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"Research, Technology and Regional Policy in an Enlarging Europe"

Background document prepared by the:

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Main themes / issues:

◇ *Role and importance of research and technology in country and economy with basic indicators*



Republic of Serbia

Age	Population - 2004			Structure (%) - 2004		
	All	Male	Female	All	Male	Female
Total	7463157	3629194	3833963	100.00	100.00	100.00
0-14	1183100	606477	576623	15.85	16.71	15.04
0-19	1662029	851716	810313	22.27	23.47	21.14
20-39	1993328	1003006	990322	26.7	27.6	25.8
40-59	2139833	1051488	1088345	28.7	29.0	28.4
65+	1271594	537649	733945	17.04	14.81	19.14

Year	2000	2001	2002	2003	2004
Population age 15+ Unemployment rate (%)	12.09	12.23	13.28	14.63	18.50

	2001	2002	2003	2004	2005
Employment	2101668	2066721	2041395	2050854	2068964
Gross Domestic Product (USD, EUR)	Year	2001	2001	2002	2003
GDP mill. USD		8050,0	9426,8	10968,0	15075,7
GDP pc USD		1071,0	1256,3	1459,5	2001,4
GDP mill. EUR		...	11916,6	15149,2	16838,0
GDP pc EUR		...	1588,2	2015,8	2235,4

Source: Statistical Office of the Republic of Serbia, Belgrade, 2006.

Year 2004	GERD	BERD	HERD	GOVERD
% of GDP	0.5	0.073	0.177	0.25

S&T system in the Republic of Serbia – Year 2004

Field of science	Type of organizations	Number of organizations	Number of employees	Number of researchers
		Abs.	(Persons)	(Persons)
Natural sciences and Mathematical sciences	RDI	10	1679	1001
	RDU	3	184	69
	HEO	12	1568	975
	Subtotal	25	3431	2045
Technical sciences	RDI	17	3121	650
	RDU	13	924	240
	HEO	19	3757	2362
	Subtotal	49	7802	3252
Medical sciences	RDI	2	1031	139
	RDU	5	65	29
	HEO	6	3043	2118
	Subtotal	13	4139	2286
Agricultural sciences	RDI	12	1386	315
	RDU	6	94	25
	HEO	4	1168	659
	Subtotal	22	2648	999
Social sciences	RDI	9	263	178
	RDU		0	0
	HEO	23	2531	1721
	Subtotal	32	2794	1899
Humanities	RDI	6	176	151
	RDU	1	5	5
	HEO	10	1132	775
	Subtotal	17	1313	931
Multidisciplinary sciences	RDI	1	62	53
	RDU	1	62	17
	HEO	3	234	155
	Subtotal	5	358	225
All sciences	RDI	57	7718	2487
	RDU	29	1334	385
	HEO	77	13433	8765
Total S&T system		163	22485	11637

