D-STIR

D-STIR Application Report describing academic applications

ERDF PP1 - Cassovia Life Sciences (CLS)

Identification			
WP	**Activity**	**Deliverable**	**Document**
WP5 – RRI Pilots	A5.1 – D-STIR Application	D-STIR Application Report describing academic applications	Final Report

Contents

1. Introduction

Science and technology policies around the world are placing new pressures on laboratories to address broader societal dimensions of their work in ways that have the potential to influence the content of science and engineering activities themselves – presumably for the better.

Despite longstanding calls for collaborations between natural and human scientists to achieve this goal, neither the capacity of laboratories to respond to such pressures nor the role that interdisciplinary collaborations may play in enhancing responsiveness is well understood or empirically supported. It is crucial to overcome these limitations in order to design, implement and assess effective programs aimed at responsible innovation.

To address these limitations, the Socio-Technical Integration Research (STIR) was developed and for the needs of this project it was adjusted to the form of D-STIR. The adaptation is fully detailed in previous project deliverables related in particular to Work Package 4 (T2) – RRI Tools.

To test newly adjusted methodology, D-STIR project decided to create 2 pilot actions – the first in academic environment and the second in business.

Indeed, D-STRI Work Package 5 (T3) focuses on the Transnational Pilot Actions, designed to test the RRI Strategy and, specifically, application and follow up of the D-STIR method. Following the logical framework of the D-STIR project, these pilot actions use the results of Work Package 3 (RRI Strategy – First draft) and Work Package 4 to undertake a 13 month pilot phase.

Activity 5.1 focuses on D-STIR application. This is a 12-week application of the D-STIR method in academic and business pilot sites. This deliverable summarises piloted organisations and work done with explicit results that will be used further in development of RRI strategy within the scope of D-STIR project (Activity 3.3). It begins with an overview of the structure of the pilot actions, before presenting the results for each territorial action carried out.

2. Activities fulfilling D5.1

This chapter provides an overview of the activities carried out within WP5, Activity 5.1 – D-STIR Application.

The partner responsible for the coordination of the Activity was Cassovia Life Sciences (CLS), with support from the D-STIR Lead Partner and from expert partner EMFIE.

Activities follow the same structure for each Pilot: Selection, Implementation and Evaluation:

- **Selection:** following procedures defined in WP4 (adjusting STIR method, as detailed in WP4 deliverables) academic partners selected at least 1 lab in their country (total 3 for pilot) and business partners selected at least 5 innovative SMEs in their country (total 36 for pilot).

- **Implementation:** the D-STIR expert (Embedded Humanist) was integrated into the chosen academic or business organisation over 12-weeks. They applied D-STIR into the daily operation of the pilot organisations, under natural conditions. In each case, as foreseen by the STIR method, they conducted continuous interactions with staff.

All pilot actions followed the approved and tested method for STIR Application. This began with a pre-D-STIR interview and on knowledge, management/organisational tasks and innovation content. The aim of this interview is to gauge the starting point of each organization in terms of innovation and research structures and procedures. Interviews are usually about hour long and they follow precise methodology developed in WP4 during adjusting STIR method for the needs of Danube region. As an output, the Embedded Humanist completes the pre-study questionnaire.

During the pilot period, the Embedded Humanist worked with the innovators in a participative evaluation of the various dimensions of RRI. The number of meetings / intensity of interaction was defined on agreement between both sides. The important methodological structure is that after each meeting, an evaluation is made using the STIR methodology.

At the end of the 12-week period, a post-D-STIR interview was carried out. This, and the notes from throughout the whole period, was used to complete the post-study questionnaire.

- **Evaluation:** throughout the implementation period, feedback was gathered by the Embedded Humanist, working in collaboration with other members of the D-STIR partner staff. In the last month, RRI Actions began to be defined in collaboration between D-STIR expert and staff. These actions form the basis for Activity 5.2, Testing RRI Actions and Activity 5.3, Preparation for Investment and Leverage of Funds.

3. Structure of pilots

Activity 5.1 consisted of 2 main pilots that were subsequently broken down to the sub-pilots for each partner:

Academic environment

- ELI-HU Research and Development Non-profit Ltd - Hungary

- Institute of Physics of the Czech Academy of Sciences - Czechia

- Horia Hulubei National Institute for Research and Development in Physics and Nuclear Engineering – Romania

All of these 3 organisations are pillars of ELI project – cutting edge laser infrastructure.

Business environment

- South East Regional Development Agency – Romania

- Cassovia Life Sciences – Slovakia

- Development centre of the Heart of Slovenia – Slovenia

- Bwcon GmbH – Germany

- Central Bohemian Innovation Centre – Czechia

- Development Agency Heart of Istria – Croatia

- Sarajevo Economic Region Development Agency – Bosnia and Herzegovina.

4. Form of pilots

The D-STIR method supports interactions between experts from different disciplines (humanities and social science with technological sectors or natural sciences), who collaboratively reflect on the societal context of research decisions in order to support reflexive learning and practical adjustments. In the selection phase of D-STIR, the D-STIR investigator (hereafter, "Embedded Humanist - EH") 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) or manager 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 (as "high interaction" persons) and also researchers who remain so-called "no interaction" persons (or "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. 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.

In order 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. The protocol is based on a four-fold model of decisions that includes opportunity,

considerations, alternatives and outcomes. With the assistance of the protocol, EHs 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. 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.

EH 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.

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.

1 pilot is in fact a 12-week long interview (12 weeks can be spread to longer time according to availability of the participants) between embedded humanist (from D-STIR project) and the so-called "STIR-ed" person from piloted organisation. Interviews are usually about 1-hour long and they follow precise methodology developed in WP4 during adjusting STIR method for the needs of Danube region. As an output, the embedded humanist writes notes following given template and do pre-interview and post interview surveys together with evaluation of the process.

The D-STIR method has the following structure:

- At the beginning, the "STIR-ed"person fills in the pre-study questionnaire
- The 12 week-long "STIRing process" – consists of a number of meetings, depending on agreement between both sides
- After each session, a small evaluation is made using the D- STIR methodology
- After 12 weeks, the "STIR-ed"person fills in a post-study questionnaire
- Evaluation of whole process, reflection and preparing next steps

5. Results of pilot activities

The following texts and tables provide a description of the piloted organisations and an overview of results.

This chapter provides an initial table detailing the interactions carried out in each pilot. It then provides some visual overviews of the results. The details behind each overview can be found in the annexes at the end, which include the full reports from each pilot prepared by the D-STIR partner with the Embedded Humanist.

Methodologically, the piloting was conducted in a way that the embedded humanist was integrated for 12 weeks in the operation of each of the research groups in the field of natural science and examined the adaptability of the STIR tool in daily operation, under natural conditions. During the 12 week-period spent at each site, we conducted continuous interactions with high interaction researchers, the other no interaction persons operated as a control group. The pre- and post-study interview questions covered mainly the scientific research area, qualification and knowledge in the field of responsible innovation of the participating researchers, their opinion and view about the innovation process. The evaluation of the social, ethical, environmental, etc. dimensions of responsible innovation and the definition of the related activities also played a role in the frame of the interview.

