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Danube RRI Strategy

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Author:

South-East Regional Development Agency – ADR SE

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1 Introduction

RRI is a transparent, interactive process by which **societal actors and innovators** become **mutually responsive** to each other with a view to the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products (von Schomberg 2013:60).

RRI has become an important concept almost all over the world in the last years. This concept has emerged in a complex context: while fast-pace innovations in technology can help us finding solutions to major global problems (such as global warming or depletion of non-renewable energy sources), at the same time uncontrolled growth might lead to undesirable consequences in environmental and social terms.

RRI approaches innovation in a responsible way, reflecting on and anticipating the potentially negative impacts of R&D&I and promoting innovation in and for the society. The slogan "better innovations for a better society" clearly illustrates the success of RRI (Fisher et al., 2006). It highlights how the innovation environment has changed and that it is essential to take into consideration societal values when developing innovation. Some other key societal trends were also important to structure the concept of RRI as it is today. Some examples are attention to prevention of new disasters, strengthening role of public opinion (Sutcliffe, 2013), loss of trust within members of the society (Wynne, 2006; Sutcliffe, 2013).

As a matter of fact, RRI is part of on-going reflection on changing governance relations between research, innovation and wider society. Adopting an RRI perspective for the daily decisions of the whole innovation pipeline, means that the (civil) society and research community should have a closer relationship, so that the final outcome of the research process is a socially-desirable innovation.

Given the growing importance of the RRI concept, the European Commission has identified 6 dimensions (RRI keys) to define it (EC, 2014):

1. Societal engagement;

2. Gender Equality;

3. Ethics;

4. Open Access;

5. Risk assessment;

6. Education and governance.

When it comes to effectively adopt RRI, a number of methodologies and tools exist. However, there is no one-size-fits-all model.

As a matter of fact, although RRI responds to the pressing need to address societal challenges and limit innovation risks, its practical application depends on a number of factors. This are linked to culture, regulation, specific characteristics of research and business actors.

Some barriers to RRI application can be:

- Current business models do not recognise economic benefits of RRI, nor the need for a preventative approach to socio-environmental risks;

- National and local policies prioritise innovation, environmental protection and social inclusion, but a few comprehensive strategies that embed RRI in economic development exist;

- Academic models for RRI are often not suitable for companies, notably SMEs;

- In general, the level of RRI awareness and capacity is limited.

In such a dynamic yet complex context, D-STIR partners investigated how RRI can be effectively integrated in innovation practices in the Danube Region.

They focused on the particular characteristics of the area, to understand what specific barriers to RRI exist and how to address these to promote a responsible approach to innovation.

For their work, they decided to focus on one specific method to promote the adoption of an RRI approach in R&D&I: STIR (Socio-Technical Integration Research). As described in sections below, they piloted STIR method in the academic and business environment in the Danube Region.

Through this practical work, and thanks to continuous discussion with policy-level stakeholders, they could identify a set of policy recommendations and practical measures for business and academic actors to effectively embrace RRI.

This document describes all the work carried-out and lays the foundations for a Danube strategy to RRI.

It starts with a conceptual analysis of the D-STIR method and its applications in the various innovation contexts and then moves on to the context analysis of the Danube Region, focusing

on specific characteristics and barriers that may prevent the adoption of an RRI approach in this area.

It then focuses on the practical work carried-out in D-STIR: how the STIR method was piloted in the business and academic sectors? What adjustments were needed? How stakeholders where engaged?

The final chapters summarise the results of this challenging pilot and interregional exchange work, identifying a set of policy recommendations and practical measures to be adopted by academic and business actors from the Danube area to effectively embrace RRI. Roadmaps of different partners to guide future work in this direction are also described.

2 Conceptual Analysis

2.1 The Practical Implementation of Responsible Innovation: Socio-Technical Integration Research

2.1.1 A Brief Introduction to Socio-Technical Integration Research

The Socio-Technical Integration Research (STIR) is a methodology supporting interactions among experts of different disciplines (primarily social and natural sciences), who collaboratively reflect on the context in which the innovative work is carried out, aiming to broaden research decisions beyond the mere technical work (Fisher – Schuurbiers 2013). Therefore, the main aim of the methodology is to strengthen cooperation between social scientists and natural scientists and to integrate social considerations into the daily work of natural researchers.

Within the STIR process, the following actors can be identified: 1) A research group that conducts research in the field of natural sciences; 2) researchers (participants) of the research group; and 3) embedded humanist(s) who take part in the daily work of the natural science research group as an outside observer (STIR investigator).

In the first phase of the process (selection phase), the STIR investigator (hereafter, **"investigator")** identifies one or more **research settings,** typically laboratories, to become **embedded** in and work as a **participant-observer.** In an **invitation letter**, the heads of research groups are asked for their own or their **delegates' participation** in the research**.**

In this phase, the principal investigator (PI) decides whether or not to allow an investigator to join his or her laboratory for **12 weeks.** Once the PI **accepts,** then the investigator **solicits** researchers from the group who are willing to actively participate in the **collaborative activities** ("high interaction" persons) and also **researchers** who remain so-called "**no interaction" persons ("controls").**

The investigator will be in active contact with the high interaction researchers. The controls allow the investigator to analyse whether any enhancements of the decision practices are the result of STIR interactions and exercises or other factors such as lab culture.

While the specific objectives of the study may set requirements for participants to be selected, participation ultimately depends on the voluntary choice of the researchers, who are not compensated for their participation and who may opt out at any time.

During the implementation, the **STIR investigator is embedded in the daily practices and operations of the natural science research group**. This may entail taking equipment training classes, attending research meetings and joining specific research projects.

The interactions conducted with the research participants consist of the following elements: pre-study interview, post-study interview, participant observation, and regular application of a decision protocol (Fisher et al. 2006). During the **pre- and post-study interviews**, the investigator asks the same questions of all participants in order to **establish baselines and track traceable changes**.

The open interview questions aim to investigate whether and how interdisciplinary interactions may help enhance the integration of social and ethical considerations into research decisions. The pre-study interview is the beginning of the participant-observation at the same time, during which the investigator visits the laboratory multiple times a week for 12 weeks and monitors the research activity of the participants recognizing their activity, attitude and decision points through the continuous interactions. The investigator communicates with the high interaction researchers while there is little to no contact with the controls.

To identify these aspects, the **embedded humanist** asks the same questions during the pre- and post-study interviews. To facilitate high-impact, real-time reflection on the evolving research activities and to track the ongoing attitudes and behaviours of the researchers participating in STIR, a "**decision protocol**" is regularly deployed throughout the duration of a STIR study (Fisher 2007; Fisher et al. 2006; Schuurbiers – Fisher 2009). The protocol is

based on a four-fold model of decisions that includes opportunity, considerations, alternatives and outcomes. With the assistance of the protocol, investigators and participants **collaborate to identify and map out the distinct decision components** that lead to any given decision**, through a collaborative process of co-description,** where **decisions are observed, described, and reflected** upon. Therefore, investigators ideally become involved in the decisions and strategies even though they begin as merely observers (Schuurbiers 2011). The protocol is usually deployed as a "grid" using a sheet of paper with four quadrants, one for each component. This facilitates the collaborators to write down and even hand-draw material together, in a transparent and interactive manner.

As a result of the 12-weeks work, it is possible to characterise decision-making processes of participants.

The learning process consists of three stages (Fisher, 2007):

- **de facto**: the identification of such socio-ethical factors, which influence the research and development decisions and outcomes;

- **reflexive**: building the responses – received during research work – into the decision-making process;

- **deliberate**: socio-ethical factors are completely considered during decision making.

In the third phase of the process (interpretation phase), investigators **document these outcomes both quantitatively and qualitatively**. Then they aggregate qualitative accounts in narrative and/or tabular form, depending on research questions and objectives. As a result, the deliberate modulations made by the research participants are correlated to the deployment of the protocol and to the specific features of the innovation environment and process already operating at the level of daily decisions. Reflexive learning is theorized to enhance researcher capacities to make decisions that are consciously compatible with RRI objectives and principles.

STIR has been used in **several different types of research and innovation organisational settings,** from university labs working on nanotechnology, synthetic, neuroscience and genetics to industrial labs working on biotechnology, microelectronics and nano-materials. In the vast majority of cases where the protocol was used to structure collaborative inquiry, all three outcomes are observed and laboratory participants Danube these developments as valuable for their own research (e.g., Fisher et al. 2010; Flipse et al. 2013; Schuurbiers 2011).

Overall, **STIR is not only a method for socio-techno integration**, it also **enables capacity building for institutionalizing RRI**: the output of STIR claims not only the **changes in behavior**, but also the *learning and/or understanding* that can lead to more changes in behavior later on. In theory, there are at least three potential outcomes from STIR studies: (i) skill development, learning, human capital; (ii) changed behaviours, practices, design and research pathways; and (iii) increased trust and social capital between different (social science and natural science) disciplines.

The **main objective of RRI approach** is to boost a **change in the approach and** learning process of **researchers**.

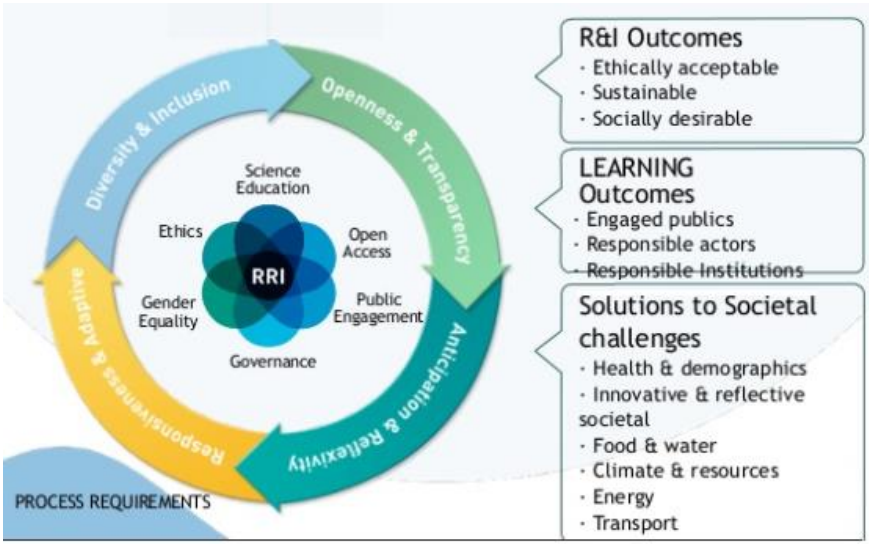

Figure 1 – Comprehensive approach of RRI[1]

2.1.3 STIR and the Next Generation Researchers

To obtain a more complex picture of the target group, and to reasonably evaluate the changes occurring during the research, the **main features of each generation** had to be reviewed:

1. Nowadays, the most **acknowledged experts** are typically the members of the so-called Baby Boomer generation (born between 1947 and 1964). After the second World War, they were born into an optimistic world, which largely determined their future behavioural patterns (Pál–Törőcsik, 2013; Oblinger–Oblinger, 2005). They get used to the persistent hard work,

[1] Source: https://www.slideshare.net/RRITools/tools-for-responsible-research-and-innovation;

because they believed that they can only get along with that. Thus, they showed humility and they own a rule-following behavior (Kovács et al., 2006). Comparing to the younger generations, it is **slower and more difficult for them to adapt to changes** and the new, accelerated life. It is important in the perspective of our research, that socialism highly influenced their life in our country (Tari, 2010).

2. Some of today's **senior researchers** and certain postdoctoral fellows fall into the category of **generation X** (born between 1965 and 1980). Members of generation X were born into a world, which does not have economic stability. Their behavioural pattern evolved because of various social and political changes (Pál–Törőcsik, 2013; Oblinger–Oblinger, 2005). They can be considered as a **transition generation**, since the Baby Boomer generation can be dated to the period before a sudden development of information technology, but generation Y and Z was born into the world of Internet and advanced technology. Generation X is a transition: the advanced technical achievements began to develop and spread at this time. Members of this generation can adjust to the new innovation results; the acceptance, however, is harder for them than their younger compartments (Pál–Törőcsik, 2013). A high degree of individualism characterizes this generation (Oblinger–Oblinger, 2005).

3. Nowadays, the **younger postdoctoral researchers** and masters' students are classified as **generation Y (**born between 1981 and 1995). They learned the benefits of technology almost as children, and they confidently use these tools. They **adopt easily to the changing environment**; besides, they are actively forming that. They live in the present, they have no long-term plans, and feel free to change. They are not afraid of the unknown, not from the novelties. Besides their optimist views of life, multitasking is peculiar to them: they are able to do several things at the same time.

4. **Generation Z** (1995–2010) involves bachelor's students, and the final year students currently studying in secondary education. For them, the change is quite natural, since they were born into a continuously changing world (Wood, 2013). They **consider the liberty important**, perhaps this is why the compliance with the rules is not always a primary concern for them. There are **no boundaries**: anyone can keep in touch with someone because of the developed technology of the World Wide Web. Communication has shifted to two fronts: they cultivate their friendships and relationships both virtually and personally (Mccrindle–Wolfiger, 2010). The members of generation Z **rather trust themselves than the world**

around them, or other people. Distrust might cause the trend that they dislike the rules, and the personal freedom is much more appreciated for them.

If we would like to **interpret the characteristics of the future researchers (generation late Y and Z) in the perspective of responsible innovation** and its implementation, we have to assume that the members of these generations feel the **rapidly changing digital world their own natural environment** (Oblinger–Oblinger, 2005; Connaway et al., 2008; McCrindle–Wolfinger, 2010). The novelty in their life is a natural consequence of innovation. They **like generating changes**, and they are not only passive observers of these changes. Thus, we can hypothesize, that they are **perceptive to novelties**, in fact, far more receptive, than the former generations. Hence, we expect **openness to responsible innovation**, and the messages of the related STIR study.

