

# STRATEGIC PLANNING

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2013-2022



*e quindi uscimmo a riveder le stelle*

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## Introduction

The future of CNR will develop along the lines of its history and institutional mission.

Hinge and lever for the growth of the Country, it will consolidate and nurture scientific research thus encouraging its implementation into the social, industrial and institutional milieu.

CNR activities will contribute to the broadening of fields of knowledge and research; to the development and nurturing of new technologies and skills; to the enticement, training and qualification of young researchers within a more international framework.

Main guidelines of the Strategic Planning:

- Enhancing and Valorization of Scientific Research
- Widen, Strengthen and Expand our Researchers' Community
- Strengthen productive competitiveness and innovation through Advanced Technology, Knowledge and Education Transfer and Implementation.

Such principles, which are a synthesis of the SWOT analysis of the current structure of the Institution and of the situation of research in Italy, will inspire the future course of action and transformation, of governance and strategic positioning of CNR.

The main actions will be focused on:

- Enhancing the value of activities, performance and research results;
- Opening new lines of scientific research;
- Widening and strengthening of research infrastructures and facilities;
- Acting for enticing and inspiring young generations to scientific research;
- Implementing, with benefits both scientific and financial, all results and practices accomplished;
- Gaining autonomy and a specific role within Public Administration also through specific norms and regulations and a specific department dedicated exclusively to provide scientific support to Administrations and Ministries.

The instruments which CNR will employ are as follows:

- The EU multi-year Programmes used as levers for the gathering of critical mass and opportunity of measuring up and cooperation on the international stage.
- The creation of international partnerships aiming at enhancing new lines of research, training of new competences, and the participation to research networks of excellence on the international level.
- Public – Private partnership as a means to obtain adequate financial resources, dimensional

growth of research structures, and the development of knowledge-based industrial activities.

- Performance Evaluation and measurement as an instrument for scouting and a better valorization of excellence and competencies;
- Endorsement of scientific culture.

## Background

Scientific research and technological innovation are essential instruments for the future of economy, environmental safety and preservation as well as people's health and wellbeing.

This concept is the guiding principle behind the EU's framework vision of Europe 2020 and implies the following actions to be taken:

- increase R&D spending to 3% of Gross National Product (GNP);
- re – focus R&D and innovation policies on the main challenges of today such as climate change, energy, efficient and sustainable use of resources, health and demographic trends in order to favor a smooth, sustainable and all-inclusive growth;
- strengthen all links in the innovation chain, from theoretical research to the consequent commercialization of its products.

For the years to come such guidelines will focus and utilize a great amount of economic resources thus determining direction and possible developments of research activities. Apart from the specifics and qualities of the knowledge acquired, criteria of sustainability and responsibility will also, and above all, be evaluated. They will inform national and regional policies which will have to be more and more complementary and subsidiary.

In such a scenario a number of innovative programmes require, due to the complexity of the current challenges, the presence and operation of highly-qualified and competitive scientific systems, well-integrated into the international networks of research and active at the highest levels of exploration and research.

All this is possible to attain if we focus on the unity, wholeness and integration of different kinds of research, on the interaction of knowledge and competences, the valorization, quality and potential



implementation of results; and on the ability of research to characterize important sectors of everyday life and social relation systems.

The framework of reference becomes therefore the leap from the objectives of the Lisbon Society of Knowledge to the interactive platforms of the Smart Societies, that is societies funded on shared knowledge, available competences and systematic and collective learning.

The CNR will play a key role in this process through development policies as a strategic partner in innovation and competitiveness of the production system both in traditional sectors and emerging new ones, as well as being a primary site for the creation and development of start-ups and a guide in the detection and attraction of new resources and hi-tech companies.

## Status and Mission

The CNR is the largest public research body in Italy.

It was founded in 1923 and plays an important role of leadership in a number of research and application sectors, with close links to the international research network.

Its strong competitive ranking is confirmed by the positive results reached when participating to European, national, and regional calls, often as a partner with important industrial poles whose demand for research and innovation it satisfies and embraces.

This Institution taking into consideration its history, numbers, competences and infrastructures is the ideal candidate for a function of catalyst of the scientific and technological network able to involve all the scientific community and all the actors involved, also from the world of industry, on the innovation, competitiveness and global growth stage.