Subsequently, our questions covered a number of topics, among others questions in relation with the chosen realization method of the participant's research, financial, organizational, management tasks. During our interactions, we endeavored to identify the features that characterize the innovation process and we also raised questions concerning the dimensions of RRI. Methodological overview can be summarized:

	Week 1	Week 2-11	Week 12
Activity	Pre-study interview	Weekly observations	Post-study interview
Tool	Interview guide	Decision protocol with decision components (modulators)	Interview guide
Purpose	To understand the research activity of the researchers; and to establish baselines for participants' attitudes towards dimensions of RRI and their level of reflexive awareness at the beginning of the study	Identification and discussion of decision modulators; monitoring of de facto, reflexive and deliberative modulation, and understanding of notions concerning RRI keys and dimensions	To measure changes in participants' attitudes towards dimensions of RRI and/or in their level of reflexive awareness at the end of the study

5.1 Results of quantitative questionnaire

Whole STIR method has been adjusted to the needs of the Danube region thus making suitable for the needs of the project. Evaluation of the whole pilot consists of 2 main parts:

- Quantitative – answering pre-defined questions before and after the 12 weeks long STIR process in order to detect changes in behaviour and thinking.
- Qualitative – describing SITR process from subjective perspective, summarising it, suggesting improvements and answering questions of utility of the STIR process

Academic environment is very specific thus making STIR process focused more on improving excellence of one specific person rather than organisation. All of the organisations that have been used for the pilot are members of the D-STIR consortium thus making it easy for EHs to persuade them to join pilot itself.

Table 1: Research participants profile

Partner	Country	EH	Duration of pilot	Test subject	High/low interaction[1]	Position of STIRed person	Occurrence of STIR interaction	Average duration of STIR interaction
ELI - CZ	Czechia	Jan Stachura	February-May 2018	P1 - CZ	High	Junior Researcher	1x per week	1 hour
ELI - CZ	Czechia	Jan Stachura	February-May 2018	P2 - CZ	Low	Research expert		
ELI – NP	Romania	Mara Tanase	January-May 2018	P1 - RO	High	Laser physicist	3x per week	25 minutes
ELI - NP	Romania	Mara Tanase	January-May 2018	P2 - RO	High	Scientific researcher	3x per week	25 minutes
ELI – NP	Romania	Mara Tanase	January-May 2018	P3 - RO	High	Chemist	3x per week	25 minutes

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[1] High interaction is person who is being interviewed, low interaction is person who is given all of the documents to fill-in, but without passing through the D-STIR process – it serves as control group.

ELI - NP	Romania	Mara Tanase	January-May 2018	P4 - RO	High	Research Assistant	3x per week	25 minutes
ELI – NP	Romania	Mara Tanase	January-May 2018	P5 - RO	Low	Engineer		
ELI – NP	Romania	Mara Tanase	January-May 2018	P6 - RO	Low	Post-doctoral Research Assistant		
ELI – NP	Romania	Mara Tanase	January-May 2018	P7 - RO	Low	Junior Researcher		
ELI - NP	Romania	Mara Tanase	January-May 2018	P8 - RO	Low	Research scientist		
ELI – HU	Hungary	Miklós Lukovics	January-June 2018	P1 – HU	High	Early-stage researcher	1x per week	45 minutes
ELI – HU	Hungary	Petra Szűcs	January-April 2018	P2 - HU	High	Early-stage researcher	1x per week	1 hour

As it can be seen from the table necessity for the project needs was to have at least one high interaction test subject. Some partners decided to have more than others, although it was on voluntary basis, which on the other hand provides us with more data to analyse.

Table 2 – Results of quantitative questions – pre-interview questionnaire[2] – high interaction

Subject	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q16
P1 - CZ	3	5	5	3	1	5	2	5	3	4	3	1	5
P1 – RO	6	4	6	6	2	6	4	6	4	6	5	4	4
P2 – RO	3	6	4	5	4	6	4	4	6	6	4	4	5
P3 – RO	4	6	6	5	5	6	6	5	6	6	4	5	5
P4 – RO	1	6	6	3	3	3	6	6	4	6	4	2	3
P1 - HU	3	6	5	4	2	6	5	4	4	4	3	4	4
P2 - HU	3	6	2	3	2	6	6	5	6	4	4	5	4
Average	3.29	5.57	4.86	4.14	2.71	5.43	4.71	5	4.71	5.14	3.86	3.57	4.29

[2] Questionnaire with full wording of question can be found as an annex to this document

Table 3 – Results of quantitative questions – post-interview questionnaire – high interaction

Subject	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q16
P1 - CZ	3	5	5	4	2	5	3	4	5	5	4	2	5
P1 – RO	3	2	4	4	4	6	3	6	6	5	6	5	5
P2 – RO	6	6	4	5	5	5	6	4	5	5	6	5	5
P3 – RO	6	6	6	6	6	6	6	6	6	6	6	6	6
P4 – RO	3	6	2	6	5	6	6	6	6	6	6	1	6
P1 - HU	6	6	6	6	3	6	6	6	5	5	6	4	6
P2 - HU	4	6	4	5	4	5	4	5	5	5	4	5	5
Average	4.42	5.29	4.43	5.14	4.14	5.57	4.86	5.29	5.43	5.29	5.43	4	5.43

The graph on the right represent changes between pre and post study questionnaire in aggregated numbers from all interviews done. As it can be seen there is slight improvement most of the questions (Q4 & Q5 are exception) from which we can observe success of the STIR method. Although differences are mostly not very significant, which points to the direction that wording of the question is not clear and should be adjusted according to recommendations given in qualitative part of the of the evaluation of the STIR method.

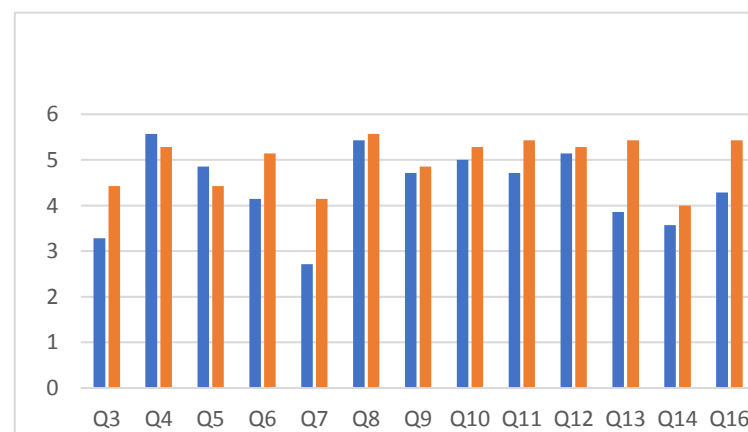*Graph 1. comparison questionnaires high interaction*

Table 4 – Results of quantitative questions – pre-interview questionnaire – low interaction

Subject	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q16
P2 - CZ	6	5	3	3	2	5	4	3	3	4	5	2	5
P5 – RO	6	4	5	3	3	4	3	5	5	4	4	5	2
P6 – RO	1	5	5	4	2	5	4	3	6	4	5	5	5
P7 – RO	6	6	4	6	4	6	6	4	4	6	5	5	6
P8 – RO	6	6	4	4	4	4	5	6	4	5	5	3	5
Average	5	5.2	4.2	4	3	4.8	4.4	4.2	4.4	4.6	4.8	4	4.6

*Table 5 – Results of quantitative questions – post-interview questionnaire – low interaction*

