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thématiques

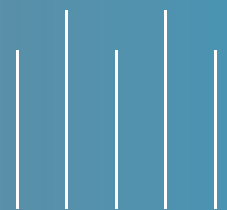


Inserm

Institut national
de la santé et de la recherche médicale



INSERM 2020 STRATEGIC PLAN



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INTRODUCTION

Inserm's dynamic approach places it among leading public-sector biology and health care research institutions in Europe and on the international stage¹. The excellence of Inserm's research is evidenced in the quality of its scientific publications. Inserm has a unique position in France at the interface between fundamental research, medicine and public health, shaped over the last fifty years through the efforts of its scientists and administrative staff and its proximity to health care issues.

This has been achieved as a result of Inserm's commitment to expanding knowledge through biological and medical research in the interests of society, for scientific endeavour with high added value and strong international visibility, and independent and ethical research that yield concrete applications and progress in terms of concepts, technology, clinical practice and public health. Its roles also include supporting governmental decision-making processes concerning policy both at home and abroad.

Inserm's 2016-2020 Strategic Plan defines how the organisational set-up and scientific policy of the Institute should be geared to anticipating the challenges brought forward by biological and technological advances, and how to deal with the changes that will shape tomorrow's medicine.

Biological and technological revolutions

While sequencing the human genome took ten years—from 1993 to 2003—and cost over \$2.4 billion, today the exome (the coding part of the genome) can be sequenced in a matter of days. The first impact of this revolution has been the discovery of variability in the human genetic sequence—and currently, this is only firmly established for the exome which corresponds to just 1.2% of the overall genome. Genomic and post-genomic studies have resulted in the identification of many genes that encode for proteins of unknown function and genomic variations as well as non-coding RNA transcripts. Characterising the biological functions of these genes and non-coding RNA molecules as well as the phenotypic impact of genetic variants **is opening up numerous perspectives for the identification of biological markers and therapeutic targets. But all this will require significant investment.**

Although great progress has been made in the characterisation of the genome, transcriptome and proteome, **post-genomics**—the analysis of post-translational modifications—is still in its infancy. The study of these modifications is still under-exploited and will require dedicated technological breakthroughs. This should lead to the discovery of **novel classes of pharmacological agents** which are sorely lacking.

Big data acquired from more or less complex biological systems is allowing for best **modelling living system**. To develop biologically relevant models, multi-scale approaches and new modelling modalities coupled with new production technologies (three-dimensional printing) are beginning

¹ Report *Place de la production académique de l'Inserm en France et dans le monde 2004-2013*, published in June 2015, *Cellule Mesures, Indicateurs, Bibliométrie de l'Inserm*.

to offer the possibility of organ reconstitution. In general, modelling tools will have a major impact on drug design, the *in silico* prediction of responses to pharmaceutical agents and the screening of candidate therapeutic agents.

The demonstration of the extraordinary functional plasticity of cells over their lifetimes and their capacity for reprogramming following differentiation back to induced pluripotent stem cells (iPSCs) represent a major advance in terms of both fundamental science and therapeutics. More recently, **Crispr/Cas9** technology has made it possible to edit the genome (i.e. modify specific sequences in a controlled fashion) opening up huge possibilities across the whole of biology, health care and biotechnology. The ability to modify the genome in both somatic and germ cells brings with it a need to establish a clear and sound framework for such practices, a need that is already being addressed internationally and in France, notably by Inserm's Ethics Committee.

The major revolutions of recent years are leading to the definition of new concepts and greater understanding in very disparate fields. This is in turn fostering interdisciplinary approaches within the Institute and the seeking of stronger links with other research institutions and bodies through the Aviesan Alliance network.

Inserm must keep up with these revolutions, both to accelerate the gain in knowledge and the establishment of consent/postulates in human health, and to consolidate the progress in human health and French excellence in medicine and life sciences.

Inserm at the heart of changes in medicine

Fundamental discoveries and their first clinical applications are creating new paradigms which are revolutionizing medical practice upside down. We are heading towards:

- **medicine enriched by fundamental, multidisciplinary and translational research**, with medical testing and clinical practice calling on input from physicists, chemists, mathematicians, computer experts, engineers, ecologists and experts from the social, human and environmental sciences;
- **predictive medicine** based on knowledge of variability in the genome and environment as well as how such differences interact. This implies not only new preventive strategies but also a new conception of risk;
- **regenerative and reconstructive medicine** thanks to advances in the fields of stem cells, nanotechnology, implants and biological materials, novel forms of medical devices (artificial organs—progression towards the “Bionic Man”) and surgery guided by computer modelling, etc.
- **high-precision, minimally invasive and closely targeted medicine** in which drugs can be locally delivered via an implanted device or as nanoparticles that are released through physical triggering mechanisms (ultrasound, a magnetic field, in response to a sensor or biological marker, etc.), controlled by a connected device, by 3D imaging or combined with a biological material. Such drugs are no longer simple chemical substances but rather biological compounds (therapeutic antibodies, possibly conjugated with a chemical agent or vectorised) that will be key agents in tomorrow's gene and cell therapeutic modalities.
- **medicine that benefits from turning big data into smart data** by exploiting massive data flows concerning living beings and health, derived from different sources and revolutionising tomorrow's health care approaches.

- telemedicine or “*e-medicine*” using both telecommunication and information connected online tools will give patients access, in addition to their medical records, to remote therapeutic monitoring and consultation by virtue of different types of sensor and device.
- and finally, **globalised medicine** with all that implies in terms of monitoring scientific innovation, the quest for competitiveness and excellence, and flexibility and adaptive agility with respect to emerging topics. There are currently 175,000 clinical trials or epidemiological studies underway in 187 different countries.

For patients, the major concrete consequence of these advances will be the possibility of more individualized medicine, known as personalised medicine or precision medicine. This approach relies on the crossing of large amounts of individual patient data with data from other patients and general databases (e.g. scientific literature, models and virtual cells) and using predictive models, can be used in predictive models that take stock of individual variability to establish the optimal therapeutic strategy.

This type of medicine opens the way to so-called targeted therapy, notably on the basis of the considerable progress made in the field of oncology in recent years. The analysis of genetic variants has already changed the risk, diagnosis and treatment of cancer. In the Cancer Plan led by INCa with the collaboration of Inserm and its Aviesan Alliance partners, the **Decision** announced by the French President in February 2014 to analyse 60,000 tumours by sequencing exomes and entire genomes is very much **in line with this approach.** In the USA, President Obama recently decided to direct the National Institutes of Health (NIH) to launch a Personalised Medicine Plan on 30 January 2015. Starting with this revolution in oncology, the accumulation of knowledge, technology and expertise will spread into all other fields of medicine.

These few examples show the amplitude and omnipresence of the changes underway in life sciences and medical research, which will directly impact how care is administered and how the health care system is organised. They pose **a number of challenges for France,** largely cross-cutting challenges that are constantly being reviewed by the management of Inserm working in concertation with all involved in biomedical research in France, from the most fundamental research to the social sciences.

Inserm's place in the transformation of the French research landscape

The revolution currently underway in scientific knowledge and medicine is proceeding against a national background which, in recent years, has fostered the emergence of **new models of scientific cooperation and operation** aiming at reinforcing synergies between higher education institutions and research organisations. These reforms in how research in biology and health is conducted have led Inserm's leading position which be safeguarded but also built upon.

Among the high points of the past years, three reforms have largely contributed to the evolution of the research endeavour in France: the creation in 2009 of five Alliances² to reinforce the coordination of studies and bring together all those involved in research, including Aviesan for the life sciences and health, the French investments for future program (*Programme d'investissements d'Avenir*, PIA) and the 2013 Law on Higher Education & Research. Inserm, with its Aviesan partners, is identified as the privileged strategic place to discuss issues related to research as written in the National health strategy, participating thus to the coherence between the two strategies, the National Research Strategy and the National Health Strategy.

The aim of PIA, a key component of national policy on research and innovation, is to restimulate **long-term growth** by relying on the knowledge economy and innovation. This programme which has already been funded twice (in 2011 and 2014) sets out to set up **major drivers for growth** in fields as diverse a tomorrow's cities, cloud computing, smart electronic networks, biotechnology and biomedical research. Benefits and impacts are expected from these programmes on the reinforcement of the generation of scientific knowledge, speeding up of technological development, multiplication of social and technological innovations and the provision of top-quality scientific training for new generations of scientists.

The first French investments for future program (PIA 1), with funding of €35 Bn, announced by the French President in June 2009 financed a range of innovative projects from the creation of "laboratories of excellence" (Labex), University Hospital Research Institutes (*Instituts de recherche hospitalo-universitaires*, IHU), equipment of excellence (Equipex), and connections between universities and research bodies (*Initiatives d'Excellence*, Idex). These government-accredited initiatives were selected in a highly competitive process under the aegis of an international jury, and completely transformed the university landscape with restructuration around centres of excellence. The practical objective was to accelerate the evolution of the university research system in a markedly sharper context of intelligence, and then forge tighter links between research, training and economic actors to promote competitiveness, activity creation, growth and employment as well as providing a more effective response to new societal challenges.

Inserm played an important role in PIA 1 as a stakeholder in 52 Labex, 6 new IHU, 29 Equipex and cohorts and 8 new Idex³.

² Aviesan for life sciences, Ancre for energy, Allistene for information sciences and technology, AllEnvie for the environment and Athena for human and social sciences

³ The eight IdEx are: Sorbonne Paris Cité, Sorbonne Universités, Paris Saclay, Initiative d'Excellence de l'Université de Bordeaux, Paris Sciences Lettres, Toulouse Initiative d'Excellence, Université de Strasbourg, Aix-Marseille Initiative d'Excellence

These IdEx centres of excellence are managed by Comue, communities of universities and establishments created in the Law on **Higher Education & Research adopted on 22 July 2013**. This Law imposes, over a given geographical area, the coordination of training and of the research and technology transfer strategy between the various higher education establishments as well as with partner research organisations.

This involves a number of measures, the main ones setting out to:

- better define the country's priority topics by identifying a National Research Strategy, in line with the European H2020 Programme and targeting major societal challenges
- preserve fundamental research,
- reinforce technological research by integrating different scientific fields and strategic technological services (ano-electronics, robotics, biotechnology, etc.)
- harmonise the programming of the French National Research Agency (ANR), the funding agency, with the country's strategy and creating more synergies with the new European Horizon 2020 Programme and relying on the positioning of national alliances,
- ensure territorial consistency and legibility by promoting sustainable reinforcement of cooperation between all types of higher learning establishments, research organisations, and socio-economic stakeholders through the creation (among other things) of communities of universities and establishments (Comue). To date, 21 Comue are being created. Inserm plays a central role in this new landscape, notably in the definition of scientific strategies to promote biology and health care research at certain sites (depending on their specificities).

One of the main priorities of the 2016-2020 Strategic Plan will be to organise interactions between the Institute's national strategy and its territorial offshoots with its partners.

PRIORITIES AND OBJECTIVES OF THE INSERM 2020 STRATEGIC PLAN

Inserm has a central place in the organisation of biological and health care research in France; the Institute closely collaborates with universities, other research institutions and the health care system. Its role has been reinforced to optimise its involvement in the development of research policy and its implementation. While preserving the absolute necessity of encouraging fundamental research to meet the ever-increasing need to expand basic knowledge, Inserm, with its unique status in France, is obliged to take on the most challenging issues in 21st century biomedical research and facilitate the application of fundamental discoveries in the service of patients and society at large.

The Inserm strategy is based on three priorities. The strategy will be set out in annual operational steering documents specifying action plans. A contract of objectives with the State for the period 2016-2020 will establish firm targets to be achieved with corresponding indicators.

Priority 1: More integrated research that better matches society's needs and expectations as well as public policy

Inserm's strategy sets out to develop a climate that encourages interaction between fundamental, translational and clinical research and thereby promotes the juxtaposition of biology and medicine with a central place for fundamental research. New initiatives will be undertaken and supported to promote an interdisciplinary approach and establish tight relationships between fundamental discoveries and clinical and societal needs. This will require better coordination of infrastructural services to make them more accessible to researchers as well as the development of special structures to speed up the dissemination of state-of-the-art technology.

Priority 2: Develop, capitalise on and organise skills to serve strategic ends

Inserm will establish a policy to revitalise scientific careers and attract the skills required to achieve the institution's strategic scientific goals. This policy will rely on the development of existing potential, new recruitment and the redefinition of how researchers and institutions are evaluated. In this context, Inserm will reaffirm its commitment to responsible research in terms of both experimental practices and the management of human resources. All these actions will be complemented by the development of communication and information systems to strengthen Inserm staff's sense of belonging—a key factor when it comes to research partnerships.

