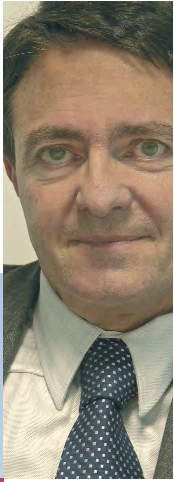


...NERSHIPS • BASIC RESEARCH • APPLIED RESEARCH • PRIVATE RESEARCH
PUBLIC-PRIVATE PARTNERSHIPS • BASIC RESEARCH • APPLIED RESEARCH • PRIVATE RESEARCH
CALLS FOR PROPOSALS • PUBLIC-PRIVATE PARTNERSHIPS • BASIC RESEARCH • APPLIED RESEARCH • PRIVATE RESEARCH
PUBLIC-PRIVATE PARTNERSHIPS • BASIC RESEARCH • APPLIED RESEARCH • PRIVATE RESEARCH

AGENCE NATIONALE DE LA RECHERCHE

ANR

2007 ANNUAL REPORT



P R E F A C E

The year 2007 represents a milestone for the French national research agency (*Agence Nationale de la Recherche – ANR*). Indeed, processes are reaching a mature stage within their three articulated steps: programming, research proposal selection, and funded projects follow-up. ANR personnel and support units are also progressing, imposing on themselves tight schedules to meet expectations from both the research community and the government.

A large number of proposals were received again this year and the average funding for selected projects was increased, in keeping with the strategic goal to finance larger-scale, scientifically ambitious projects.

In 2007, new lines of activity were created and developed:

- The agency was involved in major national scientific debates through its active participation in the *Grenelle de l'Environnement* and the *Conseil d'analyse stratégique sur l'énergie*.
- ANR international activities grew as a result of more agreements and original calls for proposals launched together with Germany, United Kingdom, China and Taiwan; ANR also participated in two new ERA-NETs. As part of its annual programme, the Agency solicited input from an increasing number of foreign scientists to evaluate submitted research proposals. The impetus given to partnership research was consolidated through the labelling of 13 new Carnot institutes and continued significant participation of industry in calls for proposals.
- For the follow-up of funded projects, ANR organised, documented and systematised processes. The outcome enabled the Agency to report activities with results obtained by research groups funded in 2005.
- For the first time, ANR granted universities and public research institutes with an amount of 5% of the budget awarded to their funded research groups. This preciput aims at improving researchers' working environment.
- So as to facilitate project funding procedures, submission forms were simplified, with an updated financial regulation published at the end of 2007.

With its short, three-year lifespan, ANR still has to improve and explore many other ways to meet future challenges. However, when looking through the 2007 report, I am firmly convinced that ANR is fully integrated into the French research system, and that its skills are acknowledged by both its partners and the scientific community.

Jacques Stern
Chairman of the ANR



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■ PRESENTATION

In 2007, the status of ANR was changed into a public administrative establishment (EPA). A new Board of Directors was selected with Jacques Stern as its Chairman, who was awarded the CNRS Gold Medal in 2006.

In 2007 ANR launched 50 calls for proposals in a large number of scientific and technological fields. The organisation and funding of the calls for proposals (CFP) totalled 607.4 M€; this which represents 73.62% of the 2007 programming, excluding allocated resources of 8.54 M€.

Together with the Ministry of Higher Education and Research, ANR managed various funding mechanisms for research, namely, Carnot institutes, INCa, incubators, the young innovative enterprises competition, etc.

1 CALLS FOR PROPOSALS

In 2007, the ANR Calls for Proposals focused on six themes: Biology and Health; Ecosystems and Sustainable Development; Sustainable Energy and Environment; Engineering, Processes and Security; Information and Communication Sciences and Technologies (ICST); Humanities and Social Sciences, as well as Non-Thematic Actions.

ANR continued structuring its programmes around the following two categories of calls for proposals:

- 'open' calls for proposals to produce knowledge and which are intentionally non-specific, and
- 'partnership' calls targeted to more specifically defined themes and which are only open to a consortia of public laboratories and business enterprises.

In 2007, ANR issued 50 calls for proposals, of which two were ERA-NETs, i.e. transnational European calls. Eight of the 48 national calls for proposals were entirely new.

During the year, ANR terminated funding for the following programmes: Telluric Disasters and Tsunamis; Collections of Biological Resources for Health; Agriculture and Sustainable Development; Conflicts Wars and Violence; Learning, Knowledge and Society.

In 2007, 5,636 proposals were submitted and the proposal preparation time was the same as in 2006, i.e. 60 days.

Evaluations were made:

- by more than 10,350 external experts (10,100 in 2006) including close to 3,000 from abroad (2,200 in 2006) and close to 670 from industry (650 in 2006);
- by Evaluation Committees with over 1,520 members (1,176 in 2006), including 189 from abroad (179 in 2006) and 221 from industry (200 in 2006).

| | |
|--|---------------------------------|
| Proportion of external evaluations by foreign experts | 28.6% (22.5% in 2006) |
| Proportion of external evaluations by experts from industry | 6.4% (6.3% in 2006) |
| Proportion of foreign experts of Evaluation Committees | 12.6% (15.2% in 2006) |
| Proportion of experts from industry of Evaluation Committees | 24.7% (17% in 2006) |

As in 2005 and 2006, the participation of foreign experts and industry in 2007 varied according to the type of call for proposals. A large number of foreign scientists was involved in the selection procedure for proposals responding to 'open' calls; scientists from the private sector were more likely to be present for the partnership programmes.

| Participation of foreigners and industrialists as experts and members of the Evaluation Committees: results per theme | | | | |
|--|-----------------|-----------------------|--------------------|--------------------------|
| | Foreign experts | Experts from industry | Foreign EC members | EC members from industry |
| Sustainable Energy and Environment | 11.3% | 32.4% | 5.3% | 35.8% |
| ICST | 19.6% | 10.8% | 26.9% | - |
| Engineering, Processes and Security | 13% | 21.1% | 4.7% | 28.6% |
| Biology and Health | 50.4% | 1.6% | 17.9% | 14% |
| Ecosystems and Sustainable Development | 68.2% | 1.9% | 23.6% | 11.4% |
| Humanities and Social Sciences | 27.4% | 0.5% | 36.5% | 0% |
| Non-thematic and cross-cutting actions | 24.9% | 0% | 7.5% | 0.4% |

This pattern is also found in the thematic actions. More foreign scientists and fewer experts from industry are involved in Non-Thematic actions, Human and Social Sciences, Ecosystems and Sustainable Development, and Biology and Health, which all have more "open" programmes than in Engineering, Processes and Security, Information and Communication Sciences and Technologies, and Sustainable Energy and Environment.

1,430 projects were selected. The average success rate was 25.4% (25.3% in 2006). The success rate on a per theme basis ranged between 21.2% and 31.1%. Those rates are in line with those of the major international agencies similar to ANR.

| Selection rate per theme | | Funding per theme | |
|--|-------|--|-------|
| Sustainable Energy and Environment | 26.7% | Sustainable Energy and Environment | 14.5% |
| ICST | 31.1% | ICST | 20.9% |
| Engineering, Processes and Security | 27.2% | Engineering, Processes and Security | 7.1% |
| Biology and Health | 21.2% | Biology and Health | 22.1% |
| Ecosystems and Sustainable Development | 28.8% | Ecosystems and Sustainable Development | 7.3% |
| Humanities and Social Sciences | 24.7% | Humanities and Social Sciences | 3% |
| Non-thematic and cross-cutting actions | 25.9% | Non-thematic and cross-cutting actions | 25.1% |

A typical project financed by ANR in 2007 lasted for 37 months, in other words, 1.5 months longer than a typical project in 2006. As in 2006, projects involved an average of 3.1 partners, and received average funding of 425,093 € (382,603€ in 2006). The average grant per beneficiary amounted to 138,594€, which was 12.28% higher in 2007 than in 2006. ANR is trying to concentrate its financing on a limited number of projects and partners.

There was, however, a notable difference between open and partnership projects, with partnership projects involving larger numbers of partners and receiving higher levels of funding.

| | Average funding per project | Number of partners per project | Average duration of projects (months) |
|--|-----------------------------|--------------------------------|---------------------------------------|
| Sustainable Energy and Environment | 753,038 € | 5.2 | 37 |
| ICST | 654,379 € | 4.4 | 35 |
| Engineering, Processes and Security | 692,751 € | 4.8 | 34 |
| Biology and Health | 408,719 € | 2.5 | 34 |
| Ecosystems and Sustainable Development | 530,347 € | 5.1 | 37 |
| Humanities and Social Sciences | 176,278 € | 2 | 37 |
| Non-thematic and cross-cutting actions | 281,692 € | 2.1 | 27 |

Public research institutes and higher education institutions continued to be well represented among the beneficiaries, since they received 81.1% of ANR funding, of which 24.6% went to the universities (2006 figures: 77.9% and 24%). The percentage allocated to major research organisations rose from 38% in 2006 to 40% in 2007. Universities are very active in the non-thematic sector (34.1%).

The figure for VSE/SME remained unchanged, while for the other enterprises it dropped from 9.9% in 2006 to 7.8% in 2007. However, the number of projects involving at least one company varied little (383 in 2005, 413 in 2006 and 400 in 2007). In other words, 27.8% of the projects (against 25.6% in 2006).

Finally, out of the 607.4 M€ allocated through CFPs, 91.7 M€ (15%) benefited business companies (111.8 M€ or 18% in 2006).

| Financial breakdown per type of beneficiary | | | |
|---|-------|-------|-------|
| | 2005 | 2006 | 2007 |
| Universities | 22.1% | 24% | 24.6% |
| Other high education institutions | 7.8% | 9.6% | 9% |
| CEA | 6.8% | 5.9% | 5.7% |
| CNRS | 24% | 21.6% | 23.8% |
| INRA | 3.9% | 3.3% | 3.5% |
| INRIA | 1.9% | 1.5% | 1.2% |
| INSERM | 5.1% | 5% | 5% |
| IRD | 0.8% | 0.9% | 0.8% |
| SME (Small & Medium Enterprise) | - | - | 4.2% |
| VSE (Very Small Enterprise) | 9.7% | 7.8% | 3.2% |
| Enterprises other than VSEs and SMEs | 7.6% | 9.9% | 7.6% |
| Hospitals | 0.6% | 0.8% | 1% |
| Associations | 1.2% | 2% | 1.6% |
| Foundations | 1.4% | 1.6% | 1.2% |
| Private: other | 0.6% | 0.7% | 1% |
| Public: other | 6.5% | 5.4% | 6.4% |
| Foreign | - | - | 0.1% |

The average level of funding for company projects in 2007 was 46.7% as against 41% in 2006. In keeping with its SME support policy, – and in line with European Community rules on State aid for research and development, – the average ANR level of funding for SMEs and VSEs was 52.8% (46.8 % in 2006), almost 10 percent higher than the 41.6% (37.5% in 2006) awarded to companies employing more than 250 people.

Nearly 280 SMEs and VSEs received support in 2007 (291 in 2006), with a high renewal rate indicated by the fact that 250 of these SMEs and VSEs did not receive support from ANR in 2006. Furthermore, 8% of these SMEs/VSEs (10% in 2006) receive funding from more than one source since they participate in several projects.