Subject	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q16
P2 - CZ	6	4	4	5	2	5	3	2	5	4	5	3	5
P5 – RO	6	4	5	3	3	4	3	5	5	4	4	5	2
P6 – RO	1	5	5	4	2	5	4	3	6	4	5	5	5
P7 – RO	6	6	6	6	6	6	6	6	6	6	6	5	6

P8 – RO	6	2	4	6	5	5	5	3	6	6	5	5	6
Average	5	4.2	4.8	4.8	3.6	5	4.2	3.8	5.6	4.8	5	4.6	4.8

Graph 2. Comparison of pre and post interview questionnaire low interaction
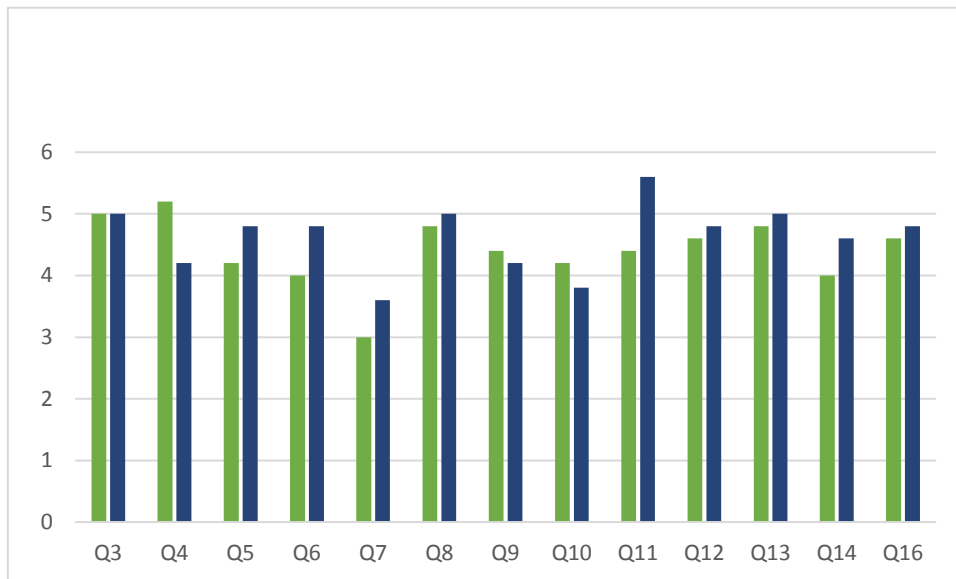
Graph 3. Comparison of difference between results of difference between post and pre study interview and low and high interaction subjects
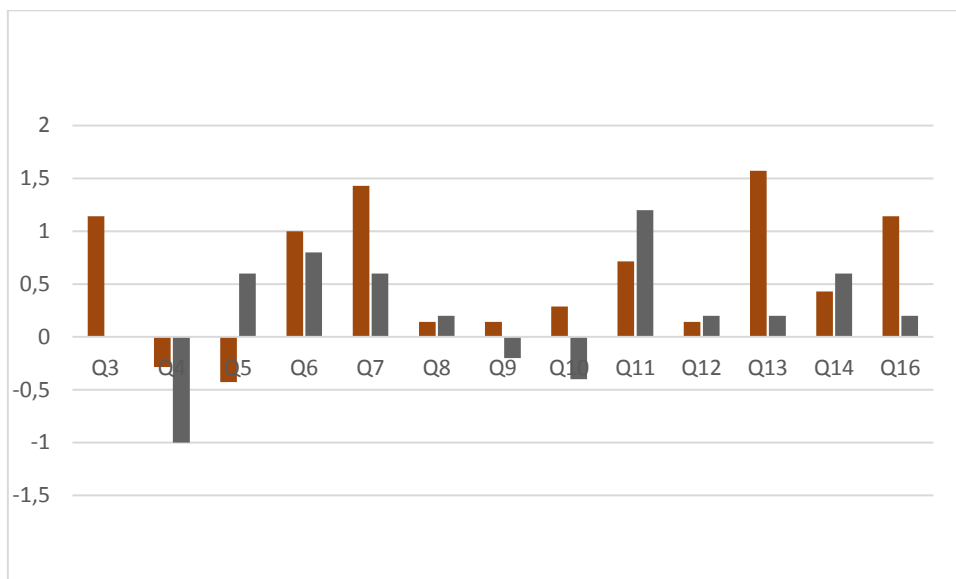
We used as control group, a number of people from the same organisation as high interactive counterparts. The main reason for this is to compare the differences in answers between subjects that attended the D-STIR pilot and those who had just filled the questionnaire (although there was a 12 week-gap between filling them). Graph 2 shows the difference between answers given to pre and post study interview from low interaction subjects. As it can be see, then difference is low, excepting for Q11 (green column is pre-study and blue post-study), which can be attributed to statistical anomaly.

Graph 3 compares the difference of values between post and pre study interview in both high interaction (brown column) and low interaction (grey column). As it can be seen most of the values (with exception of Q5, Q8, Q11, Q14) shows positive difference and hence prove impact of the method. Although it is important to stress out that understanding of the question varies in high interaction subjects, as they improve their understanding during the STIR process and can then adjust their opinions according to it in both directions.

In general, our expectations were that the application of the D-STIR method would increase values in answers given, which was successfully proven in both graph 1 and 3.

5.2 Qualitative results of the academic pilot

D-STIR interactions were correlated to changes in reflexive learning, value deliberation, and practical adjustments on the part of participants. By the end of the 12th week process, participants' awareness at all laboratories had been enhanced, as evident in changing conceptions on RRI and socio-technical collaboration, and greater decision awareness.

For example, in the post-study interview subject initially did not understand spectrum of decision making which was proven in post study questionnaire where their answers changed significantly (Table 6).

Table 6. Pre- and post-study changes in conceptions of decision making

Question 3: **How many decisions do you make a day during your work?**	
P1 - HU	
Pre-study	I have medium word in the questions of research planning.
Post-study	Now I see, that the focus is on being aware of making decisions and that they have consequences.
P2 - HU	
Pre-study	"Because so far I haven't thought about how many decisions I make a day during my work. I chose three because I'm sure that I make decisions every day."
Post-study	"Because as we talked about it, it turned out that I make decisions about tinier questions as well which weren't conscious."
P1 - RO	
Pre-study	I have to make lab tests and work procedures.
Post-study	For each paper/ experiment/ research there are multiple approaches and choosing one approach over another means a decision.

Furthermore, the participants initially stated that there is not bigger need for interactions between natural and social scientists; however, by the end of the observation period, there was a considerable change in the opinions. According to P1, it makes sense to increase interactions between social and natural scientists, see table 7.

