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Responsible Science in Societies

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The role of science in economic growth and societal welfare is inevitable in the 21st century. The ever-changing role of science in society is influencing the responsibility of research and innovation. Discussions about the place of science in society mainly address the issue at a European level. However, much less is known about the situation at the national level, which is also true for Hungary.

It is clear that science is an important 'tool' for society to achieve certain goals, such as welfare or development. However, this 'tool' needs to be used with great responsibility, which requires a close relationship between science and society. This relationship is not uniform across countries in Europe or elsewhere in the world. In this paper, we have reviewed many aspects of science-society interactions to better understand how science is integrated into Hungarian society.

This paper provides a review of how the various stakeholders are involved in discussions and decisions on scientific matters in Hungary. It is shown that public engagement in science and policy-making is weak and sporadic. The research on 'science in society' is funded more frequently by the EU than by national sources. Despite the various efforts to improve communication about science and make the scientific results understandable for a broader public, it is still a distant issue for the majority. Overall, there is room for improvement on the place of science in Hungary to better serve our society's needs.

Keywords: Science in society, Hungary, science, policy

1. Introduction

The recognised importance of research is firmly rooted in the needs of society, particularly in light of the constantly changing world. The relationship of science (and technology) to society has been constantly changing over the past 50 years, but the trend of these changes highlights the tightening contact of these two spheres. Beyond the importance of the autonomy of science (Polányi 1962), the impact and application of scientific results and the responsibility of science has become equally important (Mejlgaard–Bloch 2012). This topic was not among the main priorities of

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the European integration at the beginnings of scientific collaboration, but by the mid-1980s, it started to grow in importance. The importance of science for society has been growing during the past two decades (Maastricht Treaty, Lisbon Agenda etc.) and the European Union has been devoting an increasing amount resources to understanding how science can fulfil its new role and respond to the societal challenges in a responsible way.

Responsibility is understood as a broad concept, including moral, environmental, or societal aspects. This paper focuses on a crucial segment of a societal aspect: what the relationship between science and society is like in Hungary.[3] The ever-changing role of science in society (SIS) is influencing the responsibility for research and innovation.

This chapter first gives a short overview on the international literature on the relationship between science and society and how this relates to the current policy discussion about responsible research and innovation. The literature shows that the relationship between science and society is crucial for growth and sustainable development and it has many ingredients and aspects which influence the actual status in every country. The following sections provide a snapshot on Hungarian society's relation to science. Section 3 identifies those few topics that are on the policy agenda in Hungary about the place of science in society and investigates the depth of involvement of the various actors. Section 4 provides a rough picture about SIS-related research activities in Hungary, highlighting a fragmented research landscape where EU-funded research has a major role. Section 5 provides information on the latest trends in science communication in Hungary and the best efforts to revive interest in science. The chapter ends with a summary of how Hungarian society relates to science and scientific activities and lists some of the areas where further efforts can help to improve the role of science in society.

2. The relationship of science and society through the international literature

Science and innovation have become an important field in the policy because their contribution to economic development and social welfare was seen as evidence. (Fagerberg et al. 2004) The recognition that policy-making has not only had to rely increasingly on scientific results, but also that scientific (and technological) activities need to be regulated by the policy raised new questions about the current role of science (a short overview is provided by Mejlgaard–Bloch 2012). Furthermore, why and what kind of research have to be supported from public funds? Strategic research or programme-driven research is the dominant form of

[3] This paper is based on the Hungarian report that was prepared in the framework of the EU FP7 project on 'The Monitoring Policy and Research Activities on Science in Society in Europe (MASIS)' The project investigated this issue in 38 countries (member states and associates). ftp://ftp.cordis.europa.eu/pub/fp7/sis/docs/sis_masis_report_en.pdf.

research support currently in many fields, which are formulated based on societal problems or expectations (EC 2009). The differentiation between scientifically excellent and societally relevant research is still present and the category that combines the best of 'both worlds' is very much needed (Rip 1997).

The idea of 'responsible research and innovation' is a relatively new concept in European discourse which has one of its roots in previous research on the relationship of science and society (e.g. Owen et al. 2012). The quick scientific developments and emergence of new scientific fields in the second half of the 20th century brought up many previously unknown challenges about the role of science. The pace of this development produced new knowledge and results that were ahead of their time and sometimes there was not enough time to assess the potential long-term impacts of these new developments. This situation distanced society from science and some of the unpleasant and unforeseen side effects of the new scientific results made social groups sceptical about scientific development (Cutcliffe 2000 in Mejlgaard–Bloch 2012).

