



Development



Technology

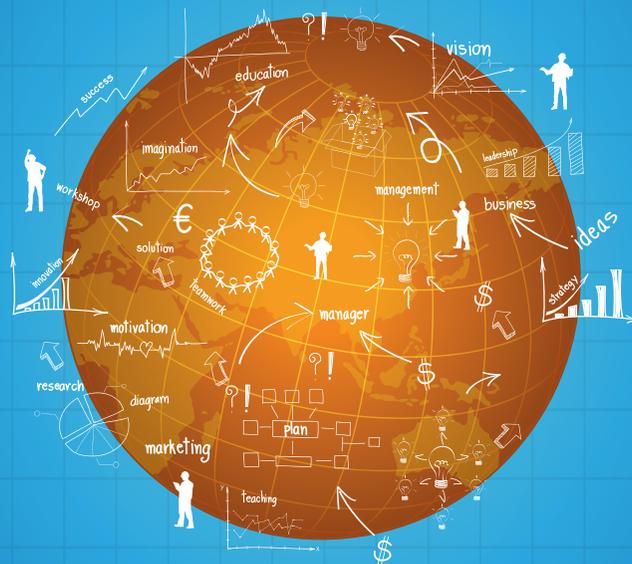


Innovation



Research

## Research and Technology Bodies under the auspices of the GENERAL SECRETARIAT FOR RESEARCH AND TECHNOLOGY



*Research, Innovation,  
Entrepreneurship for Greece*



**HELLENIC REPUBLIC**  
Ministry of Education and Religious Affairs  
General Secretariat for Research and Technology







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Today, around the world, people are beginning to realize that the rules of global competition have changed. It is now understood that the bar of competition has risen and therefore, to maintain a good standard of living, we must change the way we think and act. A country's competitiveness is aimed at the welfare of its inhabitants, which is ensured in the long-term by the way the country mobilizes its human potential, its capital and natural resources for the production of new or improved products and services.

The contribution of research to economic growth is crucial, as evidenced by studies of the European Commission (EC), emphasizing that **investment in Research and Technology, at a European average (E.A.) rate of 3% by 2020, could create 3.7 million jobs by 2025.**

Nowadays, despite the current economic climate, significant opportunities are created for the recovery and strengthening of Research and Innovation in Greece, funded by both European Structural and Investment Funds **2014-2020** and the new Framework Program for EU research (HORIZON 2020), in conjunction with the National Strategic Framework for Research and Innovation (NSRF) 2014-2020.

During the new programming period, one of the key priorities for policy and programmes design for Research and Innovation (R & I) is to focus on areas in which Greece already has a relative comparative advantage at national and regional level, based on criteria of extroversion and competitiveness. For example, such areas are Agro-Bio-Food & food processing, Energy & Materials, Environment and Sustainable Development, Health and Pharmaceuticals, Information & Communication Technologies, Marine Economy (Blue Growth), Socio-Economic Services and other strategic sectors, such as Culture, Tourism Shipping, Education, etc.



Our efforts will focus on the reorientation and modernization of the research ecosystem of the country, in a way to help overall economic development and the country's exit from the economic crisis. Our immediate goal is to link research with production, where conditions are mature enough, regardless of sectors and disciplines. Important contributions to this effort constitute the highlighting of synergies between research and education in innovation, regional innovation, entrepreneurship and the increase of private investment in research, the strengthening of scientific excellence by supporting human research potential and the upgrading of research infrastructures of national strategic importance with pan-European interest.

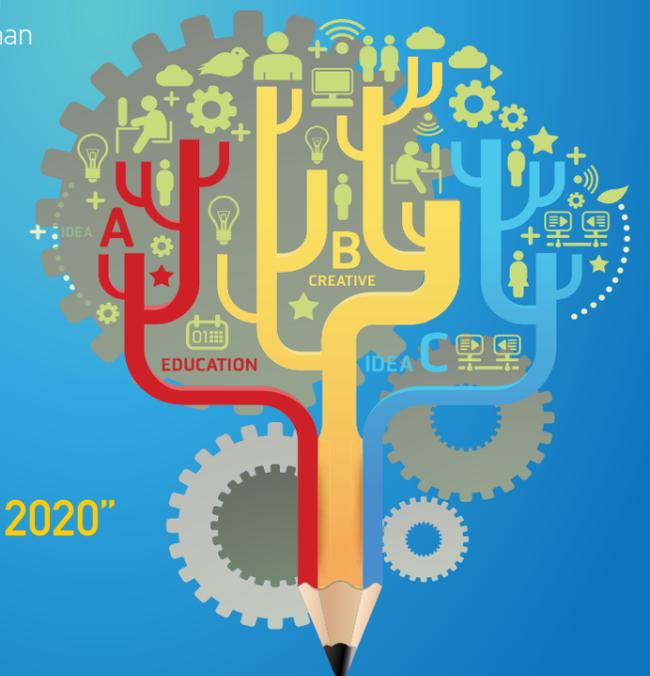
Investment in education, science, research, technological development and innovation is central to a new development model that is "sustainable", which will be "smart" and which is based on innovation and highly skilled human potential resources.

Our goal, through development of the right skills, attracting investment and building the required human capacity is to gradually highlight our country as a **Center of Technology** and Innovation within our wider geographical area.

Our vision:

**"Innovation Greece 2020"**

The General Secretary for Research and Technology  
**Dr. Christos Vasilakos**





## GENERAL SECRETARIAT FOR RESEARCH AND TECHNOLOGY (GSRT)

The General Secretariat for Research and Technology (GSRT) is the agency responsible for planning and implementing policies through state financing, for research, technological development and innovation at national and regional level. GSRT supervises a geographically distributed ecosystem of Public Research Centers, which can enrich local communities with the necessary multifaceted skills for producing innovation.

The Greek research community, while extremely competitive – having achieved high positions in both European and global rankings -remains a largely untapped resource for the development of the Greek economy and for the reversal of the severe, in recent years, emigration of highly skilled human resources ('brain drain') that is especially valuable for the country in the current crisis conditions. Therefore, it is necessary to restructure and push for further development within the arena of Greek research.

### Fields of Intervention

GSRT is responsible for policy planning on Research, Technological Development and Innovation for Greece, that is implemented through competitive research programs. These programs support the R&D activities of research and industrial bodies in sectors vital for the Greek economy and the improvement of the everyday life of people. It ensures the consistency of Higher Education, Research and Innovation as pillars for promoting and enhancing the impact of science and culture in the knowledge based economy.

GSRT supports research infrastructures as a robust framework for strengthening Greece's position as a hub for science and research in Europe and beyond, through drafting of the national Roadmap for Research Infrastructures and encouraging synergies with European counterparts. Furthermore, the GSRT promotes the excellence of research establishments through consistent financing and operational support of the most prominent research and technological centers/institutions of the country). More specifically, GSRT:

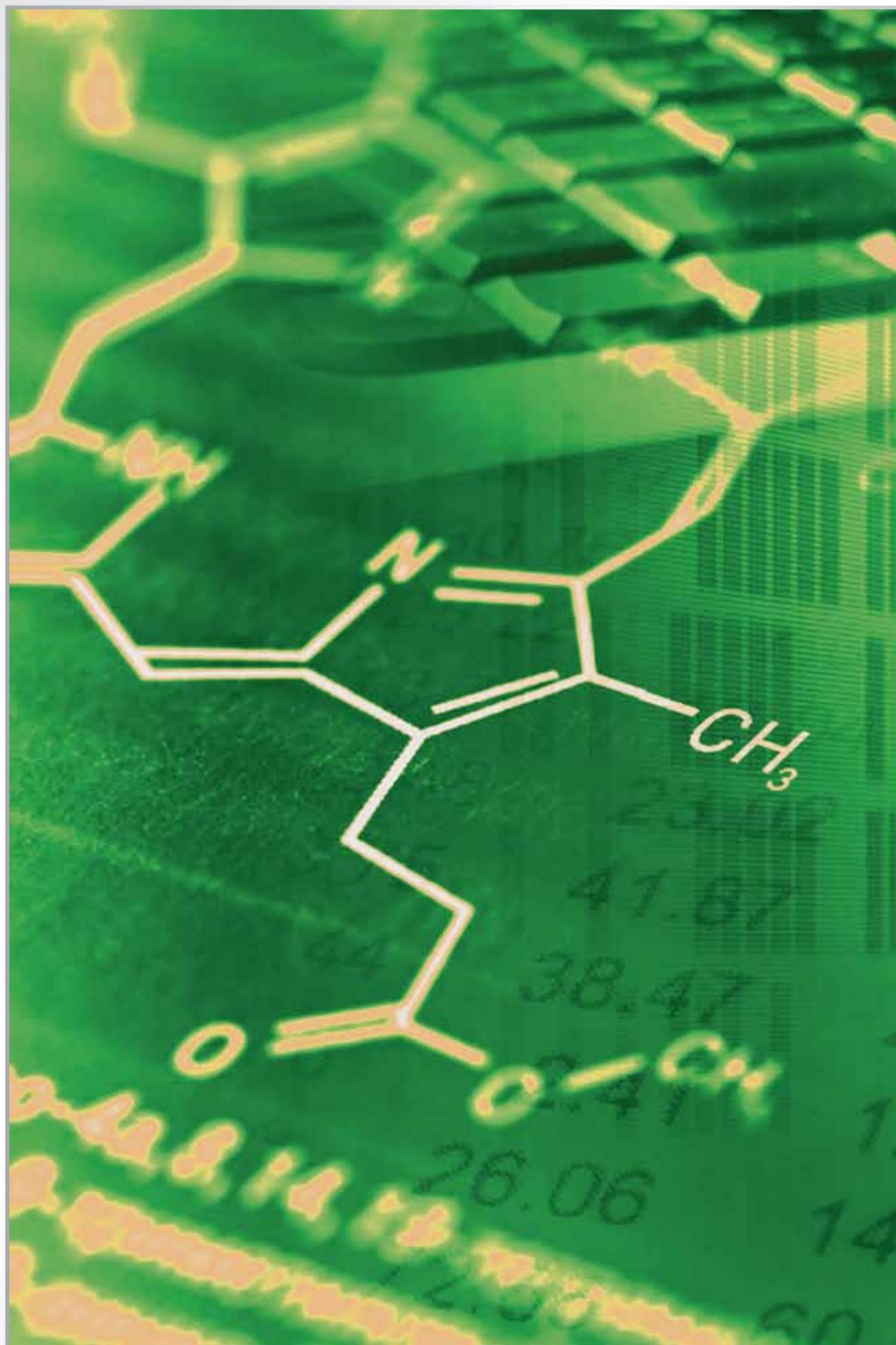
- enhances the creation and development of physical and organizational infrastructure (innovation clusters, innovation poles, incubators, S&T parks) to facilitate the development of new, knowledge-intensive business activities of respective domestic added value.
- promotes the transfer and diffusion of advanced technologies to the country's production sector, and the transformation of research results into products and services that can be utilized by new business entities.



- encourages the extroversion of Greek Research and Technology establishments and businesses organizations, through the implementation of transnational projects with Greece's strategic partner countries, while also developing Science and Technology cooperation with international organizations.
- represents the country to the European Union organizations , harmonizing research and technological national activities with the needs of the international community.
- supports employment of young, highly qualified scientists within the business sector, thus contributing to the reduction of unemployment and the promotion of business innovation.
- supports actions aiming to enhance the public understanding of science and to raise the awareness for new technologies and their uses.
- monitors the implementation of research policies by assessing their impact through Research and Technology indicators at national and regional level.

Greece invests in the “knowledge triangle” of education, research and innovation that demonstrates the close relationship of these three key elements with the development strategy of the modern era that constitutes a challenge for our country in order to increase productivity and reverse the negative economic climate.







## NATIONAL CENTER FOR SCIENTIFIC RESEARCH “DEMOKRITOS” (NCSR)

### Historical Frame

The National Center for Scientific Research “Demokritos” (NCSR “Demokritos”) is the largest multidisciplinary research center in Greece, with high level expertise and advanced infrastructure in the fields of Nanotechnology and Advanced Materials, Energy & Environment, Biosciences, Nuclear and Particle Physics, Informatics & Telecommunications.

The Center was inaugurated in 1961 as a state-owned entity under the name Nuclear Research Center “Demokritos”. Over the years it expanded, becoming the NCSR “Demokritos” in 1985. Since then, it has been an autonomous legal body supervised by the General Secretariat for Research and Technology (GSRT).

Today, NCSR “Demokritos” is a leading research organization, ranked among the best in Europe. Highly-qualified personnel conduct world-class basic and applied research to promote science and innovation in selected areas of national importance. The Center also plays a pivotal role in postgraduate education and professional training, provides customized high-technology services to the public and private sectors, operates a Technology Park and an Innovation Exhibition, and recently initiated the implementation of a plan to establish an Innovation and Entrepreneurship hub, the Metropolitan Innovation Campus of Attica, through integrating local research and industrial stakeholders.

### Organizational Structure & Management

Research activities are currently coordinated by five Research Institutes: Institute of Informatics & Telecommunications, Institute of Biosciences & Applications, Institute of Nuclear & Radiological Sciences & Technology, Energy & Safety, Institute of Nanoscience and Nanotechnology, Institute of Nuclear & Particle Physics.

NCSR “Demokritos” is governed by an eight-member Board, consisting of the Director of the Center and President of the Board, the five Institutes’ Directors, and two elected employee representatives.

The administration of the Center is carried out by the departments of: Finance and Administration, Technological Applications and Research Support, and Special Accounts which deals with research financed by third parties.

### Facts and Figures

The total number of employees range from 800 to 1.000 people, keeping a good balance between scientific, administrative, technical and auxiliary personnel. Concerning the Financial Resources, in 2013 the proportion of income from EU Programs & Services (51%) exceeded that from public grants (49%). In the period 2005-2012, NCSR “Demokritos” scientists obtained more than 120M€ funding from EU Framework Programmes and the provision of products and services.

NCSR “Demokritos” management is based on a 5-year Business Plan that aims at optimal use of the available funding opportunities to achieve its scientific objectives.

### Scientific Results

NCSR “Demokritos” generates excellent results in terms of peer-reviewed scientific publications and citations. In the years 2005-2012 (the most recent peer-evaluated period), the research output has continuously grown, with 5.237 papers in refereed journals and proceedings of International Conferences, 103.847 citations, 92 Books–Monographs. In the same period, “Demokritos” researchers obtained 154 awards/prizes/distinctions and supervised numerous PhD theses, with 107 being completed.

### Facilities - Laboratories

The Center is equipped with modern laboratories on a campus of about 600.000 m<sup>2</sup> ideally situated with respect to Attica region, Athens International Airport and transport links. It hosts 34 high-technology service provision laboratories of national importance, of which ten are accredited. The Centre also has a fully equipped Congress Center to support research and entrepreneurial activities. The Scientific & Technological Park of Attica “Leukippos” was established in 1992 to support and stimulate the development of high-technology entrepreneurship. “Leukippos” currently consists of 48 SMEs, of which 12 are spin-offs, hosted in two buildings of ~2.000m<sup>2</sup>.

### Latest Achievements

- Four FP7/REGPOT Projects: Four Research Laboratories at Regional Level have been acknowledged by the EC for their excellence records.
  - Three European Research Council Grants have been awarded to Demokritos’ researchers in acknowledgement of their scientific excellence.
  - Coordination of two European Networks of Excellence
  - 87 FP7 Projects, of which 25 are coordinated by NCSR “Demokritos” Staff
  - 61 NSRF (National Strategic Reference Framework) Projects from which: 11 Excellence in Research, 6 ESFRI, 12 Collaborative Research I&I.
  - More than 1.750 PhD theses supervised by NCSR “Demokritos” researchers
  - 71 registered patents (60 still valid)
  - National Contact Point for Environment (NCP), FP7, Programme: Environment (including Climate Change)
- After more than 50 years of operation, NCSR “Demokritos” has excellent credentials in technological innovation, education and training, scientific know-how, laboratory infrastructure and expertise, internationally recognised personnel, high impact publications, patent development and spin-off creation.

### Institutes of NCSR “Demokritos”

#### Institute of Biosciences and Applications (IB-A)

The IB-A is a pioneer in multidisciplinary biomedical and biotechnological research, aiming at international competitiveness and excellence. Interdisciplinarity in life sciences and the environment is a unique and characteristic “earmark” of the IB-A.

During the last decade, IB-A research followed major thrusts in Human Health and Environment: translational research for biomedical applications focused on common diseases: atherosclerosis, cancer, diabetes, Alzheimer’s disease (AD), cell senescence, intervertebral disc degeneration, pain perception, and addictive disorders upon opioid administration of narcotics. Additional studies address: insect disease vector control reducing malaria transmission rates; novel analgesics and other pharmaceuticals using high throughput screening approaches. These studies developed means to interfere with the onset and/or progression of the diseases above, and innovative markers and diagnostic tools. In biotechnological approaches, photosynthetic hydrogen (H<sub>2</sub>) production and Integrated Pest Management with smart and ecological technologies in agricultural and urban environment have been of great importance.

More specifically IB-A research yielded:

- New molecules for diagnosis and treatment of AD;
- Development of transgenic mice which unraveled the protective role of endogenous molecules (MMP9) against AD;
- Structural insights into AD and dyslipidemias related with apolipoprotein E mutations;
- Early diagnosis of tumors, innovative nanoparticles for combating cancer and novel agents for multi-drug resistance reversal;
- New functions of the biological clock and the role of histones
- Novel GPCR-mediated signaling pathways;
- New functions of fungal membrane transporters for screening new antifungal agents;
- Production of hydrogen as fuel from algae;
- Production and distribution of bone grafts for orthopedic and dental use;
- Development of novel software for structural models of molecules in solution.

## Major developments:

- new repellants against malaria from naturally occurring compounds;
- unraveling protective mechanisms of vitamin D3 against chronic kidney disease;
- survival of insulin-producing pancreatic  $\beta$ -cells against diabetes-induced apoptosis. (patent application);
- in vitro propagation of olfactory neuroblasts for autologous transplantation in human patients with spinal damage, to combat paraplegia, quadriplegia (funded through the "BIONIAN CLUSTER" the first Life Sciences Biotechnology cluster in South-Eastern Europe).
- Since January 2014, the IB-A is officially a member of EU-OPENSREEN, a chemical biology pan-European infrastructure for screening bioactivities of natural compounds.

## Institute of Informatics and Telecommunications (IIT)

The Institute of Informatics and Telecommunications (IIT) conducts research in the areas of telecommunications, networking, technologies for the World Wide Web (Web) and Intelligent Information Systems, aiming at excellence in these areas, for the benefit of the society and the development of the knowledge economy. The Institute pursues both long-term basic and applied research through focused and targeted R&D projects. Furthermore, IIT plays an active role in training new research personnel providing scholarships at graduate and post-doctoral level and their employment in research projects. Particular emphasis is given to the exploitation of research results and its dissemination to the public. The activities and know-how of IIT are focused mainly in the following areas:

## Telecommunications and Networking

- Technologies for modern telecommunications networks, including aspects relevant to Future internet, Internet of Things and Green Networks
- Performance evaluation, resource management and QoS aspects
- Networks for the distribution of multimedia content and QoE considerations
- Management of heterogeneous networks, efficient spectrum usage, mobility and handover management
- Wireless links, propagation models, smart antennas and body-antenna interactions
- Location-based systems and services

## Intelligent Information Systems

- Knowledge extraction, fusion and management from multiple modalities
- Document recognition
- Social network and social Web analysis
- Event recognition in multiple data streams
- Cognitive systems for natural and personalized human-machine interaction
- Applications of intelligent information systems to bioinformatics, health, culture, energy management, e-government, safe use of the internet
- Event management, decision support and data visualization systems
- Human and crowd behaviour modelling, simulation, 3D animation and gamification

## Achievements

- Location-based systems, services and multi-modal journey planners
- Human and Crowd behavior modeling, simulation, 3D animation and gamification
- Event management, decision support and data visualization systems
- On-line content analysis (email filtering, multi-document summarization, personalization)
- Analysis and recognition of Historical Documents
- Wireless links, propagation models, smart antennas and body-antenna interactions
- Optimized QoS-aware wireless connectivity over diverse collocated Radio Access Networks
- Management of heterogeneous networks, efficient spectrum usage, mobility and handover management
- Guaranteed End-to-End quality of service in video delivery over the Future Internet

## Institute of Nanoscience and Nanotechnology (INN)

The Institute of Nanoscience and Nanotechnology (INN) conducts research in the areas of Nanomaterials, Nanotechnology, and Processes, owning unique in Greece equipment for this kind of research. It was established in 2012 by merger of the three best Institutes of NCSR "Demokritos" (according to official external evaluations performed by GSRT).