Priority 3: Optimised academic and private-sector partnerships, Inserm's leadership role reinforced at national and international levels

Inserm sees all its activities in a framework of a complementary, synergistic effort on the part of all those involved in research, patient care, public health and the health care industry— at both the

national and international levels. To this end, Inserm is prioritising its academic and industrial partnerships by drawing on its partners' strengths and added value. As an umbrella body, in addition to providing its teams with scientific support, Inserm will encourage a joint discussion with its partners on issues of scientific employment and the infrastructure at their sites. Simple rules for collaboration, ensuring respect for all parties concerned, will be established to ensure effective management of the Units and to maximise the value of their work. The Institute will consolidate its role of initiator and decision-maker in the matter of research and health-care policy with its partners, particularly through its activity within Aviesan. With respect to European and international collaborative projects and partnerships, Inserm will consolidate its place as a leader in European health and biology research, establish new targeted collaborations and do all it can to reinforce its own international reputation.

Priority 1: More integrated research that better matches societal needs and expectations as well as public policy

Research at Inserm covers all fields of health research from the most fundamental to applied research, implemented at the heart of the French health care systems and public health.

French research has made direct contributions to the emergence of numerous fields at the frontiers of knowledge. Tomorrow's scientific challenges will depend on special – notably multidisciplinary – approaches, including living systems modelling, the development of synthetic biology, novel models (based on animals, plants or micro-organisms) and real-time and multimodal physical observation tools, especially high-resolution microscopy to investigate the various levels of the organisation of life, from molecule to whole organism. Future scientific questions cover a broad range of disciplines, including engineering, physics, chemistry, mathematics, information technology, the human, economic and social sciences, ecology and sustainable development. And in turn, scientific answers enrich these disciplines.

Medical innovations resulting from translational research involve iterative exchanges between fundamental research, laboratory experimentation and application at the bedside.

In this scheme, many and various factors—scientific, clinical, technological, economic and social—come together to generate innovation. Health care research is developing in constant interaction with an environment that is far broader than it used to be, right up to participation in public health research policy.

Structural initiatives will be supported throughout the duration of the Strategic Plan to promote such interactions and ensure effective responses to major societal and health care challenges through reactive research or research on emergent topics.

Integrated, multidisciplinary research (Objective 1) will be favoured according to Inserm's cutting edge priorities within the framework of the French National Research Strategy and through new initiatives like the deployment of **cross-cutting scientific programmes** designed to foster national research consortia. Concerning the responsibilities assigned to Inserm by the Government, **special Action Plans are being compiled and implemented by Inserm** to reinforce research on cancer and neurodegenerative diseases as well as to meet the expectations of National Plans, i.e. the 2014-2019 Cancer and PMND plans.

Moreover, **the development and dissemination of new scientific technologies** will be stepped up **(Objective 2)**.

Coordination between research infrastructure services will be encouraged and a system will be established to ensure **consistent handling of research and medico-economic data (Objective 3)**.

A **new policy on animal research** will be compiled to define which areas of experimentation absolutely necessitate the use of animals and help identify those in which alternatives may be used **(Objective 4)**.

A major strategic axis will be the establishment of a **Public Health Research Plan** associated with site reorganisation based on the renewal of our partnership with new institutions **(Objective 5)**.

Inserm will consolidate its position as the leading research institution in Europe and third in the world to capitalise on its research through an **ambitious policy of innovation (Objective 6)**.

Objective 1: Support integrated, multidisciplinary research

The Inserm strategy is fully in line with the Strategic Agenda⁴ for Research, Transfer and Innovation. First and foremost, Inserm will assign an important role to fundamental research. Expansion of the borders of knowledge and scientific excellence constitutes the first challenge mobilising Inserm and all those involved in life science and health care research working within Aviesan⁵.

Pushing back the borders of knowledge

Characterising physiological mechanisms and the molecular machinery involved in functioning and malfunctioning living systems is a prerequisite for identifying new diagnostic markers and therapeutic targets as well as for modelling biological processes with a view to developing predictive capacities. Such upstream “fundamental” research is therefore key to innovation in health care, including disease progression and the design of novel therapeutic interventions. Similarly, experiments on non-human organisms can be essential when it comes to investigating highly conserved phenomena in a simplified form. Indeed, experimental studies on non human model organisms (eg. drosophila, mouse, zebra fish, xenopus, nematodes and even plants) are essential to understand mechanisms of health and disease and to validate the hypotheses provided by the statistical correlations and computational models.

Inserm is and will remain very present in the field of fundamental research related to questions associated with human health. The fact that Inserm co-sponsors fundamental, translational and clinical research is a unique and one of its strengths and optimising interactions between these distinct areas is a continued challenge. Cross-cutting Inserm programmes (described below) on molecular mechanisms in disease and therapy will be an ideal instrument for promoting such links. Basic research linked to human health is one of the hallmark of Inserm, it is largely performed in Inserm research units and fundamental approaches will remain strongly supported, both through specific Inserm programmes and through nationwide research programmes such as the National Health care and research Plans (see bellow)

More generally, Inserm will focus on studies that will promote the convergence of fundamental approaches – be it at the level of the molecule, cell, tissue, organ, organism or even population – and health care challenges, in line with the “Health & Well-Being Challenge” and the Strategic Agenda⁶.

⁴ France Europe 2020, a strategic agenda for research, transfer and innovation: the agenda includes a National Research Strategy, the main purpose of which is to respond to societal challenges and promote the country’s competitiveness.

⁵ Contribution of Aviesan to the National Research Strategy, May 2013, www.aviesan.fr

⁶ Challenge 4 Health & Well-Being: “The great challenges to which our research must first respond are prevention, screening and treatment of diseases of ageing (neurodegenerative diseases), maintenance at home and independence, care for chronic, multifactorial diseases and pathologies linked to the environment, emerging and re-emerging diseases, the development of personalised medicine, e-medicine and the associated new economic models”. France Europe 2020, a strategic agenda for research, transfer and innovation

Cross-cutting Inserm programmes

Paradigm shifts in biomedical research are opening up strong possibilities for innovation and require a reorganisation of the scientific community. **Inserm will launch cross-cutting scientific programmes** to encourage its researchers to take on these challenges together in projects on a national scale.

Within the framework of its 2016-2020 Strategic Plan, Inserm is launching **three major unifying research projects** on the ambitious themes of Ageing, Microbiota and Genetic Variability Within Cohorts.

The Inserm cross-cutting programme on microbiota: studies on gut microbiota reveal its unsuspected interactions with each individual's environment. Dysregulation and/or imbalance of microbial populations may impact main body functions. Potential for innovation and medical benefits in the field is very high. In this context, Inserm cross cutting programme on microbiota intends to seek connections between dysbiosis and diseases and model how the relations between microbiota, the host and the environment have an effect on health. More precisely, the programme will focus on genetic and metabolic basis associated with dysbiosis and on microbiota regulation factors. It will explore the effects of local microbiota in addition, synergism or antagonism of local and systemic gut microbiota effects. Collaboration of research teams on the role of gut microbiota in drug metabolism and therapeutic strategies, such as immunotherapy, will also be strongly supported. The programme should contribute to a comprehensive vision of microbiota ultimately leading to new health strategies.

For these, Inserm will mobilise all its scientific excellence in fundamental, translational, technological and clinical research and involve industrial actors begin with the design phase of these major cross-cutting programmes to build a continuum ultimately leading to economic and societal capitalisation.

The Inserm cross-cutting programme on ageing: Ageing is a physiological process with related conditions and pathologies that are well documented. Identify preventive and therapeutic strategies to promote healthy ageing is yet a major challenge. To overcome gaps in knowledge, Inserm chooses to dedicate one of the programmes to a better understanding of cellular and molecular mechanisms associated with normal and pathological ageing. The programme is based on three work packages: one focusing on clocks in senescent cells, another on functional alterations of the ageing cell and both serving a final work package on mathematical modelisation of regulatory ageing networks in normal and pathological conditions. Thanks to the collaboration of excellent experts in the consortium, biomarkers and therapeutic targets should be identified and also validated with a translational approach using cohorts and biobanking.

The objective is to structure the community and bring together research strengths, especially Inserm's capacity for unravelling conceptual and technological problems at the frontiers of innovation and risk.

These **interdisciplinary national consortia** will contribute added value to enhance existing collaborations and will mobilise the best teams in France from different disciplines to address innovative questions and enrich existing collaborations. Basic research is a strong component of the cross-cutting programmes which will receive specific multi-annual funding. In terms of coordination, these programmes will be supervised by the Inserm Directorate General through its thematic institutes, and will be monitored by Inserm as well as by the public- and private-sector partners involved in each programme.

The Inserm cross-cutting programme on variability of the human genome: the development of Next Generation Sequencing technologies offers unprecedented opportunities to optimize the diagnosis, prevention and treatment of human disease depending on genetic variations individual. Taking into account the variability of the human genome, the great challenge of medical genomics is no longer the detection of variations but their interpretation. Although France has an issue in terms of accessibility to NGS compared to other countries such as the United Kingdom, the Netherlands, the United States, or the Canada, it has many assets to contribute at an international level on the interpretation of genomic variations and demonstration of their contribution to human diseases: (1) quality of cohorts of patients of rare or common diseases and population controls (2) expertise on the epidemiological genetics; (3) synergy of research teams and clinics in University Hospital campus facilitating translational research. Thus Inserm will launch a national program on the «Interpretation of genomic variations and contribution to the natural history of human diseases. This program has a high potential for industrial development. Indeed variations can be considered as biomarkers to identify individuals at risk and may benefit from preventive or therapeutic interventions. These variations can also lead to the identification of targets of therapeutic interest. This programme encourages the formation of multidisciplinary consortium federating teams of clinicians, geneticists, epidemiologists, biostatisticians, bioinformaticians and biologists to answer the central question of interpretation and its contribution to the natural history of diseases.

National Health Care & Research Plans

Within the framework of the **2014-2019 Cancer Plan**, Inserm operates and funds the Plan's actions devoted to research and schedules them with its partners from the Aviesan Cancer multi-organization thematic institute (*Institut-multi-organismes*, ITMO). Through its research units, Inserm is also the main stakeholder in biological research. In its role of operator, Inserm complements the activities of the National Cancer Institute (*Institut National du Cancer*, **INCa**) which carries out clinical, translational, medico-economic, interventional and multidisciplinary research in oncology. Inserm focuses its action on targeted tenders related to major topics of current research in oncology, supporting the emergence and training of researchers. Research fields include applied physics and mathematics, systems biology, genomics and epigenetics. Moreover, as of 2016, Inserm will be the operator of a multi- and inter-disciplinary programme on tumoural ecosystems. In addition, by supporting the ATIP Avenir⁷ programme, the Cancer Plan budget managed by Inserm helps foster the emergence of excellence in research. Furthermore, by providing training on translational oncological research for young doctors, pharmacists and veterinarians during their higher and post-doctoral studies, Inserm also fosters the emergence of young talent.

⁷ ATIP Avenir: programme supervised by Inserm and CNRS aimed at attracting high-level young team leaders to France to establish and coordinate teams

ITMO Neurosciences has been appointed to coordinate the research arm of the new **Neurodegenerative Disease Plan** (*Plan Maladies neuro-dégénératives*, PMND), the directions and measurements of which are part of the National Health Strategy and the National Research Strategy. The research component of PMND includes 26 measures and sets out to help patients suffering from neurodegenerative diseases benefit from progress in neurosciences as quickly as possible. To this end, the plan will improve coordination of neuroscience research between upstream pre-clinical, clinical and epidemiological studies as well as research in the human and social sciences. Inserm has been appointed as Chair of the PMND Research Steering Committee and has undertaken a reorganisation and developed instruments to implement the plan, in such a way to ensure a coherent approach by all involved.

On the scientific front, Inserm is directly involved in identifying biological markers in well-characterised patient cohorts (e.g. CRB-REFGENSEP for multiple sclerosis and MEMENTO for Alzheimer's disease) and is coordinating a Scientific Valorisation Domain (*domaine de valorisation scientifique*, DVS) within the framework of CoVAlliance⁸ which aims to consolidate public-private partnerships in this field.

⁸ CoVAlliance: a permanent committee for the coordination of research transfer of the Aviesan Alliance

Objective 2: Develop new structures in the form of Technology Research Accelerators (*accélérateurs de recherche technologique, ART*)

Top-level fundamental research is increasingly dependent on access to innovative technologies. In the context of international competition, facilitating access to such technology as early and quickly as possible is crucial. In important scientific fields, Inserm (and more generally France as a whole) is having difficulty keeping up with the competition in this respect as well as with recognising the real value of technological research. The aim is to speed up the provision of technological resources for Inserm teams which would be able to benefit and derive competitive advantage from such access.

This means establishing a series of **Technology Research Accelerators** (ARTs) to give the Institute **capacity for innovation, technological development and the dissemination of new technology** to Inserm laboratories. Expected benefits include faster development of innovative technologies and the acceleration of their availability to teams in the field.

These ARTs will be set up on the basis of three interrelated founding objectives:

- Development of an HR system to match the **new skills required** for proper ART operation covering career management, suitable assessment instruments, capitalisation and training.
- A **level of reactivity** compatible with international competition in terms of both decision-making and resource mobilisation.
- **Project-by-project operation** towards a final objective, from innovation to dissemination of the new technologies.