The members of generation late **Y and Z display greater openness** for the change, than the representatives of previous generations. According to the research of Mačkayová és Balátová (2011), almost all of those surveyed (98.21%) considered the change as a part of their life, moreover, they are quite open to experimentation (94.39%). During the implementation of responsible innovation, the responsiveness to change can be very important. It is important for the two youngest generation, **to use devices, which are suitable for multitasking**, thus these people expect the continuous renewal mostly from these devices (Oblinger–Oblinger, 2005; Mačkayová–Balátová, 2011; Pál–Törőcsik, 2013). A flexible and tolerant attitude characterizes the younger generation.

These properties provide an appropriate **platform for STIR research**, in which (1) multitasking is needed for the STIR work during research; and (2) the flexible, tolerant attitude is required first, to accept STIR investigators, and do not regard them as a confusing circumstance, and second, to integrate the results of STIR into their daily decisions.

The **awareness of responsibility and the green, eco-friendly thinking** appears increasingly in the mentality of these generations (Grail Research, 2011; McCrindle–Wolfinger, 2010). They pay greater attention to the environment than the former generations, and consider the effects of various processes on the environment, care about this factor when they buy a product for example (Pál–Törőcsik, 2013). According to the Nielsen Global Report (2015), generation Y and Z would be **willing to pay more to the products of manufacturers**, who are environmentally conscious, and are committed to social problems. All these features of

young generations provide a **more stable basis on the acceptance and practical implementation of responsible innovation** than previous generations.

2.2 STIR in different Innovation Environments

STIR method has been **successfully applied in laboratories** in the more developed countries of the world (mainly in the USA, the Netherlands, and Belgium), but **there is a reduced amount of experience in less developed countries**. The adaptability of STIR method; however, is affected by the interpretability of RRI in the given country, and the influence of the innovation environment. It is possible that these two factors appear simultaneously.

The practical application of RRI was investigated in **developing countries** as well (e.g., in China, Indonesia, and Vietnam), and the conclusion of these investigations is important for our study, too: **cultural, social, and political environment must be taken into account when RRI is implemented** (Macnaghten et al., 2014; Setiawan – Singh, 2015; Voeten et al., 2015).

Central and Eastern European countries own the special characteristics of capitalism; thus, their innovation environment also differ from the Western European ones (Farkas, 2011, 2016). In the Central and Eastern European countries, the R&D expenditure and the innovation performance of the private sector is low, and the proportion of employed in high-tech industry is lower than the EU average. Before 1990, Eastern European countries insisted to self-sufficiency, and did not developed with the technical changes of the World, while the Western European countries increased their expenditures (Krammer, 2007).

In the centrally planned economy innovation fell into the background: market demands were centrally influenced and the central price control made the prices so low, which did not cover the costs of innovation. Thus, companies were not motivated to carry out R&D. Besides, the innovation process was frittered away: during the implementation of research, there was a need for high interorganizational collaboration. The own interest of institutions, however, hindered the cooperation between researchers and engineers. A further barrier of research was the limited and poor-quality equipment, particularly in academia.1 During the democratic transition in Hungary after the collapse of the Soviet Union, the policy of R&D fell into the background.

As a result, the **Central and Eastern European EU countries are significantly left behind in the field of innovation**, compared to the Western European countries; and they rather

relied on external knowledge flow, than knowledge production. Furthermore, the social trust – despite democratization – remained at a low level, compared to Western European countries. It means, that transition changed neither the trust amongst Hungarian people, nor the social relationships.

In view of these factors, the results of the two Hungarian STIR research are not so surprising, since our country has such features comparing to more developed countries, that we had to perceive. A part of these can be explained by the post-Soviet mentality of senior researchers (Lukovics et al., 2016; Lukovics–Fisher, 2017). This statement generated the idea to investigate: (1) what sort of attitude do the students have towards RRI (who were born after the democratic transition in Hungary and are potential researchers in the field of natural sciences), and (2) to what extent are those features true to this generation that were identified during the STIR research of the practical implementation of RRI.

3 Context Analysis

The Danube Region is defined as the most international river basin in the world[2]: it includes 9 EU Member States (Austria, Bulgaria, Croatia, Czech Republic, Hungary, Germany – Baden-Württemberg and Bayern, Romania, Slovakia and Slovenia) and five non-EU Member States (Bosnia and Herzegovina, Moldova, Montenegro, Serbia and four provinces of Ukraine), covering 69 NUTS-2 regions.

Overall, the Danube area makes up one fifth of the EU territory and has more than 100 million inhabitants.

This results in a multifaceted context, characterised by significant diversity in terms of geography, socio-economic contexts and cultural models, making the identification and analysis of common issues and opportunities particularly challenging and crucial at the same time.

[2] Interreg DanubeTransnational Programme, Executive Summary Cooperation Programme 2014 – 2020, http://www.interreg-danube.eu/about-dtp/programme-presentation

Figure 2 – The Danube Region[3]

With reference to R&D and innovation environment, D-STIR partners have carried-out an analysis to understand and compare the contexts of the 8 countries involved in the project.

Indicators to assess local contexts were set in order to understand to what extent the countries are engaged in innovation and R&D and what are the forerunners in the Danube area. The 6 indicators are:

- R&D intensity;
- R&D expenditure;
- Number of researchers in R&D;
- Number of technicians in R&D;
- Number of applications for patents;
- Number of scientific and technical articles published.

Table 1 below ranks the countries with reference to the 6 indicators and provides general conclusions on the results observed[4].

[3] Source: https://www.danube-region.eu/about/the-danube-region;
[4] Data and statistics used for this analysis are included in Annex I to this document;

	Bosnia & Herz.	Croatia	Czech Rep.	Germany	Hungary	Romania	Slovakia	Slovenia
R&D intensity	8th	6th	3rd	1st	4th	7th	5th	2nd
R&D expenditure	8th	6th	7th	1st	2nd	5th	3rd	4th
Researchers in R&D	8th	6th	2nd	3rd	4th	7th	5th	1st
Technicians in R&D	6th	5th	2nd	3rd	4th	8th	7th	1st
Patent application	8th	7th	3rd	1st	4th	2nd	6th	5th
Scientific & technical articles	7th	8th	2nd	1st	4th	3rd	5th	7th
Indicators conclusion	*Lowest amount of money + very low no of res. & tech. = the worst results*	*Low amount of money + low no of res. & tech. = the worst results*	*Low amount of money + very good no of res. & tech. = good results*	*Highest amount of money + good no of res. & tech. = the best results*	*Good amount of money + medium no of res. & tech. = medium results*	*Low amount of money + lowest no of res. & tech. = good results*	*Medium amount of money + low no of res. & tech. = low results*	*Good amount of money + highest no of res. & tech. = low results*

Table 1 – How D-STIR countries are engaged in innovation

When it comes to RRI, it is worth noting that the term is not present directly (as a well-defined concept) in the strategic documents of most of D-STIR countries (some references in documents from Hungary and Slovenia). However, several RRI topics are mentioned in national/regional strategies for R&D. The table below lists national documents where room to RRI or RRI topics is given in D-STIR countries.

Furthermore, the adoption of sustainable, environment-friendly and responsible approaches and perspectives, as well as openness to societal challenges, are current trends across Europe.

However, again, the particular social and cultural characteristics of Danuberegion, require that RRI is managed in a specific way.

Bosnia & Herz.	THE FRAMEWORK LAW ON HIGHER EDUCATION; THE FRAMEWORK LAW ON SCIENCE; THE FRAMEWORK LAW ON SCIENTIFIC AND RESEARCH OPERATIONS AND COORDINATION OF THE INTER-ENTITY AND INTERNATIONAL SCIENTIFIC AND TECHNICAL COOPERATION
Croatia	STRATEGY FOR EDUCATION, SCIENCE AND TECHNOLOGY; STRATEGY FOR FOSTERING INNOVATION 2014-2020; SMART SPECIALIZATION STRATEGY 2016-2020; INDUSTRIAL STRATEGY 2014.-2020; CROATIAN RESEARCH AND INNOVATION INFRASTRUCTURES ROADMAP; STRATEGY FOR CLUSTER DEVELOPMENT 2011-2020
Czech Republic	THE NATIONAL RESEARCH, DEVELOPMENT AND INNOVATION POLICY OF THE CZECH REPUBLIC 2016-2020; THE NATIONAL PRIORITIES OF ORIENTED RESEARCH, EXPERIMENTAL DEVELOPMENT AND INNOVATIONS; THE NATIONAL RESEARCH AND INNOVATION STRATEGY FOR SMART SPECIALIZATION
Germany	THE FEDERAL GOVERNMENT'S HIGH-TECH STRATEGY; THE INNOVATIVE STRATEGIES OF THE 16 GERMAN FEDERAL STATES ARE LINKED TO THIS HIGH-TECH STRATEGY OF THE FEDERAL GOVERNMENT AND ITS PRIORITY TASKS AT NATIONAL LEVEL
Hungary	SPATIAL DEVELOPMENT PROGRAMME OF CSONGRÁD COUNTY 2014; SMART SPECIALIZATION STRATEGY (S3 STRATEGY); ECONOMIC DEVELOPMENT AND INNOVATION OPERATIONAL PROGRAMME
Romania	THE NATIONAL STRATEGY FOR RESEARCH, DEVELOPMENT AND INNOVATION 2014 – 2020; NATIONAL R&D PLAN AND INNOVATION; NATIONAL STRATEGY FOR COMPETITIVENESS (NSC); NATIONAL REFORM PROGRAMME 2016; REGIONAL OPERATIONAL PROGRAMME 2014-2020; REGIONAL DEVELOPMENT STRATEGY FOR THE SOUTH-EAST REGION OF ROMANIA
Slovakia	NATIONAL REGIONAL INNOVATION STRATEGY RIS3; ACT 172/2005 REGULATES 10 NATIONAL RESEARCH AND DEVELOPMENT PROGRAMS IN ACCORDANCE WITH THE PRIORITIES OF THE STATE SCIENCE AND TECHNOLOGY POLICY WERE APPROVED BY THE GOVERNMENT; ACT 185/2009 ON INCENTIVES FOR RESEARCH AND DEVELOPMENT
Slovenia	OPERATIONAL PROGRAMME FOR THE IMPLEMENTATION OF THE EU

	COHISION POLICY IN THE PERIOD 2014-2020; 2SLOVENIAN INDUSTRIAL POLICY – SIP; RESOLUTION ON RESEARCH AND INNOVATION STRATEGY OF SLOVENIA 2011-2020; 4. SLOVENIAN'S SMART SPECIALIZATION STRATEGY – S4

Table 2 – References to RRI 7/ RRI keys in national documents and strategies

Given the importance of region-specific characteristics of the Danube area, in the following paragraphs, the common features and issues of countries in this region with regard to the innovation environment will be analysed from a horizontal and vertical perspective. The former considers historic trends and processes that have contributed to structure the Danube context as it is now. The latter goes through the key features of the current scenario that are relevant for research on and implementation of RRI.

3.1 Common features of the innovation environment of the Danube Region

3.1.1. The horizontal perspective

Historical fluency and discrepancy

RRI is still a relatively new concept for countries in South East Europe (SEE) and in the Danube region. In these countries, the **innovation environment is relatively underdeveloped compared to Western countries** (European and American).

The core operational document of the Danube Transnational Programme emphasizes the following **features of the region** (EC 2014c): low level of economic development; dominance of the SMEs; challenges of exploiting the potentials; relatively low level of employment rate; diversity of culture; diversity in population density; challenges of migration: from rural to urban areas; from the East to the West; high administrative fragmentation; a large variety of bio geographical features. Another important feature of the Danube countries is that the majority of them had **relatively strong relationship with the Soviet Union**, making these countries really different from the Western countries.

Before the 90`s. Western European countries increased their expenditure on R&D, while the Eastern European countries insisted on autarky and did not keep the pace with global technological changes (Krammer, 2007). During the planned economy, innovation was hindered: market demand was centrally influenced, and owing to the central price rules, the price of a new product was so low that it would not have covered the research and innovation expenditures. As a result, companies were not interested in research and development

activities. In addition, innovation processes were really fragmented: in order to implement innovation, significant inter-organizational cooperation was needed but the interests of organizations overwrote the cooperation between researchers and engineers.

After the 90`s. At the time of political transformation, research and development policies were again in the background (Carayannis and Egorov, 1999). As a result, these countries have less developed innovation environment and they rely more on external knowledge flow than internal knowledge creation (Inzelt and Szerb, 2006; EC 2014b). In addition, even though there was democratization in these countries, transition could not change the trust of peoples towards each other (EC 2014b).

Current situation. In the old member states, innovation facilities (such as science parks, technology transfer institutions, etc.) help implement innovation strategies, but in the new member states these facilities were established only in the previous 10-15 years and their regional distribution is still uneven: these facilities are concentrated around capital and larger cities (EC 2012).

Gross Domestic Expenditure on R&D (GERD) is generally lower in the countries of the Danube region in comparison with the EU average. The same applies to their performances in terms of Business Sector Expenditure on R&D (BERD), which is relatively lower in comparison to the rest of Europe.

Some progress can be observed concerning the adoption of educational and research system in the less favoured countries. Countries in the Danube area appear to experience a structural change underlined by the ongoing upgrading of their economic structures and knowledge intensity of their economies over the last decade (EC 2014a). In most countries, universities and science centres are usually concentrated in major urban areas and/or the regional economic centres (EU 2012). Generally, the share of higher education expenditure on R&D (HERD) of GDP is still relatively low in the Danube area compared to EU15.

Moreover, over the past twenty years, the number of researchers and scientists in the Danube countries has seriously decreased, because highly educated people leave their home countries in search of a better life. Experts leave their country for better professional fulfilment abroad (“external” brain drain), or they leave their professions for better-paid jobs in the private sector (“internal” brain drain) (UNESCO 2009; Stankovic et al. 2013).

