Interreg

EUROPEAN UNION

Danube Transnational Programme

D-STIR

First Version of Danube RRI Strategy

D.3.2.1

Author:

South-East Regional Development Agency – SE RDA

Thematic support:

First Hungarian Responsible Innovation Association - EMFIE

Project co-funded by European Union funds (ERDF, IPA)

Document version 1

December, 2017

Project website: www.interreg-danube.eu/d-stir

Contents

1 Introduction

We are seeking **solutions to such global problems** as global warming and the depletion of non-renewable energy sources, by which opportunities and living conditions of both the present and future generations could be improved. The fast technological development, however, might lead to undesirable consequences that possibly influence human life for a long time. **Learning** from the past (Adam–Groves, 2011), **prevention** of newer disasters, the strengthening **role of public opinion** (Sutcliffe, 2013), as well as the loss of trust in each other (Wynne, 2006; Sutcliffe, 2013) equally contributed the more responsible thinking in the field of R&D&I, thus the formation of RRI.

RRI has become an important concept almost all over the world. Although this concept has many different representations thus definitions (Buzás–Lukovics, 2015); the most accepted one by the scientific community is created by von Schomberg (2013:60). We also rely on this definition during our research work. Accordingly, "**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** (in order to allow a proper embedding of scientific and technological advances in our society)." Consequently, RRI highlights **collaboration** among the **actors of innovation**. The slogan "**better innovations** for a **better society**" clearly illustrates the success of RRI (Fisher et al., 2006). It represents, that the innovation environment has changed, and it is essential to take into consideration the values being important for the society.

What has been emphasized in the past few years is how to **implement RRI into practice**.

To make it fluent and understandable for everyone, the **European Commission has composed 6 dimensions (RRI keys)** in RRI framework (EC, 2014):

1. The first dimension is the **Engagement of all societal actors**, through which we ensure that the output formed, become more widely accepted; and might be able to solve the urgent problem of the society.

2. The second dimension is **Gender Equality**, which aims to increase the opportunities of women, and to address the under-representation of women in research institutions.

3. The aim of the third dimension, **Science Education**, is to expand the knowledge of future generation scientists and other actors of the society to completely and actively attend the innovation processes (i.e., the first key to be realized). Besides, it is important to evolve creativity among the members of the young generation as soon as possible; additionally, to raise and maintain awareness through sciences. In spite, there are ongoing debates about the necessity of applying new methods and contents in the educational system to make science career attractive for young persons (Inzelt – Csonka, 2014).

4. According to the fourth dimension – **Ethics** – consideration and compliance with the shared values (fundamental rights and the highest ethical standards) formulated by the European Union (EU), is primary concern in the innovation process.

5. The fifth dimension is **Open Access**, according to which results has to be accessible for everyone, thus stakeholders, experts, and members of the society can be involved in a broader way in the innovation process.

6. The sixth dimension is **Governance**: the regulatory environment might have a strong effect on the outcomes of innovation processes.

Formulating these dimensions highlighted the practical application of RRI; however, it is still in an early age.

If **RRI is taken account in the daily decisions of the whole innovation pipeline**, the (civil) society and research community may have closer relationship and the final outcome of the research process would be a more socio-desired innovation.

While there are several proposed and established **methods for enhancing societal responsiveness** through the **introduction of socio-technical integration within the innovation process** (e.g., Fisher et al. 2015), we focus on STIR. STIR involves a **structured approach** that has been employed in over three-dozen research and innovation settings and has documented results in a number of national settings across Europe, North America and Asia (Fisher – Schuurbiers 2013).

Building upon this relatively broad and comparative basis, we investigate the extent to which **STIR, as an indicator of RRI** more generally**, can be adopted in transition countries** located in Central and Eastern Europe. This investigation is necessary because – as we mentioned above – the awareness of **RRI is completely different** in Western and Central European countries, and since the starting point is different, the **STIR method should be** somehow **adjusted** to these different circumstances.

Figure: https://twitter.com/rritools/status/763679567265599488

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) supports interactions among experts of different disciplines **(primarily social and natural sciences), who then** collaboratively reflect on the context in which the innovative work is carried out**, thereby aiming to** broaden research decisions **beyond the mere technical work (Fisher – Schuurbiers 2013).**

The following actors can be distinguished in the STIR process: 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.

In the selection phase of STIR, 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 analyze 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 study objectives may set requirements for who is recruited to participant, 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. In the third, interpretation phase, the STIR investigator records the results in a qualitative and quantitative form, then, summarizes the qualitative results in a narrative form and/or in a form of table. To facilitate high-impact, real-time reflection on the evolving research activities, and to track the ongoing attitudes and behaviors 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-week long visit, we are able to characterize the participants' decision-making process. 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.

Investigators **document these outcomes both quantitatively and qualitatively**. Then they assemble qualitative accounts in both narrative and tabular

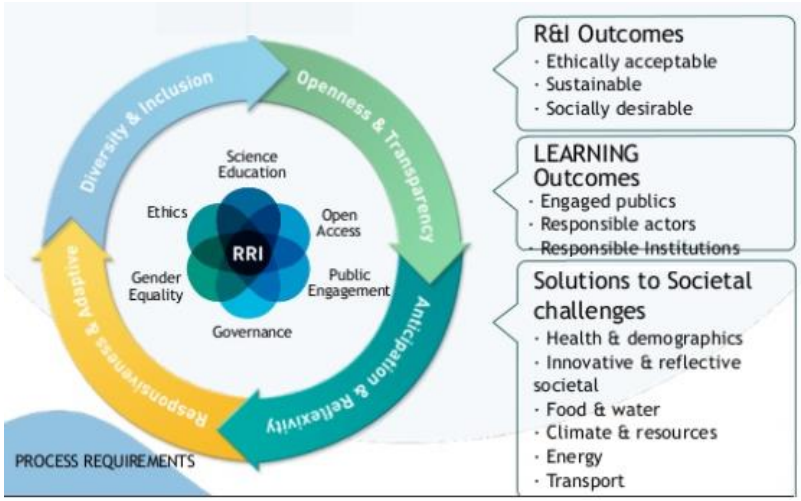
form, depending upon which are salient and are relevant to the research questions and objectives. There are two choices for data presentation about the STIR protocol exercises and observations: narratives ("stories") and tables. As a result, the deliberate modulations made by the research participants 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 organizational 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 see these developments as valuable for their own research (e.g., Fisher et al. 2010; Flipse et al. 2013; Schuurbiers 2011).

Altogether **STIR is not only a method for socio-techno integration**, but 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 behaviors, 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, that when **researchers** arrive at their **decisions deliberately** and after a **careful consideration**, we **notice the changes** in learning.

Picture: https://www.slideshare.net/RRITools/tools-for-responsible-research-and-innovation



2.1.2 Initial Thoughts on Implementing STIR in the Danube 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 SEE 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.

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 behavioral patterns (Pál–Törőcsik, 2013; Oblinger–Oblinger, 2005). They get used to the persistent hard work, 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 behavioral 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 Balážová (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–Balážová, 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 Environment

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).

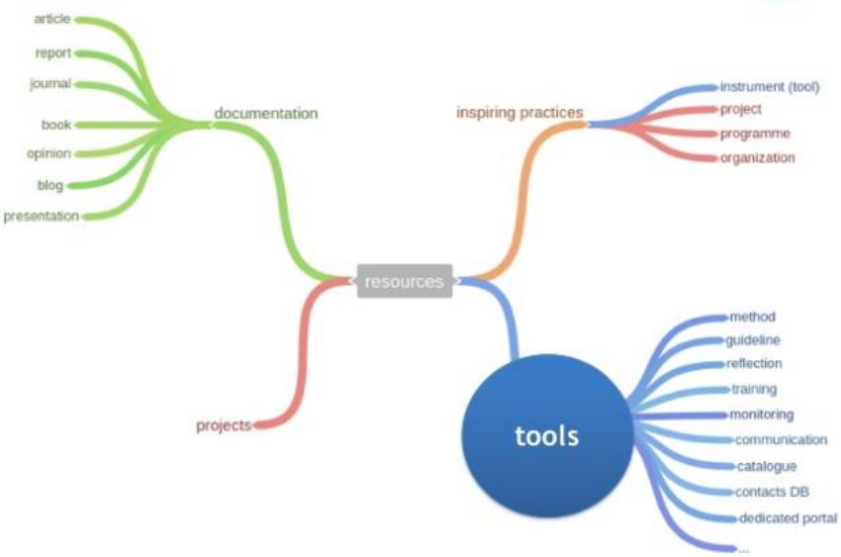
Central and Eastern European countries own the special characteristics of capitalism; thus, their innovation environment also differ from the Western European ones (Farkas, 2011, 2016). In the Central and Eastern European countries, the R&D expenditure and the innovation performance of the private sector 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.