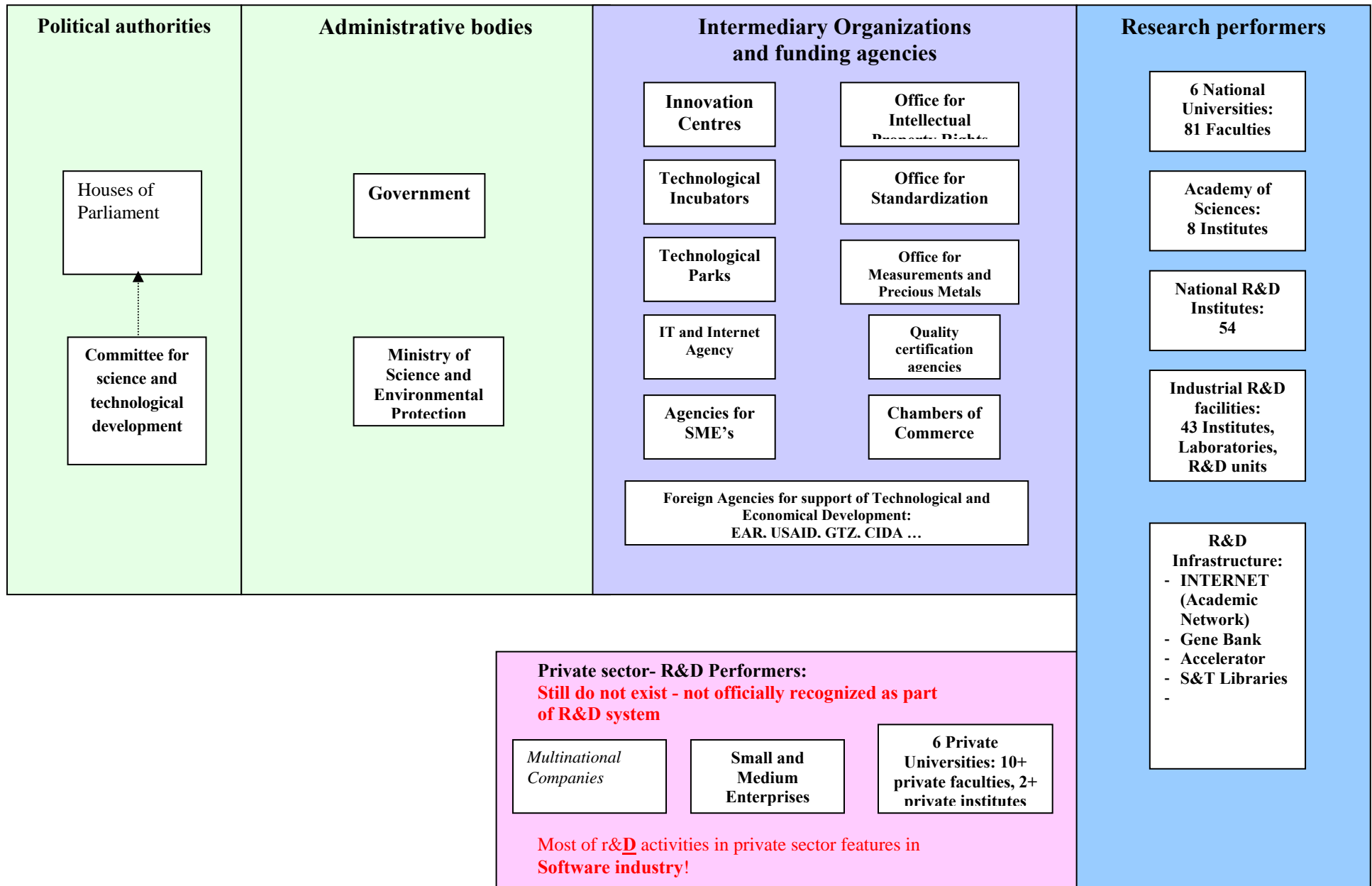
Source: *Statistical bulletin: "Institutions of Scientific-Technological Development", Statistical Office of the Republic of Serbia, Belgrade, 2006.*

Available data for National Innovation Capacity Indicators – Year 2004 or nearest

Indicator		Serbia	Bulgaria	Romania	EU25	EU15
Absorptive capacity						
1	S&E graduates (% 20–29 population)	6.7	11.7	5.8	11.5	12.5
2	Population with 3rd level education	17.3	21.3	9.6	21.2	21.8
3	Participation in life-long learning	4.1	1.4	1.3	9.0	9.7
4	Employment medium/high-tech	4.3	4.66	5.32	6.60	7.10
5	Employment high-tech services	1.9	2.69	1.45	3.19	3.49
R&D supply						
1	Public R&D expenditures (% GDP)	0.427	0.4	0.15	0.67	0.69
2	Business R&D expenditures (% GDP)	0.073	0.09	0.23	1.27	1.30
3	R&D personnel per labour force – Number of researchers per 1.000 employees	5.67		2.1		
4	EPO high-tech patents (per 1m pop)	–	0.6	0.2	26.0	30.9
5	USPTO high-tech patents (per 1m pop)	–	0.1	0.0	9.4	11.2
6	Resident patents per capita (per 1m pop)	44	38	66	–	–
Diffusion						
1	<i>Training enterprises as % of all enterprises</i>					
2	<i>CVT (continuous vocational training) in % of labor costs of all enterprises</i>					
3	<i>ISO 9000 certifications per per capita</i>					
4	<i>Internet users per 10,000 inhabitants</i>					
5	<i>PC per 100 inhabitants</i>					
6	<i>ICT expenditures (% GDP)</i>					
Demand (finance/competition/macroeconomic stability)						
1	<i>Stock market capitalization in % GDP</i>					
2	<i>Domestic credit provided by banking sector</i>					
3	<i>Share of FDI in GDP</i>					
4	<i>Share of trade in GDP</i>					

Sources: EC, Ministry of Economy of the Republic of Serbia.

