QA POLICIES

RESEARCH

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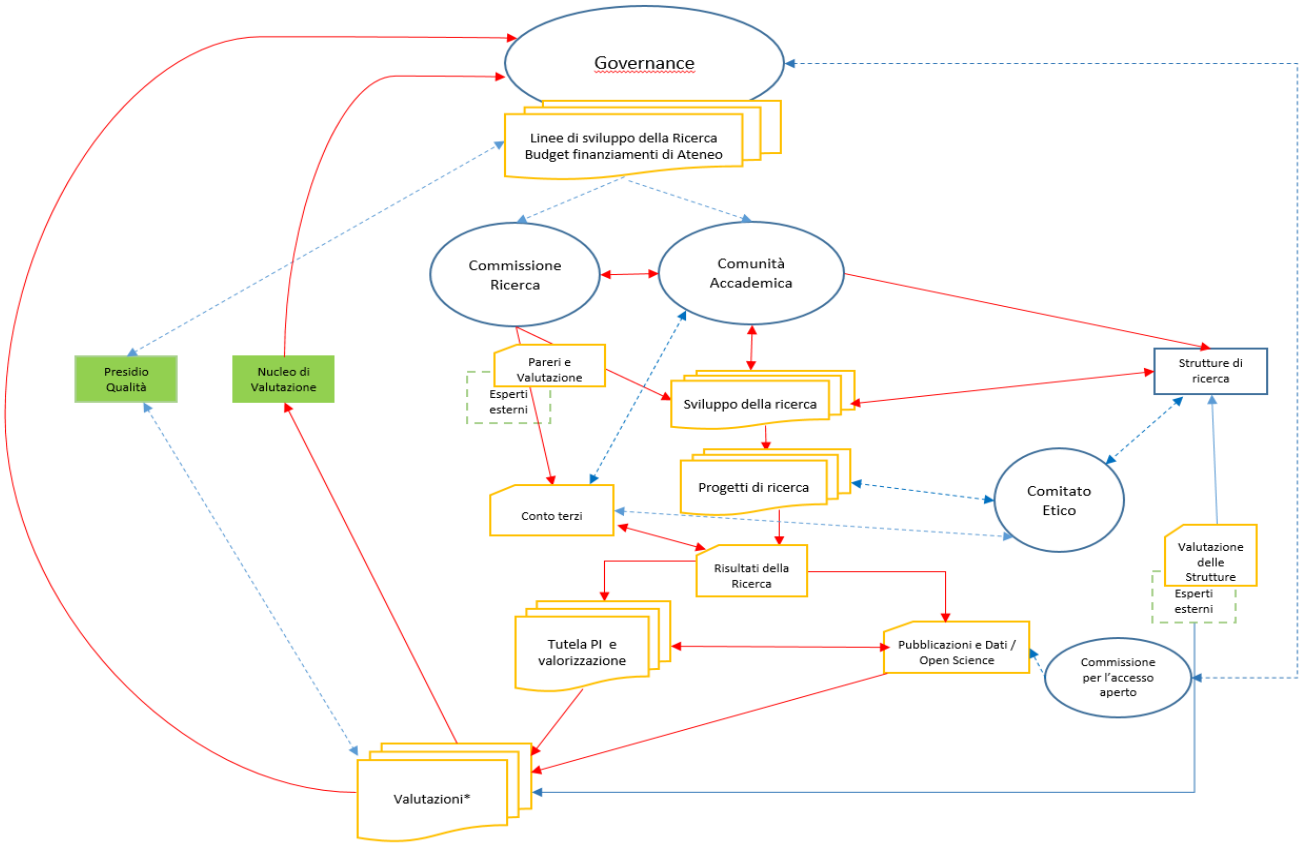
THE RESEARCH CONTEXT

The Scuola Normale Superiore (hereinafter "Scuola") is committed to creating an environment for study and research that encourages the development of research activities and critical thinking. High-level research is closely intertwined with training of excellence and both dimensions constitute the means by which the Scuola promotes social, cultural and economic growth not only for the local community but also on a national and international level. The Scuola shares the principles of the European Charter for Researchers.