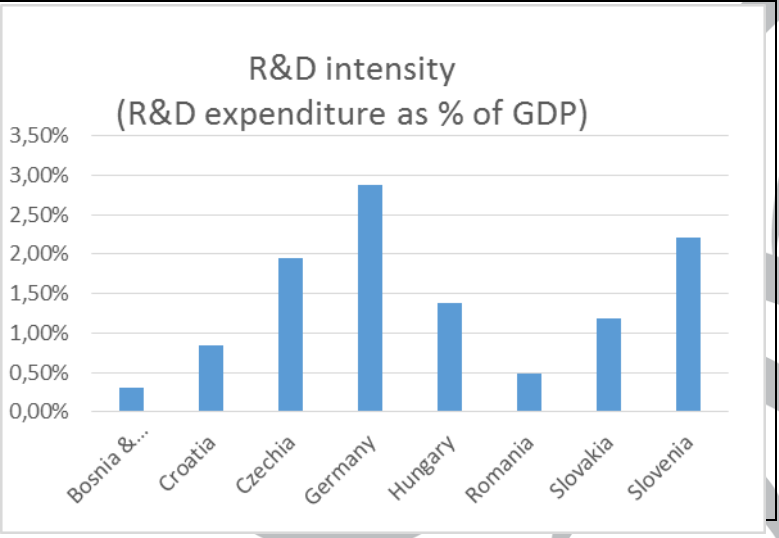
Picture: https://www.slideshare.net/RRITools/tools-for-responsible-research-and-innovation

3 Context Analysis

3.1 Statistical indicators of the Danube region

3.1.1 Raw data

Bosnia & Herz.	0.30%
Croatia	0.85%
Czechia	1.95%
Germany	2.87%
Hungary	1.38%
Romania	0.49%
Slovakia	1.18%



Slovenia	2.21%

Table and Chart: ADRSE construction, using data provided by partners

Bosnia & Herz.	31.30
Croatia	375.00
Czechia	325.00
Germany	87,188.00
Hungary	1,511.00
Romania	782.00
Slovakia	927.00
Slovenia	853.00

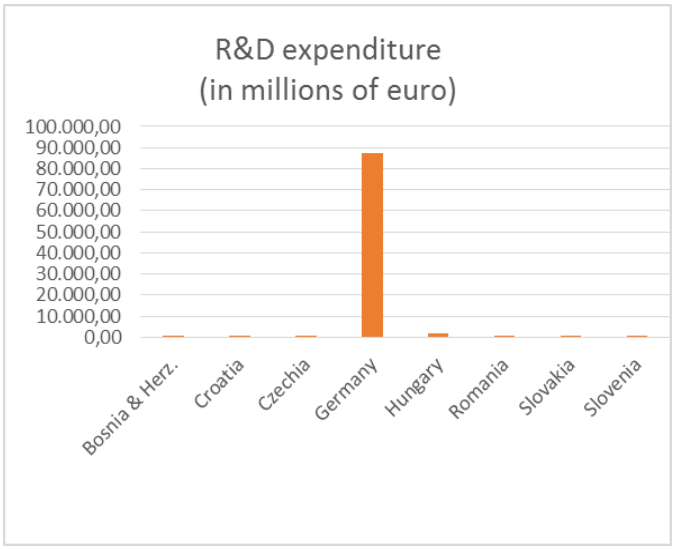


Table and Chart: ADRSE construction, using data provided by partners

In Germany, because of the large GDP, the high R&D intensity triggers a very large (unrivaled) R&D expenditure. In Slovenia, Czechia, Hungary, Slovakia, even if the Intensity is high, because of the lower (lower than Germany) GDP, the result (R&D expenditure) is modest in comparison with Germany.

	Business enterprise	Government	Higher education	Private non-profit
Bosnia & Herz.	33%	20%	46%	1%
Croatia	51%	25%	24%	0%
Czechia	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: ADRSE construction, using data provided by partners

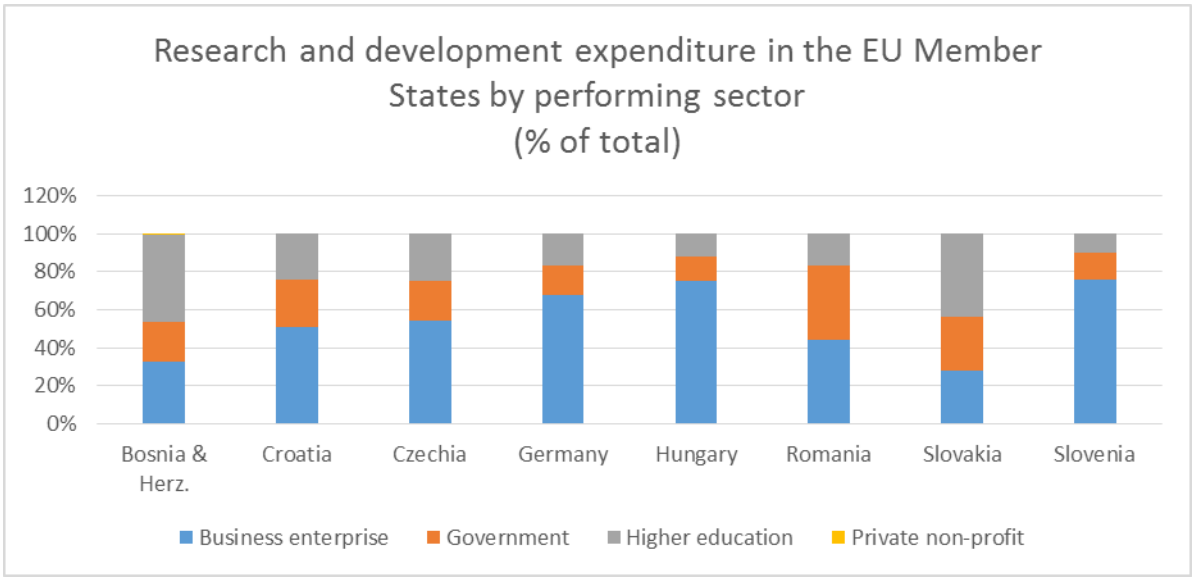


Chart: ADRSE construction, using data provided by partners

Slovenia is the 1st in „Business enterprise" and the last in „Higher education", Romania focuses on R&D in „Goverment", Bosnia & Herzegovina is the 1st in „Higher education" and the only contry that spends over 1% for „Private non-profit". Internal comparison (own categories): Slovenia focuses the most on „Business enterprise", Romania focuses the most on „Business enterprise", Bosnia & Herzegovina focuses the most on R&D in „Higher education".

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

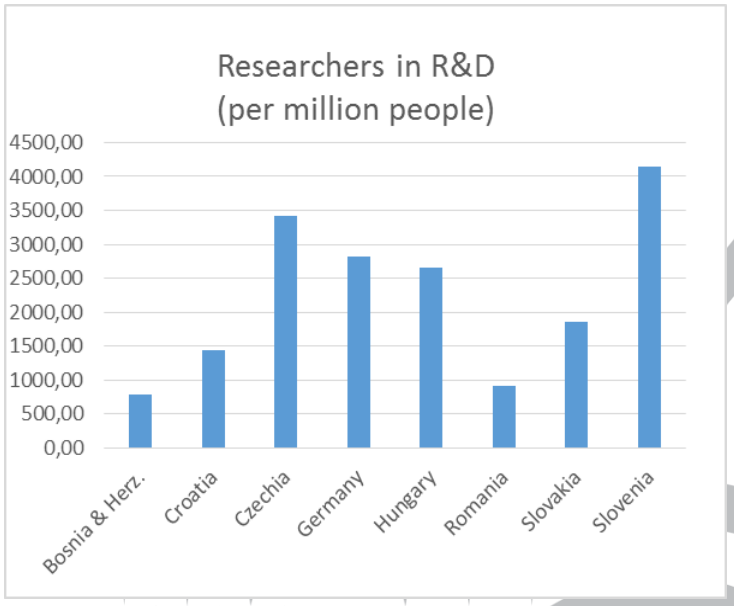


Table and Chart: ADRSE construction, using data provided by partners

	Technicians in R&D

Bosnia & Herz.	513.40
Croatia	676.50
Czechia	1,882.43
Germany	1,345.00
Hungary	691.00
Romania	229.50
Slovakia	367.00
Slovenia	2,394.00