This alienation of science and society lead to a point where researchers identified the need to renegotiate the 'social contract' between science and society. These researchers felt that a growing part of society was expecting science to concentrate more on current social challenges in exchange for public funding (Guston 2000, Nowotny et al. 2001). One may argue that science and society have never been separated from each other so this would not require a new 'contract' but the control over the new, emerging scientific fields where consequences cannot be clearly calculated may demand a new form of science-society interaction (EC 2009).

The changing relationship of science and society is not specific to any nation in Europe or worldwide, but a global phenomenon. In Europe the most visible discussions about this relationship were triggered by the EU when decisions were made about the role and importance of EU-supported research, development and innovation activities. The first EU policy documents – until the early 2000s – were emphasizing the need that scientific knowledge had to better contribute to growth (economic and social welfare). The Lisbon Agenda envisaged that European growth had to be based on new scientific knowledge generated by the European Research Area (EC 2000). The weak results achieved by the end of the decade made people realise that social acceptance and socially desirable results needed an active interaction with society. From that on EC policy documents shifted wording from 'science and society' to 'science in society' or 'science with society' even more emphasizing the interconnectedness of the two spheres (Mejlgaard–Bloch 2012). The European Commission has identified five dimensions in which science can contribute to the benefit of society (EC 2009, p. 15):

- innovation: wealth and economic growth;
- quality of life: health, welfare, education;
- policy: relevant debates, policy advice;
- culture: conserving and respecting cultural diversity;

- intellectual: ‘good society’, sustainable development.

Thinking about these dimensions, it is clear that all of them are under transformation, debates and challenges. It is not possible to identify a definitive best place for science in society or even what would be a generally desirable situation.
Developing further the idea in this direction, a new concept, the idea of ‘responsible research and innovation’ (RRI), emerged in the policy discourse by the 2010s. From a societal point of view, RRI is a broadening and reframing of earlier attempts to find the role of science in society. As a new concept it is not easy to define, but there is a definition widely cited in international literature:

“Responsible Research and Innovation is a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view on the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products (in order to allow a proper embedding of scientific and technological advances in our society)” (von Schomberg 2012, p. 280).

The RRI concept includes the need to identify the ‘right impacts’ and the right process that research and innovation should target (von Schomberg 2012). It goes beyond what is in the ‘science in society’ with its three main emerging features (Owen et al. 2012). First, it contributes to the starting question of how research (and innovation) activities can be governed in a participatory and ethical way leading to ‘right impacts’. Second, it emphasizes “the integration and institutionalisation of an established mechanism of reflection, anticipation, and inclusive deliberation in and around the processes of research and innovation” (Owen et al. 2012, p. 755). Third, it attributes new, collective responsibility not only for researchers and innovators, but for all stakeholders and public debate participants that are involved in this process.

3. The place of science in political developments, public debates and policy initiatives

Very few topics may be identified in Hungary on the place of science in society. Public engagement in policy-making is in its infancy and both sides are struggling how to find the best form of negotiations and involvement in decision-making. There is no institutional framework established in Hungary to organize this process.
Except for the most debated *ecological and energetic issues*, other topics are not debated in the media or in Parliament. Such issues are related to the use of renewable and nuclear energies, genetically modified foods or food safety. Even in this latter case, which is regarded very important by the public, from time to time debates emerge in the media only when the safety rules are broken and people get

hurt. After a couple of days/weeks even these debates are subsidized and the public is seldom informed about the consequences (Inzelt 2011).

A recent good example was the conciliation on water-supply management. This topic was raised in the frame of the EU Water Framework Directive, which is a sign that such debates are emerging mainly on external stress. In this case, during the conciliation period, local meetings were organized and the broad public was invited to express its views. Thus politics took into consideration the views of both academics and the public in this case as a rare example.

A very fresh example is the debate on a genetically modified corn hybrid. This old debate flared up again in 2011. The new Fundamental Law of Hungary that took effect on 1 January 2012 declared that Hungarian "agriculture remains free from any genetically modified organisms" (Hungarian Gazette 2011, XX (2), No. 43, p. 10663). This prohibition was strongly debated in Parliament and in the media. Scientists and several producers were active in these debates however their voices were weaker than the voices of several authorities and various Churches. The debate got another impetus during the extermination of a genetically modified corn plantation.