ARTs will be genuine sites of innovation that will fit in perfectly with Inserm's objectives. The aim is to set up 4 to 6 ARTs over the duration of the Strategic Plan. Technologies that are key to Inserm and therefore the ARTs will be selected in a three-stage process:

- **Technological monitoring** covering four types of information: i) Inserm teams' needs with respect to a given technology, ii) identification of key technologies in biology and health care developed as a priority in major international institutions, iii) the possible existence of technological building blocks and skills already present in Inserm teams for targeted technologies, and iv) identification of national and foreign partners which Inserm could work with to develop priority technologies.
- Analysis of priority technologies and partnerships to develop these technologies in collaboration with our own internal strengths.
- Budgeting and arbitration by Inserm management to define the ARTs to be created. A special technological monitoring cell will be set up at the end of 2015 with Inserm Transfert.

In 2015, the thematic institutes have already identified the first priorities: i) **Ultrasound-based technologies and medical applications** are being addressed as part of a collaboration initiative between Inserm, CNRS and ESPCI (*Institut Langevin*, Paris). This collaboration, which is highly regarded on the international stage, aims to develop and disseminate a series of innovative approaches to numerous Inserm teams working on fundamental and clinical research. On this basis, with a view to meeting the many and various needs expressed by Inserm teams, it was decided to create a prototype ART focusing on ultrasound; ii) **Bioinformatics and related technologies** have been identified from the outset as a priority; iii) Bio-printing to create organoids and drive regenerative

medicine has also been singled out in this process.

These new structures will respond to the issues of **new posts with rare technological skills** that are today indispensable at Inserm, with a view to attracting the most highly trained, best-qualified candidates (see **Priority 2** of the Strategic Plan). This initiative will ensure a degree of **reactivity compatible** with that of the international competition and will bolster development with training programmes on the dissemination of technologies in France.

Objective 3: Reinforce the coordination and visibility of research infrastructure, and develop policy to encourage good handling of research and medico-economic data

Appropriate infrastructure is vital to competitive, high-level research. The quality of these infrastructures in terms of productivity and reactivity are important factors for research teams, both academic and industrial.

Good research not only relies on state-of-the-art shared platforms / infrastructures but also helps improve and develop them. Today we have a set of infrastructures of varying size and scope, covering both structures that focus on high-tech applications and networks of platforms in the form of Resource Centres, like the infrastructures supported under the PIA.

Inserm intends to enhance the legibility and coordination of its research infrastructures by equipping itself with capacities for control, pooling and protection.

Ensure legibility and coordination of research infrastructures

As different infrastructural entities are run with differing national and regional approaches to creation, organisation and funding and are highly varied in terms of scope and function, **coordination by Inserm is vital** to ensure effective structures for research development.

Thus, the use of Inserm platforms, major investments in heavy equipment, and the development of national and international infrastructure networks will be governed by stable Standard Operating Procedures compiled by Inserm together with all the partners involved, for a common approach to decision-making and commitment to reflection at the national and European level.

An Inserm infrastructure committee will establish a policy to promote and conduct nationwide actions. The aim of this committee is to:

- pursue and reinforce coordination activities like those undertaken within the framework of IBiSA⁹, with investment in equipment for universities, regions and Europe by coupling it with support in the form of technical staff for researchers as part of an inter-institutional consultation;
- maintain, on the basis of scientific assessments, support to distributed infrastructures put in place within the framework of the Future Investments (*Investissements d'Avenir*) programme and contribute to their growth;
- supervise the coordination of special training programmes and encourage the creation of skills networks.

For each infrastructure, specifications should be established in line with the Institute's strategy. A reflection process will be launched to define relevant criteria for assessment of the operations of infrastructures and technological services. These harmonised criteria will establish comparators and emphasise services with respect to potential for technological/methodological innovation on an individual level. The first Internet portal stipulating the services offered by the various platforms will come into operation in 2017. It could be developed in collaboration with all interested parties.

⁹ IBiSA: Infrastructures in biology, health and agricultural research, IBiSA represents the first initiative for the national structuration of actions by the various actors involved on the basis of an independent evaluation conducted by a Scientific Council

Reinforce the policy for research data management

Technological and scientific revolutions have led to an **explosion in the volume** of valuable, interpretable data. The storage, archiving and traceability of raw (patient) data and biosamples are subject to specific rules which guarantee high-quality results in both pre-clinical and clinical research. In the long term, however, reliable data archiving comes down to the individual researchers. Confronted with these requirements in addition to the real risk of **data loss**, the need for **reproducible data** (in the event of having to refute contestations of published results by presenting original raw data), and the necessity of **sharing data and making them openly accessible**, **Inserm created an institute wide service for data management support in 2013**. As part of the Strategic Plan, Inserm intends to implement an ambitious national policy on the management and protection of research data. Data accessibility and openness (e.g. a secure sharing system) should be considered in a national context in which regulatory experience (e.g. CNIL) is strong and remains a prerequisite.

One of the new Inserm initiatives, the **electronic lab book**, an essential tool for supervision, traceability and information sharing, will be test-run in the last three months of 2015 by some thirty research teams. An Internet portal will be set up to publicise services, in particular training courses on parallel distributed calculation, the use of calculation grids, cloud computing for big data and high-performance calculation. Most of these training courses will rely on existing expertise and current national digital infrastructures, e.g. GIS France Grilles with which a partnership has been established.

Moreover, Inserm will reinforce its **governance at national level and progressively build up a network of data correspondents** with a view to promoting **Good Data Handling Practices** at all stages: acquisition and formats, organisation and storage, long-term preservation, ethics, intellectual property, sharing and reutilisation.

Inserm will develop quality training programmes for all laboratory and service personnel. It will also encourage researchers to make their articles more transparent by following internationally recognised reporting guidelines and sharing their data.

Establish a management platform and medico-economic data analysis

The main national strategic guidelines aim to better integrate health-related big data (clinical findings, laboratory test results, epidemiological, demographic and behavioural data, environmental and administrative data). **Inserm is greatly involved** in drawing up legislation planned in the current **Health Bill (Art. 47)** with the establishment of a **national health data system** (*système national des données de santé, SNDS*) concerning the management and use of large medical and administrative databases for the purposes of research. This is an important issue for the Institute as these data will be complemented by massive quantities of digital data from various sources (genetics, genomics, laboratory tests, imaging, cohorts, populations) as well as individual data derived from an ever-increasing number of different types of well-being sensors used by a population that is more and more preoccupied by health.

It is essential to establish procedures for the extraction of data relevant to research and its rigorous interpretation and application, as well as providing the required expertise and critical thinking.

Inserm is proposing to establish a common technical platform for all research institutions and universities to be co-managed with the Athena National Alliance for Human & Social Sciences. The aim is to help teams with technical, regulatory and ethical aspects to ensure that their projects proceed under the optimal conditions of timing and safety within the legislative framework.. This platform will also make it possible to capitalise on the success of the Internet site *Portail Épidémiologie France*¹⁰ (Epidemiology Portal France) which catalogues all French health-related databases.

¹⁰ The *Epidémiologie France* Portal co-constructed by Aviesan and *Les entreprises du Médicament* (LEEM), launched in 2011, presents over 700 databases with nearly 1,500 visits a month, including one-third from abroad

Objective 4: Develop new initiatives in animal research policy

Inserm will undertake new initiatives to cope with changes in research using animal models. In 2016, Inserm will launch a training and awareness-raising campaign on animal welfare.

Because an experimental model can only be selected according to the scientific question put forward by the project originator, Inserm will develop **a service to aid with model selection** and project design. The aim is to be able, by the end of the Strategic Plan, to: i) exploit every animal model according to its capacity to provide an answer to the scientific question by helping with the design of upstream projects, ii) stimulate the use of ex vivo models (3D tissue culture, stem cells) or iii) *in silico* (bioinformatics, etc.) as a preliminary or to substitute for certain experiments on mammals, iv) encourage and support the use of organisms such as fish, amphibians, arthropods and marine species. A strong project design policy using animal research will be associated with training in alternative methods. In particular model selection policies, command of statistical methods and the use of high-resolution methods will be expanded in addition to obligatory training programmes.

A vocation of expertise and aid in the setting up of projects will help to reinforce: i) the use of biostatistics with evaluation of the power of the tests used to make as accurate a determination as possible of the sample sizes required for experiments; ii) Inserm will encourage researchers to freeze genetically modified rodent lines and only raise the number of animals needed for the projects underway, and iii) submit negative results related to the use of animals or other organisms to the HAL Inserm site in order to prevent pointless duplication. Moreover, in the course of its assessment, every unit will be asked to produce a document on its animal research strategy.

In collaboration with specialist networks¹¹ and FRANCOPA, Inserm will launch a reflection process with a view to compiling an overview of the current situation and ensure monitoring of new models being developed to improve replacement.

Inserm will continue its communication efforts targeting bodies responsible for national and European policies in order to promote animal research and avoid counter-productive multiplication of regulations in this field.

¹¹ Notably the EFOR, ROCAD CELPHEDIA and EMBRC networks

Objective 5: Establish of a Public Health Research Plan

Public health research sets out to understand how the health and welfare of populations and the efficiency of the health care system can be improved through interventions and policies based on the best available data. In practice, public health policies in both France and at international level are not as evidence-based as they could be. Yet the challenge is a significant one when it comes to guaranteeing society the best possible health care by managing to reconcile disruptive technologies with the medicine of the future. The issues include how to cope with the rising prevalence of chronic disease and disability (largely due to increasing life expectancy) and meet the expanding demand of patients to be part of the decision-making processes as well as the emergence of new health, infectious, climatic and environmental risks with potentially massive impacts on health care and social protection systems in the future.

Inserm **will reinforce strategic steering tools** by taking part in the deployment of a national public health research programme designed to consolidate the convergence of all funding sources and the consistency of public health research with national health care research programming. At the same time this plan will leave the responsibility of research topics to the teams and units concerned, conceived as closely as possible to the scientific settings in which they are formulated.

This programme will cover four consistent axes to prioritise the reinforcement of the international visibility and reactivity of French research on public health:

- Health determinants, prevention and interventional research
- Interactions between health, work and environment
- Innovations and organisation of health care services and public policies
- Concepts and methods in emerging and innovative fields

Within each of these research axes, research on population health should be promoted in its entire interdisciplinary dimension, including the human, economic and social sciences. Access to existing medico-administrative databases should be improved for researchers and the compilation of massive national and European databases should be facilitated.

One priority objective will be mobilising the investment needed to guarantee the sustainability and quality of major health-related studies (cohorts, large-scale repetitive surveys, big databases) which are indispensable to growing public health research that is competitive in the long term at the international level.

Health determinants, prevention and interventional research

A specific, sustained effort in cognitive research should be conducted among the population to identify and explain the main determinants of chronic diseases, disabilities, developmental problems and addictions, whether they be physiological, behavioural, social or structural. The manifestation of socio-economic inequalities in the form of pathogenic mechanisms should always be investigated. This also means increasing the mobilisation of teams and infrastructures to make up for the French gap in interventional research, in particular to evaluate the impact of innovative programmes on prevention and health inequalities by including economic research, especially in preventive medicine.

Interactions between health, work and environment

An exposome-type approach, the identification of biological markers and a population dynamics-based approach in the course of life should be emphasised to detect the effects on health of exposure to different substances together with an analysis of social and genetic interactions with the environment to identify the most vulnerable subjects. The European dimension of this research will be reinforced thanks to Inserm's position as the supervisor of the "research" arm of the EHBMI¹² Programme.

The work place will constitute a specific, important area of intervention for training on risk management, prevention programmes and field research.

Innovation and the organisation of health care services and public policy

Targeted research can help improve public health policy and transform health care services. A national and regional organisation will be established to consolidate links between research and public health stakeholders, notably through innovative contractual modalities. Connections with European experts are encouraged, particularly within the framework of an ERANET. Enhanced understanding of local, national and wider dynamics will be acquired through contact with those concerned (professional health-care providers, patients, decision-makers) to reinforce the role of research in defining, analysing and assessing public regulations (public interventions, technological and social innovations, the coordination of care, the funding sources for health care costs).

Concepts and methods in emerging and innovative areas

New integrated models should be developed to accelerate research on public health, especially for the analysis of big data, i.e. organising, checking, integrating and interpreting data and modelling complex chains of causality. Research on innovative qualitative analysis methods will also be promoted in the field of social science and in the assessment of policies, risks and health-related technologies, operational methods which introduce a dimension of equality into the public decision-making process.

Finally, this research plan will be accompanied by initiatives to **reinforce the continuum between research and expertise**, an approach already undertaken within the mission of collective appraisals. Enhanced coordination of public health research and the institutions in charge of health care policies at national and regional level should be favoured. A national contractual framework will be established with the teams concerned and the relevant bodies in order to promote regular interactions. This approach will contribute to the organisation of a regional appraisal system grouped within Regional Public Health Research & Evaluation Centres (*Centres Régionaux de Recherche et d'Expertise en Santé Publique*, CERRESP).