The policies that determine the quality of research at the Scuola stem from the Strategic Planning phase and mainly translate into the definition of research guidelines and criteria for the allocation of resources for research activities. These also lead to the definition of various evaluation steps both on the activities of the research structures, which condition their continuation over time, and on the development of the University's research projects that require assessment. In particular, in the near future the Scuola's research in the sectors related to the Faculties of Sciences and Humanities will develop in new directions as a result of the impetus provided by the project connected to the Departments of Excellence.

The Scuola relies on various subjects, bodies and structures that, on the basis of information paths and procedures, contribute to defining the process of Quality Assurance (QA) in Research.

1. QUALITY ASSURANCE FLOW CHART



*The Assessments macro category includes all the internal and external documentation reporting on the research activities of the Scuola (e.g. Research Quality Assessment, scientific report of the University projects, research activities report, infrastructure assessment report, catalogue, etc.).

KEY:

- Panels with green background = bodies/structures responsible for internal checks
- Circular panels = other QA actors
- Dotted two-way arrows = reciprocal information flow between the various actors
- One-way arrows = interaction in which one actor provides information, guidance, instructions and/or support to another
- Red arrows = continuous improvement cycle (PDCA)

1.1 RESEARCH QA MAPPING

SUBJECT: Governance (Governing bodies).
PHASE: Plan.
PURPOSE: Definition of strategic development guidelines in the field of research and allocation for internal funding (budget).
OUTPUT: Documents. Scuola's Strategic Plan, Implementation Policies, Research Guidelines, Research Funding Policies, Recruitment Policies, Research Quality Policies.
TIME FRAME: Early months of the year, annual or multiannual.

SUBJECT: Academic Community.
PHASE: Do.
PURPOSE: Realization of research activities.
OUTPUT: Documents and research products. Research projects, research results, creation of research structures (laboratories, centres, research groups).
TIME FRAME: Continuous throughout the year.

SUBJECT: Ethical Committee.
PHASE: Check.
PURPOSE: Assessment activities also through opinions on trial protocols on human subjects of non-clinical nature.
OUTPUT: Documents. Opinions.
TIME FRAME: Continuous throughout the year.

SUBJECT: Research Committee.
PHASE: Check – Act.
PURPOSE: Assessment activities on internal research activities and expression of opinions for external research activities.
OUTPUT: Documents. Assessment activities on internal research activities and expression of opinions for external research activities.
TIME FRAME: Continuous throughout the year.

SUBJECT: Committee for Open Access.
PHASE: Check – Act.
PURPOSE: Making proposals to the Governance in order to promote open access and monitoring the achievement of the annual objectives set out in the Programme Development Plan.
OUTPUT: Documents. Opinions and annual report.
TIME FRAME: Continuous throughout the year.

SUBJECT: Evaluation Team.
PHASE: Check.
PURPOSE: Assessment activities on research activities and quality policies.
OUTPUT: Documents. Research activities report, Performance report.
TIME FRAME: April and June, annual.

SUBJECT: Quality Control Unit. **PHASE**: Check. **PURPOSE:** Control and support of educational QA policies, research and development of the information flow. **OUTPUT**: Documents. Research activities report, Performance report. **TIME FRAME:** April and June, annual.

SUBJECT: External experts. **PHASE**: Check. **PURPOSE:** Assessment of research projects and structures. **OUTPUT**: Documents. Projects: assessment of proposals. Structures: assessment of scientific production and financial management. **TIME FRAME:** Projects: April-June, annual. Structures: quinquennial for each laboratory separately.
SUBJECT: Governance (Governing bodies). **PHASE**: Act. **PURPOSE:** Implementation of actions to improve and consolidate the levels achieved through reporting. **OUTPUT:** Documents. New Strategic Plan of the Scuola, new policies for the implementation of the strategic plan, approval of the reporting documents. **TIME FRAME:** Continuous, annual.

The main actors of the Quality Assurance (QA) flow for research and technology transfer (third mission) are the bodies and structures in charge of defining the quality cycle. These are the Governance bodies, the Academic Community, the Research Committee, the Committee on Open Access and the Ethical Committee for Research. In the flow chart outlined above, the Governance bodies play a central role in the whole quality assurance process. At the beginning of the process, they define the guidelines for the development of research (e.g. Strategic Plan of the Scuola, Implementation Policies, Recruitment Policies) and prepare the budget for the funding of the University. Later on in the process, they take all the necessary decisions for the research quality levels achieved to be improved and consolidated. The other actors are the Research Committee, which issues opinions and evaluates research project proposals, the Committee for Open Access, with the task of promoting open access policies for data and research results, and the Academic Community as a whole which, being naturally heterogeneous, is the link between the actors mentioned above and the processes of quality and continuous improvement. A further actor of the QA is the Ethical Committee for Research, established in collaboration with the Scuola Superiore Sant'Anna, to evaluate the ethical implications of some proposed research projects.