Although the CNR has already gained important scientific results, there is no doubt that in the future they must be incremented, increased and widened by strengthening its ability to gain and focus resources; by a re-organization of its services and infrastructures; by training and recruiting new generations of researchers and by favoring the Country's growth.

The CNR will acknowledge and adopt the issues of sustainability and integrity of research, thus increasing the institutional and political value of its



operations and gaining a greater administrative and managerial autonomy. In order to reach such objectives, it is paramount to activate at once new paradigms of relation to international institutions, as well as national and regional, beyond its current network, according to a whole consistent vision.

The Institution will therefore continue to play its original role as “Council”, contributing to the implementation of the Ministry’s planned activities and programmes, defining at the same time a greater specific focus on managerial and research objectives which can favor its institutional status within the framework of the scientific and technological milieu in the Country.

Such actions can be achieved within a whole national integrated system of scientific and technological research, able to acknowledge each member’s policy and administrative autonomy.

## Elements for a SWOT Analysis

### Strengths

- Characteristics and scientific and technological competences of human resources.
- Top Performer teams with internationally-acknowledged leadership in specific fields.
- Presence on the territory of structures and laboratories
- Multi-disciplinary cover and strong vocation to scientific and technological interdisciplinarity.
- Integration into the international scientific network
- Presence of clusters on the territory
- Experiences and competences acquired in the creation and realization of large national and international projects.

### Weaknesses

- Limited availability of resources for R&D
  - Excessive number of fixed-term work contracts
  - Average age of research staff higher than the European norm.
  - Patents and start ups not proportional to the possible potential.
  - Low level of ICT applications and sharing of structures, instruments and knowledge
  - Low level of institutionalized relations to industry, finance and venture capital
  - Low level of geographical integration of structures
  - Limited use of evaluation processes
- Structural limitations with regards to scouting, creation of spin offs and foresight

### Opportunities

- EU programmes based on clusters and interaction among different fields of knowledge
- Active role in the innovation policies on the territory
- Formally equal CNR researchers to University personnel.
- Increased interaction with University teaching and research
- Re-structuring of the network with regards to Departments
- Review of activities and strategies
- Re-structuring of the Headquarters: offices and functions
- Acquisition of a greater administrative autonomy
- Issuing of new Rules and Regulations
- New website project and intranet enhancement
- Focus on career development
- Wide availability of well-trained researchers
- Work programme on a multi-year basis
- Increase of major scientific activities

Concentration of resources on the centers of excellence.

### Risks

- Centralization
- Red tape Institutional structure
- Measures of limitation of public spending
- Prohibition to recruit can be a limit to the development potential on the international level
- Too few incentives for researchers to start cooperation with the world of industry.

## Strategic Mission: Enhance and Encourage Scientific Research



Scientific research is by its own nature global, based on network relations, therefore the CNR, as Institution and researchers' community, will have to play a more and more central role on the stage of international scientific activities and life, contributing to influence policies, choices and instruments.

In order to do so, it will have to focus on the generalist characteristic of its network and its strong vocation to innovation research to involve also, and act as a catalyst for, the interests and potentialities of the other great actors on the scene of research, innovation and high education in the Country.

These will be priority guidelines: freedom and autonomy of research; interdisciplinary paradigm and interaction among knowledge fields; cultural, scientific, technological and social transformations due to the mass development of Green Economy, ICT, new materials and nanotechnologies. The enhancement and valorization of research activities will be supported also by the strengthening and widening of the network of inter-institutional relations.

The CNR will play a key role in the relation-building with local and regional administrations in order to define and implement knowledge-based local development strategies. To such aim, it will also be able to explore and make its own the new scientific and technological scenarios, by further rationalizing and enhancing existing infrastructures, laboratories, national and international networks, active participation in the large EU projects, but also, and above all, the inherent freedom and bottom-up dimension of research, investing with consistency and conviction on interdisciplinary and forward-looking activities.

The autonomy of research, on an equal level with that granted to the Universities, will have to be regained and revalued and

the distance both on the administrative and networking level with the University will have to be filled, focusing on all opportunities of cooperation also on the education and teaching field. To this end the Ministerial Decree of November 2012 on the extension of Art.6, provision II of the 240/10 Law to Public Research Institutions also, is the first meaningful step into the right direction for the construction of an integrated research and higher education system in Italy.