¹² **European Human Biomonitoring Initiative (EHBMI)**: This H2020 initiative aims to assess the exposure of European citizens to chemicals of concern. The initiative involves the European Commission, the EU Agencies and EU Member States as well as relevant stakeholders

Objective 6: Support the innovation transfer in human health

One of the challenge's facing Inserm is to ensure that discoveries made in its laboratories are embodied in applications that are accessible to patients and more globally the population as a whole.

Inserm and Inserm Transfert¹³ are world leaders in innovation in the life sciences and human health as well as good practice and results in terms of technology transfer. In the European Patents Office's 2014 listings, Inserm ranks sixth overall among French patent (all sectors) submitters and has confirmed its strong position in Europe as the fourth European submitter in the Biotechnology sector and fifth European submitter in the Pharmaceuticals sector. The Institute has seen its position strengthened in recent years with a current portfolio of 1,279 patent families at the end of 2014, compared with just 634 in 2006, i.e. more than a 100% increase. The great diversity of the portfolio in terms of both the diseases targeted and therapeutic and diagnostic possibilities represents a precious opportunity for industry. In 2014, industrial partnerships generated some €27.5 M for Inserm and its diverse partners, 25.5% of which corresponds to licenses granted to industrial entities in France and on the international stage.

For Inserm, this means sustaining all the fundamentals of the technology transfer value chain at the vanguard of international excellence, such as proactive and efficient detection which benefits from close proximity to researchers, intellectual protection extended to cover patents, software, databases, connected objects and e-health, sustained, independent maturation of innovations and multi-level capitalisation and ambitions with French and foreign multi-sector industrial companies (pharmaceuticals, diagnosis, digital, etc.).

Future investments are in the process of advancing the maturation of innovations in the short and medium term given the sums invested in Accelerated Technology Transfer Companies (*Sociétés d'accélération de transfert de technologies*, SATT). The field of therapeutic development of biological compounds associated with capitalisation of innovative intra- and extracellular therapeutic targets that can be modulated by pharmacological agents nevertheless remains delicate because it is highly dependent on capital and therefore risky, requiring specialised, high-resolution appraisals although it potentially yields long-term—even very long-term—returns. Specific work on this type of innovation remains to be undertaken with a view to reinforcing innovation at Inserm and ensuring that the Institute remains one of the top major international research institutions with respect to therapeutic development right up to the bedside.

Inserm's aim is to anticipate changes as well as academic, technological and industrial upheavals and thereby **attract new partnerships**. This means studying the viability of new capitalisation channels in the fields of therapy and diagnosis/prognosis within the framework of the continuum towards translational research, clinical practice and patients.

¹³ Inserm Transfert has been a 100% private subsidiary of Inserm since 2006 and manages, on behalf of Inserm, some of the technology and knowledge transfer activities, as well as life sciences and health care through the Aviesan Alliance

Over the duration of the Strategic Plan, the initiatives will concern:

“New channels of valorisation in the field of therapeutic development”

Time is key in this area. The time it takes to develop a drug has grown enormously because of more stringent regulations and diversity of therapeutic approaches, including the competition; development times these days can be upwards of fifteen years. In parallel, the transfer to a drug company of a family of patents or a therapeutic product at the research stage usually takes a few years, with a resultant product sometimes only arriving on market towards the end of the period of patent protection.

This is why a new initiative by Inserm and Inserm Transfert would make it possible to pursue the applied research within the Institute further along the value chain as far as the clinical phases. This **AccTion Project which is dedicated to speeding up innovative therapeutic development** through proof-of-concept clinical phases in human beings. The aim is to create a pipeline for therapeutic products mainly derived from Inserm innovations with, at the pilot stage, a portfolio of 4 to 6 development projects. This initiative will be established in collaboration with partners with expertise in innovation and preclinical and clinical development. The AccTion Project constitutes a model for the structuring of new public-private partnerships to reinforce the continuum between translational and clinical research.

The observational dimension and cohorts

Inserm has always fostered a policy of supporting population science. Future investments have reinforced very large-scale infrastructures and France now has available unique tools in the field of public health.

Building value through infrastructures based on Inserm’s biological resources is expanding; it especially concerns databases, cohorts, Clinical Investigation Centres (CICs), specialist clinical networks and biobanks. This capitalisation depends on new multi-public/multi-private partnership models and on the exploration of new capitalisation channels in preventive medicine.

Priority 2: Develop, capitalise on and organise skills to serve strategic ends

Inserm's organisation and policies should be adapted with agility and reactivity to the constant challenges of the world of research that constitute strategic priorities, notably with the emergence of new research topics, and a technological, regulatory framework with ever-changing HR issues.

To do so, Inserm can rely on the strong values of the groups and individuals that constitute its staff. Its foremost priority is to attract the best scientists while a highly competitive international environment exerts. The institution must also direct all of its potential to the service of the scientific strategy and aim for continuous improvement of its policies and changes adapted to its operational guidance mechanisms.

A policy to revitalise scientific careers (**Objective 7**) will rely on the development of existing potential, new recruitment and the redefinition of how researchers and institutions are evaluated (**Objective 8**). In this context, Inserm will reaffirm its commitment to responsible research in terms of both experimental practices and the management of human resources (**Objective 9**). All these actions will be complemented by the development of communication and information systems to strengthen Inserm staff's sense of belonging (**Objective 10**) – a key factor when it comes to research partnerships.

Concerning links established for over 20 years with patient support groups, in particular with respect to training, education and partnership for clinical research, **Inserm will maintain the relationships it has sustained with the patient advocate actors**. This policy of exchange should be reaffirmed and expanded as it constitutes one of the Institute's strengths vis-à-vis its relations with society and an undeniable advantage for its research in general. Patient associations have long been involved in disseminating the results of research and ensuring an increase in their social and economic value. Such bodies generate a great deal of data and can facilitate researchers broad access to it. This is why it is worth helping reinforce their roles at all phases of the research process, from fundamental science through to clinical and social aspects. It also involves pursuing the incitement initiated by the GRAM¹⁴ designed to take better stock of researchers' activities with and in favour of patient support groups in the evaluation process.

New directions will be taken to expand actions already undertaken and made permanent, especially in the promotion of equality, disability policy, responsible management, agent training, quality of life at work, etc. All of these are examples of issues at the heart of the Institute's human resources policy.

¹⁴ GRAM: Reflection Group with Patient Associations, established in 2003, This group favors interaction between Inserm and patients associations to propose subsequent actions between the two groups

Objective 7: Promote professional careers

The professional and technological environment of research is constantly evolving, both in terms of the types of jobs covered by scientific work and in working conditions: demographic issues, regulatory domain, access to budgetary levels. Inserm promotes new initiatives so that the roles of the researchers, engineers and technicians evolve smoothly in a rapidly changing technical and scientific environment. Professional career paths will have to follow these changes to support the Institute's priorities and confront the major challenges to be faced in the future.

Inserm must propose instruments to allow its employees to become drivers of their own professional development and flourish in the development of a dynamic career.

At the intersection of these two objectives over the next five years, human resources policy is prioritising four main actions:

- Development of policy towards young researchers and promotion of contact, exchange and participation with the medical world through the Inserm Lilliane Bettencourt School and its hosting system for young physicians.
- Strengthening support for contracted staff;
- Construction of employees' careers as genuine professional projects by mobilising skills and developing potential;
- Development of a support policy in engineering to react to units' needs;

Develop policy towards young researchers and systems to promote access to physician-led research

The **ATIP-Avenir Programme** is a perfect illustration of the Institute's desire to develop this policy as it allows young researchers to set up and run teams within a research structure while independently developing their own research topics. Apart from the allocation of material, financial and human resources to this programme, ATIP-Avenir candidates receive support with HR issues for their establishment and specific training. It is within this context that the Institute will continue to support this initiative in the coming years.

Since its establishment this instrument has notably demonstrated its excellence i) in terms of attractiveness, ii) through the integrated and evolving careers of these researchers.

Of the 142 ATIP-Avenir contracts responding to the 2009-2014 call for proposals, 25 laureats (17%) received an ERC contract of excellence. A specific survey was conducted in 2014 to address the position of researchers previously granted through a 10_year period ATIP Avenir programme (2000-2008): 99.5% of laureates initially non-Inserm-affiliated were recruited, 86% hold positions such as research unit directors or team leaders. Among junior researchers previously included in the ATIP Avenir programme 75% of them hold today either an Inserm unit Director position or University-Hospital position.

Over the last decade, Inserm has established a number of systems to promote the research continuum between laboratories and University Hospitals. This has resulted in the creation of hosting

systems for physicians (hosting contracts, interface contracts) and through training systems for and through research for medical and pharmacy students (École de l'Inserm Liliane Bettencourt, Edilb).

This special effort to encourage the participation of physicians in Inserm research will be reinforced over the coming years with two major actions to be conducted in partnership with the Foundation Bettencourt Schueller:

Research will concern a greater number of medical students. In addition to those selected by a competitive exam for the Inserm School, Inserm and the Foundation Bettencourt Schueller are establishing a network of French medicine-science courses. This has a dual objective: on the one hand to provide funds for medical students undertaking an early scientific dissertation; and on the other hand, to allow them to take part in various scientific activities organised by Edilb.

In 2016, Inserm and the Foundation Bettencourt Schueller will establish a support system to allow physicians to devote more time to research during their registrarships.

Regarding Inserm postdoctoral fellows, Inserm will reinforce its initiatives to improve the contractual policy (see next paragraph) and provide postdocs the best scientific environment and training to develop their projects.

Improved contractual policy

Contracted agents account for a significant proportion of Inserm's staff and contribute greatly to the activities and reputation of the research teams.

Inserm undertakes to improve the conditions under which contracted agents are taken on to fulfil its units' needs in terms of recruitment and attractiveness. This approach now has to be maintained with responsible actions aimed at reinforcing the support given to these employees throughout their careers at Inserm.

A charter highlighting good practice to be adhered to with regard to recruitment and career management of contracted agents, disseminated in April 2013, embodies this commitment and constitutes the foundation stone for the efforts to be made with respect to contractual policy.

As such, further to the principles established in the charter, Inserm's ambition is to implement **a range of operational actions**, available to decision-makers and local HR managers, with the following key objectives: i) accompaniment in professional careers, and ii) reinforcement of the employability of contracted agents. This good practice will be integrated into all relevant procedures as well as the everyday activities of the departments and laboratories.

These actions, which will be maintained throughout the agent's contract, will be developed based on the following themes:

- **“Recruitment and integration”** which will be systematically integrated into the coherence of a professional project;
- **“Ongoing support”** which will lead to regular professional interviews and monitoring of activities and professional projects by managers and the HR division;

- **“Training”** in the subject area but also on ethics, integrity and management. These actions will not only contribute to reinforcing the employability of contracted agents but will also ultimately constitute identity markers that promote the Institute’s reputation and attractiveness;
- **“Support at the end of a contract”** with training and partnerships to favour agents’ external replacement (health care agencies, industry, universities, hospitals, competitiveness clusters, etc.).

With regard to the last theme, Inserm is currently establishing a two-level partnership with Pôle Emploi at both national level, with the signing of an agreement for national actions, and at regional level with a partnership between regional actors. This also aims to promote and frame these approaches and has already been initiated with the signing of a number of regional agreements.

Promote career development

The professional research environment is constantly changing with the appearance of new jobs, new practices and technologies, and new priorities. These changes represent professional opportunities for employees. In this context, Inserm is developing an HR policy to promote the matching of such opportunities with employees’ professional aspirations and the development of their careers in the service of the establishment’s priorities. This policy must draw on the richness and diversity of talent, optimise the exploitation of existing potential and promote projects that help Inserm employees develop their careers. In other words, Inserm needs instruments to create an effective **dynamic mobility system** compatible with the establishment’s strategic objectives.

To achieve its ambitions, the Institute is implementing a series of actions. The first of these is the development of **internal pathways** to promote mobility between jobs within the organisation, more specifically from engineer to researcher if justified by results, or from researcher to engineer when justified by top-level technical qualifications.

For researchers, HR support will be reinforced and defined by regional delegation HR divisions, and targeted mobilities will be encouraged in association with the main scientific and technological programmes promoted by Inserm. Concerning ITAs¹⁵, the objective is to enhance opportunities for mobility with: i) significant reinforcement of the national system by an increase in the number of jobs with mobility options, ii) the setting up of an additional mobility system to establish localised diffusion, management and decision-making to facilitate access to opportunities, iii) improved accompaniment of team mobilities, seeking opinion from the CSS¹⁶ concerned and HR evaluation on the question of ITA mobility.

¹⁵ ITA: professional subsidiary bringing together engineers, technicians and administrators.