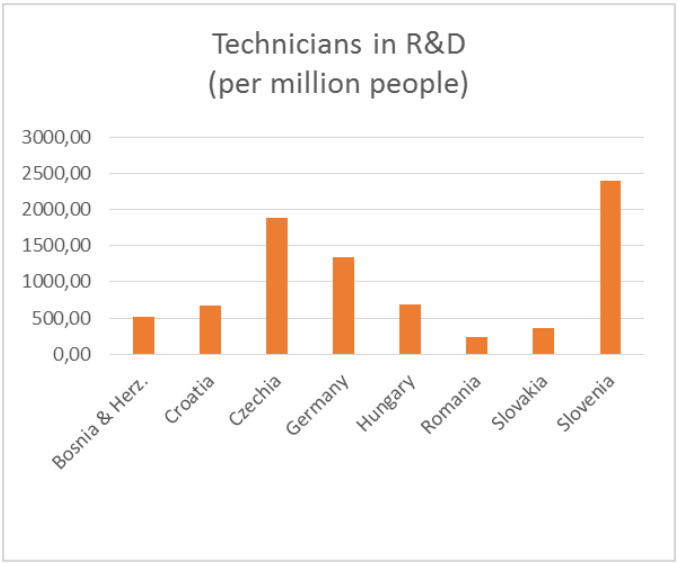


Table and Chart: ADRSE construction, using data provided by partners

Slovenia is the champion in both categories (R&D researchers & technicians), Czechia is the second, Germany is the third (even is the R&D intensity & expenditure is the highest) and Hungary is the take the forth place. Bosnia & Herzegovina has the last place in „Researchers in R&D" category and Romania has the last place in „Technicians in R&D" category.

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

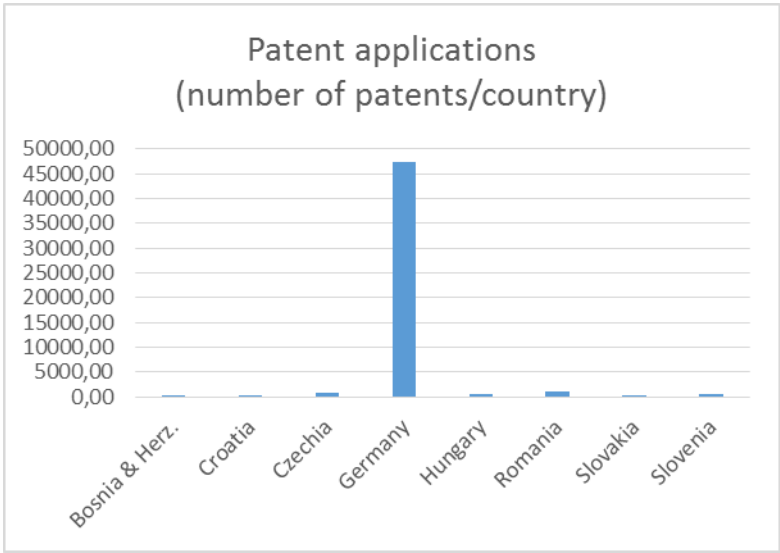


Table and Chart: ADRSE construction, using data provided by partners

	Scientific technical journal articles
Bosnia & Herz.	1,481.00
Croatia	0.00

Czechia	14,002.40
Germany	101,074.00
Hungary	6,249.00
Romania	11,163.60
Slovakia	4,730.00
Slovenia	3,514.20

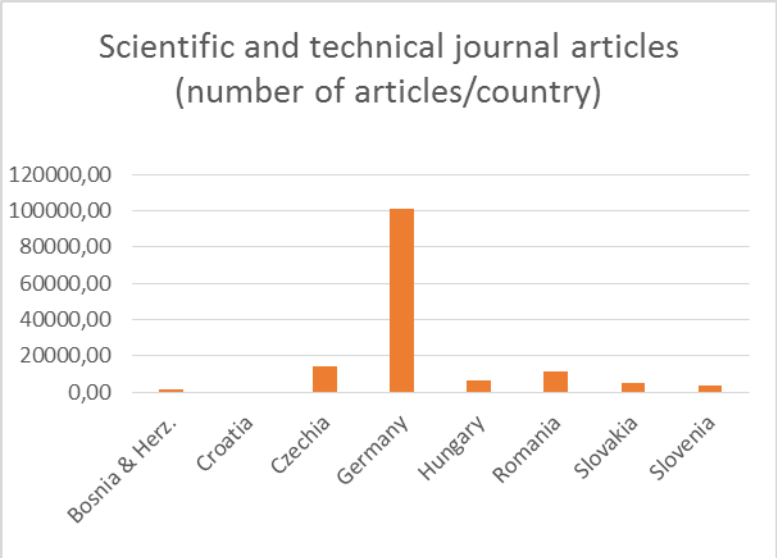


Table and Chart: ADRSE construction, using data provided by partners

Even if Germany took the third place in „R&D researchers & technicians" categories, it has the first place (unrivaled) in both „Patent applications" and „Scientific and technical journal articles". In „Patent applications", the second place is taken by Romania and the third place is occupied by Czechia. In „Scientific and technical journal articles", the second place is taken by Czechia and the third place is occupied by Romania.

3.1.2 Processed data

	Bosnia & Herz.	Croatia	Czechia	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 & tehnical 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: ADRSE construction, processing data provided by partners

https://www.timesofmalta.com/articles/view/20161202/business-news/Malta-fourth-lowest-R-D-expenditure.632653

3.2 Special features of the innovation environment of the Danube Region

3.2.1 Introduction

3.2.1.1 Horizontal

Historical fluency and discrepancy

RRI is still a relatively new concept for countries in South East Europe 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 Program 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 SEE countries in comparison with the EU average. The performance of the SEE countries in terms of Business Sector Expenditure on R&D (BERD) is relatively low in comparison with other EU members.

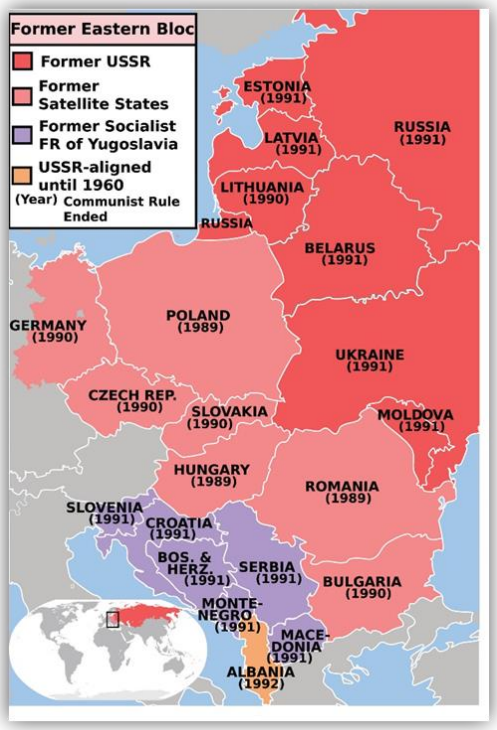
Some progress can be observed concerning the adoption of educational and research system in the less favored countries. SEE countries appear to experience a structural change underlined by the ongoing upgrading of their economic structures and knowledge intensity of their economies over the last decade (EC 2014a). In most SEE 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 SEE countries compared to EU15.

Besides, over the past twenty years, the number of researchers and scientists in the SEE 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 fulfillment 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).

"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 corruption and 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 SEE countries can be considered adequate. SEE countries still face specific problems that influence the 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).

Picture: https://en.wikipedia.org/wiki/File:EasternBloc_PostDissolution2008.svg

The difference between the innovation environment in SEE countries and those in more developed areas of the European Union, makes us assume that **in the SEE countries, responsible innovation should be handled in a different way** – including definition, application, implementation, and practical acceptance.

3.2.1.2 Vertical

Common issues in the Danube region

- **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 seriously 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 relationship between 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 high level of corruption** is a serious problem, additionally, a risk for businesses. In the public sector, corruption is usually more frequent than in the private sector, especially in case of big public procurements. Operation of policy is often linked with corrupt practices in the public opinion, thus people do not trust each other.

- 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.

Picture: https://www.danube-region.eu/about/the-danube-region

3.2.2 SWOT analysis

3.2.2.1 Foursquare

	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.
Czechia	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; the closed 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; New public procurements rules aiming at avoiding corruption.
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: ADRSE construction, processing / resuming data provided by partners

	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.
Czechia	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 and unpredictable 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; Public procurement rules too complicated and time consuming.
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 : ADRSE construction, processing / resuming data provided by partners

	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.
Czechia	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 RI, is an 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 (VA) value chains.