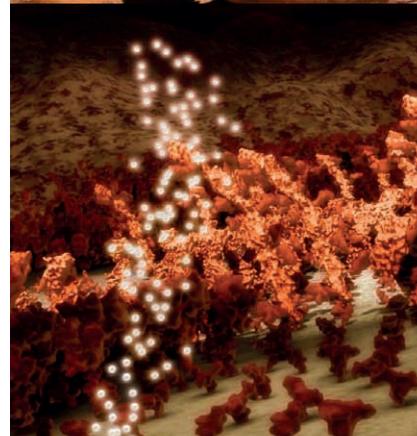
Interactions with Universities will then have to find a confirmation in the level of integration and interaction of education paths and advanced high-level professional training according to a vision of education continuum.

In particular, attention will have to be concentrated on the creation and implementation, together with the Universities, of PhD courses strongly characterized by research activity and international dimension.

The allocation of CNR structures and institutes, where nearby University sites, will lead to the creation of areas of knowledge and research endowed with common services and platforms, able to attract and activate intelligence, resources, competences and explore new scientific paths through new teaching, training and entrepreneurial experiences.

The foresight which CNR developed over the years will have to be valued and appreciated as different from the analogous services present in other structures on the territory for its ability to influence the present, foresee future scientific and technological developments on the long term, for its inclusive and interactive analysis as well as for its aptitude to elaborate strategic visions based on consensus and creation of critical mass which push towards radical and ever-increasing innovation.

The valorization of ideas, inventions, technologies and products deriving from research is an extremely complex process and



in order to succeed in this the competences of the different actors involved must be harmonized and coordinated. To this end the role of CNR should be of stimulus for proactive scouting directly with the researchers so that potential trends of development can be spotted at once as well as the needs, which are often not clear and remain unexpressed on the territory and in the industry. The main instruments will be: patenting, creation of spin-off societies, and detection and planning of new lines of research.

In order to achieve this aim, on the one hand it will be necessary to acquire a set of open and clear rules and regulations, ready to adopt, introduce and implement the innovations of the market and of the world

of finance; on the other hand it will be paramount to share good practice, awareness and training paths. A correct balance between creative energy and business world will favor the involvement and valorization also of other, more adequate, professional profiles, able to accompany the process and support the researchers to success.

New fund-raising policies and networking with the world of international and national finance will be planned and organized by utilizing more suitable management and service structures. The framework of reference will be by default at the international level.

The existing formal and informal network with industry and industry associations will be widened and strengthened so that a new industrial scenario in Italy can be built. The aim will be the enhancement of the use of technologies and advanced know-how in production, innovation spreading in the service and traditional sectors, the growth of private investments in research and the establishment of a new entrepreneurial milieu and the creation of area districts on the territory.

The integration of production systems as enhanced and supported by CNR could become an important experience of industrial growth which will allow the establishment of innovation aimed



at bringing together, although not in an exclusive manner, research and small, medium and large enterprises on specific projects and paths, so that internal conflicts and competitiveness can be lessened while competitive defenses can be strengthened and the quality of production increased, as well as the levels of employment.

To this end, the various forms of cooperation among CNR structures and the players of local development must be enhanced by widening the good practice through ad-hoc cooperations and agreements.



## Strategic Mission: Widen, Strengthen and Expand our Researchers' Community

The future of the CNR depends on the main part on a momentous increase in the care and planning of its human resources deployment.

The average age of CNR researchers is among the highest in Europe, and their number is significantly lower than those present in similar foreign institutions. It will therefore be necessary to bring the CNR human resources pool to the level of the best international institutions, in consideration of the fact that they are the benchmark against which to compare and compete. Should this not happen, the CNR will risk losing its key role in many scientific areas of research and not be able to assure continuity and growth and, at the same time, cure its weaknesses.

The priority in the years to come will be to overcome structural weaknesses regarding recruiting, training and valorization of human resources. Such action will be on the one hand brought about by a new public administration research personnel policy and, on the other hand, by a training and employment path for the all personnel within the CNR, including administration staff, researchers and technologists.

