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D7.6

Strategy for Sustainable Development of the Institute of Information and Communication Technologies

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Summary	Deliveralbe D7.6 contains the draft of a Sustainable Development Strategy (SDS) for IICT-BAS that is proposed to the IICT governing bodies (Scientific Council and Director) for consideration and adoption. The SDS is a regulatory document proposed by AComIn in order to enable the innovation capacity development in the institute. Together will all other regulatory documents, proposed by AComIn, SDS provides a consistent normative framework for the development of IICT Innovation potential.
Keywords	continuous long-term improvement of research quality, key priority challenges, implementation measures, indicators for the successful implementation

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Executive Summary

Deliveralbe D7.6 presents a draft **Strategy for Sustainability of the AComIn results**, proposing measures how to sustain the IICT research pace: keeping the employed researchers, running the infrastructure, ensuring proper funding from external projects. Taken more generally, this is a Strategy for Sustainable development (SDS) of IICT as a leading ICT actor in the country.

D7.6 presents the suggested SDS of IICT within the context of the relevant stragetic documents developed in Bulgaria for the period 2014-2020.

The SDS is a regulatory document proposed by AComIn in order to enable the innovation capacity development in the institute. Previous documents elaborated within AComIn and proposed for consideration to the IICT governing bodies (Scientific Council and Director) are:

- *Innovation Strategy* of IICT-BAS, together with Measures and Indicators for successful implementation of the innovation strategy (see D4.1, 30 September 2013);
- *Suggestions for Tuning the IICT-BAS Innovation Strategy to the Best EU Practices* (see D4.1, 30 September 2013);
- Proposal for an *Intellectural Property Policy* of IICT (see D4.2, 31 March 2014);
- Proposal for an IICT *Exploitation and Dissemination Plan* (see D4.2, 31 March 2014).

All these documents, taken as a whole, provide a consistent normative framework for the development of IICT Innovation potential.

Table of Contents

1. INTRODUCTION: PRESENT SITUATION IN BULGARIA

Recently Bulgaria has adopted the following strategic documents for science and innovation:

- [National Research Development Strategy](#)[1] and **Action Plan** for its implementation where the relevant instruments are defined together with performance indicators for successful implementation;
- Research and Innovation Strategy for Smart Specialisation 2020 (**RIS3**)[2] and
- National Roadmap for Research Infrastructures[3]

Science policy of Bulgaria is an area of public policy which is concerned with the policies that affect the conduct of science and research mostly in academic organisations rather than research enterprises.

Funding of science often is in pursuance of other national policy goals such as technological innovation to promote commercial product development, health care, environmental issues etc.

Science policy also refers to the act of applying scientific knowledge and consensus to the development of public policies.

In accordance with the public policy's concern with the well-being of all Bulgarian citizens, the science policy's goal is to consider how science and technology can best serve the society.

The **National Strategy** of Scientific Research adopted in 2010 should facilitate the development of the Bulgarian science by making it a factor for economic development based on knowledge and innovation. It aims at:

- contributing to the transformation of the Bulgarian society into "knowledge society";
- contributing to the development of a national economy based on eco technologies;
- formulating national science policy that will provide opportunities and define prospects for achieving the targets set forth in the Bulgaria 2020 Strategy[4], and
- contributing to the creation of an integrated European research area.

The National Strategy of Scientific Research has been developed within the concept of research, technological development and innovation being the drivers of the knowledge-based economy. It is consistent with the objectives of the RIS3 Strategy of Bulgaria and proposes measures for increasing the competitiveness of Bulgarian enterprises by:

- strengthening the scientific capacity;
- introducing joint financial instruments for support of science and innovation and
- building centers of competence in priority areas in economy.

