DG Research

Monitoring Policy and Research Activities on Science in Society in Europe (MASIS)

National Report, SLOVENIA

December 2011

COWI

COWI A/S

Parallelvej 2
DK-2800 Kongens Lyngby
Denmark

Tel+45 45 97 22 11
Fax +45 45 97 22 12
www.cowi.com

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Written by

Stojan Sorčan

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0 Introduction

The EU recognises the importance of ensuring that European research and research in Member States is firmly rooted in the needs of society, particularly in light of the constantly changing Europe. Efforts to reinforce the societal dimension of research are channelled through the 'Science in society' (SIS) programme. The SIS programme supports activities focusing on the governance of the research system, research ethics, public engagement in science, women in science and the promotion of scientific education and science communication.

The Monitoring Policy and Research Activities on Science in Society in Europe (MASIS) initiative is a major undertaking under the SIS programme. Its aim is to map, steer and monitor the SIS landscape in the European Research Area (ERA) (http://ec.europa.eu/research/era/index_en.htm), in order for EU citizens and society to benefit the most from SIS efforts. MASIS also covers the eleven Associated Countries.

The national MASIS reports are cornerstones in this endeavour, as they contain the knowledge gathered by a network of national correspondents on SIS. The reports will be updated every six months. The reporting format was developed on the basis of advice from the network of national correspondents, as well as discussions with authors of the initial MASIS report (see this LINK, ftp://ftp.cordis.europa.eu/pub/fp7/sis/docs/sis_masis_report_en.pdf). In addition, the Commission and a network of national validators offered comments and advice.

In total, 38 national reports covering 38 (EU and associated) countries have been produced. This is the report on Slovenia. It consists of four main sections:

1. National context
2. Priority setting, governance and use of science in policy-making
3. Research related to SIS
4. Activities related to SIS
5. The Fukushima accident.

The intention of this report is to provide a good general overview of the SIS situation in Slovenia, including public engagement in science, different models and use of scientific advice and expertise for policy-making, activities related to assessment and ethical issues of science and technology, SIS research activities and scientific culture as well as trends, policies, actors and activities. The last

chapter on the Fukushima accident was added later to the original report and contains information on the national coverage and the role of scientific advice in connection with the accident.

Please note, in accordance with the terms of reference for the MASIS project, that the issue of 'women in science' is **not included** in the mapping as this has been extensively mapped and reported in other European projects. Please note also that the present report follows the initial MASIS report in using the term 'science' in its broadest sense, as in the German 'Wissenschaft', covering also the social, economic and human sciences. A few subsections are concerned only with the natural sciences, and in these cases it is explicitly indicated.

Statistical data sheet, Slovenia

	2000	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*EU27 average/total, 2008*
Research and development								
Gross domestic expenditure on R&D (GERD), in % of GDP[1]	1,39	1,44	1,56	1,45	1,66	-	-	1,89
GERD by source of funds, % of total GERD[1]:								
- Business enterprise sector	53,3	54,8	59,3	58,3	62,8	-	-	55,0
- Government sector	40,0	37,2	34,4	35,6	31,3	-	-	33,5
- Higher education sector	0,4	0,7	0,3	0,4	0,3	-	-	0,9
- Private non-profit sector	0,0	0,0	0,2	0,0	0,0	-	-	1,6
- Abroad	6,2	7,3	5,8	5,8	5,6	-	-	8,9
GPD (million current PPP $)	34756	47007	49869	53614	56339	51938	52442	15285005
Total researchers (FTE) per thousand labour force	4,5	5,2	5,7	6,0	6,8	-	-	6,3
Total researchers (FTE) per thousand total employment	4,8	5,5	6,1	6,3	7,1	-	-	6,6
Gross Domestic Expenditure on R&D -- GERD (million current PPP $)	482,1	674,9	776,9	776,3	936,0	-	-	276734,4
Public R&D expenditures (% of GDP)	0,59	0,59	0,62	0,60	0,58*	0,56*	-	0,66*
Business R&D expenditures (% of GDP)	0,78	0,85	0,94	0,94	0,94*	0,94*	-	1,16*
Number of R&D personnel[1], % 1000	9,5	9,5	10,2	10,5	11,6	-	-	
Number of R&D personnel by sector of performance[1], % of total R&D personnel:	8.568	8.994	9.793	10.369	11.594	-	-	2.455.192
- Business enterprise sector	48%	48%	49%	51%	54%	-	-	52%

	2000	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*EU27 average/total, 2008*
- Government sector	30%	28%	29%	30%	28%	-	-	14%
- Higher education sector	20%	23%	22%	19%	18%	-	-	33%
- Private non-profit sector	2%	0%	0%	0%	0%	-	-	1%
Innovation indicators								
- S&E and SSH graduates per 1000 population aged 20-29	-	36,4	41,0	46,2*	52,1*	-	-	41,5*
- S&E and SSH doctorate graduates per 1000 population aged 25-34	0,72	0,97	0,96	0,95*	0,94*	-	-	1,26*
- Public-private co-publications per million population	-	35,0	21,4	-	-	-	-	-
- SMEs introducing product or process innovations (% of SMEs)	-	31,7**	31,7	31,7*	31,7*	-	-	32,0*
- Employment in medium-high & high-tech manufacturing (% of workforce)	8,69	9,67	8,67	9,09	9,53*	9,99*	-	6,78*
- Employment in knowledge-intensive services (% of workforce)	9,32	10,54	10,59	10,89	11,20*	11,52*	-	14,80*
Patents								
Patent applications to the EPO, total[2]	51	108	113	122	-	-	-	
Patent grants at the USPTO, total[2]	-	-	-	-	-	-	-	
Triadic patent families, total[2]	7	17	17	18	-	-	-	
Patent applications filed under the PCT, total[2]								
Human resources in science and technology								

	2000	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*EU27 average/total, 2008*
Total, % of labour force[1]	11	15	16	17	17	-	-	16
- Scientists and engineers, % of labour force[1]	-	3,7	3,7	-	-	-	-	-
Networks and projects								
National share of FP6 SiS budget	-	1%	1%	0%	-	-	-	-
No. of FP6 SiS projects managed in Slovenia	-	6	8	0	-	-	-	-
National share of FP7 SiS budget	-	-	-	0%	1%	5%	-	-
No. of FP7 SiS projects managed in Slovenia	-	-	-	0	3	4	-	-
Tertiary/higher education								
Students at ISCED levels 5-6 enrolled in the following fields: science, mathematics, computing, engineering, manufacturing, construction - as % of all students[1]	23,5	21,2	21,1	22,3	-	-		24,9[4]
Academic staff (ISCED 5-6), total in full time unit[1]								
Public Understanding of Science (only 2005 og 2010 data) se pdf dokumenterne								
% of population very interested in new scientific discoveries and technological developments	-	27	-	-	-	-	28	
% of population very well informed about new scientific discoveries and technological developments	-	9	-	-	-	-	10	

	2000	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*EU27 average/total, 2008*
% op population regularly or occasionally attend public meetings or debates about science and technology	-	9	-	-	-	-	6	
% op population regularly or occasionally sign petitions or join street demonstrations on matters of nuclear power, biotechnology or the environment	-	7	-	-	-	-	9	
% of population 'agree' and % of population 'disagree' that thanks to science and technology, there will be more opportunities for future generations	-	61/15	-	-	-	-	61/15	
% of population 'agree' and % of population 'disagree' that science makes our ways of life change too fast	-	76/10	-	-	-	-	74/13	
% of population 'agree' and % of population 'disagree' that we depend too much on science and not enough on faith	-	31/39	-	-	-	-	29/45	
% of population 'agree' and % of population 'disagree' that because of their knowledge, scientists have a power that makes them dangerous	-	59/23	-	-	-	-	67/18	
% of population 'agree' and % of population 'disagree' that in my daily life, it is not important to know about science	-	33/50	-	-	-	-	34/47	

Notes: 1) Data from EUROSTAT, 2) Data from the OECD, 3) Data from EuroBarometer 73.1 (2010) and EB 63.1 (2005) 4) Data from 2007

*: extrapolation of data

**: imputed data

1 National context

This section sets the scene and describes political developments, public debates and policy initiatives of major relevance to the place of science in society in Slovenia.