Table 7. Changes in attitude on axis natural and social sciences

Question 6: **Is it important to involve some social science aspects (sociology, psychology, philosophy, ethics, etc.) in the thinking of natural sciences?**	
P1 - HU	
Pre-study	I can imagine ethical things, but I don't know much about social sciences.
Post-study	I believe that here only creativity can limit how many social science aspects a natural scientist researcher takes into consideration in thinking. Anyway, now I'm sure that the more aspects we take into account in our research, the more valuable the result will be.
Question 14: **Does it have any sense to improve the abilities of a research group to consider social, economic, environmental, and ethical aspects during the whole research?**	
P2 - HU	
Pre-study	"it would be stressful for me to deal with such aspects and issues above my research, but certainly it would mean some benefit."
Post-study	"it is more useful since new aspects occur. However, it shouldn't go too far and take too much time, because that can hinder the processes and work."
Question 13: **Would it be useful to integrate social, economic, and ethical aspects into the R&D&I process of natural sciences? Same as question 6.**	
P1 - CZ	
Pre-study	Only general yes – environmental, ethical and economically issues
Post-study	Maybe more emphasis on economically aspect – applicability, solving society needs.
Question 15: **Could be cooperation between natural scientists and humanist during the R&D&I activities useful?**	
P1 - RO	
Pre-study	The outcome of our work (results, waste) must be justified and controlled
Post-study	Taking into consideration all these aspects involving society, economic aspects protecting the environment and animals (ethics) in research. Limit as much as possible the negative effects and damage that can be caused by the research work, for example overflow of radioactive waste into the environment; working with animals in responsible manner. Reduce costs and cost justification.

According to the participants' opinion, it was beneficial for them to participate in this research. Several topics had been discussed, which he had not considered previously (e.g. the possible negative use of his research results in the future, effective work organization, science marketing). Some participants found the research interesting because it enabled them to prepare for questions that stakeholders and others who are not representatives of the profession would raise, and this is not negligible regarding grants and marketing. As a conclusion, in the case of all participants the main output of the research was broadening their horizon with the integration of social science aspects into natural science ways of thinking.

By the end of the 12-week participant-observation period, both high interaction participants of all laboratories were well aware of their decisions, while at the beginning most of them could see only obvious decisions. Through the interactions, they became familiar with their own decisions and their potential importance in influencing research outcomes. Interestingly, as their decision-making awareness increased, the ad hoc nature of their work decreased. A further significant result in connection with decision-making is that after having reflected on the process they could identify previous decisions where now they would prefer to adopt a different solution in contrast with the original one.

We asked for embedded humanist to summarize key results of the STIR process see table 8.

Table 8. Main results of STIR process

Summary of results achieved by STIR pilot
LP - RO
In general, there was an increased level of awareness over the decision process and over one's role. One of the participants said: "On a personal level these talks helped me set the direction I want for my research". Another participant started to read articles about motivation and team management.
After the study the participants became more aware of the implications their research can have on society. Their perspective is broadened, for example one participant after the study when asked "What makes research/innovation responsible?" answered: "Taking into consideration all these aspects involving society, economic aspects, protecting the environment and animals (ethics) in research. Limit as much as possible the negative effects or any damage that can be caused by the research work (overflow of radioactive waste into the environment; working with animals in responsible manner) and reduce costs as much as possible."
The study also enabled deliberate modulations regarding time management and science popularization. Regarding time management during the discussions the idea of introducing a new tool (e-log) occurred and this was also implemented within the team.

Also, during the STIR process after talking about outreach and its importance a new brochure for general public about ELI-NP research was created.

P1 - CZ

The STIRred person realized the connections between daily research routine and social tasks. At the start of D-STIRring the interviewee could hardly name any possible relation between natural discipline (physics) and social sciences. At the end, at least the relation between soft skills and team management and leadership were found. There were opened the topics how the soft "social" skills could help in team management, leadership or business negotiations. There is also strong emphasis on interdisciplinary approach in today research and grant applications. So the researchers could be prepared on defining the inter-sectoral relations of their research and the collaborative research itself. For example, we are now implementing the project focusing on the innovative technology of waste water management for houses/small municipalities. So the researchers should present their research not only to companies but also to public authorities (mayors, etc.).

P1 - HU

In general, it can be stated that the way of thinking of the high-interaction researcher – involved in STIR interaction – has changed, mostly in the following areas:

- she realized the volume of daily made decisions and that they can have important consequences
- she realized that the social science aspects can have an impact on natural science thinking on many ways, and that the researcher can benefit from their integration
- she realized that social aspects can not only occur in the form of information in the life of a researcher, but also as gathering feedbacks from the society to make the innovation result more competitive (since it fits to the expectation of the society)

P2 - HU

I would definitely state that the way of thinking of the researcher has been broadened thanks to our interaction. He got more conscious about his work and takes into account several factors that were neglected earlier. At the beginning he didn't really have a clear opinion about the social aspects of his work. Although, probably it can be accounted for the lack of proper education in Hungary, as according to his narrative, natural scientists don't have many subjects about social issues or the method of teaching such subject is not motivating them for going more into details regarding these aspects.

Moreover, he changed his behavior as a result of our interaction on psychological issues. First, he didn't realize that there are psychological aspects of his work, too. But during our interaction he got familiar with it and afterwards, he acts accordingly with the guest researchers who come to ELI to test their work with the lasers. It is important to pay highlighted attention to these researchers, since it has an effect on the future of our

company.

Regarding the economic aspects, he also made a change in his behavior. Firstly, he just stated that economic aspects are relevant in order to produce a return with the research. During the interaction, he realized that besides financing, marketing is also a significant economic aspect of his work. At the end, he changed his actions and now he chooses the most cost-effective solutions when he has to make a decision.

As it can be interpreted from the summary of the results in bigger research infrastructure STIR cannot make meaningful impact on the organisational level. Although it made impact on personal level and shows as reasonable way of "couching" of scientist in order to broaden their perspective and use newly gained skill for communication or obtaining new funds through better ability to write proposals for research projects. Couching is not usual in Danube region and this aspect of D-STIR can have significant benefit at the thinking of researchers and thus increasing their impact.

Also it has been pointed out that even high education in Danube area does not cover all of the aspects of the work of researchers such as their economic footprint and social responsibility thus making D-STIR a suitable tool to be implemented to bridge this gap of knowledge.

6. Conclusions

The pilot projects were implemented in research groups financed from public sources. Due to this fact, results are more focused on people themselves than on organizations, as there is not significant push for organizations to obtain money.

Quantitative results proved that D-STIR has proven but limited effectiveness in an Eastern-European setting. The tools of D-STIR can be further used although some adjustments to the method are needed.

The examples of reflexive learning and changes in practice tend to be based on first-order reflexivity, which involves more efficiently accomplishing predetermined goals and values, rather than second-order reflexivity, which involves questioning predetermined goals and values.

However, the application of the method in the transition countries is influenced by special features:

1. The context in which the researchers were socialized (former socialist environment) influenced their decisions.

2. Researchers show a limited understanding of broader innovation system.
3. Researchers only recognize direct costs and benefits.
4. All the above mentioned changes required a certain amount of time discussing basic social, ethical and economic issues of science and technology that would be more familiar to scientists in developed countries.

In this activity, we applied the adjusted D-STIR methodology in order to integrate responsible research and innovation dimension to organizations and also individuals.

At individual level, the success achieved was higher than expected.

We conducted 3 empirical pilot actions based on the D-STIR methodology developed by WP4 within the D-STIR project. All of the pilots were held in cutting edge laser research facilities. We found relevant changes in the researchers' thinking and behavior. Reflexive learning was identified as well as value deliberation, furthermore the awareness regarding their decisions increased and the ad hoc characteristics of their work decreased.
We identified the specifications of the post-socialist innovation system, which influence the possibilities of the implementation of responsible innovation: support-driven innovations, obsolete research and development infrastructure, daily survival problems of innovators, the importance of informal connections.