To this aim, it is of paramount importance to face the structural problems within the scientific



organization, by launching a campaign of sensibilization and reform which can support an action of specific intervention by the Public Function Department of the Ministry which will acknowledge the special characteristics and features of the sector and can therefore grant research personnel the necessary autonomy and ease of action in order to simplify, modernize and innovate the management, recruitment and organization as well to enhance the valorization of the deserving, the training of new professional roles and the improvement of performance.

Current recruitment procedure presents a number of inadequate features among which the excessive red tape of the various phases and selection process; poor consideration of inter-disciplinary mobility, low importance given to scientific production which is not within the

traditional standard of publication; reward of years of service and absence from the international scouting circuits.

Such weaknesses, together with other factors, such as poor resources, slow career progression and low financial retributions, make the CNR less attractive and competitive when compared to similar international institutions, thus generating further weaknesses such as the excessive rigidity of the system which prevents it from growing, the slowing down of generational turnover and the creation of obstacles to exchanges and cultural mobility, which is instead essential to both creativity and knowledge advancement.

Last but not least, the turnover deriving from retirements must be completely filled by new positions, and at least for the next three years, there should be a plan put into place for recruiting extra units thus allowing continuity and quality of work for those who are currently on temporary contracts.

Also training, valorization and evaluation activities of technical personnel participating to the

implementation of research projects, will have to be reformed as well as politics for development and advancement of knowledge and technologies. To this end, all forms of mobility and exchange will be encouraged with public and private organizations in the field of research in order to favor good practice and a specific management for research which can fit it in the international system. While waiting for the radical change of perspective on scientific research in Italy , one of the specific aims to pursue is the investment on human resource of CNR in order to increase the level of efficiency and at the same time a process of optimization of expenses for maintenance of structures and their management, as instructed by ministerial guidelines, must be implemented.

There must follow managerial and organizational interventions with a view to reduce the use, within the CNR, of various forms of temporary contracts for competences in the many fields of activity. In the same way, there must follow a relocation process of research personnel for



the most efficient production of results, and for the highest valorization of each member of staff individual and group abilities and talents.

To this end, agreements of common actions will be worked out with trade unions in order to adopt criteria based primarily on merit and competences. Within this framework, there will be procedures of recruitment based on tenure track and direct call well regulated by definite criteria, also as far as the number and percentage of such calls are concerned. In order to qualify and advantage the research community a new additional financial reward scheme should be put into place based on merit, and on the re-evaluation of salary wages with rewards independent from years of service and acknowledgeable following evaluation procedures.



On the national level, there must be new opportunities based on the Ministerial Decree dated 27 November 2012 which allows full-time Professors and University researchers to carry out research within the CNR scientific structures and, on the

other hand, CNR researchers to teach and research in Universities. Such cooperation can in the future be extended also to technologists and technical and administrative University staff.

On the international level, the extra-European network should be strengthened by forms of incoming and joint projects. The aim will be threefold: to find new partners in order to reach scientific excellence in emerging sectors, to define new forms of partnership and scientific and technical cooperation for the enhancement of the research network, and finally to introduce the CNR as a key player into an international milieu, beyond Europe.

## Strategic Mission: Participate in the creation of an Italian Research System

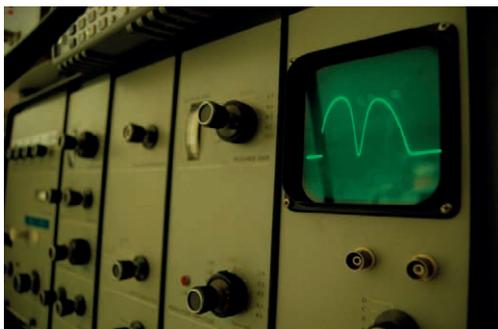
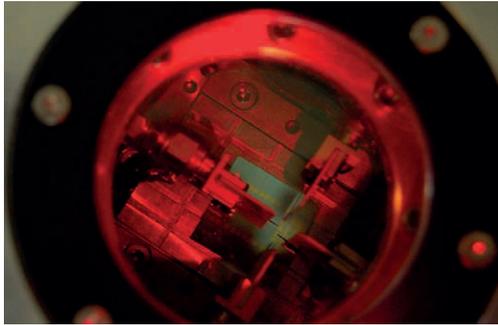
In order to reach this goal, it will be necessary, although within the current guidelines, to increase relations among knowledge and competences, favoring training processes and know-how transfer, thus reducing distances and misbalances with and to the world of Universities.