The majority of debates occur only in the media / internet. The most active actors in these debates are professional associations and other various societies, such as the Hungarian Academy of Sciences (HAS), the Hungarian Association for Innovation (MISZ), the Association of Teachers and Professors, Hungarian green associations and so on. In very few cases the actors of innovative business are involved in these debates too. In the scientific debates, the different professional groups' views are exchanged and the public is only informed about the different opinions. There are hardly any opportunities when they can represent their own standpoint, but there is hardly any need from the public for such proclamation. The debates remain in the political and partly in the academic arena.

Another usually publicly debated important topic relates to *education in science*. After the beginning of transition a trend emerged that students' interest started to decline in natural sciences. The topic of the attractiveness of science studies is highly debated in the media and in relevant professional associations. The discussions include the topic of new teaching curricula, bringing a new content into education or new modes of teaching to revive the interest in science. There also was a related debate about the role (and financing) of the HAS in the scientific community. Several MPs have also raised these issues in Parliament. Partly as an ongoing process and partly because of the debate over its funding model, the HAS introduced many reforms and became more open towards the public and improved its communication. Even this debate took place between the political and academic arena and the public was only informed.

Less frequently but occasionally the relation of *superstitions and science* and the religious views or principles (with special regards to the conflict between Darwinism and creationism) are debated either in the context of education or social

life. This debate is an endemic issue of the academic arena that is raised from time to time by one of the parties. The public is usually only informed about the latest issues and does not take an active role in the debate.

In a narrower circle of society two other important topics are debated that enjoy the attention of the media, such as building attractive *scientific career models* for the youth and creating the *culture of absorption and exploitation* of scientific results. These issues have become part of the policy agenda. Debates in various professional associations and in the HAS have got the attention of policy makers. However, there are hardly any impacts of these debates yet.

As regards to *policy goals and priorities*, Hungary has no policy specialized on the place of science in society. Nevertheless, there are policy initiatives and reforms on other related areas, which could be relevant to the situation of science in society. During the last decade, one could identify several steps that significantly increased the importance of science-industry interplay in the Hungarian S&T policy. Some government initiatives, such as the establishment of cooperative research centres and regional university knowledge centres show the growing emphasis in funding programmes on enhanced science-industry interplay. (Such government programs were the Regional University Knowledge Centre or 'Pázmány Péter' programme, and the 'Asbóth Oszkár' programme.) The establishment of the title 'Research University' served to identify higher education institutions that were engaged more in research activities and in university-industry collaboration.

The objective of these initiatives, generally, is to boost the number and the intensity of connections between universities and enterprises, between the academic and business sphere in respect to R&D and scientific cooperation. Hitherto, the impact of these recent initiatives is still poor on the relationship between the universities and business actors, thus the impact is modest on the position of science in society too. The main motivation behind these government efforts was to encourage the diffusion, dissemination and practical use of new knowledge stemming from universities. Its impact is ambivalent. On the one hand, the more dynamic flow of university knowledge towards business and society has started, but on the other hand, analysing, for example, the co-operational patent activity of universities and of their members we find that due to spin-offs (and partly due to their inadequate IPR ownership system) formally the universities hardly participate in this process.

Over the past decades, Hungary has developed a broad and differentiated *set of instruments* for public support for R&D and innovation. In 2003, the Act on R&D and Innovation set up a new fund, the Research and Technological Innovation Fund (RTIF) (launched in 2004). The main goal of this Fund was to create stable conditions for funding private R&D and to establish a mechanism for project funding on a transparent and competitive basis. The Fund has two main sources of revenue: the central government budget and the "innovation contribution" paid by medium-sized and large enterprises. (The fund was suspended for a year in 2010 and

seriously transformed after that. It has lost its strong focus on university-industry collaboration.)

Major changes occurred with the in the R&D funding scheme upon Hungary's EU accession. EU sources became available (with national co-funding) in the framework of National Development Plans (NDP). In 2007, NDP was introduced (lasted 2013) and included seven regional and eight "sectoral" programmes. It provided much larger funding sources than the RTIF. Both of these sources mark a shift of focus to applied R&D against basic research.