Starting from the above-mentioned actors, the QA flow of research and technology transfer is grounded on two interconnected levels:

1. Cycle of continuous improvement;
2. Information flow between actors in the QA process.

This includes both the internal support structures, such as the Research and Technology Transfer Service (Italian acronym *SRT*) and the Internal Audit Service, which are not featured in the flow

chart, as well as the bodies and structures in charge of internal audits, such as the Quality Control Department and the Evaluation Team.

The flow originates from the instructions provided by the Governance through the relevant activities described above. As a matter of fact, on the basis of the strategic planning of the research activities, the Academic Community is engaged, with the help of the *SRT* that carries out communication/promotion activities for funding opportunities and supports the drafting of project proposals, in the development of the research activities mainly through:

- Institutional research projects financed with external resources (a positive and prior opinion of the Research Committee on the project proposal is required to ensure compliance with the Scuola's development guidelines);
- Research projects financed with internal resources (evaluated by the Research Committee and external experts);

As far as research development is concerned, research structures play a key role actively providing their support, expertise and facilities as early as the planning phase of research projects. For the above-mentioned structures, an external assessment of the activities is also required as a part of the overall evaluation of research activities reporting, hereinafter referred to as "Assessments".

Following the successful outcome of the research proposal assessment, a transition is made to the project management phase, which thus acquires external relevance (calls for proposals, conferences, events, screenings, etc.). At this stage, the Ethical Committee for Research may be consulted where appropriate.

Furthermore, both from research outcomes and from members of the academic community, research projects on behalf of third parties may originate and might be suitable to compete on the free market.

2. RESEARCH STRUCTURES AND GROUPS AT THE SCUOLA

In order to carry out and develop research activities and associated projects, the Scuola also operates through a number of structures, Centres and Laboratories, which over time have specialised in particular disciplinary areas.

With their specific expertise, the **Scuola's Centres and Laboratories** contribute to the implementation of the strategic development programme. More specifically, they help to strike the perfect balance between individual research and research in collective structures, also in terms of efficiency and effectiveness in the use of available budget funds. The Research Centres and Laboratories undergo a five-yearly assessment process conducted by external experts, appointed by the Governing Council in accordance with international best practices, to decide whether they can continue to carry out their activities. The centres and laboratories of the Scuola are:

- the **De Giorgi Centre** (http://crm.sns.it), which aims to promote new ideas and research in an interdisciplinary context and to develop particular areas of Mathematics and its applications to the natural and social sciences and to the industrial and technological field, encouraging the mobility and reception of Italian and foreign scientists and organising research periods on areas of major importance, concerning both pure Mathematics and

applications to the natural and social sciences, such as Physics, Biology, Finance and Economics.

