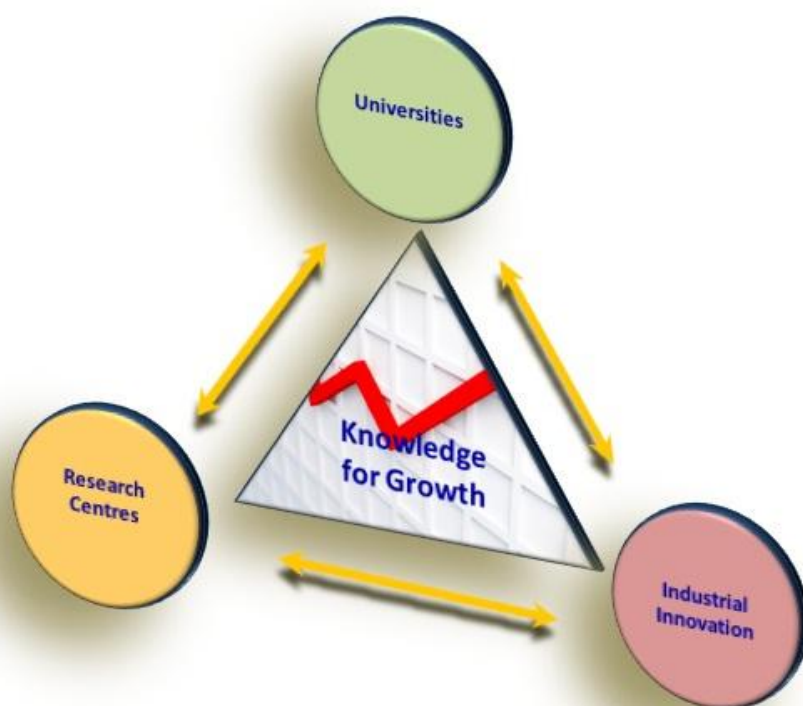




MINISTRY OF EDUCATION AND RELIGIOUS AFFAIRS,
CULTURE AND SPORTS

RESEARCH, TECHNOLOGICAL DEVELOPMENT & INNOVATION: *CATALYSTS FOR RECOVERY AND GROWTH IN GREECE*



GENERAL SECRETARIAT
FOR RESEARCH AND TECHNOLOGY

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Contents

Summary	3
The importance of Education, Research and Innovation for the country.....	4
GSRT's role	6
Proposal for an effective policy planning in the field of Research, Technological Development and Innovation	8
Restructuring of the research ecosystem and creation of a flexible organizational structure for Research and Technology organizations	9
Up-take of innovation in Greece	9
Main areas of responsibility	11
Annex I.....	13
GSRT identity.....	13
Annex II	15
GSRT research ecosystem	15
Fig. 1: The knowledge triangle	4
Fig. 2: GSRT Research Institutions geographic spread.....	7
Fig. 3: Innovation cycle and State Intervention	12

Summary

The **Knowledge Triangle** (Research, Education and Innovation) denotes a coherent ecosystem that is widely acknowledged as a crucial driver for growth and competitiveness in modern economies and societies. Countries which envision becoming *knowledge economies* pay particular attention to this synergy. The fact that the *Directorate General for Research* of the European Commission was recently renamed as *Directorate General for Research and Innovation* (DG Research & Innovation) highlights the significance of a common approach for Research and Innovation.

The Member States' role is to formulate a national strategy towards a smart Research & Innovation ecosystem. In this regard, , the experience of the **General Secretariat for Research & Technology (GSRT)** is essential to develop and sustain synergies between the research communities and the business sector in Greece, as well as among public, regional structures and the society as a whole. This is referred to as the *Research & Innovation Strategies for Smart Specialization - RIS3*.

GSRT is well positioned to cope with the RIS3 mandate as the State Authority that triggers advances in research and innovation at national and regional levels via state-aid programmes. In parallel, it supervises directly a dense geographically distributed ecosystem of Public Research Centers that can enrich local communities with multifaceted innovation anchors. This is a manifestation of the *community anchors* and *innovation poles* instruments that were planned and executed in the USA and several EU Member-States to reignite their economies in the midst of the financial crisis.