S&T System in Serbia



◇ *Challenges both for policy and economic actors in the present situation and the future*

Besides the strategic vision, that the Republic of Serbia must become a middle-range, internationally competitive developed European economy via a successful National Innovation System, and the respective innovation policy aims, the “Science and Technology and Innovation Policy for the Republic of Serbia” document proposes main devotions for the use of R&D resources in Serbia, including among others:

- ◇ Knowledge and R&D to have a significant impact on the national economy and prosperity of the country;
- ◇ Optimal utilization of R&D resources targeting the GDP growth;
- ◇ Incentives for applied research and technology development (industrial R&D);
- ◇ New mechanisms for knowledge transfer from knowledge sources to implementations in society;
- ◇ Support of industrial R&D, and national programs for national problems;
- ◇ R&D according to the national development strategy and market needs;
- ◇ New mechanisms for direct knowledge and technology transfer from universities to market
- ◇ Business incubators, start ups & spin-offs, S&T parks;
- ◇ High priority to the quality of R&D projects – International peer review of proposals, impose the competition and competitive criteria, quality metrics;
- ◇ Encouragement of international R&D collaborations.

◇ *Main goals from the perspective of European integration*

Highlights from the “Science and Technology and Innovation Policy for the Republic of Serbia” (document prepared by former S&T Minister, never adopted by the government, but only available policy paper at the moment) – main objectives are:

1. Increase of contribution of R&D to the development of economy and society in Serbia;
2. Support for R&D activities must be on competitive base;
3. Engagement of domestic R&D resources in international R&D activities;
4. Fostering Industry – Science relations – Transfer of knowledge and technologies from R&D sector into economy and society;
5. Reduction of brain-drain from the country.

Innovation Policy main aims are:

1. Development of innovative society where knowledge and development of innovation must become basis for economical development;
2. Development of National Innovation System, which will stimulate application of existing and new knowledge and technologies, as well as development of new products and processes for internationally competitive Serbian economy;
3. Derivation of competitive, commercially applicable R&D results with minimum costs;
4. Development of export oriented manufacturing industries and services, based on knowledge, for dynamic growth of GDP;
5. Creation of incentive environment for development of innovation and qualitative R&D work, useful for development of economy and society in Serbia;
6. Sustainable development of economy and society in Serbia.

Main focuses of proposed Innovation policy are:

1. Companies are main actors of NIS – innovation are generated and used there. Government support for technological development must be directed to industrial enterprises. Development of innovative products and processes will be co-financed up to 50% of total innovation project costs;
2. Government will support establishment of new technology based small and medium sized firms (NTBF) through creation of technology incubators and financing of risk capital public funds;
3. Traditional industries must be revitalized through transfer of technologies and knowledge, and support of export-oriented production. Special attention will be given to restructuring of big public companies;
4. Government will support development of transfer institutions (such as: innovation centers, technology incubators, centers for transfer of technologies, etc.), which task is transfer of R&D results from R&D organizations into production of internationally competitive innovative products;
5. R&D activities must be adapted to development needs of economy and society. Therefore, applied research and technological development activities will have higher priority, Basic research activities will be supported if they are needed for accomplishment of development aims, i.e. if they create knowledge, inventions and human resources for applied research and technological development. Minimum 50% of total R&D budget must be allocated for technological development in industry;
6. Public financing will go only to R&D activities adjusted to national R&D priorities. Industrial enterprises must cover minimum 50% of total R&D project costs;

Realization of this Innovation policy implies changes in treatment of R&D activities in Serbian economy:

1. R&D must enable development of internationally competitive products and enhancement of competitiveness of Serbian economy, therefore, R&D should be treated as investment, not as public expense;
2. Public expenditure for R&D must reached minimum 1% of GDP;
3. Council for development must be established as government body responsible for coordination of activities for realization of S&T and Innovation Policy between ministries and other institutions, and creation of legal documents, plans, instruments and programmes.

◇ *Regional aspects of research and technology activities*

THE TRANSVISION BLUEPRINT – Bridging neighboring regions belonging to different jurisdictions, i.e., historically and culturally close regions divided by national borders

The **South East Foresight Triangle** (See ForesightT): a most promising integration project involving many actors within the territories of the future Europe Union including the **Great Southern Plain Region (Hungary), RDA West (Romania), and Vojvodina (Serbia)**.

What lessons have been learnt from the elaboration of the TRANSVISION Blueprint?

Proposals for joint foresight exercise in SeeForesightT area:

Foresight exercises will identify actors, technological and managerial and marketing capabilities, the opportunities as well as the necessary conditions for promoting the development of selected industries/sectors/technologies, which will support the technological, economical and social development of the region.

1. Digital integration of SeeForesightT area into the EU information society

The Promotion of Regional Cooperation in the Software (SW) Industry – main project issues:

- ◇ education and training for SW industry;
- ◇ incubation of SW business and companies;
- ◇ Investment in SW industry.