Table: ADRSE construction, processing / resuming data provided by partners

	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.
Czechia	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 and unpredictable funding; Permanent resistance to changing the RDI system; Unprofessional reform of RDI or continuing absence of any reform; 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: ADRSE construction, processing / resuming data provided by partners

Figure: https://boagworld.com/digital-strategy/swot-analysis/

3.2.2.2 Cross-cut

	Bosnia & Herz.	Croatia	Czechia	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*
	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*	*EU funds*	*EU funds*	*EU funds*	*developed*

				value chains				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*

Table: ADRSE construction, processing / resuming data provided by partners

Figure: https://canvanizer.com/new/swot-canvas

3.3 RRI in innovation documents

3.3.1 Term(s) of RRI

Responsible research and innovation, dubbed RRI, it is part of on-going reflection on changing governance relations between research, innovation, and wider society. RRI it has been addressed systematically beyond its origins in the philosophy of science by several academic fields and from several points of view. Specifically, it has been covered under the terms responsible development, research integrity, technology assessment, anticipatory governance, public engagement in science, ELSI *(Ethical, Legal and Social Implications of science)* and ELSA *(Ethical, Legal and Social Aspects of science)* to name a few. Most recently, it has also begun to form bridges and connections with other literatures coming from different directions such as corporate social responsibility, responsible innovation including steering towards societal challenges, responsible industry and innovation systems. Policy plays such a multifarious role in innovation, it is not sufficient to merely "adapt" to trends and

developments, because policy and regulations are among the factors that determine the innovation dynamics and the chances of survival of innovations (Pol Maclaine Pont, Rinie van Est, Jasper Deuten, Shaping socio-technical innovation through policy).

3.3.2 Implementation

	National R&I strategies & policies
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
Czechia	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: ADRSE construction, processing / resuming data provided by partners	

In most of the countries, the term RRI is not present directly (as a well-defined concept) in the strategic documents. However, several RRI key topics are present in the national / regional strategies of R&D. Furthermore, the sustainable-ecologically responsible approach is an European current trend, together with the openness to society challenges like gender, social disparities etc. Some direct approach was found in Hungarian and Slovenian documents.

3.4 RRI in business environment of the Danube region

3.4.1 Introduction

In the course of discussing the topic of Responsible Research and Innovation (RRI), we shall keep in mind that the academic sphere has different characteristics than the business sphere. These different characteristics affect to a great extent how successfully we can put the conception of the RRI into practice. Until now a meaningful part of the enquiries and the practices focused on the academic sphere – in this milieu, significant results were recorded in the literature.

On the other hand, the relation between the business sphere and the RRI is not as well-known as the above-mentioned relation. The disposable information is insufficient about how successfully we can introduce the RRI to the business sector. We make an attempt to synthetise the issues of those part of the literature that give details about the adaptability of the RRI in the business sector. Our aim is to gain a deeper understanding about why the relation between the RRI and the business sphere is so specific.

Nowadays, most 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', costumers' and employees' expectations, as well (Iatridis and Schoereder, 2015).

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

3.4.2 Identification of RRI

First of all, there is a need to define responsible innovation. Many determinations are existing, but there are a few which could circumscribe it precisely.

Von Schomberg defines responsible innovation as 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, p. 19).

Waldman and Galvin (2008) for instance claim that responsible leaders combine economic orientations with an extended stakeholder orientation.

According to Blok and Lemmens (2015), the main problem is in connection with short-term purposes and long-term purposes.

Companies focus on strict cost-benefits analyses for short term, while they tempt to disregard respect to responsibility in long term.

Breakthrough innovations could have considerable risks and uncertainties, which affect the overall society and innovators, as well.

George Moore (1991) draws attention the role of markets, because there is a huge disagreement between early adopters and wider stakeholders.

Insiders and early adopters appreciate new technologies development, while mainstream markets and wider stakeholders have a strong interest in only benefits.

Wider stakeholders and mainstream markets become stronger to influence the final success of the innovation when it is introduced in larger markets.

3.4.3 The theory of moral competencies

In the field of corporate sustainability there are two new and unknown moral competencies which define this area: normative competence and action competence. On the one hand, fixed values and principles are laid down to assess and improve the sustainability of social-ecological systems by normative competence.

On the other hand, action competence means the "capability to involve yourself as a person with other persons in responsible actions and counter-actions for a more humane world" (Schnack, 1996: p15).

Both notions are considered as moral competence, because they contain norms, values and beliefs which define what is right and wrong concerning sustainability. But there is a huge difference between meaning of normative and action competence.

In the case of normative competence, actors can be held responsible for sustainability, while in the second case, actors can take responsibility for it. Sustainability is often called as wicked problem, because it concerns global problem as climate change or poverty, cannot be solved by simple solutions and may cause uncertain effects.

Moreover, involved stakeholders have different opinion about what is the "real" problem and how it can be solved, so professionals are not able to take the "right decision" and to behave in a responsible way in every case (cf. Rittel and Webber 1973; Peterson 2009). In addition, there is a tension between both competencies, as universal norms emphasize the universality of ethical judgments, while action competence highlights the singularity of ethical decision making processes (cf. Ellis and Weekes 2008; Jensen and Schnack 1997).

3.4.4 Controversial issue

According to Doris Schroeder and Konstantinos Iatridis, company's stakeholders' expectations (to maximise their wealth) not allow to meet the criteria of natural environment responsibility and societal responsibility at the same time.

Thus the most serious and urgent problems with corporate responsibility are: it is unclear and controversial, there is not sufficient practical relevant for companies and last but not least, it could not be implemented because of its complexity. The authors

suggest a new field (Responsible Research and Innovation) instead of existing tools (corporate responsibility) which could solve these problems.

Firstly, there is a need to gather increasing interest and to enhance its practical relevant. Responsible Research and Innovation does not aim to create new concept, because it is built on the existing knowledge such as technology ethics, technology assessment, science and technology studies, and research policy.

However, it has to shape, maintain, develop and coordinate existing responsibilities. The central problem is the significant proportion of RRI focuses on activities which are carried out by universities an public research organizations, but outcomes which are undertaken by private sector have more immediate impacts on end users.

In addition, the authors provide technical assistance in connection with implementation of RRI. They clarify the fundamental and already exist corporate responsibilities and show how these tools can be used for the purposes of RRI.

Thanks to it, decision-makers could adopt RRI and accept the higher-level responsibility of ensuring that their research and innovation activities are consistent. Moreover, balance between own goals of businesses and the greater good of society can be maintained by Responsible Research and Innovation, as well.

3.4.5 Reverse logistics model

Maric, Rodhain and Barlette, the three French researcher are also drawing attention to importance of Responsible Research and Innovation, thus there is a huge gap between academic goals and business goals.

Companies are tempted to disregard social and environmental impacts of new development, while universities do not focus on the exploitation of technology in commercial markets, they only try to achieve scientific perfection without profit interest. The authors provide a new solution (reverse logistics model) to business sector in order to maintain their profitability and responsibility at the same time.

This issue is receiving ever-increasing attention from the world, so many programmes and conferences are held, therefore it possesses its own Journal of Responsible Innovation, which is based on American efforts and linking with Arizona State University.

Firstly, we should define the notion of innovation at all. It is the process of making changes to something established by introducing something new, which means "creative destruction" according to Schumpeter (1912).

It can contribute to develop products, services, processes and organizations, therefore can occur at all levels in an organization, from management teams to departments and even to the level of the individual (O'Sullivan et al., 2009).

Researchers and innovators cannot predict the possible negative effects, so distrust is legitimated towards innovation of business sector, because during past several decades, many cases prove that they were not always responsible, in order to enhance stakeholders' values and meet the profit criteria.

Responsible innovation should be contained the mark of voluntary by the companies, which could create economic, social and environmental values, moreover contributes to well-being of individuals and society (Ingham, 2011).

However, it is evident that business need to innovate in order to survive this tight competition and remain profitability in market economy. But there are three factors which could question to be developed in response to consumer needs, monitoring and managing direct impacts of innovation and considering the indirect consequences of innovation (European Network for Responsible Innovation, 2014).

The authors draw attention a new solution, which is based on reverse logistics model. This conception highlights the role of recycling and reusing. In a nutshell, it is a process in which manufacturer manages product return for possible reuse, recycling (Keh et al. 2012).

This approach can cause environmental and social benefits, as well. On the one hand, it can create and preserve jobs, on the other hand, resource consumption is reduced, it contributes to a sustainable environment and complies the environmental legislations. Last but not least, economic point of view, it results reduced expenses and enhanced revenue.