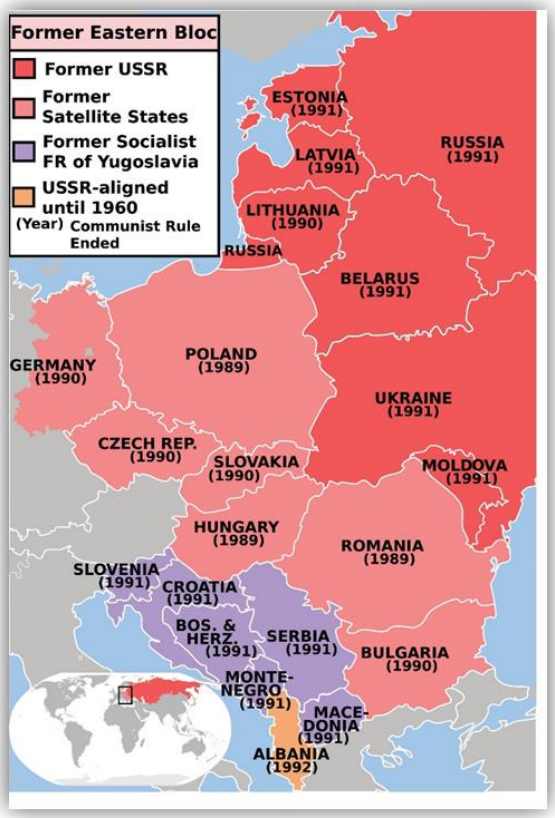

Figure 3 – The former Eastern-Bloc nowadays[5]

"The uneven distribution of research and innovation capital is mainly due to the different framework conditions the sector is facing throughout the region. The wide range of financial allocations and policies governing the research sector are determining the institutional capacities of the actors involved, leading to different levels of performance." (EC 2014c, p. 13).

However, though **substantial reforms of existing institutions have been introduced**, the significant role of informal and indirect relationship between stakeholders, a high level of political influence on innovation activities still exist in these countries. A number of new institutions have been set up in order to diversify current education systems, promoting research and development and the diffusion of innovation. Although these reforms have not always been quick and complete, as discrepancies frequently arise between the adoption of new legislation and its implementation, progress achieved so far across the Danube countries can be considered adequate. Danube countries still face specific problems that influence the

[5] Source: https://en.wikipedia.org/wiki/File:EasternBloc_PostDissolution2008.svg;

decision-making process and action planning, for example, the lack of inter-sectoral cooperation between ministries responsible for higher education, research and innovation, the traditional organization of universities or the lack of a university development strategy (UNESCO 2009).

3.1.2 Vertical

- **Universities and science centres are concentrated** in major urban areas and/or regional economic centres. Universities, however, also belong to smaller, rural regions, the only difference is that these institutions mostly focus on education rather than research and innovation.

- **The number of researchers and scientists has significantly decreased**, therefore this phenomenon became a highlighted problem. The decrease was mainly caused by the lack of career incentives, access to scientific equipment and information, current economic situations, political issues, complicated administration, as well as low salaries. Under these conditions, the brain drain had a strong impact on RDI human resources.

- The role of **informal relationships among stakeholders** is sometimes much more important than the official ways of being in contact**;** informal relationship is much faster. Furthermore, the role of trust is significant via informal relations, which reduces the bureaucratic burden. Informal relationship is more important than the official way.

- The **political influence** on innovation activities is present in most of the countries. When innovation activities are done by using their own sources in response to the market demand, there is no political influence. In case of grant-driven innovation, however, the presence of this issue is significant.

- **The level of trust is low**, except for Germany. Generally, there is a serious lack of public trust in the government. The poor transfer of technology, the low level of information sharing and cooperation results in a serious problem in the R&D sector. Besides institutional trust, trust in other people and in business is also problematic. In many cases, the inefficient innovation system led to this situation. On the contrary, the level of trust is relatively high in Germany, because of the incorrupt environment.

- **The lack of cooperation willingness** is present in most of the countries, except Germany. The lack of cooperation between universities and the business sector, and between the public and private sector is mainly caused by the low level of trust in most of the countries. In general, poor transfer of knowledge and low level of information sharing as well as cooperation are severe problems of the R&D sector.

- **The role of governmental financial support** in stimulating innovation activities is sometimes higher than the market-driven innovation. Governmental financial support is essential, because of the companies' severe lack of sources. They do not have high innovation capacities; consequently, their market-driven innovation activity is usually limited.

3.2 SWOT analysis

Based on the above, D-STIR partners carried-out a SWOT analysis to understand better the readiness of countries in the Danube area to embrace RRI.

The table below summarises the results of this analysis[6].

	Bosnia & Herz.	Croatia	Czech Republic	Germany	Hungary	Romania	Slovakia	Slovenia
S	*Strategic orientation to RRI*	*Reform in R&I framework in 2013*	*Modern facilities & equipment (EU funds)*	*Powerful economy*	*growing number of RRI experts*	*National structure for R&I*	*Good research infrastructure*	*RD activity in business sector*
	Sectoral approach to innovation	*EU projects officers in ministries*	*good HR capacity and expertise*	*high-quality technologies*	*existing RRI pilot projects*	*dedicated planning documents*	*cooperation on academic level*	*stakeholders, chains and networks*
	Initiatives of innovation development	*Tradition in research*	*Lower cost of R&D work and services*	*Research-intensive economy*	*RRI hubs and institutions*	*New public procurements rules*	*Cheap working force*	*living and working environment*
W	*lack of funds for innovation*	*Low level of R&I funding*	*Rigid system of administration*	*Technology transfer*	*Low scientific cooperation*	*administration instability*	*Low quality institutions (policy)*	*weak cooperation*

[6] Detailed results of SWOT analysis are included in Annex II to this document.

	lack of funds for SMEs	*Low ESIF absorption*	*Small scale of R&D system*	*Corporate networking*	*low number of RRI experts*	*bureaucracy*	*limited TT, incubators*	*bureaucracy*
	No statistical data	*low scientific cooperation*	*Brain drain*	*Lack of young professionals*	*lack of trust*	*Brain drain*	*Brain drain*	*Tax system*
O	*Experience in innovation labs*	*Governmental grant schemes*	*geographical location*	*integrate innovation*	*high quality education*	*state of the art European RI*	*R&I infrastructure*	*industrial revolution*
	EU funds	*EU funds*	*EU funds*	*developed value chains*	*EU funds*	*EU funds*	*EU funds*	*developed value chains*
	Educational system	*legislative R&D framework*	*Danube sharing experience*	*medium-sized enterprises*	*fast flow of information*	*incentive to comply with EU standards*	*Stakeholders awareness*	*economic opportunity*
T	*Political instability*	*national target not achieved*	*Bureaucracy of R&D funding*	*innovation pressure*	*Centralization*	*unpredictable funding*	*Unwillingness to cooperate*	*country perception*
	Economic and social situation	*low added value*	*End of EU fund 2020 period*	*demographic development*	*underfinancing environment*	*Unprofessional reform of RDI*	*low interested stakeholders*	*no "out of the box" thinking*
	Bureaucracy	*Economy*	*Political changes*	*global competition*	*Brain drain*	*resistance to change*		*Brain drain*

The information included in the table is the result of processing /summarising data provided by partners – developed by ADR SE

Table 3 – SWOT analysis

3.3 RRI in the business and academic environment of the Danube Region

When addressing RRI in the business and academic context, it is important to consider the different characteristics of these two areas.

The most important factor to consider is motivation for the business and research work. In general, while the academic sector tends to scientific excellence of the research activity, the business one is guided by profit.

In both perspectives, the potential risks resulting from a non-responsible approach to innovation are relevant.

In the business sector, the primary motivation is to enter to the market with a new product before the competitors and to acquire competitive advantage while making profit.

In this context, fast reactions to market are very important, as well as the innovation output itself, which can be completely against an RRI approach.

Nowadays, most market-oriented innovations are carried out by private sector, meanwhile, research is concentrated in academic R&D environments. This tendency may cause many tensions in the near future. Companies are responsible in different ways and for different things. On the one hand, they have legal responsibilities and contractual responsibilities, on the other hand, they have to meet their stakeholders, customers and employees expectations as well (Iatridis and Schoereder, 2015).

Due to the possible negative impacts of new technologies, policy makers have to influence the innovation process to achieve outcomes which are sustainable, societal desirable and ethical acceptable.

In R&D work, businesses are guided by a complex set of drivers. Although, they have to ensure positive impacts of technology and show high-level responsibility for their stakeholders and as part of their brand image, they generally tend to try to reduce regulatory gaps and keep high profitability regardless of other factors.

Corporate social responsibility (CSR) is a key tool to address this issue, however it is not enough to promote a comprehensive RRI approach. Therefore, further analysis is needed to identify specific tools to implement RRI in the industrial context (Yaghmaei, 2015).

In the academic sphere, market-oriented innovation generally appears only in case of research cooperation with the business sector, but in most cases neither the margin pressure nor the market pressure are the main motivations of the R&D&I activities in the academic sector. Therefore, the academic environment, in principle, provides better conditions for RRI. The academic sector generally deals with activities at the beginning of the innovation value chain, therefore more time and efforts can be dedicated to initial considerations to shape the innovation on an RRI perspective.

Table 4 below compares the different drivers that guide the action of academic and business actors.

	Business	**Academic**

Motivation of R&D&I	realise competitive advantage on the market	scientific success in early stages/ cooperation with the business sector in later stages
Main goal	very quick introduction to the market	scientific perfection
Main target group	customer	scientific community, business sector
Dominant phase of the innovation chain	later phase	early phase
Dominant type of R&D	Experimental development	Basic research and applied research
Dominant TRL (technology readiness level)	TRL7-9	TRL1-6
Profit criteria	very important	not significant
Motivation on considering RRI issues during the R&D&I activity	very limited (marketing reasons and mandatory reasons)	yes
Interest on medium and long term negative side effects of R&D&I activity	less	more
Financial disadvantage from implementing RRI	may happen (cancelling the market introduction of a "risky" product – missing profit)	no
Interest on implementing RRI	less	more
Table: RRI and its influencing factors in the two main innovative sectors, developed by EMFIE		

Table 4 – Comparing drivers for the action of academic and business actors

4 Overview of the STIR methodology in the Danube Region

As it was discussed in Chapter 3 above, the particular characteristics of the Danube area require some specific considerations about how to adopt RRI and, consequently, how to implement the STIR methodology in the region.

Concerning the innovation environment, we highly recommend the following **actions**:

1. Raising **awareness**: an effective and general (public) dissemination of the RRI concept needs to be employed as a starting point. The dissemination should include all relevant actors: target group, wider audience and policy makers.

2. Increasing **passive knowledge**: introducing RRI into the passive knowledge of society then turning it into the active one.

4. **Bottom-up approach**: embedding RRI principles in local and regional level politics.

5. Successful regional/local **pilots in innovation activities** illustrating the implementation of RRI.

6. **RRI indicators as grant indicators**: because of grant-driven innovation, attention should be paid to RRI orientated indicators when evaluating funding awards. This could be an effective tool not only to raise awareness but also to promote responsibility among funding organizations and final beneficiaries.

7. **Financial tools**: in the initial phase of RRI introduction, public authorities and business support organizations should consider the channels of funding SMEs. Because of the challenging financial circumstances in the Danube regions, innovative SMEs have to cope with daily survival resulting that they are insensitive to the potential benefits of RRI.

8. Closer to **society:** governmental organizations or local authorities as stakeholders may be deemed to be somehow partial in the process of mainstreaming RRI. Therefore, the creation of a multi-stakeholder agency or association may prove a better promoter of RRI.

Additionally, there are **age-specific recommendations**, which might facilitate the practical implementation of responsible innovation. The efficiency of STIR is relatively high among young – potential, but still not active – researchers, and these results are similar to the pilot projects carried out among active researchers (Lukovics et al., 2016). The above-presented consequences can provide important results for innovation management and might accelerate the practical implementation of responsible innovation into the daily research work. It could be done in two **ways**:

1. RRI and related disciplines should be **integrated into the educational system**. It would be an excellent basis, if these researchers would start their work according to RRI in the future.

2. The Socio-Technical Integration, which is applied in our research, as STIR, is based on **dialogs, joint thinking, and discovery**. It makes possible to students identify themselves

with the thoughts of RRI, and ensures that RRI become as an **inner motivation**, not as an external constrain.

In addition, we highlight that if we want to improve young, possible researchers' preparedness to RRI, the introduction of it has to be commenced with the basics, along with the following **recommendations**:

1. It is important to **maximize the time of STIR application**, and minimize time in which we define the missing basic concepts of RRI (Lukovics et al., 2016) ("Step Zero")

2. **Integration of sociology foundation courses** into the natural science education: the effectiveness of STIR is better in countries where social science courses are present in a greater number within natural science education. A slight enlargement of the intellectual horizon can be achieved via introducing it into the education. ("step minus one").

3. It is recommended to **strengthen the role of feedback**: later, during the practical/laboratory work, we should investigate that how or in what extent does the horizon broadening occurred after the 12-week long study.

4.1 New elements in the original STIR Method adapted to Danube context (D-STIR)

Based on the experiences and lessons gained from partners and stakeholders, new elements appear in the adapted STIR method leading to the development of the D-STIR method. Many suggestions, however, are left out as a result of the consultation with prof. Erik Fisher and the external expert, Metodus Kft. For example, it was not possible to produce training materials (as Step 0 and Step -1), which can universally be used. Furthermore, these extra steps would not bear more impacts on the effectiveness of the STIR interactions than the absence of them.