1.1 The place of science in society - current debates

In the last five years public and political debates in Slovenia were focused primarily on the questions related to the (1) national research and development (R&D) and higher-education (H-E) strategy, (2) innovation activities, (3) evaluation of research quality, (4) role of public research organisations and (5) use of scientific knowledge for sustainable development. The main issues of the above mentioned themes we could elaborate more precisely as follows:

1 National R&D and H&E strategies:

- importance of R&D and H&E development for national economy and quality of life,
- appropriate definition of national R&D and H&E goals and their implementation,
- national R&D priority-settings,
- gap between the stock of knowledge and its applications and commercialization,
- correlation between investment in knowledge and economic growth,
- promotion of natural and engineering sciences,
- status and role of social and humanists sciences and its impact to the national development.

Debates have taken place mostly in academic and political arenas. Some of the ideas have taken place continuously through many years with a relatively high intensity and citizens have primarily been informed.

2 Innovation activities of industry and transfer of knowledge:

- R&D cooperation between different actors in innovation processes (government, higher-education sector and business companies),
- mechanisms for coordination of innovation activities,
- instruments for bridge the gap between public and private R&D sectors,

- intermediary institutions for support of knowledge transfer (agencies, parks, platforms, incubators, centres of excellence…)
- evaluation criteria's for stimulating transfer and commercialization of knowledge,
- mobility of researchers,
- education of young researchers for economy,
- stimulating business companies (especially SME's) for innovation activities,
- fiscal and tax stimulations for investment in innovations.

Debates have taken place mostly in public and political arenas. Some of the ideas have taken place continuously through many years with a different intensity and citizens have primarily been informed.

3 Assessment and evaluation of research quality:

- independency and transparency of assessment/evaluation system and conflict of interests,
- use of bibliometrics and different techniques for research proposals ranking,
- introduction of international peer review system,
- international quality ranking of Slovenian universities.

Debates have taken place mostly in academic arenas. Some of the ideas have taken place continuously through many years with low intensity and citizens have not been informed enough.

4 Role of public research organisations:

- re-definition of public research organisations missions in the national innovation system,
- applied oriented role of public research organisations,
- re-constitution of management boards in public research organisations where government representatives have majority of votes,
- government pressures toward autonomy of public research organisations,
- non-stimulating system of the salaries for commercialization of science in public research organisations.

Debates have taken place mostly in political and academic arenas. Some of the ideas have taken place continuously through many years with low intensity and citizens have not been informed enough.

5 Use of scientific knowledge for sustainable development:

- new environmental technologies,
- impact of science on the climate changes,
- energy, transport, biotechnologies and food safety.

Debates have taken place mostly in public and academc arenas. Some of the ideas have taken place continuously through many years with a low intensity and citizens have primarily been informed.

1.2 Policy goals and priorities

As a result of analysis of Slovenian science policy processes we can identify some of the most important policy initiative and reforms over the last 5 years which have important impact on the relationship between science and society as follows: (1) Resolution of National Research and Development Programme, (2) R&D priority-setting and (3) promotion of research cooperation and mobility.

1. The most important policy reform in the last 5 years was definitively the adoption and implementation of the Resolution of the National Research and Development Programme for the 2006-2010 period[1] (NRDP). According to the Law on Research and Development (2002) the NRDP is the basic document, specifying the R&D policy, its objectives and priorities, the stakeholders, scope and means of financing and assessments criteria. The NRDP is in full accordance with document Reform Programme for Achieving the Lisbon Strategy Goals and it provides specific activities to achieve the Lisbon strategy goals.

The objectives of NRDP are as follows: (a) enhancing the influence of R&D in Slovenia, (b) improving the effectiveness of investments and the quality of results, (c) increasing investments, (d) strengthening human resources, developing a supportive environment, (e) increasing the number of high-tech and innovative companies. Better integration of the education and R&D system along with fiscal policies should facilitate the technological restructuring of the business sector towards higher value added. The document cite the 3 % Lisbon target and count on the business sector to increase even more dynamically its investment in R&D.

One of the positive impacts of the above mentioned goals we can see in a relatively high share of public and business investments in R&D[2]. Positive changes are shown in the structure of financing of R&D towards strengthening the role of the business sector as a result of economic policy measures (changes in tax). Some other positive impacts we can also find in a several new bridging institutions as well as in established support scheme for human resources (Young Researchers for Economy). As a result of an assessment system reform we could underline the positive trend of rising science quality and particularly the impact factor of Slovenian scientific articles relative to world[3]. The improvement of quality and excellence in knowledge production has been one of the major goals of the current NRDP. The assessment of socio-economic relevance of re-

[1]Source: NRDP (2006 – 2010); http://www.mvzt.gov.si/fileadmin/mvzt.gov.si/pageuploads/pdf/znanost/ang_verzija/NRDP.pdf

[2] Source: Statistical Office of the Republic of Slovenia (2010); http://www.stat.si/doc/statinf/23-si-086-1001.pdf

[3] Source: Bibliometric Indicators; http://www.arrs.gov.si/en/analize/biblio/

search was also introduced, but based only on the indicator of generated additional resources from non-budget sources.

There are also some negative impacts of the above mentioned goals of NRDP which are resulted in a low rate of successfully implemented measures. Slovenia is facing with a slow process of restructuring of R&D system. There are some problems related to insufficient transfer of knowledge, low innovation activities among small companies, lack of cooperation and coordination between different actors as well as fragmentation of R&D system.

2. Definition of R&D priorities are defined in the NRDP, but remain relatively broad (they follows rather closely the priorities set in the EU 6th Framework Programme): information and communication technologies, advanced (new) synthetic metal and non-metal materials and nano-technologies, complex systems and innovative technologies, technologies for sustainable development and health and life sciences. Slovenian research priorities are also those themes which have specific importance for the Slovenian society, culture and national identity.

The current funding of Slovenian research pays more attention to scientific excellence *per se* then to the selection of specific priorities. Within a particular scientific field, priorities are mostly determined by the scientific community itself ("bottom-up system") on the basis of peer review of submitted project proposals. For that reason the governmental *Office for Growth and EU affairs* planned to take relatively broadly defined R&D priorities a step further with establishment of the National Competitiveness Council. Its main objective was stimulated of technological development in Slovenia by selection of research and technology areas within the priorities defined in strategic government documents and to enable the concentration of resources and search for synergies among the selected fields. Established R&D priorities by mentioned governmental Office were not implementing into actual policy. The main reason could lay into recent activities for preparation of a new RD strategy in Slovenia.

The past years have been marked with numerous attempts for identification of narrower thematic priority fields. Additional guidelines have been elaborated on the basis of the evaluation for the Call on Centres of excellence (2009) which involved evaluations by national and by foreign experts that had taken into account societal implications and qualities of the public research sphere and its cooperating enterprises. On the basis of the mentioned studies the Government took a decision on seven narrow priority fields for the Competence centres[4].

The prior efforts point to the future development of specialization fields in Slovenia. Instead of on a basis of a top-down decision that could have been made

[4]In the past two years, over 130 MEUR from public funds were awarded to 15 priority fields. In agreement and complementary to those fields, eight industrial sectors have been pointed out and supported with 185 MEUR within the framework for Development Centres of the Slovene Economy.

by government, the development of smart specialization fields has been established as a permanent and open process that involves all the key stakeholders[5].

3. Promotion of research cooperation and mobility is another important development process in the last 5 years in Slovenia. Closer cooperation between public R&D institutions, universities and the business sector is a challenge recognised in current policy documents. They call for the improvement of available instruments and the introduction of new support measures. During last 5 years Slovenia has established a rather complex set of support institutions, with the objectives to stimulate cooperation and mobility. Some of the measures for which the policy makers hope will attract firms that do not yet perform R&D are the co-financing of interdisciplinary R&D teams as well as the mobility schemes. The mobility scheme provides for co-financing of the salaries of the researchers who have been working in public research organisations and are to move to business sector. In addition, it encourages the transfer of highly-skilled personnel from large enterprises to the small ones, where they lack sufficient personnel of their own to be able to implement R&D projects.