The Institute aims at creating new knowledge and providing innovative solutions to support Greek society and improve the viability of Greek industry.

The Institute has certified laboratories according to ISO 9001-9002, as follows:

- Environmental Analysis
  - Nanotechnology and Microsystems
  - Laboratory of Archaeometry (Carbon-14)
  - Stable Isotope Unit
- Three of them are accredited according to EN
- Environmental Analysis
  - Nanotechnology and Microsystems
  - Laboratory of Archaeometry

It should be mentioned that the Institute holds a unique infrastructure for helium liquefaction in Greece.

Furthermore, INN plays an active role in training new research personnel providing scholarships at graduate and post-doctoral level and their employment in research projects.

The activities and expertise of INN is mainly focused on the following areas:

- Chemical Sciences for Nanostructures and Bioapplications
- Cultural Heritage
- Magnetism and Superconductivity: Advanced Materials and Applications
- Nanochemistry and Nanomaterials
- Nanoelectronics, Photonics and Microsystems

## Achievements

- New Physics: Topological Defects in the Ground State
- New Materials: Novel Molecular Magnets
- Artificial Photosynthesis : A Photoactive Molecular Device
- Next Generation Photovoltaics
- Pioneering research for the development of germanium MOS technology for advanced CMOS with the aim to scale and enhance the high frequency performance of integrated circuits in microprocessors.
- Nanoelectronics: Non-Volatile Memories – From the Lab to Industry
- New Solvents and Materials for CO2 capture
- Rare Earth Free Permanent Magnets
- Development of an inexpensive, point-of-care hand-portable diagnostic device for measuring CD4+ white blood cells in patients with HIV/AIDS.

## Institute of Nuclear and Radiological Sciences and Technology, Energy and Safety (INRASTES)

The Institute of Nuclear & Radiological Sciences and Technology, Energy & Safety pursues basic, translational and applied multidisciplinary research addressing challenges of great scientific and socioeconomic impact. The activities of the Institute are organized in four thematic areas in line with both Horizon 2020 and national smart specialization priorities:

- Nuclear Technology;
- Energy / Environmental Technologies, Safety & Security;
- Radiological Sciences and Radio-pharmaceutics;
- Biodiagnostics.

Attention is paid to the exploitation of research results via advanced R&D services that support policy and decision making, the industry and the society. Specifically:

- INRASTES hosts unique nationwide infrastructure (including the sole Nuclear Research Reactor in Greece, the Environmental Radioactivity monitoring system, the Radiopharmaceutics production and quality control facilities, the Pollutants / Dioxins Analysis laboratories, etc). The Institute is the only center in Greece with integrated knowledge on nuclear technology & safety, radiological sciences and radiopharmaceutics.

In that respect, the public and the media look up at INRASTES as an important provider of scientific advice and a reliable and authoritative source of information in the wake of major events.

- Six INRASTES Labs have attained National Reference status:
  - Environmental Radioactivity Laboratory
  - Mass Spectrometry & Dioxin Analysis Laboratory
  - Health Physics, Radiobiology & Cytogenetics Laboratory
  - Solar and Other Energy Systems Laboratory
  - Radioisotopes and Radiopharmaceuticals Laboratory
  - Immunodiagnostic Products Laboratories

Aiming for secure, clean and efficient Energy, the Institute has adopted an integrated approach encompassing Energy, Environmental and Safety / Security aspects (funded among others by RegPot EU Grants) including activities:

- from Environmental & Radiological Monitoring & Simulation, Systems Reliability and Safety Studies, to Exposure / Dose / Consequence Assessment & Health Effects;
- from Solar technologies to Energy storage, Alternative Fuels / Energy Carriers (Hydrogen) & Environmental Impact Assessment (including Climate Change studies);
- on Nuclear Technology and Engineering (including coordination of the Greek Fusion Technology Program).

The aim for Personalised Integrated Radiological Risk Assessment is pursued via the development of new cytogenetic methods for dose estimation, predictive assays for individual radio sensitivity and predisposition to cancer, and a new paradigm for radiation-induced chromosomal aberrations and instability. Innovative research on Breast and Ovarian Cancer Genetics yielded high level international and national collaborations (funded by NIH, EU and GSRT-Aristeia) and a series of publications in "Nature Genetics".

Patented, EU-funded research on immunochemistry, immunosensors and DNA-sensors led to the realization of miniaturized portable devices for the detection of disease markers in blood and toxic compounds in food. R&D on properties of enzymes important for the human immune response resulted in the development of potent inhibitors, useful for innovative approaches for cancer immunotherapy (funding by NSRF-ERC14).

Research on novel radiopeptide probes for molecular imaging and radionuclide therapy of human cancer led to the improvement of bioavailability and tumor targeting of radiopeptide drugs via enzyme inhibition (Marie Curie Award EANM 2013).



## Institute of Nuclear and Particle Physics (INPP)

The research activities of INPP focus on three major scientific areas: Astroparticle Physics, High-Energy Physics, and Nuclear Physics and Applications. The Institute is mainly oriented towards basic research but is also engaged in hardware development programs and numerous novel ion-beam applications that contribute decisively to capacity building in the country, the solution of problems with key societal impact, thus advancing the scientific and technological base of society. As of today, the INPP has attracted significant external funding that ensured its sustainability and an increasing visibility. In the period 2005-2012, the publications of INPP scientists were cited more than 21,000 times (excluding self-citations). In addition, more than 25 PhD theses and more than 50 Diploma theses have been submitted under the supervision of INPP scientists. The INPP hosts two unique research infrastructures in Greece: the Tandem Accelerator Laboratory at the "Demokritos" premises and NESTOR facilities to build a deep-sea neutrino telescope, in Pylos.

Through its HEP program, the INPP has been strongly involved in the design, construction and installation of the CMS detector at the LHC accelerator of CERN. In addition, INPP scientists have decisively contributed to the development of Data Analysis algorithms. Significant contributions were also made to the design, construction and operation of the so-called Micro Megas detectors installed in the CAST experiment at CERN, which is dedicated to the search for solar axions, one of the most likely dark matter candidates. Significant effort has also been placed in the technical design of the ESFRI project KM3NeT, the deep water neutrino telescope with dimensions of at least one cubic-kilometer, a project implemented by an international Consortium planned in the Mediterranean. In the field of Nuclear Physics and Applications, the INPP has demonstrated highly-specialized expertise in studying nuclear structure and understanding astrophysics processes occurring at explosive stellar sites, such as supernovae. Through the extensive employment of ion beams in interdisciplinary applications, the INPP's accelerator laboratory has been a world-leading analytical facility for, e.g. the analysis of particulate matter collected in aerosol filters, the determination of trace elements concentration or bio-distribution in biomedical samples, the development and modification of new materials of technological interest and the characterization of cultural heritage materials.

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## NATIONAL CENTER FOR SOCIAL RESEARCH (NCSR)

### Historical Frame

The National Centre for Social Research (EKKE) was first established as the Social Sciences Centre, Athens, (KKEA) in 1959<sup>1</sup> as a public organization. The foundation of KKEA was the result of a close collaboration between governmental authorities (Ministry of Education) and experts sent by UNESCO, in the middle of the fifties, whose task was to compile a report on the existing situation of social sciences in Greece and to prepare the ground for the creation of an institution which would carry out the duty of social science research in Greece.

The period of KKEA (1959-1968) was characterized by coherent and clearly expressed scientific objectives as well as by formulating hypotheses about the development of Greek society. In this period two volumes of the journal "Koinoniologiki Skepsi" (Sociological Thought) were issued, and three international conferences of social anthropologists and sociologists were convened by KKEA.

By force of a series of Compulsory Decrees<sup>2</sup> in 1968, the Social Sciences Centre of Athens was renamed National Centre for Social Research (EKKE) keeping its public character. In 1968 the Division of the Governmental Policy of the Ministry to the Prime Minister's Office assumed the role of EKKE's supervising authority instead of the Ministry of Education, but quite soon, in 1973, the supervision was transferred again, this time to the Ministry of Culture. In 1969, its journal re-appeared with the title The Greek Review of Social Research. EKKE mainly funded by the supervising Ministry's budget.

After 1974, in tandem with the restoration of democracy in the country, the Centre's activities were re-defined and its orientation towards the empirical study of current social issues was re-established. The Centre scheduled and implemented a number of major empirical research projects (study of urban centres, public health, agricultural co-operatives, administration of penal justice, the reproduction of cultural values and others).

In 1985, the first Greek Law "on scientific and technological research" (Law 1514 of 1985<sup>3</sup>) was voted by the Greek Parliament. The organization and operating procedures of EKKE are outlined in Law 1514. An ad hoc Presidential Decree (342 of 1986)<sup>4</sup> was then passed in order to implement the above Law for EKKE. This Presidential Decree is still active today.

According to this Decree the objectives of EKKE are:

- To carry out scientific research on the composition, configuration, structure and dynamics of Greek society
- To promote social science and to disseminate methods of scientific research
- To organize and operate its Library and to publish scientific books, monographs, reviews and papers,
- To organize open public discussions, discourses and speeches, conferences and seminars, and
- To cooperate with public institutions and private organisations for the best utilization of research findings, data and their application in national planning and social policy

### Research Activities

Table 1 presents the total and annual breakdown of all externally funded projects for the 2005-2013 period. In order to depict a more accurate picture of the Institutes' overall research activity, we present all figures for projects whose starting date might be (in some cases) prior to 2005, but were active during or after 2005.

Table 1: Total number share of the Institute's funded projects by source of funding, 2000-2013

Source of Funding	Number of Projects
European	44 (28.9%)
National	96 (63.2%)
Other	12 (7.9%)
<b>Total</b>	<b>152 (100.0%)</b>

<sup>1</sup> Law 3998/1959 (FEK A'226)  
<sup>2</sup> Compulsory Decree 264/1968 (FEK A' 13), Royal Decree 502/1968 (FEK A' 168)  
<sup>3</sup> Law 1514/1985 (FEK A' 13)  
<sup>4</sup> Presidential Decree 342/1986 (FEK A' 150)

The five major thematic areas that correspond to the Institute's research activities and longstanding traditions are:



1. Political Institutions and Governance
2. Research Infrastructures
3. Social and Cultural Structures and Trends
4. Social Policy
5. Urban and Rural Studies

The budget breakdown by thematic area is the following: 33% on Social Policy, 24% on Urban and Rural Studies, 20% on Social and Cultural Structures and Trends, 12% on Political Institutions and Governance and, finally, 11% on Research Infrastructures (Figure 1).

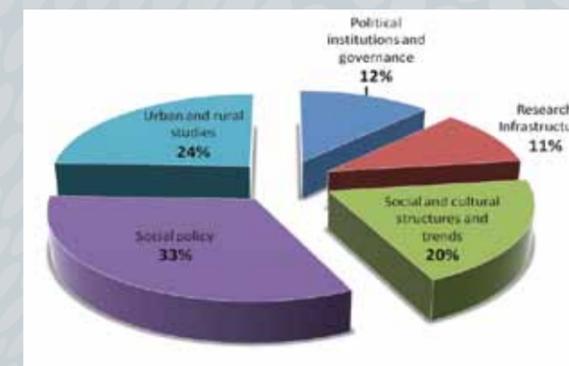


Figure 1: Share of budget and number of programmes/projects funded by thematic area (%) During the same period (2005-2012), a noticeable number (41) of research projects not funded by external sources has also been carried out within the Institute, focusing on a broad range of issues, such as memory and history, violence and bullying in schools, social trends in Greece, the social impact of the economic crisis in the Athens Greater Area, cultural values, studies on the environmental impact of development, land-use changes in urban and rural areas. The National Centre for Social Research pursued in the 2000s its commitment to contribute to

the development of Research Infrastructures (RIs) based on its strong tradition on social research's data and methods. The Centre capitalized experience of its own research tradition, as well as, of EU collaborating programmes and networks, so as to establish RIs at national and European level. As a result of its participation in and the development of RIs, EKKE assumed the role of a central node in the production, organization, management and processing of social data. Today, three research infrastructures are in operation in EKKE, with strong synergies among them: The European Social Survey (ESS), The Council of European Social Science Data Archives (CESSDA) and the Dynamic management of data management and cartographic representation ("So.Da.Map"). Recently EKKE's proposals for the inclusion of ESS and CESSDA in the National RI strategic Roadmap have been highly ranked<sup>5</sup>.

### Areas of Excellence

Apart from the aforementioned successful participation in European RIs, EKKE has implemented a number of projects or research programmes that have been prized as areas of excellence. These include the following:

- The European Social Survey
- Social Inequalities, Poverty and Social Exclusion
- Athens and Immigration
- Social Transformation Trends in Urban Space
- Socio-economic Class, Status and Consumption

Since 2012 EKKE is also conducting the 2nd Round of the PIAAC survey (2012-2016), an international comparative survey programme that assesses the skills and competences of adult population aged 16-64 years with the collaboration of the General Secretariat for Lifelong Learning (GSLLL) and the National Organisation for the Certification of Qualifications & Vocational Guidance (EOPPEP).

<sup>5</sup> ESS-ERIC-GR scored 20/20.

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## HELLENIC CENTER FOR MARINE RESEARCH (HCMR)

### Historical Frame

The Hellenic Centre for Marine Research (HCMR) is a governmental research organization operating under the supervision of the General Secretariat for Research and Technology (GSRT) of the Ministry of Education and Religious Affairs. The HCMR objectives include: (a) research and technological development activities in a broad spectrum of marine sciences, (b) creation of products and services, including education and knowledge/information dissemination, (c) support for decision-making at both central and regional levels concerning societal and economical developments, (d) economic exploitation of technological products by the Centre or in collaboration with third parties.

HCMR is located (facilities / infrastructures) in:

- Attica (Triton complex in Anavyssos/ Headquarters and the Agios Kosmas facilities),
- Crete (Thalassocosmos complex, [HCMR Crete building, AquaLabs, Cretaquarium, Underwater Technological Park]; Souda Bay pilot Aquaculture area)
- Rhodes (Hydrobiological Station).

### HCMR Comprises Three Research Institutes:

- the Institute of Oceanography (IO),
- the Institute of Marine Biology, Biotechnology and Aquaculture (IMBBC),
- the Institute of Marine Biological Resources and Inland Waters (IMBRIW)

HCMR has its foundation back in 1945 when the Hellenic Hydrobiological Station of Athens was founded by the Athens Academy, to primarily conduct fisheries research. In 1965, the Hydrobiological Station merged with the Fisheries Station of Piraeus (founded 1908 and belonging to the Ministry of National Finance), resulting in the creation of the Institute of Oceanographic and Fisheries Research (Law 4482/1965) (IOFR). In 1985 IOFR was substantially reorganized and upgraded to the National Centre for Marine Research (NCMR), which was finally merged in 2001 with the Institute of Marine Biology of Crete (IMBC) to become the Hellenic Centre for Marine Research (HCMR).

### Main Assets - Large Infrastructures

- 20.000 m<sup>2</sup> of building infrastructures (Athens/Crete/Rhodes)
- "THALASSOCOSMOS", a modern research and education complex in Gournes, Crete
- AquaLabs, a certified facility for experiments and rearing of marine organisms (broodstock, semi-intensive hatchery, phyto and zooplankton cultures, pre-growing, nutritional and feeding facilities)
- CRETAQUARIUM, a new, modern 3000m<sup>2</sup> aquarium
- Hydrobiological Station and Aquarium of Rhodes
- 3 Research Vessels (61-meter-800-ton multi-purpose R/V AEGAEON able to accommodate 21 scientists; 26-meter R/V PHILIA able to accommodate 14 scientists; 13.4 meter, R/V ALKYON for coastal research able to accommodate 8 scientists)
- Underwater vehicles: submersible THETIS (1 pilot and 1 scientist) diving capability 610m, ROV Max Rover (2000m diving capability), ROV Super-Achilles (1000 m diving capability)



- Fully equipped bio-geo-chemical laboratories and state-of-the-art field equipment for physical and biogeochemical research
- ESFR Infrastructures LIFEWATCH, EMSO-ERIC, EMBRC, EUROARGO-ERIC
- Fully equipped genetic / genomics laboratories, with state-of-the-art infrastructure (New Generation Sequencing, Real Time PCR, DNA extraction and documentation systems, )
- Micro-CT scanner for biodiversity research
- Underwater biotechnological park
- Mesocosm research facilities
- Development, Sustainment and Management of high capacity databases (Hellenic National Oceanographic Data Centre-HNODC, <http://hnodc.hcmr.gr>, Environmental and fisheries resources)

### Mission and Activities

The "horizontal" missions of HCMR are (a) to study and conserve the health of the hydrosphere so that aquatic ecosystems can continue providing their services (i.e. provisional, regulatory, aesthetic, cultural) to future generations, (b) to promote sustainable exploitation of the oceans (including marine energy in the frame of blue growth and HORIZON 2020), (c) to support the regional development within the frame of national, sub-regional and regional development, (d) to protect and explore marine biodiversity via biotechnological applications, (e) to promote sustainable aquaculture (f) to sensitize the public at large on issues related to the hydrosphere and its conservation, (g) to provide advice to regional, national, Mediterranean and EU institutional bodies on environmental sustainability and management.

The missions of HCMR are accomplished through (a) field, laboratory and experimental multidisciplinary, basic and applied research in different scientific fields related to the physics, chemistry, geology, biology, genetics, genomics and fisheries of aquatic ecosystems, in the hydrosphere-atmosphere interface, the coastal zone, the water column and sea bottom; (b) undertaking specific pilot studies and designing management plans on specific issues based in societal needs; (c) exploitation of products deriving from living and non-living resources and the supplying of various maritime and marine services; and (f) providing services to the public and private sectors. Knowledge deriving from all actions is disseminated through a variety of organized events. Finally HCMR maintains public aquaria giving the opportunity to more than 400.000 visitors/year to be acquainted with issues related to the marine ecosystems and their protection, conservation and sustainable management through specially designed events and actions.