- The Interfaculty Research Centre "**Carlo Azeglio Ciampi Institute of Advanced Studies**"(https://www.sns.it/it/istituto-studi-avanzati-carlo-azeglio-ciampi) aims to promote interdisciplinary research in an international context that supports the activities of the Faculties;
- the **Laboratory of Biology** (http://laboratoriobiologia.sns.it), whose purpose is the study of the brain and its functioning mechanisms during puberty, adulthood and old age under physiological and pathological conditions. Neuroscience research focuses on the molecular and cellular bases of neuronal development, stem cell biology, ageing and neurodegeneration.
- the **NEST Laboratory,** *National Enterprise for nanoScience and nanoTechnology* (http://www.laboratorionest.it), which aims to study nanoscale matter. The knowledge gained is applied to the development of new nanobiotechnological systems, nano-electronic and photonic devices and architectures. The NEST encompasses a broad spectrum of research activities ranging from planning, growth and experimental analysis of nanostructures, semiconductor and superconductor, to single- molecule studies in cells and tissues *in vitro*.
- the **SMART Laboratory,** *Multidisciplinary Strategies Applied to Research and Technology* (http://smart.sns.it), which addresses research mainly in the field of Theoretical Computational Chemistry for the development, validation and application of methodologies based on quantum mechanics and statistical thermodynamics and the study of complex molecular systems. Alongside this line of research is the activity of *DreamsLab*, a research group that uses immersive virtual reality systems for the visualization of different types of data (molecular systems, including large-sized ones, archaeological reconstructions, the reproduction of black holes and much more) and interaction with such data through natural gestures, enabling better use and understanding of the data, both scientifically and didactically.
- the **SAET Laboratory,** *History, Archaeology, Epigraphy, Tradition of Antiquity* (http://saet.sns.it), which supports humanities research in the fields of History (Greek and Roman), Epigraphy, History of Art and archaeological research from the archaic period to late antiquity. The strong interest in the tradition of the antiquity requires investigation of the history of historiography and of its multiple uses in the past. The Laboratory also provides scholars and students with electronic resources for the analysis of ancient texts and other scientific dissemination tools.
- the **DocStAr Laboratory,** *Historical-Artistic Documentation* (http://www.docstar.sns.it), which operates in the historical/artistic field, with seamless chronological coverage from classical antiquity to the contemporary age. It covers a wide range of disciplines and methodologies, spanning from non-invasive investigations of individual works to the creation of computer files relating to graphic and photographic collections of documents, letters and printed sources.

The **Research Groups** at the Scuola are centred exclusively on the scientific field, which includes:

- carried out and ongoing activities;
- the group's scientific relations with university institutions, research bodies, companies, other public and private, national and international bodies;

- the scientific contact person and the personnel involved (professors, researchers, postdoctoral researchers, students, technical-administrative staff).

Research groups are autonomous and external to the Scuola's laboratories (SAET, DOCSTAR; Biology, NEST and SMART). Each research group may have one or more lines of research.

An identification and census process of the groups has been initiated in order to update their composition and incorporate them in the macro-groups of the nine traditional "disciplines" of the Scuola Normale (also called “seminari”), to which "Political and Social Sciences" has been added. More specifically:

Faculty of Sciences:

- Mathematics and Information Technology
- Physics
- Chemistry and Geology
- Biological Sciences

Faculty of Humanities:

- Philosophy
- Modern Literature and Philology, Linguistics
- Ancient History and Classic Philology
- History of Art and Archaeology
- History and Paleography

Faculty of Political and Social Sciences:

- Political and Social Sciences

This process enables the overall management of each research group, because it makes it possible to follow the activities by creating specific web pages.

Among its most valuable resources, the Scuola makes available to internal and external users three important support centres for teaching and research activities:

- The **Library** (http://biblio.sns.it), which with over one million volumes, houses one of the richest open-shelf book collection in Europe.

- The **Archival Centre** (http://centroarchivistico.sns.it), which safeguards historical documents and materials of the Scuola, as well as collections of illustrious scholars gathered through donations, bequests and targeted purchases.

- ***Edizioni della Normale*** - Publishing House - (https://edizioni.sns.it), which produces national and international publications and is currently experimenting with new forms of online publishing.

The **High-Performance Computing Centre** (https://www.sns.it/it/centro-high-performance-computing), which provides technological and technical support to research groups, research centres and laboratories for carrying out scientific computing activities on high-performance web service architectures, databases and web pages for the humanities.

3. OPEN SCIENCE

With a view to promoting the dissemination of research outcomes, the Scuola adheres to the principles of Open Science, ensuring open access to the results of scientific outputs obtained through public funding, in accordance with the Messina Declaration, signed by the University in 2004, in support of the Berlin Declaration.

The development of Open Science has been included in the strategic objectives of the 2019-2024 Programme Development Plan, and has been converted into the following key actions: approval of the Regulation on open access to scientific literature, with the obligation to archive research findings in the institutional repository; implementation of a single certified open repository with data control and validation; proposal of training sessions to raise awareness of Open Science issues among the various members of the School.