3.4.6 Different Attempts to represent the Space of RRI Graphically

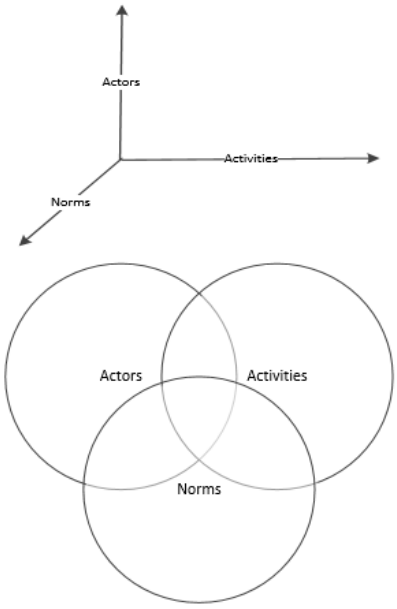


Figure: Different Attempts to represent the Space of RRI Graphically, Source: Stahl (2013)

In the first graph (Stahl, 2013), divergent directions of Actors, Activities and Norms are illustrated in the space. Although, the starting point is the same, which means the subject of innovation, the different factors may follow different aims, if there are not common values. As a conclusion, the second figure is represented as a set, where the role of cross section is emphasized. Firstly, there is a need to shed light on the relevant actors in innovation process, who represent different values. These stakeholders – just to name a few – are policy-makers, professional bodies, legislators, research funders, individual researchers, research organizations (both publicly and privately funded), educational organizations, industry, users of research and innovation, research ethics committees and civil society actors at different levels. The main challenge is aligning their existing expectations, needs and values to a desirable technology outcome. RRI actors try to influence the world of science to apply for better aligning their needs and values, moreover they make steps to develop existing RRI governance practices and they perceive plausible regulatory gaps, as well. In spite of the wide range of these activities, European Commission has suggested five action lines, which addressed as central policy priorities for RRI.

This guideline includes the following priorities:

1. better engagement of citizens to science
2. enhanced presence of women in science
3. improved science literacy and education of all Europeans
4. open access to scientific results

5. better aligned, responsible and more efficient governance of science

In order to enhance the responsibility, R&I projects need to be assessed if they are socially and ethically desirable and acceptable. Among these assessing possibilities, we should highlight risk assessment, impacts assessment, and technology assessment. Furthermore, there is a need to examine the possible future impacts, which can be carried out by future studies and foresight research. Moreover, we should define values, which promote the whole innovation system to create desirable technical outcomes. These values and norms must contain the mark of the social, cultural, economic and environmental benefits. Some of the central aims can be an improved quality of life and a reduction of the number of people living in poverty, an increased employment rate, respect for fundamental rights and sustainable development.

3.4.7 Characteristic of industry

Industry does not behave during the implementation of research as other actors do, due to the different industrial features. Although, they have to ensure positive impacts of technology and provide higher-level responsibility for their stakeholders, in practice they try to reduce the regulatory gaps, obtain appropriate knowledge on the consequences of the outcomes of R&I and maintain their profitability.

Researchers have only recently focus on how RRI principles might be implemented in industry and there is a few information about their practice. To understand how RRI principles could integrate into industrial level, it is necessary to take into account awareness of RRI-related issues and convince industry to implement RRI, as well. The main challenge is identifying the necessary implementing tools within RRI context, because mainly corporate social responsibility (CSR) tools have been developed yet (Yaghmaei, 2015

3.4.8 Conclusion

It is very important to highlight – because it fundamentally determines the attitude of the business sphere about the RRI – that in many cases the motivation, which is related to the R+D+I activities of the academic sphere differs from the motivation of the R+D+I activities of the business sector. In case of the business sector, the

primary motivation for a company is to enter to the market with a new product before the competitors.

With this action, the company could easily acquire competitive advantage while realizing profit. In such a taut situation and under pressure, the fast reactions are very important, as well as the innovation output by itself, which is completely out of accord with the aspects of RRI. If a company use the RRI, it could bring verdicts based on RRI – which the company otherwise would not bring without the existence of RRI. In addition to this, these decisions ease up the R+D+I processes or simply bolster up the decision to stop the entire process.

Without the RRI, it would not exist. Within the academic sphere, this kind of motivation 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.

This kind of academic milieu provides better conditions for the RRI, because there is enough time to take into consideration the impacts, and there are much more opportunities to bring verdicts than in the business sphere. The above-mentioned ones are proved by the followings as well: the academic sphere deals with activities from the beginning of the innovation value chain (Technology Readiness Level – first three levels), while the companies deal with activities from the end of the innovation value chain (TRL last three levels).

	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 –	no

	missing profit)	
Interest on implementing RRI	less	more

Table: RRI and its influencing factors in the two main innovative sectors, construction by EMFIE

4 Overview of STIR methodology in the Danube region

4.1 New elements in the original STIR Method to adapt the D-STIR method

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. 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 1.

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

Figure: prof. Erik Fisher, Szeged capacity building workshop (D-STIR activity)

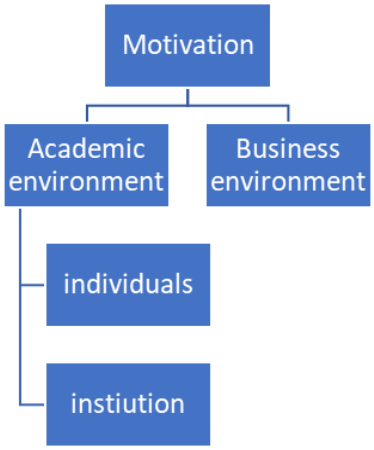
The **pre- and post-study interviews** are changed in D-STIR method, since they contain tailor-made questions to the special features of the Danube countries. In addition, the **answers** should be rated on a 1–6 scale, which gives us data that can be evaluated quantitatively, while in the original STIR, 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.

Table 1: Differences between the STIR and the D-STIR method; by EMFIE

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

One of the most important results of the methodology development is the **complex, multi-level motivation system** (see Figure 1). In D-STIR project, academic environment was separetd 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: The multi-level motivation system of D-STIR; by EMFIE



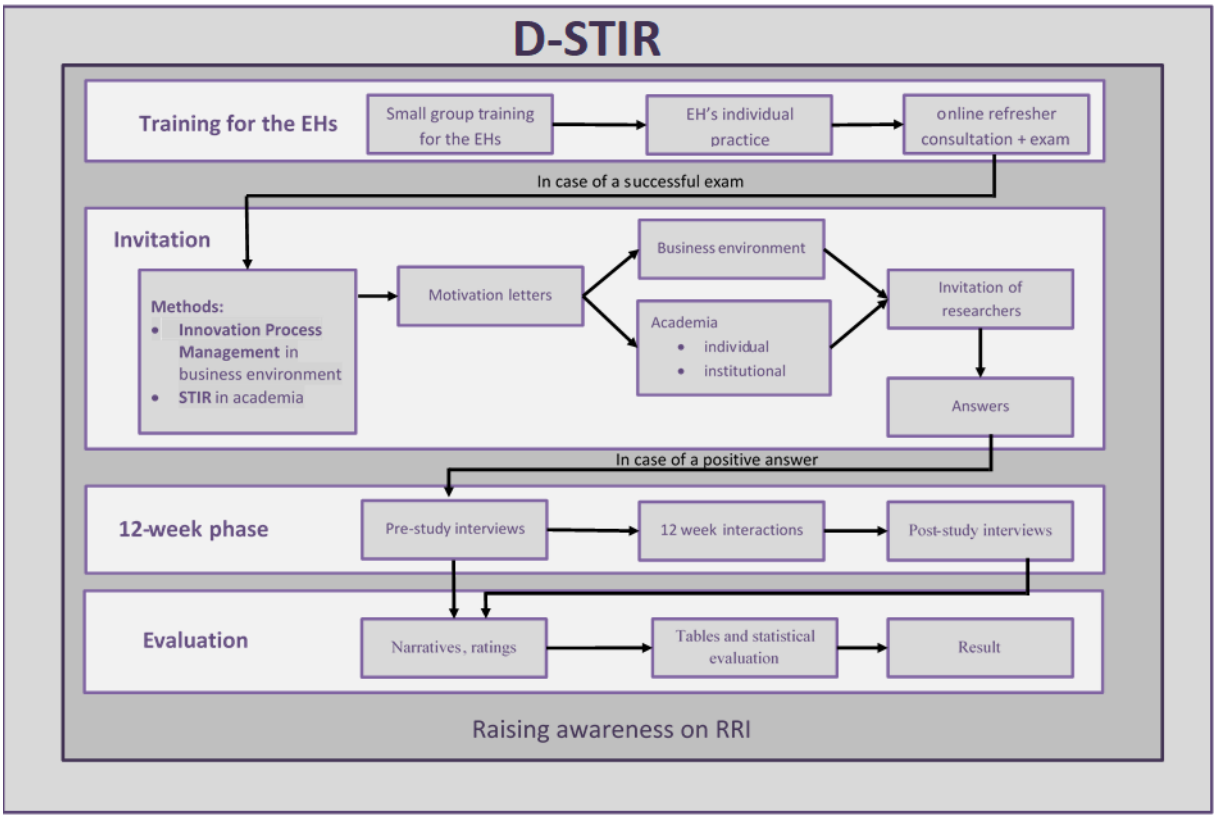
Raising awareness is a horizontal issue during D-STIR that is an obligatory and continuous task via using the social media with the support of the trainer.