The Greek research ecosystem, despite being extremely competitive (representatives of the Greek R&D academic and business sector appear in the Top 10 positions in several EU RTD Framework Programmes' rankings) has significant potential to further increase its impact on strategic sectors of the Greek economy (e.g. ICT, energy, biotechnology, agriculture, marine sciences, shipping and tourism). Moreover, it has to evolve into a key driver in limiting the *brain drain* of skilled young talents during the current economic crisis. That makes the restructuring and further development of the Greek Research and Innovation system essential.

In essence, GSRT has a critical, decisive role in coordinating the formulation and implementation of a National Policy for Research, Technological Development and Innovation by planning and enforcing the necessary conditions for the public and business sectors to create value by using skilled human capital and sharing open research infrastructures.

Such conditionalities will enable structural networking amongst research, technological development and innovation players towards a flexible, distributed environment that will serve societal needs and challenges building upon established regional and national strengths.

The importance of Education, Research and Innovation for the country

Education, Research and Innovation, are widely perceived as the main pillars for economy's competitiveness and growth. Given the harsh economic conditions Greece is facing, Education, Research, and Innovation can be then the vehicle to address pressing societal challenges (unemployment, brain-drain etc.) and to create an entrepreneurial culture and spirit thus improving citizens' lives.

Greece is going through a time of critical change that will define its future for decades to come. Greek society being in the midst of economic crisis begins to realize that it is not possible to maintain the pre-crisis standard of living and create prospects for economic recovery without a modern production base and coherent development policies.

Investing in the *knowledge triangle* of **education**, **research** and **innovation** – Fig.1 - which reflects the close relationship between these three key elements of development in the modern era, is a **challenge** for Greece to increase competitiveness and reverse the negative economic climate.

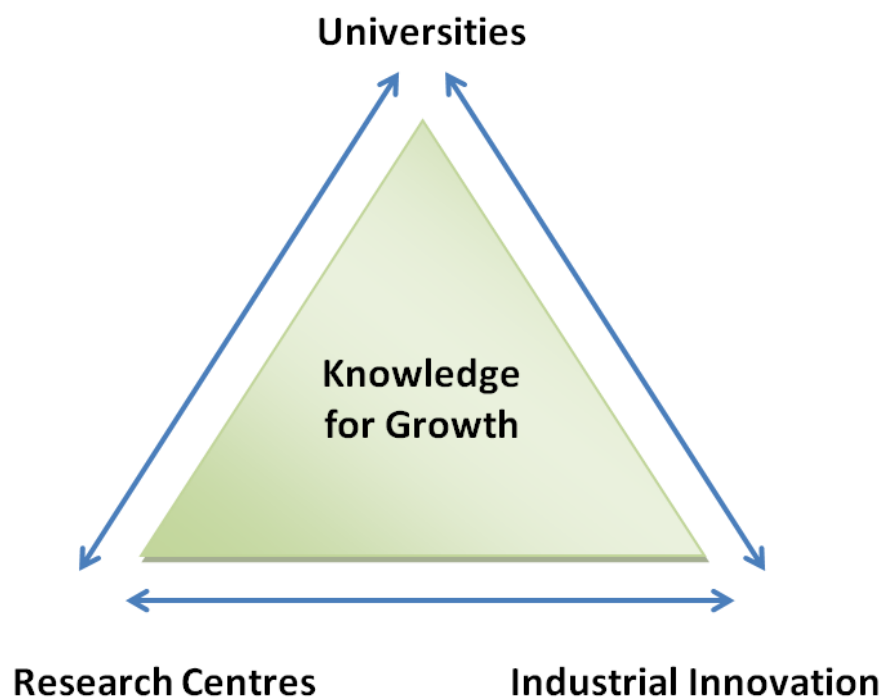


Fig. 1: The knowledge triangle

The contribution of technological research to economic development is indeed crucial, as evidenced by studies of the European Commission, which emphasize on the fact that investment in R & D at 3% of the European average by 2020 could create 3,7 million jobs by 2025.