In order to monitor the progressive advancement of the actions outlined, which mainly include the population of the institutional archive with research products (also full text) and the dissemination of Open Science culture in the academic community, the following indicators have been chosen: the percentage of products added to the institutional archive, the number of downloads of the full texts included, the number of initiatives carried out in relation to those scheduled, the number and type of participants in the initiatives, and the number and type of information material produced. The recent inclusion of Open Science in the Scuola's development strategy entails that, to date, no previous figures are available for the chosen indicators to be compared with those of 2020; however, for the following years, the targets to be reached will be set on the basis of the previous year's figures, in a perspective of continuous improvement. The body in charge of monitoring is the Committee for Open Access, as provided for by the above-mentioned Regulation, which entered into force on 1 June 2020. The commission, comprising delegates from the three academic Faculties, is responsible for making proposals to the Governance in order to promote open access, monitor the annual objectives and report on the results achieved every year.

The development of Open Science calls for two other actions that will be implemented over the period 2019-2024 and monitored with specific indicators in the future adjustments to the Programme Plan: the management of research data (which are resources to be made accessible and reusable with a view to transparency and reproducibility of research) through a specific policy drawn up according to the FAIR principles and the implementation of a data repository; the quantification of the costs incurred for publication in open access journals.

4. TECHNOLOGY TRANSFER

The Scuola, through the *SRT* (Research and Technology Transfer Service), manages the protection, exploitation and technology transfer of the results obtained as a part of the scientific activities conducted in groups, laboratories, centres and research projects.

In particular, the *SRT* offers support services for the identification, protection and management of intellectual property, for licensing activities, for the creation of spin-off and start-up companies and for the promotion and dissemination of research results also by participating in regional, national and international events and fairs. *(*See *Quality policies third mission, enhancement of research).*

5. DEPARTMENTS OF EXCELLENCE

The initiative known as "Departments of Excellence" was launched under Law 232 of 11 December 2016, Art. 1, paras. 314-337 (Budget Law 2017). On the basis of the ISPD (Standardised Indicator of Departmental Performance), as a result of the VQR (Research Quality Assessment) 2011-2014, a preliminary ranking of the best 350 Departments of State Universities was drawn up by ANVUR upon request of the MIUR and published on 12 May 2017. The aim of the initiative is to identify and fund, every five years and within the framework of the 14 CUN (National University Council) areas, the best 180 Departments of the State Universities (http://www.miur.gov.it/documents/20182/209103/12+maggio++2017+-+Elenco+dei+Dipartimenti+di+eccellenza.pdf/ae376afd-671e-4c0b-bf4f-059859e489dd?version=1.1)
By virtue of the positioning of the two Faculties, Humanities and Sciences, the Scuola has become eligible for the funding of the two proposals submitted (*Departments of Excellence* 2018- 2022), both with ISPD equal to 1. (www.sns.it/it/ricerca/dipartimenti-eccellenza).

- "FACULTY OF HUMANITIES" DEPARTMENT OF EXCELLENCE

The Department of Excellence of the Faculty of Humanities is primarily aimed at establishing a doctorate in Art History that coordinates, on the subject of the relationship between word and image, a series of lines of research that have been developed in the "Seminari" of the Scuola Normale Superiore over the last few decades. These lines of research are embedded in the mutual interaction of two strong historical strands of studies, traditionally conducted at the Scuola Normale: philological studies and cultural-historical studies. In the international community, research on the interaction between text and image has lately emerged as a privileged field of investigation. These researches have overcome the boundaries of the predominantly visual disciplinary field, typically connected to the historical-artistic disciplines, and have become an indispensable cross-check step within the literary, historical, philosophical, sociological research.

More specifically, the project of the Department of Excellence includes the development of two specific aspects:

1. the reorganisation of the doctorate on a disciplinary basis, through the creation of a specific PhD in Art History;
2. the increase and improvement of research and teaching activities on the relationship between text and images also through the enhancement of some research laboratories already existing at the Scuola and active on similar lines of research.

As regards the first objective, the fundamental step for the creation of the disciplinary PhD has been the activation of a first-tier teaching of medieval art history and the recruitment of a type-B researcher in medieval history.

The new disciplinary doctorate in the field of Art History is part of this field of studies and covers from ancient to contemporary art along the following lines of development.