The current regulatory, managerial and organizational status quo must therefore be overcome since it separates the players in public research, limiting their action to structures and organizations which are not able to provide complete all-inclusive thorough answers to the great challenges we are facing today.

In order to reach this aim, the CNR, first and foremost, will have to experiment open paradigms of greater inclusion, within the different specific disciplines and vocations, so that the strength of integration and interaction of the advancement of knowledge can be achieved as well as the valorization of methods, results and products. It is therefore necessary to introduce amendments to the statute so that such institutional mission, which is more closely corresponding to the country's needs of development and growth, can be achieved with success and efficacy.

The model which the CNR should follow will be that of the modernization of the original function of Agency of Research and Innovation, of its origins. An agency directly under the control of the highest institutions of the Country and with the mission to guide, from its central position, the national research network, providing guidelines focused on the national research priority policies and, at the same time, to act as an Advisory Body in the definition of the above, at the national and regional level.

The CNR will have to be a nimble governance body in relation to Ministries, local governments, financial sectors, production systems; quick in selecting and evaluating strategic interventions for innovation and the advancement of knowledge, careful to the valorization of advanced research and



trans and inter-disciplinary interaction as well as founded on peer –review mechanisms, both for top-down and bottom-up financing.

To this end, experiments of agglomeration and valorization of competences and private-public relations aimed at creating territorial eco –systems of innovation and creative forms of strengthening and valorization of curiosity-driven research activities, must be enhanced. It is necessary that the main regulatory staples of the CNR - interdisciplinary research, advanced research, innovation and strategic research, knowledge transfer and scientific training – all find a greater implementation and value.

The already positive experience deriving from the Areas of Research should be capitalized upon, above all those that are operating across the frontiers of the fastest developing technological sectors. Such Areas, deriving from a top-down approach, will be more and more clusters of innovation on the territory, allowing private and public institutions, gathered around the CNR nucleus, to interact on territorial and scientific development projects.

In order to reach these objectives the completion of the aggregation process and the territorial re-organization of scientific structures, as well as a cooperative action with local governments, are of paramount importance.

## Strategic Mission: Operate for the development and growth of the Country

The CNR, through its network of competences and widespread presence on the territory, is endowed also of technological infrastructures and platforms, and will contribute more and more to the industrial development of the Country, by resolving existing administrative obstacles which currently limit its efficiency.

To this end, it will need to present itself as catalyst for the establishment of territorial eco-systems of innovation through which the interaction among public and private research centers,

Universities and small, medium and large enterprises and financial operators can be enhanced and improved.

It will therefore widen and strengthen its function as Advisor for national and regional research policies, high-level academic training and innovation, interacting directly at the highest institutional levels and aiming at rising above the simple function of policy coordinator, thus becoming a governance body also in order to juxtapose the tendency to fragmentation of the various players in the research field.

Better economical results, more development of new technologies, the dissemination of Smart Specialization and Emerging Industries will be easily achieved, thanks to this intervention.

Such action will then be implemented by using the instruments of strategic policy intelligence, in particular technology foresight, so that industrial conversion projects and territorial marketing can both receive a boost.

Furthermore the CNR could participate to the socio-economic growth of the Country by a more throughout and successful action of scouting of potential innovation, of sensibilization and training of research personnel for technological transfer, creation of enterprise and strategic management. In order for it to be innovation, it is necessary to produce not only excellent research and resources, but also innovators, whose training and formation is an objective as ambitious as any start up success. It would therefore be useful in the long term that the CNR intervene by involving venture capitalists and investors, also in the process of managerial formation and advance technical-scientific and productive structures, such as technological districts or corporate research centers.

In the years to come the CNR will strengthen its network of services and facilities for small and medium enterprises by creating, among other things, also a database of technologies, products and more important scientific results in terms of competitiveness and low environmental impact so that their usage and knowledge can be widespread and industrial innovation and employment growth will derive as a consequence. In order to motivate CNR structures to pursue such objectives, suitable mechanisms of reward based on merit and valorization will be put into place.