The main objectives of HCMR are to conduct multidisciplinary applied and basic research in the following areas:

- Integrated Marine Observing and Forecasting Systems in the Greek seas
- Structure and functioning of inland, coastal and marine ecosystems, including ecosystem modeling and modern DNA-based approaches
- The role of climatic change in the evolution of aquatic ecosystems (marine and freshwater)
- Identification of natural and human-induced pressures and hazards on the marine environment and their impacts in the ecosystem functioning (e.g. oil spills, pollution, tsunamis, floods, aquatic invasions, HABs, sediment failures)
- Life history of fish, fisheries dynamics, ecology, modeling, management
- Identification of essential fish habitat and the effects of climatic changes



- Monitoring of invasion species all over the Mediterranean Sea
- Aquaculture
- Application of “-omics” approaches and Biotechnology
- Integrated river basin and coastal zone management
- Aquatic biodiversity at all levels of biological organization

## Main Milestones - Achievements During the Late 5 Years

- Coordination of EU large-scale Integrated Projects: METROMED, INTERPPOL, MTP II-MATER, SEAHEL-LARC, SESAME-IP, PERSEUS, DIVERSIFY.
- Major role in European Networks of Excellence (MARBEF, Marine Genomics, Euroceans, Esonet)
  - European Platform of Fisheries
  - Large network projects ERANET, Marifish, COFASP.
  - Database for monitoring of invasion species all over the Mediterranean Sea.
  - Mediterranean Marine Science, is indexed in WoS (Web of Science, ISI Thomson)
  - European excellence project for convergence regions (MARBIGEN)
  - Decisive contribution to the development of the aquaculture sector in Greece
  - Leading role in international organizations (IOC, GFCM, ICCAT, STECF, ESF Marine Board, CIESM)
  - Key role on the main European initiatives for Operational Oceanography (EUROGOOS, MONGOOS, MyOcean)
  - Establishment of MoU with world-leading Research Centres and Institutes (i.e. IFREMER France, Woods Hole, USA, NIO, India, SO, UK)
  - Regional unit for the dissemination of operational Oceanography Data for the Mediterranean
  - Host of the Hellenic National Oceanography Data Center (HNODC), member of European SEADATANET
  - Search and Rescue Operations in the Greek Seas with 100% success rate (5 out of 5)
  - Major participation in EU FP 6 & 7 projects (more than 50)
  - Leading role in the novel introduction of genomics approaches (aquaculture and marine environmental research)
  - Participation of HCMR in major networks and in particular the European infrastructure network ESFRI. EMSO-HELLENIC and GREEK-ARGO have entered their final phase and will be part of the EMSO-ERIC EU-ROARGO-ERIC (European Research Infrastructure Consortia). LIFEWATCH RI is in the construction phase, and HCMR coordinates its national node, HelBioNet. HCMR participates also in ESFRI “EMBRC” (preparation phase just completed), and in the I3 projects “AquaExcel”, FixO3.
  - Major partner in the creation of the European Aquaculture Technology and Innovation Platform (EATIP) and the corresponding Hellenic research platform (HATIP).
  - Active participation in a variety of international organizations, committees and associations (e.g. IOC/UNESCO, CIESM, EMAPS/ESF, EAZA, EUAC, EURO-GOOS, ICCAT, GFCM, STECF, WoRMS), networks (e.g. COST, ERANET, MedCLIVAR), Scientific Committees in international programs and in National Committees and Councils



- (e.g. National Reference Centre for the EEA, Sub Sea Research IGSP, the Academy of Athens, ESF, etc.).
- Signatory in framework agreements in the form of MoUs, with almost all the Black Sea countries, FAO, NIO (India), US universities and research centres (MIT, Texas, Rhode Island, Woods Hole Oceanographic Institution), as well as with other universities including those in third countries like Iran, and Saudi Arabia.
  - Publisher of the Mediterranean Marine Science (MMS) (published semi-annually) with Impact Factor (IF) expecting to climb up to 1.8 in 2013 (1.57 in 2012)

## Strategic Priorities 2014 - 2020

- Building a new ocean research vessel
- New aquarium in Attica region
  - Promoting innovation-Linking Marine Research to Industry
  - Consolidate Outreach Strategy

## Research Priorities

- Generation of new knowledge and promoting excellence in marine, aquaculture and inland water research in order to assist to societal needs and demands
- Contribution to the formulation and implementation of National policy for marine research innovation and technology
- Support National and EU policies: climate - aquatic environment - fisheries and aquaculture - security
- Contribution to sustainable economic development based on exploitation of marine resources and services while protecting the environment (blue growth)
- Build capacity for cutting-edge research with development of an appropriate large National Research Infrastructures
- Contribution to a unified research-education area
- Participation in the HORIZON 2020 programme, through several actions
- Establishment of “deep networking” with relevant national, European and international higher education and research institutions for a benchmark on best practices; Build new partnership for Programs and Projects by mixing teams and equipments.
- Focus in research areas with strong socio-economic impacts and special relevance to the country's/region's developmental priorities
- Utilization of the state-of-the-art technologies and modern methodologies to serve optimally national research and development.
- Support the leading role of Greece in the Mediterranean, Red and Black Sea for marine research and increase collaborative actions in these areas between institutions.
- Enhancement of the participation in the network of large European Research Infrastructures (ESFRI) and the relevant ERIC
- Implementation of the Maritime Strategy through European environmental policies (Water Framework Directive, Marine Strategy Framework Directive, Common Fisheries Policy, Habitats Directive, EUSAIR etc.)
- Better understanding towards developing early warning systems of natural and anthropogenic hazards.
- Discovery of marine unconventional bio-georesources (gas hydrates, bioactive compounds from extreme environments, etc), and renewable energy contributing to blue growth.
- Implementation of a fully Integrated Ocean Observing System of Systems in the Mediterranean, including the Poseidon system, the cabled sea-bed observatories, the autonomous observing vehicles (gliders) and the Argo floats
- Contribution to the regular monitoring of the Mediterranean Sea through the GoShip Campaigns
- Enhancement of Marine Technology, Biotechnology and innovation
- Focus on the Mediterranean Sea and the adjacent Seas (Black Sea, Red Sea, Atlantic Ocean)
- Extension of the research activities to Atlantic Ocean and Polar Seas

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## NATIONAL OBSERVATORY OF ATHENS (NOA)

### Historical Frame

Historically, the National Observatory of Athens (NOA) is the first Hellenic Research Centre (1842). NOA's course is inextricably linked with the progress of research and is connected to the services to the society of modern Greece. It was deliberately erected opposite to the Pnyx hill where Meton (Μέτων), the ancient Athenian astronomer had set up many during the 5th century B.C. the first observatory in the Greek history, the "Heliotropion". Furthermore, the Centre's 170th historical course is signaled by enlightened leaders and renowned scientists who paved the way to knowledge, such as, D. Eginitis, I. Smit, S. Plakidis, D. Kotsakis, A. Galanopoulos, I. Drakopoulos, national benefactors, such as, Sinas, Siggros, Doridis, Korgialenios, etc and also renown architects like Theofil Hansen and Ernst Ziller.

NOA was founded under a Royal Decree and has been a public institution since 1846, the year it started operating at the Hill of the Nymphs in the Thission area, just across Acropolis. NOA's later organization as a research center is under the Legislative Decree 1975/1942. With the Presidential Decree 62/1986 "Organization of NOA", NOA is a national organization operating under public law rules and procedures and is constituted of five Institutes: Institute of Astronomy and Astrophysics, Institute of Environmental Research and Sustainable Development, Institute of Geodynamics, Institute of Space Applications and Remote Sensing and Institute of Astroparticle Physics "Nestor". With the law 4051/29-02-2012, Article 5, "Merging of Institutes and Research Centers" NOA constitutes of three Institutes: Institute for Astronomy, Astrophysics, Space Applications and Remote Sensing (IAASARS), Institute of Environmental Research and Sustainable Development (IERSD) and Institute of Geodynamics (IG). These three Institutes are staffed with highly-qualified scientists and personnel who contribute to basic and applied research in various scientific fields, while at the same time they offer a wide spectrum of social services of national interest.

### Organization

The main organization and management of NOA include the Directorate of Administration and Financial Issues, the Research Support Directorate and the Special Research Account Department (SRAD) together with the three Institutes. The above administrative departments support the Institute's operations. The overall supervision of the Centre including the organization and management is under the President of the Governing Board.

The Department of Management with its special offices (Finance, Human Resources, Secretary) and qualified staff, plays an important role and supports all of the Center's activities (research, financial, other services). NOA's Special Research Account Department (SRAD) is constituted under the Governmental Decision 5439/85 "Special Research Accounts in the Ministry of Research and Technology" (Governmental Gazette: ΦΕΚ 298/τ.Β/16-5-1985).

Moreover, SRAD is equipped with a modern computational system for the financial management of the projects, the planning of accounts and project monitoring. It is presently managing around 170 multi-million research programs funded by the EC, the Greek State and international organizations.



### Institutes of NOA:

#### Institute for Astronomy, Astrophysics, Space Applications and Remote Sensing (IAASARS)

The Institute for Astronomy, Astrophysics, Space Applications and Remote Sensing (IAASARS) was created in February 2012, by the merging of two independent institutes of the National Observatory of Athens (NOA): The Institute of Astronomy and Astrophysics (IAA) and the Institute for Space Applications and Remote Sensing (ISARS). Its past provides IAASARS with an extensive experience in both applied and basic research in space physics and astrophysics, as well as earth observation. The permanent staff of the institute consists of 24 researchers, 7 research support specialists, a secretary and 5 technicians. In addition, 24 postdoctoral researchers are currently on term contracts, making IAASARS the largest institute in its field in Greece. The scientists of the Institute have been successful in attracting millions of Eur in national and European competitive research grants. In the process the personnel have developed expertise in sophisticated signal processing and data analysis techniques applying them to datasets produced by space-born and ground based facilities. This has enabled them to play a leading role in major international scientific collaborations in fields such as X-ray and Infrared astrophysics, solar physics, space weather and ionospheric physics. It should be stressed that the earth observation and remote sensing group of IAASARS is the most active in Greece and has a long record of delivering novel methodology and high data products to the community.

The Institute supports and operates a number of research facilities including ionospheric and remote sensing stations as well as a mobile Lidar and a network of magnetometers. The 2.3m Aristarchos telescope, the largest in Greece, is the major infrastructure of IAASARS. Last but not least, the Institute has a solid record of nearly 20 years of a public outreach program.

#### Institute for Environmental Research and Sustainable Development (IERSD)

The Institute for Environmental Research and Sustainable Development (IERSD) contributes to the climate and meteorology science since 1858. It holds the longest, most complete and reliable climatological records in Greece that are published annually in the CLIMATOLOGICAL BULLETIN. The IERSD scientific objectives include Meteorology, Climatology, Physicochemical properties of the Atmospheric Environment,



Solar & Wind Power, Climate Change, Energy conservation in buildings, Energy modeling and planning, Water Resources Management, Hydrology, Air and Water Quality and in general the Impacts of Development on the environment. Over the years the IERSD has extended its activities to accommodate current scientific challenges and in this way it has the ability to tackle most environmental subjects (excluding the sea environment) because of the experienced personnel and modern infrastructure. It has evolved to a hub for environmental management and research and aims at interconnecting with national and foreign research centres for the promotion of competitiveness and added value knowledge and services towards the economy, the society and the environment. The Institute offers continuously consultancy services to the state, the private sector and the general public, while emphasizing on the collection and analysis of data and the participation in scientific projects.

In order to achieve the goals mentioned above, the IERSD has oriented its research activities in the thematic areas of Environmental Monitoring and Atmospheric Environment, Meteorology, Hydrology and Natural Disasters, Climate and Climate Change, Energy and Buildings.

## Geodynamic Institute (GI)

NOA-IG since its foundation in 1890 studies seismology, physics of the earth's interior, geophysics, plate tectonics, volcanology and geothermal research, neotectonics, and seismotectonics. The main tasks of IG are collection and processing of various seismological - geophysical parameters, the elaboration of research projects and relevant studies, the training and services provided to third bodies. The Institute presents high scientific capabilities and in-house expertise in multidisciplinary space and geophysical sciences spanning from seismology, geophysics to Earth Observation techniques and applications. IG research staff members have long experience in the analysis and interpretation of measurements and ground-based instruments, and in the theoretical development and elaboration of tools and techniques. It operates a 45 stations Seismographic Network and a 156 stations Accelerographic Network, covering the whole territory of Greece. It coordinates the new Hellenic Unified Seismic Network (HUSN) that joins all national permanent seismic networks with a total of 143 real time stations. IG also operates a portable seismic network of 20 stations and a real time GPS network of 20 permanent stations. It is responsible for issuing alerts for the Greek State, to the Civil Protection. Since 2010, the Institute of Geodynamics has been assigned to be operationally responsible for the tsunami waves monitoring and warning.

## Other Activities

NOA apart from its research activities also hosts two significant international activities. A) The UNESCO Chair on Natural Hazards in collaboration with the General Secretariat for Research and Technology, the training center of the National Center for Public Administration and Local Government and other Higher Education Research Centers, B) The Greek GEO Office which was established in 2007 with the support of the General Secretariat of Research and Technology, through which NOA participates in the Group on Earth Observations (GEO) organization.

The Center has been offering educational courses for the general public and especially schools for more than 20 years. The purpose of these courses is to simplify astronomy and natural sciences in general. For the last seventeen years the "Summer School" for top secondary school students in the greater Athens area has been taking place in early September under the subject "Universe and the latest Discoveries". The aim of the program is to familiarize students with Astrophysics, Space and Environmental subjects and also bridge the gap between these sciences, Technology and Culture. To this year more than 1000 students have attended NOA's summer school.

The Penteli Visitor Center is located in the impressive building of the Newall refractor at the Penteli Astronomical Station. More than 200.000 visitors from all over Greece and abroad have visited the Center since it commenced its operations. Also, more than 6000 students have attended the training program. The purpose of the Center is science education and public outreach, aiming in particular at middle and high school students, and informing the public on major breakthroughs in astronomy. This is accomplished through special seminars, talks and observations with the 62.5 Newall refractor in Penteli. The Center also produces educational movies on various astronomy related topics which are presented to the visitors during the tours.

The Visitor Center of Thission operates alongside the Penteli Visitors Center and includes the Geoastronomy Museum, the Meridian Telescope and the Dorides Telescope at the Hill of Pnyx. The Geoastronomy Museum is housed within the historic building of the Observatory, also known as the Sina Building. Thousands of local and overseas students, up to now, have visited these premises and taken the opportunity

to observe closely scientific instruments through which natural sciences (geodynamics, astrophysics and astronomy) have developed the last two centuries in Greece. Also, they are given the opportunity to understand the evolution of science, technology and environmental observation methods which have been used the last 170 years by NOA's researchers. In the Museum Guestbook distinguished people from all over the world have already expressed their gratitude and admiration. The Geoastronomy Museum inaugurated on 09.04.2008 by the President of the Hellenic Republic and its renovation received the distinction of Europa Nostra - European Union Prize for Cultural Heritage in 2010.

The Visitor Center of Kryonerion is housed at the Kryonerion Observatory (Corinth area) and has been utilized as a means of education and astronomy outreach to the general public for many decades. So far, more than forty (40) students from the Universities of Athens, Thessaloniki and Patras have been trained in photometry observations and thousands of guests.

## Special Activities

- Global atmospheric database LIVAS developed by IAASARS (4-dimensional aerosol/cloud climatology of 1x1 degree using CALIPSO satellite data, ground-based lidar measurements from the European Aerosol Network EARLINET and the global sunphotometric network AERONET) (<http://lidar.space.noa.gr:8080/livas/>)
- Development and application of advanced algorithms for atmospheric aerosol load mapping using satellite observations with high spatial resolution
- Development of advanced Signal Processing techniques for application on High Spectral Resolution sensor images
- Upgrade of DIAS real-time ionospheric prediction services and alerts for the effects of extreme space weather events in the European region to individual users, companies and public organizations worldwide (<http://dias.space.noa.gr>)
- Development and operation of the Solar Energetic Particle Flux (SEPF) tool for real-time monitoring of the near-Earth radiation environment ([http://proteus.space.noa.gr/sepf\\_tool/](http://proteus.space.noa.gr/sepf_tool/))
- Development of advanced signal processing techniques for application on satellite observations
- Coordination of large-scale European competitive projects
- Development of the radiation code Meteorological Radiation Model for solar energy applications
- Development, organization and operation of the site [www.meteo.gr](http://www.meteo.gr)
- Organization and operation of the automatic weather stations network of NOA (255 stations)
- Organization and operation of the European network of lightning detection ZEUS
- Development of the official national tool (TEE - KENAK) for calculating the energy performance certificates and energy efficiency of Greek buildings, in cooperation with the Technical Chamber of Greece (TEE).
- Development of an online computational tool - eKIA ([www.energycon.org](http://www.energycon.org)), allowing citizens to assess the energy efficiency of their home, in the current situation and the potential for improvement
- Development and operation of information services for the prediction of the solar ultraviolet radiation in Greece
- Installation and measurements performance of an innovative sun photometric system (MaxDOAS) for the three-dimensional monitoring of pollution in Athens
- Development of a modern technique for Non-Destructive Testing of earthen dams
- Earthquake protection of important monuments of the cultural heritage (Acropolis of Athens)
- Development of an automated early warning system for tsunamis.
- Implementation of contemporary space geodesy in the real-time deformation earth's surface monitoring.
- Settlements' monitoring by implementation of modern space techniques and methodologies.

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## NATIONAL HELLENIC RESEARCH FOUNDATION (NHRF)

### Historical Frame

The National Hellenic Research Foundation was founded in 1958 originally under the name "Royal Research Foundation". It is a non-profit Research Foundation supervised by the General Secretariat for Research and Technology (GSRT) of the Ministry of Education and Religious Affairs in Greece.

Funding of NHRF is provided by GSRT and by grants raised through competitive research programs of the National Strategic Reference Framework, of the European Commission and other International Organizations, as well as through grants and revenue from contracts and specialized services provided to the private sector in the county and abroad. It is worth mentioning that during 2013, public funding was less than 45% of the annual turnover.

For over 55 years, NHRF has been a very important contributor to the modernization and development of the Greek scientific research sector. In the beginning of its existence, NHRF operated as a funding organization by administering research grants and scholarships for the enhancement of Greece's scientific development. Soon enough, though, it acquired its own research units which functioned as structures for the modernization of Greek science. Moreover, by adding three Institutes of Natural Sciences in the area of Biology, Physical Chemistry and Organic Chemistry, as well as one Humanities Institute in the area of Antiquity, NHRF became an original and innovative Research Center that encouraged the constant update of scientific methods and topics as well as outreach and connection to society. In addition, the establishment of the National Documentation Centre (EKT) as a national electronic infrastructure within NHRF, offering services on top of the content it aggregates, aims to cover the scientific information needs of the country and promote the Greek research outputs abroad.

Today, the National Hellenic Research Foundation consists of the following Institutes and Units as these are represented in the following diagram:

### Presentation of the Institutes and Units: Activities and Achievements

#### Institute of Historical Research

The Institute of Historical Research (IHR) emerged in 2012 following the consolidation of the Institute of Greek & Roman Antiquity, the Institute of Byzantine Research and the Institute of Neohellenic Research. The IHR conducts research on the political, economic, social and cultural history of the Greek areas and the regions where Hellenism has been active, from prehistoric antiquity to the modern era. IHR's research programs and projects aim at documenting and studying the ancient, medieval and modern history of the Hellenic areas, and at the cooperation of all three sections, in an effort to produce synthetic approaches that transect time.

The objectives of the Institute's Programs and Projects are:

- the study of ancient history and civilization in the areas of the Balkans, the Near East and the wider Mediterranean domain, with the aim advancing ancient studies by means of systematic collection, processing and digital recording of literary, epigraphic sources, numismatic and other archaeological evidence, as well as studies of ancient ideology, art, technology and measurement, economy and society;
- the study of the history and culture of Byzantium and its relations with medieval Europe, the Balkans and the wider area of the eastern Mediterranean through evidence from philological and archival sources, objects of art and archaeological findings;
- the study of the history of modern Hellenism from the 15th to the 20th century, based on the critical approach of primary sources. Emphasis is given on the study of culture, institutions and ideology, literature, art and sciences (positive sciences and humanities), Ottoman studies, the history of populations, historical geography, economic history, business history and modern political history.

The renewal and revival of the infrastructure of historical studies in Greece is pursued by means of:

- systematic collection and editing in computerized databases of source material including literary texts, inscriptions and coins (including squeezes and casts made of them), archival sources, photographs, plans, maps, aerial photographs and topographical diagrams;

- publication of source material (corpora, texts, summaries of documents, catalogs of archives)
- participation in national and international scientific events (conferences, congresses, symposia etc.)
- training of young scholars (awards of scholarships and supervision of theses and postdoctoral projects)
- development of collaborative research programs with Greek and foreign scholars, foundations and organizations, through scientific exchanges and organization of conferences etc.

The award of Excellence received in 2005 by the former Institutes -now Sections- of the Institute of Historical Research and the financial support entailed therein enabled them to strengthen and further develop their research activities, electronic processing and dissemination of accumulated knowledge (18 Open Access Databases), their publishing programs (135 volumes /2005-2014), and their technological infrastructure.

During 2005-2014, IHR strengthened its domestic and international academic profile. It's worth mentioning that three of IHR academic journals evolved into international electronic open access journals with referees, thus leading to an increase in their acknowledgment at an international level, a high increase in their readability and in the submission of articles by researchers and academics from around the world. A number of projects by IHR researchers have been awarded funding (ca. 6.000.000 euros) within the context of competitive national and international research funding programs (e.g. Society of information, Thalis, GSRT Excellence Projects 2011 and 2012, GSRT Postdoctoral Projects 2011, GSRT Excellence Grant [Evaluation 2005] and others). There has also been closer collaboration of IHR researchers with universities in Greece and abroad through the supervision of doctoral dissertations and the joint organization of graduate seminars. Recently IHR ranked first in Greece among all Social and Humanities Research Institutes supervised by the GSRT, as a result of the February 2014 evaluation by an international committee appointed by the Greek state. The committee highlighted the scientific excellence and international visibility, attained through the appreciation of the quality of the IHR's researchers work (publications, conferences, etc) at an international level, and reflected by the development of international networks as well as the prizes and awards collected by the teams.