We should also mention the relatively successful measure which aims at establishing bridge between research sphere and enterprises through young researchers. Young researchers are conducted in collaboration with mentors who may come from higher education organisations or the economy and thus promote a more permanent collaboration between enterprises and higher education organisations. Doctoral studies on themes which are of relevance to enterprises will contribute to strengthening links with institutions of knowledge; enterprises will acquire new fundamental knowledge in their relevant fields and activity through the implementation of research, which at the same time enables young researchers to meet the conditions necessary for obtaining a doctorate. Also, the activities in the area of R&D and innovation promotion (exhibits, annual Innovation forums and innovation awards) and support to organisations promotion innovation are aimed at stimulation firms to consider R&D activity.

4. Preparation of new national Master plans in the field of research and innovation as well as in the field of higher education for the period 2011-2020. Research and Innovation Strategy of Slovenia (RISS)[6] and the National Higher Education Master Plan (NHEMP)[7] are a 10-years programme for achieving social objectives such as improved living standards for all and improved quality

[5] Source: A draft of Research and innovation strategy for Slovenia 2011-2020, Draft for public consultation; http://www.mvzt.gov.si/fileadmin/mvzt.gov.si/pageuploads/pdf/odnosi_z_javnostmi/RISS_ENG.pdf

[6] Source: A draft of Research and innovation strategy for Slovenia 2011-2020, Draft for public consultation; http://www.mvzt.gov.si/fileadmin/mvzt.gov.si/pageuploads/pdf/odnosi_z_javnostmi/RISS_ENG.pdf

[7] Source: A draft of the National Higher Education Master Plan 2011-2020 offered for public debate; http://www.mvzt.gov.si/fileadmin/mvzt.gov.si/pageuploads/pdf/odnosi_z_javnostmi/14.10._NPVS.pdf

of life on the basis of knowledge society. This will be achieved through the establishment of modern higher-education, innovation and research system, which will contribute to increased knowledge, address societal challenges raise value added per employee and provide quality jobs and living environments. Both documents are based on the Development Strategy of Slovenia and Europe 2020 and they constitute the "knowledge triangle", which is at the heart of the strategic reflection on the future development of the Slovenian and global society. Thus, Slovenia is positioning higher education, research and innovation in the core of development ambitions of the Republic of Slovenia.

In 2020, Slovenian higher education area will rest on four main pillars supporting the role of higher education in a knowledge-based society. These four pillars will in turn base on two grounds. The two connecting grounds, which support the pillars, are the appropriate structure of studies and higher education system and a modernised system of financing, which takes into account quality and promotes achievement of goals of the National Higher Education Development Programme. The pillars are: diversification, bringing a variety of types and missions of higher education institutions and study programmes for reaching of types and missions of higher education institutions and study programmes for reaching all of the goals of higher education; internationalisation or openness to the international environment, which is necessary for higher education institutions in the present global environment; quality, which is crucial for internationally comparable and recognised higher education, employability and mobility of graduates, both within Europe and worldwide; social dimension, which will allow equitable access to higher education and conditions for completion of studies.

By 2020, a responsive research and innovation system, co-created by all stakeholders and open to the world, will be created. This system will be firmly entrenched in society, be in its service, will respond to the needs and ambitions of the citizens and facilitate the solutions of major societal challenges of the future. The gap between research, education and innovation will be overcome, their common denominator being partnership, lifelong learning, new knowledge and sustainable development.

1.3 National challenges, opportunities and trajectories

Current debates about science in Slovenian society are primarily determined by the specific development of science in transition period after the independency of Slovenia (1991). At that time Slovenia has already achieved relatively good international reputation in majority of scientific fields. Slovenia was developing R&D capacities after the Second World War very systematically. In the beginning of the ninetieth Slovenia had a well structured research system with two universities, strong governmental and developed business R&D sector. Slovenia doubled its budget for science for introducing of young researchers into science career just few years before the declared independency of Slovenia.

After the independency Slovenia formulated its R&D strategy very enthusiastic. Slovenia emphasised the scientific excellence, transfer of knowledge, edu-

cation of top-quality researchers and integration into the European Union. Slovenian policy managed to preserve its R&D system relatively untouched. The majority of larger government research institutes survived, but some of the R&D departments in industry were closed. The institutional framework of innovation policy has gone through several changes which search for the most efficient structure of R&D system. Each of the past government elections had brought forward new ideas and debates on how the best organise the government to be more manageable and supportive to science, technology and innovation. But the majority of the declared ideas were not finding the appropriate way to its effective implementations because of the different reasons. The most important ones are laying in insufficient budgetary funds and in science policy mechanisms which are not up to date with societal demands for faster technologically oriented economic growth in Slovenia.

Since the establishment of the Slovenian State, we have been witness to great changes in the areas of higher education, research and development. Past achievements and knowledge of Slovenian science in all areas are encouraging and represent an appropriate starting point for further development. The number of scientific publications in relation to public investment in R&D puts Slovenia above the average of EU-27.

But in comparison with selected countries of the European Union or with the OECD countries, Slovenia lags behind considerably in terms of expenditure on higher education and also on research and development. Similarly, we note fundamentally lower expenditure on tertiary education when compared to primary or secondary education. Among public funding for Slovenian higher education, we devote a relatively high share to social transfer for students, particularly in comparison with some other countries. The efficiency of the Slovenian higher education is, with regards to high student's dropout and large social transfer particularly because of the influence on the labour market.

Slovenia lag behind also in other areas related to higher education, for example, "knowledge-based services", innovation, patent and other innovation achievements, both in comparison with other countries of the EU and OECD. R&D spending in Slovenia is still below the EU27 average. Indicators reflect low innovation capacity. European innovation scoreboard[8] ranks Slovenia among the innovation followers, with most indicators close to the European average.

The share of research funding in the higher education sector is, in comparison with the government research sector among the lowest in the European Union. At the same time, we note that at universities is a proportionally high share of applicative research when compared to basic scientific research. The systemic separation of the higher education, scientific and technological development is evident.

The global crises in 2008 has revealed a number of structural weaknesses, particularly the fact that GDP growth in Slovenia is too depend on low technology

[8]Source: European innovation scoreboard; http://ec.europa.eu/enterprise/newsroom/cf/itemlongdetail.cfm?item_id=4139

industries and traditional services, which limit the competitiveness of the economy. In this, we are relying on human capital and knowledge, which are fundamental values and wealth of Slovenia of the future. For development of the knowledge society, further development of all areas of science is needed, as they address the societal challenges from complementary angles. In addition, it is essential to encourage partnership between academia, industry and society, allowing the development of new knowledge and technologies that are closely associated with future societal needs.

2 Priority setting, governance and use of science in policy-making

This section focuses on the different actors involved in shaping the relationship between science and society and the processes for governing science at national level. This includes government initiatives, institutions and organizations as well as public involvement and policy-making processes at all levels related to science and technology.

Different themes will be elaborated in the Slovenian context, including ethics in science and technology, equality, diversity and inclusiveness in scientific institutions, and ethnic or social minority groups in scientific contexts and careers. Moreover, this section will highlight actors in science communication and technology assessment. Public involvement in science and technology decision-making as well as the use of science in policy-making at the national level will be covered in this section.

2.1 Public engagement in priority setting

2.1.1 Formalised procedures for citizen involvement

Slovenia has a few very weak formalised procedures for citizen involvement in priority setting and assessment activities with regard to science and technology.

One of the basic principles of the National Research and Development Programme (2006-2010) is the openness of R&D towards general public. The document calls for cooperation of R&D institutions with different publics. It stressed also an importance of transparency of all R&D decisions. Transparency of criteria, procedures and results of R&D is one of the top priorities in Slovenia. With complete information about the procedure and its elements institutions is under the constant scrutiny of public and therefore forced to optimise its work.

Direct involvement of citizen in R&D institutions we can find in The Science and Technology Council. It is top advisory body of the Government of Republic of Slovenia with members from the research community, higher-educational institutions, the business community, the government and public. It recommends to the government the key priorities and objectives for the National Research and Development Programme, monitors the implementation of the research policy, suggests to the government eventual changes in the science and

technology policy and issues its opinion on all other questions of relevance for R&D. Members shall be proposed by research organisations, universities and independent higher education institutions, the Slovenian Academy of Sciences and Arts, business and expert associations and other non-governmental organisations. Six Council members shall be appointed by the Government from among researchers so that all the sciences are represented, six members are appointed from those involved in technological development and representatives of companies, one member from the general public and one member as a representative of the main trade unions in the area of R&D.