Moreover, the paramount importance of R & D expenditures of the business sector in the overall economy of a country has been highlighted through a study of the *Hellenic Foundation of Economical and Industrial Studies (IOBE)* - funded by GSRT. The study investigated the relationship of R & D with the pace of economic development in the period 2001 - 2009 for 19 EU countries and concluded that *for every 1% in the rate of change in expenditure for Research and Technological Development in the business sector - about 4 M € in the previous two years - the GDP changed by 0.07% - about 140 M€.*

More specifically:

- Education, Research & Innovation are development components, inextricably linked having not only **sectoral dimensions** but being of an **horizontal nature** as well. They can potentially affect all important economic activities and address societal challenges (industry, agricultural growth, health, culture, energy, environment, tourism, services).
- For the next **Programming Period 2014-2020**, the **European Union** gives particular emphasis on their great potential to increase **competitiveness**, setting eventually the knowledge triangle as major priority of **Europe 2020** strategy (through a *knowledge economy* for growth and jobs).
- For 2014-2020, a considerable part of Structural Funds focuses on Research & Technological Development (RTD) activities (circa €86 billion), while around €80 billion are expected in RTD competitive calls in Horizon 2020.

GSRT's role

Research, Technological Development and Innovation (RTDI) as a common system, form one of the five major strategic objectives of the new Cohesion Policy Programming Period 2014-2020.

In this regard it is worth mentioning that GSRT:

- Works closely since its foundation with the relevant Directorates in European Commission, actively participating in shaping the RTDI component of the Framework Programmes that Greece has been part of since the '80s.
- Promotes R&D extraversion representing the country in International Organizations and implementing Bilateral Programmes with border or other countries of strategic importance.
- Participates in various international Committees and Councils, European Union's *Competitiveness Council* among them, while it is the sole public Authority bearing liability for handling the related dossiers for *Research and Space* sectors.
- Formulates the new *National Strategic Framework for Research and Technology*, identifying and analyzing regions' RTDI specific needs and problems.
- Aims at regional development through Smart Specialization, launching participatory processes involving its own ecosystem, *i.e. Research Centers, Universities, high-tech companies*, along with Regions and Ministries.
- Develops coherent policies for Research, Technological Development & Innovation that provide the basis for a broader and more permanent cooperation platform amongst all stakeholders, thus safeguarding complementarity of activities and avoiding overlaps.
- Supports the creation of critical mass RTDI resources and builds on the specific assets and potentialities of the regions, key prerequisites in essence for the development of innovative technologies and value-added products and services that can compete in global markets.
- Is the Public Authority implementing Thematic Priority 1 (Research & Innovation), appointed by the Ministry of Development & Infrastructures / Secretariat General for Public Investments, the later being institutionally commissioned for drafting the Operational Programmes and for managing Structural Funds for Cohesion Policy.
- Has become responsible for the Research & Innovation Strategies for Smart Specialisation (RIS3), an ex-ante conditionality for future Cohesion Policy investments.
- Either as intermediate or as final beneficiary, it manages considerable public funds, especially those related to the National Strategic Reference Framework (NSRF) or to various Operational Programmes (Sectoral & Regional) and European Funds.
- Has managed the total state funding for the period 2007-2013 amounting to 1.7 billion Euros [Regular State budget + Public Investment Programs (PIP) that co-fund Research Technology and Innovation projects *under the National Strategic Reference Framework*.

- **GSRT supervises National Research Centres and Technological Institutions, geographically distributed in Greece (see Fig. 2 - GSRT Research Institutions geographic spread)**



REGION	INSTITUTES
ATTIKI	15
CENTRAL MACEDONIA	4
CRETE	5
EASTERN MACEDONIA AND THRACE	1
EPIRUS	1
PELOPONNESE	1
THESSALIA	1
WESTERN GREECE	2
WESTERN MACEDONIA	1

Fig. 2: GSRT Research Institutions geographic spread

GSRT’s role is particularly critical in the current circumstances and its obligations are high. Therefore, capitalizing on its organizational structure and accumulated know-how, as well as strengthening its policy-making and programme management & administration capacities, is absolutely essential.

