

anRT

ASSOCIATION NATIONALE
RECHERCHE TECHNOLOGIE

ACTIVITY
REPORT
2021

**MAKING FRANCE STRONG
THROUGH RESEARCH**



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EDITORIAL

VISION, MISSIONS, AMBITIONS



Patrice Caine
Chairman of the ANRT Board of Directors,
Chief Executive Officer of Thales Group

**“
Only by combining
top-level strategy
and constant cooperation
with the academic
and business spheres
we can be sure to remain
in control of our destiny.
”**

2021 was another very busy year for ANRT. Highlights included the celebration of an important anniversary: 40 years of the Cifre programme.

We have every reason to congratulate ourselves for the durability of this programme, whose management was entrusted to our association in 1981 by the Ministry for Higher Education and Research. This long existence illustrates the importance of bringing together the academic and business worlds. An issue that is as essential today as it ever was.

Because to tackle the immense challenges that we face, France will have a crucial need for researchers and engineers working hand in hand.

Through their close collaboration, we can hope to find solutions to overcome the weaknesses in our strategic autonomy that were revealed by the pandemic. We are also counting on them to find the technical means to limit our dependence, tomorrow, on imported fossil fuels, electronic components, and more widely to defend our sovereignty by reinforcing our technological and military resources. Lastly, researchers and engineers hold some of the keys to help us combat climate change and adapt our societies to deal with its impacts.

Faced with such major challenges, we will need basic research to acquire the knowledge that we lack, and applied science to invent the necessary solutions. And effectively connecting these two worlds is one of the keys to succeed in transforming our production methods, our mobility, and the way we build and consume.

Therefore, along with Cifre, we think it is indispensable to confirm our support for measures like research tax credit; to respect financing commitments written into the research programming law; and to support the development of large common laboratories, in order to combine the vital forces of the academic and research spheres. Lastly, it is clear that in this field we need to think at European scale. We should therefore support the extension of these co-operations throughout the continent. These are some of the messages that ANRT, in the name of its members, will continue to communicate to political decision-makers and opinion leaders.

Yet, given that cooperation between researchers and engineers is a priority, France will need to continue to train top-level scientists in sufficient numbers. Increasing the attractiveness of scientific careers is an urgent matter that, we hope, will rank highly in the objectives of the presidential term that recently began. ANRT intends to contribute, including with the preparation of a doctorate that will be one of the frontline projects for 2022.

And to ensure that we succeed, I know that we can count once again on the commitment and expertise of ANRT staff, whom I warmly thank, in the name of the board, for all that they have accomplished for yet another year. Thanks too to the members and partners of the association, whose active contributions are the bedrock of ANRT and its influence.



In 2021, the pandemic meant that we had to work mostly remotely, creating an additional challenge for an association that promotes the benefits of interpersonal exchanges. We can give ourselves a collective pat on the back because 2021 marked a record for us in terms of memberships, number of events organized, and participation figures. Habits took hold, but we are gradually returning to in-person events, which is the only way to foster opportunities for meetings – the kind of encounter from which you return with a really new idea, a source of cooperation that you thought was out of reach.

Europe was a key theme during 2021. Our two applications to run the legal and financial NCP and the EIC accelerator NCP were accepted by the Ministry for Higher Education, Research and Innovation. We were involved in the Acceleration Plan of French participation in Europe, and our annual review of new usages focusing on Energy and Digital was accredited by the French Presidency of the Council of the European Union.

Designed to cut across sectors, our work aims to support the challenges of transforming our society. We have therefore tackled important subjects like “connected oceans and fishing”, which includes achieving truly sustainable fishing, and “recycling”, which plays such a key role in durable, desirable cities. In the same vein, our approaches are intentionally daring. Our reflections on teaching through games and settlement on the Moon are ways to explore new, breakthrough horizons that benefit the activities of our members.

During the presidential campaign, we met most of the teams in the running. Our exchanges illustrated the importance of communicating the point of view of public and private researchers and scientists to public decision-makers. These meetings have encouraged us to work more with members of parliament.

Our work on the flexibility of the electricity system was an occasion to point out that we cannot compromise with security of supply in the energy transition, which mostly involves production systems employing renewable, but intermittent, sources of energy. Our work on 5G highlighted the fact that the underlying technologies of trust are connected to computing and that as a result, this evolution will have as much impact as the digital platforms that are so ubiquitous in B2C. We need to be aware of this, and together prepare for this transformation that endangers the balance of historical industrial ecosystems; one of the solutions is the sovereign federation of European clouds, GAIA-X.

ANRT is intentionally intergenerational, and actively creates occasions for exchanges between our young Cifre doctoral students and our more senior members. Our scientific meetings, fun common contests and awards provide opportunities to bring together their skills, analyses and visions.

I take advantage of this chance to thank all of our contacts at the Ministry for Higher Education and Research for placing their trust in us and for the high quality of our relations. In our joint commitment to train doctoral students, we applaud here the financial contribution that allowed us to award 1,677 Cifre contracts in 2021.

At your side, we are committed to making France a nation that drives progress.



Clarisse Angelier
General Delegate of ANRT



Designed to cut across sectors, our work aims to support the challenges of transforming our society.



NEW MEMBERS IN 2021



AN INTERSECTORAL APPROACH WORKING FOR THE FUTURE

UNIQUE ASSOCIATION IN EUROPE

The ANRT network is based on a cross-cutting approach and collective intelligence. Unique in Europe, it brings together private and public actors in French research from all areas of activity and scientific disciplines. We represent three-quarters of the national R&D output.

Dialogue between disciplines and core business sectors opens up endless fields for exploring research and innovation avenues. To deal with the challenges facing our society and our businesses, the emphasis needs to be put on exchanges and cooperation. **ANRT is committed to offering its members a space for frank debate and constructive listening.**

In 2021, ANRT gathered **7,864 physical people, representing the 394 moral entities – companies and institutions – that are our members.** The network welcomed 65 new members, including 32 companies, mostly SMEs, 15 higher education and research bodies and establishments, and 16 support actors.

The main sectors of activity of the new member companies are health, deep tech, digital and the circular economy. Two are winners of the prestigious European Innovation Council award, and five have received the European Commission's Seal of Excellence, illustrating the high added technological value of the ANRT network and its capacity to promote breakthrough technology.

OUR PROMISE: A DIVERSE PACKAGE FOR THE BENEFIT OF ALL MEMBERS

Our members can take advantage of our comprehensive information and exchange package: our **news watch, bimonthly ANRT newsletter, three annual symposia**, and more than **one hundred meetings organized throughout the year.** All of these opportunities for exchange allow our members to **build up their network, construct a joint strategic mission, and put forward proposals at the highest level of state.**

Our 3 national symposia and the 130 events and meetings organized in 2021 gathered 3,966 participants.

Our **strategic breakfasts, symposia**, our **working groups**, and **inter-generational get-togethers** with Cifre doctoral students are all sources of intelligence and strategic watch that feed into our members' ambition for research and innovation.

CIFRE DOCTORAL TRAINING, 40 YEARS OF COMMITMENT

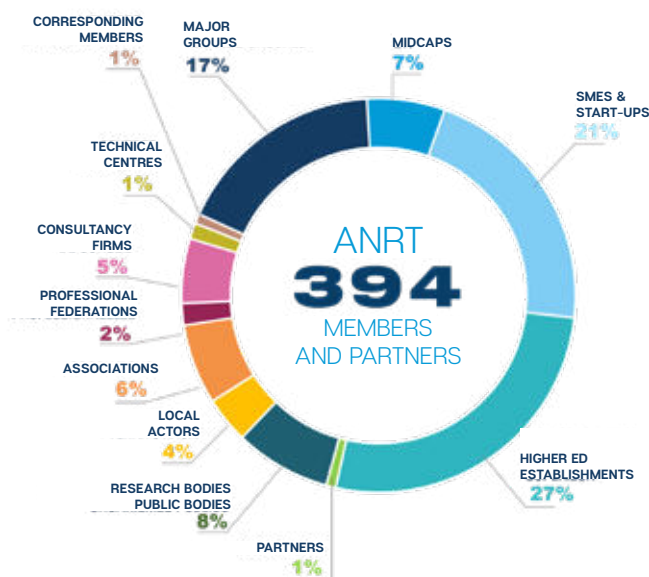
In 2021, the Cifre programme celebrated its 40th anniversary. Four decades of commitment alongside the Ministry for Higher Education, Research and Innovation. This popular programme involved a total of 5,084 Cifre students and 2,744 different employers in 2021.

The Cifre programme is a simple, direct and effective avenue that builds research relations between companies and laboratories. The same euro of funding is used to train a top scientist, foster a research partnership, and mature a research process at the very heart of a socio-economic structure. Few measures can claim to be so effective.



I particularly appreciate ANRT's dynamic approach, its ambition for research in France and Europe, and its drive.

Patrick BASTARD – VP research, Renault Group



PRESENCE ON SOCIAL MEDIA

ANRT is present on the main professional social networks:

LinkedIn, with **5,612** members and **189k** sessions annually; Twitter with **819** followers and **132k** print-outs; YouTube on our own channel.

The website, which showcases the Cifre programme, totalled over **1.5 million** page views and **556,477** visits over the year.

INFORMING OUR MEMBERS

OT

NATIONAL & INTERNATIONAL BENCHMARK

Obtaining reliable, choice, quality information is particularly valuable in today's world. Whether you find it in our **news watch**, our **bimonthly newsletter**, our **strategic breakfasts**, or our **symposia**, it always stems from undeniable expertise. That of our members and the personalities we invite to express their opinions.

This information, which crosses activity sectors and scientific themes, is designed to support the strategies of each one of our members, and help them step back and look beyond their routine environment to think about other avenues for research, development and new successes.

Updated information, monitoring and warning tools.

In 2021, our **documentary resource portal**, **news watch**, **ANRT newsletter** and **"Cifre offers and applications" platform** were updated to take advantage of the latest IT developments.

“

A big thank you for giving me access to ANRT's information and really valuable resources!

Nadège MARIOTTI – INSPÉ – University of Lorraine

”

A FULL SET OF INFORMATION SOURCES FOR OUR MEMBERS

Know, understand, anticipate

Documentary resource portal

In 2021, we totally redesigned the ANRT documentary resource portal. The more modern, easier-to-use version attracts a growing audience. The website has almost tripled user numbers, with 131,306 pages consulted, a monthly average of 10,942 in 2021 compared to 3,700 in 2020.

The ambition is to gather together all documents relating to the French research and innovation system useful to our members in a single area organized into clear, easy-to-access sections.

News watch

Every week for the last 16 years, our bulletin de veille (news watch) communicates the latest events to its 7,923 subscribers. The carefully selected information puts the focus on French and European public finance policies and major industrial trends.

Among the most consulted sections in the 43 issues published in 2021, the readership of over 2,000 per issue particularly appreciated news on higher education, industry and Europe.

ANRT newsletter | Decoding Europe & forward-looking

Our bimonthly newsletter has also been revamped. The new version centres on members in two dedicated sections: The Interview, and The Guest. EU issues now get more coverage, with two decoding articles followed by questions and answers. Our Focus feature article tackles subjects that have been the object of an ANRT event. Point of View articles present expert opinions.

Cifre offers and applications

In October 2021, ANRT launched a real platform for putting candidates, host laboratories, and social-economic actors into contact. This new website, which clocked up 4,407 account creations in five months, is a great way to widely disseminate possible contacts between potential partnerships. Around ten candidates apply for the Cifre opportunities offered by employers.

“

I really like the wide range of subjects covered by News Watch (partnership research, Europe, higher education and themes) and the quality of the articles selected from different sources.

Morgane LE BRAS – Coordinator of scientific projects, PARIS-EST SUP University

”

“

Thank you so much for News Watch! I'm proud and delighted to be able to read and contribute to your community. I set out on the adventure almost at the same time as the birth of the Cifre programme, which I still contribute to as a thesis supervisor. At ENSADLAB that often means looking for financial partners for doctoral theses planned by students. You could call them customized theses.

Jean-François BASSEREAU – Lecturer at ENS des Arts Décoratifs de Paris, Lecturer at Ecole des Mines St Etienne

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“

I would like to thank you for organizing the ANRT breakfasts. Their subject matter and the way they work make them a genuine occasion for openness and reflection.

Stephanie KERVESTIN – Head of partnership and promotion department, CNRS

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ANRT STRATEGIC BREAKFASTS

Since 2017, ANRT has been giving the floor to business leaders and heads of public institutions so that they can share their vision and research and innovation strategies with our members. ANRT's ambition is to bring members direct information on a wide range of sectors and interest areas.

The ten events organized in 2021 welcomed 941 audience members, or about one hundred at each event.

IN 2021 WE HAD THE HONOUR OF RECEIVING:

Edelio Bermejo

Group Head of R&D, innovation and intellectual property, LafargeHolcim
21 January 2021



Gilles Bloch
CEO of INSERM
26 March 2021



Laurent Buisson and Claire Bordes
Director and Deputy Director of the Centres of Excellence programme at the Secretary General for Investment (SGPI)
9 February 2021



Emmanuel Chiva
Director of the French Defence Innovation Agency
6 May 2021



Pierre-Franck Chevet

Chairman of IFP Energies Nouvelles
4 April 2021



Julien Chiaroni and Eric-Olivier Pallu
SGPI and European Commission
6 July 2021



Guillaume Plantin
Scientific Director, Sciences Po
17 November 2021



Philippe Manguin

CEO of INRAE
15 September 2021



Tawhid Chtioui,
Founding President and Dean - aivancity School for Technology, Business & Society Paris-Cachan
8 December 2021



13 October 2021



Pascal Lemasson and Benoît Weil
Mines ParisTech



Quentin Plantec
Toulouse Capitole University



Benjamin Cabanes
Ecole des Ponts ParisTech

THREE ANNUAL ANRT SYMPOSIA

15 MARCH 2021

Partner-based research
Cifre 40th anniversary celebration
at the Collège de France

Symposium steering committee



To celebrate 40 years of the Cifre programme, an exceptional symposium was organized at the Collège de France. It featured some prestigious speakers, including Frédérique VIDAL, Minister of Higher Education, Research and Innovation; Yves COPPENS, professor, Collège de France; Patrice CAINE, CEO of Thales and Chairman of ANRT; Olivier ANDRIÈS, CEO and Director, Safran. François BAYROU, High Commissioner for Planning, closed the event.

Partners and current and former doctoral students shared their experience and identified lessons for the future.

Produced as a live video conference due to the health crisis, the event was followed by 1,500 people during the afternoon, with average connection times ranging from 40 minutes to one hour and a peak of 450 simultaneous spectators. The video was posted on our YouTube channel and has been watched 1,800 times.

For Ms Frédérique Vidal, celebrating the 40th anniversary of the Cifre programme means celebrating 40 years of informed activism, driven by steadfast confidence in science, technology, and young people. The motivation behind creating Cifre was twofold:

- build connections between the research and business spheres;
- foster the professional integration of doctorate holders.

The minister observed that in the space of 40 years the mission has been accomplished, because the frontier between the academic world and the private sector has become a real exchange area, and 90% of Cifre doctorate holders find employment within 6 months following the end of their thesis.

The programme has benefited from constant ministerial support, and is set to change scale thanks to the research programming

law, which establishes a target of 2,150 new Cifre partnerships in 2027, compared to 1,400 in 2017.

Ms Vidal described the Cifre programme as a key to partnership-based research because it connects two major driving forces in society: the desire to understand, and the entrepreneurial spirit.

In his role as High Commissioner for Planning, Mr François Bayrou recalled that the Cifre programme was the brainchild of researcher and politician Pierre Aigrain. He said he was delighted to observe the extraordinary success of this partnership-based research tool.

According to Mr Bayrou, research in France appears to be a separate domain, while in other developed countries it is considered as a common support for all activities in society. Young people and their families do not see doctorate degrees as a means to access major responsibilities. Mr Bayrou said that not giving research the place it deserves is a French shortcoming. People need to get used to considering research as a way to access responsibilities. He thus confirmed the opinion expressed by Mr Olivier Andriès, CEO and Director of Safran, at the start of the symposium: firmly establishing research in France guarantees that production sites remain in the country.