#### Institute of Biology, Medicinal Chemistry and Biotechnology

The Institute of Biology, Medicinal Chemistry and Biotechnology (IBMCB) established in 2012 as a result of the consolidation of the Institute of Biological Research and Biotechnology and the Institute of Organic and Pharmaceutical Chemistry of NHR. The IBMCB engages in the development of a modern research approach in the field of Chemical Biology, from design and synthesis of bioactive molecules to animal and clinical studies, to solve cutting-edge issues in the areas of Health, Drug Discovery and Biotechnology

The research activities and objectives of the Institute include:

- i) Development of new bioactive compounds and associated companion diagnostics for the prevention and treatment of degenerative conditions with emphasis on cancer, aging and neurodegeneration and other diseases with significant socioeconomic interest
- ii) Application of modern holistic approaches of chemical and biological analysis in health-disease biomarkers
- iii) Development of environmentally-friendly approaches in the production of high-added-value compounds with application in the food industry, cosmetics, fuels, chemicals

The unique IBMCB potential was highlighted by the international evaluation committee (IEC) in January 2014 (under the supervision of GSRT). In Greece, no other Institute currently employs an integrated multidisciplinary approach to disease prevention and treatment, combining cutting edge biological research (biological target identification, biological evaluation of bioactive agents) with medicinal chemistry and molecular analysis (rational design and synthesis of bioactive compounds – potential drugs to combat major diseases and targeted delivery formulations).

The two former Institutes which merged to create IBMCB have been designated as Centers of Excellence under peer evaluations of GSRT after evaluation by international evaluation committees in 2005: i) the former IOPC for the project "Design and synthesis of bioactive and functional compounds" and ii) the former IBRB was ranked second nationwide and first among the bioresearch institutes of Attica. In the RAND Europe report entitled "Summary Report of the Greek Research and Development System", in September 2011



made at the invitation of the GSRT, the sector of Medicinal Chemistry activity of IOPC was characterized as a strong research area with a need to be maintained and further developed. (Index RC: 1,53). Indicatively, in 2005-2012 IBMCB researchers have achieved very good status in all metrics of research performance compared to the previous period, as highlighted by the international evaluation committee (Jan 2014) : 50% Publication increase per year in refereed journals: [http://www.eie.gr/nhrf/institutes/ibmcb/publications/PublicationList\\_IBMcb.pdf](http://www.eie.gr/nhrf/institutes/ibmcb/publications/PublicationList_IBMcb.pdf); almost 3-fold increase in Citation Number: 3MEuros Inputs from external Funding sources, the majority from competitive EU grants.

During 2005-2012 IBMCB researchers participated in 130-European (63) and national (67)- project networks, 20% in which acted as co-ordinator; IBMCB also acted, in the context of 10 Marie-Curie Training Programme projects as a pan-European training centre for pre- and post-doctoral researchers. IBMCB seek for research exploitation: they hold 16 patents, interact with many companies in the health, drug and food sector, and with several hospital clinics and departments.

As highlighted by the IEC, IBMCB has a unique in Greece combination of expertise and infrastructure based on the inter-disciplinarity and synergy between chemistry and biology. The main goal of IBMCB is to engage in the discovery, design and evaluation of bioactive small molecules and use them as lead agents toward the development of drugs and their companion diagnostics. Impressive facilities (also Jan 2014 IEC comment) obtained through competitive EU grants during the last decade include: State-of-the-art NMR, X-ray facilities, a robotic unit for protein crystallisation and two mass-spectrometers. The above mentioned IBMCB assets, as well as its central location, will form the basis for further future development of IBMCB in research and innovation excellence.

## Theoretical and Physical Chemistry Institute

The Theoretical and Physical Chemistry Institute (TPCI) is one of the three research institutes of NHRF. It was established in 1979 from the merging of the Institutes of Physical Chemistry (est.1968) and Theoretical Chemistry (est.1976). Central to the scientific activities of the TPCI is the understanding of structure and properties of matter and light-matter interactions that would facilitate the exploitation of materials with advanced functionality in energy conversion and storage, optical and electrochemical sensing, electro-optics and photonics applications. To this aim, TPCI has pursued research and acquired strong expertise in both experimental and theoretical investigations of matter along the following three fields:

1. Theoretical and Computational Chemistry and Physics; aiming at understanding the nature of materials from a fundamental point of view with the intent of predicting their structure and properties, which can then be tested and exploited in applications by experimentalists.
2. Materials Synthesis and Physical Chemistry; engaged in the synthesis of new materials with advanced functionality and the physico-chemical understanding of relevant phenomena using spectroscopic techniques.
3. Photonics for Nano-applications; with interests in the fundamental aspects of how light interacts with matter and then applying this understanding to nano-structuring of materials for device applications.

The Institute operates also two service laboratories, Applied Spectroscopy Lab and Photonics for Nano-applications Lab, which translate its expertise in spectroscopy and photonics to the benefit of Greek industry. Some of the early milestone achievements of the Institute include the installation of the first laser-Raman facility in the country (1969), the first computing facility in Greece for the theoretical investigation of excited states in atoms and molecules (1981), and the design and construction of the first pulsed-discharge 157 nm laser in the world (1985).

The TPCI has made an internationally recognized scientific output as attested by more than 1360 publications in highly rated peer-reviewed scientific journals. A collection of publications in international journals as well as the outcome of other TPCI activities is available at <http://www.eie.gr/nhrf/institutes/tpci/papers-en.html>. Following the 2000 and 2005 evaluations by international committees appointed by the General Secretariat for Research and Technology (GSRT) of the Greek Ministry of Education, the TPCI was awarded twice the national Excellence in Science grant "Aristeia". In a broader European context, the TPCI was selected to host one of the twenty five very competitive European Young Investigators (EURYI) Awards 2004 for the development of innovative materials with advanced functionality by chemical manipulation of carbon nanotubes. These awards constituted an initiative of the European Union Research Organizations Heads of Research Councils and the European Science Foundation.

Recently TPCI ranked third in Greece among all Research Institutes supervised by the GSRT (31 in total), as a result of the February 2014 evaluation by an international committee appointed by the Greek state. The committee highlighted outstanding scientific achievements of TPCI at the forefront of physical chemistry and materials science relevant to nano-medicine, environmental monitoring and diagnostics, based on its excellent knowledge and experience in theoretical and experimental materials science and its unique vacuum ultraviolet (VUV) laser-matter interactions and VUV and vibrational spectroscopy facilities.

## National Documentation Centre

The National Documentation Centre (EKT) founded in 1980 as a Documentation Unit within NHRF initially, developed to a National infrastructure in 1986. EKT is the National infrastructure for the collection, aggregation, documentation and dissemination of the scientific information produced in Greece. EKT provides advanced services to the country's research, education and business communities and the wider public. Through its electronic infrastructure and services on top of the content it aggregates, EKT aims to cover the scientific information needs of the country and promote the Greek research outputs abroad.

EKT ([www.ekt.gr](http://www.ekt.gr)) provides integrated, data-centric, one-stop-shop services that encourage open access and re-use of high quality scientific, research and cultural e-content for a global audience of diverse user communities, such as researchers, businesses and citizens. EKT's nation-wide e-Infrastructure services range from long term preservation and documentation of e-content, data-stores, repositories and e-publishing to e-learning, knowledge-bases, e-helpdesk, e-training and legal support services. It fosters excellence in the academic and research communities, ensures open access and the preservation of the national scientific output and allows the development of evidence-based policies by the public sector, while promoting and supporting innovation in the private and business sector.

EKT acts as a strategic partner to enable excellent research at a European and international level, participating in numerous FP7-funded projects and being the NCP for several FP7 and Horizon 2020 programs. It focuses on expanding collaborations with organizations, initiatives and projects that promote the development of the European Research Area according to the current policies of the European Commission, and especially the Digital Agenda for Europe and Innovation Union flagship initiatives. As the national aggregator of scientific and cultural content, through its e-infrastructure EKT implements with particular care the EC's policies (Communications and Recommendations) on Access to, Dissemination of and Preservation of Scientific Information, as well as facilitates the development of the relevant policies and compliance with FP7 and Horizon 2020 rules. EKT's scope of activities is organized along 3 main axes, providing unique added-value services: a) e Content, b) Metrics & Evidence-based Policies and c) Knowledge Transfer & Exploitation.

A) eContent: EKT aggregates and collects content from various highly qualified scientific and cultural sources and provides access to it in various ways:

- by operating the main nation-wide harvester of high quality content, [www.openarchives.gr](http://www.openarchives.gr)
- through a series of repositories for scientific and cultural content of significance, developed in compliance with international interoperability standards, including the institutional repository of the NHRF "Helios" [e.g. [helios-eie.ekt.gr](http://helios-eie.ekt.gr), [www.didaktorika.gr](http://www.didaktorika.gr), [pandektis.ekt.gr](http://pandektis.ekt.gr), [www.parthenonfrieze.gr](http://www.parthenonfrieze.gr), [repository.acropolis-education.gr](http://repository.acropolis-education.gr), [www.ergani-repository.gr](http://www.ergani-repository.gr)].
- Through the Science & Technology Digital Library, that provides access to subscription content, Library Information Services, the ABEKT Library Automation Software, the Union Catalogue of Serials of Greek Journals of the National Network of Scientific and Technological Libraries.
- Through its ePublishing, a unique service in the country that offers open access to 3.000 articles in peer-reviewed academic eJournals, as well as books and proceedings at [epublishing.ekt.gr](http://epublishing.ekt.gr).

B) Metrics & Evidence-based Policies: EKT provides reliable Research & Development metrics and comprehensive studies on bibliometric indicators for Greek scientific publications, official national statistical data on R&D and innovation, as well as reviews of the participation in EU projects. They offer a solid background for the identification of the Greek research competencies and smart specialization strategies and serve researchers and policy makers.

C) Knowledge Transfer & Exploitation: EKT supports entrepreneurship by coordinating the Enterprise Europe Network-Hellas ([www.enterprise-hellas.gr](http://www.enterprise-hellas.gr)), the largest network of integrated business support in Greece. It provides international business cooperation services, information on European policies, innovation and technology transfer services, as well as services for encouraging SMEs' participation to the European programs for Research and Technology. EKT is also the National Contact Point for programmes of Horizon 2020.

Since 2005 EKT has developed 14 digital repositories, showcasing more than 47,000 records, while the National Archive of PhD Theses provides digital access to more than 30,000 theses. In 2013, EKT published the study named "Research and Development Expenditure and Personnel in Greece in 2011", contributing to the Eurostat/OECD official statistics. The last 15 years, EKT has carried out more than 70 national, international and European projects of 50 million Euros total budget.

### NATIONAL HELLENIC RESEARCH FOUNDATION (NHRF)

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## FOUNDATION FOR RESEARCH AND TECHNOLOGY - HELLAS (FORTH)

Historical Frame, Year Founded: 1983

### Organizational Structure:

The Foundation for Research and Technology - Hellas (FORTH), is one of the largest research centers in Greece with well organized facilities, highly qualified personnel and a reputation as a top-level research foundation worldwide. FORTH reports to the General Secretariat for Research and Technology of the Ministry of Education and Religious Affairs. The Foundation, with headquarters in Heraklion, includes six Research Institutes in different parts of the country:

In Heraklion

- Institute of Electronic Structure and Laser (IESL)
- Institute of Molecular Biology and Biotechnology (IMBB)
- Institute of Computer Science (ICS)
- Institute of Applied and Computational Mathematics (IACM)

In Rethymnon

- Institute for Mediterranean Studies (IMS)

In Patras

- Institute of Chemical Engineering Sciences (ICE-HT)

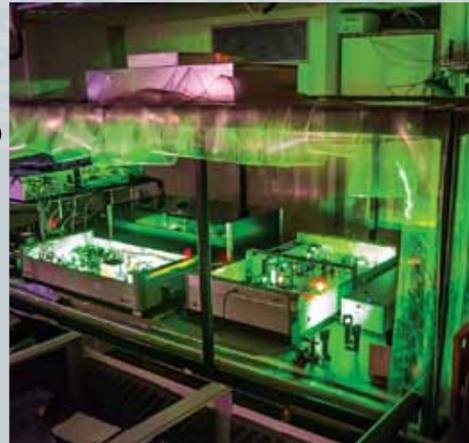
In Ioannina

- Division of Biomedical Research of the Institute of Molecular Biology and Biotechnology (IMBB)

FORTH's activities are complemented by Crete University Press (CUP), the Skinakas Observatory, the Science and Technology Park of Crete (STEP-C) and PRAXI Network.

The research and technological directions of FORTH focus on areas of major scientific, social, and economic interest, such as: Microelectronics, Lasers, Materials, Molecular Biology and Genetics, Biotechnology, Computer Sciences, Bioinformatics, Robotics, Telecommunications, Computational Mathematics, Chemical Engineering, Human and Social Sciences, Cultural Studies.

Staff: 214 research staff, 519 research fellows, 516 administrative, technical and support staff. Total personnel: 1,249



### Strategic Priorities:

- Increase of international competitiveness and extroversion of the Foundation
- Expansion of its activities in new, emerging, state-of-the-art scientific research areas with high added-value at the scientific and economic level
- Development of an International Center for Graduate Studies in synergy with Universities and Technical Education Institutes
- Research results exploitation and innovation

Vision: FORTH encompasses a collective vision for fostering an environment that promotes Learning, Research and Innovation as pillars for the regional, national and European socio-economic growth.



### Current Activities:

#### I. Targeted Scientific Research

Institute of Electronic Structure & Laser: Research in Photonics, Micro/Nano-electronics, Advanced Materials & Nanotechnology, four of the six critical Key Enabling Technologies (KET's), and in Astrophysics

Institute of Molecular Biology & Biotechnology: Basic and applied research in established and emerging areas of Biomedical sciences and Biotechnology

Institute of Computer Science: Research and Technology Transfer in Informatics and Communications

Institute of Applied and Computational Mathematics: Mathematical modelling and computing for solving complex problems in science and technology

Institute for Mediterranean Studies: Application of sciences and informatics in the field of humanities and social sciences

Institute of Chemical Engineering Sciences: R&D projects on Nanotechnology & Advanced Materials, Energy/Environment, Biosciences/Biotechnology aimed at specific industrial needs

#### II. Training and Education

Crete University Press: 500 titles in Sciences and Humanities

Fellowships: more than 450 per year

The Onassis Foundation Science Lecture Series: supported by the Onassis Benefit Foundation, highly reputed Scientists (14 Nobel laureates since 2001) give seminar lectures to talented students.

#### III. Exploitation of scientific outcome

Science and Technology Park of Crete: supports Entrepreneurship, Innovation and Regional development

PRAXI Network in Athens: a technology transfer & innovation support mechanism founded with the aim to liaise research with industry

Spin outs: 20

### Main Achievements:

#### FORTH:

- Ranks first among the research centers in Greece, in all (comparative) evaluations conducted by international committees over the last 20 years.
- Has been classified by the European Commission: 1st among all research centers and Universities in Greece; 15th among all European research foundations; and 35th among all Research Foundations and Universities, for its participation in research projects of the 7th Framework Programme approved for funding during the period 2007-2010.
- It has unique and state-of-the-art research facilities and a high level of expertise. FORTH has been proclaimed a European Research Facility in the Lasers, Polymers and Cultural Heritage sectors by the EU.
- FORTH's researchers have received 11 ERC Grants, around 61 Marie-Curie Excellence Awards and numerous international distinctions.
- Has created "schools" in several scientific areas: young researchers who trained at FORTH excel worldwide.

#### IESL:

There are several scientific achievements by members of the Institute of Electronic Structure and Laser (IESL), which have resulted in high quality publications and have received worldwide recognition. Recent highlights include: (a) the design and fabrication of negative refractive index metamaterials at optical wavelengths; this activity has been recognized by highly prestigious International Awards like the 2005 Descartes Prize of the European Union and the 2013 James C. McGroddy Prize for New Materials of the American Physical Society; (b) the generation of intense isolated attosecond laser pulses and their attosecond temporal bunching, where IESL is in the forefront of international research; (c) The fabrication of biomimetic artificial surfaces with controllable wetting properties and responsive behavior utilizing ultrafast (fs) lasers and appropriate chemistry; (d) The experimental realization of new generation polaritonic devices.

IESL holds a leading position in the areas of the application of lasers for the preservation of Cultural Heritage. Novel laser systems and techniques, pioneered at IESL, have been used in real life applications at national and/or international campaigns. An important example is the laser cleaning of the Parthenon sculptures, now demonstrated in the new Acropolis Museum of Athens, by a novel laser system developed at IESL. The latter received the 2012 Keck Award by the International Institute for Conservation of Historic and Artistic Works.

The Institute has expanded its participation in ambitious European projects, such as the EU Programme for Research Infrastructures (RIs). IESL continues to operate as part of LASERLAB Europe (since 1990). It successfully participates in two recently approved RIs on Cultural Heritage (CHARISMA) and Soft Matter (ESMI). Moreover, it participates in the definition phase of the Extreme Light Infrastructure (ELI), a project belonging to the roadmap of the European Strategy Forum for Research Infrastructures (ESFRI).

IESL has received four Grants for the European Research Council (ERC): one Starting Grant, one Proof of Concept Grant, one Advanced Grant and one Consolidator Grant; three Marie Curie Excellence Grants; four Grants from GSRT for projects, which had received positive recommendation for funding by ERC but were not funded due to funding limitations; six ARISTEIA I and five ARISTEIA II grants from the GSRT.

### IMBB:

The Institute of Molecular Biology and Biotechnology (IMBB) is a hub of leading edge Molecular Biology Research in Greece, fostering innovation and novel biotechnology applications. IMBB has an established record of scientific excellence that is evident by both its publication and funding record. Research conducted at IMBB places emphasis in the elucidation of basic life processes and the integrated function of genes, as well as, the discovery of the mechanisms that control the development and function of an organism. The overall scientific output is best served by combining and integrating the use of model systems that facilitate biomedical research, the investigation of molecular machines whose coordinated function is the basis of cellular life and finally, the development of multidisciplinary approaches and enabling technologies important in biomedicine and biotechnology.

Recent notable scientific achievements include the elucidation of a universal and potent protective mechanism against neuronal necrosis, and a novel mechanism regulating metabolism and ageing, both published in the premier international scientific journal Nature. The novel findings reported by IMBB investigators could be effectively utilized towards identifying candidate common intervention targets, in an effort to battle the contemporary and increasingly prevalent heat stroke hazard, as well as other pathological conditions involving necrosis in humans. The conclusions of these groundbreaking studies are highly relevant to ageing research in humans and to the successful development of novel, targeted and personalized therapeutics towards battling numerous devastating, age-associated pathologies such as cancer, cardiovascular and neurodegenerative disorders.

### ICS:

Numerous of the current R&D projects in ICS have a potential for immediate commercialization of their results.

Several among them are in the area of efficient architectures and systems software for datacenters and high-performance computing (HPC), where ICS has a three-decade history of pioneering research in interconnection network architecture, high-speed communication in scalable multi-processor systems, storage systems, and runtime systems for many-core processors. ICS currently participates in numerous EU initiatives and collaborative projects with European academic organizations and industry in this area. Over the last years, ICS has developed technology in the area of datacenter storage, funded by EU research grants, and which eventually was licensed to a major international company and has found its way to commercial products. Moving forward, ICS now works towards monetization of new technologies in the area of efficient datacenters, through spin-offs and direct collaboration with business partners. One of the technologies ICS is developing has the potential to significantly improve the efficiency and cost of storage systems in datacenters, resulting in faster, lower-cost, and more reliable storage for more applications.

Since 2005, ICS has set up an interdisciplinary Research & Development Programme in the strategically selected area of Ambient Intelligence (Aml), with the participation of all of the Institute's Laboratories. The Programme constitutes a platform for cooperative research towards developing and studying Aml-related technologies and assessing their impact upon the individual and upon the society as a whole, but also as a unique showcase for demonstrating the potential, added-value and benefits of Aml technologies in different aspects of everyday life and activities. At the same time, the Aml Programme provides an excellent ground for identifying new, real world problems. Thus, besides the obvious benefits resulting from the interdisciplinary synergies, the Aml Programme contributes to advancing the state-of-the-art in the individual scientific fields and technologies. The R&D Projects conducted in the context of the Aml Programme have led up to now to the creation of twenty-eight products, in the domains of arts and culture, commerce and marketing, learning and education, as well as leisure and entertainment.