Initiatives aimed at building stable and long-term relations with industry and production system will be increased: from creation to prototype development, from start up to new high-tech realities, down to the industrial production of the final merchandise.

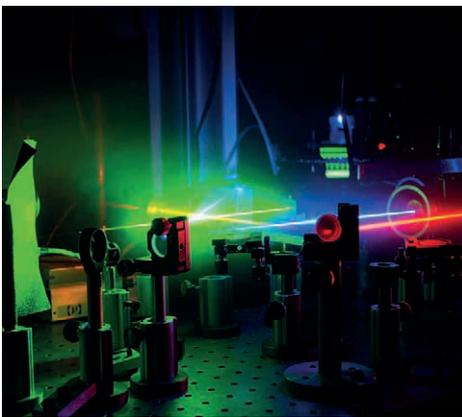
## Structural Organization and Resources



The current re-organization of CNR identifies in the Institute the key unit linked to the territory, in the Department the first level of thematic agglomeration and the second level of the territorial Area of research which interacts with other institutes of research and of higher education as well as with proximate scientific-technological fields.



The Central Head Office has, on the other hand, the function of providing coordination, stimulus, guidelines, evaluation and management. Such view has led to the creation of seven Departments: Biomedical Sciences, Physical Sciences and Technologies of Matter; Sciences of the Earth and Environmental Technologies; Chemical Sciences and Technologies of materials; Engineering, ICT and Technologies for Energy and Transport; Bio-agrifood Sciences.



Such structure, whose interconnections and relations on the different levels still need to be oiled and smoothed over, will have to be tested on matters of functionality, sustainability and efficacy, as well as for its ability to face territorial innovation and scientific-technological challenges within the framework of scientific fields of reference.

To this end, the links with the international scientific community will have to be enhanced as well as the international activity and participation; the multi and interdisciplinarity

will become qualifying values and methodologies for the advancement of knowledge in the medium and long term.

It will be necessary to act on the Institutes, both for safeguarding their heritage of experience and basic research activity, which is excellent, and for encouraging a rationalization per scientific field, without compromising the widespread presence on the national territory, which is of fundamental importance to CNR, and to open a dialogue with local authorities and participate to innovation processes on the local level and short term period.



Following the end of this process of agglomeration, rationalization and simplification of the institutional structure of CNR, also the relationship, the interaction and the interconnection among structures and University network and other research institutions will be put into place.

The Department will play a role of coordinator of activities for the structures thus favoring future developments and optimization in the Areas of Research or in the territorial eco –systems of innovation, and also at the same time also intervene actively in the processes of qualification of competences, on the international scientific and production competitive network.

The management model will be inspired by the principles of responsible de – centralization, of simplicity, functionality, transparency, efficiency and efficacy. The rationalization already started is only a first step in a process which will end with the re-organization of the whole scientific network - composed by Institutes, Departments and Areas – and the re- structuring of the Central Head Office which will bring to a greater managerial responsibility, reduction of time consuming processes, simplification of procedures, cost control, transparency of decision-making processes, continuous monitoring and evaluation processes and increase in services. To this end the development guidelines will be more and more informed by the philosophy of open government.

A new paradigm of practice and participation to internal and external financing, direct and indirect, will be agreed upon and put into place, and it will see all structures participating to a combined management.

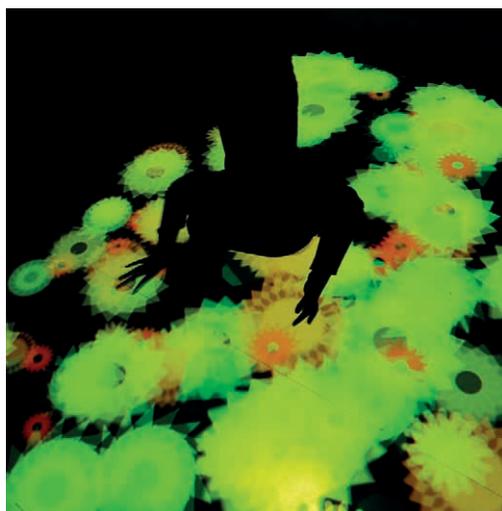
The inspiring principles behind the new managerial-financial course will be those of complementarity and subsidiarity of resources in order to allow the systematic growth of the whole CNR and of all the scientific fields, not only of single parts or components. A sort of mutual solidarity both financial and patrimonial between Institutes, Departments, Areas and Central Administration, will allow for the benefits of one balance sheet, maximizing results and reducing costs.