For Mr Bayrou, research is valuable, not only because of the connections it creates with companies, but because it constitutes the progressive part of a society that tries to look forward to the future. In his eyes, research and its recognition in the areas of business and public action are absolutely crucial for the future of our country.

You can find the minutes and videos in the Cifre section of the website at www.anrt.asso.fr



“

I really liked your symposium, obviously for its content, but also the way the programme was organized: opened by the Minister and closed by the High Commissioner for Planning, starting with young Cifre students working on their theses, then senior Cifre graduates in employment, followed by the two 180-second dramatized thesis presentations. Along with its scientific interest, it was entertaining and sufficiently varied thanks to its clever construction to keep everyone's attention. Well done! That's what the cinema trade calls dramatization. The Collège was delighted and honoured to have been chosen to celebrate your 40th anniversary.

Yves COPPENS - Professor, Collège de France

”

“

A big thank you for organizing an event where future and established doctors could talk about their research with pride! It was a really great moment, painstakingly organized. Despite the distance created by the health crisis, we wouldn't have had such an impressive number of participants at a face-to-face event. Thank you so much to ANRT, to the doctors and doctoral students!

Sylvie Pommier – Professor, Assistant Vice-President for doctoral research, Vice-President research and promotion, President of the national network of doctoral schools, Paris-Saclay University

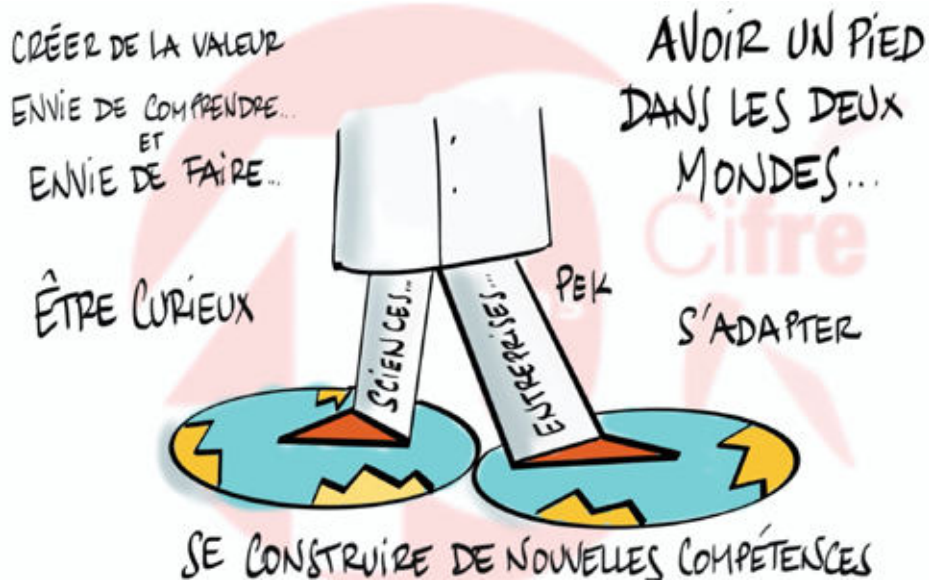
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Well done for this day that, despite the unusual situation, was a celebration in style with an impressive line-up to mark 40 years of the Cifre programme. The very sincere speeches by former and present Cifre students at the round tables couldn't fail to convince students taking part in the symposium that they should follow a similar research path.

Laurent BILLET - Scientific Delegate, EDF R&D

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16 JUNE 2021

**Annual review of new uses,
connected oceans and fishing**

at IFREMER – Brest

With presentations by



*In the presence of Mr Guy CLAIREAUX,
Scientific Advisor to Ms Annick Girardin,
Minister of the Sea*



The involvement of research teams from varied disciplines to discover solutions, or parts of solutions, measures, methods and apparatus, will reinforce the solidity of science-based solutions. They will also help build trust with society. The Annual ANRT Review, which opens up the space for exchanges between public authorities, research institutions, associations and the social-economic sphere, constitutes a real opportunity

Guy Claireaux – Scientific Advisor to the Minister of the Sea, Annick Girardin, enthusiastically supported ANRT in exploring this avenue, and said he would like to see many more opportunities of this kind for fruitful meetings.



Virtuous circulation of maritime data: technical expertise and public and private decision-making.

Tackling and analysing marine and maritime issues involves employing digital technology. Whether you want to understand something by taking a scientific approach, act politically, or as a business, you need to use digital methods. Production, collection, processing, modelling, transmission: data are everywhere and circulate, either in a constrained way or more freely, thanks to the interconnection of telecommunications networks and computer processing by companies and public research laboratories closely

involved in maritime issues. The **“connected ocean and fishing”** annual review of new uses convincingly illustrated the contributions made by digital infrastructures to the maritime sphere and the issues involved: **greater knowledge of oceans and improved fishing activities, aimed at more sustainable fishing.**

At the heart of our maritime policy driven by the Ministry of the Sea is the implementation of thematic research projects, which form the foundations to find the solutions that the oceans and their users desperately need. The Ministry of the Sea encourages and promotes the production of joint responses involving academic teams and all stakeholders, including economic users of the sea. The different areas of oceanography: biology, chemistry, physics, and geology, are all involved. The questions addressed to science are both fundamental and applied; efforts made by researchers in this field need to be encouraged, supported and showcased by research institutions. Scientific ambition in this area also involves discovering practical, practicable solutions. The performance indicators of research financed by public funds can fully adapt to these conditions. Producing new knowledge that will take shape in technological demonstrators, then in products, processes and processing methods, is of vital importance for the use of the sea. This importance should be translated into calls for projects and manifestations of interest supported jointly by ministries.

The discovery of solutions, contextualized and interwoven with local issues, would usefully be the main impetus behind calls for research projects related to the use of the sea. While the rules should be as universal as possible, as attested by those managed and decided by the United Nations at the International Maritime Organization, the ecological responsibility of the international community means adapting to the issues of profitability, and energy and security constraints for the local communities concerned. Companies operating in this field should therefore be mobilized and involved in looking for solutions. Numerous examples presented during this symposium provided pertinent, convincing illustrations.

2 DECEMBER 2021

**Research, innovation & society
Recycling: what R&D is needed
for sustainable, desirable cities?**

At INSA Lyon - Villeurbanne

Chaired by Michael Matlosz, professor at the University of Lorraine, chairman of EuroScience, member of the French Academy of Technologies and chairman of the ANRT Ecological Transition working group.



Recycling in order to manage our production and consumption in a more responsible way is a key component of the ecological transition, with a view to developing circular models aimed at limiting the impacts that our activities have on the climate and the environment. This challenge calls for a wide range of new knowledge and skills. The theme of "sustainable, desirable cities", seen from a recycling perspective in the building and public works sector – a major source of waste and so potential resources – was an occasion to take a look at the state of the scientific and technological art and at the needs of citizens and communities.

As an introduction, Jean-Louis Demois, mayor of Écuillé, 9th vice-president of Angers Loire Metropolis, responsible for waste and the circular economy, insisted on the commitment of politicians and local authorities, at the forefront of a transition that needs to mobilize all local actors.

The recycling challenges facing the building sector and the city were the subject of a first round table featuring ADEME, BRGM and VINCI, with important regulation deadlines, like the environmental regulation RE2020, and REP 2023 on extended producer responsibility. The economic incentive relates to the relationship between the cost of virgin raw materials and that of the work needed for recycling, referring to the consideration of negative externalities.

New interactions for circular strategies were the subject of the second round table. The speakers (Vicat, Michelin accompanied by partners from a major European project, BlackCycle, and a young company, Agyre) described the new partnerships they have embarked on to develop ambitious projects to reduce their impacts through recycling. Two key factors are: "move from think tank to do tank" (Agyre) and large-scale experimentation.

The afternoon was devoted to the need to accelerate the transformation of models. New economic models deal with: the question of the impacts and values to consider in a perspective of increased sustainability (initiatives by Engie and LafargeHolcim, studies by the AgroParisTech environmental accounting chair and Paris Dauphine University). In addition, the "society 5.0" concept led to discussions on the need for more cross-cutting science to give humans and their needs a coherent place in sustainable cities in a sustainable world.

You can find the videos on the ANRT website at www.anrt.asso.fr



It was a great pleasure for INSA to host this symposium, which resonates with our key research subjects and is consistent with our values.

Marie-Christine BAIETTO – Director of Research CNRS, INSA Lyon



The day before the symposium, participants visited the LafargeHolcim recycling platform at the Saint-Fons site near Lyon to discover the circular economy solutions devised by the dedicated subsidiary Géocycle France.

EXCHANGING BETWEEN MEMBERS



INTERSECTORAL NETWORK OF FRENCH RESEARCH

Discovering, getting to know each other, and envisaging new partnerships make up one of the ANRT promises.

The pandemic reduced the capacities for direct interaction, those fortuitous meetings that so often mark the start of new cooperations, new projects, and future opportunities. Exchanges nevertheless carried on, and ANRT kept its promise to put its members in contact.

European issues

The adoption of the new Research and Innovation framework programme, and monitoring of regulation changes, are key issues for our community and ANRT makes them a priority. Through our concrete action, including our two national contact points, ANRT helps to boost French participation in projects funded by the European Union.

National issues

ANRT works on developing relations between its member SMEs and major companies.

Research tax credit is a really important issue for the French R&D community. For the last ten years, ANRT has annually published an original survey of the cost of researchers in the private sector. Our work is a reference in the field.

ANRT cultivates inter-generational relationships between Cifre doctoral students and our members. Looking at junior players' research in light of the experience and expectations of more senior players provides a source of enrichment.

ACCELERATION PLAN FOR FRENCH PARTICIPATION IN EUROPE - PAPFE

The level of participation in calls for EU projects from French research teams, both public and private, is central to drive the general impetus of our country, beyond the chronic lack of return for France's financial support to Europe. The Ministry of Higher Education and Research has set up an acceleration plan for French participation based on consultation of all types of actor concerned. Continuing on from 2020, ANRT was asked to contribute, and is a member of the steering committee.

ANRT has participated in several expert groups, including as part of measure 2, **“Reorganizing support at national, regional and local levels”**. ANRT has set an objective of professionalization of support skills, with a particular ambition to see current training courses listed in Europe (36 short courses to date), and their development to reflect feedback. In parallel, the acculturation of masters and doctoral students to EU projects is indispensable to ensure that Europe is an established reflex for young generations.

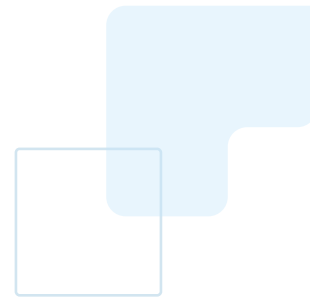
ANRT has promoted the integration of the most qualified French SMEs, in other words those whose innovation approach is clearly established (technological skills, control of niche markets, capacity to work at international scale), into the European consortiums best placed to win calls for projects. This involves working in close proximity to encourage greater participation by French SMEs.

ANRT has also contributed to reflections on **reinforcement and professionalization of the NCP network** (measures 6, 7 & 8) and on **informal influence in the preparation of EU texts** (measure 12).

NATIONAL CONTACT POINTS – NCPS

National contact points are the official organization of personalized, immediate support on financing opportunities for research and innovation projects at EU scale for all those who want to access the Horizon Europe programme. NCPs are national networks appointed by governments and Member States.

As part of the PAPFE, France has professionalized its NCP network for Horizon Europe. In answering two calls for applications relating to the Legal and Financial NCP and the EIC-Accelerator NCP, launched in February 2021, ANRT achieved a double victory: since respectively May 2021 and June 2021, two staff members from ANRT have been made available part time to the ministry, 60% for one NCP and 40% for the other. We would like to thank the ministry for recognizing the expertise of our team and for placing their confidence in us.



Legal and Financial NCP

As a member of the **legal and financial national contact point**, ANRT answers any questions from H2020 and Horizon Europe participants to help them interpret rules related to:

- Justification of expenditure: rules on eligibility of costs, features of the different types of cost (staff, equipment, sub-contracting, consumables), compliance of practices, requirements on treasury management and financial reporting.
- The constitution of consortiums: means of participation, management of relations between partners, status of third parties involved in a project, management of results, data and intellectual property.
- Tools for submitting project proposals and project management.

In 2021, ANRT dealt with a quarter of the 1,000 questions asked to the legal and financial NCP. ANRT also participated in organizing webinars and information workshops on the financial and legal rules of Horizon Europe, intellectual property, the consideration of gender, open science, and European partnerships.

EIC Accelerator NCP

The action of the EIC Accelerator NCP focuses on promotion, guidance, support and feedback from candidates and winners. In 2021, ANRT carried out 102 long individual meetings and answered 375 questions by email.

Public presentations on EIC and launch of Horizon Europe

ANRT made 14 public interventions to present EIC challenges to entrepreneurs and researchers, in particular during the launch of the Horizon Europe programme. It was the first time that ANRT had been chosen to speak at the programme's launch meetings, and it did so in the French regions of Occitanie, PACA, Brittany and Ile-de-France, reaching 1,029 participants in 2021.

In parallel, ANRT organized a webinar called **Horizon Europe: why do it? How to win and benefit from it, in partnership with France Industrie, MEDEF and AFPC.**

ANRT was solicited by the Ministry for Higher Education and Research (MESRI) and the Directorate General for Enterprise (DGE) to analyse and comment on six draft work programmes for 2021 and 2022 by the EIC (European Innovation Council) and the EIE (European Innovation Ecosystems).



Congratulations for the Horizon Europe EIC Accelerator webinar on the first assessment phase. It was extremely detailed and well documented, which is rarely the case for NCP presentations in other countries.

Xavier Aubry – CEO, Zaz Ventures



Strategic challenge of EIC

ANRT spoke at Forum Horizon Europe 2021 on the theme: R&I Framework Programme as an innovation accelerator. We particularly defended the fact that the EIC needs to maintain its signature approach by supporting risky innovators with very high growth and impact potential. European public powers make the investment of carrying the initial risk, and thus allow private investors to then get involved. At the same time, ANRT gave a very early warning to public authorities about the harmful effects of a possible drift in the EIC FUND, whose decentralized management could alter attitudes towards this risk-taking. Other organizations then took the helm at the forum, building on the movement triggered by ANRT.

CLUB EUROPE INNOVATION & COMPETITIVENESS



The “Europe, innovation & competitiveness” club gathers public and private actors from all sectors of activity involved in European policy on research and innovation. The aim is to boost their performance for the Horizon Europe programme.

Discussions on experience between peers in the working groups fosters a better understanding of the legislative and operational challenges of the EU research programme - European Research Area WG, Contracts WG and Data and Research Tax Credit WG - Innovation & competitiveness WG. The members, by giving their opinions and recommendations, actively participate in defending their common interests to both European and national public authorities.

European research area - ERA

The European Research and Innovation Framework Programme Horizon Europe was launched in 2021. With a budget of €95.5 billion, it is the most ambitious collaborative research programme in the world to date. It offers French researchers numerous possibilities to develop projects individually or in a partnership.

In 2021, the **European Research Area working group** (ERA WG) gathered experts on project engineering and managers of European and international affairs. The aim is to develop expertise on the Horizon Europe programme to win calls and effectively manage projects.

To submit a Horizon Europe project calls for careful preparation. The programme is competitive and requires both knowing how to form good partnerships at an early stage and mastering the detailed participation rules. The ERA WG worked on breaking down and analysing the new terms of participation: financial engineering; intellectual property rules and governance; uses of new instruments (PPPs, missions, clusters).

The team also looked at the financial challenges related to using a grant agreement that is common to several EU programmes: for example, staff costs, the main expenditure item of European research projects whose calculation has been modified for Horizon Europe. This thus involves adapting beneficiaries' reporting practices. Members shared their understanding of the challenges of this new calculation method and how they have devised tools and trained their teams for this change.