As far as the history of ancient art is concerned, emphasis will be given to the analysis of written evidence (literary and epigraphic sources) in order to reconsider the contexts of production and fruition of the work, in order to reconstruct the lost originals not only by using the tools of philological archaeology but also taking into account a more dialectical context of production. For

what concerns the history of medieval art, which is the main focus of this project, the studies on visible writings are intended as a starting point for an inventory of artistic, cultural and linguistic practices intertwining art history, political, social and economic history. As regards the history of modern art, the study of the ways in which the artistic heritage is transmitted is of primary importance; historiography and critique combine with forms of visual multiplication and dissemination of critiqued images, together with the methods of conservation and fruition of works. In contemporary art history the centre of interest is a new visual and documentary philology, applied mainly to the second half of the twentieth century: printed documents, thus, become central to providing the necessary historical information and also lead to a more correct and broader cultural contextualisation of the work.

In this context, it is worth mentioning the various recruitments within the department, specifically aimed at ensuring the interaction between the historical and historical-artistic lines of research that is instrumental to the combination of text analysis and interpretation of visual evidence, which is the core of the Department of Excellence's scientific project:

- a post of permanent full professor, scientific disciplinary sector L-FIL-LET/10 Italian literature;
- a post of permanent full professor, scientific disciplinary sector M-STO/02 Modern History.

The second goal of the Department of Excellence of the Faculty of Humanities is to bring together, on the theme of word and image, the three laboratories of the Scuola Normale Superiore that recently have been working in this area of study: the DocStAR, SAET and SMART laboratories. As for the DocStAr laboratory, priority has been given the development of the *Nomina* project, covering a wider geographical area and further categories of medieval and post-medieval artefacts; the research on the photographic transmission of artworks in the text-image relationship of illustrated atlases, books and art magazines; the enhancement of the contemporary art project, with the creation of a database of the activities of the major Italian private art galleries of the post-war period. With regard to the SAET laboratory, the development prospects of the text-image research, which so far has been extensively analysed in terms of historical cartography and toponymy, include the possibility of producing 3D images of monuments, structures and artefacts unearthed during on-site research activities, opening up to new perspectives of investigation aimed at sculptural and vascular production. The DreamsLab laboratory also operates within the SMART Laboratory of the Faculty of Mathematical and Natural Sciences. It uses immersive virtual reality systems for the visualization of different types of data (archaeological reconstructions, the reproduction of artworks, visualization of lost collections), which enable the interaction through natural gestures and, thus, ensure a better use and understanding of the data from both a scientific and didactic viewpoint. The DreamsLab approach is therefore meant to be interdisciplinary with the aim of enhancing existing computing infrastructures and developing applications for visual and textual pattern analysis.

- "FACULTY OF SCIENCES" DEPARTMENT OF EXCELLENCE

The disciplines of Mathematics and Physics have always been part of the Faculty of Sciences and represent a consolidated tradition of Excellence; more recent is the introduction of Biology and

Chemistry and, in the field of Mathematics, Mathematical Methods for Finance[1]. First of all, mention should be made of the recruitment initiatives undertaken by the Scuola even before the eligibility for DE funding, which involved the following disciplines: probability theory, numerical calculation, computational astrochemistry, experimental high energy physics, all of which reflect the growing interest in Computational Science and, especially, in its applications to Data Science (C&DS). In this framework, the departmental development project named "*Faculty of Sciences" Department of Excellence* aims to provide a significant input to the development of advanced lines of research and training in computational and data sciences, encouraging their integration with other related disciplinary areas. As a matter of fact, the extraction of significant information from large sets of data is a central issue in several areas, and especially in the economic and social spheres, where it is often possible to track the behaviour of millions of individuals, or economic agents, over long periods of time. As a consequence, Economics, Finance, Social Sciences have been radically changed by the advent of high-performance computing and artificial intelligence, increasing the level of understanding and prediction skills. In Biology, Chemistry, Cosmology, Condensed-Matter Physics, High Energy Physics (all of which are well-represented research areas at the Scuola) sometimes the volume and rate of data production far exceed the possibility of processing with conventional computational tools. At the same time, the large amount of data available paves the way for new scientific paradigms: hypotheses are not formulated *a priori*, to subsequently seek experimental validation; on the contrary, it is the study of structures within data that suggests new scientific assumptions, in a data-driven perspective. The development of efficient algorithms is therefore particularly relevant and involves, in an interdisciplinary approach, the various areas of mathematics (Numerical Calculation, Calculus of Variations, Probability Theory, Dynamic Systems Theory, Partial Derivative Equations, Harmonic Analysis).