In the years to come, a system of governance which will rationalize the policy structures will take more and more ground and reduce overlapping, delays and decision making processes thus

bringing about the harmonization of all different levels of action and operability.

The CNR will then be able to play the role of a hub of area departments, each independent, whose central structure will have a strategic function of impulse, address, coordination and evaluation of activities and performances.

The transformation of governance will also go through a radical programme of transparency, traceability and monitoring of individual and collective performances, at central and departmen-



tal level, built with the help of dedicated IT platforms; the enhancement of the intranet, the development of internal and institutional communication and the identification of indicators of progress and quality necessary to the setting of goals and achievement to be attained.

## Priority Scientific Areas of intervention

The CNR will operate so that, together with the participation as a key player in international research projects, new frontier or currently underdeveloped research fields can be explored and given the necessary consideration, which at the moment they are not receiving in the International agenda of R&D.

Alongside its strategic role for the valorization of the national scientific identity and heritage, the CNR will continue to play a role of forerunner of knowledge. To this end, with the creation of scientific macro-areas its positioning into the competitive international research agenda , which is nowadays guided by Horizon 2020, will be secured.

By analyzing performances and trends of emerging technologies and disciplines, it is possible to identify as priority for the decade to come, the following macro-areas :

- Food
- Energy
- Society
- Micro-nano materials
- Mobility
- Health
- Safety

Such macro-areas are characterized by interdisciplinarity and a balanced presence of curiosity-driven, industrial and strategic research; the high level of interaction with social issues and daily life make them stimulating and interesting to public opinion as well as to stake and share-holders, and therefore attract also successful national interventions.

Below is the anticipated impact level of such macro-areas of strategic development compared to the great challenges of the Horizon 2020 Multi-Year Programme, as well as the level of intervention in each Department

Horizon 2020  
The Great Challenges

| CNR 2023 Strategic Macro Areas | Health Demographics and Welfare | Food Safety , Sustainable Agriculture, Marine Research and Bioeconomics | Safe, Clean and Efficient Energy Sources | Smart, ecological and integrated Transports | Weather issues, Raw Materials Efficiency | Inclusive, Innovative and Safe Society |
|--------------------------------|---------------------------------|---|--|---|--|--|
| Food                           | ★★★★                            | ★★★★  | ★★                                       | ★★  | ★★★★                                     | ★★★★                                   |
| Energy                         | ★★                              | ★★★★  | ★★★★                                     | ★★★★  | ★★★★                                     | ★★★★                                   |
| Identity                       | ★★                              | ★★  | ★★                                       | ★★  | ★★★★                                     | ★★★★                                   |
| Micro-nano                     | ★★★★                            | ★★  | ★★★★                                     | ★★★★  | ★★★★                                     | ★★★★                                   |
| Mobility                       | ★★                              | ★★★★  | ★★★★                                     | ★★★★  | ★★★★                                     | ★★★★                                   |
| Health                         | ★★★★                            | ★★  | ★★                                       | ★★  | ★★★★                                     | ★★★★                                   |
| Safety                         | ★★★★                            | ★★  | ★★                                       | ★★★★  | ★★★★                                     | ★★★★                                   |

CNR 2023  
Strategic Macro Areas

| CNR dipartimenti | Engineering, ICT and Energy and Transport Technologies | Bio-agrifood Sciences | Biomedical Sciences | Chemical Sciences and Technologies of Materials | Sciences of the Earth and Environmental Technologies | Physical Sciences and Technology of the Matter | Human and Social Sciences and Cultural Heritage |
|------------------|--|-----------------------|---------------------|---|--|--|---|
| Food             | ★★   | ★★★★                  | ★★★★                | ★★★★  | ★★★★   | ★★   | ★★  |
| Energy           | ★★★★   | ★★★★                  | ★                   | ★★★★  | ★★★★   | ★★★★   | ★★  |
| Society          | ★★   | ★★                    | ★★★★                | ★   | ★★   | ★  | ★★★★  |
| Micro-nano       | ★★★★   | ★                     | ★★★★                | ★★★★  | ★  | ★★★★   | ★   |
| Mobility         | ★★★★   | ★                     | ★★                  | ★★★★  | ★★   | ★★   | ★★  |
| Health           | ★★   | ★★★★                  | ★★★★                | ★★★★  | ★  | ★★   | ★★  |
| Safety           | ★★★★   | ★★★★                  | ★★★★                | ★★★★  | ★★★★   | ★★★★   | ★★  |