Horizon Europe is built like a programme supporting the major challenges faced by the European Union: European strategic autonomy, the dual green and digital transition, and recovery following the COVID-19 crisis. From a strategic point of view, it sets out to be more ambitious than its predecessors. This has very concrete implications for setting up and managing projects. Applicants need to formulate and respond to precise impacts while developing a multidisciplinary, intersectoral approach.

The ERA WG observes that the size of EU projects has changed, which has an impact on participation strategies and support for research teams. The result was even more exchanges between members in 2021.

The overhaul of the European Research Area (ERA), led by the Commissioner for research, Mariya Gabriel, was also the subject of attention. In 2021, reflections focused on analysing the European Commission's global approach in terms of international cooperation on research and innovation published in May. In addition, regular exchanges with members from MESRI and the European Commission allowed members to make their position clear.

The ERA WG now includes "Data" and "Contracts"; specific sub-groups can be created corresponding to needs and current events.

Contracts

The members of the **Contracts working group** focusing on legal issues, reactivated in 2019, contribute to preparing legal aspects for Horizon Europe, i.e. dissemination and use of research results and data, management of intellectual property, confidentiality, ethics and integrity of research. Its members thus participated in the response to French authorities in European consultations on the grant agreement for Horizon Europe.

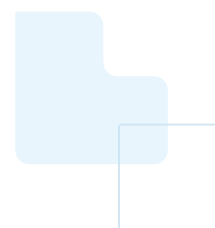
In 2021, the Contracts WG also contributed to writing up the DESCA model consortium agreement, published in December 2021. Members defended the introduction of a new anti-corruption measure to ensure that establishments comply with the requirements of the law on transparency, the fight against corruption and modernization of economic life, known as the "Sapin II" law. The part on "effectively fighting corruption" provides France with a legal anti-corruption framework and stipulates eight measures to put in place by organizations and their leaders.

As a reminder, ANRT is a member of the DESCA Core Group.

Data

In 2021, the **Data working group** joined the activities of the ERA WG on Horizon Europe. With an ambition of maximizing the impact of research funding, the European Commission has boosted its approach to Open Science. This aspect is now evaluated in Horizon Europe proposals and the open source requirements for research and data management publications are reinforced in the Horizon Europe grant agreement. As a result, R&I actors need to elaborate their strategy for showcasing research results in an approach that balances openness with protection.

A data management plan (DMP) is now an obligatory deliverable for all projects. A model is recommended by the European Commission. In October 2021, the Data WG began writing annotations to the model. The ambition is to publish a document in early 2022 incorporating the requirements of the European Commission with analyses, interpretations, recommendations and examples that could be used by project leaders.



Innovation and competitiveness

Since 2007-2008, the “ **Innovation and competitiveness**” group has been working on research and innovation systems. After finding itself in a difficult situation in 2021, with complicated prognostics in 2022 due to uncertain legislative developments, French R&D tax credit (CIR) is both more useful – as we regularly demonstrate – and more threatened than ever. National budget constraints and the European context (regulation of state grants, common consolidated corporate tax base) and international situation (support measures in other countries, OECD minimum unit tax rate) constitute a shifting mass that is likely to have a negative impact on French support measures for R&D. Working with jointly devised agendas, the ambition of this WG is to be more discerning and to increase our capacity for collective action.

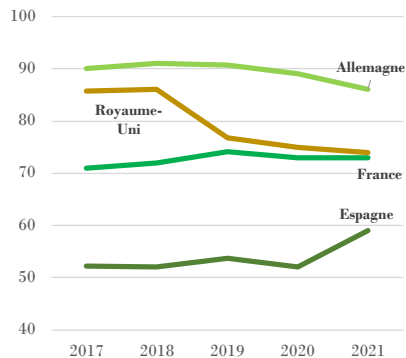
INTERNATIONAL COMPARISON OF RESEARCHER RATES REPORTED BY GROUPS RECEIVING RESEARCH TAX CREDIT (CIR) IN 2020 Eleventh issue

The stability of R&D tax credit is the main reason behind the competitiveness of French RDI ecosystems

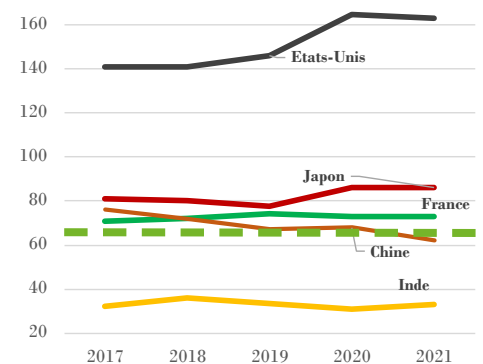
As international tax competition increases and the contest to acquire cutting-edge knowledge and skills gets more intense (cf. the US researcher rate), for the third year in a row France has opted to reduce the effectiveness of CIR (R&D tax credit). A period of uncertainty begins that could have dramatic consequences for research-development-innovation (RDI) ecosystems.

Graph 1 – Over the last 5 years, France has become less competitive in Europe, while internationally, the country’s relative position no longer stands out

■ 1.a Europe



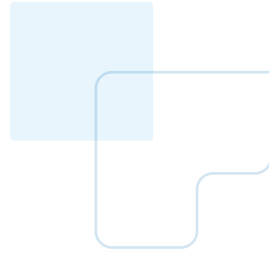
■ 1.b World



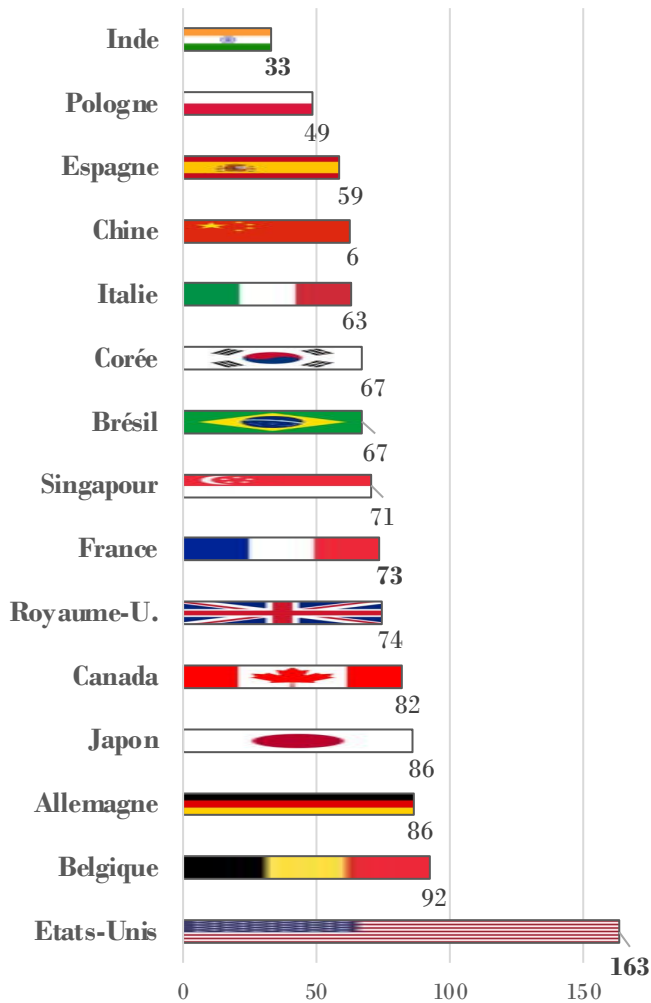
These graphs present a comparison of the evolution of researcher rates, established using data collected from the ANRT Panel over the last five years. The values on the y-axis correspond to the cost of researchers in the form of an index. The dotted line (■ ■ ■) shows the French researcher rate with no CIR (or subsidies).

Graphs 1.a and 1.b illustrate how the impact of CIR on the relative researcher rate has evolved. The green dotted line at 100 on the y-axis shows that in Europe, without CIR, the French researcher rate would be from 10 to 14 percentage points higher than the German rate. Compared to Spain, although the gap has narrowed to the latter’s disadvantage, it would range from between 48 to 41 percentage points. Spanish sites represent a growing threat in a number of research and technological development sectors given the RDI framework conditions.

1 - "New Forms of Tax Competition in the European Union: An Empirical Investigation", EU Tax Observatory, 22 Novembre 2021.



Graph 2 – 2021 researcher rate (CIR 2020)



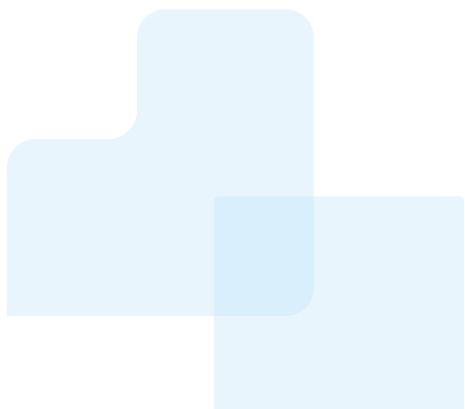
Graph 2 below shows the 2021 situation of the researcher rate based on the average cost in 2020. This comparison of indexes, which includes the impacts of support systems to promote industrial R&D located in the different countries, reflects the different approaches implemented by decision-makers. The countries at the two extremes of our sample since 2010, the United States and India, are separated by 130 percentage points; in Europe, 43 percentage points separate Poland and Belgium.

The French researcher rate remains at 73, an average position in our sample.

As the geographic proximity increases, differences between rates tend to have a much greater influence on decisions to readjust R&D teams. French researchers still have a positive advantage compared to Germany (13 points) and Belgium (19 points), although narrower in both cases.

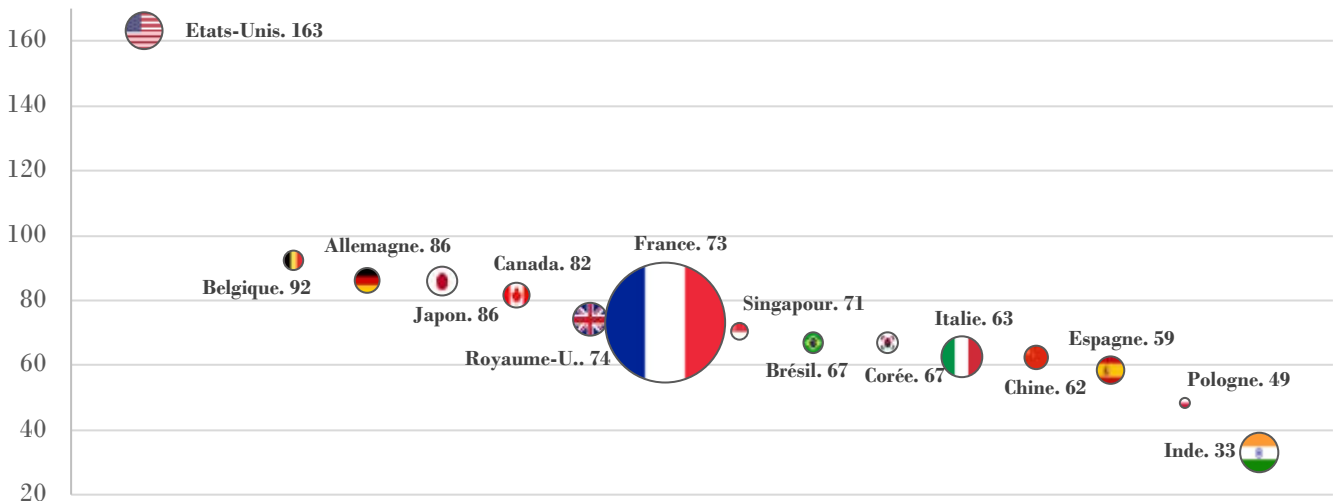
US rates appear to have stabilized at 163. They are 2.23 times higher than French rates. Maintaining research teams on American soil is a luxury that few multinationals can afford. Intense, growing pressure in the digital sector and inefficient public support measures for R&D act to reinforce this phenomenon, which has been observed for over a decade.

Despite reductions in 2019, 2020 and 2021/2022, French R&D tax credit sustains the competitiveness of national industrial research. Its relative advantage is nevertheless shrinking as most other advanced economies, over time, set up similar measures. Fifteen out of the leading 20 countries in terms of public support for R&D mainly bolster their industrial research ecosystem through tax support². The remarkable result of this significant effort is visible in the continued internationalization of national R&D through multidomestic companies of French origin; the latter, at the same time, supported the growth of their local R&D teams. For the companies on the Panel, this proportion has tended to increase (c.f. previous years). In 2021 once again, the size of the French flag in graph 3 (below) represents a little more than 53% of the total.



2 - According to "OECD Science, Technology and Innovation Outlook 2021", 2018 statistics.

Graph 3 – Researchers from companies on the ANRT Panel work mainly in France, once again proving the effectiveness of French R&D tax credit to date



KEY

The size of each flag is proportional to R&D staff in the panel companies. The position on the y-axis shows the cost of researchers in the form of an index: the 100 mark is the cost of a French researcher with no tax credit or subsidies.

Europe, followed by Asia, then the Americas reflects the stable ranking in terms of numbers of research staff at companies on our Panel.

CAUTION: ATTRACTIVENESS IS FRAGILE

The attractiveness of a country is fragile when it comes to the cutting-edge research skills indispensable for companies to cope with the changes brought about by shifting socioeconomic requirements. The ANRT Panel has always pointed out the considerable impact of differences in researcher rates on the size of R&D teams, in particular in geographically close countries. An example is research on environmental technologies, which has seen departures from France to Spanish regions that offer relatively more favourable conditions, especially financial ones.

When it comes to qualified jobs, researchers are particularly mobile. The market for 'star' and 'high-potential' researchers has no borders. Recent examples of brain drains are common, often involving entire teams, especially in the digital sector. More generally, increased competition means that early career conditions for researchers in knowledge-intensive companies are crucial. French R&D tax credit, including the Young Doctor programme, is therefore a key asset to maintain the attractiveness of France in terms of R&D.

The "end of doubling"³ comes into effect on 1 January 2022. As we write these lines, it is not clear whether the compensatory measure that was the object of a government amendment in the 2022 Finance Bill, called tax credit for collaborative research (CICo), will be enough to avoid the predicted collapse of partner relations. Apart from the restrictive definition of R&D expenditure concerned, the measure has three other major pitfalls. This tax credit is separate from CIR and any connection between the two remains uncertain. The ceiling that the measure applies to is arbitrarily low (6 million euros), which means it penalizes the most virtuous companies that maintain a high number of research collaborations. The expenditure likely to be affected can only concern new collaborative research, starting in 2022. This date of effect alone will exclude a large number of projects already underway involving collaborations spread over several years.

The full study is available on the ANRT website at www.anrt.asso.fr

3- By which companies can double the figure they declare for expenditure corresponding to R&D entrusted to their public partners.

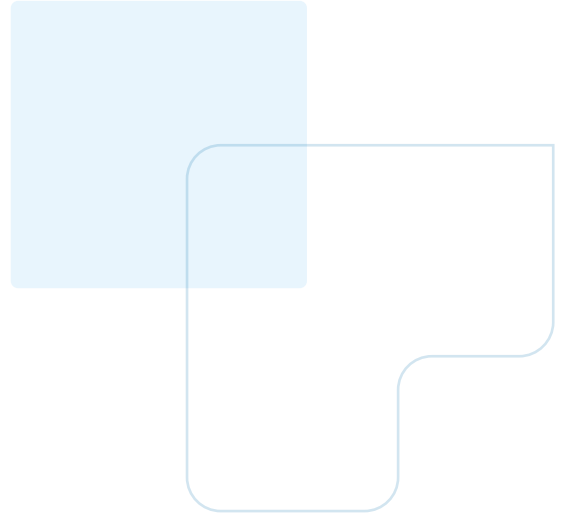
SME, MIDCAP, INNOVATION & TERRITOIRES CLUB



ANRT helps member start-ups, SMEs and midcaps get the most out of support measures for research and innovation by organizing meetings between business leaders, public research representatives and local authorities.