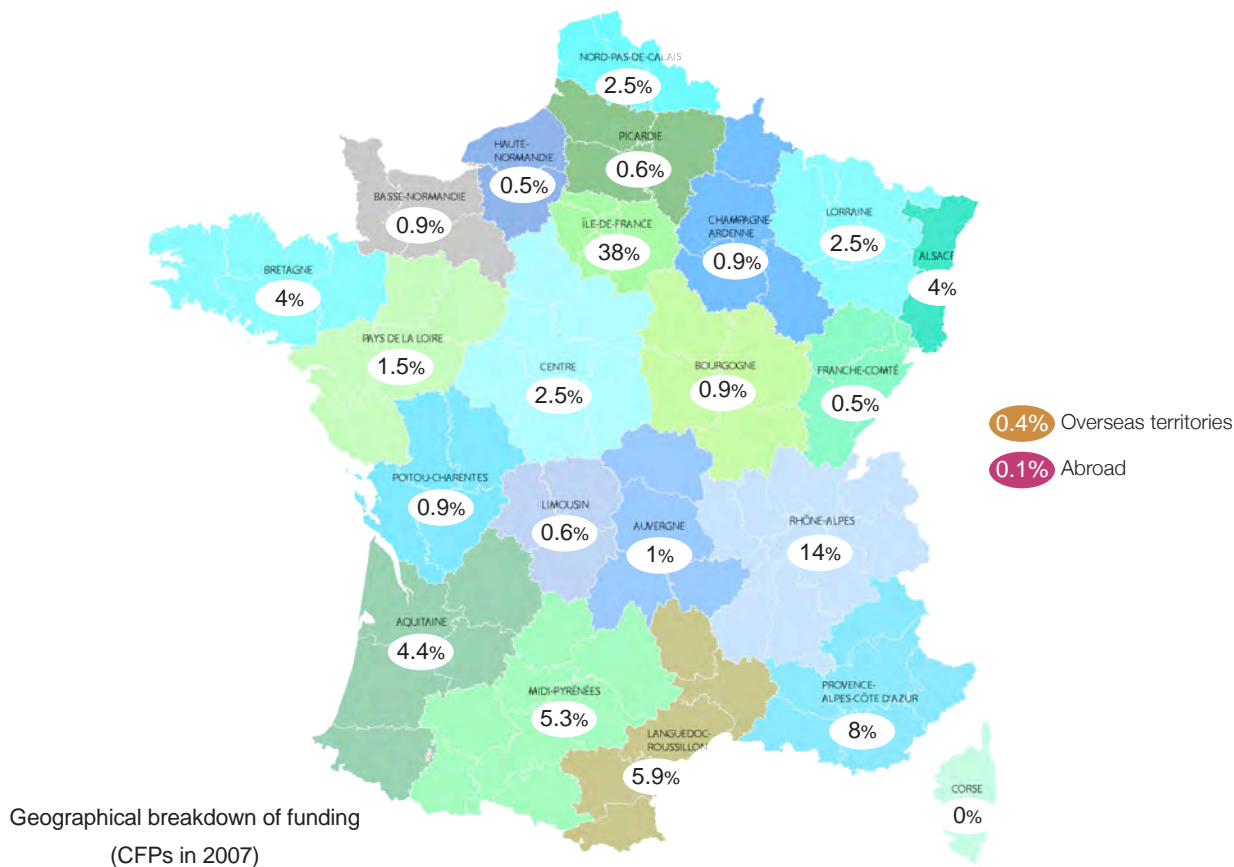
The increased support for private research was not detrimental to fundamental research. The pattern of funding awarded to the different research categories defined by the European Commission shows an increase for fundamental research from 58% in 2006 to 61% in 2007, which means an extra 13 M€. The share of funding for work further down the innovation chain, as in 2006, was stable for industrial research, and lower for pre-competitive development.

| | |
|-----------------------------|-----|
| Fundamental research | 61% |
| Industrial research | 35% |
| Pre-competitive development | 4% |

Consolidation of the funding allocated to public laboratories and companies shows a breakdown similar to that observed in 2006 for the main areas of spending. Staff costs is still the principal expenditure for ANR, accounting for 46.7% in 2007 as against 51.5% in 2006. This is partially explained by the cost of salaries for people under contract in public research institutes (excluding EPIC), with 5,957 person-years financed from ANR grants (1.37 three-year fixed term contracts per project).

The geographical breakdown of funding accorded to projects shows a pattern similar to that observed in 2006: in first place is the Ile de France region received 38% (40.9 percent in 2006), followed by the Rhône-Alpes region which received 14% (14.6% in 2006) and the Provence-Alpes-Côte d'Azur region which received 8% (6.8% in 2006). The overall percentage of funding earmarked for these regions has dropped to 60% (62.3% in 2006, 64.6% in 2005).

| Allocation of 2007 CFP funding per major area of spending | |
|---|-------|
| Equipment | 11.8% |
| Services | 5.6% |
| Payroll | 46.7% |
| Other operating expenses | 33.6% |
| Other | 2.3% |



Out of the 4,383 partners in 2007, 913 (21%) were women with scientific and technical responsibility at the beneficiaries' end. This rate has remained unchanged since 2005/2006. The same figure (21%) has been observed for the post of project coordinator for both the submitted and the selected projects. Further, women comprise 17.4% of the external experts and 18.9% of the members of the Evaluation Committees.

Global figures are very different from one scientific sector to the next.

| | External experts (% of women) | Members of evaluation committees (% of women) | Selected multipartner projects (% of women coordinators) | Submitted multipartner projects (% of women coordinators) |
|--|----------------------------------|---|--|---|
| Sustainable Energy and Environment | 15.7% | 12% | 22.2% | 22.5% |
| ICST | 8.5% | 20.5% | 16.7% | 13.4% |
| Engineering, Processes and Security | 15.6% | 19% | 12.9% | 10.1% |
| Biology and Health | 19.6% | 25.1% | 27.7% | 25.7% |
| Ecosystems and Sustainable Development | 21.4% | 17.1% | 34.9% | 33.3% |
| Humanities and Social Sciences | 25.5% | 23.5% | 32.3% | 32.3% |
| Non-thematic and cross-cutting actions | 17.2% | 17.6% | 14.5% | 16.6% |

2 OTHER OPERATIONS

Under its 2007 programme, ANR devoted 207.6 M€ (158.8 M€ in 2006) to various other activities. Some were carried out jointly with the ministry in charge of research, including a nationwide competition for the creation of innovative technology companies, the EURÉKA programme, a shared technology transfer system, and the research components of *contrats de plan État-Région* (contracts for development projects between central government and the regions).

| | € |
|--|------------|
| Coordination | 2,212,138 |
| Regional actions, including CPER | 22,996,000 |
| Co-organisation of technology transfer, innovative projects development and incubators | 10,999,700 |
| EUREKA | 3,025,876 |
| Cancer Plan | 45,000,000 |
| OSEO Innovation - Enterprise creation competition | 17,500,000 |
| Fundamental technological research on micronanotechnologies | 15,000,000 |
| Additions to competitiveness clusters | 6,535,702 |
| Carnot Institutes | 62,068,727 |
| Preciput | 22,441,979 |



NON - THEMATIC DEPARTMENT

1 THE STAKES

The aim of the ANR Non-thematic Department is to launch programmes that stimulate knowledge production and scientific progress, regardless of discipline. Recognition of excellence and encouragement for innovative and interdisciplinary approaches are the sole measures used in the management of these programmes.

The Department has launched three programmes:

- Chairs of Excellence
- Young Researchers
- Blanc

The aim of the Chairs of Excellence programme is to make France more attractive to high-level scientists, foreigners or long-term French residents abroad, by offering substantial funding for 3-4 year research projects.

The Young Researchers' programme supports projects by researchers or professors under the age of 39. It is complementary to the ANR thematic programmes since it is not focused on any specific theme. It has been designed to encourage development of novel projects on innovative topics.

Since 2005, the Blanc programme, a first in France, has been a driving force for ambitious, internationally competitive projects on the cross-cutting edge of knowledge. These programmes allow researchers from all disciplines to submit proposals on research topics of their choice ("blue sky research"). It also allows scientists from different research organisations to obtain funding for collaborative research projects.

For each of these programmes, a CFP was launched in 2007.

2 A RETROSPECTIVE LOOK AT 2005-2007

The results of the CFP launched during the last three years for each one of the main sectors is summarised below:

| Number of submitted projects | 2005 | 2006 | 2007 |
|---------------------------------------|--------------|--------------|--------------|
| Blanc (Blue sky) | | | |
| ICST | 101 | 129 | 96 |
| Engineering sciences | 104 | 163 | 139 |
| Chemistry | 136 | 231 | 212 |
| Physics | 125 | 182 | 173 |
| Mathematics and interactions | 50 | 73 | 60 |
| Universe and geo-environment sciences | 85 | 155 | 121 |
| Agronomy and ecology | 75 | 122 | 156 |
| Biology and health | 405 | 372 | 304 |
| Humanities and Social Sciences | 168 | 247 | 146 |
| Total | 1,249 | 1,674 | 1,407 |
| Young Researchers | | | |
| ICST | 101 | 74 | 64 |
| Engineering sciences | 71 | 54 | 49 |
| Chemistry | 123 | 132 | 97 |
| Physics | 101 | 73 | 43 |
| Mathematics and interactions | 37 | 35 | 28 |
| Universe and geo-environment sciences | 61 | 73 | 50 |
| Agronomy and ecology | 62 | 64 | 58 |
| Biology and health | 272 | 173 | 161 |
| Humanities and Social Sciences | 114 | 114 | 103 |
| Total | 942 | 792 | 653 |
| Chairs of Excellence | 50 | 43 | 26 |
| Grand total | 2,241 | 2,509 | 2,086 |

Young Researchers' and Chairs of Excellence programmes existed before the creation of ANR. The Blanc programme gave an actual opportunity for scientists working in basic research to submit projects judged exclusively on their originality and excellence. The number of submitted projects in the Blanc programme during the last three years fluctuated from 1,249 in 2005 to 1,674 in 2006 and 1,407 in 2007. These fluctuations are directly due to changes in programmes in the other ANR's basic research departments. In 2007 selection rate varied between 22% and 30%, depending on the

discipline, with an average of 26%. Furthermore, the Evaluation Committee was especially favourable to very high level and promising interdisciplinary projects, since ANR is the most appropriate agency to evaluate and to fund these types of projects.

The number of submitted proposals under the Young Researchers' programme declined during that period from 942 in 2005 to 792 in 2006 and 653 in 2007. In the first two years, ANR absorbed the programme that had been launched by the Ministry in charge of research, a programme that had had a very low selection rate. For the ANR Young Researchers' programme, the selection rate is directly connected to the quality of the projects and has varied over the years as follows: 26% in 2005, 21% in 2006 and 24% in 2007.

The number of submitted proposals for the Chairs for Excellence programme steadily decreased: 50 in 2005, 43 in 2006 and 26 in 2007. In 2007, ANR held a think-tank on the future of this programme; the results will lead, in 2008, to a better communication strategy to develop contacts with scientists abroad, such as CNRS representatives in North America, and via French Embassies.

The average grants awarded in Chairs of Excellence increased over the years: from 330 K€ in 2005, to 500 K€ in 2006 and 2007. Grants for the Young Researchers' programme rose from 120 K€ to 150 K€ in 2005 and 2006 to a maximum subsidy figure of 200 K€ in 2007. For the Blanc programme, in 2007, the average grants were about 330 K€ in representing funding ranging from 60 K€ to 800 K€ as compared with marginal project costs.

From 2005 to 2007, the overall budget of the department fell from 162.5 M€ in 2005 to 156.4 M€ in 2006 and 152.4 M€ in 2007.

3 SCIENTIFIC ASSESSMENT

A preliminary analysis was made for each major disciplinary sector as well as for each sub-sector of projects submitted and selected under the Blanc and Young Researchers' CFP over the last three years.

- **Information and Communication Sciences and Technologies (ICST)**

There has not been much variation in submission figures over the last three years. "Electronic information technology" accounts for half of the selected projects, followed by "micro and nano-technologies" and then "signal and communication". A more detailed analysis of the "information technology" brought out the overriding importance (60%) of "software technology". The success rate is twice higher than for "information technology and knowledge". Same result applies to "micro- and nano-technologies" compared to "waves and photonics".

- **Engineering sciences**

Submitted projects can be divided into five sub-sectors: "structure and material mechanics" (26%), "fluid mechanics" (21%), "process engineering" (18%), "biomechanical bioengineering" (13%) and "laser plasma and optics" (10%). The success rate in the last sub-sector is the highest (36%), with an overall average of 27%.

- **Chemistry**

Submitted projects fell into two main categories: "molecular chemistry" (60%) and "materials chemistry" (40%). It is important to stress the interdisciplinarity of chemistry, since 40% of the projects are at the interface with living sciences, 25% with sustainable development, 20% with nanosciences and ICTS and 6% with the energy field.

- **Physics**

These projects fell uniformly into three main sub-sectors; however, there is a significant difference in their success rate: "condensed materials" (20%), "astrophysics, atomic physics, soft matter" (30%) and "theoretical quantum physics" (35-40%).