So, representatives of citizens are formally included in the key national bodies which make advices, assessments and decisions related to the R&D in Slovenia. But in reality the voice of citizens in R&D bodies is not very distinctive and powerful. Citizen involvement in the fields of R&D has been facing mainly with two general problems. Firstly the distinction between citizen and expert role of person in R&D bodies has not been often so clear. The basic criteria for appointed someone to the R&D body has been laying mostly in the expert status of person. The civil society mostly does not have articulated specific interests or demands and clear positions or statements towards the particular issues which are on the agendas of R&D bodies. Therefore it seems that recognised expert position of representatives of civil society in R&D bodies is highly appreciated in Slovenia.

The second problem has been laying in the type of issues which are on the agendas of R&D bodies. Those issues have not been containing substantial questions of scientific research and relevant social and other impacts of R&D results. The agendas of R&D bodies in Slovenia show us that are more or less policy oriented towards strategic, normative and organisational questions of R&D development which rarely contain debates about social implications of specific R&D activities. Decisions about funding of particular R&D priorities are mostly determined by the scientific community itself on the basis of science quality criteria and peer review of submitted research proposals.

2.1.2 Citizen- or CSO-initiated activities with political impact

Citizens in Slovenia are generally informed about R&D decisions and developments. Public transparency of R&D decisions is one of the main principles of Slovenian R&D policy. Slovenian citizens are formally involved in some processes of R&D decision making. As we mentioned above they are part of key national bodies which make advices, assessments and decisions related to the R&D in Slovenia. Finally, the NRDP as a main strategic and policy document in the field of R&D is discussed and approved by the Slovenian parliament. There are many obstacles in R&D culture and system which hinder Slovenian citizens to realise their potential interests and demands.

We can identify researcher's union[9] and student organisations as very motivate groups of civil society into public discussions about R&D issues. They are in-

[9] http://www.sviz.si/eng/

terested mostly on themes which determine their social status. Regarding other areas of R&D where the level of citizens' engagement in public debate is particularly high we can identify all aspects of innovation and technology development issues. But we can not find any specific examples of citizen initiated activities that have had a strong impact on decisions related to science and technology.

We should mention that only activities in this field we can find in the field of genetically modified organisms where activities against them (GMO-free) are very wide spread. We have the Slovenian Biosafety Portal[10] which is the central Slovenian website on biosafety with the use and handling of genetically modified organisms (GMOs). On the Slovenian Biosafety Portal, we provide information on the biosafety system (legislation, competent authorities, supervision) in Slovenia, which ensures the protection of the environment and people's health with the use of GMOs.

2.1.3 Importance of upstream engagement

The discussions about different approaches to public engagement have not been very important in Slovenia yet. The system as we have it now does not allow possibilities to involve citizens at early stages in S&T development of specific research initiatives or projects. Citizens have opportunity to discuss general priorities which should be relevant for Slovenian R&D development, but decisions about funding the particular R&D initiatives are in hands of scientific or technological experts.

The awareness of social impact of science in Slovenia is not very present. On the general level it is understandable that national innovation capabilities are crucial for future development of Slovenian society. But on the level of particular individual research projects that kind of awareness is not so clear. Ex-post evaluation and assessment of specific social impacts of research projects are not well developed in Slovenia.

2.2 Public - private interaction

Public-private partnership is a relative novelty in Slovenia. Public-Private Partnership Act came into force in March 2007. While support to business R&D is high on the government's priority list in the strategic documents, the actual allocation of R&D funds shows that most of the public resources are still directed to R&D government and higher education sector. Gradual increase of funds for programmes, stimulating greater business R&D, has occurred already in last two years. To stimulate more cooperation, different mechanisms where resources are available to either business R&D subject to cooperation with the public R&D, or vice versa, where public research institutions get extra resources in the case they prove cooperation with business have been employed over last years. As examples of such relationships in the field of R&D, the for-

[10] http://www.biotechnology-gmo.gov.si/index.php?id=2&L=1

mation of clusters, technology centres and, more recently centres of excellence and technology platforms can be mentioned.

Support for technology centres is one of the oldest instruments in Slovenia. This measure aims at promoting companies to connect within the framework of technology centres and joint operations in the R&D field. Within the measure, technology centres are stimulated to implement research and development project.

A more recent instrument to support the establishment of Technology Platforms was modelled after the EU instrument and is one more attempt to increase science-industry linkages. The purpose of the measure is to support R&D projects within Technology platforms. Their formation is, by the rule, taking place in fields where a connection at the EU level has been made, and where in Slovenia the critical mass of knowledge and a high level of interest in the application of such knowledge for productive purposes already exists, given a simultaneous opportunity for the dissemination of applicability and accessibility of new technologies to all other fields where such technology in or is going to be needed.

Centres of Excellence have been supported from 2004 on. Centres combine research potential at different national research units with research units in the business sector. They have been supported for research and research infrastructure by EU structural funds. It is more suited for larger projects which have up till now not been present in the field of R&D. The current model of centres of excellence provides high participation of business sector in setting the R&D priorities and thus helps in changing the orientation of basic research toward higher level of relevance for Slovenian economic and technology development.

Implicitly, one could also list mobility schemes, young researchers for economy and applied research projects with co-funding from business enterprise as a sort of public-private partnership.

2.3 Use of science in policy making

2.3.1 Formal procedures and advisory bodies involved

The complexity of decision-making process needs scientific support in different levels of governance. On the governmental level Slovenia has established different advisory councils for specific tasks of ministries where a lot of prominent researchers have participated. Slovenia does not have any general and formalised rule or procedure for using scientific knowledge and advice in policy making process. But there are many areas of governance where different acts regulate procedures for creation specific advisory governmental bodies and use of expert's advices.

In the area of science and technology policy The Council for Science and Technology is the top advisory body.

Procedure for nomination the last Council is as follow: Ministry for Higher Education, Science and Technology issued a public call for nomination of members of the next Science and Technology Council. Research organisations, Higher-education Institutes, business associations as well as interested public were invited to put forward names of potential members. Final selection from the proposed candidates was made by the Minister of Higher Education, Science and Technology and the new Council appointed by the government in January 2010.

The Council for Science and Technology is an advisory body of the Slovenian government with a task to give proposals to the government in the area of science and technology policy. This implies also the preparation of the basic orientations of the NRDP, which is to be prepared by the Ministry of Higher Education, Science and Technology every five years. The Science and Technology Council recommends to the government the key priorities and objectives for the five-year NRDP, monitors the implementation of the research policy, suggests to the government eventual changes in the S&T policy and issues its opinion on all other issues of relevance for R&D.

2.3.2 Trends at national level

The use of research and scientific advice in policy making in Slovenia has been growing rapidly. This trend we could monitor in different ways. Here I will briefly show research system for advice in policy making with some quantitative data about numbers of research reports for different government areas which have intention to advice and improve decision-making process in the level of ministries.

In Slovenia we have a specific Target Research Programmes (TRP) which represents a system created in 2001 for inter-sectoral cooperation in planning and implementing networked R&D projects for specific areas of public interest. They represent a special form of research programme with which the Ministry for Higher Education, Science and Technology intends to contribute to setting and implementing strategic development objectives for Slovenia in cooperation with other ministries and other interested users, in order to improve Slovenia's competitive capacity. The aim of a TRP is to ensure target-oriented research support for the following: (1) the preparation of long-term development planning documents and systemic solutions for their implementation at the national level, and for priority areas at the individual, inter-sectoral, and inter-departmental or inter-ministerial levels; (2) monitoring and evaluating the implementation of the basic policies from these documents and systemic solutions; (3) adapting or amending their objectives and implementing measures with respect to changing circumstances in the domestic and/or international environment. TRPs are implemented taking into account interdisciplinary, multidisciplinary and inter-institutional dimensions. Each Ministry was able to specify its specific needs in terms of research and consultancy support for policy formulation and had dedicated special resources for this purpose. The main objectives of the Targeted Research Programmes were on one hand to increase the sophistication of policy-making and on the other to engage research potential

more directly on the topics of economic and social development. The programme also enabled several monitoring and policy -evaluation projects in different policy areas.

These means that we had quantitatively last year (2009) approximately 400 targeted research projects in the following areas:

- Economic competitiveness and faster growth (57 projects),
- Knowledge based society, education, R&D (65 projects),
- An efficient and less expensive state (7 projects),
- A modern welfare state and higher employment (8 projects),
- Integration of measures to achieve sustainable development (183 projects),
- Science for Peace and Security (85 projects).