The “business model” series is always particularly popular. Several types of business model were examined in 2021: shared risk; combination of a B2B and B2C approach; business models combining research, innovation, industrialization and production; and business models based on frugal innovation. Subjects related to intellectual property in partnership-based innovation projects and those related to transitions (green, digital, etc.) are also popular with our members.

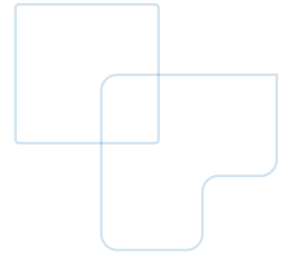
For the first time, ANRT organized a **Club session fully focused on a local territory: the Loire region**, in the presence of Samia Soulatni-Vigneron, vice-president for higher education, research and innovation.



In 2021, the Club featured 229 participants, 53% from the private sector and 39% from the public sector:

- start-ups & SMEs: 86
- Midcaps: 14
- major companies or groups: 22
- public research institutions: 90
- regions or regional innovation agencies, CCl or competitiveness clusters: 10
- ministries: 7

LET'S TALK ABOUT OUR RESEARCH!



INTERGENERATIONAL GET-TOGETHERS BETWEEN CIFRE DOCTORAL STUDENTS AND ANRT MEMBERS



27 JANUARY 2021

Manifesting intent in the digital era

by doctoral students Valentino Armillei, Clement Fontaine and Pauline Prepin, scientific chairwoman Linda Arcelin-Lecuyer, professor, digital transformation task manager.

4 FEBRUARY 2021

Research on fiscal and public policies

by doctoral student Sacha Frey, scientific chairman Howard A. Chernick, professor emeritus of economics, Hunter College, New York.

“

Thank you for inviting me to this conference, it was a great experience! My warm thanks to Mr Chernick for the quality of our exchanges and the interest that they generated. The crossed analysis of our subjects with an added international dimension gave me several new ideas that I hope to pursue in my work.

Sacha Frey – Cifre doctoral student, Institut de recherche en droit des affaires et du patrimoine / HSC Finance

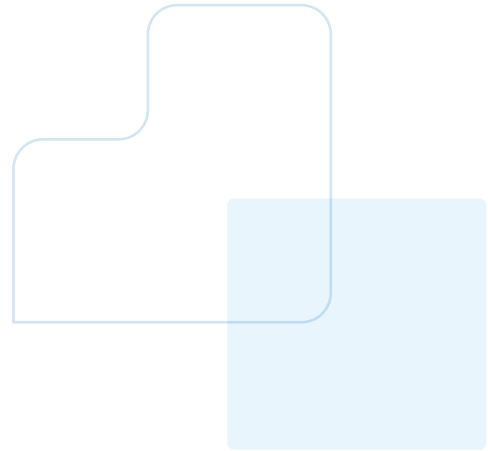
”

8 JUNE 2021

Augmented operators in reconfigurable production systems

by doctoral students Abhaya Arige, Pierre Begout, Mathilde Drouot, Hugo Durchon and Traian Lavric, scientific chairman

Emmanuel Bricard, director of information systems, and Quentin Thomas, deputy director and partnership manager, ELM.LEBLANC, at the premises of ELM.LEBLANC followed by a tour of the factory.



16 NOVEMBER 2021

Preserving our heritage: culture, digital, tourism

by doctoral students Cyril Cvetkovic, Amandine Gabriac, Alexia Gignon, Marina Khemis, Enora Maguet, Céline Tastet, scientific chairman Benoît Pierre, director of the Centre d'études supérieures de la Renaissance and the "smart heritage" programme, at the premises of the University of Tours.



Marina Khémis, Scenographer Designer, Adrien Gardère Studio, Cifre doctoral student
©Drawing produced during the session on 16 November 2021

3 DECEMBER 2021

Small satellites and small loads

by doctoral students Francesco Filice, Daniel Galla and Jona Petri, scientific chairwoman Sabine Klinkner, professor and deputy director, Institute for Space Systems, University of Stuttgart, and Bertrand Goldman, professor at the International Space University, at the premises of the International Space University.



INFLUENCING THE FRENCH RESEARCH & INNOVATION SYSTEM



THE POWER OF COLLECTIVE INTELLIGENCE

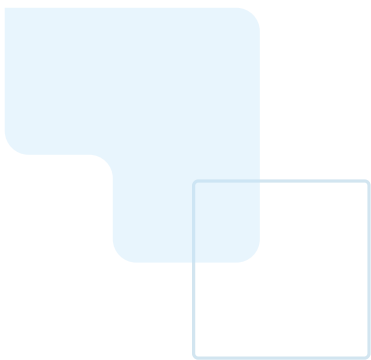
As a third party of trust, ANRT is appreciated for its attentiveness. Our members share their experience and vision with us, allowing us to put together objective analyses and well-founded proposals. Our messages are designed to participate in positive progress of French and European research and innovation systems and the transition taking place in ecology, energy, digital, space and education.

We clearly put forward our ambition to have an impact. Public decision-makers are attentive to our work and interested in our analyses; we regularly report to ministers, members of parliament and the European Commission.

Our exchanges with advisors of ministers and politicians, and the directions, announcements, or measures taken, indicate that our views are listened to and that they count. The strength of ANRT lies in our multi-sectoral character (public/private, all activity sectors, all scientific disciplines), the expertise of our members on the subjects covered, and our relationship of trust with our interlocutors aimed at boosting the French R&I system.

All action to represent the interest of ANRT carried out in 2021 was declared to the High Authority for Transparency in Public Life.





FutuRIS activities are supported by the financial contributions of the following partners:



FRENCH RESEARCH & INNOVATION SYSTEM (SFRI)

Performance conditions for partnership-based research

Chaired by Dominique Vernay, member of the French Academy of Technologies

The working group has two targets: the first is to establish a solid benchmark for practices to support partnership-based research in other countries in the world; the second is to act on current SFRI developments through notes and direct exchanges with political decision-makers.

International comparison of practices to support partnership-based research

Presentations by key experts, usually group members, led to exchanges on the following subjects:

- Support for **R&D on health**, from the IMI to the future health PPP, or why a cooperation of consortia involving stakeholders and various disciplines at European level is indispensable, by A. Bril, Servier.
- A comparison of **Germany and France** regarding support for public-private R&D in the electricity domain, illustrated by the experience of EDF R&D in a Land, by B. Péchiné, EDF.
- The different kinds of support for **partnership-based R&D in other countries, and the experience of CEA's integration** in these various programmes and measures, by E. Viassnof, CEA.
- Comparison of research and innovation systems in **Hungary and France**: recent reforms of the Hungarian national research and innovation system, by N. Somogyi, Hungarian Embassy in France.
- **Franco-German Academy for the industry of the future** by IMT and TUM, at the heart of the Franco-Germany Industry 4.0 ecosystem, by P.-G. Meunier, IMT.
- Lessons from several **key public private R&D partnerships in telecoms**, C. Picory-Donné, IMT.



Establishing common positions related to national policy on partnership-based research and innovation

To this end, the WG:

- provided public decision-makers with support on its recommendations produced as part of the French recovery plan: (1) proposal for public support for common strategic laboratories; (2) proposal for clearer, stronger institutional support for innovative public procurement;
- contributed, through interactions with the drafting parties, to the private law doctoral contract, established in article L. 412-3 of the research code and written into the research programming law;
- made proposals for the research policy for 2022 presidential programmes, to Create a solid national ecosystem of research for the transitions and the future of France (published in September 2021);
- made recommendations on the career progression of research lecturers that takes into account research missions, in terms of both transfer and the relationship between science and society.

All of these texts are available on the ANRT website at www.anrt.asso.fr

Showcasing our work

We were received by the following institutions and presidential teams:

- **General Secretariat for Investment & Ministry for Higher Education and Research**, regular meetings for work 1
- **Ministry for Higher Education and Research**, regular meetings for work 2
- **Xavier Bertrand's team**, June 2021
- **La France insoumise team**, September 2021
- **Michel Barnier's team**, October 2021
- **Fabien Roussel's team**, October 2021
- **Ministry for Finance, Economy and Industry**, industry advisor (as part of the France 2030 plan), October 2021
- **PM**, technical advisor on industry, research and innovation, October 2021
- **Valérie Pécresse's team**, December 2021
- **Parliamentary Office for the Evaluation of Scientific and Technological Choices**, forward-looking delegation, December 2021

Publication in the press & media

AEF, 28 September 2021, **R&D et innovation : quelles sont les propositions de l'ANRT pour les équipes des candidats à la présidentielle ?** [R&D and innovation: what are ANRT's proposals for the presidential teams and candidates?] by Julien Jankowiak **News Tank Education & Research, 11 October 2021**, Il faut constituer une équipe France de la recherche [We need to put together a research team for France]

L'Opinion, 15 October 2021: Le déclin de la recherche française n'est pas inéluctable [The decline of French research is not inevitable], open forum, Clarisse Angelier and Dominique Vernay **Les Echos, 20 October 2021**, Présidentielle 2022 : ce que demande le monde de la recherche [Presidential elections 2022: what the research world wants], by Marie-Christine Corbier **Le Figaro, 30 November 2021**, **Big Bang de la santé** web programme devoted to **French research**, featuring Clarisse Angelier.

NATIONAL ENERGY RESEARCH STRATEGY (SNRE)

Chaired by Olivier Appert, member of the French Academy of Technologies

Since late 2016, ANRT has been working with some of its members on defining the scientific, technical and societal research requirements for energy. Technologically advanced societies are facing opposing challenges: to reduce the impacts on the climate of historical forms of energy production, and to satisfy the growing need for energy related to changing lifestyles and extreme digitalization, but in a way that can better control the multiplication of production and distribution, and consumption itself.

Flexibility of the electricity system

Publication and showcasing of work in 2020

The growth of renewable energy (RE), in practice wind and solar power, has an impact on the characteristics and operation of the electricity grid. These sources are intermittent⁴. But electricity is difficult to store. This creates a much greater need for flexibility to tackle **differences between electricity supply and demand**, differences that are becoming larger and more frequent, sometimes requiring real-time responses from electricity system operators. In addition, over the coming years, the European electricity network is set to undergo a significant drop in programmable production capacities (traditional and nuclear power stations). But **making compromises with supply security is not an option** in the energy transition: at times, simultaneously and over vast areas, RE produces insufficient electricity for several days, and the electric power system comes up against the **difficult problem of long-term storage**. It is also essential to maintain voltage stability and frequency, despite the absence of natural inertia in wind and solar power. Lastly, it is indispensable to **minimize the financial cost of the energy transition**. Flexibility needs to be employed to reduce overall investment, even though flexibility itself requires expenditure.

Showcasing of work

We were received by the following institutions:

- **Ministry for Finance, Economy and Industry**, advisor for industry, March 2021
- **Ministry for Higher Education and Research**, research and industry advisor, March 2021
- **PM**, technical energy advisor, March 2021
- **Secretariat General for Investment**, director of the research promotion programme, April 2021
- **Energy Regulation Commission**, director general, April 2021
- **National Assembly**, June 2021

Jean-Charles Colas-Roy, former coordinator of LREM members of parliament at the sustainable development commission (until 2020), Vincent Thiébaud, rapporteur on the proposed law on the environmental impact of digital technology, Jean-Marc Zulesi, current coordinator of LREM members of parliament at the sustainable development commission (since 2020), and one of the rapporteurs on the draft climate and resilience law, Paul Sèbe, assistant to Martine Berthet, LR senator (vice-president of the energy study group at the Senate).

SNRE steering committee, June 2021: presentation of work done in 2020

Press publication

Les Echos, 2 March 2021: Opinion | Pas de transition énergétique sans transformation du réseau électrique [no energy transition without transforming the electricity network], Olivier Appert



The full report is available on the ANRT website at www.anrt.asso.fr

4- For the sake of simplification, the notion of intermittence is employed indifferently with variability in this report to designate RE characterized by a dependence on natural cycles, and in particular solar and wind power.

Energy & digital

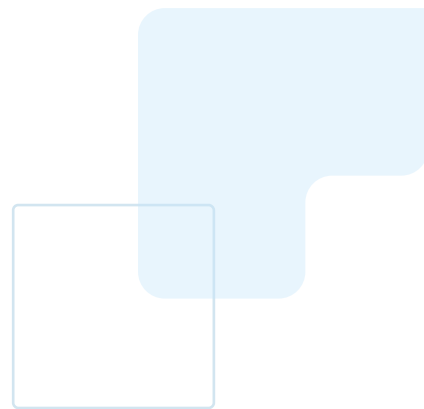
Work done in 2021 to be published early 2022

With support from Gérard Roucairol, Honorary President of the Académie des technologies, former scientific director of the BULL group

Managing energy consumption is a global priority. Digital technology is a feature or an accelerator of energy consumption and rare raw materials. One of the prerogatives of the presidency of the EU Council is to make a very factual, frank overview of R&D needs based on current or future usages to guide financing programmes. An invitation, for example, to verify the energy balance sheet for each digital solution developed right from R&D level can constitute a pragmatic avenue of progress and a guarantee of effectiveness.

At global level, developing digital solutions to tackle the energy transition might seem schizophrenic. Experts are divided on the energy consumption generated by digital technologies and the latter's contribution to the energy transition. As a factor in the growing consumption of fossil fuels and raw materials, digital solutions are also a means of breakthrough in creating an opportunity to reduce energy demand and natural resources while bringing down CO₂ emissions, without diminishing well-being. What will tomorrow's world be like following the long-term impact of the pandemic? What are the challenges at global level to reduce and decarbonize the energy used by ICTs? How can we take advantage of digital solutions to boost the energy transition? What are the opportunities and risks for France in this major shift that will involve technologies, services, and behaviours, without forgetting economic and geopolitical dimensions? What are the R&D needs?

Digital solutions already absorb about 8% of French domestic electricity consumption. At global level, the sector consumes as much primary energy as air transport, following a strong trend, at least pre-COVID-19. The energy consumed by digital technology is likely to rise with the anticipated extension of platformization, robotization, video and video conferences, smart vehicles, massive data storage and the consultation and use of data. We also need to consider the impact of producing the equipment needed, which represents about 45% of the digital impact.



INDUSTRIAL DIGITAL POLICY

Chaired by Gérard Roucairol, Honorary President of the Académie des technologies, former scientific director of the BULL group

5G in data value chains, the technological and industrial challenge ahead of us

Work done in 2020-2021 published in March 2021

The aim of the group was to analyse, in advance, the impacts of using 5G on data value chains. 5G is progressively establishing itself as a new, key component of the digital platformization groundswell. The main ambition of the working group is to understand the issues and concrete transformative means involved. The work done in the report "5G in data value chains" constitutes the continued exploration of the manifestations of digital platformization. This report is in line with the White Paper "For an industrial digital policy", and "Price and value of data in B2B digital platformization", and aims to share the issues involved in the digital transformation with public and private decision-makers. Digital platformization is shifting relationships between companies and their ecosystems (B2C, B2B, B2G). This fundamental shift can also turn out to be an opportunity for French and European industries, provided that a congruent industrial policy is put in place.

While most of the technological and industrial challenges lay head, for industrial companies, 5G constitutes a unique gateway to digital platformization. In the absence of urgent political decisions based on an understanding of the technical issues involved, 5G will increase the power of the market and the technological superiority of the already dominant hyperscalers to the detriment of French and European companies in the same domain, and more widely, industrial companies. "5G in data value chains" lays out the techno-economic analysis behind this observation, looks at the means of disseminating 5G in industrial data value chains, and suggests possible avenues that are both strategic (for the companies concerned) and political.



The report is available on the website at www.anrt.asso.fr

Central aspects of the report

5G represents a combination of telecommunication technologies (increased spectrum of frequencies, new antennae) and network computing (including the revolutionary core). But the key change is that **5G computerizes** the core of **telecoms** thanks to a new, original mix of equipment and software.

Virtualization – the share of computer resources thanks to the software translation of equipment and hardware – which is announced for 2023, will mean that a company can be dynamically allotted a private portion of the network. Thus, **the technologies of trust underlying 5G rely on computing** (distributed computing and associated protocols, encryption software based on varied techniques, security by design of enriched processors, etc.). This "determining change" and its equally strong consequences appeared clear to us when, in 2020, **B2C digital platforms** started to become dominant actors of cloud services.