Proposal for an effective policy planning in the field of Research, Technological Development and Innovation

With regard to “Smart Specialization Strategies” that have been set by the Structural Funds as the prerequisites for the funding for Research, Technological Development and Innovation in the next Programming Period 2014-2020, the need for a strong and solid pole for shaping and monitoring National Policies in this area, is indispensable.

In fact GSRT’s administrative and operational capacity along with its ongoing organizational rationalization, definitely empower it to efficiently respond to its demanding role in marshalling the necessary resources and coordinating the RTDI stakeholders in Greece.

The consultation process that has currently been carried out to identify priorities in terms of the Smart Specialization Strategies at national and regional level, brought up the need to explore the foundation of a broader, inter-ministerial body.

It will be consisting of representatives of relevant Ministries and Regions (at the level of General Secretaries or senior authorized state officials) and will be coordinated by the relevant Ministry (Ministry of Education & Religious Affairs, Culture and Sports or/and Ministry of Development, Competitiveness, Infrastructures, Transports and Networks).

The task of the coordination mentioned above falls in the range of GSRT’s competences, as the later has the know-how to be setting RTDI objectives based on actual national & regional societal needs as well as economic development priorities.

This kind of process may be facilitated through inputs and aspirations stemming from its dense, geographically distributed ecosystem of National Research Centers that eventually enrich local communities and economies with multifaceted innovation anchors.

In particular, GSRT with the contribution of the *National Council for Research & Technology (NCRT)* and representatives of a ***federated scheme of the Research and Technology Organisations*** – as briefly described below - will reassess the whole R&D picture in conjunction with the wider strategic priorities and policies of the country.

In a subsequent step GSRT will devise smart specialization policies and will draft both national (*of horizontal scope*) and regional programmes for Research, Technological Development & Innovation.

Such a comprehensive plan will allow development of balanced and coherent research and innovation policies in the country that will eventually mobilize adequate funding from national & regional Public Authorities including Private sector as well. .

Restructuring of the research ecosystem and creation of a flexible organizational structure for Research and Technology organizations

A legislative act is currently being drafted by GSRT to support reshaping of the research ecosystem, creating a *flexible organizational structure* of public interest as a federated umbrella for Research and Technology Organisations; this is expected to lead into synergies and economies of scale, structural networking and increased mobility of researchers as well as better utilization of public infrastructure and resources (bottom up approach). The umbrella organization will sustain the operational autonomy of its entities while encouraging bottom-up teaming in competitive Research and Development calls.

This proposal is meant to consolidate the wider research community in the country and apart from GSRT's constituency, may include organizations such as Institutes of the Academy of Athens, Research Units of Universities and Research Centers supervised by other Ministries (*i.e.* National Agricultural Research Foundation - N.AG.RE.F. -, Center for Renewable Energy Resources - CRES).

Restructuring along these lines will act as a catalyst to promote *innovative synergies* at regional level among RTDI institutions serving as *community anchors* and *innovation poles*. This scheme is believed to create favorable conditions for the private and public sector to join forces towards a high added-value economy of products and services favoring synergies of the knowledge triangle type.

Up-take of innovation in Greece

Innovation is not a privilege of big countries only (USA, Japan, etc) where resources for R&D are abundant; with big research centers and world-class scientists, and corporations with hefty R&D budgets.

Now-days, innovation is taking-up on a world-wide scale. Small countries (Sweden, Finland, Switzerland, etc.) given the right policies, may become innovation leaders with tangible results for their economic growth.

In Greece, GSRT's historical record is inextricably linked to widespread promotion of Innovation and Research.

- The basis for the development of Research and Technology and its linkage with Innovation is set in 1985 under 1558/85 act mandating the merger of Ministry of Research and Technology with the Ministry of Industrial Energy and Natural Resources to the Secretariat General of Research and Technology (GSRT). This era is marked by the implementation of a popular Programme for Developing Industrial Research known as PAVE (more about the PAVE's creation and its implementation through the course of the years can be found in Annex I).