### IACM:

IACM enhanced its status as an internationally recognized research and training center in applied mathematics with special emphasis in mathematical and computational modelling in interdisciplinary research with applications in underwater acoustics, wave imaging in complex media, material science across scales, simulation of industrial, physiological and environmental flows, coastal hydrodynamics, spatial statistics, satellite imaging, and computational neuroscience.

### IMS:

The Institute for Mediterranean Studies has been founded in 1986 with the aim to conduct research into the history and civilization of the Mediterranean societies. A particular focus is placed on the cultural exchanges between the various Mediterranean peoples. The research carried out in the IMS combines the classical methods of historical investigation with the modern techniques of natural sciences and informatics.

The Laboratory of Geophysical – Satellite Remote Sensing & Archaeo-environment is unique in its kind in the Mediterranean area and it is involved in a great number of international research projects, both in Greece and abroad, in cooperation with major research entities as the European Space Agency and the Field Museum of Chicago.

The Ottoman Studies of the IMS research group has been recognized by the international scientific community as a leading international center in its field and it has been trusted with the organization of the last congress of the CIEPO (International Committee for Pre-ottoman and Ottoman Studies) in 2012.

Actually the IMS participates to the major international events celebrating the 400th anniversary of El Greco's death.

The IMS promotes interdisciplinary projects among its various research groups as well as with the other institutes of FORTH. Today the Institute is engaged in a path breaking research project into the history of technology and innovation in Greece and in wider the Mediterranean area.

### ICEHT:

Novel methods for the study and production of nanostructured materials, like membranes, graphene and graphene-based materials, were established. In the energy sector, in particular, catalytic systems were advanced and polymeric membranes for high temperature Fuel Cells were synthesized. Two spin-off companies, namely, ADVENT and Nanothinx, were founded with the contribution of ICE-HT researchers to further advance and exploit achievements in energy technologies and carbon nanotubes, respectively. Functional advanced materials with well documented applicability in several technological areas such as, lithium batteries, LEDs and OPVs, packaging, water treatment etc were designed and produced. Multi-scale simulators for the design and study of nanostructured materials were developed.

The Institute developed strong initiatives in the environmental sector. It coordinated the first Pan-European air quality/climate change measurement campaigns in 2012 and 2013 using a Zeppelin NT, as well as the development of a coupled global to local climate and air quality modeling system. The transfer of know-how from hydrocarbon recovery to soil and groundwater contamination was supported by a new environmental laboratory and sophisticated numerical models. The successful filtration of agro-industrial wastewaters and extraction of high added value compounds was demonstrated. Finally, a national node in metabolomics and systems biology was established. A brain metabolic network based on own data and literature scavenging was reconstructed and techniques for fast multi-screening of several toxicological endpoints were developed.

#### FOUNDATION FOR RESEARCH AND TECHNOLOGY - HELLAS (FORTH)

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## BIOMEDICAL SCIENCES RESEARCH CENTER "ALEXANDER FLEMING" (BSRC AI. Fleming)

### Historical Frame

The Biomedical Sciences Research Centre "Alexander Fleming" (hereafter FLEMING) is devoted to scientific and technological excellence, training and innovation in the biomedical sciences. FLEMING was established in 1998 in honour of Nobel laureate Alexander Fleming and is consistently exhibiting top research performance among its peers in Greece, reaching international best practice levels in key academic and research excellence indicators.

FLEMING is a governmental non-profit research institution, supported in part by the Greek government and operating under the supervision of the General Secretariat for Research and Technology of the Ministry of Education and Religious Affairs. Despite its moderate size, research by its international calibre scientists frequently makes world-class contributions to global medical and pharmaceutical research. FLEMING is involved with, and often leads, European and international networks such as INFRAFRONTIER, EMMA and ELIXIR, and thus plays a key role in materializing the EU's mid- to long-term vision for research.

The Centre occupies a fully-owned facility of approximately 6,000 m<sup>2</sup> in a 138-acre site in Vari, Attica and is equipped with high-quality infrastructures, including – among others - a mouse transgenesis facility, proteomics, genomics and imaging facilities, as well as a state-of-the-art mouse facility, the largest of its kind in Greece. Since its founding, FLEMING has evolved into an internationally competitive research centre of ~150 staff, comprising 14 research groups.

Until 2011, research at FLEMING was performed under the aegis of three Institutes – Immunology, Molecular Oncology and Molecular Biology & Genetics; in 2011 the Institute of Cell & Developmental Biology was established after election of a Director and the move of one Researcher from the IMBG. A restructuring of the Centre took place in 2012 in order to achieve simplification of governance and economies of scale, in which the four Institutes were merged into one. Currently, the Alexander Fleming Institute for Biomedical Research is organized into three Divisions along the lines of the three "old" Institutes and a new Division, the Division of Neurosciences.

### Administrative Structure

FLEMING consists of the Alexander Fleming Institute for Biomedical Research, the Administration and the Core Facilities. It is governed by a Board of Directors and headed by Chairman of the Board.

Each one of the four Divisions of the Institute is headed by a Researcher of high standing. Division Heads are mainly responsible for recruitment of new Group Leaders, mentoring of junior Group Leaders and securing funding for the development of Division-specific infrastructures. Group Leaders are expected to apply for research funding and are encouraged to collaborate within and across Divisions. In addition, each of the Group Leaders is assigned supervision of one or more "common" activities or facilities of the Centre.

The Division of Immunology (formerly the Institute of Immunology, hereafter DI)

The Division of Molecular Biology and Genetics (formerly the Institute of Molecular Biology and Genetics, hereafter DMBG)

The Division of Molecular Oncology

The newly formed (2011) Neurosciences Division (hereafter ND).

The mission of the Core Facilities is to provide high quality research and technological services to FLEMING labs, research institutions, health services providers and the industry. The Core Facilities include a Mouse Facility (ISO certified), a Transgenesis Unit (ISO certified), a Protein Chemistry Facility (ISO certified), a Genomics Facility, a Bioimaging Unit, and Genotyping, Flow Cytometry and Bioinformatics Services. They

are partly supported by competitive grants to FLEMING (EU FP7 and EU Structural Funds). In addition, FLEMING has established in 2005 an Innovation and Entrepreneurship Unit (IEU) which aims to support the commercialization of research work and promote strong links with the local and international industry in line with international practice. IEU has developed a comprehensive range of services and procedures necessary to protect FLEMING intellectual property. Among other activities, the IEU has managed a portfolio of 7 patents, completed over 400 Material Transfer Agreements and played a key role in founding a successful spin-off biotech company, BioMedCode S.A.

FLEMING Administration employs 31 people distributed in 7 Sections (Finance, Personnel, Procurement, Buildings and Grounds, Grants, Reception and Support).

### Current Activities

The cornerstones of FLEMING's mission are to:

- perform basic and translational research in the molecular biomedical sciences,
- train scientists and students,
- offer scientific and technological services,
- actively engage in technology transfer.

### Fleming's Research Activities Include:

**Division of Immunology:** The DI exploits state-of-the-art technologies to advance understanding of the mechanisms that govern the function and regulation of the immune system and to propose innovative proof-of-principle concepts for improving human health. The DI is internationally renowned for animal modeling of chronic inflammation and autoimmunity and has gained extensive visibility in the European Research Area through its state-of-the-art research programs in basic, as well as translational and applied science. Early studies from the Division's Researchers provided proof of principle findings that primed the first biological therapies for rheumatoid arthritis in the clinic. The 5 DI research groups are active in the areas of disease modelling, transgenic and conditional mutagenesis in the mouse, post-transcriptional regulation of gene expression, inter- and intra-cellular signalling and functional genomics, aiming at:

- Dissection of the molecular and cellular mechanisms that underlie chronic inflammatory disease pathogenesis
- Systems level understanding of molecular and cellular pathways, identification and validation of novel targets involved in the pathogenesis of chronic inflammation and cancer
- Alignment of animal models to human disease and development of novel, more predictive animal models
- Developing translational platforms for the evaluation of novel therapeutics and translational biomarkers.

**Division of Molecular Biology and Genetics:** The major focus of DMBG is on epigenetic regulatory mechanisms. Current focus and objectives are:

- Studies on the role of histone methylases and demethylases in the regulation of liver development, hepatic metabolic pathways and hepatocarcinogenesis
- Exploration of the role of transcription in suppressing cellular toxicity and preserving genetic and epigenetic inheritance
- Functional characterization of transcriptional arrest-specific interactomes
- Understanding the role of long intergenic non-coding RNAs (lincRNAs) in Wnt pathway mediated intestinal and liver homeostasis and carcinogenesis
- Mutation analysis in familial breast and ovarian cases through exome capture and NGS sequencing and studies on gene regulation in abdominal adipose tissue by integrating data from regulatory variation, open chromatin and GWAS signals.

**Division of Molecular Oncology:** The DMO aims to achieve excellence in Cancer Research by employing multi-disciplinary approaches to understand fundamental mechanisms that regulate cell growth and promote carcinogenesis. In order to pursue these goals it uses state-of-the-art genomic and proteomic technologies, advances methodologies for the characterization of macromolecular interactions and develops novel bioinformatic tools. DMO's activities include:

- Establishment of state-of-the-art proteomic platforms for cancer research which have served a large number of projects, both at Fleming and in collaboration with other Greek and international research teams.
- Development of novel methodologies to analyze protein-DNA interactions, which involve the specific tagging of proteins by biotinylation, allowing for the very specific and highly efficient purification of the tagged

protein from very complex cellular protein extracts.

- Development of advanced bioinformatic tools for miRNA research and machine learning approaches for cancer marker identification. A suite of programs developed for the analysis of miRNAs ([www.microna.gr](http://www.microna.gr)) is widely used, currently with more than 4,000 visits per month and more than 100,000 visits from all over the world since the establishment of the server in early 2009.

Neurosciences Division: The vision for ND is to advance high quality research in cutting edge areas of current Neuroscience, especially with potential for innovative diagnostic and translational approaches in line with the broad mission of the Centre. Moreover, ND reaches out to Greek companies operating in the area of pharmaceuticals and agrochemicals that target the nervous system with the aim of joint projects and strategic partnerships. During the past 8 years the Skoulakis group has been using a number of diverse technologies and approaches, ranging from Electron Spin Resonance measurements in live animals, associative and non-associative learning, locomotor and olfactory behavioural analyses and electrophysiology, to molecular biology, advanced genetics, biochemistry and proteomics. ND aims to expand in the areas of neurodegenerative disorders of the central and peripheral nervous system and cognitive diseases, utilizing invertebrate and mouse models in order to implement the "discovery in *Drosophila*, validation in the mouse" approach to these research areas. Recently, ND researchers have made a seminal contribution to the emerging field of Quantum Biology by providing groundbreaking experimental evidence that molecular vibrations of an odorant molecule contribute to its detection.

In the area of training services, FLEMING is actively organizing multiple seminars and workshops on its areas of focus and participates in international networks to disseminate the knowledge developed internally and to support the development of its own staff.

FLEMING also hosts the Alexander Fleming Museum, which contains Fleming's original archival material and personal effects bequeathed to the Fleming Foundation by his widow Amalia Fleming. The collection includes photographs of the actual Petri dishes on which Fleming discovered penicillin, a turning point in 20th century biomedical science. The Alexander Fleming archives contain

- Fleming's original laboratory notebooks and hand-drawn representations of his research results
- Scientific notes, lectures, books, leaflets, photographs and letters
- Reprints of his main scientific publications after 1908
- Articles in the international press
- Scientific instruments, microscopes and various personal effects
- Prizes, awards, photographs and correspondence
- Material about Amalia Fleming.

These archives provide the basis for a presentation of modern scientific thought and technology through the Museum's exhibitions. The Museum is presently accessible only by appointment. We envisage using it as the centerpiece of a contemporary Biomedical Sciences Museum, which will be part of Biotechnopolis (see below) linking Fleming's work to modern biomedical research.

In parallel to - and as a result of - the core research work, FLEMING's focus on innovation has already led to the establishment of a successful spin-off company, Biomedcode S.A., located within FLEMING premises and leveraging the Centre's facilities. Biomedcode focuses on pre-clinical drug evaluation services and has managed to quadruple its revenues between 2007 and 2012, reaching an annual turnover of EUR 1.8 million, with over two thirds deriving from exports.



## Indicative Achievements

Despite the shrinking core funding provided by the State in the last 4 years, FLEMING increased its competitive edge due to its success in attracting research grants from Greece and abroad. Currently, FLEMING participates in 20 European, 16 National and 6 International grants that have cumulatively a budget of more than 23.4 million Euros. Notable examples include 3 ERC grants, 9 Marie Curie programs and 9 integrated and infrastructure projects. Moreover, FLEMING participates in the Innovative Medicines Initiative (IMI) project BTCure, and several national actions funded by the General Secretariat for Research and Technology and by the Ministry of Education (COOPERATION, EXCELLENCE, KRIPIS and THALES actions). It is noteworthy that in 2013 core funding represented 16.8% of FLEMING's budget, while its contributions to the State for income taxes and workers' benefits amounted to 28% of the budget. For the 5-year period 2009-2013 these figures were 21.7% and 28.2% respectively.

The work of FLEMING's scientists has significant and tangible social impact, e.g., towards the better understanding of disease mechanisms, as well as the development of concrete therapies. Indicative achievements of FLEMING scientists include:

- Discovery of the effect of Tumor Necrosis Factor (TNF) in arthritis, leading to the introduction of the first biological anti-TNF therapies for rheumatoid arthritis one of the most important scientific contributions to the treatment of rheumatoid arthritis in recent years;

- Discoveries in mechanisms of long-distance gene activation, heritability of chromatin modifications and transcription factor methylation, leading to better understanding of the epigenetic basis of liver cancer and metabolic syndrome;

- Identification of PI3 kinases and other signaling molecules as key components of intracellular pathways deregulated in cancer, leading to a better understanding of carcinogenic transformation and identification of novel signaling modules, including the catalytic subunits of distinct PI 3-kinase isoforms, as promising targets for therapeutic intervention.

- Experimental evidence that molecular vibrations of an odorant molecule contribute to its detection, demonstrating the existence of quantum phenomena in olfaction in flies and in humans.

FLEMING was ranked first in an evaluation of the Greek Life Sciences Research Institutes by an international committee, which took place in January 2014 under the auspices of the General Secretariat of Research and Technology.

## Our Vision for the Future:

### Biotechnopolis

Going forward, FLEMING is aiming to create Biotechnopolis, the first Biotechnology Park in Greece. The Biotechnopolis concept involves strengthening and expansion of Fleming's activities across three dimensions:

- Research excellence and international relevance, through an estimated doubling of its research teams
- Innovation and services, through attraction of 4-5 high-end biotech Firms, better utilization of Fleming's infrastructure, and strengthening of its bonds with industry
- Advanced Training Center and Culture, through establishment of systematic conference, workshop and seminar activity, set-up of selected training programs in collaboration with Greek and non-Greek universities, as well as radical renovation of the Fleming Museum.

FLEMING has prepared a detailed business plan to define the target operating model, and the underlying organizational and funding pre-requisites to make Biotechnopolis a reality. Materialization of Biotechnopolis will provide significant benefits not only to the international scientific community, but also to the local society and the Greek state. We are working towards aligning the Biotechnopolis Project with the Smart Specialization Strategy Program 2014-2020 of the Attica Region, thus attracting support from EU Structural Funds.

#### BIOMEDICAL SCIENCES RESEARCH CENTER

#### "ALEXANDER FLEMING" (BSRC Al.Fleming)

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## CENTRE FOR RESEARCH AND TECHNOLOGY HELLAS – CERTH

### Historical Frame

The Centre for Research and Technology-Hellas (CERTH) is the only research centre in Northern Greece and one of the largest in the country and it was founded in 2000 by Presidential Decree 77/2000. It is a legal entity governed by private law with non-profit status, supervised by the General Secretariat for Research and Technology (GSRT) of the Ministry of Education and Religious Affairs of the Hellenic Republic.

### Current Organisational Structure

CERTH consists of five institutes and the Central Directorate. Is governed by its Board of Directors and is legally represented by the Chairman of the Board and Director of the Central Directorate. The five CERTH's institutes and their respective research units / laboratories are the following:

### Chemical Process & Energy Resources Institute (CPERI)

[http:// www.cperi.certh.gr](http://www.cperi.certh.gr)

- Environmental Fuels and Hydrocarbons
- Polymer Reaction Engineering
- Natural Resources and Renewable Energies Utilization
- Aerosol and Particle Technology
- Inorganic Materials
- Process Systems Design and Implementation

### Information Technologies Institute (ITI)

[http:// www.iti.gr](http://www.iti.gr)

- Image & Signal Processing
- Computer & Cognitive Vision
- Pattern Recognition & Machine Learning
- Human Computer Interaction
- Virtual & Augmented Reality
- Artificial Intelligence
- Security & Surveillance
- Biomedical Applications
- Environment, Geoscience & Remote Sensing
- Communications & Networking
- Multimedia, Database & Information Systems
- Social Media Analysis
- E-Government
- Cultural & Educational Technology
- Integrated Commercial Solutions

### Hellenic Institute of Transport (HIT)

[http:// www.imet.gr](http://www.imet.gr)

- Driver & Vehicle
- Surface Transport & Networks
- Transport Economics & Environment-Air Transport Systems

### Institute of Applied Biosciences (INAB)

[http:// www.inab.gr](http://www.inab.gr)

- Agri-Biotechnology
- Health Translational Research
- Informatics for Big Bio-Data

### Institute for Research and Technology of Thessaly (IRETETH)

[http:// www.ireteth.certh.gr](http://www.ireteth.certh.gr)

- Mechatronics
- Agrotechnology
- Biomedicine
- Kinesiology

### Central Directorate

The Central Directorate consists of the following 3 divisions:

- Administrative & Financial Services
- Technical and Supporting Services
- Extroversion Services

### Certh's Institutes Short Profiles

### Chemical Process & Energy Resources Institute (CPERI)

Chemical Process and Energy Resources Institute (CPERI) was formed by the merger of the Chemical Process Engineering Research Institute (CPERI) and the Institute for Solid Fuels Technology and Applications (ISFTA) according to Law 4051 (Official Government Gazette 40 A / 29.02.2012).

Chemical Process Engineering Research Institute was founded in 1985 in Thessaloniki, as one of the seven Institutes of the Foundation for Research and Technology Hellas (FORTH), while the Institute for Solid Fuels Technology and Applications was founded in 1987 under the auspices of GSRT and since March 2002 was incorporated into CERTH.

CPERI is a legal, non-profit entity under private law and is managed by its Scientific Board

The research and technological areas of CPERI are the following:

- Environmental Fuels and Hydrocarbons, Catalytic processes
- Production and utilization of Hydrogen – Fuel Cells
- Biofuels, utilization and novel production technologies
- "Clean" Coal Technologies, optimization of excavation technologies and exploitation techniques and utilization of combustion by-products (ash)
- Co- combustion of coal and biomass or waste technologies
- CO<sub>2</sub> capture, transport and storage
- Pollution reduction and emission control technologies
- Alternative energy forms and exploitation of natural resources
- Environmental processes
- Polymer Production Processes
- Development of advanced informatics tools
- Design, optimization and control of industrial processes
- Advanced materials processes and technologies
- Aerosol and Particle technology

## Information Technologies Institute (ITI)

The Information Technologies Institute (ITI), former Informatics and Telematics Institute, was established in 1998 in Thessaloniki, as a non-profit research organization, under the auspices of the General Secretariat of Research and Technology (GSRT), of the Greek Ministry of Development. Since 2000, ITI has joined the Centre for Research and Technology Hellas (CERTH), which was also established under the auspices of GSRT.

Since its creation, ITI has always been heavily involved in the transfer and dissemination of high-quality research knowledge and advanced solution development trends and leading-edge technologies, by taking into consideration the needs of industry and society. From its beginning, ITI's research is focussed on image processing and multimedia while ITI is on the latest state of the art regarding technical equipment, technical methods used and innovation in the field of image processing, computer vision, information visualization and 3D technology. ITI was evaluated to be amongst the best ITI institutes in Greece as well as in Europe.