Thanks to their commercial surface and some judicious alliances, these platforms, which already provide infrastructural services (IaaS, PaaS, SaaS), have added the 5G option to their services. Their prime market for these 5G services is industrial companies. The urgency of the situation has encouraged the key European cloud actors to accelerate the establishment of a **federation of sovereign European clouds: GAIA-X**, established in early September 2020. ANRT, which is a member of the GAIA-X "France team", coordinated by the Directorate General for Enterprise and the CIGREF network for large corporations in France, follows GAIA-X's work and progress.

Showcasing of work

- We were received by the following institutions:
- **Secretariat General for Investment**, Director of the Big Artificial Intelligence Challenge, April 2021
- **Ministry for Finance, Economy and Industry**, advisors from the ministry for industry & digital transition, May 2021
- **Idate DigiWorld**, think tank, June 2021
- **European Commission, DG CONNECT**, 5 Heads of Unit, June 2021
- **National Assembly, Vice-President of the Commission for Economic Affairs**, MP for the Loire, Ms Valéria Faure-Muntian, August 2021

Publication in the press and media

Le Monde, 27 April 2021: 5G, porte d'entrée des géants américains du cloud dans les télécoms [5G, the American cloud giants' gateway into telecoms] by Alexandre Piquard

Le Monde, 27 September 2021: Comment les GAFAs s'invitent sur le terrain des télécoms [how the GAFAs are moving into the telecoms field] by Alexandre Piquard and Adrien Sénécat

Institut Sapiens, 30 March 2021, television programme, La France qui gagne, devoted to initial and continuous training and the attractiveness of companies, featuring Clarisse Angelier

TEACHING THROUGH GAMES

Chaired by Franck Tarpin-Bernard, Managing Director, SBT Humans Matter

Since 2018, ANRT has opened out to cover human and social sciences, tackling pedagogical issues with some of its members. Work is split into two areas: strategic reflections made by the working group; and coordination of the action research laboratory, CréativLab at the pilot training and research hub for education, AMPIRIC, accredited by PIA3.

Teaching through games: a priority to put the fun back into learning

By revealing the inequalities of learning, the difficult mobilization of learners, and the new training needs of teachers, the pandemic showed just how important innovation is in the education sector. While the efforts of some pioneers (teachers, researchers, EdTechs) have started to get things moving, a lot remains to be done. For this reason, **it is urgent to encourage “French-style teaching through games”**.

ANRT has put together some concrete steps for action. They are based on the following objectives:

- **recognize teaching through games as a key issue**, by putting in place a wide-scale national plan coupled with human resources, adequate organization and budget, and with support for the French EdTech business sector;
- **accelerate the development of teaching practices** by integrating research progress in neuroscience and by supporting actors through training and awareness-raising action while recognizing the expertise of the designers of teaching games;
- **foster the large-scale roll-out of fun teaching tools and assessments of their impact**, by intensifying collaboration between teachers, researchers, actors in the EdTech sector, and game developers;
- **modernize or create sociability areas** to discover and circulate learning games.

Showcasing of work

We were received by the following institutions:

Haut-commissariat aux compétences,
Minister for Labour, Employment and Economic Inclusion, January 2021

Teaching and digital research PEPR,
Hearing as part of the preparation, March 2021



The report is available on the website at www.anrt.asso.fr

CréativLab Ampiric



Since 2020, ANRT has coordinated the **“CréativLab”** action research laboratory, which is action 4 of the AMPIRIC project led by INSPE Aix-Marseille University. The overall objective is to improve students’ performance in learning basic knowledge and core skills throughout their lives, from school to vocational training;

Speed-dating and selection of winning CréativLab projects

On 1 April 2021, **CréativLab** organized its second speed-dating event. Companies, researchers and teachers presented 30 potential cooperation projects on the following five themes: educational issues; education and transmission; social and human sciences and games; sciences; cognitive sciences.

Following the speed-dating event, ten cooperation projects were submitted to the selection committee, which chose five of them to be supported for three years. In total, CréativLab currently counts eight projects.



The “P’tit Prof” app being tried out in a classroom.



PRESENTATION OF THE EIGHT CRÉATIVLAB WINNERS:

2020

P'TIT PROF

Develop a new version of the P'tit Prof application suitable for use in the classroom and based on works of art.

CAMPUSTELLA

Foster the improvement of core learning in secondary school areas that are part of the customer relations sector (vocational and technological careers), by transforming the local and digital ecosystem through cooperation and support for research.

ADESIF

Customize training for apprentices using adapted teaching tools developed from neuroscience and analysis of individual behaviour to foster a learning to learn approach.

2021

LABORA (FOXAR)

Measure the impact of an augmented reality tool based on spatial and scientific reasoning.

KUTI KUTI

Develop a kit of objects and teaching games on a scientific/ technological theme, to be adapted to the constraints of the classroom.

MATHEMATICAL MODELLING

Offer teaching on mathematical modelling backed by a digital tool with teaching based on a problem-solving approach.

HIBOU ADAPTED READING

Develop the interactive book Hibou and provide a multi-support web application (for tablets and computers). Then measure the rate of engagement and satisfaction among users (children) and their guides (teachers/parents).

LEARN ENJOY

Measure the effectiveness in situ and the impact of the applications LearnEnjoy, PreSchool and MathPower designed to combat academic failure from as early as nursery school. Aimed at all pupils and in particular those with autistic spectrum and neuro-developmental disorders.

Seminar on emotions and the learning process

ANRT has organized a series of conferences aimed at its members and AMPIRIC partners on the theme of **emotions and the learning process**. Starting from 2022, these get-togethers will focus on basic learning. They will come into area 5 of the AMPIRIC project, whose mission is to "disseminate and promote educational knowledge".

28 January 2021

Art and learning tools

Françoise Lombardi-Peissel, Christine Parney and Sophie Radix, Réunion des musées nationaux – Grand Palais

7 April 2021

Gamification and the teaching process: learning through science

Team from the learning artefacts programme (EGRESS and ARTEfac) at Aix-Marseille University

1 July 2021

How Brain Tech is reinventing teaching experiences

Franck Tarpin-Bernard, SBT Humans Matter, with a demonstration of innovations in the Brain Tech domain by business leaders: SBT Humans Matter, OVAOM, Learn Enjoy, Someo, Crocos Go Digital, on site at Epopée Village in Marseille and by video conference.



DESTINATION MOON

*Chaired by Claudie Haigneré, former ESA astronaut
and Thomas Fouquet, adviser to the director of Innovation,
Application & Sciences at the CNES*

Destination Moon: for a European ambition

On 23 March 2021, ANRT and the CNES signed a letter of intent calling for the creation of the **Moonshot Institute**, aiming to cover the entire value chain of the Moon ambition, from training to commercialization, and including ideation and development.

In May 2021, ANRT published a strategic note to promote a European ambition to establish a base on the Moon, in particular given the geopolitical context, where the USA and China, which has joined forces with Russia, have put forward a very assertive, relatively short-term agenda.

KEY MESSAGES

The Moon is once again the object of ambitions of states and powerful, visionary private players. We are campaigning for a clear, immediate European commitment to land on the Moon and set up camp for the long term. The race is on, and 2022 offers decision-making opportunities that must not be missed.

The autonomy, power and strategic influence of Europe are at play in a technological, economic and geopolitical contest.

Europe is expected to take a differentiating, synergistic position in line with its identity and compatible with international cooperation.

This is a project of the future for Europe that mobilizes young generations and European talents.

Destination Moon is an inspiring opportunity, fitting in with European economic and political recovery, to mobilize breakthrough innovations and open the way to thinking differently in response to both lunar and earthly challenges.

DESTINATION MOON, A BOOK CHARGED WITH EMOTION

Workshops, organized in September 2020, invited working group members to experience five dramatized situations on the Moon in the presence of artists. In June 2021, ANRT published a book featuring the productions and debates. The publication only exists in a paper version, and was sent to the French President, the Prime Minister, and ministers and their advisors concerned by space issues. The reception was highly encouraging.

Showcasing of work

We were received by the following institutions:

Ministry for Finance, Economy and Industry, advisor on companies, state participation and space, May 2021
PM, advisor on technical industry, research and innovation, May 2021

Sénat, working group on space, June 2021

State Secretariat for European Affairs, advisor on economic policy and monitoring of implementation of reforms and cabinet director, June 2021

Ministry for Higher Education, Research and Innovation, general director and her deputy, September 2021

Press publications

La Tribune 25 March 2021, "On pense Lune pour construire la logistique lunaire de demain" [the Moon mindset for building tomorrow's lunar logistics] Jean-Yves Le Gall, CNES

Report by Zenon research, produced with input from ANRT, "Retourner sur la Lune pour y rester" [return to the Moon and settle there]

Series of conferences

In order to improve ANRT members' understanding of space issues related to our satellite, a series of conferences tackled them from a sociological point of view.

25 February 2021

Spatial anthropology and artificial societies

Isabelle Tisserand, PhD, anthropologist, expert in security and defence at the Ministry for Higher Education, Research and Innovation

30 March 2021

From Cyrano to Deng Xiaoping, asking for the Moon

Thierry Montmerle, astrophysicist and former secretary-general of the International Astronomical Union (2012-2015)

4 May 2021

What can life under lockdown teach us about space missions?

NAVAL GROUP & Romain Charles, French crew member on Mission Mars 50

30 September 2021

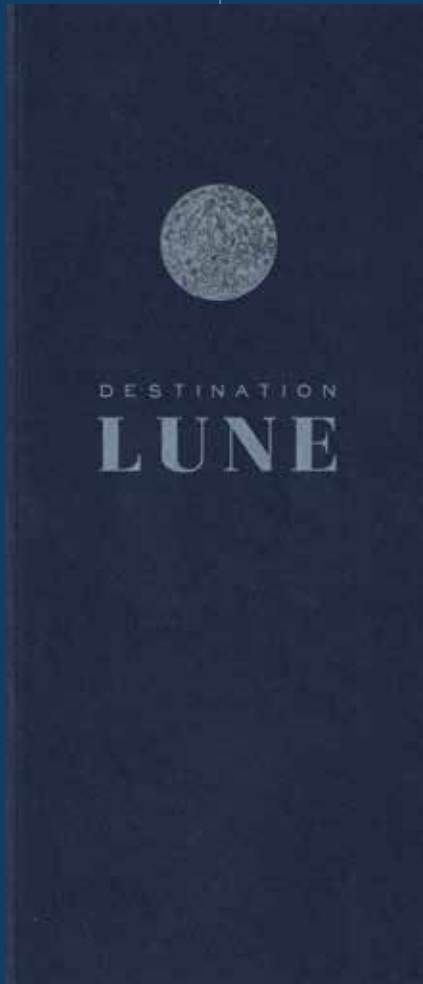
The race to the Moon and the law, current regime and NewSpace

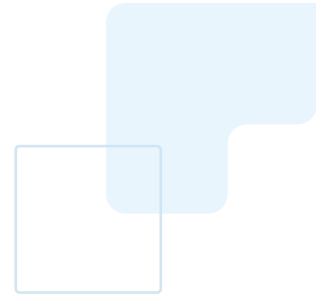
Mireille Couston, Professor of law, Lyon 3 University

25 November 2021

Space in the imagination: from science fiction to concrete reality

Roland Lehoucq, astrophysicist, expert in popularizing science, CEA





ECOLOGICAL TRANSITION

Chaired by Michael Matlosz, Professor at the University of Lorraine
 – President of the UNIT Foundation and the Euroscience association
 – Member of the French Academy of Technologies

The latest IPCC report, coupled with increasingly frequent catastrophic weather events, make it clear that climate change and its impacts are speeding up, and that current efforts are highly insufficient to prevent its escalation. How can research and innovation contribute to finding more effective solutions, mobilizing all of the levers available – technological, politico-legal, economic, and socio-cultural?

Drawing from our symposium on life cycle assessments, organized on 10 December 2020, in 2021 ANRT set up a working group on recycling with support from the Ministries for Education and the Ecological Transition.

Recycling is one of the seven pillars of a circular economy, the aim of which is to combine economic and social development with reduced environmental impacts. Clear directions have been taken at European level (Green Deal in 2019, Circular Economy Action Plan in 2020) and in France (Circular Economy Roadmap in 2018, law on reducing waste and the circular economy in 2020).

The group focused on the theme of **building and public works – construction – sustainable cities**. The building sector is the second biggest emitter of waste in France, with a total of 228 million tonnes a year, or 70% of the waste produced⁵. Opening out to take in cities and local areas means that a wide range of stakeholder views can be considered, taking into account the variety of materials, sectors, disciplines and problems involved.

Objectives of the work

- To offer ANRT members a **public-private, multi-sector exchange platform** on the ecological transition, with a focus on recycling in the sector of building and public works – sustainable cities in 2021.
- **Contribute to planning research and innovation**, by identifying the research needs, in particular for companies. This involves feeding into two acceleration strategies (PIA 4): Recyclability, Recycling and Reincorporation of Recycled Materials (launched in September 2021 by the minister for the ecological transition, Barbara Pompili); and Solutions for Sustainable Cities and Innovative Buildings – and in particular the “research” parts of these strategies (PEPR – priority research programmes and equipment).
- **Participate in organizing and coordinating a community** of companies and research laboratories committed to transforming production and consumption models.

The work was showcased during the symposium on “recycling: what are the research needs for a sustainable, desirable city?”, organized on 2 December 2021, in partnership with INSA Lyon, which hosted the event at Villeurbanne, and the cluster INDURA.

It was strongly underlined that R&D to support recycling development is part of a global transition, moving from a linear model to a circular model. A systemic vision is therefore indispensable to consider the interactions between very different scientific, technological, economic and societal fields.

5- Institut National de l'Economie Circulaire, La Responsabilité élargie du producteur et la loi AGECE, 17 December 2020.

The group looked at two key dimensions whose interconnection is crucial:

- technological innovation on the industrial products and processes of recycling;
- methodological and organizational innovation, which largely conditions the scope and effectiveness of recycling developments.

The group identified the main problems involved in each of these dimensions, while underlining the importance of interconnecting them.

R&D REQUIREMENTS TO SUPPORT TECHNOLOGICAL INNOVATION FOR RECYCLING

Recycling techniques and recycled matter have improved considerably in recent years, leading to both higher quality and a move to industrial scale for recycling initiatives. Numerous challenges currently surround the **conditions for boosting the value of recycled products**, making market access more competitive, and beyond that, widely developing circular models.

Examples of the challenges identified:

- **Improve knowledge of the behaviour** of numerous materials to maintain their recyclability at an acceptable quality (purity, stability, etc.).
- Know how to **separate elements** initially devised to be as interlinked as possible within a material or product (compounds, etc.); and rethink these products in an eco-design way integrating this need for future separation for reuse.
- Improve the **environmental performances** of products resulting from recycling (use of alternative, less-polluting inputs, limitation of need for additional inputs, etc.); and recycling procedures: efficient sorting and cleaning processes, etc.

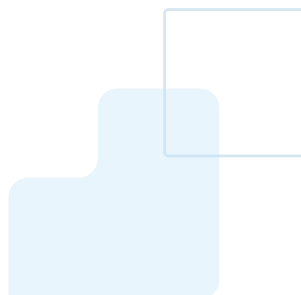
This progress will be all the more efficient if it is combined with other visions and transformations of a socio-economic or cultural nature (see following point).

R&D REQUIREMENTS TO SUPPORT METHODOLOGICAL AND ORGANIZATIONAL INNOVATION

Numerous needs evoked come into the sphere of collective and individual representations and behaviour, which underlie public and private action frameworks: methods, institutions, partnerships, regulations, etc. Yet these dimensions are not always perceived as questions that can be solved or improved by research – even though they are problems that relate to human and social sciences, and should be promoted as such within interdisciplinary set-ups.