Figure 4 – Working on STIR[7]

They would only lengthen the study resulting in loss of some impacts. Therefore, it was decided to leave these educational steps out of the final D-STIR method. In this chapter, we summarize the new elements of the D-STIR method in comparison with the original STIR method. These reflect how we adapted the STIR method to the Danube region. These differences are summarized in Table 5.

In the original STIR method, the **training for embedded humanists** was carried out in small groups under the leadership of Erik Fisher (professor at Arizona State University, USA). In D-STIR, however, the training takes place in medium-sized groups personally in a form of seminars and online training sessions. The latter ones have to be introduced because of the great geographical distances. The trainer remained Erik Fisher – and this unchanged property has a crucial importance in terms of constant quality and a uniform and standardized process.

[7] Source: prof. Erik Fisher, Szeged capacity building workshop (D-STIR activity);

This resulted in changes in the procedure of exams: the final exam is organized after the online reminder training.

The **pre- and post-study interviews** are changed in D-STIR method, since they contain tailor-made questions to the special features of the Danube countries. In addition, the **answers** should be rated on a 1–6 scale, which gives us data that can be evaluated quantitatively, while in the original STIR, the answers were exclusively narrative. During the **twelve-week long interactions**, embedded humanists consult with their trainer, i.e., Erik Fisher, and EMFIE. This consultation is regular, happens after the sixth, ninth, and tenth week. Moreover, the embedded humanists have to report the results continuously what is not a practice in the original method.

Criteria	STIR	D-STIR
TRAINING PHASE – EMBEDDED HUMANISTS		
Type of the personal training	in small groups led by Erik Fisher	in medium-sized group (talk and seminar) with an online "reminder training" led by Erik Fisher
Exam	in-process exam during the training	final exam after the online reminder training
INVITATION PHASE		
Focus of the invitation letter – motivations	Focus on STIR research without motivation	Adjusted to the personal and institutional needs and motivations of the actors in the Danube Region
Invitation letter – short-term benefits	No focus on the short-term benefits	Mere emphasis on the short-term benefits of the participant company (why is D-STIR useful for the company?)
Invitation of the academic and business actors	No distinction	Different invitation letters to academia and business
Name of the method	STIR	Business: STIR Innovation Process Manag. Academia: STIR

PRE-STUDY INTERVIEW		
Questions	General questions	Tailor-made questions to the special features of the Danube countries
Answers	Only narrative answers	Answers on a 1 to 6 scale
12-WEEK PHASE		
Consultation with the trainer	No regular consultation	Online consultation after week 6, 8 and 10.
Reporting to the trainer during 12 weeks	No	Continuous reporting
POST-STUDY INTERVIEW		
Questions	General questions	Tailor-made questions to the special features of the Danube countries
Answers	Only narrative answers	Answers on a 1 to 6 scale
EVALUATION PHASE		
Evaluations	Narratives	Narratives and statistical evaluation (scale)
HORIZONTAL ISSUE		
Raising RRI awareness	No	Obligatory and continuous task with using the social media with the support of the trainer

Table 5 - Differences between the STIR and the adapted D-STIR method (developed by EMFIE)

One of the most important results of the methodology development is the **complex, multi-level motivation system** (Figure 5). In D-STIR project, academic environment was separated from the business one after long discussions and careful examination – that was unknown in the process of STIR. In the case of academic environment, the motivation is tailored to academic individuals, and institutions, as well. In the businesses environment, the choice of participating or not in D-STIR is not a one man's decision. Thus, it was not necessary to develop different motivational materials. Additionally, the new motivation system mentions

short-term benefits as well, which encourages the candidates to participate. The name of the method became Innovation Process Management in the business sector, while it remained STIR in academia. The motivational materials are listed in Chapter 4.

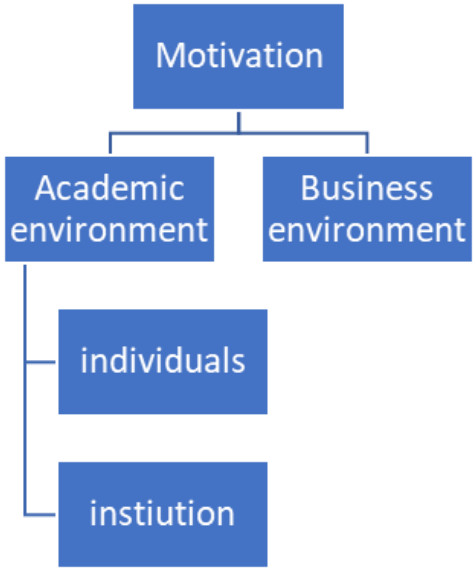

Figure 5 – Multi-level motivational system

Raising awareness is a horizontal issue during D-STIR that is an obligatory and continuous task via using the social media with the support of the trainer.

4.2 The adapted D-STIR Method

The Figure describes how the D-STIR method logic looks like. The interventions concern the invitation phase, the pre- and post-study interviews, the name of the STIR in the business sector, and the evaluation phase (not only narratives but statistics are also used).

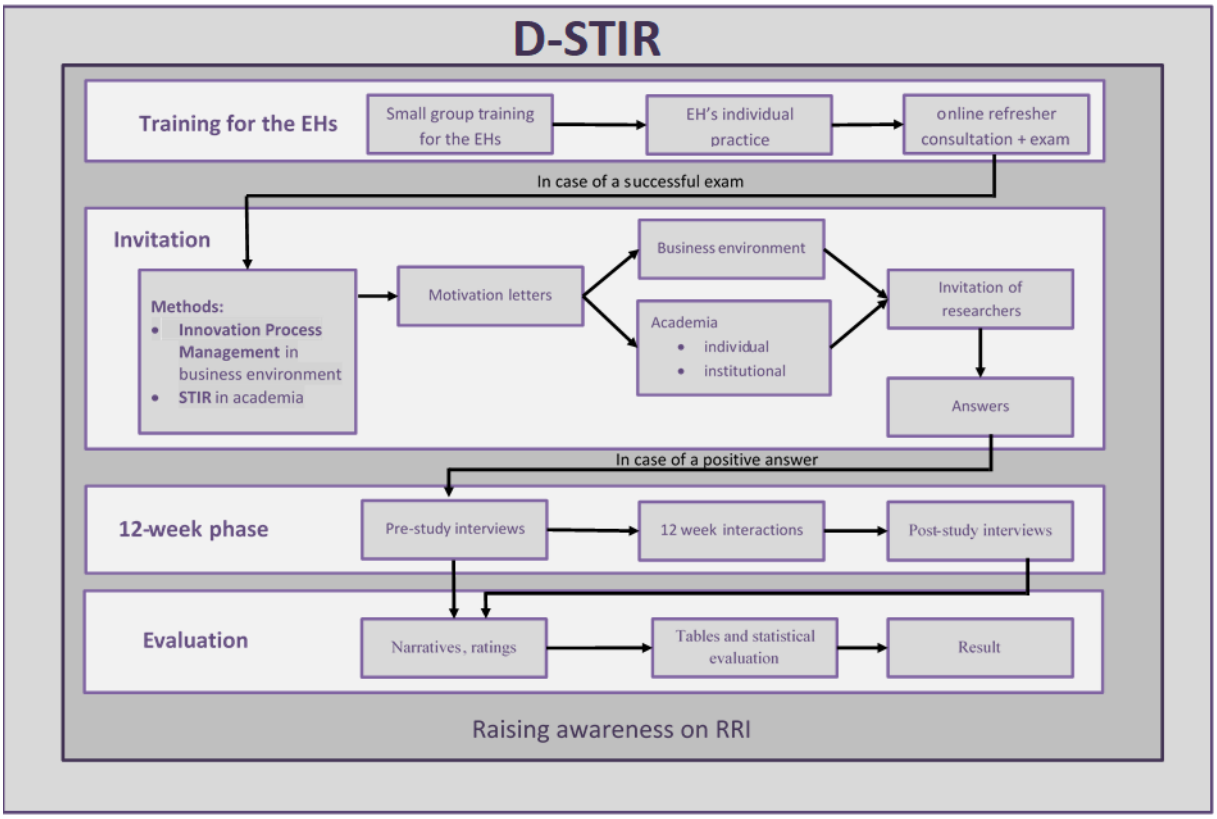

Figure 6 – Final structure of the D-STIR method

4.2.2 STIR in Academia

The STIR method in academia begins with the training of embedded humanists. To maintain the quality of the study, the training happens in medium-sized groups, and the leader is Erik Fisher who developed and tested the method years ago. Thereafter, an online reminder training will take place, also with Erik Fisher. Participation in both pieces of training is obligatory for the EHs. At the end, a final exam with pass/fail assessment will be held. If the trained EH fails, he or she is not allowed to implement the STIR method in the pilot partner institution.

The first step of the project is sending out invitation letters. We prepared motivation letters that are adjusted to the needs of the Danube Region. We paid attention on the careful word choice and the content as well. The EH can choose which motivation letter is the most appropriate (in academic environment individual or institutional). We intended to rename the method, however, STIR became a brand, and sells itself. There is no reason to introduce a somewhat similar name.

When the EH receives a positive answer, the study is about to begin. The EH starts it with a pre-study interview. The questions are adjusted to the special features of the Danube countries. The answers are no longer narrative since there is a scale from one to six that avoids neutral answers, from which we will be able to reach quantitative data, statistics and tables. With the above-mentioned interview, the study has already started. The EH asks questions regularly from the researcher. It is important to note that in D-STIR EHs can ask Erik Fisher about difficulties and questions arisen.

There are also non-optional consultations after the sixth, eight, and tenth week. Similarly to the pre-study interview, there is an interview after the observation and examination phase (twelfth week). The EH asks tailored questions, and the answers are scaled like in the previous interview. The evaluation will be based on more quantitative data due to the modified interviews. Besides narrative data, there will be a statistical evaluation in this step, too.

An important added value of the project is that it will familiarize the society with RRI and related terms. Namely, there is a horizontal issue, the raising awareness on RRI. It is compulsory, but the project partners can ask for help from the EMFIE.

Finally, here we collected the tasks of the adjusted STIR method in twelve points.

TRAINING PHASE – EMBEDDED HUMANISTS

1. There will be a personal training in a medium-sized group (talk and seminar) as well as an online “reminder training” provided by Erik Fisher. Participation in both pieces of training is obligatory for the EHs.

2. At the end, a final exam with pass/fail assessment will be held for the trained EHs. If the trained EH fails, he or she is not allowed to implement the D-STIR method in the pilot partner institution. The Erik Fisher team at the ASU will detail the exam and how to prepare the necessary STIR-simulation video.

INVITATION PHASE

3. The invitation (and motivation) letters have been changed and adjusted to the personal and institutional needs and motivations of the actors in the Danube Region.

4. As a more than a 10-year old brand name in academia, the STIR remains the name of the 12-week long interactions in academia.

PRE-STUDY INTERVIEW

5. Questions are tailor-made to adjust to the special features of the Danube countries.

6. Answers given in the pre- and the post-study interviews are rated on a 1–6 scale to avoid neutral answers.

12-WEEK INTERACTION PHASE

7. Online consultation after weeks 6, 8 and 10.

8. Continuously reporting on the progress and the difficulties arose.

POST-STUDY INTERVIEW

9. Questions are tailor-made to adjust to the special features of the Danube countries.

10. Answers given in the pre- and the post-study interviews are rated on a 1–6 scale to avoid neutral answers.

EVALUATION PHASE

11. Based on points 6 and 10, embedded humanists will make narrative and statistical evaluations as well.

HORIZONTAL ISSUE

12. During D-STIR, the partner institutions must pay extraordinary attention to the continuous "raising awareness on RRI" activity. To support the partners and help them find the right contents, EMFIE helps the partners in this activity – the partners must continuously share the relevant contents of the EMFIE Facebook page on their own Facebook page or motivate their pilot partners to follow us (or both).

4.2.3 STIR in the Business Sector

The STIR method in business environment begins with the training of embedded humanists. To maintain the quality of the study, the training happens in medium-sized groups, and the leader is Erik Fisher who developed and tested the method years ago. Thereafter, an online reminder training will take place, also with Erik Fisher. Participation in both pieces of training is obligatory for the EHs. At the end, a final exam with pass/fail assessment will be held. If the trained EH fails, he or she is not allowed to implement the STIR method in the pilot partner institution.

The first step of the project is sending out invitation letters. We prepared motivation letters that are adjusted to the needs of the Danube Region. We paid attention on the careful word choice and the content as well. The invitation (and motivation) letter of the business sector is specific and focuses on the short-term benefits of the participating company. It details why D-STIR is useful for the company. Additionally, we renamed the method to Innovation Process Management to make it more attractive.

When the EH receives a positive answer, the study is about to begin. The EH starts it with a pre-study interview. The questions are adjusted to the special features of the Danube countries. The answers are no longer narrative since there is a scale from one to six that avoids neutral answers, from which we will be able to reach quantitative data, statistics, tables. With the above-mentioned interview, the study has already started. The EH asks questions regularly from the researcher. It is important to note that in D-STIR EHs can ask Erik Fisher about difficulties and questions arisen. There are also non-optional consultations after the sixth, eight, and tenth week. Similarly to the pre-study interview, there is an interview after the observation and examination phase (twelfth week). The EH asks tailored questions, and the answers are scaled like in the previous interview. The evaluation will be based on more quantitative data due to the modified interviews. Besides narrative data, there will be a statistical evaluation in this step, too.

An important added value of the project is that it will familiarize the society with RRI and related terms. Namely, there is a horizontal issue, the raising awareness on RRI. It is compulsory, but the project partners can ask for help from the EMFIE.

Finally, here we collected the tasks of the adjusted STIR method in twelve points.

TRAINING PHASE – EMBEDDED HUMANISTS

1. There will be a personal training in medium-sized group (talk and seminar) as well as an online “reminder training” provided by Erik Fisher. Participation in both trainings is obligatory for the EHs.