In the case of NDP, Hungary had to adopt the EU-practice in project monitoring and evaluation, thus providing an incentive to apply this practice elsewhere in RDI funding schemes. According to the first full-scope evaluation of the RTIF, which was performed in 2010, the governmental support of the innovation was not obvious. The RTIF had a visible and significant impact on the economy but the activity and the management of the Fund had to be developed further (source: Evaluation of RTIF for period 01/01/2004-31/12/2009, 16 September 2010).

It is worth to mention another initiative even if it was frozen because of the economic crisis. In 2007, the Ministry of Education and Culture[4] introduced a system of a 3-year Maintainer Contract in the field of higher education with the public institutions to help the institutes to elaborate and improve their own governing methods and management skills, to strengthen their fact-based strategy making and to promote the activity of HEIs in the European Higher Education Area. The Ministry, as maintainer, could monitor (and assess) capabilities of HEIs for setting up and performing strategic targets in various fields during the contracted 3 years. However, the targeted indicators and the values could be set by the HEIs themselves, therefore, it did not really support comparability over the whole system and the relevance of certain targets could be questioned too.

Generally speaking these developments have shown the first steps towards creating a more evidence-based decision-making culture. These efforts have restrained influence. The weak demand for evidence-based policy-making from the side of decision makers themselves is the most important factor of the relatively low level of project evaluation or technology assessment and related activities. The attitude of decision makers has to be changed to achieve considerable progress in this respect.

3.1. Employing statistical facts in the debates

The public tends to be interested mainly in societal and economic issues, with special regards to the reform of the economic and social system in the country. The scientific issues do not reach society on a broad scale and this fact is reflected by the

[4] In 2010, the governmental structure was revised and that Ministry became a division of the Ministry of Human Resources.

scarce appearance of scientific issues in the media comparing to other societal issues.

Between 2000 and 2009 there was no leaflet on R&D indicators as Parliament and even business organisations were hardly interested in facts. In 2010, a leaflet on R&D indicators was published again following the 10-year interruption due to the (temporarily) existing Minister of Science without Portfolio. The short existence of this Ministry is an emblematic case for the problems in policy making, which continuously suffers from constant changes in the institutional and/or legislative environment. Any initiative for public debates can be disrupted with the change in governance, even if Parliament/Government remains the same. In such an environment, there is no opportunity to lay down permanent elements and fora for public consultation and to generalize the culture of public involvement in discussions over different scientific issues. Because of these frequent changes, stakeholders can hardly accumulate good knowledge on STI policy-making.

Hungarian Parliament – as the highest level of policy-making – had only an ad hoc committee dedicated to innovation and development issues during 2010-2014. This committee was overviewing the national system for R&D and innovation support without much daily effect on its operation. Between 2010 and 2014, other various committees (e.g. Budget, Education and Science) of Parliament put STI-related issues on their agenda approximately 20 times.

The availability of STI policy-relevant statistical data and indicators has improved since the Observatory of STI indicators was established in 2012. (It was set up inside the National Innovation Office supervised by the Ministry of Economy.) This Observatory is responsible – among other tasks – for the publication of RDI statistics and information. The Observatory regularly produces the inherited yearly leaflet with the national RDI indicators and short reports on selected issues. The brand product of the Observatory is the on-line 'Kaleidoscope' where latest indicators and analytical reports are available. (www.kaleidoszkop.nih.gov.hu) Up to now the Observatory's work is driven by internal strategy and they hardly had to reflect on the demand-side. Any data/information requests are very rare birds from Parliament or the Government.

3.2. Public engagement in priority setting

In Hungary, the public engagement related to STI or in other areas of policy-making is not characteristic. The tradition of democratic decision-making is not very strong in Hungary. *Formal procedures for citizen involvement do not exist.* It is not only the presence of society that is very weak in STI policymaking, but very frequently the dedicated professional organisations are also neglected. Time-length for public debates is usually very limited. As part of the usual policy-making process, such parallel reconciliation of interests results in a legal proposal that comes to light without

much reference to the public opinion and it is being submitted to the Parliament for approval.

In the S&T policy-making the HAS has special role by tradition. Beside the HAS, a few influential public administrative executives and few business leaders play a significant role.