In summary, it is clear that D-STIR is able to support reflexive learning and practical changes in the characteristics of the Danube innovation ecosystem.
However, there are some limitations of the methodology and numerous questions were raised which can be basis for further tests and research. Results of the D-STIR projects highly depend on the skills of the embedded humanist. It is clear that if he or she is an economist, the economic issues will be emphasized during the on-site research, while if the humanist is an ethical expert, the ethical concerns of the research would be in the focused.

We found out that Pre- and post-evaluation questionnaires showed overall slight improvement in understanding of RRI, but the formulation of questions was not clear and should be improved in order to achieve better quantitative results. There is a lot of space for improvement in the field of project management, time management and overall coaching of employees of the research infrastructures. Method is very time consuming and should be more flexible in order to increase cost (time)/benefit ratio.

Next steps

This report and the individual learnings from each pilot form the basis of the next activities in D-STIR, summarised in the following image:
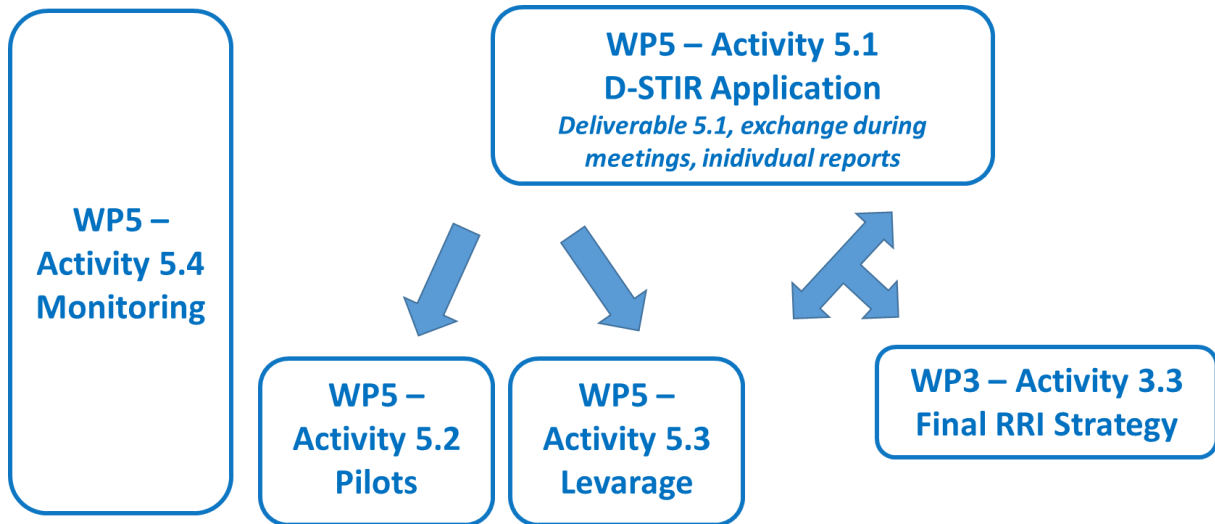
7. Annexes

ANNEX 1

MAIN QUESTIONS OF THE INTERVIEW

1. What does innovation mean in your interpretation?

2. What does research and development (R&D) mean in your interpretation?

3. How many decisions do you make a day during your work?

None	1 – 2 – 3 – 4 – 5 – 6	Many
Because (If you suddenly cannot think of anything, feel free to leave it empty)		

4. Is it important to a natural scientist to be able to summarize his/her research topic in one easily understandable sentence?

Not important at all	1 – 2 – 3 – 4 – 5 – 6	Very important
Because (If you suddenly cannot think of anything, feel free to leave it empty)		

5. Could you summarize your own research topic in one easily understandable sentence?

I could not do it	1 – 2 – 3 – 4 – 5 – 6	I could do it without any problem
My research topic in an easily understandable sentence is the following: (If you suddenly cannot think of anything, feel free to leave it empty)		

6. Is it important to involve some social science aspects (sociology, psychology, philosophy, ethics, etc.) in the thinking of natural sciences?

Not important at all	1 – 2 – 3 – 4 – 5 – 6	Very important
Because		
(If you suddenly cannot think of anything, feel free to leave it empty)		

7. Does it make sense to involve social scientists into natural science researches?

It makes no sense	1 – 2 – 3 – 4 – 5 – 6	Very important
Because:		
(If you suddenly cannot think of anything, feel free to leave it empty)		

8. Is it important to involve environmental aspects into natural science researches?

Irrelevant	1 – 2 – 3 – 4 – 5 – 6	Very important
Because:		
(If you suddenly cannot think of anything, feel free to leave it empty)		

9. Is it important to involve social aspects into natural science researches?

Irrelevant	1 – 2 – 3 – 4 – 5 – 6	Very important
Because:		
(If you suddenly cannot think of anything, feel free to leave it empty)		

10. Is it important to involve economic aspects into natural science researches?

Irrelevant	1 – 2 – 3 – 4 – 5 – 6	Very important
Because:		
(If you suddenly cannot think of anything, feel free to leave it empty)		

11. Is it important to involve ethical aspects into natural science researches?

Irrelevant	1 – 2 – 3 – 4 – 5 – 6	Very important
Because:		
(If you suddenly cannot think of anything, feel free to leave it empty)		

12. Can social, economic, ethical, and environmental aspects influence the R&D&I process in natural sciences?

Not at all	1 – 2 – 3 – 4 – 5 – 6	Completely
Because: (If you suddenly cannot think of anything, feel free to leave it empty)		

13. Would it be useful to integrate social, economic, and ethical aspects into the R&D&I process of your company?

Not at all	1 – 2 – 3 – 4 – 5 – 6	Completely
Because: If you suddenly cannot think of anything, feel free to leave it empty ()		

14. Could be cooperation between natural scientists and humanist during the R&D&I activities useful?

Not at all	1 – 2 – 3 – 4 – 5 – 6	Completely
Because: (If you suddenly cannot think of anything, feel free to leave it empty)		

15. In your opinion, what makes the research/innovation responsible?
   (If you suddenly cannot think of anything, feel free to leave it empty)

16. How responsible do you consider yourself?

Not at all	1 – 2 – 3 – 4 – 5 – 6	Completely
Because: (If you suddenly cannot think of anything, feel free to leave it empty)		

17. What do you think about STIR? Was it useful? Was it a barrier? Did you gain benefit from it? or Was it "just a talk"?

Useless	1 – 2 – 3 – 4 – 5 – 6	Useful
Because: (If you suddenly cannot think of anything, feel free to leave it empty)		

18. What did STIR provide to you? Summarize it in two sentences.

ANNEX 2: Reports on D-STIR Pilot Application in Academic Environments

ELI beamlines (ELI-CZ – Czech Republic)

Embedded Humanist (EH)	Duration of pilot	STIRed person[3]	High/low interaction[4]	Position of STIRed person	Occurrence of STIR interaction	Average duration of STIR interaction
Jan Stachura	February-May 2018	Martina Žáková	High	Junior Researcher	1x per week	1 hour
Jan Stachura	February-May 2018	Veronika Olšovcová	Low	Research expert	N/A	N/A

How/Why did you select participants for pilot action (seniority, willingness, additional value…)

We chose the contact from other technology transfer projects at the department.