2. At the end, a final exam with pass/fail assessment will be held for the trained EHs. If the trained EH fails, he or she is not allowed to implement the D-STIR method in the pilot partner institution. The Erik Fisher team at the ASU will detail the exam and how to prepare the necessary STIR-simulation video.

INVITATION PHASE

3. The invitation (and motivation) letters have been changed and adjusted to the personal and institutional needs and motivations of the actors in the Danube Region.

4. The invitation (and motivation) letter of the business sector is specific and focuses on the short-term benefits of the participating company (details why D-STIR is useful for the company).

5. For marketing reasons, the name of the method is "Innovation Process Management" in the business sector.

PRE-STUDY INTERVIEW

6. Questions are tailor-made to adjust to the special features of the Danube countries.

7. Answers given in the pre- and the post-study interviews are rated on a 1–6 scale to avoid neutral answers.

12-WEEK INTERACTION PHASE

8. Online consultation after weeks 6, 8 and 10.

9. Continuous reporting on the progress and the difficulties arose.

POST-STUDY INTERVIEW

10. Questions are tailor-made to adjust to the special features of the Danube countries.

11. Answers given in the pre- and the post-study interviews are rated on a 1–6 scale to avoid neutral answers.

EVALUATION PHASE

12. Based on point 7 and 11, Embedded Humanists will make narrative and statistical evaluations as well.

HORIZONTAL ISSUE

13. During D-STIR, the partner institutions must pay extraordinary attention to the continuous "raising awareness on RRI" activity. To support the partners and help them find the right contents, EMFIE helps the partners in this activity – the partners must continuously share the relevant contents of the EMFIE Facebook page on their own Facebook page or motivate their pilot partners to follow us (or both).

5 Stakeholder engagement

5.1 D-STIR project approach

5.1.1 Key points of successful stakeholder engagement

During the **engagement process** we have to decide why we want to involve stakeholders, who are our relevant stakeholders and how we want to organise the engagement.

Why?

- Have clear aims for stakeholder engagement in the project;
- Identify the benefits for stakeholders who engage with you;
- Determine and understand the motivations of stakeholders to be involved in the project.

The first, and perhaps the most critical step, in the stakeholder engagement process is to **identify why the stakeholder engagement activity is necessary**.

In the case of **D-SIR project** there is a simple answer to it:

1. Because stakeholder involvement is a compulsory activity in all projects implemented within the Interreg Danube Transnational Programme.

2. Because stakeholders in D-STIR project contribute to all project outputs (strategy, tools, pilots).

Beside the already mentioned points, some **other reasons** for the stakeholder engagement can be the following:

- To better understand **local needs** and circumstances;
- To raise awareness of the project and provide a clearer **understanding** of the benefits of it.
- To raise **awareness** of the responsible research and sustainable innovation;
- To gain **trust** and improve **working relationships**, form **new partnerships**, create **new networks** in the sector of entrepreneurship, business and academia. These networks and new relations can also be used after the D-STIR project end;
- To collect and share ideas and **good practices** and get help for creating the outcomes of D-STIR;

- To provide people and organisations with an opportunity for **personal development** through engagement activities. The TSGs members can learn from each other's and can **learn new methods**;
- To create new (or improved) **communication channels**, identify effective dissemination activities;
- To ensure the **sustainability of results**;
- To use TSGs meetings for a marketing purpose. It can be a good opportunity for you to share information about your institution, issue a press release etc.
- To investigate issues from **different perspectives**.
- **Who?**
- Systematically identify those who are likely to hold an interest in the project, including those who have power to influence the uptake of the project findings;
- Group your stakeholder. Remember that not all stakeholders will have the same role or desire to be involved; not every stakeholder needs to be involved all of the time;

How?

Factors like **trust, openness and commitment play** an important role in working with the stakeholders. Once engagement has been achieved, it is important to **maintain that engagement** by following certain actions that can support **continued engagement**.

During the stakeholder activities, **the following factors should be taken into account**.

-Clarity It is very important to clarify the objectives and goals of the engagement and to evaluate the appropriateness of the techniques. Communication plays a crucial role in delivering the objectives or defining the problem across the stakeholders at the same time acknowledging the differences in people's perceptions and stakeholder entity perspectives.

-Management of information. Stakeholders need to be persuaded of the benefits of sharing information. It may be necessary to present information in different ways as the attitudes and the way the information is processed by the stakeholders needs to be taken into account. Information should be presented without using complex concepts and jargon.

-Support and capacity development. The knowledge the stakeholders possess about the project varies depending on the different levels of stakeholder entity involved. In order to

enable stakeholders to contribute ideas and visions to the discussions, each stakeholder entity needs to be worked with so that they are on the same level of understanding as the rest of the stakeholder entities.

-Transparency. Each stakeholder entity needs to be up-to-date on the actions and opinions through various channels. They need to be assured that their concerns, requests and expectations are addressed in a clear, open and transparent manner.

-Trust-building. Letting the stakeholders know that every stakeholder's view is valued and respected in the engagement process will give the assurance that their opinions are heard. This will build trust.

Transnational stakeholder engagement is critical to success of the D-STIR project. **Engagement** means the **active involvement and participation** of others in a project. To achieve the strategic objective of D-STIR project, **3 TSGs** are engaged in all phases of the project: 1 academic environment; 1 business environment; 1 Danube macro region. Their engagement is essential to ensure relevance and feasibility of applying D-STIR results and long-term sustainability. Only transnational cooperation can produce a Danube RRI Strategy that meets the region's R&I needs.

5.1.2 Project tools

Involvement tools: TSGs workshops (workshop or online consultation); ad-hoc meetings (individual contact with TSG);

A set of communication tools and involvement techniques is described that can be applied in different contexts.

Output tools detailed:

- Leaflet (It can be in English or national language)
- Brochure (final brochure is obligatory)
- Project posters (for the project time in facilities of each partner is obligatory)
- Newsletter (dissemination is role of all partners)
- Website (both your existing website and the official project website)
- Social media (FB + LinkedIn)

- Mailing lists
- Public events (capacity building-Szeged, study visits-Bucharest, Stuttgart, Prague)
- Media relations: press releases, inviting media for the TSGs workshops and other public events

5.1.3 Transnational stakeholders groups

Partners create 3 transnational RRI stakeholders groups (2 Pilot & 1 Danube level): **ACADEMIC, BUSINESS AND DANUBEMACRO LEVEL** group.

Involvement of TSGs has to follow **QUADRUPLE HELIX MODEL**: innovation cooperation model or innovation environment in which users (citizens), business (industry), research actors (academia) and public authorities (government) cooperate in order to produce innovations. They work together to co-create the future and drive structural changes far beyond the scope of what and one organization or person could do alone.

- **Transnational Stakeholder Group 1**: group of stakeholders focuses on the Pilot in Academic Environments - so Higher Education is the main target group (departments of ELIs, scientific/humanistic, other local universities, science parks, local authorities, national ministries).

- **Transnational Stakeholder Group 2**: group of stakeholders focuses on Pilot in Business environments - so enterprises (SMEs) and representatives (e.g. Business Support Organisations) are the main target group.

- **The third group is organised at Danube level** and collects representatives from target groups in areas across the Danube Region (min. 2 representatives per eligible country) (e.g. Development Agencies). Members of the Danube Territory Stakeholder Group (DTSG): are continuously updated and invited to STIR capacity building workshop, to exchange sessions, to study visits etc; Input from this group of stakeholders is used to support development of all outputs.

The Stakeholder Groups and information flow with members was critical to the success of the D-STIR project and to ensure relevance and feasibility of applying D-STIR results and long term sustainability. The involvement of DTSG members provoked and facilitated exchange

among interested research infrastructure actors in the Danube macro-region, but not only since different organisations have been mobilised during the project lifetime.

At the same time, the involvement of DTSG members offered a closer look at the latest achievements and practical challenges in the field of RRI, as well as individually developed solutions.

Moreover, the exchanges facilitated the further uptake of results by the countries and research organisations and revealed possible synergies with current initiatives. Beyond that, briefs about current developments in relation to research infrastructure and options to contribute to a macro-regional action plan for the Danube region focusing on the topic have been produced.

The activities contributed to better addressing the complex topic of RRI in the future and to the development of tools to integrate it in the research area, also by using and exploiting the macro-regional opportunities and resources.

Nevertheless, the involvement of DTSG members paved the way to promote the uptake of Danube RRI Strategy and the newly developed D-STIR research method across Danube Region.

6 Policy Recommendations for improving institutional & infrastructural framework conditions (Danube/Local Level)

6.1 How to design effective RRI measures for the Danube area?

Embedding RRI in R&D&I practices is not about adopting a new work methodology, it is about triggering a durable change in the way we approach innovation and we create value. It requires a multisector perspective and a strong commitment at policy, academic and business level to produce a systemic change.

In general, to effectively embrace RRI, a number of factors should be considered.

RRI actions must be designed taking into account the specific nature and priorities of the organisations involved (either research institutions or private companies). They vary based on the sector (e.g. biomedicine and energy have different needs), on the level of innovation/RRI experience, on management procedures in place and on the availability and skills of human resources.

On top of that, as it was described in Chapter 3 - Context Analysis, countries of the Danube region have very specific characteristics that require further consideration. Disregarding such characteristics in the RRI design phase may negatively impact on the implementation and success of the measures adopted. As an example, the lack of trust and willingness to cooperate, experienced in the post-socialist countries, may prevent any RRI initiative from being successful if not duly addressed by mitigation measures.

A key part of partners' work in D-STIR focused on testing RRI actions in the academic and business environment in their regions, to gather evidence supporting the identification of suitable measures for RRI adoption in the Danube area.

This was done in the framework of project Activity 5.2, coordinated by ERDF1 CLS, with support from LP and ERDF2 EMFIE. Activities carried-out followed the same structure for each Pilot and are summarised as follows:

• Selection/Planning: each pilot organisation identifies, with support from D-STIR expert, the RRI Actions to be implemented and defines people responsible and timeline of activities;

• Implementation: each pilot organisation undertakes the activities planned for their specific RRI Action(s), with support from D-STIR expert. During implementation, exchange between different pilot organisations is particularly encouraged to promote peer learning.

• Evaluation: throughout the implementation period, feedback is gathered from each pilot organisation. A final evaluation of activities is carried out, providing input to Activity 5.4 – Exchange and Monitoring of Application period.

The two tables below summarise the key features of the pilot actions in D-STIR.

Pilot Action in Academic Environment

Pilot Action - Phases	**No of labs involved (Total: 4)**	**Timeframe**	**Responsible Partners**
Selection	At least 1 lab per partner	April 2018 – April 2019	ERDF 3 (with ERDF8 for policy side), ERDF 5 (with ASP1), ERDF 6 (IFIN-HH and ELI-NP labs)
Implementation	At least 1 lab per partner		
Evaluation	At least 1 lab per partner		

Pilot Action in Business Environment

Pilot Action - Phases	**No of SMEs involved (Total: 36 SMEs)**	**Timeframe**	**Responsible Partners**
Selection	At least 5 SMEs per partner	April 2018 – April 2019	LP, ERDF1 (with ASP2), ERDF 4, ERDF 7, ERDF 9, ERDF 10, IPA1 (with ASP3)
Implementation	At least 5 SMEs per partner		
Evaluation	At least 5 SMEs per partner		

Through research work, pilot actions and transnational exchange, D-STIR partners could understand better the readiness of the Danube region to embrace RRI and the potential barriers to successful implementation.

The role of public institutions (National, Regional and local governments) is considered as crucial to encourage the adoption of RRI and to provide the needed support conditions, at regulatory and infrastructural level.

Based on the above, in the sections below a set of policy recommendations and possible measures to be adopted by private companies and research institutions to embrace RRI are provided.

The figure below, summarises the interactions among the policy level, the academic and business sector to create innovation with and for the society.

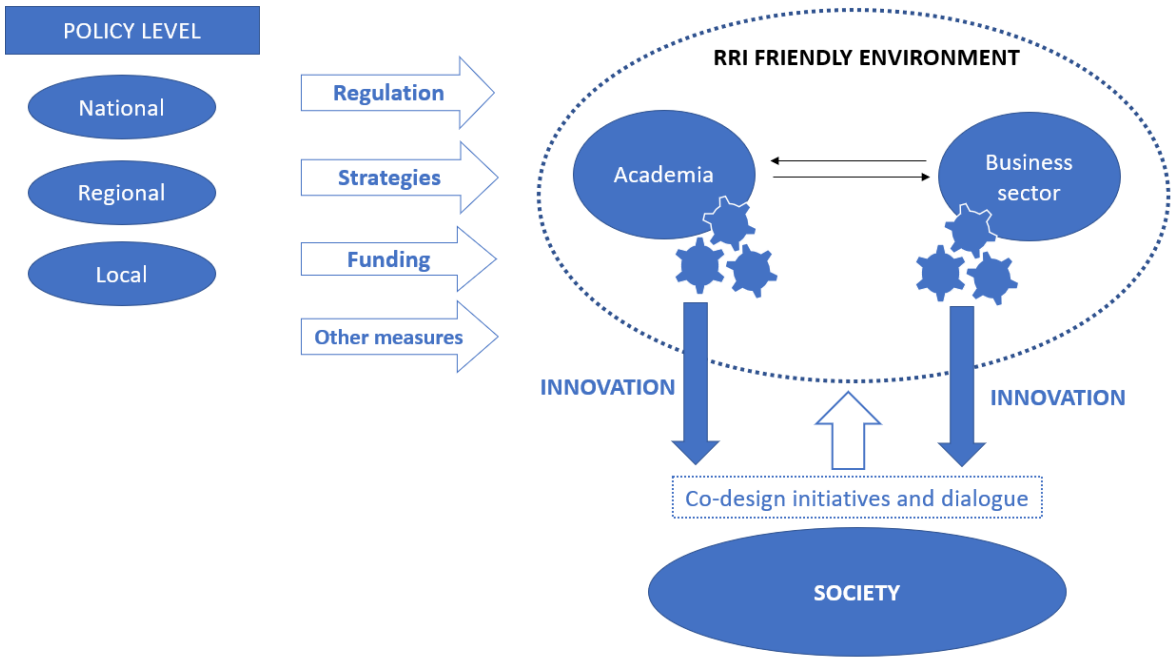

Figure 7 – Interactions among policy, academia and business sector

Policy recommendations and list of possible actions to be implemented by academia and business sector in the Danube area are the basis for the definition of local road-maps for D-STIR territories (as described in Chapter 7).