- The inclusion of GSRT in 1996 to the Ministry of Development leads policy making towards connecting research with economic development, innovation, technology transfer via the implementation of novel Programmes.
- Moreover, state-owned companies in specific sectors και Technology Parks are being founded, while research infrastructures and human capital development is being taking place to a large extent in the country.
- The importance of promoting innovation is being clearly reflected in GSRT's 2000-2006 Operational Programme (EPAN I).

EPAN I ran as a basic instrument for competitiveness support and new business creation. In this framework 3.500 projects had been funded, including inter alia:

- Creation of 5 Regional Innovation Poles (Central Macedonia, Western Macedonia, Thessaly, Crete, Western Greece) for the promotion of innovation in sectors pertinent to the regional economies
- Development of the 1st Technology Cluster in microelectronics bringing together rapidly growing hi-tech companies
- Foundation and operation of 7 incubators providing services to 61 knowledge-intensive companies (Athens & Thessaloniki)
- 4 innovative private investments in R&D for the energy sector
- Creation of 33 spin-offs for the commercial exploitation of research results (Forthnet constitutes one of the most successful spin-off example)
- Creation of the world first floating, energy independent desalination platform, with zero emissions - «Hydriada» (2008, first «Regio Stars» Prize).
- Implementation of 123 Research and Development consortia between research and business sector for the creation of innovative products and services and support to 352 companies in production and commerce that run projects in Industrial Research and Technology.
- Support for the creation of Thessaloniki Innovation Zone

Many of the dynamic SMEs and big companies that are active in R&D and Innovation were given support through GSRT's Programmes.

Major players among them, are: Intracom, Intrasoft, Teletel, Marak, Lavifarm, Giotis, Creta farm, Nireas, Delta, Fage, Korres, Apivita, while others (MLS, Velti, Coco Mat etc) are publicly traded in Global Exchange Stock Markets and their innovative products can be found in world markets.

GSRT has also been involved in policy making in the framework of Structural Funds aiming at:

- * *Spin offs/spin outs creation*
- * *Shaping collaboration between research and business sector*
- * *Cluster creation*
- * *Innovation and technology transfer in industrial research*
- * *Foundation of an Innovation fund*

It has thus confirmed its leadership in shaping Innovation Policies in Greece and become highly specialized in human capital terms dealing in particular with State-Aid activities.

Main areas of responsibility

The General Secretariat for Research & Technology:

- Designs the **national policy for Research, Technological Development and Innovation** that is implemented through competitive R&D programs, supporting initiatives from the research & industrial sectors in areas of national strategic importance, crucial for the Greek economy and the citizen's quality of life.
- Ensures the **coherence of Education, Research and Innovation pillars**, supporting the contribution of science and culture in the knowledge economy.
- Supports **research infrastructures promoting excellence within Research Centers** (through state funding to the Research Centers). In parallel, GSRT has recently initiated the drafting of a National Roadmap of Large Scale Research Infrastructures, identifying and promoting synergies with the relevant European ones and opening access to existing national research infrastructures.
- Initiates and supports the **development of specific organizational instruments and infrastructures** (*innovation clusters, innovation poles, incubators, technology parks*) aiming to facilitate knowledge-based entrepreneurship and boost research creativity and innovation.
- Promotes **dissemination of research results and technology transfer to the country's productive sector**, while encouraging the "translation" of research results to high added-value products and services.
- Encourages and promotes the **international outreach of Greek R&D entities** through bilateral cooperation programmes, establishing strategic partnerships with other countries. In parallel, GSRT also supports R&D cooperation with International Organizations (ESA, CERN, EMBL etc).
- Represents Greece to the relevant Institutions of the European Union, promoting **dialogue and synergies with International R&D activities**.
- Supports the **national human research potential** and develops strategies to confront **brain drain** through specific programmes for young researchers.
- Promotes **creation of jobs in businesses** for young, highly qualified scientists aiming to confront unemployment and to boost innovation within the business sector.
- Initiates and supports specific actions aiming to enhance **public awareness and understanding of science** towards the Greek society and beyond.
- Monitors research policy implementation and organizes **evaluation and impact assessment** of RTDI policies.
- Compiles **Science & Technology indicators** at national and regional levels.

The GSRT policy framework for Research and Technological Development covers all the main phases of the innovation cycle (from basic and applied research to the creation of favorable tax framework for research in the private sector, Figure 3 below).