- **Mathematics and interactions**

The main themes are "scientific computing and partial derivative equations" (30% of projects submitted), "algebra and geometry" (26-28%), followed by "probabilities and statistics" (12-13%). For all these themes, the success rate is about 35% in the Blanc programme and 29% in the Young Researchers' programme. As for interdisciplinarity, 47% of the projects in the Blanc programme and 32% in the Young Researchers' programme are considered to be multidisciplinary. The associated disciplines most regularly mentioned are the following:

- Information and Communication Sciences and Technologies,
- Physics,
- Biology and Health.

And to a lesser extent, Engineering sciences and Universe and Geo-environmental Sciences

- **Universe and geo-environment sciences**

Projects fell under four sub-sectors of which three ("astronomy and astrophysics", "ocean and atmosphere", "earth sciences") attract essentially the same number of projects (approx. 29%) and enjoy essentially the same success rate. The last theme "surfaces & interfaces of continents" attracted 12% of the projects and had a lower success rate than the other three themes.

- **Agronomy and ecology**

In this discipline, the number of projects submitted per sub-sector increases each year in "agronomics", "development and behavioural biology" and "biology of stress response". The number of submitted proposals for "biogeochemical cycle", "genomics" and "modelling" has decreased over the years.

- **Biology and Health**

Four main sub-sectors have been identified: "cellular biology", "structural biology", "genomics" and "evolution and development". In the Blanc programme, the number of projects funded in neurosciences, public health, and physiopathology was low, partly because thematic programmes in Biology and Health cover these disciplines.

- **Humanities and Social Sciences**

The diminution of the number of submitted projects was correlated to the increase in the number of thematic programmes: in 2007, 249 projects were submitted, of which 64 were funded. 75% of funded projects are run by University teams or scientists. Three disciplines are well represented: "historical sciences" and "archaeology" received close to 30% of the overall funding, with "anthropology and

ethnology" (approx. 8%). Cognitive sciences reached 20%, and economics over 15%. Social sciences, and in particular sociology, collected less funding, as well as political sciences and information/communication sciences. The main reason for the small amount of funded projects in literature, philosophy and the arts, is due to a very small number of submitted projects.

The interdisciplinarity of the Blanc and the Young Researchers programmes

As mentioned above, responses to CFPs, in certain disciplines, sometimes include a request that the project be evaluated by one or two Evaluation Committees (main and secondary ones). The request will only be considered if some sections of the project are actually interdisciplinary. Out of the 6,717 projects submitted in the last three editions of the Blanc and Young Researchers' programmes, 2,315 (35%) were considered interdisciplinary by project coordinators. Characteristics of an interdisciplinary project may vary, depending on the main scientific field of the project.

For the so-called "hard sciences" (mathematics, physics, chemistry, engineering), investigators, in over 40% of the cases, felt that their projects were interdisciplinary. The main interdisciplinarity of the projects was as followed:

- ICST collaborates with all disciplines;
- Engineering science collaborates with physics, chemistry and life science;
- Chemistry collaborates mainly with life science, but also physics and engineering sciences;
- Physics develops collaborations with chemistry and engineering sciences. Collaboration between life sciences and HSS is less important, about 20%. However these figures are significant and may well increase in the near future.

The initial level of interdisciplinarity between research areas is usually maintained throughout the duration of selected projects. Altogether 34% of the funded projects were evaluated by two scientific committees, and were considered as interdisciplinary by the project coordinator.

Investigators have shown high interest in interdisciplinarity, and in 2007 ANR had Evaluation Committees select proposals with equal input from the two disciplines. These projects were given a priority rating by each one of the Evaluation Committees. Out of 60 interdisciplinary projects, 31 were selected, in accordance with the steering committee (5 for Young Researchers' and 26 for Blanc). ANR aims at favouring and supporting multidisciplinary research; hence these projects will be carefully monitored and followed-up.

Project monitoring

Besides the semi-annual reports for all projects, projects are also monitored in three ways: site visits, ANR project reviews, and, most important, midway seminars. For Young Researchers' programmes, five seminars were held in various French provinces in spring 2007, where all investigators were invited to present their data. For the Blanc programme, six seminars were held in the provinces on the following themes: "Light", "Planetary Systems and Climate", "Energy and Sustainable Development", "Genomics", "Developmental Biology" and "Embedded Materials Technology". These seminars were attended by 10 to 23 project coordinators.

Seminars were organised not only to monitor the projects, but also to familiarise the scientific community with the very first projects selected under these two programmes in 2005.

International cooperation

In 2007, and for the first time, the Blanc programme was opened to international collaboration with the National Science Council (NSC) of Taiwan. This experience was so convincing that in 2008 the Blanc programme decided to collaborate with three other foreign funding agencies, namely the National Natural Science Foundation of China (NSFC), the Japan Society for the Promotion of Science (JSPS), and the Japanese Science and Technology Agency (JST).

- Association Française contre les Myopathies (AFM),
- Caisse Nationale de Solidarité pour l'Autonomie (CNSA),
- Direction Générale de la Santé (DGS),
- Institut National du Cancer (INCa),
- Ministère du Travail (DGT),
- OSEO Innovation.

2 A RETROSPECTIVE LOOK AT 2005-2007

The 16 programmes that were launched between 2005 and 2007, involved the following 35 calls for proposals (CFPs):

- 19 multidisciplinary CFPs aimed at increasing fundamental knowledge in the field of biology, health and environment-health relationships. These 19 CFPs funded research projects, such as the non-thematic programmes, are essential to major fields such as neurology, microbiology, immunology, cardiology; they also encourage interdisciplinary research at the edge of several fields, and research involving cross-cutting approaches (from biology or physiopathology to epidemiology, or from biology to clinical research etc.); as well as research using approaches from other disciplines such as physics, chemistry, mathematics, computer sciences, etc.
- 9 CFPs were dedicated to knowledge transfer from academic research, or to promote public-private partnerships in biotechnology and health-related technologies.
- 5 CFPs were opened to international partnerships in topics in which national programmes were already launched.
- 2 CFPs were dedicated to technology platforms, to fund either quality control approaches, large equipment updating or innovative technological developments needed for platform activities.

Eight of these programmes had a 3-year life span (corresponding to 24 CFPs), namely:

- four programmes on fundamental research on major diseases and fields related to these diseases:
 - **PHYSIO**, in 2005, focused exclusively on research proposals about molecular and physiopathological mechanisms in cardiovascular and metabolic diseases (obesity and diabetes). For 2006 and 2007, this programme expanded to other common diseases (excluding neurological, infectious and rare diseases that are covered by other programmes, and also cancer and AIDS that are covered by INCa and ANRS);
 - **MRAR** was part of the 4-year national plan on rare diseases launched in 2004, a plan including research spanning from the identification of disease-related genes to the development of early diagnostic and therapies;
 - **NEURO** combined basic research in neurosciences, natural history of neurological diseases (including sensory organs), psychiatric diseases, and cognitive sciences;
 - **MIME**, in 2005, combined basic research in microbiology and immunology with research on infectious diseases. Starting in 2006, this programme was modified to include research on emerging diseases in response to health crises triggered by the outbreak of bird flu, and also Chikungunya.
- The programme SEST Health-environment and health at work was part of the national action "health & environment" that was launched in 2005 by four ministries: health, environment, labour, and research. SEST was included into the Health and Labour Plan of the Ministry of Labour. This multidisciplinary programme ranged from studies of environmental factors to infectious components in the environment, as well as the health impacts of environmental changes, to research on the influence of work on human health. Priorities such as nanoparticles impact on human health were also considered in SEST.
- Emergence, a programme to favour knowledge transfer from academic research, was originally focused on

innovations & developments of biotechnology research projects (health, agronomy, and environmental sciences). In 2007, Emergence opened to research proposals on "technologies for health".

- Public/private partnership programmes in the field of biotechnology, RIB, and in the field of health-related technologies, TECSAN. TECSAN is the continuation of the first CFP launched in 2000 by the national network for health technologies. In 2007, RIB programme focused on health-related biotechnologies with the capacity to fund clinical research, and TECSAN opened its scope to include handicaps and assisted living. These two programmes are particularly dynamic, and since 2005, 163 enterprises have participated in RIB research proposals. Each year, at least half of the companies involved in submitted proposals are first-comers.

Two national programmes launched in 2006, BIOSYS and PCV, focused on fundamental multidisciplinary research in living science. BIOSYS aimed at giving an impulse to this young field, systems biology that requires both modelisation and the

Programmes - Co-funders

| |
|--|
| Physiopathology of human diseases (PHYSIO) |
| Multiyear research programme on rare diseases (MRAR) – AFM – DGS ³ |
| International research programme on rare diseases (E-RARE) |
| Neurosciences, neurology and psychiatry (NEURO) |
| Longevity and aging (LONGVIE) |
| Microbiology, immunology and emerging diseases (MIME) |
| International research programme on pathogenic organisms (PATHOGENOMICS) |
| Health & Environment, Health at Work (SEST) – DGT ⁴ |
| Physics and Chemistry of Living Organisms (PCV) – INCa ⁴ |
| Systemic biology (BIOSYS plus ANR-BBSRC-SYSBIO) |
| Emergence and development of biotechnological and technological projects on health (EMPB then EMERGENCE) |
| Research and innovation in Biotechnology (RIB) |
| International research programme on biotechnology (EuroTransBio) – OSEO Innovation |
| Technologies for Health (TECSAN) – CNSA ⁴ |
| Collection of biological samples in the health sector (CEBS) |
| Technological platforms on living organisms (PFTV) – INCa ⁵ |

Total

use of data from "high throughput" technologies. In 2007, BIOSYS was only opened to partnership projects with research teams in the UK. PCV aimed at developing research at the interface of physics, chemistry and biology. This programme initially embraced life sciences as a whole, but in 2007, was focused on health sciences.

The LONGVIE programme was launched in 2007 to accelerate research on longevity and aging, and was meant to complement the PHYSIO and NEURO programmes in a field with very strong societal demand. This programme was not reopened.

To enable French teams to submit research proposals in collaboration with foreign partners in fields that have already national programmes, five international actions were started in 2006. In 2006 and 2007, for instance, EuroTransBio (ETB) was the ERA-Net equivalent of the national programme RIB; Pathogenomics was the Eranet equivalent of MIME; and ERARE the equivalent of MRAR in 2007. The last two programmes were especially competitive CFPs and attracted many European groups, French research teams also did well and were present in each one of the selected projects. These results confirmed the intrinsic value of French researchers in the fields of pathogenomics and rare diseases. In 2007, the first bilateral initiative of the Department was SYSBIO, and was issued together with the UK funding agency BBSRC.

| Data for 3-year period | | | | | | | Typical project | | |
|------------------------|---|--|----------------------------|---------------------------------|------------------------------------|-------------|---|--------------------------|-----------------------------|
| Number of editions | Number of submitted projects ¹ | Number of funded projects ¹ | Number of cluster projects | Number of partners ² | Number of enterprises ² | Budget (M€) | Number of partners per project ² | Budget (K€) ¹ | Selection rate ² |
| 3 | 467 | 107 | 2 | 275 | 1 | 35.8 | 2.6 | 334 | 23% |
| 3 | 401 | 102 | 2 | 193 | 0 | 25.3 | 1.8 | 248 | 25.4% |
| 1 | 132 | 13 | - | 18 | 0 | 2.5 | 1.4 | 192 | 16.3% |
| 3 | 663 | 146 | 6 | 319 | 4 | 52.7 | 2.2 | 361 | 22.1% |
| 1 | 52 | 7 | - | 17 | 0 | 2.4 | 2.4 | 336 | 13.5% |
| 3 | 529 | 113 | 11 | 243 | 1 | 35.3 | 2.2 | 312 | 21.4% |
| 1 | 42 | 12 | - | 21 | 0 | 2.3 | 1.8 | 188 | 43% |
| 3 | 396 | 114 | 2 | 317 | 2 | 24.9 | 3 | 219 | 28.8% |
| 2 | 399 | 68 | 13 | 201 | 2 | 28.3 | 3 | 416 | 17% |
| 2 | 90 | 21 | 1 | 64 | 1 | 6.8 | 3 | 324 | 23.3% |
| 3 | 346 | 102 | 11 | 210 | 0 | 16.3 | 2.1 | 160 | 29.5% |
| 3 | 289 | 75 | 22 | 233 | 91 | 58.3 | 3.1 | 778 | 26% |
| 2 | 83 | 21 | - | 47 | 11 | 5 | 2.2 | 239 | 48.1% |
| 3 | 315 | 71 | 8 | 364 | 104 | 47.8 | 5.5 | 673 | 22.5% |
| 1 | 41 | 29 | - | 36 | 0 | 4.6 | 1.2 | 157 | 70.7% |
| 1 | 91 | 18 | - | 30 | 0 | 6.8 | 1.2 | 377 | 19.8% |
| - | 4,336 | 1,019 | 78 | 2,588 | 217 | 355.1 | 2.4 | 332 | 28.1% |

¹ For the international programmes, these figures only include projects that have a French partner

² For the international programmes, these figures only apply to the French partners

³ These data do not include the co-funders' contribution

⁴ These data include the co-funders' contribution

⁵ The 7 projects supported by INCa are not included



ECOSYSTEMS AND SUSTAINABLE DEVELOPMENT

1 THE STAKES

The Ecosystems and Sustainable Development Department covers a vast part of the biology sector, to include:

- studies on the ecosystems,
- research on agricultural activities to meet the challenges of sustainable development,
- animal and plant genomics and large scale microbial genomics,
- research on human nutrition,
- research on GMOs.