Activities initiated by citizens and their organisations

The role of citizens as members of civil society organisations, or as individuals is marginal in S&T decision making. The formal negotiation procedure is limited to the appearance of the related documents on the official website of the responsible public institution. In the preparatory phase of S&T policy, the availability of information is limited and thus web-based debates are hardly encouraged and feedbacks on debates are rare. So, citizens are informed about decisions and developments related to S&T policy, but significantly not involved in the preparation of them. In theory, they have the possibility to pursue and control these developments but there are no traditions on how to use these possibilities.

In a proactive society, the informed public or civil societies may take the lead and initiate on actions and not wait for policy-makers. In Hungary, such 'upstream engagement' is in its infancy. There are only sporadic experiments to involve the general public in effect to form policy-making.

One good example for upstream engagement was the so-called 'Innovation Spring' in 2005 organised by the National Office for Research and Technology, on which industrial sectors could be propulsive. More recently, the 'National Consultation on Innovation' was organised as a 'road show' which actually indicated a series of open debates where in the strict sense of the word everyone could explain his/her opinion or standpoint. In the interest of an effective debate, the strategy program called 'Innovative Hungary' was put into words clear to all.

There are certain topics – apart from those mentioned in the first part of Section 3 – that may be of interest for the public, but remain largely the responsibility of professional or non-profit organisations. These are issues related to research and/or medical ethics where debates and discussions are remain within the Hungarian Academy of Sciences or in ethical committees managed by professional organisations. In many cases, the language used in these debates quite simply prevents the broad public from joining in.

The various channels of the media might be important to mediate these and other issues to the public and translate it into a clear form. Currently, scientific issues are not in the focus of the mainstream media, thus they cannot effectively support the improvement of public engagement in Hungary.

Public-private interaction

Public-private interaction has different layers: such as partnership in policy-making and partnership in performing R&D activity. As regards the first layer, business

involvement may be observed only in a couple of cases in Hungary. Some of the business representatives are invited to a few governmental advisory bodies, and some of them may have influence through various informal involvements in policymaking. Most of this interaction has taken place in the final stages of agenda setting.

Technology assessment

Technology assessment (TA) is one of those traditional areas where responsible research and innovation may have its roots. TA activities are basically geared towards preventing non-desired effects of new technologies. There were several initiatives to introduce technology assessment in Hungary in the past, but TA activity hardly exists in the governance of the country. Seeds of the activity could be the related parliamentary Committee or the Deputy Commissioner for Future Generations. However, at present, the governance of TA activity is absent on the level of Government and thus any 'upstream' initiative or good practice cannot get enough attention or even materialize.

Few professional organisations performing traditional assessments are present in the country, such as food-safety control; safety regulation for goods and services; regulation of environment protection. This means that there are a couple of institutions in Hungary capable for conducting or collaborating in technology assessment. Such actors are public and private organizations with measurement capacities.

A sad example is the red sludge disaster in Western Hungary. It turned out that there were a few analyses (conducted 20 years before) about the possible future problem, but these materials could not get attention – not even the owners were aware of it – without a responsible authority.

The attitude of the public towards science and scientific results is also influencing what they are expecting not only from the scientific community but also from the policymakers. One way to assess this attitude is through the public engagement in various debates and discussions over various scientific issues. As it was already shown, this engagement is rather modest in Hungary. EuroBarometer is providing information on the level of public understanding and on public attitude toward science in Hungary comparing it to the European average (Table 1).

An interesting contrast in the public's attitude in Hungary can be seen in the first couple of rows in Table 1. While the public's interest in new discoveries is higher than the EU average (and grew over the 2005-2010 period) they are much less informed about these new discoveries and their level of activity (meetings, petitions) to engage with such S&T issues is below the EU average. Data also reveal that the overall positive belief of scientific discoveries is somewhat declining and more and more people are on the opinion that the pace of change is getting too fast. There is one aspect where the Hungarian public diverges significantly from the Eu-

ropean average. Almost half of them (and their proportion grew over 2005-2010) believes that "we depend too much on science and not enough on faith".