6.2 Policy recommendations

In general, in the Danube area R&D&I policies are defined at National level. Therefore, to boost a durable change, it is essential that RRI principles are embedded into National strategies.

Regional policies also play a key role in this sense, given the capacity of regional governments to design and adopt their own strategies and plans to boost innovation, in the framework of the National regulation.

Last but not least, a number of tools are available also to local governments (e.g. local development plans, close contacts with industry and innovation environment), to introduce the concept of RRI and facilitate its adoption and acceptance as a normal practice in R&D&I activities.

The policy recommendations defined below have a general perspective and can be followed by the three government levels, based on their specific competences in policy-making in the field of R&D&I.

The objective of these recommendations is to inspire a set of actions that policy makers can put in place to overcome the negative factors characterising the innovation environment in the Danube area (described in Chapter 3 above) and create an RRI friendly context for academia and business sector.

1. Include **RRI as a horizontal principle** in R&D&I strategic documents including, but not limited to, Smart Specialisation Strategies, Regional Operational Programmes, local development plans;
2. **Optimise regulation**, to guarantee that RRI principles are embedded in all relevant sectors and at all levels. Promoting the adoption of codes of conduct for R&D&I in different sectors, improving regulation for the industrial sector, guaranteeing even allocation of research funds between major and minor academic institutions and defining RRI-focused National education programmes are possible measures in this sense;
3. Use RRI as a criterion to **award public funding** for research and innovation and/or as an indicator to monitor the performances of the projects funded;
4. **Define new funding initiatives** to finance RRI piloting in private companies or academic institutions and/or RRI support structures;

5. **Promote transparency** in the allocation of funds for R&D&I activities and in granting access to research objectives, results and outcomes;
6. **Engage industry** to boost a change in business culture, by demonstrating the commercial value of RRI and its benefits in terms of public image and competitiveness. In doing so, it is essential to consider the differing levels of knowledge of RRI among large companies and SMEs;
7. **Create incentive schemes and reward initiatives** to offer acknowledgements and prizes to RRI champions (private companies and academia);
8. Create/support the development of **innovation intermediaries** (e.g. development agencies, Chambers of Commerce, FabLab) with specific skills and expertise to support businesses that want to engage in RRI;
9. Promote **cross-sector collaboration** in R&D&I, facilitating exchange among industry and academic sector;
10. **Promote education, training and capacity building** at all levels on RRI topics, to guarantee that skilled professionals who can effectively work on RRI in the business and research sector are available on the market;
11. **Raise awareness** about RRI and its building principles in the industrial and academic sector, making use of the political influence on innovation activities;
12. **Encourage the development of official channels** to build relationships among stakeholders that are based on slender structures and flexible approaches, with very low bureaucracy;
13. **Encourage co-design initiatives** to involve the civil society in the innovation process.

6.3 Academic sector

Practical experience in pilot actions showed that, in general, researchers and academics have a stronger motivation to engage in RRI compared to people from the business sector. However, as described in Chapters 2 and 3 above, academia in the Danube area suffers from some weaknesses. These include (but are not limited to) the uneven allocation of research funds between major institutions and smaller ones, the different level of flexibility and propension to collaborate of researchers based on their age and background and the strong bias towards perfection and scientific excellence that may overshadow any other principle.

The points below summarise a list of actions and measures that can be adopted by academia in the Danube area to move towards RRI.

1. **Adopt RRI and its keys as horizontal principles** not only for R&I purposes, but for all the activities of the institution (e.g. selection of staff, facilities / waste management, etc.);
2. Design **education programmes** that focus on and/or comply with RRI principles;
3. Use RRI as a **criterion to select and finance R&I projects** and/or as an indicator to monitor their performances;
4. Include **RRI training/background** among the qualifications requested for research personnel to be hired;
5. Facilitate **cross collaboration** among different research areas/departments/individuals, to build mutual trust and strengthen exchange of experiences;
6. Promote **diverse and inclusive** working groups;
7. Adopt **gender/diversity management plans**;
8. Create **ethical advisory boards**;
9. Define **socio-environmental monitoring systems** to be used to assess the different phases of the research activity;
10. **Raise awareness** on RRI topics and principles among researchers, providing evidence on the benefits of an RRI approach for the scientific excellence of their activities;
11. **Educate students** on RRI, to build a new RRI culture and trigger a durable change in the approach of next-generation researchers to the R&I activities;
12. **Define incentive schemes/prizes** to award R&I projects adopting an RRI approach;
13. **Participate in transnational/international R&I projects** on RRI, or related topics, to improve knowledge and approaches thanks to peer learning and exchange of experiences with other institutions and actors;
14. **Promote/participate in joint initiatives** with business, third sector and citizens to co-design innovation in and for the society.

6.4 Business sector

When it comes to the business sector, practical experience shows that, in general, the motivation to adopt an RRI approach for R&I activities is generally low, being profit and competitiveness two key priorities for companies.

The objective of companies investing in R&D&I is to develop new or improved products that are highly competitive and that can reach the market as quickly as possible.

Market driven innovation is, at the same time, a key activity and a challenging task for companies, due to limited amounts of resources to invest. This might force even the most responsible companies to prioritise an extremely quick time-to-market over ethical/ environmental aspects.

Moreover, while large companies can have specific Corporate Social Responsibility policies influencing decision-making, SMEs might lack such kind of strategic vision, making it harder for them to effectively understand the potential of and engage in RRI.

It is crucial for companies in the Danube area to rethink their approach to business and management processes, in order to effectively engage in RRI.

The points below summarise a list of actions and measures that can be adopted by the business sector in the Danube area to move towards RRI.

1. **Adopt RRI keys as horizontal principles** not only for R&D&I purposes, but for all company's activities (e.g. selection of staff, facilities/waste management, etc.);
2. Take advantage of **funding granted and training opportunities and support initiatives promoted** by public institutions and/or innovation intermediaries in the field of RRI;
3. Use **RRI as a unique selling point and core component of company's brand identity**, to gain visibility, reputation and competitiveness;
4. Promote **diverse and inclusive** work environments;
5. Include **RRI training/ background** among the qualifications requested to professionals applying for job positions;
6. Adopt **gender/diversity management plans** and release periodic reports on company's performances;

7. Facilitate **cross collaboration** among different departments, professionals and individuals, to build mutual trust and encourage peer learning;
8. Create **ethical advisory boards**;
9. Define **socio-environmental monitoring systems** to be used to assess the different phases of product lifetime and the performances of the company as a whole;
10. **Involve different company levels** and professionals (from top management to employees) in co-designing innovation;
11. **Participate in transnational / international R&I projects** on RRI, or related topics, to improve knowledge and approaches thanks to peer learning and exchange of experiences with other institutions and actors;
12. **Promote end-user engagement programmes and participate in joint initiatives** with academia, third sector and citizens to co-design innovation in and for the society;
13. **Identify key stakeholders** and establish permanent working groups to guarantee continuous dialogue and exchange.

7 Concrete proposals for STIR application (long-term road map, including funding options)

7.1 Boosting a durable change toward RRI across the Danube Region

- How the RRI approach can take root across the Danube Region in a durable way?
- How to boost a long-term change in the mind-sets of target actors?
- How can RRI principles, research excellence and market priorities coexist and "collaborate" to deliver sustainable innovation?
- How can STIR help with the above?

Answering these questions has been a priority for D-STIR partners and has constituted a core part of the project work.

How to actually translate RRI principles and approaches into daily practices of academia and, above all, businesses is one of the key challenges to be faced.

As discussed in the previous chapters, the concept of RRI is mainly developed by actors (e.g. social scientists, researchers, policy makers, etc.), who are sensitive to the topic and who have a clear view of how research and innovation activities should be designed and carried-out in a responsible way. However, the general concept of RRI might be hard to be embedded in daily practices of science institutions and businesses as it is, above all considering that a different approach should be adopted when addressing research, development and commercialisation activities.

It has already been discussed how the bias towards scientific excellence and quick economic results can negatively affect the sustainability of innovation. Especially in the business context, market needs and commercially-driven innovation entail a set of priorities and constraints that are frequently conflicting with some RRI principles.

The above said, it is essential to investigate how the RRI principles and recommendations developed (see Chapter 6 for detailed description) can be actually implemented in business and academia, how STIR can serve to this purpose and how D-STIR partners can support target actors in the process in a durable way.

In the framework of project activities, D-STIR partners have adapted the original STIR methodology to (WP4) and have selected a set of RRI actions to be piloted and tested in key academic institutions and SMEs from their countries (WP5). They have then observed and monitored the barriers, needs and constraints associated to RRI implementation in practice.

Based on the results from this work (that are detailed in the relevant deliverables), they have developed a long-term road map for the application of RRI, through STIR, in businesses and academia across the Danube region.

Partners, in cooperation with ASP where present, have identified the most effective solutions to guarantee the long-term durability of results achieved in their territories and to broaden the impact to the whole Danube Region. They have also identified a set of financial tools (from private and public sources at EU, national and regional level) to support the application of STIR and foster the transition towards an RRI sensitive Danube Region.

The road-map (described in Section 7.2 below) contains indications that can be easily adapted to local specificities and priorities and turned into specific local road-maps. It is developed using a graphic representation, so that all the steps towards the successful implementation of RRI are clearly visible to and easily understandable by target actors.

7.2 Road map for long-term application of STIR and implementation of RRI in the Danube Region

The road-map for the long-term application of STIR methodology across the Danube region has been developed as a result of project work.

The road-map includes a set of specific actions that D-STIR partners intend to undertake after project conclusion, to guarantee long-term sustainability of results and impacts. Partners decided to keep the road-map simple and lean, so as to guarantee that it can be easily adapted by each organisation to cater for specific needs of local areas, thus ensuring a successful and effective implementation of the measures undertaken.

Although the actions are designed to be deployed on a long-term perspective, it is expected that, as time goes by, these can be redesigned and/or enhanced, based on the emerging needs. Moreover, it is expected that they will produce tangible impacts already on the short/medium-term, triggering a multiplier effect and increasing the number of stakeholders/target actors that could become themselves leading players implementing the road-map.

To define the actions, two different perspectives were considered:

- **Internal dimension**: actions that can be carried-out by D-STIR partners at internal level within their organisation, to consolidate the knowledge gained and the results achieved throughout the project;
- **External dimension**: actions to be undertaken by D-STIR partners outside their organisations, towards stakeholders and other actors.

As for the internal dimension, the key actions identified are:

- **Embed** RRI principles and STIR into usual organisation's practices: D-STIR partnership includes organisations of very different nature (e.g. Public Authorities, Development Agencies, Research Institutions, etc.). To guarantee that they can effectively transfer their knowledge on RRI and their experience as "Stirers" to other stakeholders and target groups, it is essential that they embed themselves the RRI approach into their practices and daily work.
- **Train** staff on RRI and STIR: D-STIR partners should spread knowledge about STIR and RRI within their organisations among colleagues, using training sessions and knowledge sharing tools. Training on soft skills is an important part of an RRI strategy.
- **Continue work** on adaptation of STIR methodology: in the framework of D-STIR, a specific work to adapt the STIR methodology to the needs of the Danube Region, with a focus on businesses and academia, has been initiated. The adapted methodology has been the basis of pilot activities within the project and interesting outcomes were observed (as detailed in relevant deliverables). Continuous work to adapt the methodology and tools to new needs and specific characteristics of target actors involved is considered as a priority to guarantee the long-term sustainability of D-STIR across the region.
- **Allocate internal resources** for work on RRI and STIR: to successfully continue their work after D-STIR conclusion, partner organisations should allocate some specific resources. These can be either human (i.e. identify one or more "Stirers" or RRI experts within the organisation, set-up a STIR task force, etc.) or financial resources (i.e. dedicate a part of the organisation's annual budget specifically to STIR related activities) and are vital to guarantee STIR application on a long-term perspective. Workshops to support organisations to access funding were a large part of the RRI pilots, particularly in the business environment. If companies have more information on where to receive funding

for RRI and more skills in grant application, they may be more willing to invest in RRI strategy.

As for the **external dimension**, the key actions identified are:

- Take part in **interregional cooperation** projects or other transnational initiatives: the participation in D-STIR has represented a positive experience for all the partners involved. They could learn about STIR and RRI and they could enhance their skills and expertise thanks to peer learning and exchange. Interregional cooperation helped them getting a better knowledge of the Danube region as a whole and even of their specific contexts. Therefore, the participation in other interregional cooperation projects and other transnational initiatives is particularly sought after.

  Moreover, D-STIR partners have created very good relationships with each other and a solid network that they intend to maintain even after project conclusion.

- Continue **raising stakeholders' awareness**: this has been one of the core activities of D-STIR from the start. Project partners have put many effort in informing target actors and raising their interest about RRI and STIR, over the different project phases. They have developed dedicated messages and adopted tools that could maximise communication outreach. This activity must be continued in the after-project period, in order to guarantee that D-STIR stakeholders continue to be involved and that new target actors can be attracted. The development of dedicated campaigns and materials is particularly sought after.