2 A RETROSPECTIVE LOOK AT 2005-2007

The range of sub-disciplines stretches from highly focused research on the genome, to a broadly integrated approach through the ecosystems.

More fundamentally, the technological advance in sequencing genomes of bacteria, plants and animals has given an enormous boost to knowledge about the structure, functioning and evolution of these genomes. The first applications are ready and waiting. Demand is growing for both plant and animal genomes, which is vastly greater and more complex than bacterial genomes. With considerable help from ANR, French teams regularly join international public consortiums. In functional genomics, animal and plant research is usually conducted within the country and then rounded out at the international level. In this field, ANR programmes have created structures for research bodies such as INRA, CNRS, Universities, CIRAD, CEA and IFREMER. A major step forward was taken in 2007, with the creation of a large-scale microbial genome programme that uses the metagenomic approach.

Research on agricultural activities as part of the stakes of sustainable development bears not only on agriculture as such, but also on fields such as sylviculture, continental and marine aquaculture and coastal fishery, taking research to very different environments, such as rural, peri-urban, aquatic, coastal... This research is carried out as part of the production, and the transformation of foodstuffs, as well as non-food uses of produced goods, such as biomass as a source of energy. It is intended for countries of both the North and the South (production-consumption integration). The CFPs were launched in 2005 and 2006. Part of these activities has since been taken over by SYSTERRA, the new programme launched in 2008.

The purpose of the National Food and Human Nutrition Research programme (PNRA) is to finance projects that support innovations in the food industry and facilitate access to knowledge on foods and the food chain, the consumer, and the links between eating patterns, food, health and food policies. More broadly, this programme seeks to spur research in both the food sciences and nutrition sectors, thus clearly identifying France's place in a rich, ever-changing scientific context both at national (competitiveness clusters, RTRA) and international levels.

Biodiversity is, on the social front, a very sensitive topic that lies at the heart of the concept of sustainability. The Biodiversity programme, launched in 2005, fits in with French research in this field and seeks to characterise and evaluate biodiversity, understand its dynamics (with the prospects of making forecasts on its evolution), and grasp the ecological, economic and social impact of changes in biodiversity. An ancillary aspect is species conservation and habitats.

The scientific research programme on the GMOs is also an extremely sensitive element in our country's research panorama, due to the very specific political context and to public opinion. ANR seems to be the only governmental body that openly funds research projects on GMOs, although the budget is small (< 2 M€) due to the small number of project submissions. Themes are very broad since they range from understanding and improving transgenesis technology to socio-economic, legal, and bio-ethical impacts. Between these extremes, attention is focused on aspects related to the evaluation of security in relation to the risk of transgenic dispersal and use in foods, as well as studies on the space-time co-existence of GMO and non-GMO production organisms. This programme was originally limited to plants but, in 2006, expanded to include animals. In 2005 and 2006 the number of project proposals went up significantly, but very few proposals were received in 2007. ANR, has therefore decided to stop the programme in 2008. If all goes well, this will only be a temporary decision.

Aside from the GMO question, the results of the work programme carried out by the Ecosystems and Sustainable Development Department were rich and diversified with 7 different programmes⁶, of which six were listed in the 2007 editions. Out of the 6 CFPs launched in 2007, 4 attracted strong private sector participation and even the GMO programme currently receives slight but tangible backing from a private organisation. This private sector involvement is a very welcome economic boost for the plant and animal product sectors, as well as for the agro-food sectors.

A workshop was held in 2007 to prepare for the future (*Atelier de Réflexion Prospective - ARP*). BIOMASFUT seeks to identify and improve plants that may be used to produce biomass for non-food purposes, mainly agrofuels and the chemical industry under sustainable conditions based on comprehensive energy assessments.

The programmes of the Ecosystems and Sustainable Development provide annual funding of around 41 M€.

The amount allocated to ARP BIOMASFUT (232,000 €), and drawn on the 2007 Foresight budget, is to be added in the description of this programme.

6 To be more precise, there is an 8th programme that should be added. It makes up the international component of Plant Genomics with French teams participating in ERA-Net Plant Genomics that is run as a dedicated CFP, independent of the national programme. In this assessment, the two CFPs (national and ERA-PG) have been merged.

| Programmes | Data for 3-year period | | | | | Typical project | | |
|---------------------------------|------------------------|------------------------------|---------------------------|----------------------------|---------------|--------------------------------|-----------------------|--------------|
| | Number of editions | Number of submitted projects | Number of funded projects | Number of cluster projects | Budget (M€) | Number of partners per project | Number of enterprises | Budget (K€) |
| BIODIV Biodiversity | 3 | 305 | 45 | 7 | 30.48 | 5.8 | 0.2 | 677.3 |
| ADD Sustainable Agricult. Dev. | 2 | 193 | 33 | 1 | 9.6 | 7.8 | - | 291 |
| GANI Animal genomics | 3 | 108 | 41 | 6 | 9.47 | 3.6 | 0.68 | 230 |
| GPLA Plant genomics | 3 | 252 | 93 | 15 | 41.87 | 2.9 | 0.47 | 450 |
| GMGE Large-scale micro genomics | 1 | 11 | 4 | 0 | 3.23 | 4 | - | 809 |
| GMA | 3 | 45 | 21 | 2 | 5.71 | 3.2 | 0.28 | 271 |
| PNRA Food science | 3 | 429 | 83 | 32 | 41.8 | 6.2 | 1.5 | 503.6 |
| Total | - | 1,343 | 320 | 63 | 142.28 | 4.7 | 0.66 | 444.6 |

Monitoring

Monitoring, as an activity, was gradually introduced through:

- regular activity reports prepared periodically by each project coordinator;
- midway and project completion seminars organised by each programme for all project coordinators and representatives from each programme;
- a Scientific Advisory Board already established for several programmes (these boards are composed mainly of foreign scientists who attend the seminars and analyse the results);
- site visits, usually 2 or 3 per programme per year.

Cross-cutting actions

Several programmes in the Ecosystems and Sustainable Development Department interact with programmes in other departments in high level consultations to demarcate their thematic fields:

- food/nutrition programme with human physiology (Biology and Health Department);
- plant genomics programmes (plants for bio-fuels) with Engineering, Process and Security;
- large-scale microbial genomics programme (enzymes for biocatalysis of reactions in industrial chemistry);
- GMO programme including social, legal, commercial and ethical aspects that fall under the Humanities and Social Sciences Department.

3 SCIENTIFIC ASSESSMENT

Since the first two editions of the CFPs were only launched in 2005, results for the 2-year projects are only just beginning to appear. However, thanks to feedback from the monitoring mentioned above, we are able to draw some early conclusions, as per the programme descriptions below.

• Food science research programme (PNRA)

Editions of the PNRA programme have covered most of the scientific themes in the agro-foods sector through ambitious projects that include both multidisciplinary and fundamental approaches. Nonetheless, this programme, regrettably, is somewhat weak in both technological fields and policy support.

• GMO research programmes

Scientific research on GMOs developed considerably in both 2005 and 2006. Results from projects launched in 2005 provide insights on crucial questions for scientists as well as for public opinion and politicians.

Unfortunately, anti-GMO pressure has been such that the scientific community abandoned the subject, thus leading to a sharp drop in project submissions in 2007.

- **Biodiversity research programme**

The third edition of the programme, like the first two, attracted strong support from scientists. In 2007, the earlier preference for biodiversity characterisation was replaced by proposals on the evaluation of the impact of changes in biodiversity and the management of biodiversity, a field whose relation to the research strategy adopted in 2005 is not adequately expressed. One of the great successes of this programme is its strong project interdisciplinarity and the capacity of consortiums to deal with highly complex research topics. Another remarkable point is the great international, especially European, openness of the scientists approach in broaching their subjects.

- **Genomics research programmes**

The majority of the 2005 and 2006 plant and animal genomics programmes are progressing on schedule, and most requests for extensions are related to plant genomics, since plant growth suffers from the vagaries of our climates.

The **plant genomics** programmes launched in 2005 and 2006 were analysed by a monitoring committee composed exclusively of international experts whose opinions were positive; breakthroughs led to patents on improvements to field crops (3 have already been obtained), and genome sequencing in the vineyards made international news. For the programme themes, three editions cover the various aspects of genomics (defined in the broad sense of the term) and incorporate emerging issues, such as the production of biomass as a source of energy, reduction in inputs, resistance or tolerance to bioagressors and abiotic stress, especially drought. The national programme was rounded out by an ERA-NET action launched in 2006, which went on to become trilateral in 2007 (France-Germany-Spain).

In **animal genomics**, all the areas proposed in the CFPs have been covered, including bioagressors and emerging diseases (bird flu, Blue Tongue, Rift Valley Fever). In the three successive editions, the list of sectors receiving support grew steadily and now abounds in species of major importance for the economy. Top ratings have been obtained: a major gene for meat tenderness and a gene that explains muscular hypertrophy in sheep have been identified, and two patent applications have been deposited. Bilateral Franco-German collaboration is in the planning stage.

A **large-scale microbial genomic** programme was launched in 2007 and meets a need strongly expressed by the scientific community speaking on behalf of all the research organisations working in this field. Together with China, an important project is being prepared on the metagenome of the human digestive tract and its relation to obesity.

Furthermore, following consultations with the DGRI, a plan for functional coordination of the ANR CFPs was introduced. It involves massive genome sequencing and the GENOSCOPE CFPs.



SUSTAINABLE ENERGY AND ENVIRONMENT

1 THE STAKES

Present-day popular debate mainstreams the science and technology of energy and environment, especially under the umbrella of the *Grenelle de l'Environnement*⁷, with prices for raw materials soaring, medium-term prospects of "peak oil", problems stemming from climate change, and impacts on the environment. A research policy that addresses the conjoining problems of energy production and efficiency and the reduction of risks to the environment is required to cope with these intertwined factors. These fundamental challenges will eventually lead to important changes in the way our societies produce and consume energy.

R&D will have to invent and develop new modes of industrial production, transport, urban organisation and habitat, to radically reduce energy consumption and diversify our sources of energy, whereby significantly decreasing pollutive emissions, especially greenhouse gases. The brief will also include the study of the vulnerability of our societies to environmental risks and how we should adapt to these risks.

The ANR programme fits in well with the priorities discussed at the debate on the environment (*Grenelle de l'Environnement*). The Sustainable Energy and Environment Department has a threefold priority programme:

- development of new technologies, from alternative energy to carbon-based fossil energy;
- energy efficiency in building and transport;
- sustainable development for industry and cities, environmental risk management.

There are two concomitant challenges: a) supporting changes in the French society in response to changes in the energy model for industrial production, and b) increasing the competitiveness of both national and European industry.

The technological research programmes are structured around the notion of an energy sector, such as hydrogen, bioenergies, and photovoltaic solar cells, as well as an industrial sector, such as ecotechnologies (PRECODD), construction (PREBAT) and transport (PREDIT). Two multisectoral programmes are devoted to two specific technological problems: CO₂ capture and storage, and energy storage. Most of these programmes combine fundamental research with industrial research, with strong emphasis on public-private partnerships.

In the environment sector, pride of place has been given to a systemic approach, especially in the "Vulnerability: Environment and Climate" programme, requiring strong multidisciplinary research with partnerships between environmental sciences and the human and social sciences.