The vision of RIS3 brings out two main strategic objectives, which are mutually complementary and suggest strengthening the synergies between sustainable and smart growth, namely:

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[1] http://www.mon.bg/?go=page&pageId=74&subpageId=143, adopted 12.08.2011; and its updated version adopted by the Council of Ministers on 30.10.2014
[2] Version 09/09/2014, http://www.mi.government.bg/files/useruploads/files/ris3_09_09_2014.pdf
[3] http://www.mon.bg/?go=page&pageId=74&subpageId=143, adopted by the Council of Ministers on 21.09.2010
[4] http://www.strategy.bg/StrategicDocuments/View.aspx?lang=bg-BG&Id=765 adopted by the Council of Ministers on 20.12.2012

Vision: By 2020, Bulgaria should pass from the group of "*modest innovators*" to the group of "*moderate innovators*" by achieving:
- **Objective 1**: Focus on innovation potential in the identified thematic areas (the creation and development of new technologies, leading to competitive advantages and increase in the added value of domestic products and services) and
- **Objective 2**: Support innovation for resource efficiency and ICT applications in the enterprises throughout the whole industry (for accelerated absorption of technologies).

According the RIS3 Bulgaria should focus its efforts to improve performance in four main sectors:
- *(i)* Informatics and Information and Communication Technologies,
- *(ii)* Mechatronics and Clean Technologies (which includes electro-, energy storage, robotics and software development for the purpose),
- *(iii)* Healthy Living and Biotechnology and
- *(iv)* New Technologies in Creative and Recreational Industries (including radio, television, cinema, music, architecture and design, specialised clothing and equipment).

At the national level the Strategies provide the scientific organisations, universities and the whole academic research community with the necessary framework where they can formulate their Strategies, Policies, Regulations and Plans for participation in national R&D activities, by giving priority to funding of programs. However no academic organisation in Bulgaria has adopted research or innovation strategies, let alone ones for sustainable development.

2. MAPPING BETWEEN THE IICT MISSION AND THE OBJECTIVES OF THE STRATEGIC DOCUMENTS ADOPTED IN BULGARIA

IICT as a leading research organisation in the field of ICT has the following mission assigned in 2010 according to the decision of the General assembly of Bulgarian Academy of Sciences:
- to carry out fundamental and applied research in computer science, information and communication technologies
- to develop innovative interdisciplinary applications based on ICT.

IICT attains its mission following several priorities in the field of ICT, also defined in 2010:
- *(i)* Development and management of the national electronic infrastructures;
- *(ii)* Supercomputer and grid applications in ecology, medicine and high technology; Decision-making in risk and early warning for natural disasters;
- *(iii)* Intelligent communication systems and services; Web-based technologies and services; Wireless communications; Sensor networks and applications;
- *(iv)* Parallel methods and algorithms for computing tasks with large dimensions and high computational complexity;
- *(v)* Built-in intelligent devices and technologies; Modeling and Optimisation in dynamic and hierarchical information networks and computer systems;
- *(vi)* Detection, evaluation, and signal processing; Pattern recognition and biometric identification; Information processing in sensory environment; Semantic and language technologies;
- *(vii)* Technologies for knowledge processing and knowledge management; Technology for discrete, continuous and multi-criteria optimisation and decision making under uncertainty; Technologies for personalised learning.

In this way IICT's activities are positioned exactly in the sector which is a priority for both the National Strategy of Scientific Research and the RIS3 Strategy. This is a great opportuny but also a challenging responsibility for the institute that is the leading national performer in ICT.

Currently it is necessary to elaborate the institute's Policies, Strategies and Action plans and to provide the related organisational structure.

After the development of the IICT Innovation strategy in 2013 the time has come to develop a **Strategy for sustainable development of IICT** following its mission and other adopted policies and strategies.

3. DEFINITIONS

A ***Sustainable Development Strategy*** *is a package of applicable principles, relevant existing institutional, national and international action programs, agreements, and instruments, as well as implementation approaches, for achieving **sustainable development** of the Institute of Information and Communication Technologies.*

Sustainable development *is development that meets the needs of the present without compromising the ability of future generations to meet the Institute's own needs. It comprises two key concepts:*
- *the concept of needs, in particular the essential needs of IICT to be a leading and competitive research institute in the field of ICT, to which overriding priority should be given; and*
- *the idea of limitations imposed by the state through the national science policy, innovation and science strategy or the institutional resources, organisation and management on IICT's ability to meet present and future needs.*

All definitions of sustainable development require that IICT is considered as a system - a system that connects space; and a system that connects time.