- **Spread the word** on STIR among similar actors: it has already been highlighted that the presence of actors of different nature within the D-STIR consortium is a key added value for the project. While it can be hard for a project as whole to effectively reach a specific target audience in the different countries of the Danube region, it can be easier for the single partners to establish links with other organisations from their regions / countries that are similar to them. Therefore, individual contacts of each partner with organisations of similar nature are sought after. This could be done, for instance, on the occasion of networking events (e.g. organised by Associations of local councils or Innovation agencies) or in the framework of periodic meetings.

- Provide **direct support** to actors that are interested in adopting STIR and embrace RRI: this can be done either in the form of in-person training sessions or by providing help-desk services, materials or consultancy.
- Use D-STIR participating stakeholders as "**ambassadors**", so that they can spread the work among other organisations belonging to their sectors. This is particularly sought after for target actors from the business sector, as it appeared that attracting enterprises towards RRI can be a rather challenging task. Therefore, hearing the positive experiences from D-STIR pilot SMEs can help overcome their resistances and raise their interest.

The road-map for the long-term application of STIR across the Danube Region is presented in a graphic format in the figure below.

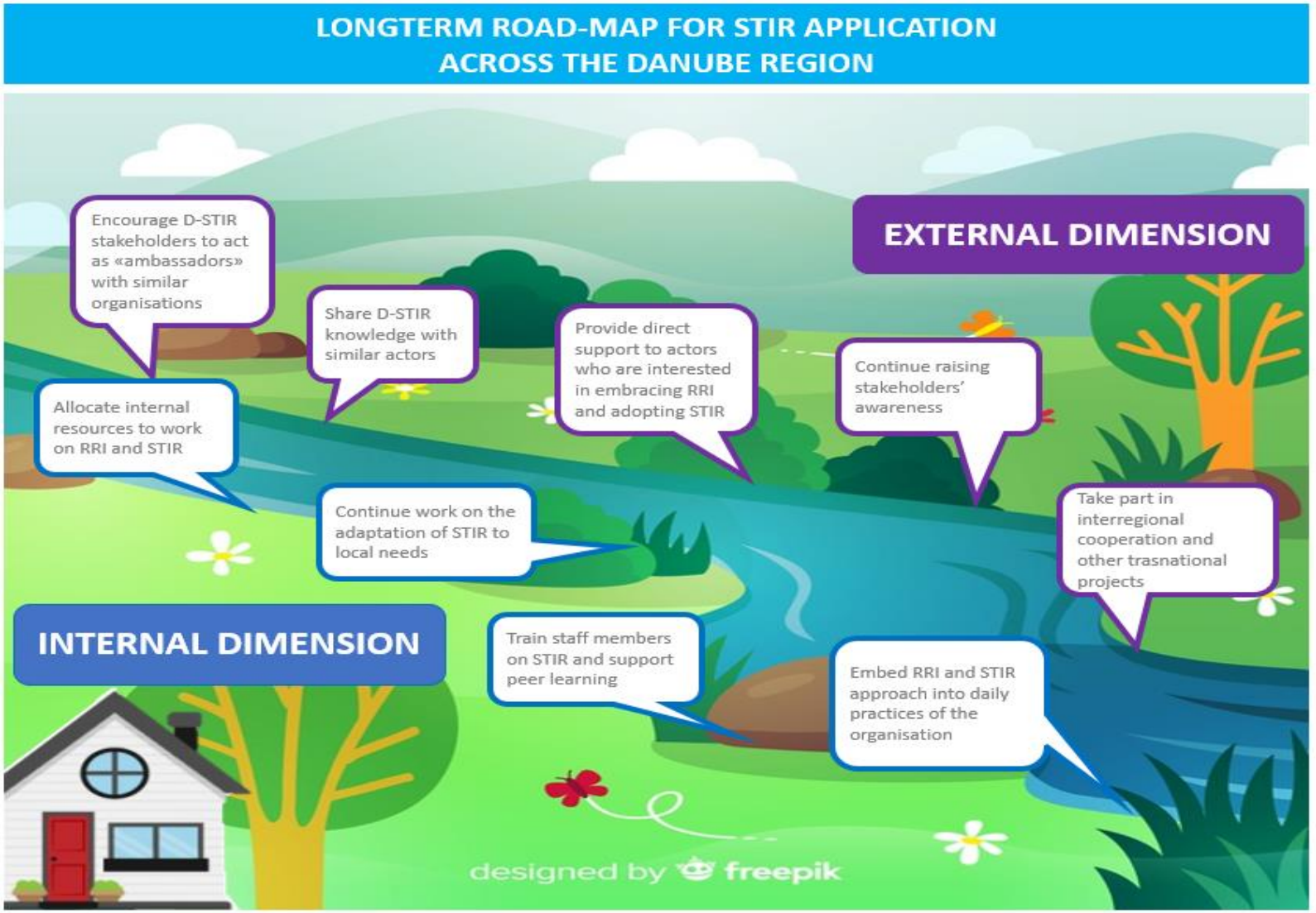

Figure 8 – Road-map for STIR application in the Danube Region

7.3 Funding options

Country	Funding source	Funding tool
-	European	Horizon 2020
-	European	ERASMUS +
-	European	Interreg Europe
-	European	Interreg Danube
-	European	Interreg Central Europe
-	European	Cost
Slovakia	National	Slovak research and development agency
Slovakia	National	National cluster funding
Slovakia	EU	Operational programme research and innovation – academia and industry axis
Hungary	EU	Economic Development and Innovation Operational Programme (GINOP)
Hungary	National	National Research, Development and Innovation Fund
Hungary	National	MTA PREMIUM POSTDOCTORAL RESEARCH PROGRAM 2019
Hungary	National	MTA LENDÜLET

		(“MOMENTUM”) PROGRAMME (2019–2024)
Hungary	Regional	Territorial and Settlement Development Operational Program
Croatia	EU	Operational Program Competitiveness and Cohesion 2014-2020
Croatia	National	ESIF Micro and Small Loan Program
Croatia	National	State Aid Grant Program to Check Innovative Concepts
Croatia	Private	CRANE - Croatian business angels network
Czech Rep.	EU	Operational Program Research, development and Education
Czech Rep.	National	Zeta Program
Czech Rep.	National	ETA PROGRAM
Slovenia	EU	Operational Programme for the Implementation of the EU Cohesion Policy 2014-2020
Slovenia	National	ARRS national budget
Romania	EU	2014-2020 Regional Operational Program
Romania	EU	2014-2020 Competitiveness Operational Programme

Romania	National	National Plan for Research, Technological Development and Innovation 2015 – 2020 PNCDI III
Germany	EU	ROP ERDF GERMANY
Germany	EU	BADEN WURTTEMBERG - 2014-2020
Germany	National	goInno
Germany	National	BAFA Coaching
Germany	Regional	ESF Coaching
Germany	Private	Business Angels Region Stuttgart e.V.
Bosnia and Herzegovina	National	Grants provided by Ministry of development, entrepreneurship and crafts of Federation of BiH
Bosnia and Herzegovina	Regional	Encourage the development of a small economy

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ANNEXES

Annex I – Key statistics describing the Danube region

Bosnia & Herz.	0.30%
Croatia	0.85%
Czech Rep	1.95%
Germany	2.87%
Hungary	1.38%
Romania	0.49%
Slovakia	1.18%
Slovenia	2.21%

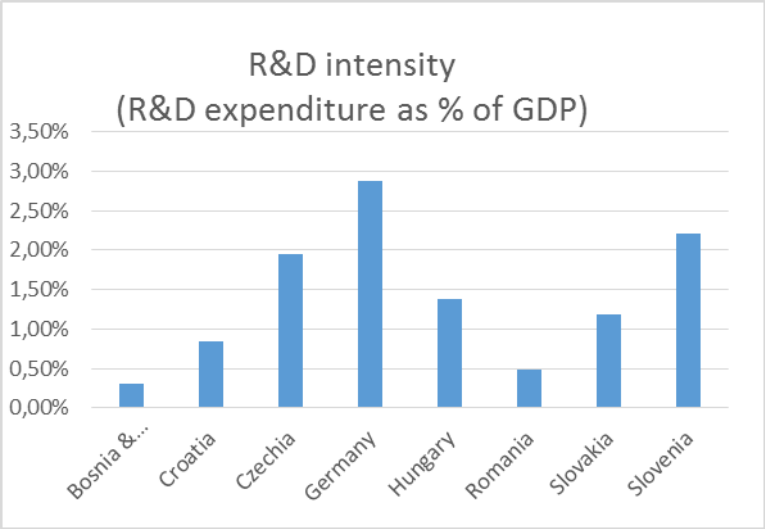
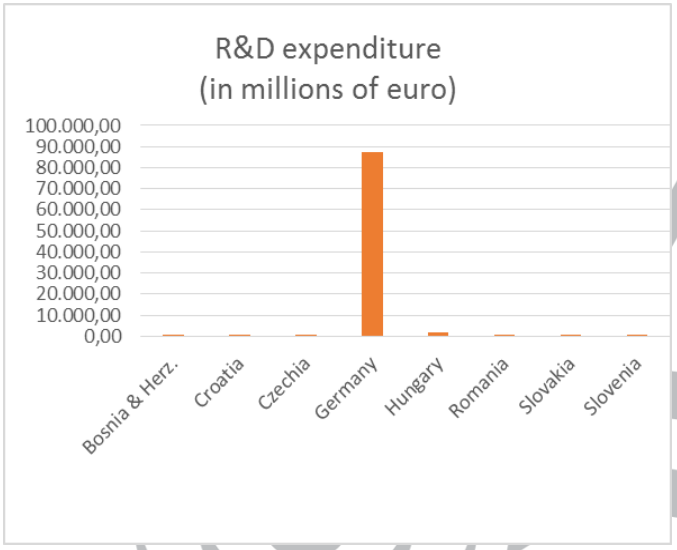


Table and Chart: The information included in the table is the result of processing /summarising data provided by partners – ADR SE

Bosnia & Herz.	31.30
Croatia	375.00
Czech Rep	325.00
Germany	87,188.00
Hungary	1,511.00
Romania	782.00



Slovakia	927.00	
Slovenia	853.00	

Table and Chart: *The information included in the table is the result of processing /summarising data provided by partners – ADR SE*

	Business enterprise	Government	Higher education	Private non-profit
Bosnia & Herz.	33%	20%	46%	1%
Croatia	51%	25%	24%	0%
Czech Rep	54%	21%	25%	0%
Germany	68%	15%	17%	0%
Hungary	75%	13%	12%	0%
Romania	44%	39%	17%	0%
Slovakia	28%	28%	44%	0%
Slovenia	76%	14%	10%	0%

Table: *The information included in the table is the result of processing /summarising data provided by partners – ADR SE*

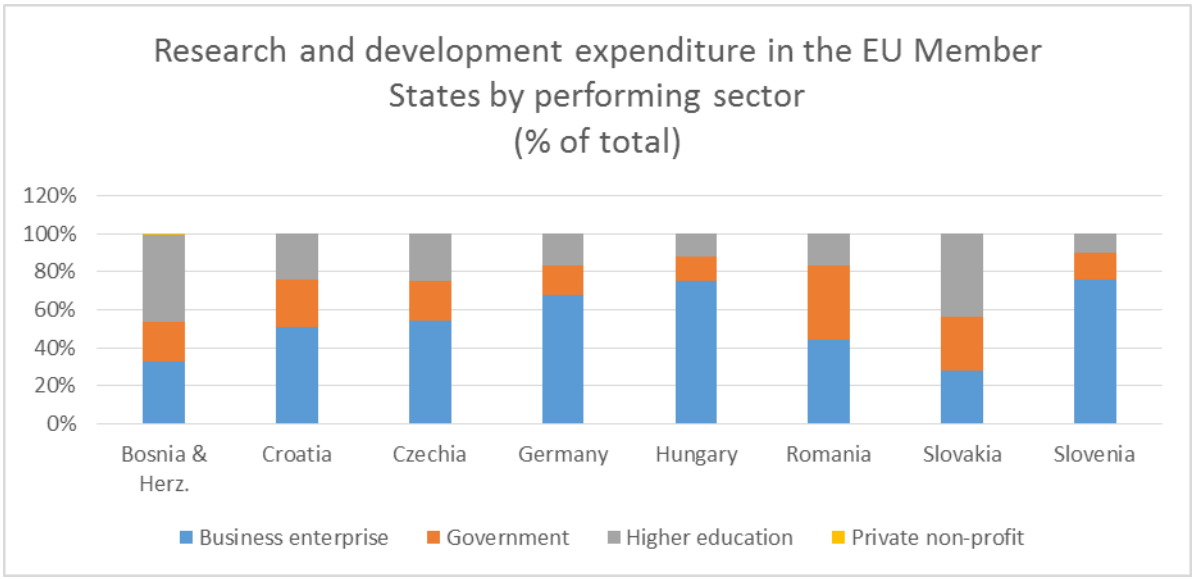
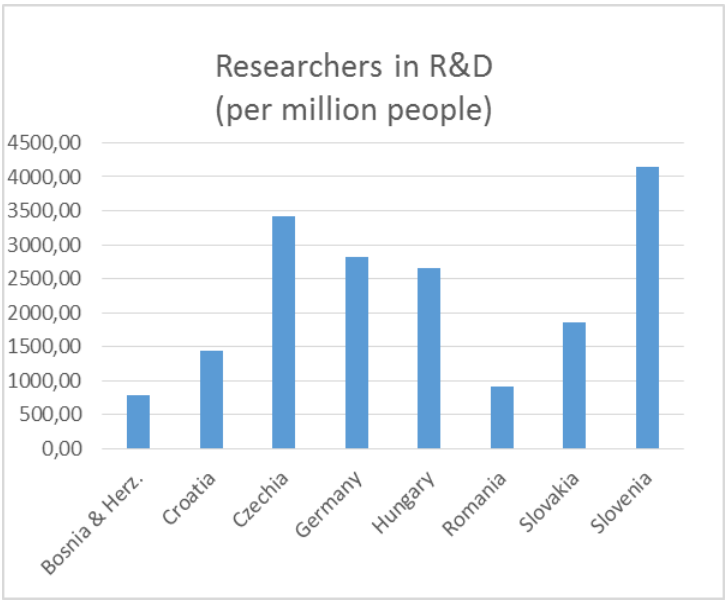