⁷ Multiparty debate that led to numerous agreements on environment-related policy.

To complete the spectrum of energy research on energy efficiency programmes, two programmes have been centred on major technological obstacles in energetics: energy storage and CO₂ capture and sequestration.

The Stock-E programme was launched in 2007 to deal with the problem of energy storage as electricity, thermal energy, mechanical energy, etc. Priority was given to electrochemical storage.

The CO₂ Capture and Storage programme is focused on the important challenge of massive reduction of CO₂ emission in the medium term by the energy sector and certain industries, such as cement and steel. The programme covers the full range of technologies, from gas capture and separation to transport and underground storage. At the outset of this programme in 2005, the brief was to expand and strengthen the French scientific community working in this field.

Environment, climate and urban systems

In this field, ANR researches systemic aspects of major environmental problems such as natural risks and global change, as well as technological advances in improving the quality of the environment.

Two CFPs on Telluric Disasters and Tsunamis were issued in 2005 and 2006 to develop fundamental research into the phenomena causing major telluric disasters: earthquakes, volcanoes, tsunamis, and gravitational instability. The CFPs targeted the world's main risk areas such as the Indian Ocean, the Antilles Arc, and the Mediterranean.

Global change has become a key issue with strong environmental, social and economic implications. This explains the ANR decision in 2006 to launch the Vulnerability: Environment and Climate (VMC) programme to study systems prone to climate change and anthropic pressure, and to develop a predictive approach that, at least, will cover the next thirty years. As part of the International Polar Year in 2007, the VMC focused particularly on the polar environment.

In Europe, operationalisation of the EcoTechnologies Action Plan (ETAP) in 2004 provided momentum and structure for the development of environmental technologies. This was the backdrop to the PRECODD programme which ANR started in 2005, with focus on pollutant emissions from industry and urban areas. This programme explores sustainable industrial production and pollution treatment and assessment technologies. Its scope has changed slightly since 2005; first it included polluted soils and waters and then, as of 2006, grew to include air and marine pollution technologies.

The Civil and Urban Engineering programme, launched in 2005 in conjunction with RGCU, the technological network, was the key to improving services through civil engineering and urban infrastructure; better control of the vulnerability of these structures to natural and technological risks and improving the safety of workers and users. The 2005 CFPs focused on improving the safety and reliability of these structures and on reducing natural risks. The 2006 and 2007 calls focused on improving the engineering, risk control, and accommodating the principles of sustainable development in civil and urban engineering.

Since 2005, support for energy technology has amounted to 209 M€, of which 121 M€ supports new energy technologies (hydrogen, bioenergies, photovoltaic solar) and 87 M€ energy efficiency in buildings and transport, energy and CO₂ storage. Most of the research on new technologies has been focused on hydrogen and the fuel cell (72 M€, that is 62% of earmarked aid).

| Programmes | Data for 3-year period | | | | | | | Typical project | | |
|---|------------------------|------------------------------|---------------------------|----------------------------|--------------------|-----------------------|----------------|--------------------------------|--------------|----------------|
| | Number of editions | Number of submitted projects | Number of funded projects | Number of cluster projects | Number of partners | Number of enterprises | Budget (K€) | Number of partners per project | Budget (K€) | Selection rate |
| PAN-H | 3 | 179 | 59 | 34 | 339 | 132 | 160,385 | 5.7 | 2,718 | 33% |
| PV | 3 | 82 | 30 | 18 | 184 | 54 | 43,168 | 6.1 | 1,439 | 37% |
| PNRB | 3 | 79 | 32 | 22 | 185 | 66 | 30,396 | 5.8 | 950 | 41% |
| PREBAT | 3 | 201 | 34 | 25 | 165 | 77 | 9,397 | 4.9 | 276 | 17% |
| PREDIT VPE | 2 | 113 | 17 | 28 | 221 | 94 | 18,789 | 13 | 1,105 | 15% |
| PREDIT TSFA | 3 | 156 | 51 | 18 | 127 | 41 | 64,963 | 2.5 | 1,274 | 33% |
| CO ₂ | 3 | 73 | 26 | 5 | 171 | 58 | 29,193 | 6.6 | 1,123 | 36% |
| Stock-E | 1 | 25 | 10 | 4 | 42 | 12 | 6,350 | 4.2 | 635 | 40% |
| Total Energy | - | 908 | 259 | 154 | 1434 | 534 | 362,641 | 5.5 | 1,400 | 29% |
| PRECODD | 3 | 249 | 55 | 24 | 278 | 102 | 79,532 | 5.1 | 1,446 | 22% |
| VMC | 2 | 91 | 29 | 5 | 150 | 9 | 17,914 | 5.2 | 618 | 32% |
| CATTEL | 2 | 69 | 31 | 8 | 122 | 4 | 19,405 | 3.9 | 626 | 45% |
| PGCU | 3 | 117 | 25 | 21 | 229 | 69 | 26,638 | 9.2 | 1,066 | 21% |
| Total Environment, climate and urban systems | - | 526 | 140 | 58 | 779 | 184 | 143,489 | 5.6 | 1,025 | 27% |
| Total sustainable energy and environment | - | 1,434 | 399 | 212 | 2 213 | 718 | 506,130 | 5.5 | 1,268 | 28% |

A PAN-H seminar, held in Grenoble in November 2007, brought together close to 300 participants to assess progress in programme implementation and, more specifically, to look at key elements of the projects selected in 2005.

The CO₂ Capture and Storage programme held a midway seminar in Pau in December 2007, where 150 participants discussed this emerging industry.

The PRECODD programme held a two-day meeting in November 2007 in Aix-en-Provence, in partnership with ADEME and the Mer et Risques PACA clusters. Close to 150 people attended, and discovered the early results of projects selected in 2005.

The CATTEL programme held a midway seminar in December 2007 to present results from projects selected in 2005 during the first edition.

3 SCIENTIFIC ASSESSMENT

After three successive calls for proposals, the time has come to make a preliminary assessment of programmes launched since 2005.

- **PAN H**

The programme on the hydrogen and fuel cells sector funded 59 projects at a cost of 72 M€. The breakdown of projects selected is as follows: 11 projects on hydrogen production technologies (14.5 M€); 14 projects on supply, storage and security of installations (12.4 M€); 31 projects on research on fuel cells for embedded applications, such as PEMFC or stationary applications such as SOFC (43.5 M€); and 3 projects on technico-economic approaches, security and social acceptability (1.8 M€). The PAN-H programme significantly strengthened the French "hydrogen and fuel cells" community, and hence strengthened its position at the European level, especially in the Joint Technology Initiative on hydrogen.

- **PV**

The photovoltaic solar programme funded 32 projects costing 25.6 M€: 22 industrial research projects, 9 fundamental research projects, and one pre-competitive type project. ADEME funded most of the pre-competitive development projects in this programme. Altogether, the PV programme funded 7 projects on crystalline silicon cells, 6 projects on fabrication processes based on thin layers, 11 projects on new concepts (mainly based on polymers or doped carbon nanotubes), and 8 projects on components and systems related to electrochemical storage, micro-networks, electricity production and consumption flow management.

- **PNRB**

The PNRB programme selected and funded 32 projects at a cost of 23.2 M€ with strong input from industry (45% of the teams): 4 projects on the evaluation of lignocellulosic resources (3.45 M€); 13 projects on the thermo-chemical conversion of biomass (8.8 M€); 12 projects on biological conversion (10.2 M€); and 2 projects on socio-economic and environmental evaluations (0.75 M€). The programme contributed to strengthening public-private partnerships in this field of research (working with a competitive scientific community on second generation processes), and to the emergence of scientists working on third generation processes.

- **PREDIT 3**

The ANR contribution to the PREDIT 3 programme in 2005-2007 funded 68 projects at a cost of 57.5 M€, distinctly banking on partnerships. Industry joined research laboratories and almost all received the competitiveness clusters label. During this period, 21 projects were devoted to the integration of information technologies and intelligent transport, 15 projects to user safety and reliability, and 17 to Clean and Thrifty Vehicles.

- **PREBAT**

The ANR contribution to the PREBAT programme funded 34 projects at a cost of 12.2 M€, with strong input from industry (45% of the teams). Over one-third of the funded projects (14 projects, 4.4 M€) fell under the building envelope component.

The other leading theme in the programme was equipment for energy production: heat, refrigeration and electricity (10 projects, 3.6 M€). Cross-cutting technical approaches allowed 6 projects (2 M€) to be funded, while modelling, a new theme in 2006, was taken up in 4 projects (2.25 M€). Almost all the projects were prepared through competitiveness clusters (TENERRDIS, DERBI, Capenergies). The PREBAT CFPs (technological component) contributed their collective efforts in making research in this field more coherent.

- CO₂

The CO₂ Capture and Storage programme is the first national programme to bring together everyone working in this emerging industry; it has financed 27 projects at a cost of 22.14 M€. 44% of the grants went to research on capture technologies (12 projects), 48% of the grants went to geological storage (13 projects). Two projects were funded under the theme of security and socio-economic approaches in industry (0.8 M€). Close to 30% of the grants were for fundamental research projects, the rest for industrial research. The programme served to expand the community of scientists working in this area, especially in universities, and consequently help to prepare for the emergence of CO₂ capture and injection pilots across the country.

- PRECODD

The PRECODD programme on eco-technologies funded 56 projects at a total cost of 33.4 M€ (approximately one-third was granted to private partners): 18 projects on sustainable industrial production and waste management (12.4 M€); 33 projects on the production of natural resources and pollution emission processing and assessment, more specifically, 14 on water, 9 on the sea, 9 on soils and 1 on air (15.8 M€); and 5 projects on the integrated management of pollutants, including socio-economic approaches. PRECODD is the first national programme to cover the whole eco-industrial sector. It has greatly increased the number of public-private partnerships and directed significant attention to innovations in this emerging sector.

- PGCU

The three editions of the PGCU programme funded 26 projects at a cost of 15.3 M€, (with strong input from the business sector, close to one-third of the teams.): 9 projects on risk prevention and infrastructures monitoring (4.1 M€); 6 projects on the engineering and maintenance of infrastructure (3.6 M€); 5 projects on improving the performance of civil engineering (3.4 M€); and 6 projects on sustainable development approaches devoted to the public works industry (4 M€). This programme was extremely well received by both the private sector and public research laboratories, and it has made a considerable contribution to structuring and reenergising research in civil engineering.

ENGINEERING, PROCESSES AND SECURITY

1 THE STAKES

The Engineering, Processes and Security Department, which was created on 1 January 2007, has three programmes:

- Materials and Processes,
- Chemistry and Processes for Sustainable Development,
- Concepts, Systems and Tools for Global Security.

Materials and Processes and Chemistry and Processes for Sustainable Development are part of a broader theme related to sustainable development. The era of "eco-efficiency" that has characterised the last few decades is still central to many activities and needs to be followed by an "eco-design" era that incorporates environmental parameters from the beginning of the product design stage.

With regard to materials, one of the challenges is to bring together scientists from disciplines as far apart as materials sciences, process engineering, chemistry, mechanics, physics and even mathematics around a common objective, i.e. the development of more advanced materials to meet societal needs for sustainable development and optimised performance. Major challenges include the development of lighter, thus energy-saving construction materials as well as multifunctional materials to stimulate innovation in sectors such as habitat, transport, textiles, "cleaner" processes for waste treatment, etc., more economical use of materials and lower energy consumption.

In the chemistry sector, basic research and strong innovations are keyed to environmental protection, as was discussed in 2005 by the think-tank on the future of the chemical industry in France by the year 2015. The *Grenelle de l'environnement* suggested actions of direct or indirect concern to the chemical industry, a forward-looking industry that has embarked on actions to reduce greenhouse gas emissions and increase the use of renewable materials (increase from 7 to 15% of the supplies by the year 2017).

Controlling risks and impacts of chemical substances and products for people and the environment has become a major target exemplified by REACH, a European Community Regulation that entered into force on 1 June 2007 and concerns tens of thousands of substances. Risk evaluation tools currently in use are old and often very costly. Some of them that involve experiments on animals are ethically questionable. New tools and methods for industry, especially SMEs and expert bodies are needed to enable the French scientific community to stay abreast of the other European countries and demonstrate a high level of expertise in its dealings with the future European Chemical Agency (ECHA).