Examples of avenues for improvement:

- Integrate **decision-making methods** based on better shared tools and environmental evaluation criteria (LCAs, flow analyses, impact studies, etc.) at an earlier stage in projects.
- Stimulate and support **partnerships between different sectors and domains** in order to develop new ecosystems and new industries centred on recycling.
- Take better account of **specific local issues** as part of coherent circular economy strategies, at pertinent levels.
- Implement on the field the principles and tools of **responsible innovation**: research into economic, social and environmental impacts; inclusive multi-stakeholder collaboration throughout the project; collective intelligence methods, etc.
- Act on the **economic, regulatory, normative and socio-cultural frameworks** that condition both the adoption and the production of products resulting from recycling.



TRAINING IN RESEARCH AND INNOVATION

04

PREPARING JUNIORS, SUPPORTING SENIORS

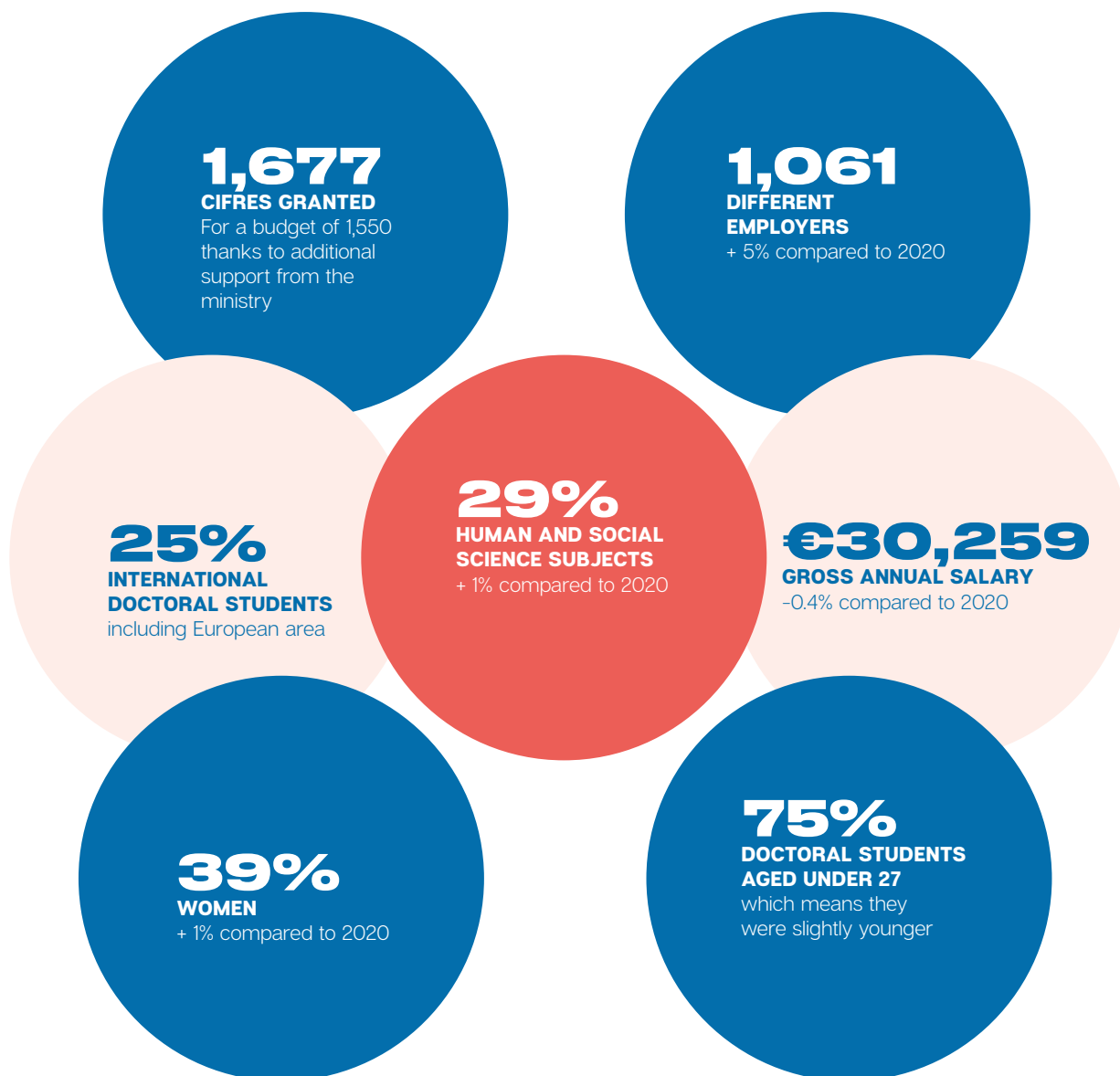
In 1981, the Ministry for Higher Education and Research entrusted ANRT to operate the **Cifre programme** on behalf of the state. In 2021, we celebrated 40 years of joint action to train thousands of doctoral students who have joined the French socio-economic fabric and the academic world. They are now ambassadors for public-private partnerships, the combination of long-term research and short-term business, and the exhilarating intellectual agility involved.



In 2009, the Ministry of Armed Forces asked ANRT to create a Cifre-Defence programme with the aim of training more scientists to deal with the specific needs of the military.

ANRT's **Innovation School** offers training within and between companies on European research and innovation programmes. The ANRT **Innovation Studio** provides customized support to private innovators to help them build up research projects based on partnerships.

INDUSTRIAL AGREEMENTS FOR TRAINING THROUGH RESEARCH (CIFRE)



Principle of the Cifre programme

ANRT runs the Cifre programme for the Ministry of Higher Education and Research (MESRI). This support measure involves granting a subsidy of €42,000 over three years to any socio-economic entity, company or local association that recruits a doctoral student and entrusts them with a research mission organized in partnership with an academic laboratory. This research, overseen by a thesis supervisor, is carried out with a view to obtaining a doctorate. The starting salary is no less than €23,484. Expenditure, net of the subsidy, qualifies as research tax credit for employers eligible to claim it.

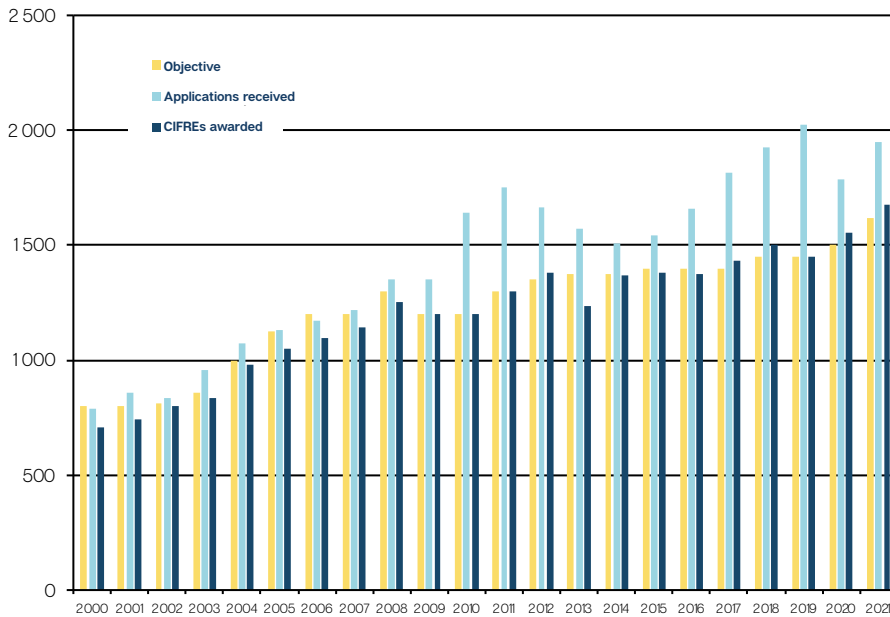
FOCUS



GROWTH BACK ON TRACK

In 2021, the programme returned to growth, with 9% more applications than in 2020. This momentum saw the scheme reach 2018 levels, pointing to a likely return to the pre-Covid situation of 2019, a record year for Cifre applications.

Evolution of Cifre applications from 2000 to 2021



FOCUS

70 MORE CIFRES GRANTED OVER THE YEAR AND IMPACT OF OPTIMAL MANAGEMENT

The annual number of Cifres awarded exceeded the initial budget granted by the Ministry, despite stricter award criteria. In October 2021, the Ministry approved a measure for 70 additional Cifre contracts.

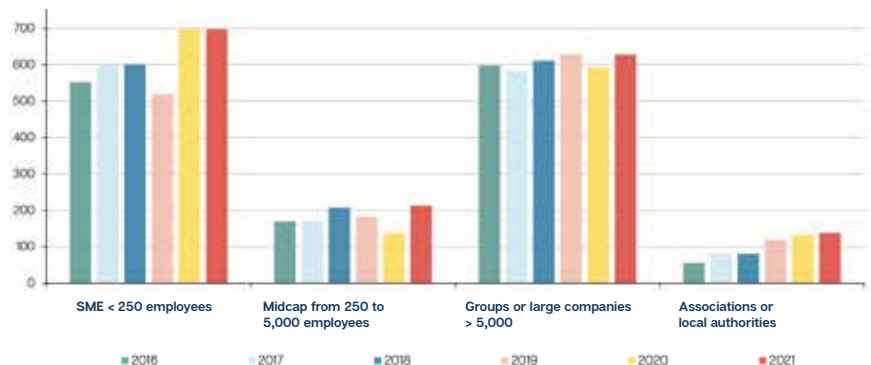
We take the opportunity to thank the minister for this increase in the 2021 budget. In addition to this measure, the Act on Research Programming came into force, which authorizes a progressive annual increase in the number of new Cifres.

In parallel, the Ministry authorizes ANRT to optimize Cifre awards thanks to close management of the contracting process in order to ensure that the entire budget is allocated.

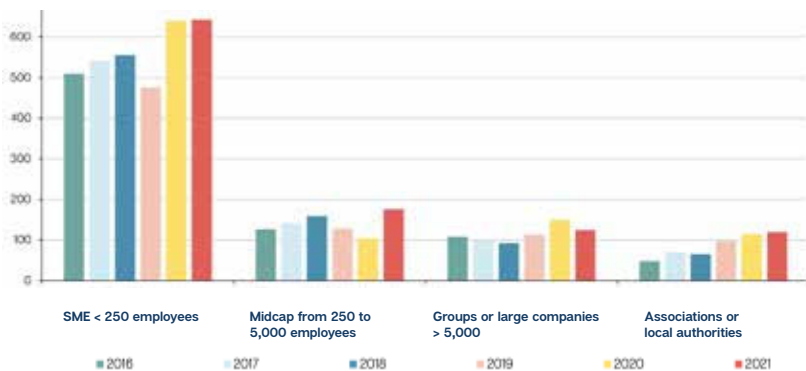
With 1,061 different employers among the new Cifre contracts in 2021, the number of beneficiaries grew 5% compared to 2020. The number of Cifres awarded to SMEs remained stable. Midcaps saw an increase in numbers of both Cifres and beneficiaries. For groups and large companies, the number of Cifres increased, but with a more restricted scope than in 2020, pointing to increased concentration. The number of Cifre contracts awarded to local authorities and associations confirms the trend observed in recent years.

Avec 1061 employeurs distincts parmi les nouvelles Cifre allouées en 2021, le nombre d'acteurs bénéficiaires augmente de 5% par rapport à 2020. Le nombre de Cifre allouées aux PME est stable. Les ETI enregistrent une croissance à la fois en nombre de Cifre et en nombre de bénéficiaires. Pour les groupes et les grandes entreprises le nombre de Cifre augmente mais avec une surface de portage inférieure à 2020, traduisant une dynamique qui se concentre davantage. Le nombre de Cifre attribuées aux collectivités territoriales et au monde associatif confirme le niveau observé depuis trois ans.

Number of Cifre contracts according to employer type

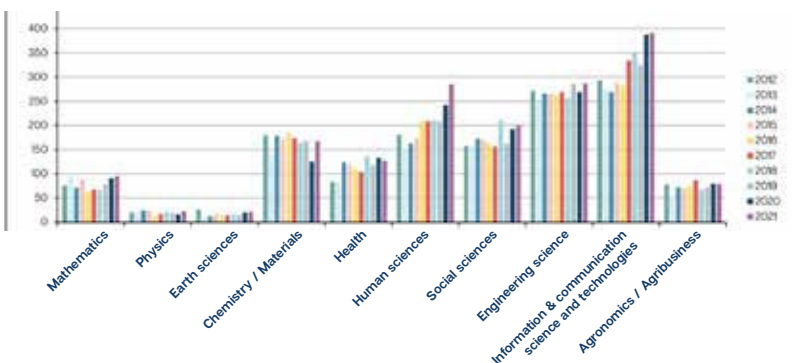


Cifre employers (different)
 in 2021 (69% new employers compared to 2016-2020)

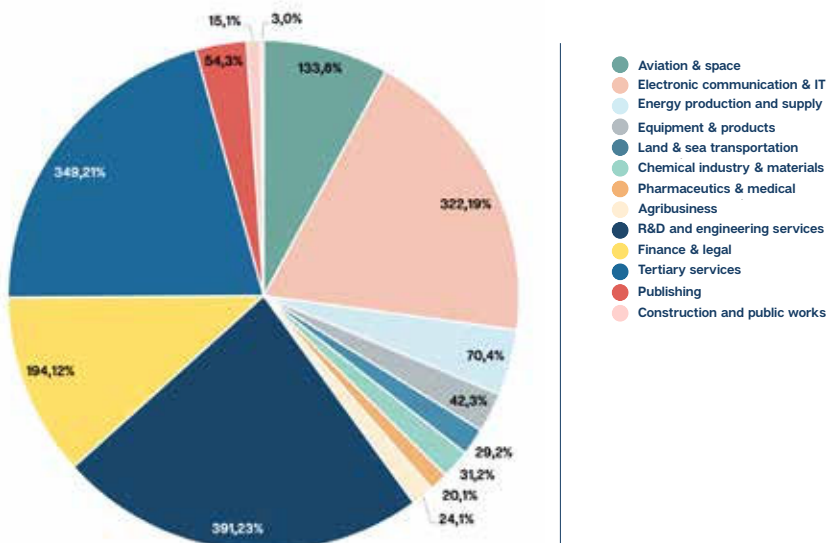


The breakdown of Cifre contracts between the main scientific areas has remained generally stable for several years. An increase of almost 18% can be observed in human sciences, along with a stable number of Cifres in the social sciences, bringing the total number of human and social science contracts to a record level of 29%. Engineering science and information and communication sciences remain the most represented areas, at 17% and 23% respectively.

Evolution of breakdown of scientific disciplines for Cifre accepted from 2012 and 2021



Breakdown of the 1,677 CIFREs accepted in 2021 by sector of activity



FOCUS

OVERVIEW OF THE APPROVAL PROCESS FOR THE EMPLOYERS MOST COMMITTED TO THE CIFRE PROGRAMME

In 2017, ANRT was authorized to set up a simplified process for granting Cifre contracts to employers that have requested at least six contracts per year over three consecutive years. An approval drawn up between the company and the ANRT allows exemption from a systematic scientific appraisal of applications submitted based on a documented commitment to setting up a rigorous internal selection process within the company. Random examinations are carried out by ANRT to verify that the approval remains justified.

A group of 25 companies initially benefitted from the approval in 2017, and the previous five years have seen few changes in its composition. The total number of their Cifre applications rose sharply between the first and second years (+9%) to plateau at 500 Cifres, a figure that has remained stable since 2019. This figure corresponds to around a third of Cifre contracts awarded annually. The number of Cifres subject to the approval nevertheless dropped by 21% in 2020, and then rose again in 2021 to reach 470.

The first approval of a local authority was drawn up in late 2021.