The design of support actions, financial instruments and legal interventions currently focuses towards the optimal use of research results, boosting entrepreneurship through new innovative start-up businesses and supporting them during initial operations, crucial intervention for their survival, largely at stake due to the lack of capital investment (“death valley phase”).

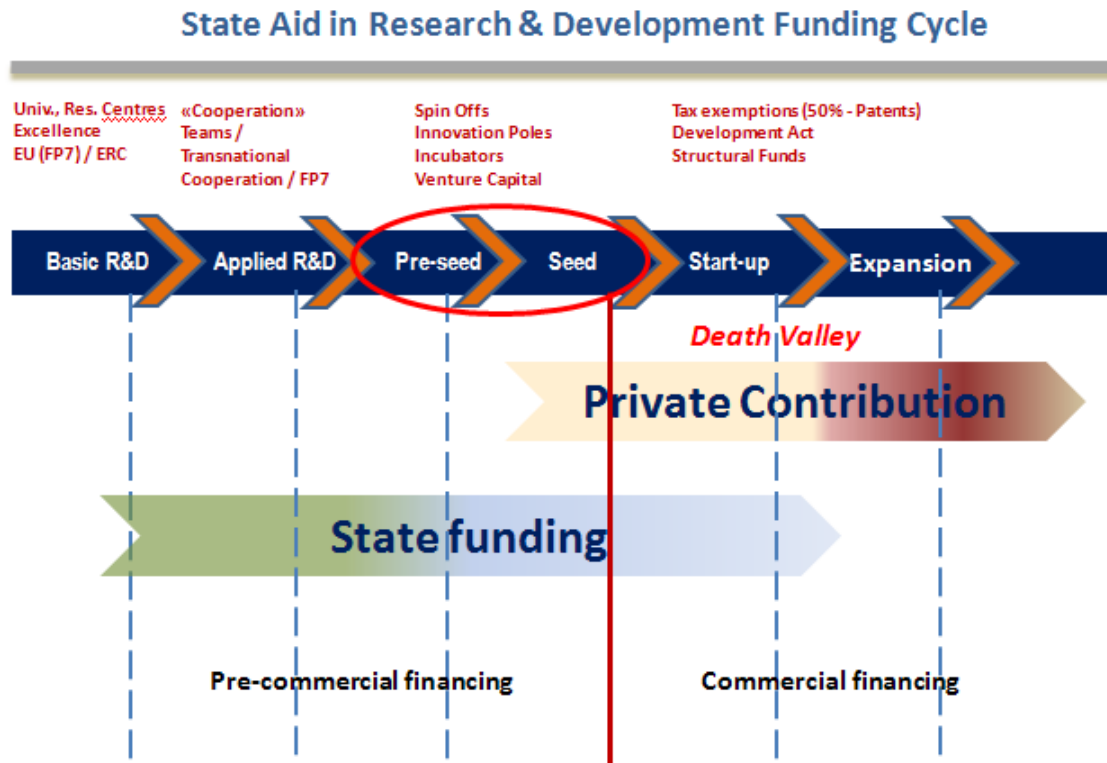


Fig. 3: Innovation cycle and State Intervention

Annex I

GSRT identity

Brief flashback

The following brief flashback, from 1964 to date, on the major events of the Agency's history, provides an understanding of the GSRT's crucial role and its necessity for the future of R&D in Greece and the economic and social growth of the country.