The Concepts, Systems and Tools for Global Security programme, using a prospective-cum-systemic approach, seeks innovative solutions to the high stakes of security; this involves organisational, social, cultural, economic, legal and technological challenges.

To cope with these challenges, three objectives need to be fulfilled:

Decompartamentalise research on security matters. The introduction of innovative technology in public and civil security can only lead to effective solutions, i.e. solutions that decrease the level of real risks and risks perceived by the public, if it is supported by parallel thought on usages, and on the legal, sociological and economic facets of the security problem. With this in mind, when establishing complex, interconnected protection systems at the national level or even within an enterprise due attention must be given to system interoperability and, upstream, the need for a pre-normative approach in designing the systems. This is where human and social sciences have a decisive contribution to make, but unlike the Anglo-Saxon world, in France there is a certain “reciprocal suspicion” of integrated research that brings industry and academia together.

Introduce a genuinely forward-looking approach that allows all the stakeholders to adopt the more effective medium- and long-term time frame in anticipating threats and working out appropriate solutions. An incremental, systemic approach of this sort is not part of the habitual perspective, first and foremost among the users and the public/private security authorities.

Reorganise and ensure greater coherence in the security market, especially from the demand side, thus making it more attractive and more accessible, a twofold advantage. Furthermore the third objective fits in with the European line of logic, thus fulfilling a pre-requisite to amalgamating the needs.

Like many other ANR programmes, these three programmes recognise the need for multidisciplinary actions with fundamental research often carried out alongside applications (two programmes are in partnership, the third is “open”); interaction of hard sciences with human and social sciences should be developed in the near future in the chemistry, materials and global security sectors.

2 A RETROSPECTIVE LOOK AT 2005-2007

This retrospective (see following tables) will be very limited since the Chemistry and Processes for Sustainable Development programme was launched in 2007, and the Concepts, Systems and Tools for Global Security programme in 2006. The Materials and Processes programme is the only one that was launched in 2005. It is a partnership programme stemming from the RNMP (national materials and processes network) that involves at least one public research laboratory and one industry. It has launched its third CFP and enjoys unarguable success. Its CFPs brought in 82 project submissions in 2005, 99 in 2006 and 106 in 2007. Out of 99 proposals in 2006, for instance, 7 of the 23 projects that were selected and financed were labelled by the competitiveness clusters. These projects bring 148 partners together, including 70 enterprises. In its triennial programme revision, ANR felt that this generic programme should be continued. Organisations and ministries consulted at the beginning of the year felt the same. The Chemistry and the Materials and Processes sectorial committees made a recommendation along these lines. This led to a proposal for a major overhaul to focus the theme more on the functionality of materials, including the concept of multifunctionality and the law of scales (nano-meso-micro-macro). This in-depth revision led to a change in name. In the 2008 edition, the programme will be called Functional Materials and Innovative Processes.

The Concepts, Systems and Tools for Global Security programme, launched in 2006 is a partnership programme and received a top up from the DGA. It is becoming steadily more successful (43 projects of which 7 were labelled by 4 competitiveness clusters in 2006, 52 projects in 2007). It is natural for this multidisciplinary programme to be continued in 2008, becoming more appealing for the Human and Social Sciences teams.

Last, the new Chemistry and Processes for Sustainable Development was launched in 2007. Its first year was successful with 70 project submissions. Unlike the two preceding programmes, this is an "open" programme; 25 projects include teams from industry (SMEs and large groups). In 2008, minor adjustments should be made on "plant chemistry" and to deal with constraints stemming from REACH, the European regulation. The foresight workshop, "REACH and its constraints: the need for adapted research" (called PRO-REACH), launched at the end of 2007, should be helpful.

Monitoring

Two of the Department's programmes have been monitored with the assistance of the support units: "classical" midway monitoring for MatetPro, the only programme that was started in 2005, and an original type of monitoring through a workshop, which combined scientific activities carried out in a multidisciplinary community and a presentation on the initial results of the projects under the CSOSG programme launched in 2006.

In January 2007, ANR and USAR organised the first seminar of the Materials and Processes programme on progress halfway through projects funded in 2005. This was a monitoring seminar organised as sessions related to the main objectives of the CFPs: polymers, plasma, thin layers, metallurgy and processes, metallurgy and nanotechnology. Three speakers were invited to introduce the pre-project research work as follows:

- Deciphering Fracture Surfaces, *Elisabeth Bouchaud*
- Nanopowder Metallurgy - Mechanical Behaviour of Metallic Nanostructures, *Yannick Champion*
- Brief Review of Plasma-Surface Interactions, *Pascal Brault*

The first Interdisciplinary Workshop on Global Security (WISG'07, 30 and 31 January 2007), held at the *Université Technologique de Troyes*, signalled the emergence of a scientific and technical community. This created a need for an annual meeting on global security to allow the members of this community to meet, share their ideas and take stock of their current situation, etc.

The purpose of the second workshop (WISG'08, 29 and 30 January 2008) will be, *inter alia*, to continue creating awareness in certain academic communities. The workshop will provide an opportunity for poster presentations (by participating

consortiums) on projects selected by ANR for the Concepts, Systems and Tools for Global Security programme in 2006 and 2007.

| Breakdown of funding per theme | | | | |
|--|---------|----------|----------|-----------|
| Materials and Processes | 2005 | 2006 | 2007 | Total |
| Number of projects submitted | 82 | 99 | 106 | 287 |
| Number of projects funded (cluster labelled) | 16 (6) | 23 (7) | 28 (14) | 67 (27) |
| Selection rate | 19.5% | 23% | 26.4% | 23.3% |
| Number of partners financed (industry) | 83 (40) | 148 (70) | 154 (69) | 385 (179) |
| Number of partners per projects | 5.2 | 6.4 | 5.5 | 5.7 |
| Total amount (M€) | 12.1 | 18.3 | 21.2 | 51.6 |
| Amount per project (K€) | 760 | 796 | 758 | 771 |
| Amount per team (K€) | 147 | 124 | 138 | 136 |

| Concepts, Systems and Tools for Global Security | 2006 | 2007 | Total |
|---|---------|---------|----------|
| Number of projects submitted | 43 | 52 | 95 |
| Number of projects funded (cluster labelled) | 14 (8) | 13 (7) | 27(15) |
| Selection rate | 32.5% | 25% | 28.5% |
| Number of partners financed (industry) | 64 (34) | 76 (29) | 140 (63) |
| Number of partners per projects | 4.6 | 5.8 | 5.2 |
| Total amount (M€) | 10.8 | 11.7 | 22.5 |
| Amount per project (K€) | 773.3 | 900.8 | 838 |
| Amount per team (K€) | 168.8 | 154.1 | 161.5 |

| Chemistry and Processes for Sustainable Development | 2007 |
|---|---------|
| Number of projects submitted | 70 |
| Number of projects funded (cluster labelled) | 21(3) |
| Selection rate | 30% |
| Number of partners financed (industry) | 69 (11) |
| Number of partners per projects | 3,3 |
| Total amount (M€) | 10 |
| Amount per project (K€) | 476.7 |
| Amount per team (K€) | 145 |

INFORMATION AND COMMUNICATION SCIENCES AND TECHNOLOGIES (ICST)

1 THE STAKES

Information and Communication Sciences and Technologies (ICST) is a scientific domain where research provides significant added value that directly impacts the innovation and the competitiveness of the companies as well as the society. The following major issues can be highlighted:

- the introduction of embedded systems in a large number of products,
- the evolution toward the internet of things,
- the access to new services and usages through ubiquitous computing,
- the growing role and importance of simulation in designing processes,
- the development of breakthrough for circuit miniaturisation and added functionalities to develop smart systems.

The competitiveness of national and European industry is not the only challenge. There are also intangible fields such as training, health, sustainable development and access to culture as well as the development of a secure digital world that inspires users' trust. The public and private R&D spend in France for ICST amounts to 0.4% of the GDP, in other words, around 7,200 M€.

With regard to the organisation of research and development, STIC and nanotechnologies have common characteristics that are reflected in the ANR programme:

- **the need for multidisciplinary actions.** ICST increasingly requires skills from various disciplines, e.g. digital computing, and fields being modelled. Similarly, software, materials and HSS (through usages, legal issues, economic models) are often closely connected. For instance, for nanotechnologies, a variety of skills and techniques are required for objects characterised primarily by a length scale: physics, chemistry, manufacturing processes ;
- **convergence between knowledge and technologies**, whose full value is expressed through applications to other fields such as trade, healthcare, production, transport, intelligent materials, etc ;
- **bridging the gap between fundamental research to applications.** This ranges from pre-competitive projects to the first prototype, demonstrations of functions, as well as subjects far upstream such as quantum mechanics, mathematics, sciences of living resources, cognitive sciences.

2 A RETROSPECTIVE LOOK AT 2005-2007

Between 2005 and 2007, the "Materials and Information" Department, recently renamed the ICST Department, launched nine¹⁰ programmes.

¹⁰ To be precise, the "Materials and Processes" programme should be added since it was part of the Department under 2006. To make the data clearer, these calls are presented in the section on "Engineering and Processes".

- Five were the continuation of programmes that existed already when the agency was created in 2005: CFPs connected to existing research and innovation networks (RNRT, RNTL, RIAM)¹¹ and two from the ARAs¹² on the security of information systems and the processing of large scale data by the ministry in charge of research.
- Two resulted from work started in 2005; a programme on intensive computing and computing grids, and the Nanosciences and Nanotechnologies (PNANO) CFP stemming from the combination of a basic research CFP on nanosciences, and an engineering CFP on micro and nanotechnologies driven by RMNT network¹³. PNANO programme introduced an international branch in 2006 when the agency joined ERA-NET Nanosciera when participating in an European CFP.
- Two are actions that the agency launched in 2006 to bridge some scientific and strategic gaps: the CFP on Future Hardware Architecture, and on Interactive Systems and Robotics.

Besides these programmes, the agency is continuing actions that were initiated by the ministry in charge of research in 2003 to upgrade a cluster of micro and nanotechnology platform composed by seven centers that have objectives to maintain France at the best level for fundamental research in nanosciences and to improve the transfer toward industry.

These actions represented 435 M€ funding for the three year period, representing around 12% of the state's research subsidies in this field. About 116 M€ of this sum was been allocated to companies (almost in equal shares, 50% to SMEs and 50% to large companies). The table below gives a summary of the CFPs.

| Programmes | Data for 3-year period | | | | | Typical project | | |
|---|------------------------|------------------------------|---------------------------|----------------------------|--------------|--------------------------------|-----------------------|-------------|
| | Number of editions | Number of submitted projects | Number of funded projects | Number of cluster projects | Budget (M€) | Number of partners per project | Number of enterprises | Budget (M€) |
| RNTL Software technologies | 3 | 316 | 91 | 43 | 78.5 | 6.4 | 2.8 | 0.8 |
| RNRT Telecommunications | 3 | 236 | 92 | 54 | 79.6 | 5.6 | 2.5 | 0.8 |
| RIAM Audiovisual and multimédia | 3 | 203 | 66 | 40 | 36.6 | 4.1 | 2.2 | 0.5 |
| MDMSA/MDCA/MDCO (Massive data) | 3 | 139 | 48 | 11 | 19.3 | 4.1 | 0.3 | 0.4 |
| SSIA/SETIN/SESUR (security) | 3 | 125 | 52 | 12 | 18.9 | 3.4 | 0.3 | 0.3 |
| CIGC/CIS (high performance computing & grids) | 3 | 129 | 37 | 10 | 20.6 | 4.5 | 0.7 | 0.5 |
| PSIROB (Robotics) | 2 | 82 | 25 | 6 | 15.21 | 4.6 | 0.9 | 0.6 |
| Next generation architectures | 2 | 50 | 17 | 8 | 11.3 | 3.5 | 0.9 | 0.6 |
| Total ICST | - | 1 280 | 428 | 184 | 280 | 4.8 | 1.7 | 0.6 |
| PNANO | 3 | 798 | 207 | 46 | 99.3 | 3.9 | 0.6 | 0.4 |
| RTB | 3 | - | - | - | 55 | - | - | - |
| Total Nano (PNANO+RTB) | - | 798 | 207 | 46 | 154.7 | 3.9 | 0.6 | 0.4 |
| ERA-NET NanoSciERA (European data) | 1 | 251 | 12 | - | 2.2 | 3.8 | - | 0.7 |
| Grand total + French part on ERA-NET | - | 2,105 | 647 | 230 | 437 | 4.5 | 1.3 | 0.6 |

¹¹ Respectively, Réseau National de Recherche en Télécommunications, Réseau National de recherche et d'innovation en Technologies Logicielles, Réseau pour la Recherche et l'Innovation en Audiovisuel et Multimédia.