2.4 Key actors

2.4.1 Ethics in science and technology

Name of actor and web link	Type of actor	Sector	Influence on public opinion	Influence on political decision
National Medical Ethics Commite http://www.kme-nmc.si/	Ethicy council	Public	Extremely influential	Very influential
Slovenian Academy of Sciences and Arts http://www.sazu.si/en/	National academy	Public	Extremely influential	Very influential
Kvarkadabra – on-line newspaper http://www.kvarkadabra.net/index.php	Media	Private	Somewhat influential	Not very influential
Civil Movement for Equty and Development http://www.gibanje.org/	Civil society	Private	Somewhat influential	Not very influential
Slovenian Evaluation Society http://www.sdeval.si/Vsebina/Slovenian-Evaluation-Society.html	Professional SiS practionars	Private	Not very influential	Not very influential

2.4.2 Equality, diversity and inclusiveness in scientific institutions and in educational systems

Name of actor and web link	Type of actor	Sector	Influence on public opinion	Influence on political decision
Society for Young Researchers http://www.drustvo-dmrs.si/povezave.html	Civil society	Private	Somewhat influential	Not very influential
Education, Science and Culture Trade Union of Slovenia http://www2.sviz.si/eng/	Trade unions	Public	Extremely influential	Very influential
Committee for defence of higher education and scientific research http://www.oovzd.com/	Civil society	Public	Somewhat influential	Somewhat influential
The Slovenian Science Foundation	Professional	Mixed	Somewhat	Not very influential

http://www.szf.si/?lang=en	SiS practionars		influential	
Student organisation of Slovenia http://www.studentska.org/	Civil society	Private	Extremely influential	Very influential

2.4.3 Science communication

Name of actor and web link	Type of actor	Domestic of foreign	Influence on political initiatives
The Slovenian Science Foundation http://www.szf.si/?lang=en	Professional SiS practionars	Domestic	Not very influential
Newspaper DELO http://www.delo.si	Media	Domestic	Very influential
Slovenian Research Agency http://www.arrs.gov.si/en/dobrodoslica.asp	Government	Domestic	Very influential
House of Experiment http://www.h-e.si/index.php?lang=en	Private	Domestic	Not very influential
Ministry of Higher Education, Science and Technology http://www.mvzt.gov.si/en	Government	Domestic	Extremely infulential

2.4.4 Technology assessment

Name of actor and web link	Type of actor	Sector	Influence on public opinion	Influence on political decision
University of Ljubljana, Faculty of Social Sciences http://www.fdv.uni-lj.si/English/Office_IC/	Universities	Public	Not very influential	Very influential
The Institute for economic research http://www.ier.si/index.php	Research institute	Public	Not very influential	Very influential
Slovenian Technology Agency http://www.tia.si/	Government	Public	Not very influential	Not very influential
Institute for Innovation and Development of University of Ljubljana http://www.iri.uni-lj.si/iri-introduction/	Universities	Public	Not very influential	Not very influential

3 Research related to Science in Society

This section is concerned with research activities related to science in society. The purpose is to describe the efforts in Slovenia, including the SIS research being undertaken and how SIS issues are embedded in mainstream research. The section will also elaborate on how SIS research is being funded and what the scale of funding is.

A distinction is made between *SIS research* on the one hand and *SIS issues embedded in mainstream research* on the other. SIS research are the studies particularly targeting public understanding of science, governance of science, science policy, science education, science communication, ethics in science and technology, the reciprocal relations of science and culture, young people and science and similar issues. However, SIS issues may also be present in other research activities, in which the main objectives of research are *not* SIS related issues, but in which SIS practices or perspectives are embedded. This could include studies within the natural sciences which apply innovative or extensive use of public involvement in the research process, new ways of communicating research results, ambitious efforts to bring ethical and societal issues into research, innovative ways of involving a variety of stakeholders (politicians, NGOs, industry, social scientists etc.). Such efforts are referred to as SIS issues embedded in mainstream research.

The section provides examples of Slovenian research projects and funding programmes related to SIS, cross-cutting and emerging themes of SIS. Moreover, the role of SIS in evaluative practices of research programmes and institutions are elaborated.

It should be noted that this section is concerned with mapping research activities which are **not fully EU funded**. The subsections are concerned with national as well as international research efforts, but not activities funded solely under the European framework programs. Such research activities are already well-documented elsewhere.

3.1 Research on Science in Society

3.1.1 Research projects

Name of project	Local, national or cross-country	Institutions participating	Budget and founding source	Field of study
Factors of knowledge transfer from academic institutions into business companies and role of intermediate institutions, Franc Mali	National	University of Ljubljana, Faculty of Social Sciences; Institute for Economic Research	50.000 €, Slovenian Research Agency; Ministry of the Economy	Sociology of science, science of science policy, economy of science
Effectiveness of governmental instruments for promotion of innovation and technology development, Maja Bučar	National	University of Ljubljana, Faculty of Social Sciences; Institute for Economic Research	60.000 €, Ministry of Higher Education, Science and Technology, Slovenian Research Agency	Science of science policy, economy of science, sociology of science
Importance of social capital for young researchers, Anuška Ferligoj	National	University of Ljubljana, Faculty of Social Sciences	50.000 €, Ministry of Higher Education, Science and Technology, Slovenian Research Agency	Social methodology, sociology of science, sociology
Technology foresight and R&D priorities in Slovenia, Peter Stanovnik	National	Institute for Economic Research; University of Ljubljana, Faculty of Social Sciences; University of Primorska, Faculty of Management	20.000 €, Slovenian Research Agency; Ministry of the Economy	Economy of science, science of science policy, management of science
Brain drain in Slovenia, Milena Bevc	National	Institute for Economic Research; University of Ljubljana, Faculty of Economics	70.000 €, Ministry of Higher Education, Science and Technology, Slovenian Research Agency	Economy of science
Analysis of research policy instrument, Slavko Dolinšek	National	Institute for Innovation and Development of University of Ljubljana	38.000 €, Slovenian Research Agency	Interdisciplinary research, sociology of science
Measuring of R&D potential in the field of ICT in Slovenia, Berce Jaroslav	National	University of Ljubljana, Faculty of Social Sciences; Institute for Economic Research	86.000€, Slovenian Research Agency	Sociology, economy
Peer reviews system and	National	Biomedical Research	75.000 €, Slovenian	Information science

bibliometric method in Slovenia, Primož Južnič		and Innovative Society	Research Agency	and librarianship

3.1.2 Trends in research

Science and Technology Studies (STS) as research field dealing with the social aspects of science and technology have reached in the last two and half decades in Slovenia the important progress. In spite of small number of scientists specialized in STS topics, the field has contributed to some interesting empirical and theoretical insights in functioning of science and technology in Slovenia. There is no doubt that the experts in field of STS are working on problems that are today intellectually the most challenging and interesting for transitional societies. The beginning of research work in field of STS in Slovenia was the establishment of Centre for Social Studies of Science. The Centre has been established in 1980 at The Faculty for Sociology, Political Science and Journalism. (The Faculty for Sociology, Political Science and Journalism renamed in the beginning of 90s in Faculty of Social Sciences.) The small group of philosophers and social scientists began to conduct the first long-range research projects in field of STS. At Centre for Social Studies of Science, in period from 1982 onwards different long-range and empirical based studies have been made. Those longitudinal empirical investigations have been performed in different time-series to uncover very extensive range of issues concerning the external and internal social, economic and political conditions of functioning of science in Slovenia. A lot of additional research projects have been made as well. Let us number only some of them: the forecast as the base for long-range planning of scientific activity (Hribar et al, 1981), the application of scientific and expert potential in policy decision-making (Rus et al, 1984), relations between basic science, applied science and development (Mali and Sorcan, 1988) social and cognitive assumptions of science in Slovenia, values in science (Kirn et al, 1988), comparative study of sociological models of science (Mali and Kozmus, 2001), publication productivity of scientists in Slovenia (Mali and Splichal, 1999). The establishment of Centre for Social Studies of Science provided strong institutional support for social scientists oriented in their research to STS topics. We could talk about the multiple effects of this process of institutionalization:

1.The results of research investigations have been more intensively used in the teaching curricula at the Faculty of Social Sciences of University of Ljubljana (at some other faculties as well), where they contributed to the development of sociology of science and innovation studies as academic sub disciplines. Until now the two courses in field of STS have been taught for the students at the undergraduate level of study. For the future, the goals are much more ambitious. Last year, the new MA program »Development Studies« has been accredited at the University of Ljubljana. The new program for the post-graduate students consist from 3 modules: international relations, socio-economics and science, culture, development. The new MA program will offer to the postgraduate student's very deep knowledge in the interconnection between the processes of globalisation, scientific-technological and socio-economical development.