4.2 Adapted D-STIR Method

4.2.1 Logic

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 Final structure of the D-STIR method; by EMFIE



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, 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 Innovation Process Management 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).

4.2.4 Conclusions

D-STIR research **method** is **specific** enough to use in **post-socialist countries**, but **not too different** from the **original method**. It is a hard task to find the **equilibrium**, but we assume that it was successful. The advantage of the newly developed process is that we can **compare** these studies with the earlier ones carried out in the USA, the Netherlands etc. Another achievement is that the method itself does **not different in the business and the academic sector**, therefore these data will be **comparable** as well.

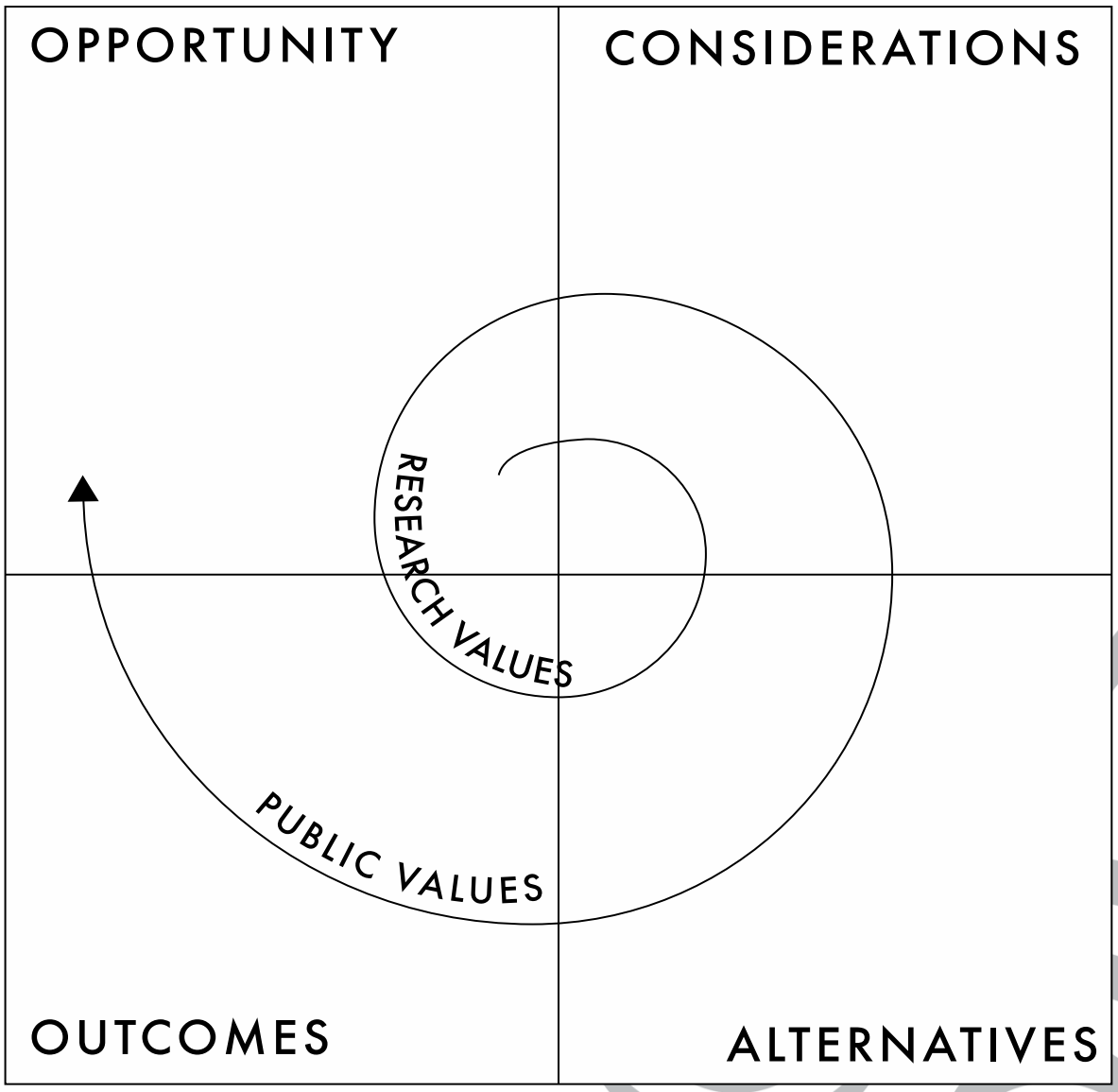


Figure: prof. Erik Fisher, Szeged capacity building workshop (D-STIR activity)

5 Stakeholders engagement

5.1 D-STIR project approach

5.1.1 Key points of the 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 expired;
- 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 avenues;

· 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:

o Leaflet (It can be in English or national language)

o Brochure (final brochure is obligatory)

o Project posters (for the project time in facilities of each partner is obligatory)

o Newsletter (dissemination is role of all partners)

o Website (both your existing website and the official project website)

o Social media (FB + LinkedIn)

o Mailing lists

o Public events (capacity building-Szeged, study visits-Bucharest, Stuttgart, Prague)

o 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 DANUBE MACRO 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.

5.2 Results

This subchapter will be developed for the Final Version of the Danube RRI Strategy.

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

6.1 Action/work plan for the implementation of project activity 5.2 "Testing RRI actions"

Activity 5.2 is run by ERDF1 CLS, with support from LP and ERDF2. A selection of the RRI Actions defined thanks to the application of D-STIR are tested in pilot organisations with support from the D-STIR expert.

RRI Actions depend on the exact nature of the organisations involved. They may vary according to sector (e.g. biomedical sector has different needs that energy producers), to organisation priorities and policies, to level of innovation/RRI experience, to existing management procedures and to human resource availability. The following are examples, meant to illustrate the potential, though exact actions will be defined: creation of ethical advisory board; definition/application of socio/environmental monitoring systems, risk management procedures or end user engagement procedures; definition of open access structures or of gender equality/diversity management plans and reporting procedures.

Activities follow the same structure for each Pilot and are summarised as follows:

- Selection/Planning: identification in each pilot organisation, with support from D-STIR expert, of the RRI Actions to be implemented and definition of the people responsible in each organisation and the 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.

Throughout the work, partners feedback to other members of their Transnational Pilot. An Implementation Report is prepared at the end of the activity, describing RRI Actions in academic and business Pilots. Exchange between the two Pilots and feedback to improve the Strategy (WP3) is undertaken in Activity 5.4.

Pilot Action in Academia Environment

Pilot Action - Phases	**No of SMEs involved (Total: 36 SMEs)**	**Timeframe**	**Responsible Partners**
Selection	At least 1 lab per partner	April 2018 – December 2018	ERDF 3 (with ERDF8 for policy side), ERDF 5 (with ASP1), ERDF 6
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 – December 2018	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		

6.2 Policy recommendation

6.2.1 Academic sector

6.2.2 Business sector

This subchapter will be developed for the Final Version of the Danube RRI Strategy.

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

7.1 Action/work plan for the implementation of project activity 5.1 "D-STIR application"

Activity 5.1 is run by ERDF1 CLS, with support from LP and ERDF2. It covers preparation and 12-week application of the D-STIR method in academic and business

pilot sites. Throughout the work, partners feedback to other members of their Transnational Pilot. A D-STIR Application Report is prepared at the end of the period, describing D-STIR application. Exchange between the two Pilots (business and academia) and feedback to improve the Strategy (WP3) is undertaken.

Pilot Action in Business Environment

Three phases are foreseen: selection, implementation and evaluation.

They are summarised as follows:

• Selection: business partners select at least 5 innovative SMEs in their country (total 36 for pilot), among which 1 innovative SME will have the role of "highly interactive" pilot and it will be involved over 12-weeks of testing phase (including pre- and post D-STIR interviews) while 4 innovative SMEs will have the role of "control group" and there will be involved only in pre- and post D-STIR interviews.