¹² Actions de recherche en amont (upstream research)

¹³ Micro- Nano -Technology Network

3 SCIENTIFIC ASSESSMENT

This section emphasized certain scientific and strategic assessments on the running ICST programmes :

- **Intensive computing and digital simulation**

This programme was launched in 2005 to reinforce the French research position in the field of simulation. The priorities were:

- Grand challenges for engineering,
- Simulation methodologies,
- Advanced architectures,
- Intensive computing and grid computing.

The programme was very attractive with 129 projects submitted over three years, with 37 funded projects of wide scientific interest: fluid mechanics (22% of the projects), materials (10%), biology and medicine (15%), environment (17%), astrophysics and fusion (10%). Adding projects selected in other programmes, such as the 17 devoted to "modelling and simulation" under the RNTL/Software technologies programme, brings the total to over 54 projects that received a subsidy of close to 35 M€.

- **Security**

Increasing and massive use of digital technology brings up the question of security (of individuals, data, infrastructure), the reliability of embedded systems, digital rights management, and more generally user trust. This issue has been handled through calls for specific projects on security, composed mainly by fundamental research, but also through calls for themes related to this issue, e.g. proof that software works (software technologies), copyright (audiovisual and multimedia, cryptography and operating reliability), and telecommunications. During the last three years, 206 projects were submitted under ICST CFPs (i.e. about 16% of the total 1,280), mainly concerning "security". Half of them were submitted under CFPs on security, the other half under other CFP submissions. The agency has allocated 47 M€ to security-related activities (the request was for 123 M€). The themes covered ranged from operating security (30% of the projects), to formal methods, proof (23%), cryptography (20%), digital rights management (7%), and trust (7%).

- **Interfaces**

To produce applications that link the real world to the digital world in professional fields (design, data and knowledge analysis), entertainment (games, tourism), and daily life activities (domotics), is a major challenge that can require physical tools such as the mechanisms of perception for a robot, or mechanisms that enable an electronic system to "grasp" or model reality (capture a scene), or interfaces that link a user and a computerised application. Similarly, the growth in volume and the complexity of contents, such as data produced by modelling a physical process (designing an automobile, data on climate), or multimedia (musical works, videos), now require more intuitive interfaces capable of equipping the user to take control of and surf through the contents. ANR CFPs have supported more than 60 projects on interfaces for 45 M€ funding.

- **Mobility and interoperability**

The proliferation of mobile terminals, communicating objects, interconnections between heterogeneous networks, as well as new methods for distributing content (and the attendant services), are changing uses; changes that need to be supported by research on hardware and software but also on the uses themselves. To cope with this situation, the Agency has funded more than 40 projects for a cost of around 30 M€.

lower than the equivalent figure for the ICST projects (45%) but, as indicated below, the difference is mainly due to the composition of the partnership.

- Concerning partnership, an interesting comparison can be made between the applicative projects under the PNANO CFPs and those from the ICST projects¹⁴. The ICST projects involve an average of 2.5 companies, while the PNANO projects only involve 1.6. This may be because nanotechnologies are viewed as part of a maturing sector. In ICST there are consortiums composed of technology suppliers and integrators, or even end-users, while in PNANO, in many cases there may only be one company that explores new pathways, together with university laboratories. In both cases, the funding request is practically the same (0.145 M€ for a partner company in ICST, 0.120 M€ for PNANO).
- Projects were monitored from the scientific angle for the years 2005 and 2006. A special study is underway on the 2005 projects. 68% of the projects have been analysed and have produced 441 scientific publications and 23 patents.
- The agency has also worked closely with ERA-NET Nanosciera in an "upstream" Europe-wide call for proposals. The first transnational call was launched in 2006. National teams are participating in 7 of the 12 projects selected. A second CFP was launched in early 2008 on the specific topic of single molecule addressing.

It should be noted that sustainable and responsible development of nanotechnologies is a very important priority of the agency. The potentially toxic effects of nanoparticles on people and the environment have been taken up, especially through the PNSE and then the SEST CFPs¹⁵. The agency has funded 10 projects in this field since the beginning. Since 2007, the PNANO CFP has been opened to projects on the impact and regulation of nanotechnologies.

¹⁴ The average for the first three programmes reported in Table 1

¹⁵ These calls are handled by the Biology and Health Department.



HUMANITIES AND SOCIAL SCIENCES

1 THE STAKES

In its scientific policy, the Humanities and Social Sciences (HSS) Department should especially consider the following four characteristics:

- HSS are sciences like all others, with their own demonstrable, verifiable methods, which explains the overriding importance given to sources and documents. Scientific knowledge, as in all other disciplines, is built on critical analyses, debate and ideas that are challenged and compared.
- HSS do not have a single all-embracing theory about society. They have become more scientific and less ideological, replacing various forms of dogmatism by greater pragmatism.
- The relation between individual and collective types of research in HSS has become the central issue in diagnostics of the strengths and weaknesses of this field of research, especially in France; ANR must bear this in mind in its CFPs.
- The link between research and university education is unquestionably stronger here than in any other sector.

Humanities and Social Sciences must also consider the new contexts of research, and take into account that cooperation between research and other sciences (natural sciences, engineering, etc.) will grow in the future for the following reasons:

- Constant and rapid change in our societies is enhancing the role of HSS, and new production models have stoked collective awareness about the central role they play. Scientific progress cannot be envisaged without measuring its effects on lifestyles and its degree of acceptance by society.
- These changes have motivated the HSS Department to incorporate contributions from other disciplines in its themes; this should have an effect on the definition of the ANR programme. Population growth and urbanisation, globalisation as a phenomenon, new modes of communication, and new types of poverty, marginality and exclusion, combined with the problems of dwindling resources, new types of intolerance, conflict, war and violence, redefine or even eliminate disciplinary boundaries thus ushering in new arenas for thought and discussion.

2 A RETROSPECTIVE LOOK AT 2005-2007

Since its creation in 2005, the Humanities and Social Sciences Department underwent two major developments: the introduction of thematic calls for proposals in 2006 and, through the Franco-German programme, the introduction of international CFPs in 2007. The results for its development and activities can be summarised as follows:

282 submissions in 2005, 696 in 2006, and 662 in 2007. The success rate has levelled off at 24-25%, and average funding per project is between 180 and 200 K€.

This take-off reflects the HSS scientific community's support for ANR CFP policy, and the goal set in 2005 to finance some 600 projects over a four-year period, will probably be reached by the end of 2008. This support was demonstrated by the entire HSS community, and in particular by the universities. In 2007, as in 2006, HSS projects funded through CFPs were carried out by over 70 universities that submitted projects that tripled between 2005 and 2007.

The programme has had a decisive effect in rallying scientific researchers. The Department, in compliance with procedures defined by ANR, has made special efforts to prepare proposals of interest to all of this large and diverse scientific community. The themes selected are targeted to a three-pronged objective:

- to respond to solicitations from the scientific community to change the approach used in certain areas and to reconsider epistemological questions: Corpus programme (2006-2007), Governing and administering (2008);
- to stimulate research in certain fields that seem inadequately covered, to accelerate research on other fields, to help to structure new scientific communities: Enterprises and forms of economic organisation (2007), Communication, Creation (2008);
- to respond to major questions in the contemporary world and to focus on major problems facing society today: Wars, conflicts, violence (2006), Learning (2006), the Souths, today (2007).

The number of projects submitted indicates that these choices received strong support and were approved by the scientific community. But what is most important is the impact that the CFPs had on the restructuring and recomposition of certain disciplines. The thematic programmes, far more than the open programmes, stimulated and paved the way to interdisciplinary projects within the scope of the HSS. This was because the proposed subjects, as well as the texts in the CFPs, encouraged a new vantage point: as a result most of the projects had, on average, three partners, and the research themes went beyond the limits of the discipline that initiated the project. In many cases, the projects went beyond multidisciplinary, with complementary scientific themes, and achieved interdisciplinarity, thus inviting the partners to risk going outside their own domain to discover each other.

The international dimension of the HSS department grew in 2007, thanks to cooperation between the ANR and DFG. Responses to the joint CFPs were beyond all expectation and showed that within this scientific community there were old scientific links that had either become loose or had lost visibility, and were simply waiting to emerge again. Collaboration was established quickly and efficiently, and the two agencies, out of mutual interest, harmonised their approach to scientific demands and evaluations. This programme is expected to develop other bilateral cooperation, first with Japan in 2008, and then with the United Kingdom and Argentina in 2009. The Department's aim to devote 25% of its activities and resources to international actions should be achieved in 2009.

Besides its programmes and the development of its international sector, HSS will be expanding its project monitoring activity which is organised together with the *Lyon ENS Lettres et Sciences Humaines*, an ANR support service. The first CFPs, dating back to 2006, will be completed at the end of 2009, and monitored as of 2007 when the first monitoring committees composed of a scientific coordinator, an ANR representative and the president and members of the Evaluation Committee were established.

The table on the following page gives a summary of all HSS activities since 2005.

| | Non-thematic | | | Thematic | | | International | Total | | |
|---------------------|--------------|-------|-------|----------|-------|--------------------|-------------------|-------|-------|-------|
| | 2005 | 2006 | 2007 | 2005 | 2006 | 2007 | 2007 | 2005 | 2006 | 2007 |
| Projects submitted | 282 | 368 | 249 | - | 338 | 320 | 93 | 282 | 696 | 662 |
| Projects funded | 95 | 87 | 65 | - | 75 | 74 | 27 | 95 | 162 | 165 |
| Selection rate | 33.5% | 27.3% | 25.7% | - | 22.2% | 23.1% | 29% | 33.5% | 24.5% | 24.9% |
| Average amount (K€) | 143 | 172 | 174 | - | 173 | 194 (incl. IRD) | 150 (+200 DFG) | 143 | 173 | 174,5 |
| Total amount (M€) | 13 | 15 | 11.3 | - | 13.3 | 13.9 | 4.1 | 13.7 | 28.3 | 28.9 |

3 SCIENTIFIC ASSESSMENT

In 2007, three thematic CFPs were launched, a Franco-German CFP was drawn up together with the DFG, and the non-thematic CFPs were maintained. The following table gives a summary of the results of these initiatives.

| | Non-thematic | | Thematic | | | International | Total |
|---------------------|--------------|-------|----------|-------------|----------|-------------------|--------------|
| | YR | Blanc | Corpus | Entreprises | Les Suds | | |
| Projects submitted | 103 | 146 | 152 | 60 | 108 | 93 | 662 |
| Projects funded | 23 | 41 | 36 | 13 | 26 | 27 i.e. 29% | 165 i.e. 25% |
| Average amount (K€) | 112.5 | 203 | 189.5 | 166 | 183 | 150 (+200 DFG) | 174,5 |
| Total amount (M€) | 2.8 | 8.5 | 6.9 | 2.2 | 4.8 | 4.1 | 28.9 |

The global HSS success rate (non-thematics, thematics and Franco-German) is slightly under 25%, distributed as follows: 21.6% for Entreprises, 28% for Blanc, and 29% for Franco-German CFPs. These selection rates are very similar to those of ANR CFPs in the hard sciences.

Financing for Humanities and Social Sciences as a whole, exceeded 31 M€, not counting certain programmes, (Suds and Corpus), nor contributions from DGRI and ARD. Average financing for the programmes was diverse, more so this year than in the past: 112 K€ for the Young Researchers CFP, 166 K€ for Entreprises, 230 K€ for Suds and 150 K€ for the French part of the Franco-German CFP.

The results confirm a trend that began in 2006: a clear preponderance of universities and a more balanced position for the universities in the regions. The number of universities that responded rose again (75), as did the number of universities whose projects were selected (44). The number of projects submitted by women is constantly on the rise (1/3rd of the submissions, 37.5 selection rate). It is noteworthy that the

selected projects submitted by women mainly fall under the Suds programme and that the French part of the Franco-German programme has a higher percentage of women laureates than in our partners' part.