The Department of Excellence project sets out to develop specific objectives:

1. Strengthening the research group in Financial Mathematics and establishing a research group in Computational Sciences;
2. Activating a PhD course in Computational Sciences;
3. Developing and consolidating training activities in C&DS, with increased synergies between the research groups involved;
4. Creating a centralised infrastructure for high-performance computing and Big Data (purchase of Storage equipment and a GPU computing system for Data Intensive High-Performance Computing applications).

In particular, the accreditation of the new doctoral programme in Computational Science is serving as a catalyst for joint research activities involving teachers and students of the Scuola, temporary lecturers in charge of doctoral courses, and visiting researchers supported by DE funds. The research activities cover physics and computational chemistry issues, as well as issues related the field of Quantitative Finance and basic research in Numerical Analysis. The teaching activities comprise the courses offered within the Doctorate, enhanced by a number of seminars carried out by visiting lecturers. Thanks to the DE, the Scuola can now be regarded as a relevant research centre in the field of Computational Science and Data Science, with significant synergies between

[1] Main areas of interest: Mathematics, calculus of variations, geometric analysis, harmonic analysis, number theory, algebraic geometry, dynamic systems theory, financial mathematics; Physics, cosmology, particle physics, experimental theory, condensed-matter physics, nanotechnology, quantum information; Chemistry, computational chemistry; Biology, neurobiology.

the various areas (especially Mathematics, Finance, Physics and Chemistry), with a substantial number of teachers, researchers and students involved in this field, and with a substantial increase in interdisciplinary collaborations on issues of considerable interest and impact.

Furthermore, in order to achieve the above-mentioned objectives, staff recruitment policies, specifically aimed at enhancing and intensifying the interaction between the areas of main interest for the Scuola, have become a key factor. First, the Scuola's eagerness towards information technology, which is currently not represented as a discipline, is noteworthy. In fact, since the main target of the project is to strengthen the Faculty in the theoretical and applicative aspects of scientific computing (through the acquisition of skills and infrastructures in the emerging field of artificial intelligence), in view of the establishment of a new doctorate and owing to the widespread enthusiasm shown by students (enrolled in the ordinary course of the Faculty of Sciences, with particular reference also to students enrolled in the degree course in computer science at the University of Pisa), the Scuola's academic team needs to be enhanced with a lecturer specialised in computer science (sector 01/B). Second, recruitment has been initiated in the following disciplinary areas: a position as a professor in the 1st tier, examination sector 01/A5 Numerical analysis, SSD- MAT/08 Numerical analysis; a position as a professor in the 2nd tier, examination sector 03/A2 Methodology Models for Chemical sciences, SSD- CHIM/02 Physical Chemistry; a researcher (as per art. 24 par. 3 letter B of Law 240/2010) examination sector 05/E2 molecular biology SSD BIO/11 molecular biology. All recruitments are aimed at strengthening and expanding the lines of research of the Scuola (e.g. Computer Science).

6. TOOLS FOR QUALITY MONITORING

The Scuola monitors the quality of research through:

- International Ranking
- VQR- Research quality assessment
- Report on research, training and technology transfer activities
- Internal audit
- Quinquennial evaluation processes of the Research Centres and Laboratories at the Scuola

6.1 INTERNATIONAL RANKINGS

The Scuola participates in the following evaluation rankings:

- QS World University Ranking (https://www.topuniversities.com)

- ARWU *Academic Ranking of World Universities* (http://www.shanghairanking.com)

- THE World University Ranking (https://www.timeshighereducation.com)

- RUR Round University Ranking (https://roundranking.com/)

6.2 RESEARCH QUALITY ASSESSMENT

The figures published by ANVUR in relation to the last Research Quality Assessment period (2011-2014) show that:

- with regard to the assessment of research products, the percentage of products submitted compared to the expected production is on average 97.06: this percentage is higher than the average for universities;

- the Scuola Normale Superiore di Pisa is present in seven out of the sixteen scientific areas, and is ranked, in all areas, within the category of small universities. The R indicator is greater than one in all areas, showing that the score is higher than the national area average. The X indicator is also greater than one in all areas, showing that the percentage of excellent and high-level products is always superior to the area average;

- as regards the area context indicators, both in absolute and normalised values (on *addetti in mobilità* – employees hired or promoted within the institution during the four-year period of the VQR – and on funding from tenders and on training employees), the Scuola Normale Superiore di Pisa always appears in the first quartiles of distribution.