Following its strategic research directions, and according to the experience of its members, ITI has developed spheres of excellence and critical mass in research and technology in several strategically important fields in the following areas:

- Image and signal processing, computer vision
- Pattern Recognition and Machine Learning
- Human Computer Interaction
- Virtual and Augmented Reality
- Artificial Intelligence
- Security and Surveillance
- Biomedicine – Bioinformatics
- Robotics
- ICT for Environment Monitoring, Geosciences and Remote Sensing
- Social Network Analysis
- Networks and Communications
- Cultural and Educational Technology

The main objective of the Institute is to be a research institution of Excellence, identifying promising fields for the future and creating an environment that will allow the conduction of basic, applied and technological research in the growth of the digital economy of 21st century. Projecting the institute as an attractive national organisation for the best researchers from all computer science backgrounds, ITI must remain a core component of its research mission.

## Hellenic Institute of Transport (HIT)

The Hellenic Institute of Transport (HIT) is one of the five Institutes of the Center for Research and Technology Hellas (CERTH) based in Thessaloniki, Greece. It was established in March 2000, by Presidential Decree 77/2000 together with the rest of CERTH and started its operation in February 2001.

The fundamental mission of HIT/CERTH is to provide innovative research services for government and other public or private organizations and bodies, and to provide support for the conduct of Transport research in Greece. It is also devoted to providing support to Ministries and other government bodies for the formulation of Transport policy and other scientific based consultation.

Its scope of services covers all areas of Transport and in particular the organization, operation, planning and development of infrastructure, standardization, economic analysis, management, vehicle technology and impact assessment of land, maritime, air, and multimodal transport services. HIT co-operates and interacts with similar organizations and Institutes in the EU and other countries, and represents Greece in relevant international fora.

The main areas in which HIT has been activated can be defined as follows:

- Scientific and research support for transport policy formulation to Ministries and other Organizations in the field of Transport in Greece.
- Specialized research in all fields of Transport (except air transport).
- Organization and operation of a full data and documentation centre in the field of Transport in Greece.
- Development and installation of many innovatory applications of Intelligent Transport Systems in Greece.
- Representation of Greece, in international Transport research and other relevant scientific fora, and promotion of the bilateral as well as multilateral co-operation between Greece and other European countries – as well as the US - in the field of Transport.

- Investigation of user requirements and transfer actions of transport research results to industry.
- Technology transfer and dissemination of research results to the transport industry and the transport users.
- Organization of training and professional education Seminars and Programmes.
- Contribution to quality control in the field of Transport.
- Transport research evaluation and appraisal.
- Support of standardization work in the field of Transport and issuance of handbooks, rules and guidelines concerning the operation of the Transport system.
- Various other publication and dissemination activities (including Conferences and regular publications).

## Institute of Applied Biosciences (INAB)

The Institute of Applied Biosciences (INAB) was established in 2012 by legislature No. 4051 (Government Gazette Issue 40 A' / 29.02.2012) from the merge of the former Institutes of Agrobiotechnology (INA) and Biomedical & Biomolecular Research (IBBE).

The mandate of INAB is to address the gap between research excellence and applications that meet end-user demands through close ties to interested stakeholders (SMEs, health sector, productive sector, social groups etc). Realizing that change happens fast in the world of work, driven by innovation and by developments in technology and markets, INAB will actively try to meet the challenge of keeping up with this pace of change through concerted actions in well defined areas with scientific and economic relevance.

Three main pillars of research activities are covered:

- Research in Agri-biotechnology
- Health translational research
- Information and Computer Sciences

INAB has a leading position in the fields of biotechnology and agri-biotechnology in Greece emphasizing on genomics applications and molecular biotechnology for the production of food with improved quality, new elite plant varieties, industrially relevant materials, certified genetically plant materials and microbial production systems of high added value products and overall to identify solutions in important problems of Greek agriculture.

INAB is also conducting multidisciplinary biomedical research in the fields of genomics, bioinformatics, epigenetics and the science of nutrition in medicine. A propos of this, it is relevant to mention that INAB has coordinated large-scale biomedical projects entailing the collaboration of academic institutes from both Europe and the US and reporting on genomic and functional studies of various types of cancers with a main emphasis on hematologic malignancies, on the largest thus far analysed patient cohorts. These studies have been published in high-impact factor scientific journals and have also received distinctions in scientific meetings in Greece and abroad, contributing significantly to the understanding and molecular diagnosis of debilitating neoplastic diseases.

INAB is very active in the field of ICT for health and personalized health. Its competences start from big data management, analytics and interpretation with data stemming from biomolecular to streaming data, to telemonitoring, medication, and social media data. E-Health systems based on medical devices and ICT are built aiming in producing third generation telemonitoring systems enabling disease management of chronic patients, multi-morbid patients, as well as preventive monitoring of healthy individuals. Finally, in-silico modeling of the human organism beyond the cellular level in the cardiovascular system as well as in the mental/immuno systems is a major focus of INAB.



## Institute for Research and Technology of Thessaly (IRETETH)

In 2006, the Center for Research and Technology – Thessaly (CE.RE.TE.TH.) was established with main goals a) to support interdisciplinary research in order to strengthen the competitiveness of the economy at the national and regional level and b) create a research environment to encourage more active participation of the private sector.

In January 2013, CE.RE.TE.TH. became part of the “Centre for Research and Technology – Hellas” (CERTH) as its fifth institute under the new name “Institute for Research and Technology of Thessaly” (I.RE.TE.TH.). The new Institute continues to support research in the areas of mechatronics, agrotechnology, biomedicine, and kinesiology. In addition, because of its regional character, I.RE.TE.TH./CERTH provides a value-added high quality research environment for the faculty members of the University of Thessaly and the Technological Education Institute of Thessaly and their research teams and supports innovation efforts of local business through interactions with the Institute’s researchers and the use of the Institute’s facilities. The mission of I.RE.TE.TH./CERTH is to be the major public interdisciplinary research organization in the Region of Thessaly and Central Greece devoted to world-leading basic and applied research at the interface of the physical sciences, engineering, agriculture and life sciences. This mission will be realized by bringing together scientists from various disciplines in an environment with advanced technological capabilities aiming at cutting-edge research in relevant themes, as well as addressing complex problems that affect the quality of life, the environment, and the economic development of Central Greece.

I.RE.TE.TH./CERTH’s basic framework of operation includes the following specific regional goals:

- To provide a model research environment with advanced technological capabilities to local scientists, aiming at the promotion of research and innovation and at new sources of funding which will become an attraction point for new researchers.
- To create “corporate relations” with academic, business, and local government bodies in order to deal with problems of the Region of Thessaly, such as water resources, industrial and agricultural development, accessibility to health services, welfare, tourism and environmental quality.
- To provide the required research personnel for the support of research projects and specialized studies combined with initiative for development in the Region of Thessaly and Central Greece.
- To provide a “collaborative technological environment” for the development and promotion of innovation and advanced technologies to researchers, entrepreneurs, and national/local government partners.
- To support an incubator structure for fostering new innovative ideas and their transformation to products/companies in collaboration with the proposed Thessaly Discovery Park, the formation and writing of R&D proposals, and to establish a “knowledge foundation” that will provide financial and technical information.
- To support a “lifelong education” environment and to train people of secondary or higher education, university graduates, and people who deal with primary production and processing in areas that are related to the activities of I.RE.TE.TH.

## Certh Main Achievements

### Self-Supported Research Centre

CERTH is essentially a self-supported Research Centre generating an average annual turnover of ~ € 22 Million over the last 10 years with contributions to it coming from: >30% from bilateral industrial research contracts, >60% from competitive research projects and <10% as government institutional funding. Based on the above figures, CERTH generates the Highest Return-on-Investment among all Research Centres (9:1) supervised by the GSRT.

## Distinctions and Awards

CERTH has received numerous awards and distinctions and is listed among the Top-20 of the EU’s Research Centres with the highest participation in FP7 competitive research grants (in 8/2012 in position 18 and in 9/2013 in position 16). Among the many achievements and distinctions of CERTH the following are particularly important:

- The European Commission’s 2006 Descartes Prize for Research
- European Research Council Advanced Grant (2010)
- The FP7 “Capacities” program, REGPOT Grant (2012)
- 1st Prize in the Microsoft International Contest (2010)
- International Activities Award from the Academy of Sciences/Transportation Research Board (2009)
- Energy Globe Award 2009 for project GROUNDHIT (2009)
- International Partnership for the Hydrogen Economy (IPHE) Technical Achievement Award (2006)
- Global 100 Eco-Tech Award at the EXPO 2005 (Japan)

### Extensive International Partnerships

CERTH has participated successfully in more than 1.100 competitive research projects financed by the European Union (EU), leading industries from USA, Japan and Europe and the Greek Government via the General Secretariat of Research and Technology (GSRT). As a result CERTH has developed an extensive collaboration network with leading academic, research and industrial organisations. Some examples are given below:

Academic & Research organisations: Almost all academic and research organizations of Greece, Imperial College of London, Hamburg University of Technology, University of Taiwan, Fraunhofer, Max-Planck, Institute of Transport Economics, German Aerospace Centre, Aachen University of Technology, University of Surrey, University of California at Berkeley, etc.

Industrial organisations: Akzo Nobel, Alcatel, AOL, Aramco, Astrium-EADS, BASF, Bekaert, BlackBerry, Borealis, BP, Carbon Sequestration Leadership Forum (CSLF), Corning, Daimler Chrysler, Degussa, Delphi, Dow Chemicals, Dupont, Egnatia Highway S.A., Euroheat & Power (UNICHAL), Fiat, France Telecom, GAF, Google, Greek Railways Organisation, Hellenic Petroleum, Honda, Ibsen, IBM, Indensca, Intracore, John Deere, Kuehne & Nagel, Klor INC BV, Microsoft, Motor Oil, Motorola, Mozilla, Nokia, OMV, Oracle, Organisation of Piraeus Port, OTE, Philips Components, PSA, Repsol, Siemens, Singapore Refining Co, Sumitomo, Sun, Telefonica, Telespazio S.P.A, Thai International Freight Forwarders Association, Thales, TOTAL, Toyota, Vodafone, Volvo, VW.

## Entrepreneurship

Central aim of CERTH is to develop co-operations with Greek and European industries to support the financial exploitation of CERTH’s research. As a result of this long term focus in entrepreneurship, CERTH has created and participates as the main shareholder in the Thessaloniki Technology Park (TTP), <http://www.thestep.gr>. Moreover, CERTH has created the following 4 spin-off companies:

- C SOLUTIONS Ltd: Applications and exploitation of energy and environmental processes
- CLEAN ENERGY Ltd: Energy and environmental technologies concerning solid fuels
- POLYMERS Ltd: Advanced software for polymer manufacturing
- INFALIA: A knowledge based company developing mobile and event management applications

### CENTRE FOR RESEARCH AND TECHNOLOGY HELLAS – CERTH

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## ATHINA- RESEARCH AND INNOVATION CENTER IN INFORMATION, COMMUNICATION AND KNOWLEDGE TECHNOLOGIES

### Historical Frame

The "Athena" Research and Innovation Center in Information, Communication and Knowledge Technologies ("Athena" RIC) was founded in 2003 (under the original name "IRIS – Integrated Research for the Information Society", which was changed in 2006), to consolidate and further expand the Greek R&D activities and initiatives in the area of ICT.

"Athena" RIC initially comprised the following existing institutes: the Institute for Language and Speech Processing-ILSP (established in 1991), the Cultural and Educational Technology Institute-CETI (established in 1998) and the Industrial Systems Institute-ISI (established in 1998). Its founding act also provided for the creation of new institutes that would cover vibrant areas of digital technology as well as of units that would incubate and develop new ideas and directions.

In 2007 two more Institutes were created: the Institute for the Management of Information Systems (IMIS) and the Institute for Research on Networking Technologies (IRNET). In 2012 CETI was merged into ILSP and IRNET into IMIS. Through the years, several units have been created as well, of which three are currently operational: Industrial Technology Clusters Initiative-Corallia (established in 2005), Space Programmes Unit-SPU (established in 2006), and Information Analysis and Modeling Unit-IAMU (established in 2009).

The overall structure and operation of "Athena" RIC and its institutes, units, and administrative/support departments are based on the provisions of Laws 1514/1985 and 2919/2001, and the Presidential Decree 145/2003. "Athena" RIC is a public Legal Entity operating under Private Law and is supervised and partially funded by the Ministry of Education and Religious Affairs – General Secretariat for Research and Technology. It receives most of its funding through competitive R&D projects awarded by national, European, and international agencies and organisations, and through contract research, product licensing, scientific studies, and technology implementation services offered to industry.

### Mission and Identity

<http://www.athena-innovation.gr>

The mission of "Athena" RIC is to conduct outstanding research in Informatics, Communications, and Computational Sciences and to ensure this research has an impact on society, especially regarding local needs. "Athena" RIC deals with a broad spectrum of issues, including some raised by other sciences, industrial applications, or societal challenges. Together with research, innovation is also a fundamental pillar of the mission of "Athena" RIC. Research institutes, spin-off companies, and technology industrial clusters create a fertile technological innovation ecosystem within the Center, with mutually beneficial collaborations between its members and systematic efforts to bring to market any research results with such potential.

The vision of "Athena" RIC is to serve the full spectrum of the research lifecycle, starting from basic and applied research, continuing on to system & product building and infrastructure service provision, and ending with technology transfer and entrepreneurship. The fundamental role of "Athena" RIC is to build knowledge and devise solutions and technologies for the digital society. Its value lies in the unique collection of skills and know-how of its researchers and professional staff and its national and international reputation.

The overall strategy of "Athena" RIC and the research values on which it is based are highlighted below:

- A research plan targeting fundamental and applied challenges with high potential impact, aiming at high-quality novel results and putting emphasis on interdisciplinary work, with informatics at the core of synergies with other sciences
  - A technology transfer plan with a global focus, while paying particular attention to the Greek society and economy
  - A young researcher development plan based on identifying and supporting original talent
  - A strategic co-operations plan aiming at key industrial companies, governmental agencies, regional authorities, and international research and higher-education organisations
  - An educational plan targeting creation and participation in local and international graduate programs
- A European and international actor, "Athena" RIC operates in three cities and implements its research and innovation strategy through its research institutes and units, positioning itself as a leader in and partner of the regional plans conducted by political, academic, economic and societal entities.

The scope of activities for "Athena" RIC is defined as all Information, Communication, and Computational science and technology, including all areas of informatics / computer science, automation, robotics, signal processing, artificial intelligence, networking and digital communication, modelling, and simulation. Research and development is carried out at the level of both information technology itself and specific applications. Computational sciences form a strong component of the "Athena" RIC activities, including but not limited to computational linguistics, archaeology, engineering, medicine, biology, and mechanics.

### Current Facts and Activities

**Projects:** "Athena" RIC is involved in 70 R&D projects funded by various programmes and agencies. The scientific and technological axes of these projects are described below in the paragraphs dedicated to the corresponding Institute/Units.

**Personnel:** "Athena" RIC employs about 260 persons (long and short term contract researchers, scientific associates, senior and junior research assistants, and other professionals), of which 20 are administrative staff. **Scientific output:** "Athena" RIC researchers publish about 120 publications per year on peer reviewed journals and books. Several hundreds of citations each year verify the high impact these publications have on the scientific community.

**Research Infrastructures:** "Athena" RIC participates in several large international research infrastructures, e.g., DARIAH, CLARIN, META-SHARE, ELIXIR, INTERACT, ESPAS, EHRI. It is a key policy of "Athena" RIC to invest in large Research Infrastructures as one of the most crucial boosters of its international reputation and of its researchers' ability to gain access to unique research facilities that would have been otherwise unavailable.

**Events and Education:** "Athena" RIC participates in two postgraduate programmes (on Language Technologies and Quality Journalism & New Technologies). It has recently organized two major international conferences (Int'l Conference on Research Infrastructures-ICRI 2014, European Data Forum-EDF 2014) and participated in the organization of several others, thereby putting itself in a protagonist's role in the corresponding communities.



### Selected Achievements Information Technology Applications (Public and Private Sector)

"Athena" RIC has had several significant contributions to basic research but its main focus is strongly on industrial and applied areas. This has led to several mature information and computational technologies being deployed in a wide variety of both public and private sector environments, such as the following:

- On/off-line educational applications for the Ministry of Education, vocational training platforms, and other educational tools, most of them active and continuously used for the last 10 years
- Web services for various public agencies and organisations
- Licensed technologies to Greek and International companies
- Technical application and feasibility studies for public and private entities, mainly in the area of large information systems and industrial processes
- Cultural Heritage management and presentation studies and services through customization, lab processing, and digital archiving and preservation tools and platforms, for cultural institutions in Greece and abroad
- Systems development in collaboration with SMEs and larger companies specifically in the areas of manufacturing, transport services, space, and others; provision of significant added value and expertise in embedded and networked systems

## Data and Content Economy

ICT has enabled the generation, storage and processing of unprecedented volumes of data, resulting in a significant transformation of the field of Data, Information, and Knowledge Management. Language-based interaction, access to structured data (e.g., databases, authority registries, established taxonomies, etc.), unstructured text, and multimedia evidence collections, open access to research/enterprise/user-generated/social media data, and several other Big Data challenges are all elements of a vibrant data and content economy that arises and is expected to dominate much of human activity in the near future. Systematic and diligent efforts in these directions through R&D projects, capitalisation of knowledge assets, and careful recruitment of experienced personnel have brought in several excellent technological results in the area and have propelled "Athena" RIC to a position of prominence to the point of actively shaping the data and content economy itself! A clear indication of this is the participation of "Athena" RIC in the development of large research data and content infrastructures in the areas of Geoinformatics, Cultural Heritage, Language Processing, Industrial/Manufacturing Asset Management, Bioinformatics, Space and Environment.

## Research Institutes and Units

### **Institute for Language and Speech Processing (ILSP)** <http://www.ilsp.gr>

Founded in Athens in 1991 and later merged with an independent institute in Xanthi, North Eastern Greece, ILSP aims to advance research and technology in the areas of language, interaction, knowledge & content processing, and 3D & multimedia, and to deliver innovative application solutions in a wide range of sectors with a particular focus on creative industries, human learning, tourism and cultural heritage.

ILSP carries out fundamental and applied research in the following areas:

- Natural language processing
- Speech technologies
- Natural interaction and embodied communication
- Intelligent systems and multimedia
- Learning technologies
- Cultural technologies
- Language resources infrastructure

### **IndustrialSystems Institute (ISI)** <http://www.isi.gr>

Founded in Patras, Western Greece, in 1998, ISI focuses on providing state-of-the-art ICT for industrial operations and enterprise environments, strengthening Greek industry competitiveness. It aims at the development of industrial applications and products, and the provision of advanced services.

ISI seeks at present excellence in the following industrial research fields:

- Networked embedded systems
- Intelligent systems and robotics
- Enterprise information systems
- Enterprise interoperability
- Security & protection of industrial systems

### **Institute for the Management of Information Systems (IMIS)** <http://www.imis.athena-innovation.gr>

Established in Athens in 2007, IMIS focuses on data, information, & knowledge management and associated large-scale systems. IMIS is particularly interested in Big Data, database technologies, scientific databases, geo-referenced data, social networking, information integration, as well as associated applications.

IMIS carries out fundamental and applied research in the following areas:

- Distributed Information Systems and Web Information Systems, with a focus on scalability and efficiency
- Information integration, interoperability of information systems, semantic Web and ontology management
- Business and Database intelligence systems, with a focus on implementation and optimization
- Management of geographical information, with a focus on spatial and spatiotemporal data management
- Scientific databases and Digital Libraries, with a focus on biological / environmental data management, and data preservation and provenance.
- Big data and scalable analytics, with a focus on collecting, storing, combining, and exploiting information from open data sources, linked data and social networks

## UNITS

### **Technology Clusters Initiative (Corallia)** <http://www.corallia.org>

Corallia, the Hellenic Technology Clusters Initiative, is a public-private partnership aiming at boosting competi-

tiveness, entrepreneurship and innovation in knowledge-intensive and exports-oriented technology segments where Greece has the capacity to attain a worldwide competitive advantage. Corallia portrays the mutual vision of industry, academia, research labs, VCs, business angels and regional and central government.