All selected organisations participate in information sessions with the D-STIR Expert aiming to familiarize with RRI concept and D-STIR method.

To ensure long term commitment, cooperation agreements will be concluded with the selected SMEs.

• Implementation: business partners select 1 highly interactive SME where the D-STIR expert is integrated over 12-weeks. They examine D-STIR in daily operation, under natural conditions. They conduct continuous interactions with staff.

Pre- and post D-STIR interviews on knowledge, management/organisational tasks and innovation content, evaluation of social, ethical, environmental, etc. dimensions of RRI are carried out with all 5 innovative SMEs. At least 1 pre- and post D-STIR interview will be carried-out with the "control group" companies while at least 2 pre- and post D-STIR interviews will be undertaken by the "highly interactive" SMEs.

• Evaluation: throughout the implementation period, feedback is gathered. Embedded humanists will make narrative and statistical evaluations as well.

Information sessions will be organised with all selected companies for sharing the results of D-STIR application and for creation the premises to start the testing of RRI Actions.

Work plan for business pilot sites

Pilot Action - Phases	**No of SMEs involved (Total:**	**Timeframe**	**Responsible Partners**

	36 SMEs)		
Selection	At least 5 SMEs per partner	15.12.2017-06.01.2018	LP, ERDF1 (with ASP2), 4,7,9,10, IPA1 (with ASP3)
Implementation	At least 5 SMEs per partner	Pre-study interview: 31st of January 2018 for the "highly interactive" SMEs Pre-study interview: end of February 2018 for the "control group"; 12 weeks of testing the method starting with 22.01.2018 Post-study interview: By the end of the implementation phase	LP, ERDF1 (with ASP2), 4,7,9,10, IPA1 (with ASP3)
Evaluation	At least 5 SMEs per partner	Narrative and statistical evaluations	LP, ERDF1 (with ASP2), 4,7,9,10, IPA1 (with ASP3)

Pilot Action in Academia Environment

Three phases are foreseen: selection, implementation and evaluation.

They are summarised as follows:

• Selection: academia partners select at least 1 lab in their country (total 3 for pilot). Selected organisations participate in information sessions with the D-STIR Expert aiming to familiarize with RRI concept and D-STIR method.

To ensure long term commitment, cooperation agreements will be concluded with the selected SMEs.

• Implementation: D-STIR expert is integrated into the chosen R&D organisations over 12-weeks. They examine D-STIR in daily operation, under natural conditions. They conduct continuous interactions with staff.

Pre- and post D-STIR interviews on knowledge, management/organisational tasks and innovation content, evaluation of social, ethical, environmental, etc. dimensions of RRI are carried out. At least 2 pre- and post D-STIR interviews will be undertaken during the implementation phase.

- Evaluation: throughout the implementation period, feedback is gathered. Embedded humanists will make narrative and statistical evaluations as well.

Work plan for academia pilot sites

Pilot Action - Phases	**No of research organisations (Total: 3 at project level)**	**Timeframe**	**Responsible Partners**
Selection	At least 1 research organisation per partner	15.12.2017-06.01.2018	ERDF 3 (with ERDF8 for policy side), ERDF 5 (with ASP1), ERDF 6
Implementation	At least 1 research organisation per partner	Pre-study interview: 31st of January 2018 12 weeks of testing the method starting with 22.01.2018 Post-study interview: By the end of the implementation phase	ERDF 3 (with ERDF8 for policy side), ERDF 5 (with ASP1), ERDF 6
Evaluation	At least 1 research organisation per partner	Narrative and statistical evaluations	ERDF 3 (with ERDF8 for policy side), ERDF 5 (with ASP1), ERDF 6

7.2 Road map (including funding options)

This subchapter will be developed for the Final Version of the Danube RRI Strategy.

8 References

- Altuzarra, A. (2016): Convergence in R&D Intensity across European Countries: A Fractional Integration Approach. Acta Oeconomica
- Adam, B. – Groves, G. (2011): Futures tended: care and future-oriented responsibility. Bulletin of Science, Technology & Society
- Association for Project Management: https://www.apm.org.uk/resources/find-a-resource/stakeholder-engagement/
- BiodivERsA Stakeholder Engagement Handbook: http://www.biodiversa.org/705/download
- Blok, V. and P. Lemmens, 2015. The emerging concept of responsible innovation: three reasons why it is questionable and calls for a radical transformation of the concept of innovation. In: Koops, E.J., J. van den Hoven, H.A. Romijn, T.E. Swierstra and I. Oosterlaken (eds.) Responsible innovation 2: concepts, approaches, and applications. Springer, Dordrecht, the Netherlands.
- Buzás, N. – Lukovics, M. (2015): A felelősségteljes innovációról. (About Responsible Innovation). Közgazdasági Szemle
- Blok, V. and Scholten, V. E. 2015. Responsible innovation in the private sector. Journal on Chain and Network Science 2015
- Carayannis E. G. – Egorov, I. (1999): Transforming the Post-Soviet Research Systems Through Incubating Technological Entrepreneurship. The Journal of Technology Transfer
- Connaway, L.S. – Radford, M. L. – Dickey, T. J. – Williams, J. D. A. – Confer, P. (2008): Sensemaking and synchronicity: information-seeking behaviors of Millennials and baby boomers. Libri
- **D-STIR documents/input**: parteners input; RRI Strategy template (WP3, EMFIE); Danube context analysis (WP3, ADRSE); Conceptual analysis (WP3, EMFIE); Overview of the Danube Territorial Context (WP3, EMFIE); Partner Input Template (WP3, ADRSE); Evaluation of the WP4 Input Template (WP4, EMFIE); Adapted STIR Method (wp4, emfie); Analysis of the WP4 Input Template (WP4, EMFIE); Practical

manual on how to set up and operate the transnational stakeholder groups (WP2 CLCH); Application Form –DTP1-1-019–

- EC (2012): Regional Innovation in the Innovation Union. Project financed by the 6th Framework Programme for Research, for the implementation of the specific programme "Strengthening the Foundations of the European Research Area". Brussels: European Commission.
- EC (2013): Options for Strengthening Responsible Research and Innovation: Report of the Expert Group on the State of Art in Europe on Responsible Research and Innovation. Brussels: Directorate-General for Research and Innovation, Science in Society, EUR25766 EN.
- EC (2014a): Innovation Union 2013 Competitiveness Report. Commission Staff Working Document, Brussels: Directorate-General for Research and Innovation, EUR 25650 EN
- EC (2014b): Responsible Research and Innovation. Europe's ability to respond to societal challenges. European Commission, Brussels. Internet: https://ec.europa.eu/research/swafs/pdf/pub_rri/KI0214595ENC.pdf
- EC (2014c): Danube Transnational Cooperation Programme. European Commission, Brussels.
- EC (2014): Responsible Research and Innovation. Europe's ability to respond to societal challenges. European Commission, Brussels, Internet: https://ec.europa.eu/research/swafs/pdf/pub_rri/KI0214595ENC.pdf
- EC (2015): European Innovation Scoreboard 2015. Brussels: Directorate-General for Research and Innovation. Blok et al 2016. Dealing with the Wicked Problem of Sustainability: The Role of Individual Virtuous Competence. Business & Professional Ethics Journal 34:3, Fall 2015
- Eurostat - Research & Development; World Bank database; Global Competitiveness Report 2016-2017; Human Development Report 2016; European Innovation Scoreboard
- Eurobarometer: Consumer understanding of labels and the safe use of chemicals. Report, Special Eurobarometer 360; Responsible Research and Innovation (RRI),

Science and Technology. Report, Special Eurobarometer 401. Brussels: European Commission.