Overall positioning of the Scuola in the VQR 2011-2014 evaluation period:

	By average score	
Areas	*Overall positioning*	*Small universities positioning*
Area 1 - Mathematical and Computer Sciences	1 out of 59	1 out of 34
Area 2 - Physical Sciences	7 out of 55	6 out of 24
Area 3 – Chemical Sciences	1 out of 56	1 out of 35
Area 5 - Biological Sciences	14 out of 62	12 out of 31
Area 10 - Sciences of Antiquity, literary-philological and artistic history	2 out of 66	2 out of 38
Area 11a - Historical, philosophical and pedagogical sciences	1 out of 74	1 out of 48
Area 14 – Political and Social Sciences	3 out of 69	3 out of 48

For the purposes of internal procedures, the VQR results also indicate:

- Allocation of one-off economic incentives pursuant to art. 29, paragraph 19 of Law no. 240 of 30 December 2010 to professors and researchers
- Quality of Doctoral College.

6.3 REPORT ON RESEARCH, TRAINING AND TECHNOLOGY TRANSFER ACTIVITIES

The research and technology transfer activities of the research structures, the research groups of the Scuola and of the JoTTO (Joint Technology Transfer Office) are monitored on an annual basis in the Report on research, training and technology transfer activities drawn up in compliance with the provisions of Law 1/2009 art. 3c and attached to the Final Financial Statements of the Scuola. The report is the monitoring and accounting tool that provides information on research groups and structures (objectives, human resources and tools, acknowledgments achieved, figures and activities). This information is used by the bodies to define actions to improve and consolidate results in subsequent planning.

6.4 INTERNAL AUDIT

Since 2014, the Scuola Normale has had an Auditing Service, subordinate to the General Secretary and responsible for carrying out the following functions:

- Control over projects financed by external funding sources;
- Internal audit activities, national (including *in itinere* audits) and European research projects;
- Support to the structures of the Scuola in the verification activities by external auditors;
- Verification of the adequacy, correctness and cost-effectiveness of accounting and administrative controls and the level of operational compliance;
- Assessment of compliance of the underway processes with policies, procedures, standards, laws and regulations;
- Development of methodologies and tools for effective control action.

Audit activities are conducted on national research projects on two levels:

Level I is an internal level; level II is carried out by the Integrated Audit Unit established by Scuola Normale Superiore, Scuola Superiore di Studi Universitari e di Perfezionamento Sant'Anna and Scuola IMT Alti Studi - Lucca.

In the three-year period 2016 - 2018 the Auditing Service conducted a total of 70 audits on research projects funded by the MIUR, of which 31 were *ex post* and 39 were *in itinere*.

In 2017, the MIUR identified as best practice the control dashboard designed and used by the Auditing Service for auditing activities on PRIN 2012 projects and with the approval of the Scuola Normale Superiore, in a note dated 30 May, shared it with all Italian Universities, in order to "make internal auditing activities easier, faster and more consistent".

7. THE ROLE OF THE RESEARCH AND TECHNOLOGY TRANSFER SERVICE

In addition to the administrative and management activities assigned by the function flow chart, the Research and Technology Transfer Service is involved in:

- <u>Research Development:</u>
  - scouting, communication and promotion of research funding opportunities, from external sources (international funding - EU and non-EU - ministerial, regional, private foundations, etc.) and from internal sources (University funding);
  - assistance to the Academic Community in the drafting and presentation of project proposals;
  - organisation of training/information events for PhD students, researchers and teachers, on specific funding opportunities, in particular in the framework of EU programmes and on the issue of intellectual property protection and business creation;
    participation in events and fairs at regional, national and international level for the promotion, dissemination and exploitation of research results.
  - support to the activities of the Research Committee: verification of the compliance of project, institutional and third-party proposals with the guidelines and lines of development of the Scuola; evaluation and funding of internal research projects.

- Assessment:
  - support to the activities of the Research Committee: verification of the compliance of project, institutional and third-party proposals with the guidelines and lines of development of the Scuola; evaluation and funding of internal research projects.