¹⁶ CSS: *Commission scientifique spécialisée*; CSS, Inserm subsidiaries, participate in the assessment of research units

Develop engineering policy

Innovative, competitive research depends on state-of-the-art technology. **The purpose of creating ARTs** (see above) is to develop useful technological tools and make them available to researchers before they are commercially available. The establishment will support this ambition and propose targeted actions to ensure that ARTs operate properly in the broader framework of an overall policy that is supportive of technological research.

Sought-after engineering skills should be developed within the Institute to meet needs; Inserm will implement a recruitment policy to ensure the presence of required skills, and will propose a suitable system for the rapid and pertinent recruitment of qualified personnel.

In addition, the Institute will promote training for and through research by organising **partnerships between Inserm and engineering schools**. The general objective is to provide structures with engineering support. This action concerns both ARTs and laboratories. Although there are already close links between Inserm and the top engineering schools in France (early training of many researchers, mixed units with Polytechnique, Mines-Télécom, ESPCI, INSA, etc.), these need to be reinforced with a view to technological development with national or regional agreements. In the latter case, the choice of the partner school should correspond to an existing list, and the approach comes under the formalised national framework.

Partnerships with the *Grandes Écoles* (High-level universities) will be formalised with three objectives:

- bring together the Inserm staff concerned and engineering schools to help them evolve in an environment conducive to engineering;
- attract the best students by getting involved in their education in order to collaborate in schools' courses by defining priority areas for thematic internships, and by ensuring continuity between different internships and Inserm training courses;
- develop research and technologies in priority areas for Inserm.

Within this framework, a partnership between Inserm and Centrale Supélec school is under consideration, covering pedagogy, research and entrepreneurship.

Objective 8: Optimise the assessment process of researchers and teams

In order to harmonise and simplify, all Inserm research structures will be classified as Research Units comprising one or more teams in the future. The coherence of each unit will be assessed according to the match between its scientific strategy, its governance and the composing teams.

Towards a new definition of Inserm research structures

The team – directed by a manager – is the elementary operational unit in the Inserm research system. A research team is defined by its scientific objectives and the resources (funding, equipment and personnel) it has to carry out its own research programme in line with Inserm's overall strategic goal.

Creation of an Inserm team involves support for the team from the institution in line with the team's objectives.

Teams can therefore vary in size but should remain a coherent, logical entity in terms of their composition and their organisation around a medium and long term sustainable research programme that is accepted and recognised by Inserm. The research programme may cover more than one specific complementary objective, each directed by its own project manager.

The team must contain at least one full-time qualified researcher. The absence of a qualified researcher is only justified in clinical teams or SHS operating in an environment in which there are already qualified researchers who contribute to the team's project (institute, centre, multiple teams).

In addition, all teams are subject to certain recommendations proposed by the Scientific Board:

- A reasonable size for a team is at least 5 full-time equivalents, including post-doctoral fellows. Inserm accreditation of smaller teams in an isolated setting must remain exceptional and only when justified by special circumstances;
- The manager undertakes to direct the team throughout the duration of his/her mandate;
- The creation of a team should take stock of the compatibility of its programme with local scientific resources;
- A single work location is recommended;
- Co-publications within a team are generally considered as common to the project community;
- Apart from ERC and ATIP-Avenir, good practice requires that the emergence of a team during the course of a mandate should be submitted for approval by an ad hoc scientific committee, a unit scientific council, etc. This team will be assessed by the supervising body for accreditation at the time of the HCERES's site assessment.

Changes to Inserm assessment bodies

As the specialised scientific committees CSS¹⁷, the administrative committee CAR¹⁸ and the scientific advisory board CS¹⁹ mandates are set to come to an end at the end of August 2016, the Institute will be able to establish new provisions for the 2016-2020 mandate. Consequently, a discussion has led to the definition of a new distribution of research themes in CSS, from the most fundamental to the most applied. Their number will thus decrease from 9 down to 6²⁰. The purpose of this new organisation is to balance the number of teams assessed, the breakdown of jobs open to competitive examination, and the possibility of promotion between the various CSS.

Regarding the scientific board, the Institute wishes the new mandates to be inscribed in a renovated framework. To achieve this goal, a process of reflection concerning the mission, composition and functioning of the scientific board was undertaken. The following elements were agreed:

- maintaining the scientific board's missions and reaffirming its role as the authority consulted by the CEO of Inserm, for issues such as the main orientations of the Institute, activity programming, strategic planning and the pluriannual contract to be signed with the ministries, as stated in the Research Code, article L.311-2;
- decreasing number of members but maintaining the parity between elected and nominated members;
- nomination of the President of the scientific board by the CEO of Inserm;
- within the scientific board members, a permanent group will be put in place for scientific consultation on main orientations of the Institute, activity programming and exploitation of results, studies led by the Institute or those where it is in charge of the organisation, and the strategic plan. The composition of this group would include highly qualified scientific experts from abroad.

Optimise assessment procedures

In the new assessment procedure, CSSs will conduct a 5-component analysis based on the HCERES²¹ report and information provided by the team: i) scientific production, ii) national and international positioning, iii) programme specificity and novelty, iv) direction and coordination, v) synergy with the environment.

This assessment will estimate the added value of the team's project and its contribution to Inserm's scientific strategy. The assessment of researchers will be in phase with that of the teams to ensure harmonisation, making it possible to: i) better assess the matching of skills and requirements, ii) get a better idea of a researcher's activity in his/her environment, iii) propose dynamic management of the mobility of researchers at the time of the definition of a new project in a unit, iv) reinforce follow-up of a researcher's career and help them with their development choices. The chronology of these two assessments will therefore optimise researchers' scientific and HR monitoring.

¹⁷ *Commission Scientifique Spécialisée*

¹⁸ *Commission d'Accompagnement de la Recherche*

¹⁹ *Conseil Scientifique*

²⁰ The new CSSs are: CSS1 – Living mechanisms, CSS2 - Pathologies of development, haematology and oncology, CSS3 – Physiology and physiopathology of the great systems, CSS4 – Neurosciences, CSS5 - Immunity, Infection, CSS6 – Public Health and Health Care Technology

²¹ *Haut conseil de l'évaluation de la recherche et de l'enseignement supérieur*

Objective 9: Promote responsible research conduct

Affirm the need for integrity

Scientific integrity is a central element of the Europe 2020 strategy and the European Union's Horizon 2020 research and innovation programme. In this respect, the “**Ethical Charter of Research Professions**” compiled by Inserm, CPU²², CNRS²³ and Inra stipulates “the criteria of a rigorously honest scientific approach, notably applicable within the framework of all national and international partnerships”. This charter was signed on 29 January 2015 by the universities (represented by CPU), CNRS, Inserm, Inra²⁴, Inria²⁵, IRD²⁶, Cirad²⁷ and Institut Curie. In a research environment in which laboratories have more than one governing body and staff affiliated with different institutions, this Charter makes it possible to deal with potential contraventions. Henceforth it shall be appended to Inserm's internal regulations.

Inserm's objective within the framework of the Charter is to raise awareness among its staff on the question of scientific integrity and the need to declare conflicts of interest. Currently, any employee at any Inserm entity who takes part in an appraisal must declare any conflict of interest they might have. In addition, the Institute endeavours to raise awareness among partner universities (Masters' Degrees and Doctoral studies) on these issues and promotes the systematic teaching of methodology to students. In parallel, Inserm runs ongoing training workshops and on-line courses on this subject.

Inserm will establish regular regional Awareness Days on the themes of integrity, ethics and professional conduct. This increases Inserm's attractiveness, consideration of problems highlighted in the Strategic Plan, and enhances the establishment's reputation.

Assimilate Inserm HR policy with European strategy

Regarding Human Resources, Inserm has committed to developing its practices and following the recommendations of the European Charter and the Code of Conduct for researcher recruitment (Charter and Code) by adhering to the Human Resources Strategy for researchers (HRS4R, Human Resources Strategy for Researchers incorporating the Charter and Code Principles). Adhering to this strategy is all the more important since the subsidy agreement for the new H2020 programme stipulates that research institutions receiving European funding are obliged to take every measure possible to implement the principles laid out in the Charter and the Code.

²² *Conférence des Présidents d'Université*

²³ *Centre National de la Recherche Scientifique*

²⁴ *Institut national de la recherche agronomique*

²⁵ *Institut national de la recherche en informatique et en automatique*

²⁶ *Institut de recherche pour le développement*

²⁷ *Centre de coopération internationale en recherche agronomique pour le développement*

The objective is to obtain the European **HR Excellence in Research** label, disseminate best practices, enhance the Institute's attractiveness and visibility, and develop the European Research Area. Following an in-house analysis of the Institute's strengths and weaknesses, an action plan has been drawn up based on four main themes:

- Recruitment;
- Career development and assessment;
- Working conditions;
- Non-discrimination.

Objective 10: Reinforce the corporate spirit in a context of research partnerships

In the institutional context of the research landscape, Inserm and its staff operate in an open environment in which mixed collaboration is the rule. Consequently, the Institute has a dual objective: on the one hand to reinforce the visibility of its scientific excellence and expertise at the service of society; and on the other hand to take into account the diversity of administrative supervision of laboratories.

Within this framework, Inserm must both **reaffirm its identity, vocation and values** while simplifying everyday work environment Research Units as much as possible. To this end, three priorities for actions have been established: improve the Institute's communications and enhance the corporate spirit, develop tools to embody the "Inserm Community", and facilitate administrative management, which is under the responsibility of research units, by offering new services that fit the laboratory needs and by harmonising information technology systems with those of the various partners.

Adapt the communication strategy

The desire to reinforce a corporate spirit assumes that special attention should be paid to the establishment's internal and external communications. To this end, the Communication Plan being compiled will particularly focus on the sense of belonging, international reputation, and increasing the societal, cultural and media value of the scientific production at the heart of the research profession.

A corporate spirit cannot be separated from an establishment's values (excellence, social responsibility, scientific ethics, openness, etc.). The communication strategy allows their dissemination and sharing: this is the subject of a charter of good practice aimed at framing the establishment's communication and promotional activities with new rules on the **authorship of articles** and **international harmonisation of titles**.

Develop internal communication

Internal communication will be reinforced by the development of **digital media** enabling networking, creating links between people, promoting interactivity and providing a means of disseminating and sharing of information in the form of a **social, collaborative Intranet**. This will allow both vertical and horizontal communication between collaborators and bring concrete benefits in terms of interactivity and the dissemination of information. In this way, it will reinforce Inserm's competitiveness by providing a set of services for professional networks, communities of technicians, engineers and researchers within the institution. The social and collaborative Intranet will take the form of a portal with a number of sections - institutional, personal, networks, self-access. It will offer services in response to needs: institutional communication media, collaborators' profiles, forums, collaborative spaces for document handling (revision and version tracking, validation pathways, publications, etc.), areas for knowledge sharing to identify good practice, subscriptions to information sources, electronic signatures, etc.

Systems architecture

Inserm is also continuing to encourage the convergence of information systems within the Ministry of Higher Education & Research, and between different organisations and establishments. It thus promotes the application of shared frames of reference, essential building blocks for the systems architecture and interoperability of applications, and is adopting the same applicative and/or pooled tools and solutions as its partners. In this way, Inserm is setting objectives of efficacy and simplicity.

For example, under the guidance of the Ministry (DGRI), Inserm has been involved in constructing a **research consistency framework**, a foundation stone for a future frame of reference to be shared by Higher Education & Research structures and staff. Inserm supervised this study (the REFP Project, «REFérentiel Partagé»). In this regard, Inserm will gradually implement a common internal frame of reference that will be interoperable through the entire research community.

At the same time, work is underway to improve the functionality of IT applications available to staff, e.g. **the overhaul of tools for assessing, interpreting and managing Eva²⁸ and Gaia²⁹ competitive examinations, the enhancement of the Safir³⁰ financial monitoring tool, enriched by new dashboards designed for every user and the overhaul of the information base on BIR structures.** This essential work will reduce or eliminate the need for the repeated input of a given data point in the various different applications, thereby simplifying processes. Moreover, enhancement of the quality of the reference data will make it possible to disseminate more reliable, consolidated information to a greater number of people for research activity supervision and research support

Furthermore, training and communication resources together with media training modules will be proposed for managers and researchers.

²⁸ Eva: Inserm's scientific assessment Web site

²⁹ Gaia: Inserm human resources Web site (ITA appraisals, competitive examinations, professional examinations, etc.)

³⁰ SAFir: Inserm's automatic funding system

Priority 3: Optimised academic and private-sector partnerships, Inserm's leadership role reinforced at european and international level

Inserm has a long tradition of international collaboration (including in Europe) as evidenced by the 6,300 cooperative projects declared by its units with foreign partners as well as the number of international co-authorships which, in 2013, represented 48,7% of the Institute's output. These collaborations concern all research fields in life sciences and health care and involve partners in nearly 100 different countries, half of which are in the European Union or its immediate vicinity with the leading partnership country remaining the USA, which accounts for some 25% of all collaborations.