Corallia undertakes systematic actions to support these goals:

- Acts as a one-stop shop, through which the entire innovation network gains access to unique business opportunities in the thematic segments of operation (microelectronics, energy, ...)
- Supports new venture creation, where students and entrepreneurs "to be" can apply innovative ideas and set-up start-ups
- Expands the innovation-knowledge horizon with a thorough training program, through which members gain best-in-class know-how on topics ranging from technical skills and project management, to negotiation tactics and business plan development
- Eases the innovation gap through complementarities and partnerships among members as well as between members and national & international organisations, including world-class innovation centres of excellence, in Europe, USA, Japan, etc.
- Sponsors actions to establish strong ties with universities and research centres, to enhance technology transfer and R&D commercialization in the thematic technology areas of focus
- Provides incentives for VCs and Business Angels to invest especially at the early stages by creating a favorable environment and matching investments

### **Space Programmes Unit (SPU)** <http://www.athena-spu.gr>

The principal objective of the Space Programmes Unit is to foster participation of Greece in all aspects of the country's membership in the European Space Agency (ESA) and assist the nation's competitiveness by advancing the use of leading-edge technologies in space engineering and science at the national, European and international levels.

The principal thrust of SPU is to marshal the high technology, intellectual, entrepreneurial, and institutional resources available within Greece in pursuit of programs and projects relating to space activities that have the potential of high payoff in the technical, defense, economic, and commercial arenas. Emphasis is placed on promoting the involvement of Greek industry in space programs of interest, stimulating development of innovative programs, and effecting technology transfer to a level where potential spin-offs opportunities may be created.

### **Information Analysis and Modeling Unit (IAMU)** <http://www.athena-innovation.gr>

IAMU aims at solving theoretical and applied problems whose fundamentals lie at the intersection of various fields of applied sciences & technology, such as the following:

- Computer Vision and Image Processing
- Speech and Language Processing
- Audio processing (e.g., computer music)
- Biomedical signal processing and modeling
- Audio-Visual information processing as well as cue-integration and fusion of other multimedia streams that are produced and utilized in multimodal (audio, video, text, graphics, tactile) human-computer interaction
- Information processing topics in problems of cultural heritage and digital arts
- Nonlinear systems: Morphology, Fractals, Chaos, Automata
- Statistical systems and Graphical models for Detection, Estimation, Inference
- Cognitive systems for Perception, Action, Learning, Modeling of multimodal information processing in the Brain

## General Directorate

The research and scientific personnel of the Center is assisted by experienced administrative staff specialized in all aspects of administration, accounting, and technical support. The vast majority of administrative staff belongs to the General Directorate, which is distributed at the different sites where the Center is present. Depending on the specific needs, institutes and units may maintain a small number of additional administrative personnel serving the explicit needs of the respective institute or unit and acting as local liaison to the General Directorate.

### **ATHINA- RESEARCH AND INNOVATION CENTER IN INFORMATION, COMMUNICATION AND KNOWLEDGE TECHNOLOGIES**

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## HELLENIC PASTEUR INSTITUTE (HPI)

### Historical Frame

Established in 1920, the Hellenic Pasteur Institute (HPI) has a long tradition in translational biomedical research, particularly in the field of Infectious Diseases and more recently in Immunology and Neurobiology, and a commitment to Public Health Services in collaboration with the Ministry of Health and Social Solidarity. HPI is a private, non-profit organization supervised by the Ministry of Education, Lifelong Learning and Religious Affairs and the Ministry of Health and Social Solidarity. The Institute functions according to the Greek law for Research and Technology and a Bilateral Agreement (3733/28-1-2009) between the Greek Government and the Institute Pasteur in Paris. HPI is a member of the International Network of Pasteur Institutes (RIIP), comprising of 32 Institutes around the 5 continents, and maintains strong scientific collaborations with the Institute Pasteur in Paris and other Pasteur Institutes in North and Central Africa, SE Asia, Europe and Canada. HPI is recognized as the forefront Institute of the network in Eastern Europe and Balkans region.

### Mission and Vision

HPI has a modern Institutional framework with strategic objectives in line with the current European Scientific Community requirements. Scientists of the HPI need to address the challenges of infectious diseases facing the world today and remain at the forefront of new research developments. Main objectives pertain to activities in:

- Basic and applied biomedical research with emphasis on human and animal Infectious diseases.
- Basic and translational research in Immunology and Neurobiology.
- Issues of Public Health.
- Research in the development, production, storage and distribution of vaccines, biological and therapeutic agents, according to National Demands set by the Greek Authorities.
- Education and training in areas related to its research activities.

### Biomedical Research

- Activities of the HPI aim to improve human health and well being through internationally recognized biomedical research implementing state-of-the-art technologies and translated towards the clinic through innovative diagnostic, prophylactic and therapeutic approaches.
- Research activities in the HPI currently focus on three main scientific fields: Infectious Diseases, Immunology and Neurobiology, each having groundbreaking contributions to their fields.

### Public Health Services

A unique feature of the HPI is its strategic role in investigating outbreaks, epidemics and/or pandemics in Greece. HPI provides services to the Ministry of Health and Social Solidarity through a well organized and accredited Diagnostic Centre specialized in the rapid detection and diagnosis of bacterial, viral and parasitic diseases. Moreover it contributes to the Ministry of Health policy, to the surveillance, prevention and control of infectious diseases program, by hosting a number of Reference Laboratories.

### Vaccines and Biological Agents

A Vaccine Unit equipped with a certified Quality Control Laboratory provides vaccines to the Public Sector and performs assessment control on vaccines and biological products on behalf of the Greek Ministry of Health and of the National Drug Organization (EOF).

### Education

HPI has a fundamental role in and contributes to pre- and postgraduate education and training of scientists involved in biomedical research by providing exposure to cutting edge research and technology. Educational activities include Master's and Doctorate research programs in collaboration with Greek Universities, seminars, theoretical and practical hands-on workshops.

### Institutional and Operational Framework

HPI is located in the centre of Athens in private grounds covering 14.700 m<sup>2</sup> and buildings covering 7.590 m<sup>2</sup> and provides a highly stimulating research environment. Today the highly qualified personnel consists of 21 researchers, 4 collaborating researchers, 1 visiting researcher, 7 research engineers, 19 post-doctoral researchers (funded by external funds), 20 pre-doctoral students and 35 technicians, as well as a number of visiting investigators attracted from abroad. Research in HPI is performed in 13 independent and fully equipped laboratories/groups, organized into four Departments:

#### A. Administrative bodies

According to the existing legal framework the Administrative Bodies of the Hellenic Pasteur Institute (HPI) are the Executive Board and the General Director.

**B. The Scientific Advisory Committee** consists of 6 internationally renowned scientists, two of whom are researchers of the HPI. The Scientific Advisory Committee has a consulting role to the Executive Board and the General Director.

**C. The Administrative Manager** ensures the proper administrative and financial operation of the Institute and reports to the General Director.

**D. The HPI organization structure** is as follows:

#### 1. Administrative and Financial Services sector:

- I. Administration Department
- II. Financial Department.

#### 2. The Research Sector includes all research activities of the Institute:

- I. Department of Microbiology
- II. Department of Immunology
- III. Department of Neurobiology
- IV. Department of Molecular Medicine (to be formed)

#### 3. The Core Facilities Sector provides specialized support services and consists of the following:

- I. Department of Animal Models
- II. Research and Technology Core Facilities, including Transgenesis, Bioimaging, Flow Cytometry, Stem Cells and Tissue Engineering, Biosafety Laboratory level 3 (BSL3), Gene lab and Bioactive molecule production.
- III. Technical Support and Information Technology Department
- IV. Library

#### 4. The Public Health / Medical Services Sector includes:

- I. Diagnostic Department
- II. Vaccines Unit
- III. National Reference Laboratories



## Current Activities

### Research

Research activities in HPI currently focus on three scientific fields: Microbiology, Immunology and Neurobiology. Research in Microbiology is focused on the molecular and cellular biology of significant pathogens with high socio-economic impact on National and European level. These include: hepatitis C virus (HCV), herpes viruses, protozoa *Leishmania* and *Trypanosoma brucei*, multiresistant Gram-negative nosocomial pathogens, *Neisseria gonorrhoeae*, *Chlamydia*, and *Helicobacter pylori*. Particular emphasis is placed on the identification of pathogen molecules involved in the growth and virulence of pathogenic agents, the mechanisms determining pathogen-host interactions critical in disease progression, with specific emphasis on mechanisms that control pathogen evasion of host immune system.

Research in Immunology covers the study of various aspects of the immune system and its development. Immunology team comprised 4 laboratories/ research groups with 5 researchers and 1 engineer. Research in this field is focused on basic immunology and the study of autoimmune diseases, neuroimmunology and neuroimmune interactions with emphasis on identifying pathogenetic mechanisms and therapeutic strategies for multiple sclerosis, immuno-biotechnology for the development of recombinant biologics for use as diagnostic and therapeutic tools and studies on cellular and cancer immunotherapy. Research in Neurobiology is focused on the study of neuromuscular function and neuroimmune interactions, brain development and stem cell biology aiming at applications in brain repair after disease or neurotrauma. Neuroimaging, electrophysiology and the use of animal models of human disease are key components in the studies of the Department which comprises 2 laboratories/research groups with 5 researchers, 1 collaborating researcher and 2 engineers.

Translational research, exploitation of research results, collaboration with Industry.

With the support, both scientific and administrative, of the new General Director and his strong affiliation with the School of Medicine at the University of Athens, an effort is undertaken to enhance the translational research activities within the HPI. The participation of HPI in the Research Infrastructures projects, EATRIS-GR, BBMRI-GR, ERINHA, BIOIMAGING-GR, INSTRUCT-GR supports the development of translational research projects and the collaboration with hospital clinics.

### Research Core Facilities

Excellence in research is directly related to excellence and availability of state-of-the art technology. The HPI technological Units strive to transform the high expertise developed to high quality advanced services provided to academia and bioindustry.

### Research Projects

HPI is carrying out approximately 40 research programs funded by the European Commission, the Greek General Secretariat of Research & Technology, public organizations and private enterprises. The overall budget of the programs amounted roughly to 1.4M€.

### Other Activities

HPI has expanded its activities in the area of education and training. The Institute runs an annual program of high-level research seminars addressed to the National biosciences research community and is engaged in the organization of several National and International Scientific Meetings/Workshops.

### Public Health

At the interface between basic Research and Public Health Services are the five National Reference Laboratories (NRCs). They include: the National Influenza Laboratory of Southern Greece, the National Polio-enteroviruses Laboratory and the National Measles and Rubella Reference Laboratory, all three of which are recognized by WHO, as well as the National Reference Laboratory for Leishmaniasis and the National Reference Laboratory for *Neisseria gonorrhoeae*. Additionally, the Public Health services of HPI include a well organized Diagnostic Centre specializing in the rapid diagnosis of bacterial, viral and parasitic diseases. This makes the NRCs and the Diagnostic centre exceptionally effective as they are in close contact with the research

activities in the field and thereby are aware of the most recent developments in diagnosis, epidemiology and treatment. At the same time, this cooperation brings research in Infectiology close to its clinical applications, thereby strengthening translational research at HPI. Further, a Production Unit for Vaccines coupled with a modern

Quality Control Laboratory provides vaccines to the Public Sector and assessment control on vaccines and other biological products on behalf of the Greek Ministry of Health and of the National Drug Organization (EOF).

## Achievements During the Period 2005 - 2013

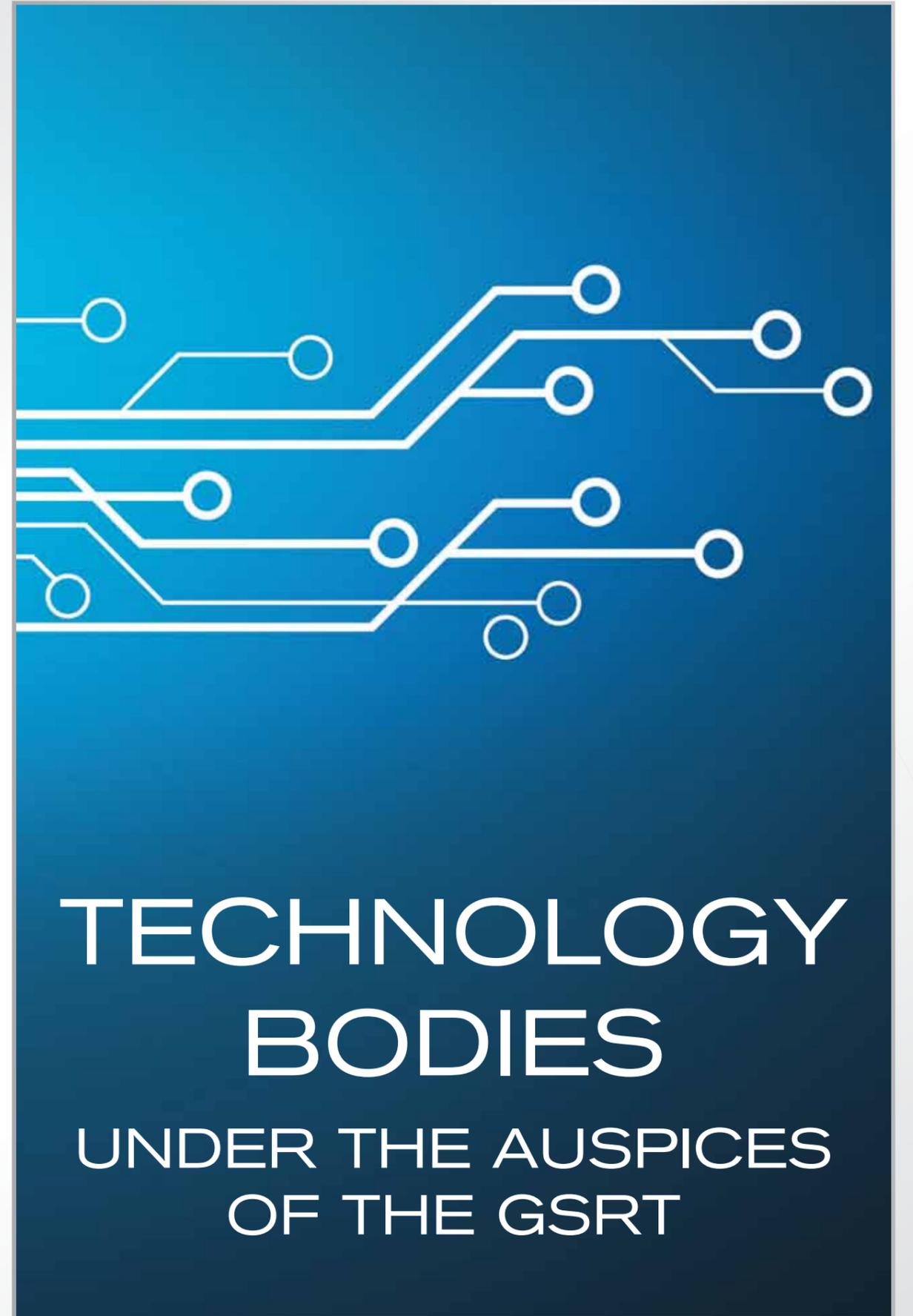
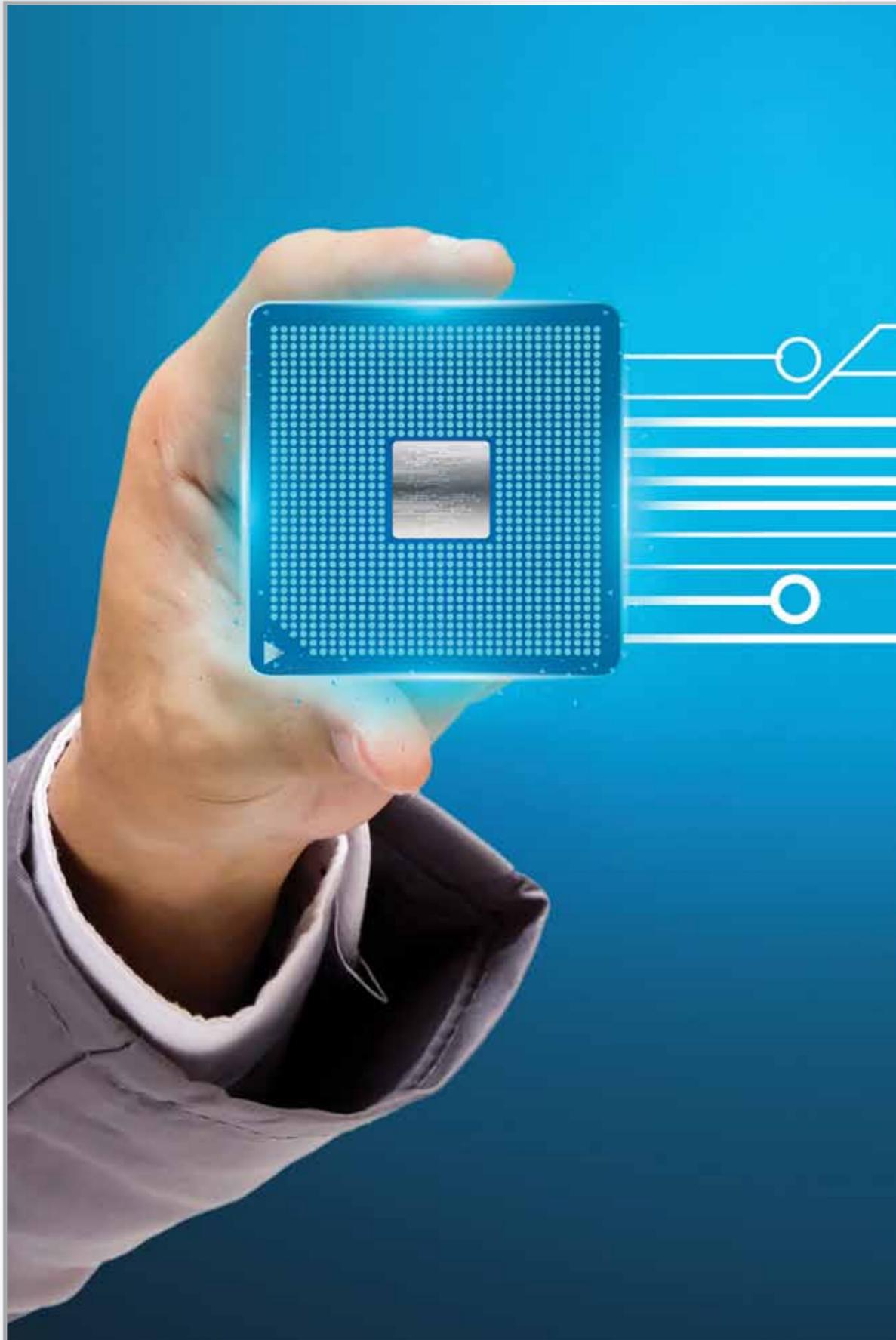
The high quality of the scientific research is testified by 454 scientific articles and monographs published during 2005-2013, 12 patent applications and an excellent track record in attracting and managing research funding [during 2005-2012 19M€ from competitive European and International grants, contracts for R&D projects from industry and private legal entities and National projects and studies and Public investment funds for infrastructure]. HPI has boosted its capabilities to deal with the threat of infectious diseases, immunology and neurobiology by maintaining and renovating buildings and complete with state-of-the-art equipment.

- A new updated Bilateral Agreement between the Greek Government and Institut Pasteur Paris (IP) was signed in 2009 (N. 3733/2009) to replace the older agreement (N.309/1975), describing the strategic objectives of HPI within the modern developing European Scientific Community.
- A major upgrading and renovation of premises and infrastructure was materialized and a number of research laboratories and Public Health facilities were relocated in fully modernized premises completely dedicated to infectiology. In addition, a Biosafety Level 3 laboratory was built to fulfill the biosafety demands for Public Health in cases of epidemics and pandemics and to promote research activities into highly pathogenic agents.
- Renovation of the Experimental Animal Unit facilities to house animal infectious disease models as well as transgenic animal models, including a modern surgery unit. The reception of the Diagnostic Department and the veterinary examination room were relocated, after a complete refurbishment of the building in order to meet the high quality of standards for primary healthcare systems and to provide a well-functioning, safe, warm, attractive and welcoming environment.
- Establishment of state-of-the-art centralized technological facilities by upgrading already existing HPI technological facilities and establishment of new ones to host new cutting edge technologies. These include upgraded Light Microscopy, Flow Cytometry and Human Stem Cell Units.
- A constant concern for highly qualified personnel to operate each facility and provide training where required. The creation of such centralized facilities brought together key expertise in the fields of Infectiology, Immunology and Neurobiology, and this has promoted several horizontal interactions among HPI laboratories and collaborations with other National and International Institutions.
- Implementation of new technology in Public Health labs: -Development, evaluation and validation of molecular techniques such as PCR and real time PCR, isothermic RNA amplification (NASBA), branched-DNA and Transcription Mediated Amplification (TMA). The aforementioned techniques are currently applied for diagnosis, surveillance and molecular epidemiology of infectious agents. Special attention has been paid to the quality assurance in the Public Health laboratories.
- Encouragement of translational research, exploitation of research results, links with Industry. During the last few years, the number of patents has increased (total number 12), important collaborations have been established with the private sector and a number of contracts have been signed with Industry mainly for the evaluation of molecular and sero-diagnostics, for drug screening/efficacy, and for the development of immunotherapeutics.
- Enlargement of the scope of education and increase visibility by supporting the organization of National and International workshops, special courses, annual seminars with National and International speakers at HPI. The institute serves as a training center for young scientists.