- **1964: the Greek Government** assigns to a Task Force of OECD to study the national system and to submit proposals for the optimal organization and governance of the R&D system.
- **1971:** The findings of the Task Force feed the national policy. The main idea is the creation of a National Council for Research & Technology and of a permanent Secretariat for Research & Technology under the auspices of the Ministry of Coordination. The National Council for Research & Technology and the Agency of Scientific Research & Development are established, in the framework of Law 823/1971. The Agency is initially established directly under the Prime Minister's office, but is then moved under the Ministry of Culture & Science. The Agency's affiliation under the Ministry of Culture & Sciences gives rise to various operational difficulties for the Agency that seems then to survive mainly due to the implementation of bilateral cooperation initiatives, signed and ratified through Parliament. Following the re-establishment of Democracy in 1974 and in view of the accession of Greece into the EEC the need for the creation of an Agency for the overall coordination and funding of the Research sector became apparent
- **1976:** The Prime Minister assigns to a Task Force, comprising mainly of scientists from the USA, the drafting of a new Law for the coordination and funding of Research & Technology for economic development and growth
- **1977:** Law 706/77 establishes the Ministerial Committee for Research & Technology, the National Council for Research & Technology and the Agency for Scientific Research & Technology directly under the Minister for Coordination, facilitating thus the approval of funds for Research. **The main change introduced through this Law was the provisions for funding for specific programmes rather than institutional funds.**
- Further to the provisions of the Law, the first National Programme for Research & Technology (EPET-I) is designed, approved and announced from the Ministerial Committee, in cooperation with all academic, research and financial stakeholders. The Programme included broad infrastructure projects, as well as specific projects in areas of strategic importance for the country.
- Therefore, according to the revised legal framework for R&D founding the General Secretariat for Research & Technology (Law 1514/85) the GSRT has been, since 1985, the only National Agency responsible for the design and implementation of national R&D policy. Over the last 28 years the GSRT is serving this mission, through its highly qualified, experienced staff, with dedication and efficiency, designing and implementing numerous innovative Programmes, highly recognized by the business and research community of the country.

- During the mid '80s, the GSRT is transferred under the auspices of the Ministry of Industry and consequently the R&D policy focuses more towards the needs of the industrial sector. The main policy aims during that period were focused towards the increase of private investments in R&D, the promotion of innovation, technology transfer and the creation of knowledge-based start-ups
- In 2009 GSRT became part of the Ministry of Education, Lifelong Learning and Religious Affairs (currently Ministry of Education and Religious Affairs, Culture and Sports). This marks the State's will to create synergies between the Research & Education common area and Innovation.
- Other parallel initiatives include support of R&D Infrastructures, support of human research potential, legal instruments aiming to facilitate and to simplify the procedures for funding of R&D in enterprises (e.g. Presidential Decree 274/2000, tax exemptions for R&D activities), promotion of entrepreneurship of the research centers, systematic evaluation of Research Centers according to international best practices, implementation of R&D impact assessment studies and regular reporting of national Science & Technology indicators. All these initiatives led to a new reality within the R&D for the public and business sector in Greece, creating a framework of favorable conditions for economic development in the country.

Annex II

GSRT research ecosystem

I: Institutions under Public Law

- ✓ National Center for Scientific Research “DEMOKRITOS” (N.C.S.R.) (www.demokritos.gr)
- ✓ The National Center for Social Research (NCSR) (www.ekke.gr)
- ✓ Hellenic Centre for Marine Research (HCMR) (www.hcmr.gr)
- ✓ National Observatory of Athens (NOA) (www.noa.gr)

II: Institutions under Private Law

- ✓ The National Hellenic Research Foundation (NHRF) (www.eie.gr)
- ✓ Foundation for Research & Technology HELLAS (FORTH) (www.forth.gr)
- ✓ Biomedical Sciences Research Center “Alexander Fleming” (BSRC Fleming) (www.fleming.gr)
- ✓ Greek Foundation for Basic Biological Research “Alexander Fleming ” (GFBBR Fleming) – endowment
- ✓ The Centre for Research & Technology Hellas (CERTH) (www.certh.gr)
 - The Centre for REsearch and TEchnology – THessaly (CE.RE.TE.TH) – as an Institute of CERTH (www.certh.gr)
- ✓ Athena – Research and Innovation Center in Information Communication and Knowledge Technologies (www.athena-innovation.gr)
- ✓ Hellenic Pasteur Institute (HPI) (www.pasteur.gr)

III: Technological Institutions

- ✓ The Greek Atomic Energy Commission (GAEC) (www.eeae.gr)
- ✓ Greek Research and Technology Network S.A. (GRNET) (www.grnet.gr)
- ✓ Science Center and Technology Museum “NOESIS” (www.noesis.edu.gr)