- Ellis, G., and Weekes, T. 2008. Making sustainability "real": Using group-enquiry to promote education for sustainable development. Environmental Education Research
- Farkas, B. (2011): The Central and Eastern European model of capitalism. Post-Communist Economies
- Farkas, B. (2016): Models of Capitalism in the European Union: Post-crisis Perspectives. London: Palgrave Macmillan.
- Fisher, E. – Mahajan, R. L. – Mitcham, C. (2006): Midstream Modulation of Technology: Governance from Within. Bulletin of Science, Technology and Society
- Fisher, E. – O'Rourke, M. – Kennedy, E.B. – Evans, R. – Gorman, M, – Seager, T† (2015). Mapping the Integrative Field: Taking Stock of Socio-Technical Collaborations. Journal of Responsible Innovation
- Fisher, E. (2007): Integrating Science and Society in the Laboratory. Presentation. Center for Integrated Nanotechnologies. Los Alamos National Laboratory. Los Alamos, NM.
- Fisher, E. – Schuurbiers, D. (2009): Lab-scale intervention. Science & Society Series on Convergence Research. EMBO Reports
- Fisher, E. – Schuurbiers, D. (2013). Midstream Modulation. In Doorn, N. – Schuurbiers, D. – van de Poel, I. – Gorman, M. E. (eds): Opening up the Laboratory: Approaches for Early Engagement with New Technology. Wiley-Blackwell
- Flipse, S. M. – van der Sanden, M. C. – Osseweijer, P. (2012): Midstream Modulation in Biotechnology Industry: Redefining what is 'Part of the Job' of Researchers in Industry. Science and Engineering Ethics
- Flipse, S. M. – van der Sanden, M. C. – Osseweijer, P. (2014): Improving industrial R&D practices with social and ethical aspects: Aligning key performance indicators with social and ethical aspects in food technology R&D. Technological Forecasting & Social Change
- Guston, D. H. – Sarewitz, D. (2002): Real-Time Technology Assessment. Technology in Society

- Iatridis, K. and Schroeder, D. 2016. Responsible Research and Innovation in Industry: The Case for Corporate Responsibility Tools. SpringerBriefs in Research and Innovation Governance
- Ingham, M. (2011). Vers l'Innovation Responsable. De Boeck, 1st edition
- Inzelt, A. – Schubert, A. (2011): Collaboration between researchers from academic and non-academic organizations. A case study of co-authorship in 12 Hungarian universities. Acta Oeconomica
- Inzelt, A. – Szerb, L. (2006): The Innovation Activity in a Stagnating County of Hungary. Acta Oecoomica, 56(3): 279-299. Jensen, B. B., and Schnack, K. 1997. The action competence approach in environmental education. Environmental Education Research
- KARIM Project (2014). Responsible Innovation in the context of the KARIM project.
- Keh, P., Rodhain, F., Meissonier, R., LLorca, V. 2012. Financial performance, Environmental Compliance, and Social Outcomes: The Three Challenges of Reverse Logistics – Case study of IBM Montpellier. Supply Chain Forum: An International Journal
- Krammer M. S. (2007): Drivers of national innovative systems in transition. An Eastern European empirical cross-country analysis. Working paper. Rensselaer Polytechnic Institute Department of Economics.
- Lukovics M. – Fisher, E. – Udvari B. (2016): A felelősségteljes innováció iránti fogékonyság fejlesztése a gyakorlatban. Marketing & Menedzsment,
- Lukovics, M. - Fisher, E. (2017): Socio-Technical Integration Research in an Eastern-European Setting: Distinct Features, Challenges and Opportunities. Society & Economy
- Lukovics, M. – Flipse, S. M. – Udvari, B. – Fisher, E. (2017): A Responsible Innovation Tool in a Different Innovation Environment: the Case of Socio-Technical Integration Research in Hungary and the Netherlands. Technology in Society
- Lukovics, M. – Buzás, N. – Huntingford, J. – Bubbolinie, G. – Udvari, B. (2017a): Facilitating Responsible Innovation in South East European Countries. Acta Oeconomica

- Lukovics, M. – Flipse, S. M. – Udvari, B. – Fisher, E. (2017b): A Responsible Innovation Tool in Two Different Innovation Environments: the Case of Socio-Technical Integration Research in Hungary and the Netherlands. Technology in Society
- Macnaghten, P. – Owen, R. – Stilgoe, J. – Wynne, B. – Azevedo, A. – de Campos, A. – Chilvers, J. – Dagnino, R. – di Giulio, G. – Frow, E. – Garvey, B. – Groves, C. – Hartley, S. – Knobel, M. – Kobayashi, E. – Lehtonen, M. – Lezaun, J. – Mello, L. – Monteiro, M. – Pamplona da Costa, J. – Rigolin, C. – Rondani, B. – Staykova, M. – Taddei, R. – Till, C. – Tyfield, D. – Wilford S. – Velho L. (2014): Responsible innovation across borders: tensions, paradoxes and possibilities. Journal of Responsible Innovation
- McCrindle, M. –Wolfinger, E. (2010): Az XYZ ábécéje. A nemzedékek meghatározása
- MedMPAnet Project: Stakeholder Participation Toolkit for Identification, Designation and
- Management of Marine Protected Areas; http://www.racspa.org/sites/default/files/mpa_stakeholder_toolkit.pdf;
- Maric, J. et al 2014. Examining responsible innovation concept of integrated reverse logistics model. https://www.researchgate.net/publication/264899323
- Moore, G.A., 1991. Crossing the chasm: marketing and selling hightech goods to mainstream customers. Harper Business, New York, NY, USA.
- Oblinger, D. – Oblinger, J. (szerk.) (2005): Educating the Net Generation. Washington: EDUCAUSE.
- Okada, A. (2016): Responsible research and innovation in science education report. The UK: Milton Keynes: The Open University.
- Owen R. – Macnaghten P. – Stilgoe J. (2012): Responsible research and innovation: from science in society to science for society, with society. Science and Public Policy, O'Sullivan, D., Dooley, L. (2009). Applying Innovation. Sage Publications
- Pál E. – Törőcsik M. (2015): Irodalmi áttekintés a Z generációról. In: Törőcsik Mária (szerk.) Tanulmányok a TÁMOP-4.2.3-12/1/KONV-2012-0016

„Tudománykommunikáció a Z generációnak" projekt keretében. Pécs: Pécsi Tudományegyetem, 2015

- Panzda, K. – Ellwood, P. (2013): Strategic and Ethical Foundations for Responsible Innovation. Research Policy, 42(5): 1112-1125. doi: 10.1016/j.respol.2013.02.007 Peterson, C. 2009. Transformational supply chains and the "wicked problem" of sustainability: Aligning knowledge, innovation, entrepreneurship, and leadership. Journal of Chain and Network Science
- Peterson, C. 2009. Transformational supply chains and the "wicked problem" of sustainability: Aligning knowledge, innovation, entrepreneurship, and leadership. Journal of Chain and Network Science
- Ravesteijn, W. – Liu, Y. – Yan, P. (2015): Responsible innovation in port development: the Rotterdam Maasvlakte 2 and the Dalian Dayao Bay extension projects. Water Science & Technology
- Rittel, H. W. J., and Webber, M. M. 1973. Dilemmas in a general theory of planning. Policy Sciences,
- Schomberg, R. von (2013): A Vision for Responsible Research and Innovation. In: Owen, R.–Bessant, J.–Heintz, M. (szerk.): Responsible Innovation. London: John Wiley
- Schuurbiers, D. – Fisher, E. (2009): Lab-scale intervention. EMBO Reports. Science & Society Series on Convergence Research
- Setiawan, A. D. – Singh, R. (2015): Responsible Innovation in Practice: The Adaption of Solar PV Telecom Towers in Indonesia. In Koops, B-J. – Oosterlaken, I. – Romijn, H. – Swierstra, T. – van den Hoven, J. (eds.): Responsible Innovation 2: Concepts, Approaches, and Applications. Switzerland: Springer
- Stankovic, M. – Angelova, B. – Janeska, V. – Stankovic, B. (2013): Science and Innovation Policy in Southeast Europe: Brain Drain as Brain Gain. International Journal of Technological Learning, Innovation and Development
- Sutcliffe, H. (2013): A Report on Responsible Research and Innovation. London: Matter
- Tari A. (2010): Y generáció: Klinikai pszichológiai jelenségek és társadalomlélektani összefüggések az információs korban. Budapest: Jaffa Kiadó

- UNESCO (2009): Science, Higher Education and Innovation Policy in South Eastern Europe. Venice: UNESCO Regional Bureau for Science and Culture in Europe. Waldman, D.A. and B. Galvin, 2008. Alternative perspectives of responsible leadership. Organizational Dynamics
- Várady J. – Tóth M. – Fogarasi J. (2005): Merre tovább? A Magyar vegyipar jövőképe. A Magyar vegyipart érintő szakképzés, felnőttképzés fejlesztésének problémái, lehetőségei. http://www.vdsz.hu/files/45/22/vegyip_szakkepzes.pdf
- Voeten, J. – de Haan, J. – de Groot, G. – Roome, N. (2015): Understanding Responsible Innovation in Small Producers' Clusters in Vietnam through Actor-Network Theory. European Journal of Development Research
- Wood, S. (2013): Generation Z as Consumers: Trends and Innovation. Institute for Emerging Issues: NC State University
- Wynne, B. (2006): Public Engagement as a Means of Restoring Public Trust in Science? Hitting the Notes, but Missing the Music. Community Genetics
- Yaghmaei, E. 2015. Addressing Responsible Research and Innovation to Industry – Introduction of a Conceptual Framework. SIGCAS Computers & Society, Sept 2015