Activities should include:

- ◇ a feasibility study on the establishment of Regional centre(s) for the education and training of human resources for SW engineering professionals in the region;
- ◇ the incubation of technologies and business in SW engineering, which could support the development of other, non-ICT related sectors and services;
- ◇ the education and certification of SW professionals;
- ◇ The mobilization of pools of potential investors for SW engineering businesses.

2. Biotechnologies for better health and sustainable development of SeeForesightT area

Promotion of regional cooperation in biotechnologies (BT) – main project issues:

- ◇ research and technological development (RTD) in BT;
- ◇ incubation of BT business and companies;
- ◇ investment in BT Industry;
- ◇ Early Warning Infrastructure in health and sustainable development issues.

Activities should include:

- ◇ integration of the regional RTD resources through joint RTD programmes and projects under FP6 and other EU RTD activities, which could support the development of the region and integration into ERA;
- ◇ incubation of technologies and businesses in the biotechnology sector;
- ◇ mobilization of pools of potential investors in BT businesses in the region;
- ◇ establishment of Early Warning Infrastructure in order to prevent the spread of health problems and diseases related to the deterioration of the environment and to pandemics;

- ◇ *Potentials for cooperation in an enlarged Europe with special emphasis on South-Eastern Europe*

TECHNOLOGY FORESIGHT IN PRE-ACCESSION COUNTRIES

1. NEED & RELEVANCE:

Technology foresight (TF) is methodology used for identification of future needs in economy and society in order to make right, as much as possible, allocation of available R&D resources in country. TF is widely used, in developed countries, but in majority of developing and undeveloped countries it remain **mystery** although these countries desperately needs selective approach and wise suggestions what and how to do research and technology development (RTD) which will integrate limited national resources. Without TF and usually with trial and error planning approach, catching-up process last longer, wastes money and human efforts.

2. SCALE OF AMBITION & CRITICAL MASS:

Possible TF exercise in Serbia, as well as in other pre-accession Balkan countries should include three research activities:

1. Best practice approach for introducing TF methodology in Balkan countries, as a **tool** for development of National Innovation System (NIS); and as a **process**, which will help integration of Balkan countries into European Research Area (ERA).

This comprises analysis of different TF approaches, used by OECD/EU member countries. One of the main outcomes of this analysis should be proposal of TF methodology, modified and adapted to contributing countries. Full cooperation with authorities, researchers and TF experts from relevant EU member countries is precondition for successful realization of this phase;

2. Identification of the fields of particular interest for future development of the Balkan economies and societies where RTD activities could make substantial contribution, based on domestic resources and desirable cooperation with partners within EU;

Proposed TF methodology should be launched as national TF programme, implemented as joint activity between national TF programme teams and team of experts for TF methodology implementation from relevant EU member countries. Main condition for realization of this phase is adoption of TF methodology by responsible country's authorities, therefore, as high level policy issue. EU should be involved in negotiation and preparation phase. Results of this phase must be: (a) thorough analysis of country's human and other resources, (b) highly reduced set of national developmental priorities, probability of their realization is most reliable, (c) foreseen of future national development path, which is based on the presumption of sooner, as much as possible, integration into EU and permanent cooperation with countries in region and other EU member countries;

3. Diffusion of TF processes into society as precondition for democratization of decision-making process in country's NIS.

Parallel with previous phase, intensive promotion of TF principles, philosophy and way of thinking and perception of future development should take place in RTD community, but also in other relevant socio-economic segments in contributing countries. This phase should be treated as an important part of democratization processes in those countries, in which decision-making process in RTD sector must involve not only largest part of RTD community as possible, but also other segments of society, which could be affected by RTD activities. Awareness of the size and strength of the existing resources and

information of RTD activities effects and achievements must become available to all people, without restrictions and mystifications.

3. INTEGRATION:

Regional approach in realization of abovementioned three phases is more likely to be implemented, having in mind differences within contributing countries.

Rationality comprises:

- (a) implementation of particular methodological instruments, better suited for some regions,
- (b) involvement of regional RTD institutions and individuals and public authorities,
- (c) Formation of national TF findings as a compromised summation of regional priorities rather than centralized approach which is usually without bases in real life circumstances.

4. EDUCATION; PANELS; INTERNATIONALIZATION:

- ◇ *Educational approach* is the second broad aspect of the proposed project. Because of absence of TF activities in contributing countries, project team should be instructed and supported by TF experts from relevant EU member countries, as well as education of RTD community will take place during the project realization.
- ◇ *Sectoral and/or panel approach* is the way how particular TF activities should be organized for analysis of country's potential and future needs, as well as the way for involvement of key participants in TF exercises.
- ◇ Finally, last but not least, *international dimension* must be stressed, either as joint project for contributing countries, but also as project were experts and institutions from EU member countries or Commissions authorities must take serious part.