The projects are becoming increasingly multi- and interdisciplinary, although this trend is less prevalent in the non-thematic CFPs than in the Suds and Enterprises programmes where it is sometimes difficult to classify a project under a specific discipline. Nonetheless, the overall tendency is gaining ground, and ANR is quite a good reflection of French research in HSS. History (including the history of sciences and the history of art) make up about one third of the project submissions. Economics and Cognitive Sciences are also well represented. The figure is lower for Political Science and Sociology, whilst Management has benefited from the Enterprises CFP and Geography from the Suds CFP. There has been less response from Law and the Information and Communication Sciences; the 2008 thematic CFP should correct this situation and mobilise the scientific community in both these fields, although an ANR CFP alone cannot be expected to change the research picture. Last but not least, it is encouraging to see that Literature and Philosophy now appear in ANR statistics.

PARTNERSHIPS AND COMPETITIVENESS DEPARTMENT (PCD)

The Partnerships and Competitiveness Department (PCD) is responsible for encouraging public-private partnerships in research. It supports all approaches that lead to relationships between public research institutions and the socio-economic world, as well as those that favour the use of research results. PCD is transdisciplinary by nature; it has a wide variety of tools to facilitate collaboration between the worlds of academia and industry throughout the whole research & innovation process.

The tools are described below according to the position they occupy in the chain of innovation.

- Upstream, the Foresight Studies Workshops help identifying future challenges and thus lead to new programmes and new calls for proposals in the ANR scientific departments.
- The priorities of competitiveness clusters are taken into account in the programming process of ANR as well as in the preparation of the calls for proposals. ANR also makes an inventory of all project labels issued by the clusters. A specific top-up funding mechanism encourages the clusters to support the preparation of research projects in response to ANR calls for proposals.
- The Carnot scheme selects and monitors institutes that give a high priority to collaboration with socioeconomic partners. It grants them additional funding that is calculated on the basis of their income from contractual research. The objective of these extra resources is to help them ensure the long-term viability of their scientific and technological capacities and their participation to the innovation process, as well as to augment their professionalism.
- In partnership with the Ministry of Higher Education and Research (MESR), an action encourages the pooling of services performing technology transfer and management of intellectual property in universities and their collective organisation.
- In partnership with MESR, support for incubators helps enterprise creation projects to become more mature and facilitates initiation of technology transfer in France's regions.
- Downstream, the nationwide competition for the creation of innovative technology companies managed with OSEO rewards, after regional and national selection, the best company-creation projects based on innovative technologies or services.
- Participation in permanent inter-ministerial committees which evaluate projects submitted to the European EURÉKA Initiative facilitates the funding of multilateral projects aiming at bringing major technological progress to the development of new products, processes or services which are under the responsibility of industrial firms.

Besides these tools, PCD has other cross-cutting activities. It manages budgets allocated to *Contrats de plan Etat-régions* (State/Region action plan – CPER); it carries out technico-economic studies and analyses to provide ANR scientific departments with additional information on market demands. It also organises conferences to identify the needs of the socio-economic world. In 2007 two conferences were held; the first one was a consultation of enterprises, the second a meeting of competitiveness clusters.

| Budget | |
|---|----------------------|
| Foresight Studies Workshop | 2,212,138 € |
| Top-up funding to competitiveness clusters | 6,535,702 € |
| Carnot Scheme | 62,068,727 € |
| Collective organisation of services in universities | 4,000,000 € |
| Incubators | 6,999,700 € |
| Eureka | 3,025,876 € |
| Competition for the creation of innovative technology companies | 17,500,000 € |
| CPER (State/Region action plans) | 22,996,000 € |
| Total | 125,338,143 € |

RESOURCES DEPLOYED BY ANR AND ITS SUPPORT STRUCTURES IN 2007

Operating expenses for ANR have been maintained to very reasonable level, below the international norm: 0.9% of intervention costs. Including the management costs for support institutions, the amount is 2.1% (17.1M€).

IMPLEMENTATION BY ANR

ANR is becoming more powerful: its (actual) operating budget rose from 1.9 M€ in 2005 to 6.1M€ in 2006 and to 7.5M€ in 2007 (+23%).

ANR personally manages seven programmes, as well as ministry-funded operations that were transferred to ANR in 2006 (FNS, FRT, FCE). ANR draws up programmes, supervises CFPs, and monitors programmes administered by support organisations. The main expenditure is for seconded, contractual and detached personnel: 4.9 M€ or 66% of the operating budget. Staff figures, calculated as full-time equivalents (FTEs), were equal to 69.3 in 2007, about half in scientific positions and half in administration. Current operating costs are over 50% for rent (1.37M€), the rest for developing activities (missions, seminars, conferences, etc. connected to the programme and to project monitoring).

WORK BY SUPPORT STRUCTURES

In 2007, ANR worked with 15 support organisations, including 13 for the 2007 edition of the programmes. Conventions were concluded to give these organisations managerial responsibility for one or more of the annual programme editions. Support organisations for the 2007 edition employed 120 FTEs at end 2007.

The total number of decisions to grant subsidies processed under CFPs between 2005 and 2007 was 14,075 (1,255 directly by ANR and 12,820 by the support services).

SIGNIFICANT EVENTS

1. Decree no. 2007-1908 of 26 December 2007 and the related order authorised payment of indemnities for non-resident experts and for members of the Evaluations Committees as of 1 January 2007.
2. On 13 December 2007, the Board of Directors adopted a revised version of the regulation on granting aid that simplifies the process.
3. With due heed to the new *Etablissement Public Administratif* (EPA – public administrative establishment) statutes, a certain number of procurement contracts were concluded on operations and investments, especially to operationalise the new *système d'information métiers* (SIM) and to provide assistance with the ISO 9001 certification process.



EUROPEAN AND INTERNATIONAL ACTIONS

Since the beginning, ANR international cooperation policy has been based on bilateral contacts with international funding agencies and research organisations, especially the German DFG and BMBF, certain British Research Councils, the U.S. NSF, and the Academy of Finland. The concept was to draw on their experience to strengthen ANR, to identify possibilities for bilateral cooperation, and to build partnerships.

2006 – First partnerships and European calls

Priority has been given to European activities by focusing on ANR participation in the present and forthcoming ERA-NETs. As part of these actions, national funding organisations discuss their national policies in a specific field and coordinate their national programmes in the area. Some ERA-NETs launch joint calls for proposals since they develop common priority themes, action plans, procedures, and/or scientific evaluation committees. These transnational calls for proposals target consortiums composed of teams from various countries. Research projects stemming from the ERA-NETs' transnational calls for proposals are funded by the national agencies. In 2006 ANR was a partner in seven ERA-NETs and, collaborating with the European agencies that participate in these ERA-NETs, launched four transnational calls for proposals.

2007 – Strengthen European cooperation and expand international horizons

ERA-NET activities and multilateral programme coordination were further developed and intensified in 2007 with ANR joining three new ERA-NETs (ERA-NET on rare diseases, neuron-ERA-NET on neuro-degenerative diseases, and FENCO-CO₂ storage) and participating in the launching of two new multilateral calls through ERA-NET ETB on biotechnologies and E-RARE (see Biology and Health Department).

On the basis of cooperation started in 2005, two calls for bilateral proposals were launched and have been very successful: the Franco-German call in human and social sciences with the DFG, and the Franco-British call in systems biology together with the BBSRC.

In 2007 ANR also started collaborating with countries outside of Europe. A call was opened with the Chinese Ministry for Science and Technology (MOST) for research on metagenomes, and part of the Blanc programme was opened with NSC in Taiwan. This led to funding of a major Franco-Chinese project through a public-private partnership and four projects with NSC (Taiwan). This also provided an opportunity to experiment with the mutual opening of national programmes using a unique cooperation process that offers a flexible, efficient framework for the co-funding of bilateral projects: the agencies agree on priority themes for cooperation in their national calls for proposals. Each country evaluates and selects projects, while the funding decision is based on a mutual, synchronised process.

This above mentioned model made funding possible for the ANR-NSC and ANR-MOST projects, with the same conditions, and in the same time-frame, as for the national projects. It was also used when the German Ministry of Economics and Technology (BMW) collaborated in a project implemented through a public-private partnership on hydrogen technologies in PAN-H, and was applied to three inter-Carnot/Fraunhofer projects with the German Ministry of Research (BMBF). Alongside dedicated transnational calls for proposals, successful cooperation will lead to the launching of new programme agreements in 2008 in an effort to extend this model to other programmes and agencies, namely China NSFC, Japan JST and JSPS, Finland AKA, Germany DFG, Brazil,...

The following table gives a summary of the transnational calls for proposals and the projects funded in 2006 and 2007.

| | Number of submitted projects | Number of projects with French partners | Number of funded projects | Number of projects funded by ANR with French partners | ANR funding (M€) |
|---------------------------------------|------------------------------|---|---------------------------|---|------------------|
| 2006 | | | | | |
| Nanosciences: Nanosci ERA | 251 | 180 | 12 | 7 | 1.6 |
| Plant genomics: ERA PG | 37 | 35 | 14 | 14 | 3.3 |
| Microbial genomics: Pathogenomics | 40 | 30 | 12 | 12 | 4.4 |
| Biotechnologies: Eurotransbio | 77 | 46 | 23 | 19 | 4.4 |
| Total | 405 | 291 | 61 | 52 | 11.6 |
| 2007 | | | | | |
| ERA-NET ETB | 34 | 6 | 17 | 2 | 0.6 |
| ERA-NET E-RAR | 132 | 80 | 13 | 13 | 2.5 |
| SHS DFG ANR | 93 | 93 | 27 | 27 | 4.1 |
| ANR-BBSRC BIOSYS | 32 | 32 | 10 | 10 | 2.9 |
| China MOST metagenomes | 1 | 1 | 1 | 1 | 2.2 |
| Blanc France/Taiwan | 17 | 17 | 4 | 4 | 0.8 |
| PAN-H with D (BMW) | 3 | 3 | 1 | 1 | 1.2 |
| INTER CARNOT Fh | 10 | 10 | 3 | 3 | 2.5 |
| Total | 322 | 242 | 76 | 61 | 16.8 |
| Total Europe and international | 727 | 533 | 137 | 113 | 28.4 |

On the whole, French teams were very active and highly involved in these calls and the scientific quality of the proposals was excellent. Quite remarkably, these transnational projects started at the same time as the national projects.

Altogether, over the past two years 113 transnational projects, selected from among 533 submitted proposals (with French partners), were funded (28.4 M€ in total). The selection rate for these proposals (21%), and the average ANR grants allocated to French teams participating in these projects (251 K€/project), were comparable to national ANR projects.

As early as 2005, ANR strongly encouraged the participation of European and inter-national scientific experts in the project selection process. The foreign participation rate is constantly increasing (18% in 2005, 22% in 2006 and 28.6% in 2007), although the limited size of the database of foreign experts available is constraining. One of the positive repercussions of the dedicated transnational calls for proposals was the creation of a common database of international experts shared by the agencies.

ANR intends to contribute actively to building up European research by participating in various European coordination actions (committees, groups,...). For instance, in 2006 ANR joined Eurohorcs (European Heads of Research Councils), an association of European research funding agencies and research organisations that is often consulted as a reference by the European Commission. Eurohorcs initiated the European Young Investigators Award, whose success encouraged the creation of the European Research Council (ERC). The ERC is a European-level funding agency for non-thematic research projects.

In 2007, ANR became a member of the European Science Foundation (ESF), an association constituted of funding organisations and agencies from most European countries. Its aims are to promote high-level scientific research and to facilitate co-operation at a European level.

Collaboration and partnership with the European Commission, and coordination of national programmes with the Seventh Framework Programme, are essential. Hence ANR directors participate in discussions with national thematic groups (NTG) and thus contribute to designing the DG Research programme. Furthermore, ANR represents France on the ERC's "Idea" committee, and participates in discussions on the definition and modalities of ERC interventions. This collaboration with the commission will be strengthened in 2008. Moreover, in 2007, ANR, together with the *Caisse nationale de Solidarité pour l'autonomie* (CNSA), joined Ambient Assisted Living (AAL), a six-year funding programme, designed to develop and implement innovative solutions for the elderly, based on information and communication technologies. The transnational projects created by this programme will be co-funded by the European Community and participating national funding agencies.



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