The participation of Inserm in consortia (European and Developing Countries Clinical Trials Partnership (EDCTP), Innovative Medicines Initiative (IMI), EU-LAC Health, Joint Programming Neurodegenerative Diseases (JPND)) and international associations (Heads of International Research Organizations (HIROs), Science Europe) demonstrates its policy commitment to work in international networks.

The number of foreign staff members (students, post-doctoral fellows and researchers)—mainly from Europe, China and India—estimated at 2,353 in 2014, also demonstrates this dynamic. Between 2011 and 2012, almost 12.4% of Inserm researchers were from abroad (Europe and elsewhere).

For Inserm, the objective is to consolidate its role as a key protagonist in biomedical research and create a knock-on energising effect promoting the search for synergies with other organisations affiliated with the Aviesan Alliance and other alliances, in the context of site policies on a national, European and international scale.

Inserm will continue reinforcing links between Research Units and the University Hospital setting (**Objective 11**), links which on the one hand benefit from the presence of many Inserm units at many hospital sites, and on the other hand depend on the identification of each thematic site benefiting from significant critical masses and in research.

To preserve its place as a major actor in European and International life sciences and health care research, Inserm will implement a proactive, incentive-based, innovative policy (**Objective 12**) and develop a strategy for international cooperation (**Objective 13**).

Finally, the Institute will consolidate its role of initiator and decision-maker in the matter of research and health-care policy with its partners (**Objective 14**), particularly through its activity within Aviesan.

Objective 11: Contribute to on-site scientific strategy and optimise partnerships to the benefit of biomedical research

The vision of each research organisation on the implementation of a site policy is closely linked to its organisation, in particular the procedures for the establishment of its laboratories. For Inserm, this means full implication with universities and hospitals. There is constant dialogue between Inserm and its partners in terms of both the development of a shared scientific strategy with support from the thematic institutes and for the everyday accompaniment of teams by Regional Delegations.

Implement national policy in synergy with local actors' policies

Recent policies on higher education and research (Law of 22 July 2013 and tenders for IdEx and I-SITE projects) support the emergence in France of new multidisciplinary centres of excellence and international-standard research. At most sites, universities and other higher learning and research establishments reserve a special place for national research organisations and want to get involved in the governance of these new structures. Within these, Inserm works to accompany the development of each site within the bodies responsible for the scientific strategy of these structures (Idex/ I-SITE and Comue). Inserm promotes health care research to ensure it is a strong point of the site and that the resources are in line with the site's potential.

Drawing on the experience of its thematic institutes and their analysis of local and national strengths, Inserm helps define priority issues, takes part in scientific programming and supports structuring actions so that each site is competitive at international level and also contributes added value at national level.

However, Inserm is concerned about avoiding the dispersal of research efforts and redundant actions at different sites, in order to enhance efficiency and legibility and favour the attractiveness and reputation of the country, its territories and its actors.

Stimulate collaboration with Research Unit partners

Against the backdrop of rapid changes in how higher education and research is organised, the Research Unit remains the corner stone of the organisation of research in France. For Inserm, Research Units are created on principle through partnerships (mixed), often with a research establishment. For the last few years, decisions concerning the creation of laboratories, resource allocation and the establishment of university-organisation professorships are made in close concertation and in light of each supervising body's priorities. Interviews with Unit Directors and the partners of the Research Units concerned at the beginning of the university five-year cycle provide a consolidated snapshot of existing resources and needs in a multi-annual perspective. On this common basis, organisations and universities can individually implement what has been decided collectively with full transparency.

Before significantly increasing the number of its own units, Inserm undertakes the reinforcement of work with its partners in order to support researchers in existing units and contribute to the definition of scientific direction and site development.

Inserm will offer the partners of its mixed units the possibility of founding partnerships **on the basis of strategic objectives and shared responsibilities**, favouring the implementation of modernised instruments to enhance efficiency and legibility for the accompaniment of units. Among these instruments, Inserm will support the **management platform system** at all sites where such a configuration is justified. More concretely, this means favouring a renewed and more flexible form of **global management delegation** (délégation globale de gestion, DGG). In cases where a unique management platform is not possible, Inserm strongly encourages daily management tasks to be restricted to two supervisory partners. The gradual implementation of a **principle of a unique management mandate per unit for technology transfer issues** is also a priority for Inserm, with the objective of simplification for research teams. Above and beyond joint administrative supervision, Inserm will maintain its collaborations with other actors, especially University Hospitals.

Consolidate Inserm's scientific and functional organisation in terms of site policy

To achieve the above-mentioned objectives, Inserm will draw on the current scientific and administrative organisation: respectively the **Thematic Institutes** and **Regional Delegations** coordinated by the Directorate-General.

The nine thematic institutes oversee strategic reflection within their scientific communities. Within the framework of the site policy, they aid teams with their projects, initiate or support networks, and contribute to the national consistency of research efforts for each theme.

The Regional Delegations create a local relationship for both questions of administrative supervision and laboratory management, as well as questions of site policy. In this respect, Inserm will take care to ensure that the scope of the Delegations is compatible with changes in university structures.

Scientific expertise and national vision on the one hand and the expertise of local policymakers on the other are therefore complementary and indispensable when it comes to setting up and implementing partnerships based on in-depth dialogue on scientific issues, taking into account the technical skills and management of each partner.

Objective 12: Enhance Inserm's role in the construction of the European Research Area (ERA) by facilitating and supporting its teams in European competition

On the European stage, Inserm is the **leading institution in terms of the coordination of and participation in** collaborative projects on health-related topics in the FP7 financial instrument. The Institute was **one of the first two European recipients of ERC laureates**, among the selected European Health projects. Inserm's active participation in the construction of the European Research Area is illustrated by an overall management of 434 projects of the 7th PCRD (including collaborative projects, ERC projects, Innovative Medicines Initiative projects, Marie Curie fellowships, Euratom, Science in society programme, Infrastructures)

Among the projects of the FP7, 224 are collaborative projects, 41 of which are being coordinated by Inserm. 112 ERC projects are conducted in Inserm laboratories, of which 59 individual ERC grants are directly managed by the Institute. Regarding joint technology initiatives that promote public-private partnerships with pharmaceutical companies, Inserm is a participant in 12 Innovative Medicines Initiative (IMI) projects. Inserm also manages 116 Marie Skłodowska-Curie projects, 97 providing individual fellowships.

The policy to be conducted over 2016-20120 is based on three themes: promoting targeted bilateral cooperation; promoting the participation of Inserm teams in European programmes³¹; and stepping up influential actions in the Aviesan and CLORA frameworks.

Promote high-level targeted bilateral European cooperation and define which cooperation tools should be emphasised

Inserm must define the European countries and institutions of excellence with which to collaborate in order to promote: i) high-level scientific exchanges, especially in emergent fields (fundamental, translational, technological research, etc.), ii) the constitution of consortia to respond to calls for collaborative European projects, iii) the organisation of exchanges between researchers on a basis of reciprocity, in particular by making greater use of European instruments dedicated to mobility and researchers' careers, including ERC³².

To ensure effective and balanced bilateral cooperation, it is important to reinforce which tools to should be emphasised:

- Scientific meetings to bring together high-level teams with Inserm teams to discuss improved cooperation tools and future consortia for forthcoming European calls for projects;
- Associated European laboratories to favour the coordination of collaborative European projects and promote exchange between researchers;
- Targeted agreements—limited in number—to define actions of common interest.

³¹ European programmes of interest to Inserm are notably collaborative health/TIC projects; ERC; Marie Skłodowska Curie; Future and emergent technologies; KIC Santé...

³² European research council

Encourage the participation of Inserm teams in European programmes (Horizon 2020, etc.)

In compliance with the recommendations of the Ministry of Research, Inserm aims to **further increase the participation** of its teams in various European programmes with an end goal of increasing the ratio of Inserm teams involved in European projects / the number of structures being managed by Inserm (a ratio which depends on tender guidelines launched by the European Commission).

To do so, Inserm's objectives are to:

- Ensure high-quality information for researchers, engineers, technicians and administrators about the opportunities offered by European programmes, by coordinating a **National Contact Point** (Point de Contact National, PCN) for Health, Demographic Change, Well-Being on behalf of Aviesan.
- Consolidate and amplify the efficiency of the **design and setting up of research or development projects/programmes** in order to find funding. Inserm will continue coordinating support for setting-up projects, which will provide Inserm candidate coordinators with access to the corresponding expertise of Inserm-Transfert, with the sponsorship of Inserm.
- Encourage researchers to choose Inserm as their host institution, for example by:
 - Taking into account the coordination of collaborative European projects or ERC funding, with Inserm chosen as the host institution for the allocation of grants, prizes, career advancement, assessments, etc.;
 - Highlighting Inserm instruments for coordinators of European projects (LEA, Interface Contracts, etc.);
 - Budgetary flexibility for the coordinators of collaborative European projects.
- Maintain ERC Aviesan support sessions (organised by Inserm and CNRS) to help young candidate researchers and consolidators prepare for ERC interviews.

In addition, within the framework of European programmes, collaborative work with voluntary-sector actors (in particular with support from Patients associations working group GRAM) could be boosted to facilitate both the emergence of new projects and joint compilation of strategies and methods to accompany them.

Step up influential action within the framework of Inserm, Aviesan and CLORA

Influential actions launched will need to be diverse and communicated through the various different channels available to Inserm: Inserm Siège, Thematic Institutes, CLORA / Aviesan.

The priority actions will be to:

- Provide a regular interface between Inserm management and European decision-making bodies;
- Implement influential actions to prepare working programmes and tender guidelines, in particular under the aegis of Aviesan (Groupe Europe Aviesan) and CLORA, in collaboration with MENESR and the European Commission – for the dissemination of Position Papers on topics of current interest (the protection of personal data, animal experimentation, etc.);
- Maintain annual scientific meetings in Brussels in partnership with the Commission to enhance Aviesan’s visibility to members of the European Commission and European Parliament (Aviesan Brussels Meeting);
- Get involved in European bodies like Science Europe to take part and influence the construction of the European Area;
- Get involved in various Europe-wide projects (KIC Santé, EDCTP, etc.) and European initiatives (JPND/JPIAMR, etc.) because of their influence on European decision-makers for future actions.

Objective 13: Launch a proactive policy to encourage and accompany consistent international collaborations (beyond Europe)

The cooperative dynamic is largely dependent on an approach taken by Inserm teams which themselves initiate and develop collaborations with international partners. Inserm's current objective is to reinforce these exchanges and implement a **strategy for international cooperation** in order to:

- Support Inserm's global and general policy, at both the scientific level (cross-cutting programmes, development of technological research) and in terms of its human resources;
- Develop a corporate spirit among its employees;
- Reinforce its attractiveness and ambition in a tight budgetary context;
- Allow it to act as a key partner for the development of global scientific and technical advances at the same time as protecting French economic and heritage interests.

This strategy is based on four principles:

- Vitalising researcher leadership;
- Capitalising on Inserm's priority themes (including cross-cutting programmes and technological research);
- Concentrating and prioritising efforts in "strategic" countries;
- Responding to governmental directions for national strategies on research and health care.

Two major initiatives will be launched in the course of the Strategic Plan: i) construction of an incentive policy for partnership, and ii) reinforcement of international attractiveness.

Set up an incentive policy for partnership

This involves focusing the Institute's efforts on priority countries and themes, designing suitable instruments (**Associated International laboratories LIA following a call for tenders, set-up of consortia**) and playing a greater role in the Horizon 2020 Programme open to third countries, at the programming level and at the level of awareness-raising and education of scientists.

The Inserm strategy for 2020 will specifically focus on:

- **Consolidating its relationships with major scientific powers**, first and foremost the United States, Canada and Israel, in order to consolidate its position as a preferred partner, acquire greater visibility and promote multidisciplinary.
- **Reinforcing activities with emerging powers**, e.g. China, India and Brazil, by promoting close relationships between institutions and structuring collaborations: China – Infectious Diseases, India – Chronic Metabolic Diseases, Brazil – Neurosciences.
- **Ensuring an incentive policy with Asian countries** like Japan, South Korea, Singapore and Taiwan which now view investment in education and biomedical research as a key factor in their race to competitiveness and with which it is worth developing a partnership strategy with strong added value, especially in the fields of ageing, cell therapy and regenerative medicine.

- **Maintaining links with Africa**, especially North Africa, where more than 50% of foreign students in higher education in France come from.
 - Elsewhere, Inserm is involved in **structuring activities** in keeping with its mission and in particular for the strategic organisation of research in the South. Aviesan has reinforced interactions between French teams and partners in the South to improve strategic organisation of research. Composed of representatives from different institutions associated with the alliance, the Aviesan Sud Group – with strong encouragement from Inserm – is playing a major role in coordination, and has notably produced:
 - Coordinated Actions (*Actions Coordonnées*, AC) to complement those in place for research on HIV/AIDS, through new Coordinated Actions for the control of malaria, tuberculosis and neglected tropical diseases;
 - a strategy for interventions and responses to the EDCTP call for proposals for clinical research in sub-Saharan Africa;

Inserm will continue the discussions underway with its partners on the reinforcement and possible accreditation of research units in the South, especially in sub-Saharan Africa and South-East Asia, to complement the network of ANRS sites.