Table 1. Public Understanding of Science in Hungary (2005 and 2010)

% of population…		***2005***	***2010***	***EU27 average/total, 2010***
very interested in new scientific discoveries and technological developments		30	41	30
very well informed about new scientific discoveries and technological developments		7	6	11
regularly or occasionally attend public meetings or debates about science and technology		11	7	9
regularly or occasionally sign petitions or join street demonstrations on matters of nuclear power, biotechnology or the environment		6	9	13
'agree' and 'disagree' that thanks to science and technology, there will be more opportunities for future generations	Agree	82	78	n.a.
	Disagree	5	6	n.a.
'agree' and 'disagree' that science makes our ways of life change too fast	Agree	55	61	n.a.
	Disagree	21	17	n.a.
'agree' and 'disagree' that we depend too much on science and not enough on faith	Agree	46	48	38
	Disagree	22	23	34
'agree' and 'disagree' that because of their knowledge, scientists have a power that makes them dangerous	Agree	54	50	53
	Disagree	21	24	24
'agree' and 'disagree' that in my daily life, it is not important to know about science	Agree	40	37	33
	Disagree	42	41	48

Source: Data from EuroBarometer 340/73.1, cited in the Hungarian MASIS report

4. Research related to Science in Society

A distinction can be made between *SIS research*, on the one hand, and *SIS issues embedded in mainstream research*, on the other (Inzelt 2011). SIS research includes 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 in-

volvement 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.[5]

The previous section has shown from various perspectives that the topic of SIS is not very important in the Hungarian S&T policy. This means that there is no dedicated Hungarian funding available and there are no organized fora for researchers in this field to exchange their views or research results. Researchers can apply for funding from more general supporting programs (e.g. OTKA funds for basic research) but the number of such projects and the sum devoted to them is very small. More often Hungarian researchers collaborate in EU funded programmes (e.g. the 7th Framework Programme, H2020).[6]

There are very few attempts to research SIS issues in a more detailed way. The research topics listed in the Hungarian MASIS report (in section 3.1.1, see www.masis.eu) are one-time projects. However, two topics seem to be emerging fields in Hungary:

1. biotechnological ethics;
2. communication between knowledge and society.

These topics are regularly discussed in the academic arena and sometimes also the broad public is informed. Beyond them the governance of science; science education and science policy might also be considered as emerging topics.

Formalized science education contains some elements of ethical issues. Public outreach and dialogue strategies are encouraged in calls for research projects. In the last few years, publicising STI results became a significant part of the on-going programs.

Knowledge dissemination is becoming an important criterion for project and institution evaluation. However it has minor weight among the elements of project evaluations.

The practice of knowledge dissemination is on the rise at institutions. Not only because of being an evaluation criteria, but also because the competition among the institutions for funding and for students has made visibility more important to them.

As regards the relative weight in evaluation of research proposals, the gender balance issue is more dominant than ethical issues. The regulation of such ethical

[5] This section is concerned with mapping research activities which are not fully EU funded. Activities funded solely under the European framework programs are already well-documented elsewhere.

[6] Section 2 has referred to EU documents and initiatives discussing the situation of SIS on the European level. The EU's RTD Framework Programmes (RTD FPs) had dedicated research calls to investigate this topic just like the current Horizon 2020 program. These regular funding opportunities are open also for Hungarian stakeholders that are interested in the investigation of such topics, so there is an open way to join European consortia supported by the RTD FPs.

issues as conflict of interests is a bit confusing. Same organisations and/or individuals may work for business research and for standardisation, quality control and so on at the same time.

5. Trends in national science communication

Any kind of media has an important impact on how science is present in society and how citizens are able to understand new developments in science. The media influences the interest of the young generation towards or against science.

The overall characteristic of the science communication scene in Hungary is not very intense. There are, however, several good initiatives (Inzelt 2011). The scientific community could fight more or less successfully against the esotericism and superstition that occurred in the initial years of transition in the mass media. However the intensity of communication on scientific matters is not very strong. Some fields of science are much better present in the media such as the advancement in information and communication technology and biotechnology. As regards the actors, the scientists with good communication capabilities play important role. The citizens have access to information, but the supporting activities for using available information are absent.

Table 2. Changes in last decade in the use of various communication means

Means	Increasing	Same	Decreasing
Large scale festivals	↗		
Web-based communication	↗		
Museums, exhibitions	↗		
Science TV programmes		=	
Radio		=	
Magazines		=	
Citizen- or CSO initiatives		=	
Newspapers			↙

Note: ↗ increasing; = same interest; ↙ decreasing
Source: Authors' compilation based on the Hungarian MASIS report

In accordance with some general trends, the role of the traditional media (e.g. printed newspapers) has declined or stagnated in Hungary. TV and radio programs kept their role by re-balancing their content towards more light, eye- (ear) catching topics, or by presenting the views of scientists more interesting for a wide audience. At the same time, some new media (internet and blogs) have become more popular. As part of the efforts to improve the relationship of society with science, some new, more interactive types of communication gain in importance. Thus, science festivals and new-type museum activities (interactive exhibitions, out-reach activities) have become very popular (Table 2 illustrates the changes by means of communication).