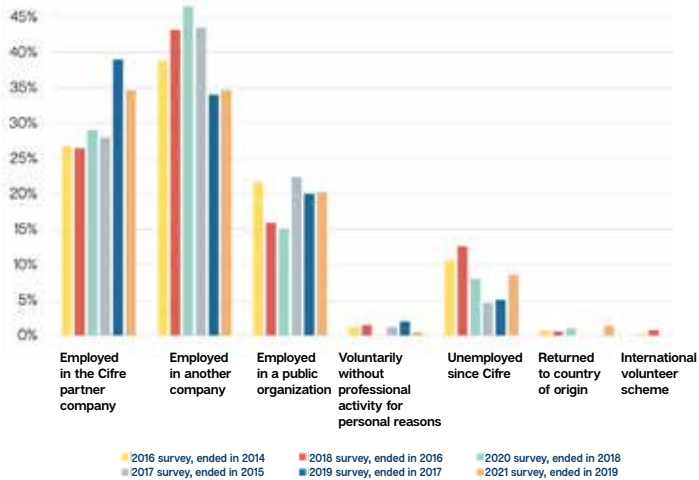
Career path of Cifre doctoral students: they consolidate their foothold in R&D activities in the private sector

RESULTS OF 2021 SURVEYS INVOLVING FORMER CIFRE DOCTORAL STUDENTS ONE AND FIVE YEARS AFTER FINISHING THEIR CIFRE FROM 2015 TO 2019.

The data relate to Cifre contracts lasting at least 33 months. The response rate for the two surveys was around 20% (222 replies for 1,115 cases and 208 replies for 1,078 cases, respectively one and five years after finishing their Cifre).

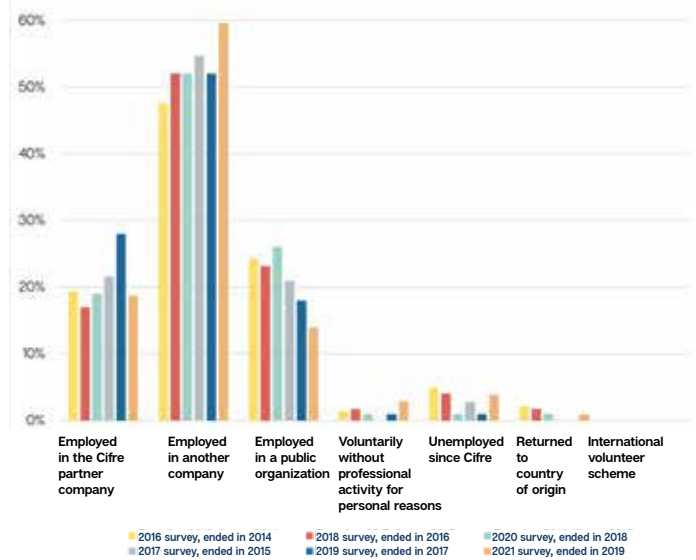
During the year following the end of the Cifre, i.e. 2020, 70% of the young doctors had a position in the private sector, with similar proportions (35%) remaining with the Cifre partner company or working in another company. The 4% drop of those remaining with the Cifre employer compared to the 2020 survey appears to directly impact the proportion of doctors seeking work (+4%). The number employed in a public organization remained stable at 20%.

Employability of former doctoral students 1 year after end of Cifre



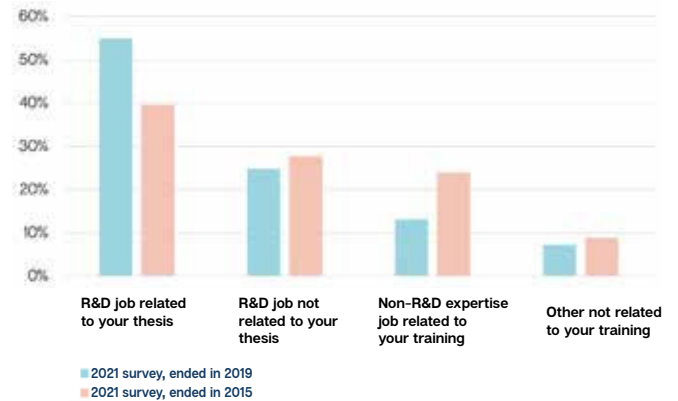
Five years after the Cifre ended, 80% of former Cifre doctoral students were working in the private sector. The number of former doctoral students employed by a different company from their Cifre employer shot up by 8 points, illustrating the mobility of young doctors and possibly the impacts of the health crisis. The number of doctors looking for work is higher than the figures for the three previous surveys. Former doctoral students were questioned in mid-2021, at which time the post-Covid return to employment was only just picking up.

Employability of former doctoral students 5 years after end of Cifre



In the private sector, 80% of former doctoral students were pursuing their career with an R&D job one year after their Cifre ended. Five years later, the figure is 65%, with a move towards non-R&D expert jobs that draw on their initial training.

Pursuit of career in the private sector for former doctoral students



CIFRE-DEFENCE

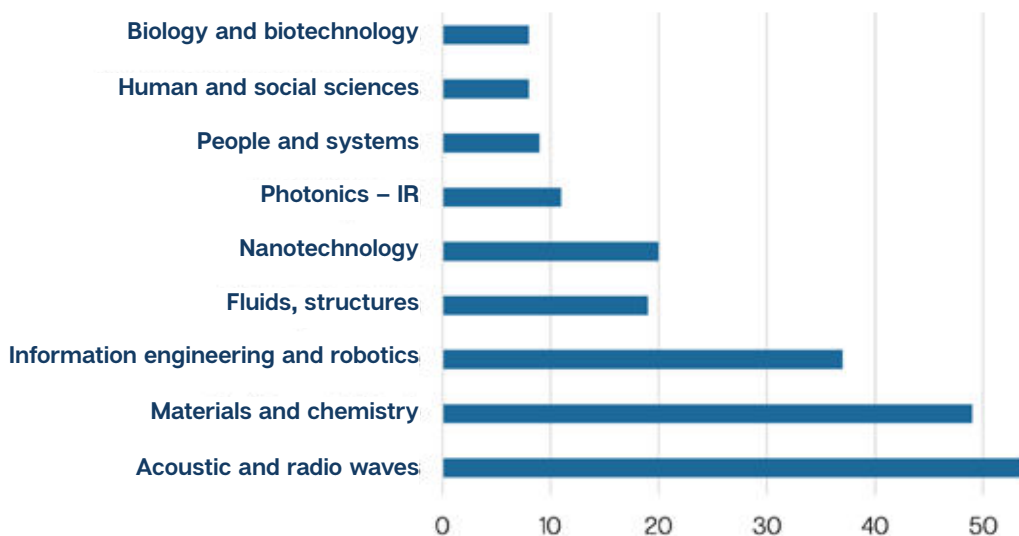


**AGENCE
INNOVATION
DÉFENSE**



A cohort of 17 Cifre-Defence doctoral students in 2021 comes in addition to the 215 projects financed since the creation of the programme in 2009. Coverage of the themes launched annually by the Defence Innovation Agency (AID) remains stable.

■ Cifre-Defence – scientific fields 2009-2021



THE INNOVATION SCHOOL

ANRT employs its expertise in EU research and innovation programmes and its special relationship with public research institutions to develop training within and between companies.

INTRA AND IN-COMPANY TRAINING

ANRT has developed comprehensive training courses drawing from its experience of the EU framework programme for research and innovation. Our eight courses took place in 21 sessions to train 283 attendees in 2021.

Comprehensive programme to grasp the R&I framework programme

- **Setting out on Horizon Europe**
- **Securing funding in Horizon 2020**
- **Securing funding in Horizon Europe**
- **Horizon Europe: what's involved in the consortium agreement**
- **All you need to know about the European Innovation Council**
- **EIC Accelerator: drafting a good project**
- **Open science and open data**
- **Managing and opening research data. Data management planning.**



REPUBLICQUE FRANÇAISE



Registered with Datadock since 2019, ANRT continued to improve the quality of its courses in 2021. The association received Qualiopi certification following an audit carried out by Bureau Veritas. Based on a national list of 32 indicators, this certification guarantees the quality of ANRT's management process and training.

It makes our courses clearer and means that trainees can benefit from public funding (state, regions, OPCO, Pole Emploi, Agefiph).



Following the course 'All you need to know about the EIC', 10 September 2021

The course gave a good explanation of the doctrine, with an emphasis on practical application designed to avoid the pitfalls.

Didier Chevreux – Managing Director, REUCIRS





THE INNOVATION STUDIO

The Innovation Studio is based on a cooperation between ANRT and five public research institutions: CEA, ENSAM, INRAE, ONERA and SORBONNE UNIVERSITY



In 2021, the innovation studio enabled training and support in identifying partnership opportunities for 30 companies: 22 start-ups, 4 SMEs, 2 midcaps and 2 large groups.

The seven innovation studio sessions involved 36 project-leading participants, who received a first day of training followed by a day of expert advice on their project.

These sessions featured input from 44 partner experts. The studio is highly appreciated by companies because it is a way of finding the "right researcher, from the right lab, for the right project". The studio's dynamic activity illustrates the keen interest of companies and academic laboratories in finding avenues for cooperation.

For Sorbonne University, the Innovation Studio means that we can offer our laboratories a wide range of original research subjects that call for the kind of cross-cutting approach that Sorbonne University wants to develop. Participating in the Studio is a way of fulfilling our mission to support the technological development of SMEs and mobilizes the resources of our research teams to help businesses overcome the scientific obstacles they face.

Lise Tourneux-Ravel – Expert in industrial research partnerships and technology transfer. Research and Innovation Department. Sorbonne University.



OUR ORGANIZATION

COMPOSITION OF THE BOARD

APPROVED BY THE GENERAL ASSEMBLY ON 22 JUNE 2021

CHAIRMAN

Patrice CAINE,
CEO, THALES

TREASURER

Pierre-Marie LEHUCHER,
CEO, BERGER-LEVRAULT

GOVERNMENT

COMMISSIONER

Olivier CAILLOU,
General Controller, CBCM
MENJS – MESRI, organization
control department

AUDITOR

EY Audit

ACCOUNTANT

AEQUIDO

ADMINISTRATORS

AIRBUS – Jean PERROT, Director of institutional relations for R&T

AIX MARSEILLE UNIVERSITE – Eric BERTON, Chairman

BERGER-LEVRAULT – Pierre-Marie LEHUCHER, Président-Directeur Général

BOUYGUES – Christophe LIÉNARD, Director of group innovation

CDEFI – Christian LERMINIAUX, Vice-President

CEA – Hervé DESVAUX, Director in charge of programmes

CETIM – Daniel RICHER, Managing Director

CNRS – Antoine PETIT, CEO

ELM-LEBLANC – Philippe LAFORGE, Managing Director

FRAMATOME – Hervé BOURRIER, Executive Vice-President

INRAE – Philippe LÉNÉE, Manager, Partnership and Transfer for Innovation Department

INSERM – Thomas LOMBES, Deputy Managing Director – Strategy

IN VIVO – Antoine POUPART, Director of strategic marketing and innovation, Bioline by Invivo

IRIS – Emmanuel CANET, Chairman R&D

MICHELIN – Emmanuel CUSTODÉRO, Scientific Director

NAVAL GROUP – Nathalie MERCIER-PERRIN, Economic Development Director with the state and the regions, and industrial partnerships

NOKIA – Jean-Luc BEYLAT, Chairman Nokia Bell Labs France

RINCENT BTP Services – Jean-Jacques RINCENT, CEO

SAFRAN – Benoit GUYON, Director of R&T partnerships

SANOFI – Eric VACARESSE, Director of scientific relations (Europe)

SOL SOLUTION – Anne-Sophie VERET, Managing Director

SORBONNE UNIVERSITÉ – Nathalie DRACH-TEMAM, Chairwoman

THALES – Patrice CAINE, CEO

UNIVERSITÉ DE PARIS – Christine CLERICI, Chairwoman

VALEO – Patrick SEGA, VP Innovation and scientific development

MEMBERS OF ANRT IN 2021

68 MAJOR COMPANIES AND GROUPS

- AIR LIQUIDE
- AIRBUS
- ALSTOM TRANSPORT
- APERAM
- ARCELORMITTAL
- ARIANEGROUP
- ARKEMA
- ATOS
- AVRIL
- BIOMERIEUX
- BOUYGUES
- BUREAU VERITAS MARINE & OFFSHORE
- CONSTELLIUM C-TEC
- CONTINENTAL AUTOMOTIVE FRANCE
- COOPERL
- CRITEO
- DANONE RESEARCH
- DECATHLON
- EDF
- EGIS
- ENEDIS
- ENGIE
- ESSILOR INTERNATIONAL
- FACEBOOK
- FRAMATOME
- GE HEALTHCARE
- GRDF
- GROUPE LIMAGRAIN
- GROUPE ROULLIER
- GROUPE SEB
- GROUPE VICAT
- HERMES
- HUAWEI TECHNOLOGIES FRANCE
- HUTCHINSON
- INTERDIGITAL
- INVIVO GROUP
- LAFARGEHOLCIM
- MATHWORKS
- MICHELIN
- MITSUBISHI ELECTRIC R&D CENTRE EUROPE
- NAVAL GROUP
- NOKIA BELL LABS FRANCE
- ORANGE
- ORANO
- PARFUMS CHRISTIAN DIOR - LVMH
- RECHERCHE
- PHILIPS FRANCE
- PSA AUTOMOBILES
- RATP
- RENAULT
- RTE-FRANCE
- SAFRAN
- SAINT-GOBAIN
- SANOFI
- SAVENCIA
- SCHLUMBERGER
- SCHNEIDER ELECTRIC
- SERVIER
- SIEMENS HEALTHCARE
- SNCF
- SOLVAY - RHODIA OPERATIONS
- SPIE BATIGNOLLES
- ST MICROELECTRONICS
- SUEZ GROUPE
- THALES
- TOTALENERGIES
- VALEO FINANCE
- VEOLIA ENVIRONNEMENT
- VINCI

25 MIDCAPS

- ACOME
- BERGER-LEVRAULT
- BERTIN TECHNOLOGIES
- BRL GROUPE
- DIANA
- EKINO
- ELM LEBLANC
- FLORIMOND DESPREZ
- GROUPE CRISTAL
- GRT GAZ
- HYDRECO GUYANE
- INTEUM
- KARDHAM
- KROHNE SAS
- PCM TECHNOLOGIES

- POCLAIN HYDRAULICS INDUSTRIE
- SAFE METAL
- SEPTODONT
- SOITEC
- TDF
- TECHNIC
- TEREKA
- THUASNE
- TRANSGENE
- VIBRACOUSTIC NANTES

84 SMES / START-UPS

- 4P-PHARMA
- AIRSEAS
- ALICE & BOB
- ARYBALLE TECHNOLOGIES
- ASOBO STUDIO
- ATEME
- BEELSE
- BERNARD CONTROLS
- BIG BANG PROJECT
- BIOSPACE LAB
- BLOCKCHAIN CERTIFIED DATA
- BRAIN CUBE
- CANOVIA
- CERB
- CLINSEARCH
- COMAT
- CORIAL
- COVAL
- CRIME SCIENCE TECHNOLOGY
- CRYPTONEXT SECURITY
- DIABELOOP
- DOMICONUS
- EDITIONS TECHNIQUES DE L'INGENIEUR
- EFJM
- ENGIE GREEN
- EREN TES
- EUREKABIOME (GROUPE EUREKARE)
- EVERZOM
- EXYSTAT
- FOXAR
- FOXSTREAM

- GREENCELL
- GREENTROPISM
- HORUS PHARMA
- HYBRIGENICS SERVICES
- IMRA EUROPE
- IREIS
- IPSOMEDIC
- IREPA LASER
- ITHPP
- ITK
- KALRAY
- LOGIKKO
- MICROFACTORY
- MODULEUS
- MOTEN TECHNOLOGIES
- MY-SERIOUS-GAME
- NANOBACTERIE
- NEOPLANTS
- NUMERYX TECHNOLOGIES
- ORPIA INNOVATION
- ORTHOPUS
- PHD AVENUE
- POLLEN METROLOGY
- POLYTHERAGENE
- PRISMATIK
- PROTEC INDUSTRIE
- PUSH4M
- QUANTCUBE TECHNOLOGY
- RINCENT BTP SERVICES
- SANTEN
- SBT-HUMAN(S) MATTER
- SCALITY
- SCIADO PARTENAIRES
- SENSE-IN
- SERIOUS OR NOT ?
- SILAB
- SIPEARL
- SKIN'UP SAS
- SOL SOLUTION
- SOLVIONIC
- SPACEABLE
- STATINF
- STRATEGIES
- STREAMVISION
- SURGAR
- SURICOG
- SYNAPLUS SOLUTIONS
- TEMATYS
- THERANEXUS
- TOOPI ORGANICS
- TRAPIL
- VIDMIZER
- WEKO SAS