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# TECHNOLOGY BODIES

UNDER THE AUSPICES  
OF THE GSRT





## GREEK ATOMIC ENERGY COMMISSION (GAEC)

### Historical Frame

The Greek Atomic Energy Commission (GAEC) is the competent national regulatory authority in the fields of radiation protection and radiological and nuclear safety.

Its mission is the protection of the public, the workers and the environment from ionizing radiation and artificially produced non-ionizing radiation.

GAEC sets the regulatory framework and oversees its implementation. The regulatory control refers to radiation facilities (medical, industrial etc.), special infrastructures (e.g. research reactor), occupationally exposed workers, antenna base stations, environmental radioactivity monitoring, etc.

GAEC sets the radiation safety rules by issuing regulations and drafting or proposing legislation; the compliance with the legislative framework is achieved by:

- performing inspections and measurements
- monitoring the environmental radioactivity
- monitoring the occupationally exposed workers
- keeping the national radiation protection database
- providing continuous education and training
- informing the public and the State.

Having safety as priority, GAEC:

- provides high level quality services and operates state-of-the-art laboratories
- prepares for and responds to radiological/nuclear emergencies
- promotes the radiation safety culture
- commits itself to scientific excellence.

### Establishment - Funding - Organizational Structure

GAEC was originally established in 1954, but as competent regulatory authority was established in 1985, by Law No. 1514/1985. In 1987 (re-establishment year), GAEC took the legal form of decentralized (autonomous) public service, by Law No. 1733/1987.

GAEC has adequate infrastructure, financial and human resources. Its staff is 75. Financially is supported by two sources:

- government funds and
  - provision of services, fees and funds coming from research and development projects (Special Account).
- GAEC is governed by a 7-member Board, appointed by the supervisory Ministry for a three-year period. Its organizational scheme, established by the Presidential Decree No.404/1993, consists of 4 Divisions (having a total of 10 Departments) and 6 independent Offices, namely:

a. Division of Regulatory Control, Safety and Radiation Protection.

b. Division of Licensing and Inspections (Licensing and Inspections, Personal Dosimetry, Environmental Radioactivity Control)

c. Division of Research, Development and Education

d. Division of Administration and Technical Support

e. Offices: Non-Ionizing Radiation, Ionizing Radiation Calibration Laboratory, Research Reactor, International and Public Relations, Legal Affairs, Special Account.

A new, more compact organizational scheme consisting of 2 Divisions (having a total of 5 Departments) and 3 independent Offices has been officially proposed.

Main activities – current strategic priorities:

GAEC's role entails mainly:

- drafting legislation and monitoring its implementation;
- reviewing and performing inspections for ensuring radiation protection and safe use of radiation in medical, research and industrial facilities, along with in situ measurements in facilities emitting electromagnetic fields (non-ionizing radiation). The scope is broad: 2.500 facilities (medical, industrial, research) using ionizing radiation and 10.000 mobile phones base stations are subject to inspections and measurements performed by GAEC,
- individual monitoring of 12.000 occupationally exposed workers,
- provision of calibration services,
- coordination of the national program of environmental radioactivity control,
- operation of the telemetric system of monitoring radioactivity levels in the atmosphere.

Moreover, GAEC:

- responds at operational and decision-making levels to radiation emergencies; participation in the General Plan for Civil Protection and the National Plan for Chemical, Biological, Radioactive and Nuclear (CBRN) threats,
- contributes to the combating of illicit trafficking of radioactive materials,
- has the infrastructure and the expertise required for specialized radiation detection analysis in environmental samples, products, materials etc. and for radon measurements in dwellings and workplaces,
- participates in postgraduate courses and provides education and continuous training to professionals,
- performs research in the scientific areas connected to its regulatory functions,
- provides information and advice to the state authorities and the public,
- acts as communication channel, represents the country and cooperates with European and international organizations.

Currently, GAEC's strategic priorities include:

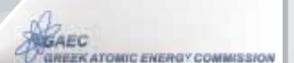
- the implementation of the action plan following the international peer-review of the national regulatory framework in radiation protection and nuclear safety, as well as of GAEC as the competent authority (Integrated Regulatory Review Service, IRRS Mission, May 2012);
- the harmonization of the national regulatory and legislative framework with the new EC Directive and IAEA safety standards in the fields of radiation protection, nuclear safety and radioactive waste management;
- the determination of radiation doses to the general public in the country and the development of a national information system to act as channel for both collection and dissemination of radiation related information (project funded by the National Strategic Reference Framework);
- the participation in research projects and scientific excellence in areas supporting GAEC regulatory role;
- the promotion of cooperation and ties with other Authorities and scientific networks in Europe;
- education and training activities: promotion of safety culture among stakeholders in the country;
- further improvement of GAEC's integrated management system;
- continuous improvement of services provided by GAEC to third parties.



### Main Achievements

- establishment of a solid and effective radiation protection system in the country;
- oversight of the totality of radiation facilities/applications;
- successful response in radiation emergencies, both limited and large scale, that occurred in the country;
- recognition as "International Regional Centre for Education and Training in Radiation, Transport and Waste Safety" (long term agreement with IAEA ratified by Law), as well as in the field of Nuclear Security;
- contribution to the establishment of the National Observatory of electromagnetic fields, emitted by all kinds of antenna stations installed in the country;
- installation of fixed radiation detection systems at entrance points (e.g. customs offices) and metal industries to combat illicit trafficking of radioactive materials;
- development of an integrated information system including technical and administrative information of all facilities under regulatory control, information regarding the occupationally exposed workers, the regulatory control of radioisotopes and radiation sources transportation, etc.;
- establishment of an integrated management system certified according to the terms of ISO 9001; accreditation of provided high-quality services according to the terms of ISO 17025 standard, accreditation of GAEC as "inspection body" according to the terms of ISO 17020 and accreditation of non-formal education services according to the terms of ISO 29990;
- nationwide, large scale training programs in radiation protection e.g. staff involved in emergency response, staff employed in medical practices of radiation;
- systematic active participation in EURATOM Framework Programs (FP5, FP6, FP7);
- fulfillment of international obligations in the fields of radiation protection and nuclear safety; development of international relations;
- excellent reputation and recognition as competent and trustworthy public authority.

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## GREEK RESEARCH & TECHNOLOGY NETWORK S.A.

### Historical Frame

The Greek Research and Technology Network is a state-owned company, operating under the auspices of the General Secretariat for Research and Technology (GSRT). It was established in 1998 by the Greek Ministry of Development. However, the GRNET network started operating in 1995 as a Research project of the GSRT, with the National Technical University of Athens - NTUA assuming the role of the technical co-ordinator. GRNET S.A. initially ran under PD No29/1998, which was amended with PD No308/2001, PD No145/2003 (GG No121/A/2003), and Law 3438/2006 (GG 33/A/2006).

GRNET S.A. operates today under the auspices of the Greek Ministry of Education. Its mission is to provide high-quality Infrastructure and services to the academic, research and educational community of Greece, and to disseminate ICT know-how to the general public.

#### Organizational Structure

The GRNET S.A. organization structure facilitates efficiently its organizational vision and goals:

The General Assembly is GRNET S.A.'s supreme authority. It is responsible for proposing amendments to the company statute, as well as for electing the members of the Board of Directors, for approving the annual balance sheet, and for appointing auditors.

The Board of Directors decides on all strategic matters relating to the company's management and the fulfillment of its goals, except the ones falling into the competence of the General Assembly. The Board mainly formulates the company policies and strategic development; it secures the necessary funding sources, in parallel to supervising activities and managing its assets. The Board consists of eight members and the term of office is four years.

The Strategic Planning Committee is appointed by the Board of Directors and consists of company executives. The Committee meets periodically with strategic and development issues in its agenda. The Committee Chair reports to the Chairman of the Board.

The Advisory Committee is appointed by the Board every two years and consists of up to 5 members. It holds an advisory role and consists of experienced specialists and policy makers in the field of telecommunications and / or science and technology. The outcomes of the Advisory Committee meetings are brought to the attention of the Board.

The Group of Network Experts is formed by the Board, comprising of representatives from the university and research sector, with the aim to coordinate activities for the development of the GRNET backbone network.

GRNET S.A.'s human capital consists of experience and ac-knowledged in their field people, many of which are holders of postgraduate degrees and the vast majority of which possess an academic title.

#### Advanced Network infrastructure and services

GRNET utilizes the most recent communication network technologies for the provisioning of advanced network services to the Greek R&E community. The GRNET backbone covers all regions of the country, providing to more than 150 institutions ultra-high speed connectivity to the Greek and global Internet. At the same time, it is capable of provisioning high-capacity dedicated circuits and virtual private network services for e-science applications and the needs of research projects and experiments within the country and internationally, as well as providing connectivity to the GRNET Data Centers. GRNET S.A. also operates the Greek Internet Exchange (GR-IX), providing local interconnection services to the main Greek Internet providers.

#### Advanced Cloud Computing services and applications

GRNET S.A. offers innovative Cloud Computing services to all members of the Greek R&E community. The services are available via the Infrastructure as a Service model, under the brand name ~oceanos. By using ~oceanos, any academic user can create a multi-layer virtual infrastructure and instantiate virtual



computing machines, local networks to interconnect them, and a reliable storage space within seconds. The Cloud Computing infrastructure and services of GRNET S.A. have been made available to the pan-European R&E community via the 'oceanos-global' service.

#### Hellenic High Performance Computing Infrastructure (HPC)

GRNET is procuring a national high-performance computing system (HPC), which will provide state-of-the-art supercomputing capabilities to the Greek scientists. The new system is expected to become an important center of gravity for technical computing in South-East Europe, and it will join the European HPC infrastructure (PRACE Tier-1), thus becoming accessible to a large number of scientists from all over Europe. The projected sustained performance of the new system will be around 180 TFlops, rendering the most powerful system in the region. The Hellenic supercomputing infrastructure, targets a broad range of applications and scientific domains. Therefore, it will come pre-installed with all necessary development tools, scientific libraries and execution environments that will help a large number of scientists exploit the system's capabilities.

#### Enhancing the use of ICT and Access to Digital Content

GRNET S.A. coordinates a series of initiatives aimed at creating e-infrastructures and services that can facilitate organizing, describing and promoting digital content of educational, research, geospatial, and environmental as well as cultural topics. These actions contribute to the vision of creating a virtual horizontal infrastructure of digital repositories, which is available from universities, research centers, museums, libraries and other institutions in the country and Europe and facilitates the preservation, sharing and exploitation of digital content by businesses and the society.

#### Environmental Policy

GRNET S.A. implements innovative green technologies in its networking and computing infrastructure, in an attempt to reduce its yearly greenhouse gas emissions' footprint. In order to achieve that, environmental regulation, laws and codes of practice are highly regarded when assessing standards of environmental performance. GRNET upgrades its networking & computational infrastructure with energy efficient equipment, deploys energy consumption monitoring infrastructure for real time measurements in the network Points of Presence (PoPs) and Data Centers, and applies innovative energy-aware techniques to improve energy efficiency in the GRNET Data Centers.

### Success Stories in the Last Decade:

GRNET S.A. provides state-of-the-art infrastructure and services. It has been utilizing the latest technologies, delivering an abundance of capacity and flexibility in operations and provisioning for the national networking R&E infrastructure. GRNET has evolved from an IP backbone operating upon leased circuits to an optical network with lambda provisioning capabilities and significant upgrade possibilities. The optical layer has been implemented on top of the country-wide dark fiber network of 9,000Km total length with 35 Points of Presence (PoPs). Additionally, GRNET provides the ultra-high communication gateway of the Greek R&E community to the rest of the world, with 4x10Gbps uplink connections to GIANT, the pan-European R&E network.

GRNET S.A. provides state-of-art computing and storage infrastructure & services. It has implemented a Data Center at the Greek Ministry of Education (22 racks, 400+ servers, 50,000 Virtual Machines spawned, more than 10,000 Virtual Machines active, 4 Petabytes storage), and a Data Center at the National Research Center. GRNET deploys the ~oceanos cloud infrastructure, develops the online storage service Pithos, and has reached significant milestones: more than 4,000 users, more than 8,800 active virtual machines, more than 380,000 virtual machines spawned since the beginning of the alpha version of the service, more than 85,000 private virtual networks created / destroyed since the beginning of the alpha version of the service. GRNET S.A. enables ICT R&D internationally, by significantly contributing to the development & operational activities of the pan-European GIANT R&E network, as well to pan-European initiatives in Grid and HPC computational infrastructures.

In GIANT, GRNET S.A. has coordinated evolutionary network services' development in the area of dynamic provisioning and software defined networks. As a member of the EGI pan-European Grid infrastructure, GRNET S.A. had the role of Operations Coordinator for South East Europe. Furthermore, GRNET S.A. has been one of the founding members of the PRACE AISBL since April 2010 and participates in PRACE representing Greece as one of the non-Hosting Members active in the areas of governance, operations, supporting, using and disseminating the pan European HPC infrastructure.

#### GRNET S.A.

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## HESSALONIKI SCIENCE CENTER AND TECHNOLOGY MUSEUM

### Historical Frame

Thessaloniki Science Center and Technology Museum "NOESIS" is a public benefit, non-profit, cultural and educational Foundation that promotes the public understanding of science and technology, in a way that is both educational and recreational.

The main objective of the Center is the popularization of modern scientific and technological knowledge and its dissemination to the public through exhibitions, movies, educational programmes, conferences, seminars and lectures. The brand name of the Center intends to emphasize the connection between its operation and human noesis, since the intention of its founders was to make scientific knowledge available to everyone. The Center aims to become a leading attraction in the field of science, culture and technology not only in Greece, but in South-Eastern Europe, as well.

The Center, established in 2001, is a direct descendant of the Technology Museum of Thessaloniki, a private organization - founded by an initiative of Thessaloniki citizens in 1979 who were actively engaged in the protection of the Greek technological heritage. Since 2003, it is assigned as a Body Governed by Public Law under the inspection, surveillance and financing (7% of its total annual budget) of the GSRT of the Ministry of Education. Most of the Foundation's income derives from tickets, special events, donations, membership and leasing.

The Foundation is governed by a Board of Directors (11 members, three years term). Four members are appointed by the General Secretariat of Research and Technology, five members are appointed by the Technology Museum of Thessaloniki, one member is appointed by the Ministry of Finance and 1 member is a representative of the Municipality of Thermi.

Since November 2004, it is operating in a new, privately owned 15.000 sq.m. building, located in the Municipality of Thermi (near Thessaloniki –the second largest city in Greece). The building's morphology reminds of "Archimedes's Lever" (3rd century B.C.). It is located at a privileged site –of a total surface of 48.000 sq.m - with a wonderful view over the Gulf of Thermaikos and the town of Thessaloniki.

In the Center's premises visitors watch digital shows:

- In the 160-seat digital Planetarium,
- In the 300-seat Giant Screen Cinema (2D and 3D),
- In the 18-seat Motion Simulator (2D and 3D)

They can also visit the Technology Museum with three permanent exhibitions related to Science and Technology:

- The Ancient Greek Technology exhibition, unique in its kind, featuring replicas of technological breakthroughs and machines of Ancient Greece from the prehistoric period till the Hellenistic and Byzantine period.
- The Technopark featuring interactive exhibits. The visitor has the opportunity to discover the scientific knowledge interacting with it and having fun.
- The Car Exhibition featuring car models that have marked the history of automobile.

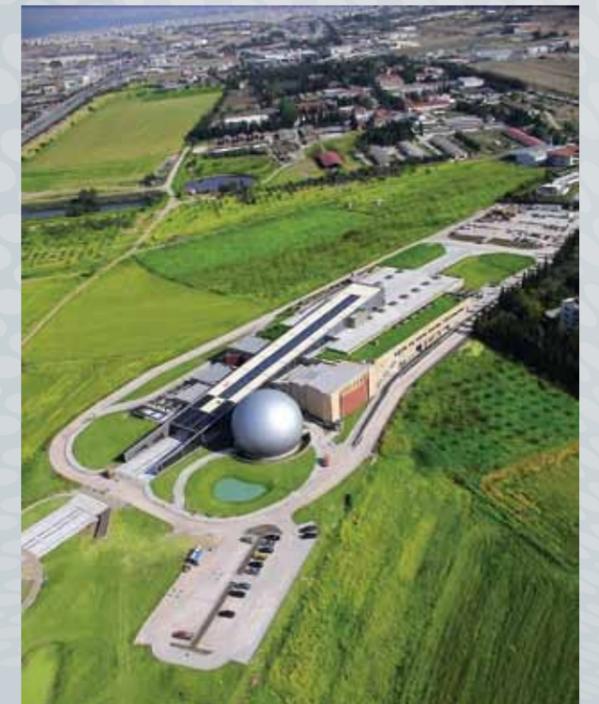
The premises of Noesis also include:

- The 200 seat Conference Hall fully equipped with the latest sound and audio technology, ready to host conferences and events.
- The Temporary Exhibition Hall, a place suitable for hosting exhibitions from other museums and cultural organizations from Greece and abroad.
- The Library with books and DVDs related to Science and Technology and computer workstations.

- The Digital Lab, a place where multimedia productions and 3D animations can be created in-house.
- The Center, also houses a Cafe and Restaurant with an excellent view to the city and a Gift Shop selling educational books, gadgets and souvenirs.

In NOESIS visitors can also attend:

- Educational Programs, such as "Summer Escape", "Science Show", "Renewable energy", "Robotics Lab" etc.
- Meetings and Discussions with members of the scientific community, in collaboration with other institutes, such as the British Council, the French Institute, etc.
- Special annual large Events (up to a few thousand participants) with free entrance such as "Astroparty", "Science Festival", "First Lego League Competition", etc.
- Cooperation with other Institutions, Universities, Museums, other foundations across Europe and participation in competitive programs such as (in short descriptions): "Black Sea", "E-Learning", "Erasmus Plus", "Grundvig", "The City is My Learning Space", "Skyroute", "Recording of Science Center and Technology Museum cultural heritage and promotion through new digital services", etc.
- Planning, organizing and presenting periodical exhibitions such as "CERN Exhibition", "Telecommunications", "Aegean-The Birth of an Archipelago", "Retrosystem", "Motor Show", "Ancient Greek Agora".
- Competitions such as "Mathematical and Logic Puzzles", "First Lego League" etc.
- Digital Dome Productions such as "Space Mission 101" and "Space Mission 201".



The Center has been involved in research and educational activities, such as:

- "Portal of ancient Greek science and technology": a long journey from the Prehistorical times until Meta-Byzantine years. The site (<http://www.tmoth.edu.gr/aet>) uses 3D animations and presents developments in technology: in production, consumption of food, clothing, the living conditions, science and culture.
- "Technomatheia": Project for the familiarization and active involvement of high school students with technology.
- "Stavros Niarchos Foundation" donation for the construction of a mobile exhibition of Ancient Greek Technology.
- E-learning project including web-based virtual labs
- "Annual Informatics School Conference" attracts 6.000 students and visitors.
- "Astroparty" event attracts more than 4.000 visitors each year.
- "First Lego League" competition, attracts more than 4.000 visitors.
- Competition "Imagine Cup" supported by Microsoft LTD
- "Take Your Classroom Into Space". Noesis acted as the host of the event with direct connection to the ISS and other European Science Centers under the auspices of ESA.
- Organizing and hosting exhibitions such as "Aegean – The Birth of Archipelago" in collaboration with Aristotle University of Thessaloniki, National History Museum of Crete, Natural History Museum of Lesvos Fossil Forest and University of Crete.

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