It also has to be noted that in many cases newspapers or science magazines publicize the translation of foreign articles or news on science and only the minority of articles are about Hungarian research results.

Since 2002, a TV program called 'Mindentudás Egyeteme' (ENCOMPASS) has had significant successes in the public communication of science. This good practice has resulted in more than 300 lectures by renowned Hungarian (and some foreign) researchers on a very broad scale of scientific topics from all fields of science. The program was broadcasted on MTV (Hungarian public television) weekly or biweekly and attracted considerable public attention. The modified program 'Mindentudás Egyeteme 2.0' proved more attractive to the public. In several Hungarian cities where there is a large university and a regional HAS organisation have also been organizing similar local programs broadcasted on local TV and radio channels based on local scientific products or with invited non-regional scientists. Unfortunately, due to the lack of devoted financial sources there has been a break in the programmes.

Another interesting attempt is the inclusion of the topic 'Science in Society' in the courses of higher education institutions. They are usually not part of the main curricula rather an optional choice for the students not offered in every semester. One example from the recent past is from ELTE (Eötvös Loránd University of Budapest) where the Department of Science History and Science Philosophy had 'Science in Society' as an optional course. Another example is from the Budapest University of Technology and Economics, which offers courses on Science History and Science Philosophy and there are occasionally voluntary courses at other universities too, on similar topics.

6. Conclusions

The public understanding of science and scientific results is not particularly strong in Hungary. Although the public is interested in these results, the information provided to them seems to be insufficient, and the public lacks a pro-active attitude. The active public engagement in the policy-making process suffers from weaknesses from two sides: in Hungary, the policy and institutional framework still faces frequent changes and reorganisations that prevent the establishment of standard mechanisms for public discussions and for taking into account public opinion during decision-making. The public itself is keen to express its opinion only on a handful of topics and in many cases these public debates fade away without taking any effect on policy decisions. In some cases, professional or non-profit organisations take the lead and try to influence certain developments or decisions, but their successfulness is inconsistent without strong public support.

The fact that the topic of 'science in society' and the responsibility of science (in terms of research and innovation) is not among the national priorities is

evidenced by the low level of research activities in this field. Not only are there only a few research initiatives, but their visibility also suffers from a fragmented research landscape. Even if there are still not many initiatives for SIS-related research, the capabilities are available in Hungary. The scattered on-going research is financed mainly by the EU or by other foreign sources. The problem is that national authorities are not only absent from the financiers but they are quite reluctant to employ the findings of such research. Another problem could be that the dissemination of research findings is concentrated at the European/international level and neglects the information-dissemination in Hungary. Therefore, the visibility of EU-funded SIS projects is very low, and this limits their potential impact.

Table 3 summarizes the main types of public engagement in this process, hinting at their importance.

Table 3. Stakeholder involvement in S&T policy-making

Presence in policy-making of…	**Quality, frequency**
Social involvement / commitment to scientific activities	Weak
Collaborations (public-private)	Sporadic
Regular mechanism for public debates	Missing
Open fora	In its infancy
Civil society participation	Hardly feature
Business sector representatives	Mostly formal
Scientific advisers and organisations	Modest, in a narrow circle
Supporting social innovations	In its infancy
Overall the science policy	Low priority, most efforts towards university-industry collaborations

Source: Authors evaluation

One way to improve on the present relationship of science and society is to better inform and involve the public through better science communication, knowledge dissemination, and education. During the past decades there have been various attempts in these fields in Hungary with varied success and impact. Many interactive audio-visual ways of communication seem to be popular and mobilize

the public, even if only for a short time period. The development of new curricula and new methods in education might also bring results in the mid or long-term.

At present, science and scientific results still seem to be too distant for the majority of Hungarians. Either they lack the necessary (and understandable) information to interact in scientific issues, or they act based on some prejudice. Continuous efforts in science communication and better education can help raise the interest of the public in scientific matters and improve their willingness to interact with such decisions. The policy-makers need to create a stable framework in which mechanisms could lay the foundation for enhanced public engagement.

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