The Aviesan Sud Group also provides an ideal forum for interaction between research actions and representation, and to reinforce links between academic teams and NGO teams. Although such reinforcement has mainly been seen in the field of infectious disease in recent years, the activities of Aviesan Sud should expand to cover other fields and diseases associated with poverty and the tropical environment.

Reinforce international attractiveness

Becoming an international research hub will reinforce Inserm's international attractiveness by promoting researchers' international mobility—incoming and outgoing—at all stages of their careers and by improving the welcoming of foreign researchers. Two types of action will be established in the Strategic Plan: i) constructing a mobility policy for more international collaborations, ii) creating an environment conducive to attractiveness. Attractiveness actions will constitute part of the HSR4R (Human Resources Strategy for Researchers incorporating the Charter and Code Principles) process, mentioned above in Priority 2 of the Inserm strategy.

International mobility is a major phenomenon that grew in the 1990s with the globalisation of economies and societies. The subject of global competition, **attracting top students and researchers is a pillar of influential policy** in major countries like the United States, the United Kingdom, and of course France.

Today, following the example of major research institutions in the United Kingdom and Germany, Inserm should be playing a pivotal role not only in France's capacity to attract and welcome foreign students and researchers, but also in the enrichment of the careers of researchers and students in its own laboratories by encouraging work experience at one or more foreign laboratories.

In the run-up to 2020, Inserm will set up programmes to promote its policy of exchange with foreign laboratories. **By prioritising the financing of mobility**, these programmes will facilitate collaborations and exchanges between researchers. They will be designed to **perfectly match** the needs of research teams by providing different types of exchange possibilities according to whether they concern students (internships with stays of 14-28 days), young researchers (exchanges of 2-3 months for doctoral students and post-doctoral fellows) or senior researchers (professors, etc.).

Specific actions will be undertaken to promote the attractiveness of researchers, and most notably that of Inserm's young researchers. These will set out to: i) **facilitate the incoming and outgoing mobility** of researchers by compiling an in-house International Mobility Guide for Regional Delegations and laboratories. This Guide could be produced in different formats (checklists, memos, procedures, etc.) and will cover all subjects related to managing international mobility (authorisation from the Defense and Security Official, salary, hosting agreement, visas, health insurance, taxes, etc.); ii) **reinforce aid and accompaniment measures** to provide foreign researchers with support for administrative formalities by directing them to the appropriate bodies and making documents available (on the Web) in English (work contracts, civil servant status, etc.). A translation of Inserm's induction document would be of great help as would inform about insurance and accommodation; iii) **facilitate the visits of foreign researchers** by helping them find accommodation through partnerships with reception structures for researchers working abroad (Euraxess France association, etc.) and contracts with CNOUS, CIUP or Executive Relocations, so as to provide personalised help to visiting researchers during their time at Inserm and propose accommodation at a reasonable cost.

Inserm will promote the return of French post-doctoral fellows from abroad by creating an **Inserm Alumni** network. The departure of French graduates abroad is often a disadvantage on their return. Many obstacles are encountered by such young scientists: poor information about what is expected by scientific commissions, lack of visibility of reception structures, lack of information about opportunities, etc. These obstacles mean that, although they have taken the initiative to leave France to gain complementary experience elsewhere which can be highly enriching for any scientific career, they then find themselves at a disadvantage compared with post-graduates who did not leave the French system who are better orientated and who have to pay considerably less out of their own pockets. Inserm's international visibility depends on its researchers, including those who spend time abroad as "**Inserm Ambassadors**" associated with the **Inserm Alumni** network. The duty of the Ambassadors and the network is to "*fly the Inserm flag*", convey the Institute's image in a given perimeter and act as a contact point for the establishment of international links. They constitute relay points in foreign countries that are essential to Inserm's visibility. To this end, Charters aimed at Ambassadors and the Inserm Alumni network stipulating their roles and duties will be compiled.

Objective 14: Reinforce the coordination of life sciences research within the Aviesan Alliance

Inserm and the French National Alliance for Life Sciences and Health (*Alliance nationale pour les sciences de la vie et de la santé*, Aviesan) play a key role in improving the perception of the French research landscape which is rightly viewed as fragmented and complicated. The fifth anniversary of the Alliance and its Thematic Institutes (ITMDs) in 2014 was an opportunity for bringing forward and revitalising of the major strengths of the research. Three of their vocations are particularly important: interaction with university sites to promote more effective local Research Unit organisation; the development of links with industrial and academic partners (learned societies, foundations); and the development of international partnerships.

Within the framework of this Alliance founded in April 2009, Inserm should be able to overcome the challenges in the optimal use of research resources. There are many challenges: simplifying the work environment of researchers, pooling resource platforms, compiling consistent site partnership policy, and developing initiatives to ensure the critical mass necessary for international competitiveness.

Site implantation and development policies are formulated in consultation with Aviesan partners. These are extended to complementary alliances (Allenvi, Ancre, Athena, Allistene) with an effect to foster collective intelligence and mutual trust.

In addition, the creation of CoValiance, a committee that coordinates and capitalises on research placed under the auspices of Aviesan, led to the establishment of the 2012 project for a thematic capitalisation consortia, which is overseen by Inserm. In this context, the **Aviesan Thematic Capitalisation Consortium** works in close partnership with the relevant protagonists to speed up innovation in fields in which our laboratories and our industrial fabric allow the emergence of innovative projects. These fields include **vaccination, imaging agents, epigenetics and targeted cancer therapy based on physical methods, biological markers and patient stratification, and medical devices**. Confronted with the issue of interdisciplinarity, Inserm has already initiated discussions between the Aviesan and Allisten alliances on digital technology.

In its first few years of existence, Aviesan has originated novel and effective initiatives which would not have been possible with this entirely new form of governance combining major public-sector establishments, universities and hospitals. Two complementary priorities guided these projects: i) coordination between institutions, and ii) simplification of the life sciences and health care landscape. As a result of its responsibility for objectives set out by MENESR, most notably within the framework of ANR programming, compilation of health care and research strategies, and positioning vis-à-vis research infrastructures, Aviesan has become the preferred point of interaction between research organisations in the life sciences and health care fields.

In the field of health and well-being, the members of Aviesan have made great contributions to constructing the objectives of the MENESR **National Research Strategy** in order to respond to the major scientific, technological, environmental and societal challenges of the 21st century.

Today, the Institute is actively taking part in the establishment of working groups with all of its partners to propose new research programmes and action plans in response to the demands of the Government.

Process of research planning for translational and clinical research³³, at the request of the Ministry of Research and the Ministry of Health

In response to the French President's request, this Action Plan was presented to the Ministers on 15 July 2015 for implementation in 2016. This is a first in France, where clinical research tends to be fragmented and difficult to navigate in terms of operators and funders. In 2013, clinical and translational research accounted for some 800 research projects with an expenditure of around €200 M.

Both researchers and decision-makers are seeking to harmonise calls for tenders as well as transparency in health care research priorities, their integration in consistent programming and simplified access mechanisms.

An Action Plan has been proposed and accepted by all of the actors and administrations of the Ministries of Health and Research. This plan sets out to unify, **in one place**, project management, and **establish a common frame of reference for procedures and Good Scientific Assessment Practices** in order to ensure **better visibility** for Inserm's research. These measures will be taken into account in Inserm's deliberations on its 2016-2020 Strategic Plan.

Coordination of research programmes for emergency situations at the request of the Ministry of Research and the Ministry of Health

Our societies are regularly confronted with health crises, be they local or global, due to the emergence of infectious disease, most often of bacterial or viral origin. Responding to crises is the responsibility of national and international public health agencies. Research that is conducted before the crisis constitutes a key aid in the decision-making process for these agencies.

This preparatory research in the period between crises requires better organisation and coordination by the scientific community, as well as increased funding. Thus, under the guidance of the Inserm Immunology, Infectious Diseases & Microbiology Thematic Institute and Aviesan, the **REACTing** (**RE**search and **ACT**ion targeting emerging infectious diseases) Project set up a multidisciplinary scientific coordination committee composed of representatives from agencies responsible for human and animal monitoring and from the human and social sciences. The value of this multidisciplinary network which brings together top French research groups has already been demonstrated in times of crisis. Inserm, with its Aviesan partners, was appointed by the Ministers of Health and Research to organise emergency responses to health crises like the Ebola outbreak in West Africa in 2014 and 2015.

Setting up genomic medicine, at the request of the Prime Minister

Recent technological advances in molecular biology and the development of new high-throughput sequencing now allow the entire human genome to be sequenced faster and more cheaply than ever. Consequently, whole genome analysis is occupying an ever-increasingly important place in medical practice, in the context of the development of personalised medicine, be it for diagnosis, prognosis or treatment.

³³ The Steering Committee (composed of the central departments concerned of the Ministries of Health and Research - DGS, DGOS, DREES, DGCS, DGRI-, Aviesan and ANR, in collaboration with INCa and ANRS) submitted its report in July 2015.

A number of countries, including the United Kingdom and the United States, have implemented unprecedented measures to capitalize on this potential. In order to avoid further delay and a dependence on foreign services, France should also acquire high-throughput capacities commensurate with needs.

As national capacities are inadequate, the sequencing of the whole genomes of some 3,000 patients in 2013, performed by both public- and private-sector services, also called on foreign sequencing facilities. Most of this sequencing was funded by the Cancer Institute's Hospital-Based Clinical Research Programme or charitable foundations. The health insurance system does not reimburse whole genome sequencing, even though the number of patients whose care will necessitate such sequencing is set to rise rapidly in the very near future. These major changes to medical practice and the organisation of care cannot be separated from innovation and require close coordination with research.

The French Prime Minister appointed Inserm and its partners from Aviesan to:

- define the place of whole genome sequencing and exome sequencing in therapeutic strategy by conducting a qualitative and quantitative review of current indications and possible changes in the next ten years;
- establish France's position in research, analyse how new technologies are taken into account in national plans (plans on cancer, neurodegenerative diseases, rare diseases, etc.) and propose priorities to be implemented in line with national research strategy;
- review issues related to innovation and assess potential impact in terms of capitalisation and economic development, taking into account both technological aspects and the question of how to manage and analyse massive databases, while incorporating ethical issues;
- propose medico-economic and industrial models to guarantee this structural organisation's financial stability, including proposed arrangements for reimbursement of whole genome sequencing by the health insurance system.

Research and innovation programme dedicated to controlling bacterial resistance to antibiotics, at the request of the Ministry of Health

The fight against bacterial resistance to antibiotics represents one of the most serious health-related challenges of the early 21st century and constitutes a national and international priority. The facts are as follows:

- Intensive antibiotic and pesticide use and resulting increased environmental selective pressures, such as the emergence of genetically-based resistance mechanisms which spread through bacterial populations. These also confer competitive advantage on resistant pathogenic strains over corresponding susceptible strains in both microbial, human, animal and environmental floras as well as on the "populational" front³⁴;
- Little recent scientific progress and as a result few new antibiotics made available over the last thirty years³⁵;
- Major global spread of resistance mechanisms and resistant bacteria, and increased prevalence of resistance to new molecules³⁶.

³⁴ The global threat of antimicrobial resistance: science for intervention. Roca et al (2015) *New Microbe and new infect.* 6: 22-29.

³⁵ Rethinking the way we fight bacteria, IFPMA (May 2015). Voir la section "Why is it difficult to develop new antibiotics?"

³⁶ An infectious arms race. K. Hede (2014) *Nature* 509.

Promoting research on antibiotic resistance is a long-term endeavour involving the whole range from fundamental research to the patient and populations (humans and animals) and their biological environments. Fundamental research on antibiotic resistance is the key to diagnostic and therapeutic innovation.

The Aviesan and AllEnvi alliances consider infectious disease and antibiotic resistance as priorities. They are joining forces to improve the coordination of research efforts in this area and are **calling for the establishment of a national research plan** in response to the issues raised by the Minister of Health at the beginning of 2015. Within the framework of a working group, they have also jointly defined nine research priorities ranging from better understanding of resistance mechanisms to studies of economics and the human and social sciences.

Foresight and partnerships with the health industries in the framework of the Strategic committee of the Industries and Technologies of Health Sector (CSF) and the Advisory committee of the Health industries (CSIS)

Regarding technology transfer and innovation, Inserm actively participates in foresight exercises driven by the CSIS to strengthen excellence in health research and to develop the skills of tomorrow to underpin therapeutic progress and development of health technologies and industries. The objective is to create the best conditions along the pipeline and initiatives to ensure that research creativity leads to concrete advances in health care. This reflection also considers the necessary evolution of assessment models for health care innovation and its access. This process encompasses all actors involved in pharmaceutical policy: the Health Authority (HAS)/the Transparency board and the Economic Committee for Health Products, the National agency of health products (ANSM), public authorities, health consumers, etc.