2. The results of different empirical investigations (R&D policy analysis, scientometric analyses, etc.) have been partially used as one of expert base by governmental bodies in R&D policy decisions. Contrary to what one might expect, working in context of application has increased the internal cognitive potential of STS. Unfortunately, the knowledge developed in field of Science and Technology Studies (STS) has been not always adequately exploited for the purposes of R&D policy actions in Slovenia, although it offers very practically oriented policy knowledge; and although governmental R&D policy provides a particularly fertile soil for the application of accumulated STS knowledge.

In last few years the main research objectives of STS specialists in Slovenia remain topical questions with regard to scientific and technological development in Slovenia, including those relating to the partial empirical research (case studies in Slovenia) in the context of main STS theoretical paradigms such as The Triple Helix, The Mode-2, and The Post-academic science. Special attention is devoted to the analysis of intermediary science structures and the transfer of scientific knowledge from academic sphere to business-enterprise sector. The basic interests in contemporary STS in Slovenia is today oriented to two basic research streams: to the sociological analysis of scientific system and its role in modern functional differentiated society (Mali, 2003) and to the R&D and innovation policy studies (Bucar, Stare, Bevc, Stanovnik, Sorčan).

3.2 Main stream research embedding Science in Society issues

3.2.1 Trends and good examples

For the more stable and qualitative progress of STS in Slovenia in the future, it will be important to come to more intellectual support inside the community of academic scientists as well as outside of scientific circles (governmental authorities, other policy decision-makers, etc.). Some researchers in Slovenia still look at STS suspiciously. They express the simplified opinion that this type of study should threaten the real image of science in society. The critical social analysis performed by STS experts is not rare denounced as being unacceptable ant-scientific ideology. Let us mention only one example. No far ago, one of high reputable physicist in Slovenia attacked in his popular article published for national newspaper Delo (in rubric devoted to science matters) the sociologists of science as a charlatans in »pure« science and as representatives of »common sense« ideology. Unfortunately, even academic community of sociologist in Slovenia which is mostly concentrated at The Faculty of Social Sciences doesn't entirely understand the increased importance of STS. In spite of the fact that small group of academics dealing with this topic is very strongly oriented in international arena. This situation itself speaks about the provinciality of sociologists in Slovenia. As it was already notified by some external critical observers, small communities such as it is the community of sociologists in Slovenia are usually characterized by »scientific inbreeding«, »intellectual parochialism«, etc.

The second challenge for further development of STS in Slovenia is to increase the different sort of communications inside the speciality. Although STS succeeded to follow the broader scientific discourse, there is still many difficulties in practice to come to new forms of inter-and trans-disciplinary communications. Namely, the new forms of communications between experts of the same field require careful listening of each other and mutual learning. As it was said, the experts dealing with STS issues in Slovenia were recruited from traditional scientific disciplines in field of social sciences, so the internal dialogue is very important. In addition to the new forms of internal communication, there is need to increase the orientation of STS studies in Slovenia to – if I use the term of authors of Mode 2 concept - »the context of application«. The research focus of STS can no longer be demarcated from solution of practical issues.

The third challenge for further development of STS in Slovenia is to increase the variety of methodological approaches. In most previous STS approaches the research concentration has been given to macro and structural analysis of science. The actor perspective was put aside and the cases of micro-social analysis of scientific laboratories were mostly absent. After two decades of development of STS in Slovenia, there is time to broaden the theoretical and methodological perspectives.

These diverse perspectives linked with differences in foci of topics will contribute to the progress of STS in Slovenia. I hope that it does not sound as exaggeration, if I say that STS must become the case, where the gaps between different theoretical and methodological perspectives are dissolving and giving way to more open structures where varieties of views are combined. Last but not least, scientists working in STS in Slovenia see themselves as working in an transdisciplinary and problem-oriented scientific field.

3.3 Funding for research on Science in Society

We do not have any research funding programs in my country, specifically targeted at SiS research.

3.4 Importance of Science in Society issues as evaluative elements for national research programmes and academic institutions

Science in Society issues are not important evaluative element in our evaluation/assessment system.

4 Activities related to Science in Society

This section relates to SIS as a field encompassing a variety of different activities particularly concerned with public communication of science and technology in Slovenian. The issues addressed are formats for science communication and the actors involved in science communication as well as trends at the national level.

4.1 National science communication trends

Popularisation and visibility of science system in Slovenian public are important elements of science and technology friendly environment. Slovenia wishes to build a knowledge-society with new opportunities and possibilities for sustainable development. For that reason we promote popularisation of scientific achievements and transparent governance structure of science policy. Public image and the position of researchers in society in Slovenia are not appropriate. Their achievements are often not known and their work is perceived as insufficiently relevant to society. Citizens are often not aware of the contributions of researchers to solving societal problems and to the competitiveness of the economy and are not familiar with globally recognized findings and products of domestic scientists and innovators. The responsibility that the work of researchers and innovators is not recognized is shared by all and also by research and innovation system that insufficiently facilitates such promotion.

The issue of relatively low coverage of achievements and results of research activities in Slovenian media in the past seem to derive from two closely interconnected and insufficiently addressed questions. Firstly, media's absence of interest in publishing scientific content is usually based on stereotypes of science being complex, incomprehensive and dull. The presumption is that scientific topics will as such make no interest to the general public. The second reason is relatively unskilled researchers and scientists, who lack the ability and the knowledge to communicate their scientific work in a manner, appropriate for the general public and therefore for the media. With the term appropriate, we mean communication of their scientific work in a comprehensive manner and language, and interesting in terms of making applicative examples of benefits of their research, that could either be transferred to private sector or could positively influence functioning of the society and have impact on our everyday lives.

Scientifically argued communication can also be perceived as a potential trigger to gradual process of sensitization, awareness building and increased compre-

hension on the importance of scientific findings and results. It can be perceived as a tool and guidance for introducing activities for increased appearance of scientific topics in media at the same time. There is a strong need for proactive actions to be taken by media sphere, scientific/research sphere, as well as by institutions, competent for the field of research and development.

However, very positive trend in increased coverage of science and research related topics can be observed in Slovenia in last half-a-year period. This trend seems to be strongly connected with the enhanced discussion on Slovenia's future development and measures for tackling the impacts of economic crisis. Additionally, different institutions (ministries, agencies, universities, companies…) acting in the field of R&D or closely connected to it are increasingly active in initiatives for communicating science and technology (supporting other stakeholder's initiatives, joint actions, responsiveness to media requests for information etc.).

The Research and innovation strategy of Slovenia[11] which is currently in public debate puts a lot of emphasis on the promotion of science and innovativeness in society and education. There are two important goals such as popularisation of science and promotion of the creativity, innovativeness and entrepreneurship culture. First goal promotes establishing of scientific culture and research mentality in society. While the second one is focused on educational system which should be adapted in a direction to support independent thinking, problem solving, creativity, inventiveness, entrepreneurship and development of other personal skills and, particularly in the later levels of education, encourages for realization of ideas and entrepreneurship.

4.1.1 Good practises

The first two good practice cases of communication of science and technology in Slovenia are two TV shows. The first TV show is from April 2010 on broadcasted on the 1st channel of Slovenia's National television once a week. The concept of this 20 minute show entitled *Lets bite into science* aims to tackle the persisting stereotypes of science being complicated, incomprehensive and unattractive. As the team producing the show explains, the show is conceptualised in a way that allows the viewer to 'bite into science'. Everyday life topics (for example light pollution, probiotic bacteria, space traffic and satellites, what information does the DNA hold, fusion energy, artificial intelligence, physical paradoxes etc.) are being covered by combining the explanations of scientist in the studio, making simple experiments, while the host of the show is using different manners to find accounts of the topic (internet, books, making an interview with another scientist over the internet). Both are complemented with short sections from the field (laboratory, institution, forest etc.). The show is co-financed and co-prepared by the Slovenian Research Agency (ARRS). Successful model of co-operation follows a simple line of idea, TV team proposing

[11] Source: http://www.mvzt.gov.si/fileadmin/mvzt.gov.si/pageuploads/pdf/odnosi_z_javnostmi/RISS_ENG.pdf

several topics to be covered and ARRS proposing potential excellent scientists (based on the information from its bibliographic systems) who could participate in the show.