Results of the pre and post study questionnaires:

High Interaction

Question of the interview – M. Žáková	Scores during the pre-study interview	Scores during the post-study interview
Q3	3	3
Q4	5	5
Q5	5	5
Q6	3	4

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[3] Stirred person is employee of the piloted organisation, who is directly involved in the pilot itself and interviewed person.

[4] High interaction is person who is being interviewed, low interaction is person who is given all of the documents to fulfil, but without STIR process – it serves as control group.

Q7	1	2
Q8	5	5
Q9	2	3
Q10	5	4
Q11	3	5
Q12	4	5
Q13	3	4
Q14	1	2
Q16	5	5

Low Interaction

Question of the interview – V. Olšovcová	Scores during the pre-study interview	Scores during the post-study interview
Q3	6	6
Q4	5	4
Q5	3	4
Q6	3	5
Q7	2	2
Q8	5	5
Q9	4	3
Q10	3	2
Q11	X	5
Q12	4	4
Q13	5	5
Q14	2	3
Q16	5	5

In high interaction group we can observe increase in average evaluation between pre and post study interview.

Describe overall STIR process:

a) **Number of sessions, what let you to decision to have this number of sessions**

12 sessions

b) **Main topics discussed**

We mainly talked about topics related to research work: ethics in research and potential misusing of research outputs; citing in prestigious journals – evaluation, citing ethics; self-marketing and grant applications; science popularization, science for society – describing the laical public what is the purpose of my research; soft social skills in the team work and team management; gender issues in physics at university (are they?).

c) **Describe changes done by STIR on personal level**

The STIRred person realized the connections between daily research routine and social tasks. At the start of D-STIRring the interviewee could hardly name any possible relation between natural discipline (physics) and social sciences. At the end, at least the relation between soft skills and team management and leadership were found.

d) **Describe changes done by STIR on organization level**

Because of shorter period of time and not enough capacity to involve the top management of ELI Beamlines, there were no organizational changes.

e) **Make summary of results achieved by STIR pilot – be as detailed as possible**

There were opened the topics how the soft "social" skills could help in team management, leadership or business negotiations. There is also strong emphasis on interdisciplinary approach in today research and grant applications. So the researchers could be prepared on defining the inter-sectoral relations of their research and the collaborative research itself. For example, we are now implementing the project focusing on the innovative technology of waste water management for houses/small municipalities. So the researchers should

present their research not only to companies but also to public authorities (mayors, etc.).

f) What did you choose for RRI Actions based on your pilot? (what do you want to improve in STIRed organization?)

Because of scope of our department, we focused on raising awareness in these specific topics: industrial law (patent application and strategy, patent ethics) and other technology transfer tasks (intellectual property evaluation, open source software, licensing…).

g) Estimate which of the results achieved by your pilot are transferable to other organizations

Technology transfer topic and process is very goof bridge between the social science and research and it is also the good topic to present the RRI/D-STIR to top management of research organisations.

STIR in future – do you think you will implement STIR methodology in future?

ELI Beamlines is now implemented HR Award project to enhance its HR policy and career order – it would be perfect to find the relation between these 2 projects.

Do you think that STIR methodology has value for research organizations within the Danube region?

I see the added value in 2 main aspects : i) self-marketing/self-evaluation of researchers is the key aspect in business negotiations with private sector and grant applications also and ii) communication with laical public is the another pillar of public research institutes because of their mission.

How would you promote STIR to academic research organizations?

Highlighting 2 aspects described above: i) self-marketing/self-evaluation and ii) communication with laical public

ELI – NP (Romania)

EH	Duration of pilot	High/low interaction	Position of STIRed person	Occurrence of STIR interaction	Average duration of STIR interaction
Mara Tanase	January-May 2018	High	Laser physicist	3x per week	25 minutes
Mara Tanase	January-May 2018	High	Scientific researcher	3x per week	25 minutes
Mara Tanase	January-May 2018	High	Chemist	3x per week	25 minutes
Mara Tanase	January-May 2018	High	Research Assistant	3x per week	25 minutes
Mara Tanase	January-May 2018	Low	Engineer		
Mara Tanase	January-May 2018	Low	Post-doctoral Research Assistant		
Mara Tanase	January-May 2018	Low	Junior Researcher		
Mara Tanase	January-May 2018	Low	Research scientist		

Results of the pre and post study questionnaires:

Low Interaction

Question of the interview	Scores during the pre-study interview	Scores during the post-study interview
Q3	5	4.75
Q4	4.75	4.25

Q5	**3.75**	**5**
Q6	**4.75**	**4.75**
Q7	**2.75**	**4**
Q8	**4.25**	**5**
Q9	**5.75**	**4.5**
Q10	**5.5**	**4.25**
Q11	**5**	**5.75**
Q12	**5.25**	**5**
Q13	**5**	**5**
Q14	**4.25**	**5.25**
Q16	**5.25**	**4.5**

High interaction:

Question of the interview	Scores during the pre-study interview	Scores during the post-study interview
Q3	**3.5**	**4.5**
Q4	**5.5**	**5**
Q5	**5.5**	**4**
Q6	**4.75**	**5.25**
Q7	**3.5**	**5**
Q8	**5.25**	**5.75**
Q9	**5**	**5.25**
Q10	**5.25**	**5.5**
Q11	**5**	**5.75**
Q12	**6**	**5.5**
Q13	**4.25**	**6**

Q14	**3.75**	**4.25**
Q16	**4.25**	**5.5**

In high interaction group we can observe increase in average evaluation between pre and post study interview.

How/Why did you select participants for pilot action

We sent an invitation to the department asking for 4 volunteers for this project and the people who responded entered the study.

Describe overall STIR process:

a) Number of sessions, what let you to decision to have this number of sessions

3 sessions per week, this was the suggested number during the training in Szeged

b) Main topics discussed

Describe what did you talk about + put it into categories such as: economics, sociology, psychology, philosophy, ethics, marketing, project management, time management, strategy, etc.

We discussed about the needs of the department and possible solutions.

The first topic we focused on was time management, this was because the STIRed person had a very busy schedule and this was a pressure point for the participant. So the participant talked about the time consuming tasks and the difficulty the participant had with the employees evaluation process.

During the sessions it became clear that there was an issue with structuring the workflow (establishing clear tasks for the team) and time pressure. So, in the STIR process the idea of using a productivity app appeared. This was considered by the participant like a very good idea because it was a way to shorten the time of the group meetings, give more structure to the entire process and also be used as an evaluation process. So, this e-log was implemented for the team.

From this topic in the next sessions naturally followed a discussion about communication

inside the department and also outside it. We talked about individualism and if this can be considered an issue in the research field. At first the participant said no, but later told me that after some reflection thought that it could be an issue even at a personal level.

We also talked about the possible negative effects their research can have on the world and how it can be used to harm others.

The environmental concern was the first mentioned by the participants because of the nature of their work with radiation.

The interesting part was that discussing about what can be done intentionally to harm society the participants became more aware that also poor management of some systems can also produce negative effects. For example one of the participants was working on a mirror design for the laser and soon after we talked about the negative effects of the research and the direct consequences especially for the scientist that will use the design, the participant changed the design, found a better and innovative solution for that specific design

We also talked about ethics and what are its implications for their research. The participants recognized as important to be completely honest with the results obtained. So that under any circumstances to not modify or manipulate the results to obtain a different result. Another concern was citation, more exactly to be sure there is no omission.