★ Low      ★★ medium      ★★★ High

Within the framework of the macro-areas, the great performing challenges of ICT such as social and evolving Robotics, Data Mining, High Performance Computing together with those emerging in the social and human sciences field, ranging from Resilience and Policy Modeling to Bioethics, will all find a place and due attention.

And last, but not least, research potential from priority areas as indicated in the National Plan for Research 2011-2013 ( Environment, Energy, Agrifood, Production, Cultural Heritage, Safety, ICT, Mobility, Health and Life Sciences) will be identified and acted upon.

In the same way, goals identified for the so-called “Technological Alliances” will have to be pursued and achieved: Biometric Technologies, Photonic Sources and Sensors, Geothermic Energy, Waste Management Technologies, Nanotechnologies, Solar Thermodynamics, Internet of the future and Cultural Heritage (See PRN 2011-2013 and Ministry of Education, University and Research, A Pact for Italy in Europe: Italian Technological Alliances)

## Evaluation and Measurement of performances

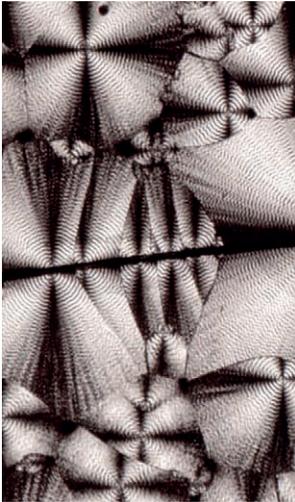
The CNR will be able to develop as an efficient and integrated system only through a clear definition of its objectives and an equally efficient system of monitoring and evaluation of performance. Thanks to such processes, it will be possible to establish an administrative management network and to introduce measurement mechanisms which will allow to reward on merit and achieve a different distribution of resources.

To this end, it is necessary to create a system of indicators of review, suitably calibrated, based on solid data and historical trends.

Among them, the following must be implemented:

- Indicators of performance whose objective is to measure the ability to attract external resources, scientific productivity, participation to competitive call and quality of expense.
- Indicators of sustainability whose objective is the measurement of the structural expenses; the consistency of personnel with its professional profile, the pulling out of personnel in the preceding two years and following three years, the recruitment of new Short –Term and Long-Term contract personnel in the preceding two years and following three years; continuity of Short-Term contract personnel on external funds.

At the same time, there must be criteria put into place which take into account scientific productivity



and indicate also its quality, such as, for instance, the launch of new scientific sectors, interdisciplinary, frontier research as well as service activities to local development through cooperation with Ministries and Local Government.

Further criteria to evaluate the ability of capitalizing and valorizing the scientific results achieved will then have to be taken into consideration, as well as their transfer and adoption potential into the productive system by creating and spreading innovation and new hi-tech enterprises.

Evaluation systems will be strengthened, made more simple and interactive, there will be suitable competences devoted to this task and a

culture of evaluation will ease the acknowledgement and valorization of merit and excellence.

The evaluation phase will lead to rewards or negative feedback to the single researcher and his/her team or structure of reference. This will mean that it will no longer be a merely formal act, but a valid and efficient instrument in the strategy of the CNR.

The evaluation of the so – called non-scientific products will also be a priority, that is all those activities which characterize the Third Mission of the CNR. While scientific publications can be valued and compared on the base of objective criteria which measure their quality and quantity, the same is not true about the measurement and evaluation of other products of research, although they are part of the Mission.

In consequence of this, it is obvious that there is a greater interest of researchers and technologists as well towards research and less attraction to acting in the field of industrial and service area.

The acknowledgment of such activities will instead have to become more and more crucial, since they are of great service to the Country, both as far as the advancement and quality of the research activities themselves are concerned, but also, and above all, for the ability to promote and support innovative forms of development.