When IICT is considered as a system over space, it has to be understood that the ICT developments in North America affect ICT in Asia, and that in turn changes the life in Latin America in Australia or wherever. The condition of the ICT education in universities in Bulgaria or in other countries also affects ICT in the country and IICT, too. And when the ICT world is considered as a system over time, one has to realize that the decisions taken by the former management of the institute continue affecting the research practice today; and that the science policies and management principles, which are applied today, will have an impact on the institute's competitiveness in the future.

4. OUTLINE

The overall aim of the IICT Sustainable Development Strategy is to identify and develop actions so to enable the management of the institute to achieve a continuous long-term improvement in the quality of research through the creation of sustainable science communities able to:

- manage and use research resources efficiently,
- tap in the innovation potential of the economy and
- in the end ensure research competitiveness of the institute, renewal of the scientific staff and prosperity of the national economy in general.

The strategy sets overall objectives and concrete actions in order to overcome five key priority challenges in the coming period until 2020:

- High quality of scientific research carried out by IICT;
- Renewal of scientific staff;
- Maintaining high level competitive scientific infrastructure and resources;
- Effective exploitation and commercialisation of the obtained research results;
- Realisation of the IICT innovation potential.

To improve synergies and reduce trade-offs, a more integrated approach to policy making is proposed, based on better regulation (impact assessments) and on the guiding principles for sustainable development. The external dimension of sustainable development (e.g. global resource use, international development concerns) is factored into the institute's internal policy making and through integration of SD considerations in IICT's external policies.

The IICT SDS proposes mechanisms for improving the coordination with all levels of the institute's departments and calls upon business, NGOs and citizens to become more involved in working for IICT's sustainable development. An example of this is the launch of a process for voluntary peer reviews of the institutional sustainable development strategy, aimed at improving the realisation the SDS through sharing of good practices. This could be achieved with the support of the AComIn external evaluators who will be selected by the EC after the workpackages WP1-WP5 compele their tasks.

Public finances for Research and Education are viewed as important instruments that facilitate the successful implementation of the transition to a more sustainable academia-industry collaboration as well as the scientific cooperation between academic partners. Since monitoring and follow-up are crucial for effective implementation, the updates and tunning of the SD strategy need a strong governance cycle. It is recommended that every two years IICT produces a progress report on the implementation of the Strategy. This report will form the basis for discussions at the Scientific Council, which will give guidance for the next steps to be implemented.

5. ROLE OF EXTERNAL PARTNERS WHO SUPPORT THE SDS

IICT needs strong partnership connections to be able to implement the SDS. External partners have various roles:

International academic partners enable research capacity growth and participation in internationally funded research and innovation projects such as the Horizon 2020, etc.

Industrial partners take part in collaborative research projects or ensure contracted research services and projects.

Pro-innovative organisations such as technology parks, clusters, technology transfer centers, NGOs, etc. enable partnership in pro-innovative activities creating favorable environment for competitive scientific research and innovations.

Partners from the public sector ensure exploitation the scientific results in all society fields, such as health, culture, history, etc.

6. MEASURES FOR IMPLEMENTING THE IICT SDS

Measures in five dimensions are proposed, as indicators for the successful implementation of SDS:

A. Knowledge and IP Management

(i) Establishing and keeping an up to date register of the background knowledge obtained in IICT;

(ii) Elaboration of short- and long-term plans for the management of IICT foreground knowledge;

(iii) Development of a technology transfer Policy and Regulations;

(iv) Development of exploitation Strategy and Plans to commercialise the obtained research results and the existing knowledge;

(v) Development of a licensing Policy and Strategy as well as a Policy and Plan for establishing spin-out, spin-off and other high tech companies.