105 HIGHER EDUCATION ESTABLISHMENTS

- AGROPARISTECH
- AIVANCITY SCHOOL FOR TECHNOLOGY, BUSINESS & SOCIETY
- AIX MARSEILLE UNIVERSITÉ
- ARTS ET METIERS SCIENCES ET TECHNOLOGIE
- AVIGNON UNIVERSITÉ

- BORDEAUX INP
- CENTRALESUPELEC
- CESI
- CHIMIE PARISTECH
- COMUE UBFC
- CY CERGY PARIS UNIVERSITÉ
- E.ARSTUP
- ECAM-EPMI
- ÉCOLE CENTRALE DE LILLE
- ÉCOLE CENTRALE DE LYON
- ÉCOLE CENTRALE DE MARSEILLE
- ÉCOLE CENTRALE DE NANTES
- ÉCOLE DE L'AIR ET DE L'ESPACE
- ÉCOLE DE MANAGEMENT DE NORMANDIE
- ÉCOLE SUPERIEURE D'AGRICULTURES
- EFREI PARIS
- ENAC
- ENACO INGENIERIE
- ENSAD
- ENSAN
- ENSAS
- ENSCI
- ENSICAEN
- ENSTA PARISTECH
- EPITA
- ESIGELEC
- ESME-SUDRIA
- ESSEC BUSINESS SCHOOL
- ESTIA
- ESTP
- EURECOM
- GRENOBLE ECOLE DE MANAGEMENT
- ICAM-LILLE
- IMT
- IMT MINES ALES
- INSA - LYON
- INSEP
- INSTITUT AGRO
- INSTITUT SUPÉRIEUR DE RÉÉDUCATION PSYCHOMOTRICE (ISRP)
- IOGS
- IPSA
- ISAE
- ISEP
- LA ROCHELLE UNIVERSITE
- LE MANS UNIVERSITÉ
- MINES PARISTECH
- NEOMA BUSINESS SCHOOL
- PARIS-EST SUP
- SCIENCES PO
- SORBONNE UNIVERSITÉ
- TELECOM PARIS
- TOULOUSE BUSINESS SCHOOL
- UNIVERSITÉ CAEN NORMANDIE
- UNIVERSITÉ CATHOLIQUE DE LILLE
- UNIVERSITÉ CATHOLIQUE DE L'OUEST
- UNIVERSITÉ CLERMONT AUVERGNE
- UNIVERSITÉ D'ANGERS
- UNIVERSITÉ DE BORDEAUX
- UNIVERSITÉ DE BOURGOGNE

- UNIVERSITÉ DE BRETAGNE OCCIDENTALE
- UNIVERSITÉ DE CORSE
- UNIVERSITÉ DE HAUTE ALSACE
- UNIVERSITÉ DE LA RÉUNION
- UNIVERSITÉ DE LILLE
- UNIVERSITÉ DE LIMOGES
- UNIVERSITÉ DE LORRAINE
- UNIVERSITÉ DE LYON
- UNIVERSITÉ DE NANTES
- UNIVERSITÉ DE NÎMES
- UNIVERSITÉ DE PARIS
- UNIVERSITÉ DE PAU ET PAYS DE L'ADOUR
- UNIVERSITÉ DE PICARDIE JULES VERNE
- UNIVERSITÉ DE POITIERS
- UNIVERSITÉ DE REIMS CHAMPAGNE ARDENNE
- UNIVERSITÉ DE RENNES 1
- UNIVERSITÉ DE RENNES 2
- UNIVERSITÉ DE ROUEN
- UNIVERSITÉ DE STRASBOURG
- UNIVERSITÉ DE TECHNOLOGIE DE BELFORT-MONTBÉLIARD
- UNIVERSITÉ DE TECHNOLOGIE DE COMPIEGNE
- UNIVERSITÉ DE TECHNOLOGIE DE TROYES
- UNIVERSITÉ DE TOURS
- UNIVERSITÉ DU LITTORAL COTE D'OPALE
- UNIVERSITÉ FÉDÉRALE TOULOUSE MIDI-PYRÉNÉES
- UNIVERSITÉ GRENOBLE ALPES
- UNIVERSITÉ GUSTAVE EIFFEL
- UNIVERSITÉ LE HAVRE NORMANDIE
- UNIVERSITÉ PARIS 2 PANTHEON-ASSAS
- UNIVERSITÉ PARIS 8
- UNIVERSITÉ PARIS I PANTHEON SORBONNE
- UNIVERSITÉ PARIS NANTERRE
- UNIVERSITÉ PARIS SACLAY
- UNIVERSITÉ PARIS-DAUPHINE
- UNIVERSITÉ PAUL VALÉRY MONTPELLIER 3
- UNIVERSITÉ POLYTECHNIQUE HAUTS-DE-FRANCE
- UNIVERSITÉ SAVOIE MONT BLANC
- UNIVERSITÉ TOULOUSE I CAPITOLE
- UNIVERSITÉ TOULOUSE III-PAUL SABATIER
- UNIVERSITÉ TOULOUSE JEAN JAURES
- UNIVERSITÉ VERSAILLES SAINT QUENTIN

31 PUBLIC RESEARCH ORGANIZATIONS

- ADEME
- AMIES
- ANDRA
- BPI FRANCE
- BRGM
- CEA
- CEREMA
- CNCR
- CNES
- CNRS
- CSTB
- DGA
- HOSPICES CIVILS DE LYON
- IFP ENERGIES NOUVELLES
- IFREMER
- INERIS
- INPI
- INRAE
- INRIA
- INSERM
- INSTITUT DE LA VISION
- INSTITUT DE PHYSIQUE DU GLOBE DE PARIS
- INSTITUT D'ÉTUDES AVANCÉES DE PARIS
- INSTITUT DU CERVEAU ET DE LA MOELLE EPINIÈRE (ICM)
- INSTITUT PASTEUR
- IRD
- LAAS - CNRS
- LNE
- MINISTÈRE DE L'ÉDUCATION NATIONALE
- ONERA
- RÉUNION DES MUSÉES NATIONAUX ET DU GRAND PALAIS

26 ASSOCIATIONS

- ACTA
- ACTIA
- ADRINORD
- ALLIANCE ATHENA
- AMVALOR
- ARMINES
- ARSC
- ASSOCIATION BERNARD GREGORY
- ASSOCIATION DES INSTITUTS CARNOT
- ATILH
- CDEFI
- CETI
- CNOSF
- CONFÉRENCE DES GRANDES ÉCOLES
- CONSEIL FRANÇAIS DE L'ÉNERGIE
- FÉDÉRATION NATIONALE DES CHASSEURS
- FONDATION DE COOPERATION

- SCIENTIFIQUE PARIS SCIENCES ET LETTRES
- FRANCE INDUSTRIE
- GÉRONTOPOLE AURA
- INTERFORA-IFAIP
- IREX
- IRT SYSTEMX
- MEDEF
- QUATORZE
- RESEAU CTI
- SYNERGIE FAMILY

5 TECHNICAL CENTRES

- CERIB (CENTRE D'ÉTUDES ET DE RECHERCHES DE L'INDUSTRIE DU BÉTON)
- CETIM (CENTRE TECHNIQUE DES INDUSTRIES MÉCANIQUES)
- CTC GROUPE (COMITÉ PROFESSIONNEL DE DÉVELOPPEMENT CUIR CHAUSSURE MAROQUINERIE)
- CTMNC (CENTRE TECHNIQUE DE MATÉRIAUX NATURELS DE CONSTRUCTION)
- IFTH (INSTITUT FRANÇAIS TEXTILE HABILLEMENT)

7 PROFESSIONAL FEDERATIONS

- CNIEL (CENTRE NATIONAL INTERPROFESSIONNEL DE L'ÉCONOMIE LAITIÈRE)
- FÉDÉRATION CINOV
- FFR (FÉDÉRATION FRANÇAISE DE RUGBY)
- FIEEC (FÉDÉRATION DES INDUSTRIES ÉLECTRIQUES ÉLECTRONIQUES ET DE COMMUNICATION)
- FNTP (FÉDÉRATION NATIONALE DES TRAVAUX PUBLICS)
- GIFAS (GROUPEMENT DES INDUSTRIES FRANÇAISES AÉRONAUTIQUES ET SPATIALES)
- UNIDEN (UNION DES INDUSTRIES UTILISATRICES D'ÉNERGIE)

15 REGIONAL ACTORS

- ADI NOUVELLE AQUITAINE
- AD'OCC
- AGORANOV
- AQUITAINE SCIENCE TRANSFERT
- BRETAGNE DÉVELOPPEMENT INNOVATION
- CAPENERGIES
- CCI PARIS IDF
- CHEMPARC
- ERGANEO
- GRAND E-NOV

- MATRICE
- OUEST VALORISATION
- RÉGION PAYS DE LA LOIRE
- TECHNOPOLE BREST-IROISE
- TOULON VAR TECHNOLOGIES INNOVATION

21 CONSULTANCY FIRMS

- 4 INNOVATION
- ABF DECISIONS
- ABSISKEY
- CABINET MASTER
- DAIKI CONSULTING
- EIF INNOVATION
- EURONOVIA
- EXPERCONNECT
- FIDAL
- FIDELYS
- HEVA
- IN EXTENSO INNOVATION CROISSANCE
- IP TRUST
- LEYTON
- LGI CONSULTING
- NOVANEXIA
- RD2 CONSEIL
- REUCIRS
- SIBELIANTHE
- SO SCIENCE
- TECHNOLIS FRANCE

3 CORRESPONDING MEMBERS

- MME CAROLINE BERGAUD
- M. GILLES SAVARD
- MME CARINE TERNEST

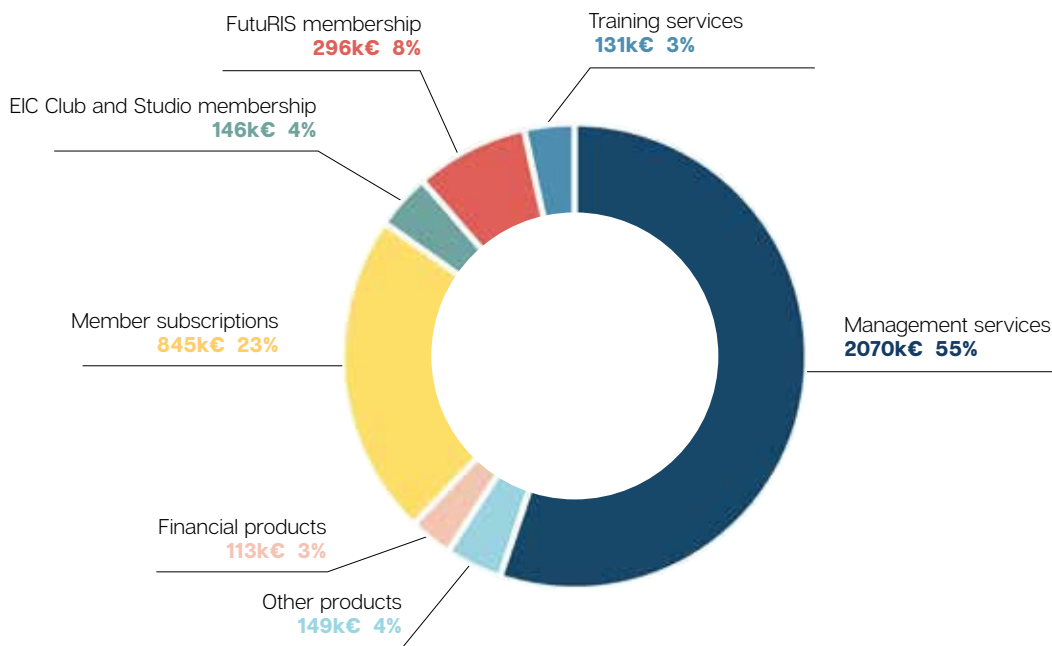
3 PARTNERS

- ANR (AGENCE NATIONALE DE LA RECHERCHE)
- FRANCE UNIVERSITÉS
- MESRI (MINISTÈRE DE L'ENSEIGNEMENT SUPÉRIEUR DÉLA RECHERCHE ET DE L'INNOVATION)

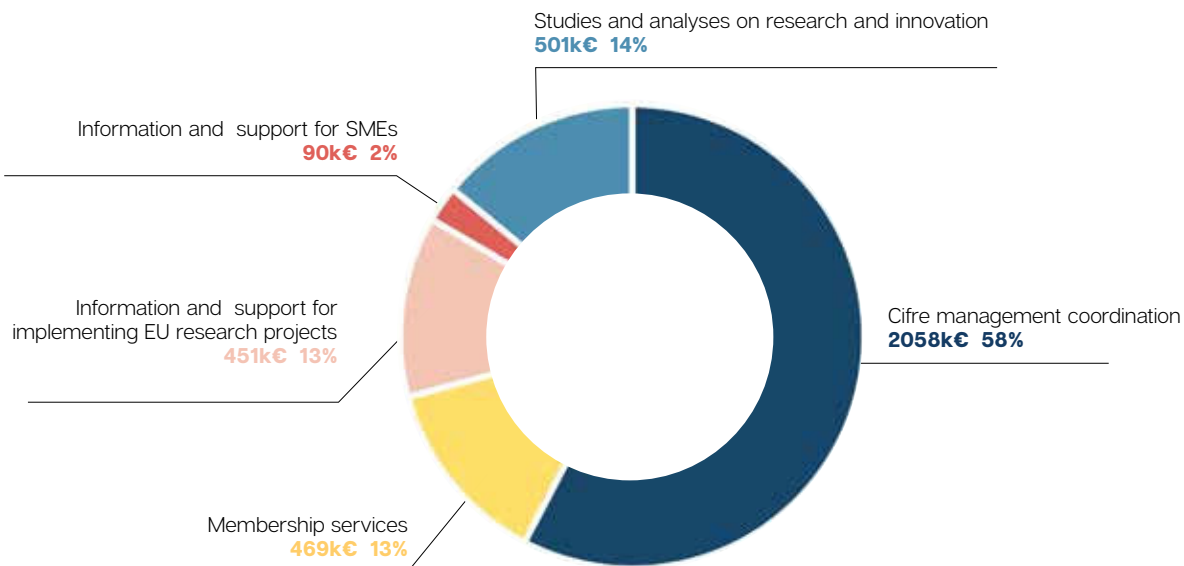
2021 FINANCIAL YEAR

FINANCIAL REPORT

INCOME: €3,750 K



ACTIVITIES: €3,569 K



ANNUAL ACCOUNTS

INCOME STATEMENT (euros before tax)	31/12/2020	31/12/2021
Member subscriptions	806 480	845 283
Other operating revenues	2 576 819	2 791 994
Operating revenues	3 383 299	3 637 276
Personnel costs	2 324 412	2 590 318
Operating costs	1 135 684	933 178
Operating expenses	3 460 096	3 523 496
OPERATING INCOME	-76 797	113 780
Financial result	100 896	112 852
Current result before tax	24 099	226 632
Extraordinary income	650	0
Exceptional expenses	0	2 543
Tax	0	42 929
NET INCOME	24 749	181 159

OVERALL BALANCE (euros before tax)					
ASSETS	31/12/2020	31/12/2021	LIABILITIES	31/12/2020	31/12/2021
Fixed assets	173 933	402 900	Shareholders' equity	8 840 783	9 561 556
Current assets	51 425 411	51 883 825	Provision for charges	101 400	55 850
			Debt	42 657 161	42 669 319
TOTAL	51 599 344	52 286 725		51 599 344	52 286 725



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