Also the ethical aspect was discussed in the context of possible negative effects of research. The main idea was that when studying fundamental science the outcome can be unknown so the risks must be considered and minimized as much as possible.

c) Describe changes done by STIR on personal level

In general, there was an increased level of awareness over the decision process and over one's   role.
One of the participants said: "On a personal level these talks helped me set the direction I want for my research".

Another participant started to read articles about motivation and team management.

d) Describe changes done by STIR on organization level

e-log for workflow management

brochure for dissemination

e) Make summary of results achieved by STIR pilot – be as detailed as possible

After the study the participants became more aware of the implications their research can have on society. Their perspective is broadened, for example one participant after the study when asked "What makes research/innovation responsible?" answered: "Taking into consideration all these aspects involving society, economic aspects, protecting the environment and animals (ethics) in research. Limit as much as possible the negative effects or any damage that can be caused by the research work (overflow of radioactive waste into the environment; working with animals in responsible manner) and reduce costs as much as possible."

The study also enabled deliberate modulations regarding time management and science popularization. Regarding time management during the discussions the idea of introducing a new tool (e-log) occurred and this was also implemented within the team. Also, during the STIR process after talking about outreach and its importance a new brochure for general public about ELI-NP research was created.

In conclusion, all participants had a new perspective about their work after they had to talk about it during our meetings. Some said that the simple fact of explaining what they do to a person that is not from the field helped them think a bit different about their work.

f) Estimate which of the results achieved by your pilot are transferable to other organizations

The implementation of productivity apps can be an idea useful for other organizations as well

Advertising materials can also be used In other organizations.

STIR in future – do you think you will implement STIR methodology in future?

Currently no.

Do you think that STIR methodology has value for research organizations within the Danube region?

I think the STIR process is a great tool to increase awareness about issues among an organization. Also it can have impact either on a professional level or personal. Having to explain to a stranger what you do everyday highlights the real issues and can give a totally different approach for some decisions. In the Danube region, especially in Romania, I believe it will be a bit more difficult to implement because this kind of method might be seen as an interrogation and receive some resistance.

How would you promote STIR to academic research organizations?

I will organize a round table/ open forum event for the potential candidates with the theme Science and society. I believe this could be a good way to attract future organizations for the STIR process.

ELI Alps (Hungary)

EH	Duration of pilot	STIRed person	High/low interaction	Position of STIRed person	Occurrence of STIR interaction	Average duration of STIR interaction
Miklós Lukovics	January-June 2018	Pápa Zsuzsanna	High	Early-stage researcher	1x per week	45 minutes
Petra Szűcs	January-April 2018	Szabolcs Tóth	High	Early-stage researcher	1x per week	1 hour

Results of the pre and post study questionnaires:

Pápa Zsuzsanna

Question of the interview	Scores during the pre-study interview	Scores during the post-study interview
Q3	3	6
Q4	6	6

Q5	5	6
Q6	4	6
Q7	2	3
Q8	6	6
Q9	5	6
Q10	4	6
Q11	4	5
Q12	4	5
Q13	3	6
Q14	4	4
Q16	4	6

The scores in the post study interview are significantly higher in the most of the cases.

Szabolcs Tóth

Question of the interview	Scores during the pre-study interview	Scores during the post-study interview
Q3	3	4
Q4	6	6
Q5	2	4
Q6	3	5
Q7	2	4
Q8	6	5
Q9	6	4
Q10	5	5
Q11	6	5
Q12	4	5

Q13	4	4
Q14	5	5
Q16	4	5

The scores in the post study interview are significantly higher in the most of the cases.

Answers for the questions – Mikós Lukovics

Describe overall STIR process:

a) Number of sessions, what let you to decision to have this number of sessions

We had 1 session each week, as we couldn't arrange more. Altogether, we had the net 12 week long interaction.

b) Main topics discussed

We talked about the following topics:

- number of decisions she makes and the importance of their consequences,

- the social science aspects that can be connected to her research,

- environmental aspects of scientific research,

- self-driving cars,

- how society can be involved to her work,

- economic aspects beyond financing,

- ethical aspects of research.

c) Describe changes done by STIR on personal level

In general, it can be stated that the way of thinking of the high-interaction researcher – involved in STIR interaction – has changed, mostly in the following areas:

- she realized the volume of daily made decisions and that they can have important consequences

- she realized that the social science aspects can have an impact on natural science thinking on many ways, and that the researcher can benefit from their integration

- she realized that social aspects can not only occur in the form of information in the life of a researcher, but also as gathering feedbacks from the society to make the innovation result more competitive (since it fits to the expectation of the society)

d) Describe changes done by STIR on organization level

At the current phase of the project it is not interpretable. The 12 week long interaction is interpretable on individual level, its impacts occur there, too.

Its spread on organization level will happen in the next phase of the project.

e) Make summary of results achieved by STIR pilot – be as detailed as possible

Taking into account, that the 12 week long interaction can only be interpretable on individual level and not on organization level, therefore the individual result is the same as the summary result, which is:

In general, it can be stated that the way of thinking of the high-interaction researcher – involved in STIR interaction – has changed, mostly in the following areas:

- she realized the volume of daily made decisions and that they can have important consequences

- she realized that the social science aspects can have an impact on natural science thinking on many ways, and that the researcher can benefit from their integration

she realized that social aspects can not only occur in the form of information in the life of a researcher, but also as gathering feedbacks from the society to make the innovation result more competitive (since it fits to the expectation of the society)

f) What did you choose for RRI Actions based on your pilot? (what do you want to improve in STIRed organization?)

We would like to produce a 5 pages long info sheet for internal use. It would contain the basics of RRI on an easily understandable way with infographics to be appealing and enjoyable for everyone.

We would also like to make two facultative workshops inside of ELI about the integration of

social and natural science:

- science marketing: what is their authenticity, uniqueness, how they can "sell" themselves and their scientific results, work on the elevator speech, how to write applications for grants, etc.

- science management: increase of efficiency, time management, efficacy of team work, etc.

We would like to organize events inside the company, where the natural and social science can meet. At these events the back office could be informed about the scientific results of the organization on an easily understandable way.

g) Estimate which of the results achieved by your pilot are transferable to other organizations

All of them.

STIR in future – do you think you will implement STIR methodology in future?

Clearly yes.

Do you think that STIR methodology has value for research organizations within the Danube region?

Clearly yes, if they did it right.

How would you promote STIR to academic research organizations?

In our estimation, in the academic sector the motivation system that was developed together is applicable effectively:

The conception of Responsible Research and Innovation (RRI) has a high priority in the innovation policy of the EU. Additionally, the possibilities of its practical application raise increasingly important questions worldwide. RRI is introduced in practice in a way that the EU Innovation Framework Program, i.e., H2020, focuses more on financing RRI-containing projects.

It is expected that RRI will be further appreciated in financing innovation projects and – according to experts – it may even become a horizontal aspect.

Let your research group be the leader in applying RRI, learn about RRI and the opportunities of its practical application, in which we are happy to help – free of charge only during the project duration! Act now and cooperate with us! As a responsible innovator, you can gain competitive advantage. Integrating this advantage into your innovative projects, the committee will recognize your application. According to our experiences and track record, these projects are more likely to be supported.