Chart: The information included in the table is the result of processing /summarising data provided by partners – ADR SE

	Researchers in R&D
Bosnia & Herz.	781.40
Croatia	1,437.30
Czech Rep	3,418.46
Germany	2,812.00
Hungary	2,650.60
Romania	921.51
Slovakia	1,863.00
Slovenia	4,149.00



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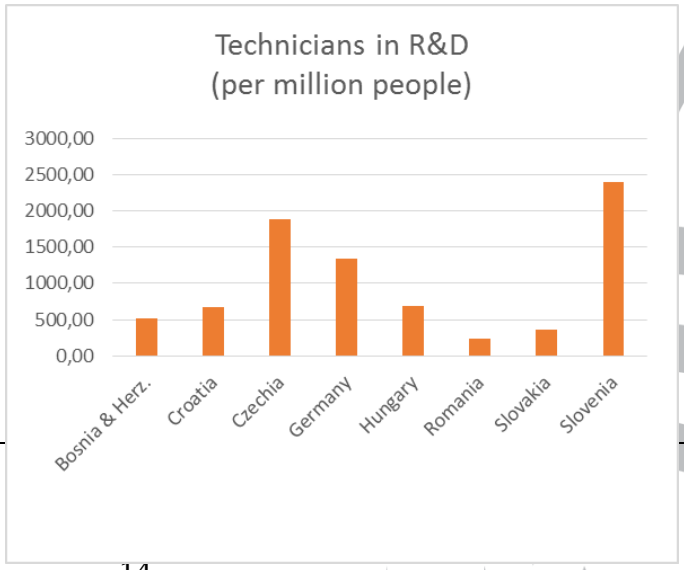
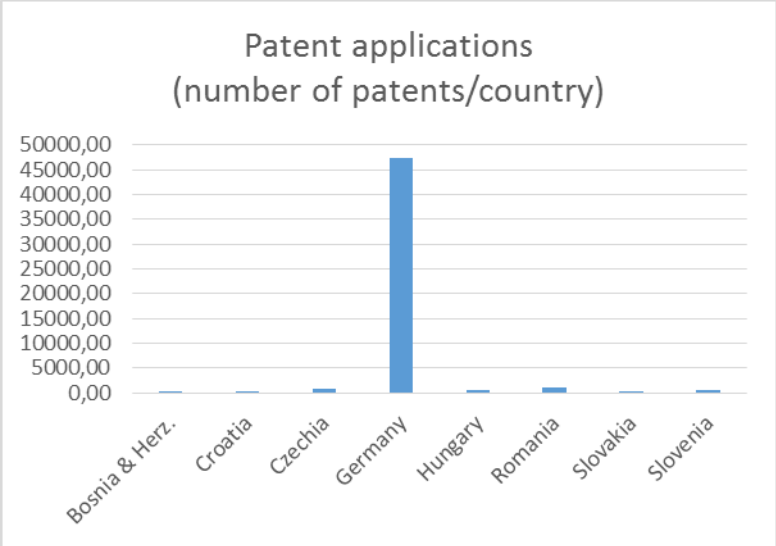
	Technicians in R&D
Bosnia & Herz.	513.40
Croatia	676.50
Czech Rep	1,882.43
Germany	1,345.00



Hungary	691.00
Romania	229.50
Slovakia	367.00
Slovenia	2,394.00

Table and Chart: *The information included in the table is the result of processing /summarising data provided by partners – ADR SE*

	Patent applications
Bosnia & Herz.	54.00
Croatia	169.00
Czech Rep	880.00
Germany	47,384.00
Hungary	569.00
Romania	975.00
Slovakia	228.00
Slovenia	470.00



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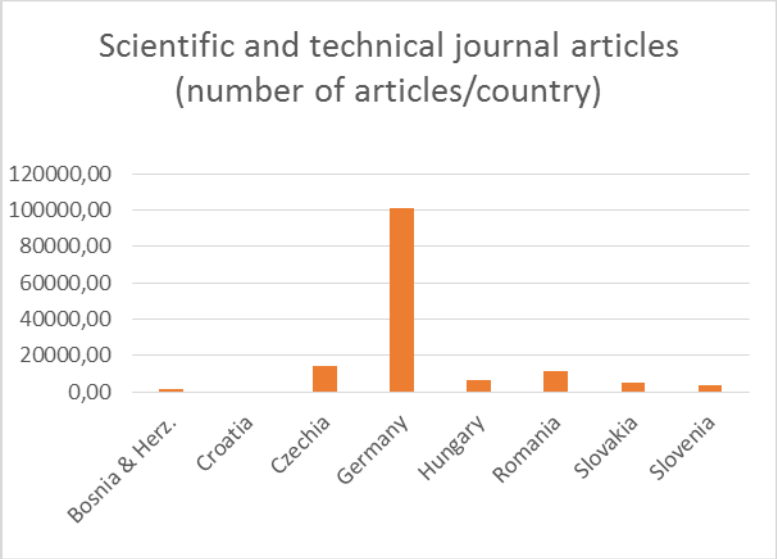
	Scientific technical journal articles
Bosnia & Herz.	1,481.00
Croatia	0.00
Czech Rep	14,002.40
Germany	101,074.00
Hungary	6,249.00
Romania	11,163.60
Slovakia	4,730.00
Slovenia	3,514.20



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ANNEX II – SWOT analysis in D-STIR countries

	STRENGTHS
Bosnia & Herz.	RRI applicable in all sectors and fields; Strategic orientation to RRI; Sectoral approach to innovation; Initiatives of innovation development.
Croatia	Reform in R&I framework in 2013; adopted Strategic documents in national education and R&I systems; rationalization and connecting of the offices for EU projects in various ministries; Tradition in research within big industrial complexes.
Czech Rep.	Modern facilities and equipment thanks to EU funds; Long experience in many disciplines of sciences, good HR capacity and expertise of research teams; ELI infrastructure; Good society and policy attitude towards R&D; Lower cost of R&D work and services; EU and national budget for cooperation; The first national programme Zéta (Technology Agency of the Czech Republic) is focused on a gender equality in research teams.
Germany	Powerful economy and low unemployment rates; Universities, research institutes and the business sector are developing high-quality technologies, processes, services and innovative products, which can then also be produced and applied locally on the basis of well-qualified employees and the narrow network of companies; Research-intensive economy; Dense network of universities, non-university and research institutes invest large amounts in the production of knowledge.
Hungary	The project team dealing with RRI from the FHRIA; some hubs and institutions dealing with RRI (growing number of RRI experts); pilot projects that were conducted on practical implementation of RRI; synergy projects (FaRinn).
Romania	Dedicated national structure for research and innovation – Ministry of Research and Innovation; Special chapter for innovation and SMEs in strategy and planning documents; Statistical targets for SMEs and Innovation; Allocation of funds on a competitive basis with evaluations made by scientists from abroad.
Slovakia	Good research infrastructure; Increasing number of researchers; Willingness to cooperate on academic level; Cheap working force; Good complimentary horizontal infrastructure – life sciences, robotics, nanomaterials and ICT; Tradition in some fields of industry that is connected to R&I; Good ethical strategy at university level; Good international networks.
Slovenia	RD activity in business sector; R&D capacity and potential in the public sector; Involvement of

	stakeholders in international vale chains and networks; intensive RDI policy and a stimulating tax environment for RDI; high quality living and working environment, and resources for the transition to green economy; Number of international scientific co-publications, new doctorate graduates, and public-private co-publications.

Table: The information included in the table is the result of processing /summarising data provided by partners – developed by ADR SE

	WEAKNESSES
Bosnia & Herz.	Not enough funds for innovation (for academic sector); Funds for SMEs are at low level; Complicated state organisation (5 levels-district); No statistical data.
Croatia	Low level of R&I funding; Low absorption of the ESIF; Lack of coherent and integrated R&I policy framework; low cooperation within scientific community; fragmented / dissipated / uncoordinated R&I institutes (universities, centres etc.); lack of coordination between responsible Government bodies; lack of coordination in design of support instruments for innovation and access to finance.
Czech Rep.	Rigid system of leadership and administration; Small scale of R&D system; lack of internationalization; Different attitudes towards new R&D evaluation (Academy of Sciences, universities) -> no agreement, no progress; Brain drain to abroad; low awareness of the RRI method. Cooperation between research organizations and businesses is low; No examples of good practice in the implementation of RRI in practice.
Germany	Technology transfer; Corporate networking; Creating strong links between research institutions and SMEs; Lack of young professionals; Product-market-fit.
Hungary	Lack of cooperation between innovation actors; lack of trust; low knowledge about RRI; low number of RRI experts; low number of scientific publication dealing with RRI; researchers refuse to cooperate.
Romania	Frequent changes in administration of research and innovation and in legislation; Low level of funding; The lowest number of researchers per million inhabitants in the EU; The lowest number of patents; Survival culture in R&D funding; Brain drain starting from high school; The quality of training in some universities; Complicated and time consuming public procurement rules.
Slovakia	Low quality of institutions (policy); Brain Drain; Limited support from government; Lack of

	supportive environment (limited TT, incubators, etc.); Lack of finances for R&I; High administrative burden on researchers – complicated reporting, public procurement, etc; Most of researchers are followers not leaders; underdeveloped R&I system; lack of drive to achieve; Limited know-how in methodology, project writing, laboratory management, etc.
Slovenia	Public expenditure for RDA; significant gap between R&D expenditure of the public and business sector; RDI management model; Low level of internationalisation; weak cooperation; absence of systematic incentives within knowledge institutions; Weak and unstable institutional capacity of the state, excessive bureaucratisation of procedures and non-supportive tax environment for entrepreneurship; Taxation system is preventing high awards – labour taxes are too high and do not stimulate employers to award the best workers with high salaries or bonuses.

Table : The information included in the table is the result of processing /summarising data provided by partners – developed by ADR SE

	OPPORTUNITIES
Bosnia & Herz.	RRI can encourage the pursuit of knowledge and innovation in all fields; Experience in innovation labs; Universities and researchers can be more oriented in science (to minimise political influence); To participate in EU programmes and projects; Educational system is wide; Economy of knowledge can be applied.
Croatia	Governmental grant schemes and instruments to support business R&I investment; Access to ESI funds; Horizon 2020 and other EU programs; New legislative framework for R&D tax incentives to the business sector.
Czech Rep.	Good geographical location in context of Danube Region – most western country; EU funds till 2020 – the unique possibility to get funding for all stages of R&D; Private sector will need R&D services to remain competitive in the EU market; Sharing of experience in Danube Region; The RRI concept is unknown among companies, publicity in this area is weak; Most stakeholders state that they perceive RRI as one of the R & D challenges.
Germany	Identification of measures that enable more SMEs to be integrated into the innovation process and to further increase the innovation activities of medium-sized enterprises; Entire value chain could be present from research and development to production in the country.
Hungary	EU funds; high quality of education; Specific call for proposals on innovation are available D-STIR; Growing knowledge of the consumers; fast flow of information; globalization.

Romania	Implementation of beyond the State of the Art European R&I; Appropriate location for implementing RRI and an incentive to comply with EU standards and rules; Increased participation in EU projects; Increasing awareness of simplification possibilities proved by EU funding programmes that can be used as examples for national funding.
Slovakia	Structural funds (ERDF) for R&I – mainly for infrastructure not research itself; know-how through EU projects; Improving R&I ecosystem according to western model also through RRI; Possibility to change mind sets of R&I stakeholders.
Slovenia	Reorganization of international value chains and new industrial revolution – opportunities to establish a stronger position within higher level value added value chains.

Table: The information included in the table is the result of processing /summarising data provided by partners – developed by ADR SE

	THREATS
Bosnia & Herz.	Political instability; Economic and social situation; Investing in R&I; Bureaucracy.
Croatia	National target of R&D intensity - 1.4% of GDP - until 2020 will not be achieved; No progress in technological development; Products of low added value instead of knowledge-based economy; Croatian economy lags behind the European Union.
Czech Rep.	Bureaucracy of R&D funding scheme; End of EU fund 2020 period; Political changes and influence on financing; Changes in grant scheme and administration rules; Outflow of private capital and big companies to lower cost countries; Absence of social aspects in the R&I life. The main issues of R & D & I in particular of RRI are financing R & D & I, human capital and R & D & I evaluation.
Germany	General modernization and innovation pressure; Without targeted countermeasures in the area of skilled labour recruitment, the demographic development would contribute to a massive intensification; Continuous intensification of the global innovation competition.
Hungary	Centralization – large cities; bad infrastructure; negative brain drain effect; underfinancing environment; RRI policy is missing from the innovation policy; low interest of business sector in RRI.
Romania	Persistence of low levels of funding; Continous resistance to changing the RDI system;

	Insufficient reform of RDI system; Low influence on decision makers in order to transform weaknesses in opportunities and opportunities in strengths.
Slovakia	Unwillingness to cooperate on both broad quadruple helix and small laboratory level; Not acceptance of RRI by stakeholders.
Slovenia	Brain drain, in particular of educated young people; Perception of Slovenia as a peripheral, non-competitive and rigid country which is investment –and talent-unfriendly; Educational system is not supporting "out of the box" thinking and not enough time and support is devoted to encourage young people to nourish their creative and innovative potential.

Table: The information included in the table is the result of processing /summarising data provided by partners – developed by ADR SE