The second TV show entitled *Fruits of science* is, with the support of ARRS, produced and broadcasted on the commercial television TV Pika. The concept of the show follows more traditional concepts of presenting science, holding a conversation with prominent scientists on contemporary topics from various fields of science (for example European Laboratory for Particle Physics – CERN, women in science, digitalised world, environmental sciences, national identity etc.). The model of co-operation is the same as the one described above. The show is being broadcasted from 2005. In 2009 all the shows were uploaded to the world's biggest education web portal Videolectures.net enabling even wider circle of interested public to watch the show on demand. Videolectures.net itself can as well be characterized as one of good practice cases of communication of science in Slovenia. VideoLectures.NET is a free and open access educational video lectures repository. The lectures are given by distinguished scholars and scientists at the most important and prominent events like conferences, summer schools, workshops and science promotional events from many fields of Science. The portal is aimed at promoting science, exchanging ideas and fostering knowledge sharing by providing high quality didactic contents not only to a scientific community but also to a general public. All lectures, accompanying documents, information and links are systematically selected and classified through the editorial process taking into account also users' comments[12].

The third good practice case is the use of information tools by the Slovenian Research Agency[13]. The official web portal serves as a tool for providing transparency of procedures (public calls for proposals, evaluation processes) and funding research. The portal enables excess to up-to-date information on the volume of public financing of R&D through the mechanisms of the agency, information on research performing organisations, types of organisations (public, private, non-profit, etc.) and distribution between scientific fields. All this information is available for individual funding mechanisms (i.e. research programmes, research projects broken down into applied, basic and postdoctoral projects, international cooperation schemes, young researchers, research infrastructure etc.).

It is also important that from the government sources the operation of The House of experiments[14] is co-finances. This is the place where young generation can come in contact with the science presented in a very popular way. The House of Experiments are civil society organisations that have gained strong recognition in society. The activities that they perform have attracted a very large number of people (several ten thousands) in the last five years (some of the activities are to be mentioned: The Slovene Science Festival, Science Caffees, Hands-on Activities…).

[12] Source: http://videolectures.net/

[13] http://www.arrs.gov.si/en/dobrodoslica.asp

[14] http://www.h-e.si/index.php?lang=en

There are also important the Slovenian Science Foundation[15] which is a not-for-profit national institution intended to accelerate and promote science and research. The foundation promotes science and its creators – researchers of all active generations – by organising one-day or several-day events, such as the traditional annual Slovenian Science Festival, Noordung's Forum, and Thanksgiving Day, for donors, sponsors and friends of science. The foundation also co-operates in European events, such as the European Science Festival, the Night of European Researchers, etc. The foundation educates Slovene researchers and teachers in communicating science, and in planning and managing research projects. It provides the Slovenian market with original scientific and popular science publications as well as guidance literature. At the same time, it assists Slovene researchers in editing such works for various publishers.

We should stress also on line-newspaper Kvarkadabra[16], since they have already had a very favourable impact on the image of science in Slovenia and only due to growing number of participants to their activities further progress in embedding the issues of science into a wider social space is expected. The initiators of this portal are individuals, scientists and professors from different science areas.

In the end we would like to mention the Ministry of Higher Education, Science and Technology which opens the call for science promotion proposals but beneficiaries of the call are civil society organizations and the aim of the call is to promote the role of science in civil society. There are also important projects of lectures (Harvesting Knowledge) of importance Slovenian scientists in the National Assembly[17].

4.2 Science journalism and training activities

In Slovenia we have only The Association of Science Journalists of Slovenia. It was founded by a group of science journalists and science writers in 1993. The firs impulse for that was invitation from European Union of Science Journalists' Associations to Slovene science journalists to attend the annual meeting in Krems, Austria in year 1992. Since Slovenia is small, the proportional association's membership is also small. After first enthusiasm in 1993 with about 50 inscripted the association has had 17 members in 2010. They are journalists, editors and science writers from newspapers, magazines, radio and TV. Members are also some other profiles like PR people from research institutes and universities.

On the national level their firs goal is promotion of science in general public. Las but not least they also keep spreading information important for journalists' work among their members. Once or twice a year they also organize excursions for the members. On the international level they cooperate within its professional network on pan european basics.

[15] http://www.szf.si/?lang=en
[16] http://www.kvarkadabra.net/
[17] http://www.mvzt.gov.si/en/harvesting_knowledge/

Unfortunately there is not science journalism training in the country either on university or some other level. Probably the main problem remains the lack of natural science profiled journalists in mainstream media.

4.3 Young people and science education in schools

4.3.1 Skills and interest

The general opinion of experts in the school fields in Slovenia is that natural and engineering scientific knowledge is not adequately represented in educational programmes in primary and secondary schools. There are also a lot of comparative empirical studies which shows that availability of natural and engineering knowledge in Slovenian schools are lagging behind the European average. Demands of Slovenian business companies for more comprehensive natural and engineering knowledge of students has been also often detected. These facts are resulted in a relatively low number of students in natural and engineering studies in universities. National Research and Development Programmes in Slovenia was envisaged some measures which could have a positive impact on higher enrolment of students in natural and engineering programmes in universities. For that reason the ministry responsible for higher education and science takes a special effort for promotion natural and engineering scientific knowledge in society at all. There are a lot of activities of science promotion. It is also important that numbers of young researchers in natural and engineering fields were substantially increasing.

On the level of primary and secondary school we have few obstacles in this area of activities. I have to emphasis the recent public call for very ambitious project which should prepare some expert background for upgrading natural scientific knowledge and develop comprehensive abilities of schools for transfer of natural and engineering scientific knowledge into teaching programmes. The ambition is to develop a specific didactic strategies, methods and techniques' for learning natural sciences (especially chemistry, physics and biology) through more understandable and friendly experiments with higher engagement of participants. One of the goals of project is also development of recognised scientific knowledge for potential applicability in different practical situations. The project is funded by European structural funds and it will be finished in 2013.

4.3.2 Societal issues and critical reflection

At the moment I can not find any successful ways of bringing societal issues and critical reflexion over the role of science in society in to (natural) science education in schools in my country.

4.4 Communication activities

Means	Much less	Less	Same	More	Much more
Science TV programmes					X
Radio			X		
Newspapers					X
Magazines				X	
Large scale festivals				X	
Web-based communication			X		
Museums, exhibitions			X		
Citizen- or CSO initiatives			X		

4.4.1 TV programmes

Programme title (and web-link if possible)	Frequency	Duration (in minutes)	Target audience	Themes covered
RTV 1: Lets bite into science http://www.rtvslo.si/spored/modload.php?&c_mod=rtvoddaje&op=web&func=read&c_id=25554	Weekly	20	General	Popular understanding of science
PIKA/POP TV: Fruits of science http://poptv.si/multimedia/sadovi-znanja-09-04-2010.html	Every two weeks	20	General	Popular understanding of science

4.4.2 Radio programmes

Programme title (and web-link if possible)	Frequency	Duration (in minutes)	Target audience	Themes covered
ARS: Look into science http://www.rtvslo.si/ars/content.php?id=41360	Weekly	15	General	Popular understanding of science
ARS: Image of science http://www.rtvslo.si/ars/content.php?id=23	Weekly	15	Interviews with researchers	Popular understanding of science

4.4.3 Popular science articles in newspapers and magazines

Newspaper science sections:

Title of newspaper (and web-link if possible)	Frequency of science section	No. of print runs	Target audience	Themes covered
Delo – Science http://www.delo.si/znanost	Weekly		General	Popular understanding of science
Večer – Science	Weekly		General	Popular understanding

				of science

Popular science magazines:

Title (and web-link if possible)	Frequency	No. of print runs	Target audience	Themes covered
Proteus http://www.proteus.si/?q=node/28	Monthly		Young and general	Natural sciences
GEA http://www.gea-on.net/o_teh_straneh.asp	Monthly		Young	Natural sciences
Moj planet http://www.mladinska.com/moj_planet	Monthly		Young	Natural sciences
Svet ptic – Bird life http://www.ptice.si/index.php?option=com_content&task=view&id=18&Itemid=31	Monthly		Young and general	Biology
Life and technique http://www.tzs.si/zit/	Monthly		Young and general	Engineering sciences

4.4.4 Festivals, science weeks, etc.

Activity title (and web-link if possible)	Activity type	Organiser	Frequency	Number of participants (approx)	Venue (city/ region-/national)	Short description
Znanstival http://www.h-e.si/index.php?option=com_content&task=view&id=146&Itemid=167	Presentation of natural science experiments	Hiša umetnosti	Once	1.000	Ljubljana	Public understanding of science
Slovenian science festival http://www.szf.si/aktualno/novica/15.-slovenski-festival-znanosti-z-mednarodno-udelezbo-60.html	Presentation of science innovation activities	Slovenian science foundation	15 X	2.000	Ljubljana	Public understanding of science

4.4.5 National portals, blogs

Activity title (and web-link)	Activity type	Number of users (if known)	Themes covered	Short description
Blog for understanding of science http://www.kvarkadabra.net/	Information about world		Natural sciences	

	scientific results			
Biblioblog http://www.biblioblog.si/			Librarian science	

4.4.6 Science museums and centres

Activity title (and web-link if possible)	Activity type	Number of visitors/year	Themes covered	Venue (city)	Short description
The House of experiments http://www.h-e.si/index.php?lang=en	Permanent experiments		Natural sciences	Ljubljana	Public understanding of science
Permanent exhibition, the Fusion Exhibition, Reactor of the Hožef Stefan Institute	Permanent	30.000	Natural sciences	Ljubljana	Public understanding of science
A National museum http://www2.pms-lj.si/pmsgb.html	Permanent experiments		Biodeversity	Ljubljana	Public understanding of science

4.4.7 Citizen- or Civil society organisations initiatives

Activity title (and web-link if possible)	Activity type	Frequency	Number of participants	Short description
Committee for defence of science and technology research http://www.oovzd.com/	Critical reflection of science policy			Very new activities.

5 The Fukushima accident

5.1 Media coverage and public debate

Many kinds of risks have been emphasized by the Slovenian media. The primary risks were the following: Potential effects of the Fukushima accident for Slovenia; emergency preparedness in Slovenia in general, in particular about the iodine prophylaxis; different aspects of security of nuclear power plants; safe and stable use of nuclear energy; seismic and technology security of the Slovenian Nuclear Power Plant Krško; measurement procedures of nuclear radiation in Slovenia; threats of the Slovenian people in Japan; differences between Japanese nuclear technology and Slovenian power plants; impact of radiation on food, health and natural environment; potential threat of Japanese nuclear radiation clouds in Slovenia; non-transparency with regard to nuclear accidents; consequences on the international financial markets.

The main issue concerns the climate aspects of the accident and was focused on global energy challenges and the future of energy production, especially alternative sources of energy in Slovenia. No specific climate issue was prevalent in the debate. There was a lot of professional and public debate about the perceptive of the new National Energy Programme, which has to put forward different scenarios of future energy development in Slovenia. The nuclear accident in Japan has added new and wider environmental dimensions to the actual political and public debate about the necessity of rebuilding the existing Šoštanj Thermal Power Plant.

There were a few articles in newspapers that stressed the importance of intergeneration responsibilities of nowadays decision-makers regarding the future energy development. They emphasized the actual 'aggressive' model for energy production taking into consideration social needs, which has reached natural limits on the global level. Some prominent scientists pointed out ethical dilemmas of the present nuclear energy decision-making process. They explained many of unintended and unexpected effects of nuclear energy (i.e. radioactive waste, technology risk etc.).

The existing ethical gap between scientists and engineers and the use of nuclear energy, is by their opinion, very large and is becoming even more dangerous. The argument is that instead of a huge investment of money in nuclear energy, we should invest more in alternative sources of energy, which should be nature friendly, socially acceptable and less dangerous for future generations and therefore sustainable for the nature and social development.

In the Slovenian public debate, the Fukushima accident was viewed as the consequence of a political problem rather as a scientific problem. The public debate pointed out political and wider social responsibilities for decisions about the future energy development, particularly in Slovenia. Any scientific issue or problem related to the accident in Japan has not been prevalent in the public debate.

In the Slovenian public debate it was recognized that sophisticated scientific technologies are imperfect and that they can cause many unexpected problems, especially dangerous risks. Social use and acceptability of nuclear energy has a different logic as scientific creation of theories. So far, the social acceptance of nuclear energy in Slovenia, compared to the thermal energy, was decreased during the public debate about the Fukushima accident. At that time, only 14 % of the Slovenian population supported the idea of building a new power plant, 22 % supported a thermal plant and about 60 % favored other kinds of energy source. But the fundamental image of science and technology has not been, directly or indirectly, a specific issue for public debate and dispute.

There was no special attention on issues related to responsible research and technology during the public debate about the Fukushima accident. There was only one minor aspect, which has been mentioned during the public debate, namely the responsibility related to seismic cartography, which had been provided as basic information for the decision-making process during building of the Nuclear Power Plant Krško.

5.2 Levels and modes of public involvement

The Slovenian mass media covered the accident at Fukushima Daiichi in a very broad and intensive way. They informed the Slovenian public about daily news and broadcasted expert explanations about the technical aspects of an accident. Slovenian nuclear experts18, as well as scientists19, have been regularly invited by media to explain the accident and its effects on different aspects of security. At that time the emergency team of the Slovenian Nuclear Safety Administration provided actual information to the public and to the media. The team issued 13 press releases and answered a number of questions20.

The public debate was mainly limited to the discussions in radio and television. Here different security and environmental aspects of domestic energy problems related to the Nuclear power plant in Krško21 and the future development of the national energy policy were discussed. Slovenian newspapers published articles from non-journalists and non-experts, who discussed the broader nuclear energy aspects of the accident in Fukushima. The environmental organizations in Slovenia, mainly Greenpeace, protested against governmental decisions for the future building of nuclear power plants in Slovenia. No other empirical evidence can be found pointing to a public involvement related to this issue.

5.3 Political responses and scientific advice

Few days after the Japanese nuclear accident, the Slovenian Government got detailed information about it. The Director of the Slovenian Nuclear Safety Administration was invited by the Government to participate in their regular weekly meeting, where he explained the situation and provided input to the governmental decision-making regarding actions to be taken in Slovenia. Due to the long distance from the accident, there were no specific protective measures recommended. For Slovenian citizens in Japan, the advice was to follow local Japanese recommendations on protective actions. The Government also informed the Slovenian public that the nuclear accident has not any direct influence on Slovenia.

At that time, a few political parties represented in Parliament organized open public discussions about the future role of nuclear energy in Slovenia. They invited eminent Slovenian scientists, which presented and analyzed the accident. The discussions emphasized some safety elements of nuclear power plant constructions and the negative vs. positive aspects of the different energy production methods. All discussions have been related to the domestic challenges of energy supply, and particularly to the Nuclear Power Plant Krško.

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[18] Nuclear Society of Slovenia, as association of professionals and scientists, was provided many public interpretations of technical, social and environmental aspects of accident (Source:

[19] Institut »Jozef Stefan«, Nuclear Engineering Department, was published a lot of articles in media and organized some public lectures on nuclear accident in Japan (Source: xxxx)

[20] All the information, including answers to the media, was published on the SNSA website which was regularly updated (Source: www.ursjv.gov.si).

[21] More about Nuclear Power Plant Krško: www.nek.si/en/

We have to mention that Greenpeace in Slovenia demonstrated against nuclear energy and wrote a letter to the Government of the Republic of Slovenia, where they requested a non-nuclear Slovenia and said no to the building of a new nuclear reactor in Krško. The request has been supported also by the Green political parties of three neighboring countries. Different environmental organizations in Slovenia have been requesting a rethinking of the Slovenian energy programme. The safety issue of Nuclear Power Plant Krško has been publicly discussed also with respect of international relation to Austria and Croatia.