The well-documented Social-Technical Integration Research (STIR) method can help in this issue, as it basically integrates social concerns into the scientific research and the decision-making processes. STIR is a tool that will widen the intellectual perspective of researchers with environmental, economic, psychological, ethical, and other sociological aspects. This sort of complex thinking, which you may consider as **Innovation Process Management,** increases the probability of arriving at responsible R&D&I decisions.

- Do you have troubles with fully understanding whole R&I chain of your research?

- Do you have troubles with identifying the impact of your research?

- Would you like to receive funds from EU R&I based schemes?

If you answer to any of these questions yes, then you should be aware of the concept of Responsible Research and Innovation (RRI). RRI is on the rise as a priority of innovation policy in EU thus making in important during development of successful project proposal.

Scientists often do not fully understand the full potential of their research – is it marketable? Is there a societal need for improvement? The well-documented Social-Technical Integration Research (STIR) method can help in this issue, as it basically integrates economic, environmental, and social aspects into the scientific research and the decision-making processes. This sort of complex thinking increases the probability of arriving at responsible R&D&I decisions. Understanding of economic, environmental, and societal aspects of research improves significantly impact part of your research proposals, where you can show that you understand the broader environment of your research from multiple perspectives.

Let your research group be the leader in applying RRI, learn about RRI and the opportunities of its practical application, in which we are happy to help as a responsible innovator, you can gain a competitive advantage by integrating it into your R&I projects. According to our experiences, these projects are more likely to be funded.

Answers for the questions – Petra Szucs

How/Why did you select participants for pilot action (seniority, willingness, additional value…)

The test bed organization was the project partner itself. We contacted the head of the research department in ELI-ALPS and explained him the work that we would like to do with the researchers. On the basis of our explanation he nominated 2 researchers who fit to the application of D-STIR method.

Describe overall STIR process:

a) Number of sessions, what let you to decision to have this number of sessions

We had meetings once a week. As there were some weeks when we couldn't meet because of being abroad or ill, the interaction was a little bit longer than 12 weeks. We couldn't arrange more meetings, as we are both students, and I only spend every half week in Szeged, where the company is.

b) Main topics discussed

We talked about numerous aspects of social sciences and their connection to natural sciences. We talked about the number of decisions he makes a day. We talked through the psychological aspects that can occur during his work when guiding guest researchers in ELI and how it can affect the future of the whole company. We talked about the environmental effects of research and how harmful they can be and how to avoid such situations. We talked about the ethical aspects of writing scientific articles. We talked about the economic aspects, such as marketing and financing: what is the most cost-effective way of his daily work, how he can promote himself when writing an application for grant. We also talked about the missing elements of education in connection with the above-mentioned topics.

c) Describe changes done by STIR on personal level

I would definitely state that the way of thinking of the researcher has been broadened thanks to our interaction. He got more conscious about his work and takes into account several factors that were neglected earlier. At the beginning he didn't really have a clear opinion about the social aspects of his work. Although, probably it can be accounted for the

lack of proper education in Hungary, as according to his narrative, natural scientists don't have many subjects about social issues or the method of teaching such subject is not motivating them for going more into details regarding these aspects.

Moreover, he changed his behavior as a result of our interaction on psychological issues. First, he didn't realize that there are psychological aspects of his work, too. But during our interaction he got familiar with it and afterwards, he acts accordingly with the guest researchers who come to ELI to test their work with the lasers. It is important to pay highlighted attention to these researchers, since it has an effect on the future of our company.

Regarding the economic aspects, he also made a change in his behavior. Firstly, he just stated that economic aspects are relevant in order to produce a return with the research. During the interaction, he realized that besides financing, marketing is also a significant economic aspect of his work. At the end, he changed his actions and now he chooses the most cost-effective solutions when he has to make a decision.

d) Describe changes done by STIR on organization level

At the current phase of the project it is not interpretable. The 12 week long interaction is interpretable on individual level, its impacts occur there, too.

Its spread on organization level will happen in the next phase of the project.

e) Make summary of results achieved by STIR pilot – be as detailed as possible

Taking into account, that the 12 week long interaction can only be interpretable on individual level and not on organization level, therefore the individual result is the same as the summary result, which you can find at Question "c" above.

f) What did you choose for RRI Actions based on your pilot? (what do you want to improve in STIRed organization?)

We would like to produce a 5 pages long info sheet for internal use. It would contain the basics of RRI on an easily understandable way with infographics to be appealing and enjoyable for everyone.

We would also like to make two facultative workshops inside of ELI about the integration of

social and natural science:

- science marketing: what is their authenticity, uniqueness, how they can "sell" themselves and their scientific results, work on the elevator speech, how to write applications for grants, etc.

- science management: increase of efficiency, time management, efficacy of team work, etc.

We would like to organize events inside the company, where the natural and social science can meet. At these events the back office could be informed about the scientific results of the organization on an easily understandable way.

g) Estimate which of the results achieved by your pilot are transferable to other organizations

Probably all of them.

STIR in future – do you think you will implement STIR methodology in future?

Probably yes.

Do you think that STIR methodology has value for research organizations within the Danube region?

Yes, I believe.

How would you promote STIR to academic research organizations?

In our estimation, in the academic sector the motivation system that was developed together is applicable effectively:

The conception of Responsible Research and Innovation (RRI) has a high priority in the innovation policy of the EU. Additionally, the possibilities of its practical application raise increasingly important questions worldwide. RRI is introduced in practice in a way that the EU Innovation Framework Program, i.e., H2020, focuses more on financing RRI-containing projects.

It is expected that RRI will be further appreciated in financing innovation projects and – according to experts – it may even become a horizontal aspect.

Let your research group be the leader in applying RRI, learn about RRI and the

opportunities of its practical application, in which we are happy to help – free of charge only during the project duration! Act now and cooperate with us! As a responsible innovator, you can gain competitive advantage. Integrating this advantage into your innovative projects, the committee will recognize your application. According to our experiences and track record, these projects are more likely to be supported.

The well-documented Social-Technical Integration Research (STIR) method can help in this issue, as it basically integrates social concerns into the scientific research and the decision-making processes. STIR is a tool that will widen the intellectual perspective of researchers with environmental, economic, psychological, ethical, and other sociological aspects. This sort of complex thinking, which you may consider as **Innovation Process Management,** increases the probability of arriving at responsible R&D&I decisions.

- Do you have troubles with fully understanding whole R&I chain of your research?

- Do you have troubles with identifying the impact of your research?

- Would you like to receive funds from EU R&I based schemes?

If you answer to any of these questions yes, then you should be aware of the concept of Responsible Research and Innovation (RRI). RRI is on the rise as a priority of innovation policy in EU thus making in important during development of successful project proposal.

Scientists often do not fully understand the full potential of their research – is it marketable? Is there a societal need for improvement? The well-documented Social-Technical Integration Research (STIR) method can help in this issue, as it basically integrates economic, environmental, and social aspects into the scientific research and the decision-making processes. This sort of complex thinking increases the probability of arriving at responsible R&D&I decisions. Understanding of economic, environmental, and societal aspects of research improves significantly impact part of your research proposals, where you can show that you understand the broader environment of your research from multiple perspectives.

Let your research group be the leader in applying RRI, learn about RRI and the opportunities of its practical application, in which we are happy to help as a responsible innovator, you can gain a competitive advantage by integrating it into your R&I projects. According to our experiences, these projects are more likely to be funded.