B. Staff Reproduction and Management

(i) Elaborating PhD programs and attracting highly motivated Ph.D. students;

(ii) Announcing Post-doc positions as a mechanism to attract the prospective scientific researchers for competitive scientific research and staff reproduction;

(iii) Promoting scientific and innovation leadership so as to form the scientific leaders able to create and head research groups in ICT;

(iv) Attracting foreign researchers and scientists to increase the competitiveness of the institute's staff;

(v) Create greater staff retention – a commitment to innovation can motivate and retain skilled staff through providing the staff with a challenging and creative environment.

C. Research Infrastructure

(i) Supporting the necessary and competitive scientific and innovation infrastructure;

(ii) Training the appointed staff to work effectively with the research related infrastructure;

(iii) Development of short- and long-term plan for investment in research infrastructure;

(iv) Development of an Exploitation strategy plan concerning the IICT's research infrastructure.

D. IICT Integration in Scientific, Innovative and Social Communities

(i) Participation in pro-innovative structures such as clusters, technology parks, competence and technology centers or incubators;

(ii) Participation and membership in scientific networks and societies;

(iii) Signing bilateral agreements with scientific, industrial and other partners;

(iv) Participation in national and European expert groups, scientific and innovation councils.

E. Institutional Management and Effective Organisation of the IICT's activity.

(i) Integration of all strategies into the intuitional regulations;

(ii) Availability of a mechanism for monitoring the implementation of all strategies and shortening the long-term plans;

(iii) Promoting the participation in national and international research programs through scientific or innovative projects;

(iv) Implementing regular procedures for risk management – risk analysis and building contingency plans;

(v) Developing and applying a Code of Ethics.

7. INDICATORS FOR SUCCESSFUL IMPLEMENTATION OF IICT'S SUSTAINABLE DEVELOPMENT STRATEGY

7.1. QUALITATIVE INDICATORS:

(i) Presence of a register of background knowledge;

(ii) Presence of a short- or long-term plan for the necessary foreground knowledge to obtain;

(iii) Presence of Technology Transfer Policy and Regulations and their integration in IICT's regulations;

(iv) Presence of an Exploitation strategy and Plan to commercialise the obtained research results and the existing knowledge;

(v) Presence of a Licensing policy and Strategy and Policy and plan for establishing spin-out, spin-off and other high technology companies;

(vi) Presence of elaborated yearly risk analysis and contingency plan;

(vii) Elaborated medium-term PhD programme;

(viii) Developed medium-term schedule of post-doc positions to be filled;

(ix) Average age of the scientists and its 3- and 5-years trend;

(x) Presence of an elaborated and accepted Code of Ethics.

7.2. QUANTATIVE INDICATORS

(i) Number of scientific, innovative, market-oriented and supported by industry projects through partnerships with the state administration, scientific institutions and companies funded by the National Innovation Fund, the Operational Program Innovation and Competitiveness as well as by EUROSTARS;

(ii) Number of innovative and market-oriented projects through partnerships and supported by companies or use of the research infrastructure;

(iii) Number of start-ups, spin-off or high technology companies created by IICT;

(iv) Number of clusters in which IICT is a member;

(v) Number of Technology Parks in which IICT takes part;

(vi) Number of Awards (stimuli, bonuses) given by IICT to the scientific and innovation leaders (after elaboration of suitable award indicators);

(vii) Number of post-doc researchers hired per year;

(viii) Number of PhD Students per year;

(ix) Number of foreign scientists employed in the IICT;

(x) Number of scientific councils, expert councils, expert peer review groups, etc. where IICT or its employees are members;

(xi) Number of scientific or innovative projects funded by national and international research programs;

(xii) Total amount of external funding attracted to IICT through the funded projects and contracts. The 3-year and 5-year trend of the total amount of funding attracted.

8. REFERENCE DOCUMENTS

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