Modern biomedicine provides an opportunity for renewed discussion on the clinical research system, on the capacity for innovation in clinical research and the necessity of developing adaptive trials. Such studies address the question of potential benefit of new therapy outside the classical path of drug development. The most promising approaches will have to be tested **in pilot studies before being extended to larger populations**.

CONCLUSION

As the first biomedical institute in Europe and one of the first in the world, Inserm celebrated its 50th anniversary in 2014 with both national and international communities. Since the initial visions of its founding partners in 1964, the institute has contributed to high-quality research, marked by efficiency and innovation. At the same time Inserm has improved and deepened the understanding of the life sciences and many of the health challenges our society faced today. Its history is marked with tremendous competencies, talents and successes. Today Inserm is undeniably a visible and solid actor in the field of biomedical research.

We should be proud of our trajectory, as we are all part of an institution that is first and foremost a wonderful resource for science and the scientific community. As sciences of fundamental importance in the 21st century, life and health sciences are disciplines that affect all nations, continents and people performing research activities both because of the paradigm shifts they incite as well as the human, political, social, ethical or economic issues with which they are endlessly faced.

Collaborations, which all scientific endeavors are, cannot thrive without being open to competition. It is in this context of tension between partnership and emulation that the Strategic Plan 2016-2020 was collectively reflected upon, debated, constructed and finalized by the institute's employees whose unfaltering involvement and enthusiasm are irreplaceable assets.

Defining priorities means forging a vision around issues our discipline faces which we know need an ever more integrated approach in order to maintain a level of excellence in research along the life and health science continuum.

It also means taking full advantage of technology that we know is needed to answer as many questions as it provokes and allows researcher's imaginations to flourish.

Finally, defining priorities ensures ample cooperation and essential partnerships while measuring up against others to stay at the top of our primary vocation – research in the service of human health.

It is these projections, underpinned by a constant concern for the concrete and the feasible that guide this strategic exercise that, I am sure, by 2020, will reaffirm the increasingly indispensable place of Inserm at the core of the research endeavor.



Pr Yves Lévy
Président-Directeur général de l'Inserm

LIST OF ACRONYMS AND ABBREVIATIONS

AccTion	<i>Accélérateur de thérapies innovantes en phase Clinique</i> [Accelerator for Innovative Therapies in Clinical Development]
AllEnvi	<i>Alliance nationale de research pour l'environnement</i> [French National Alliance for Environmental Research]
Allistene	<i>Alliance des sciences et technologies du numérique</i> [Digital Science & Technology Alliance]
Ancre	<i>Alliance nationale de coordination de la research pour l'énergie</i> [French National Alliance for the Coordination of Energy Research]
ANR	<i>Agence nationale de la research</i> [French National Research Agency]
ANRS	<i>Agence autonome de Inserm – France Recherche Nord&Sud Sida – HIV Hépatites)</i> [Independent Inserm agency – France Research North & South – HIV and Hepatitis viruses]
ART	<i>Accélérateurs de Recherche Technologique</i> [Technology Research Accelerators]
Athena	<i>Alliance nationale des sciences humaines et sociales</i> [French National Humanities & Social Science Alliance]
ATIP	<i>Action thématique et incitative sur programme</i> [Programme for Thematic and Incentive Action]
Aviesan	<i>Alliance nationale pour les sciences de la vie et de la santé</i> [French National Alliance for Life Sciences & Health Care]
BIR	<i>Banque d'information sur les recherches</i> [Research Information Bank]
CAR	<i>Commission accompagnement de la recherche</i> [Research Aid Commission]
CEA	<i>Commissariat à l'énergie atomique et aux énergies alternatives</i> [Atomic Energy & Alternative Energy Commission]
CERRESP	<i>Centres régionaux de recherche et d'expertise en santé publique</i> [Regional Centres for Public Health Research & Assessment]
CIC	<i>Centres d'investigation clinique</i> [Clinical Investigation Centres]

Cirad	<i>Centre de coopération internationale en recherche agronomique pour le développement</i> [Centre for International Cooperation on Agricultural Research & Development]
CIUP	<i>Cité internationale universitaire de Paris</i> [Paris International University Complex]
Clora	<i>Club des organismes de recherche associés</i> [Club of Associated Research Organisations]
CNG	<i>Centre national de génotypage</i> [French National Genotyping Centre]
CNIL	<i>Commission nationale de l'informatique et des libertés</i> [French National Commission for Information Technology & Privacy]
CNOUS	<i>Centre national des œuvres universitaires et scolaires</i> [French National University & Scholarly Works Centre]
CNRS	<i>Centre national de la recherche scientifique</i> [French National Scientific Research Centre]
CoEN	Network of Centres of Excellence in Neurodegeneration
Comue	<i>Communauté d'universités et d'établissements</i> [Community of Universities & Establishments]
CoValliance	<i>Comité permanent de coordination de la valorisation de la recherche (organismes membres d'Aviesan et leurs cellules de valorisation)</i> [Permanent Committee for Research Coordination & Capitalisation (member organisations of Aviesan and their capitalisation units)]
CPU	<i>Conférence des présidents d'universités</i> [Conference of University Presidents]
CS	<i>Conseil scientifique</i> [Scientific Council]
CSS	<i>Commissions scientifiques spécialisées</i> [Specialist Scientific Commissions]
DGCS	<i>Direction générale de la cohésion sociale (ministère des Affaires sociales, de la Santé et des Droits des femmes)</i> [Directorate-General for Social Cohesion (Ministry of Social Affairs, Health and Women's Rights)]
DGG	<i>Délégation globale de gestion</i> [Global Management Delegation]
DGRI	<i>Direction générale de la recherche et de l'innovation (ministère de l'Éducation nationale, de l'Enseignement supérieur et de la Recherche)</i> [Directorate-General for Research & Innovation (Ministry of Education, Higher Education and Research)]

DGOS	<i>Direction générale de l'offre de soins (ministère des Affaires sociales, de la Santé et des Droits des femmes)</i> [Directorate-General for Health Care Provision (Ministry of Social Affairs, Health and Women's Rights)]
DGS	<i>Direction générale de la santé (ministère des Affaires sociales, de la Santé et des Droits des femmes)</i> [Directorate-General for Health Care (Ministry of Social Affairs, Health and Women's Rights)]
DR	<i>Délégué (ou Délégation) régional(e) (de l'Inserm)</i> [Regional Delegate (or Delegation) (of Inserm)]
DREES	<i>Direction de la recherche, des études, de l'évaluation et des statistiques (ministère des Affaires sociales, de la Santé et des Droits des femmes)</i> [Directorate-General for Research, Investigation, Assessment & Statistics (Ministry of Social Affairs, Health and Women's Rights)]
EDCTP	European & Developing Countries Clinical Trials Partnership
Edilb	<i>École de l'Inserm Liliane Bettencourt</i> [Inserm School Liliane Bettencourt]
EFOR	<i>Réseau d'études fonctionnelles chez les organismes modèles</i> [Network for Functional Investigations on Model Organisms]
EMBRC	European marine biological resource centre
EPSCP	<i>Établissement public à caractère scientifique, culturel et professionnel</i> [Public-Sector Scientific, Cultural or Professional Establishment]
EPST	<i>Établissement public à caractère scientifique et technologique</i> [Public-Sector Scientific or Technological Establishment]
ERA	European Research Area (European Commission)
EU-LAC	European and Latin America and Caribbean
Euraxess France	<i>Réseau initié par la Commission européenne ayant pour vocation d'accompagner les chercheurs (européens ou pays tiers) en mobilité</i> [Network launched by the European Commission to promote the mobility of scientists (European or other countries)]
ERC	European Research Council
ESPCI ParisTech	<i>École supérieure de physique et de chimie industrielle de la Ville de Paris</i> [Paris Higher University of Industrial Physics & Chemistry]
ETP	<i>Equivalent temps plein</i> [Full-time equivalent]

Eva	Inserm's scientific assessment Web site
FRANCOPA	<i>Plateforme nationale pour le développement des méthodes alternatives en expérimentation animale</i> [French National Platform for the Development of Alternatives to Animal Experimentation]
Gaïa	Inserm human resources Web site (ITA appraisals, competitive examinations, professional examinations, etc.)
HAL	Open multidisciplinary archive for the dissemination of scientific articles and dissertations from French and foreign, private- and public-sector teaching and research establishments
HCERES	<i>Haut conseil de l'évaluation de la recherche et de l'enseignement supérieur</i> [Supreme Council for the Assessment of Research & Higher Education]
HIROs	Heads of International Research Organizations
HR Excellence in Research	Award granted by the European Commission
HRS4R	Human Resources Strategy for Researchers
H2020	Horizon 2020: European funding programme for research and innovation programme
IBISA	<i>Infrastructures en biologie santé et agronomie (Groupement d'intérêt scientifique - GIS)</i> [Biology, Health & Agriculture Infrastructure (Scientific Interest Group - GIS)]
IdEx	<i>Excellence Initiative</i>
IMI	<i>Innovative Medicines Initiative</i>
INCA	<i>Institut national du cancer</i> [National Cancer Institute]
INRA	<i>Institut national de la recherche agronomique</i> [National Agricultural Research Institute]
INRIA	<i>Institut national de la recherche en informatique et en automatique</i> [National Institute for Research into Information Technology & Automation]
INSA	<i>Institut national des sciences appliquées</i> [National Applied Sciences Institute]
Inserm	<i>Institut national de la santé et de la recherche médicale</i> [French National Institute of Health and Medical Research]

iPSC	Induced pluripotent stem cell IRD	<i>Institut de recherche pour le développement</i> [Institute for Research for Development]
iSITE		<i>Initiatives Science-Innovation-Territoires-Economie</i> [Science-Innovation-Territories-Economy Initiatives]
ITA		<i>Ingénieurs, techniciens et administratifs</i> [Engineers, technicians and administrative staff]
ITMO		<i>Institut thématique multi-organismes</i> [Multi-Organism Thematic Institute]
JPIAMR	Joint programme initiative on antimicrobial resistance	
JPND Research	Joint programme - neurodegenerative disease research	
KIC	Knowledge and innovation communities	
LEA		<i>Laboratoire européen associé</i> [Associated European Laboratory]
LEEM		<i>Les entreprises du médicament</i> [Drug enterprises]
LIA		<i>Laboratoire international associé</i> [Associated International Laboratory]
MENESR		<i>Ministère de l'Éducation nationale, de l'Enseignement supérieur et de la Recherche</i> [Ministry for Education, Higher Education & Research]
MND		<i>Maladies neuro-dégénératives</i> [Neurodegenerative disease]
NGS	Next Generation Sequencing	
NIH	National Institutes of Health	
PCN		<i>Point de contact national</i> [National Contact Point]
PIA		<i>Programme d'investissements d'avenir</i> [Investments for the Future programme]
PMND		<i>Plan maladies neuro-dégénératives</i> [Neurodegenerative Disease National Plan]
PNB		<i>Produit national brut</i>

	[Gross National Product]
PRES	<i>Pôles de recherche et d'enseignement supérieur</i> [Research & Higher Education Poles], replaced by the Communautés d'universités et d'établissements (Comue) by the Law of 22 July 2013
REACTing	Consortium Research and ACTION targeting emerging infectious diseases (founded in 2013 by ITMO Immunology, Inflammation, Infectious Disease & Microbiology – Aviesan)
RH	Human Resources
ROCAD CELPHEDIA	<i>Réseau opérationnel de centres pour faciliter l'accès et la distribution des modèles souris – Création Elevage PHEnotypage Distribution Archivage de modèles animaux</i> [Operational Network of Centres to Facilitate Access & Distribution of Mouse Models – Creation Breeding Phenotyping Distribution Archiving]
SAFir	<i>Système automatisé financier de l'Inserm</i> [Inserm's automatic funding system]
SATT	<i>Société d'accélération du transfert de technologies</i> [Technology Transfer Acceleration Company]
SNDS	<i>Système national des données de santé</i> [National Health Care Data System]
SNR	<i>Stratégie nationale de recherche</i> [National Research Strategy]
TGIR	<i>Très grandes infrastructures de recherche</i> [Big Research Infrastructure]
TIC	<i>Technologies de l'information et de la communication</i> [Information & Communication Technologies]
UMR	<i>Unités mixtes de recherche</i> [Mixed Research Units]
UMS	<i>Unités mixtes de service</i> [Mixed Service Units]



**Inserm,
Health Research
since 1964**

The French National Institute of Health and Medical Research is an organisation dedicated to biological and medical research as well as human health.

It is involved in the entire range of activities from the research laboratory to the patient's bed.

It is founding member of Aviesan, the French National Alliance for Life sciences and Health.

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