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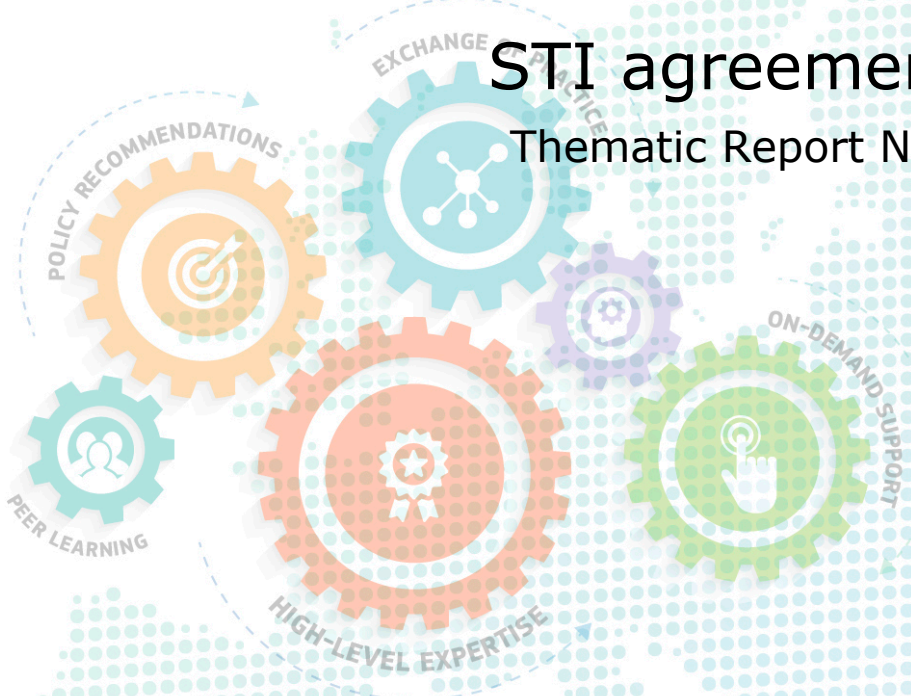
Mutual Learning Exercise (MLE) on National Strategies and Roadmaps for International Cooperation in R&I

Tools for International Cooperation: STI agreements

Thematic Report No 2



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MLE on National Strategies and Roadmaps for International Cooperation in R&I: Thematic Report No.2: Tools for International Cooperation: STI agreements

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Mutual Learning Exercise (MLE) on National Strategies and Roadmaps for International Cooperation in R&I

Tools for International Cooperation: STI agreements

Thematic Report No 2

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1 INTRODUCTION

1.1 The background of the Thematic Report

This *Thematic Report No 2* on **Tools for Internationalisation: STI agreements** discusses the experiences with Science, Technology and Innovation (STI) agreements used by European Member States (MS) and Associated Countries (AC). This is the second topic of the Mutual Learning Exercise (MLE) on National Strategies and Roadmaps for International Cooperation in Research and Innovation, supported by the Policy Support Facility of the Directorate-General for Research and Innovation.[1]

The aim of the MLE is to foster a policy exchange on the various national approaches towards international cooperation in research and innovation. Thus, the activities of the group of MLE participants are focused on learning from each other and taking these lessons 'back home' to implement good practices and good ideas within the national context. Thus, the findings are also a reflection of the second Country Visit (Bucharest, 16 and 17 September 2019) in this MLE, which included workshop debates, presentations from the hosts and other participants and a visit to the Extreme Light Infrastructure – Nuclear Physics (ELI-NP) at the Măgurele Science Park.

This Thematic Report takes stock of the know-how on Science, Technology and Innovation (STI) agreements, to develop a better understanding of their critical success factors and provide perspectives on possible lessons for now and in the future and to summarise and synthesise the work and exchange of experiences during the MLE.

The Thematic Report complements two more Reports that are being produced in the context of this MLE. The first was published in July 2019 on the topic of internationalisation strategy design and development in preparation of the first MLE workshop. For the third topic, a Thematic Report will be prepared on framework conditions for challenge-driven international cooperation.

1.2 The focus on STI agreements

This Thematic Report and the Challenge Paper[2] written to prepare for the second Country Visit are not intended to provide a comprehensive overview of the STI agreement landscape as it exists in the EU today. On the topic of STI agreements a comprehensive evidence basis has already been developed by the Strategic Forum for International Cooperation (SFIC), in particular the Toolbox Working Group that produced its report in December 2018. This report focused on six types of policy instruments for international cooperation, one of which is STI agreements. The report elaborated the purposes and objectives for cooperation instruments including meeting global challenges; achieving scientific excellence; leverage funding; exploring competencies and complementarities; attracting talents and STI investments; access new markets; capacity building; regulating IPR; science diplomacy and international cooperation as a goal in itself. Simultaneously with this MLE, SFIC is conducting a benchmarking exercise on strategies and roadmaps for international cooperation in R&I. The MLE papers and discussions complement the work of this Benchmarking Working Group.

[1] See for more information: https://rio.jrc.ec.europa.eu/en/policy-support-facility/mutual-learning

[2] Ibid.

The added-value of the MLE is to delve deeper into the success factors of STI agreements and engage in concrete operational policy learning by the participants. The discussions amongst the participants in the MLE kick-off meeting (Brussels, 20 March 2019) came to a number of conclusions regarding the scope of Topic 2 of the learning exercise:

- Overlap with recent and current activities in SFIC regarding tools and instruments should be avoided and coordination to exploit synergies ensured.

- A choice was made for 'deepening' rather than covering a broad array of tools.

- The type of tool that all MLE participants can learn from is STI agreements. In order to make the exercise relevant for all Ministries and Agencies taking part in the MLE, the definition of what type of STI agreement we took in consideration was not narrowly defined.

- To add value to existing stock of knowledge and ongoing work by SFIC a 'good practice case' from each country and a case where participants have doubts about effectiveness and efficiency, were selected for analysis and reflection. Two templates were developed, one to describe successful STI agreements, and one quite similar template to describe non-successful STI agreements. They covered general characteristics, implementation, evaluation and impacts, key success and non-success factors and views on the future.

Each participating country was asked to describe the two examples according to the templates provided. The definition of an STI agreement (e.g. legal status, type of signatories) was kept very open to ensure that each country and type of MLE participant can draw on relevant national examples. This means that the cases that MLE countries have provided include intergovernmental bilateral and in one case multilateral agreements as well as Memoranda of Understanding (MoUs) between different types of legal entities (e.g. Agencies and Ministries). The remainder of this report will refer to STI agreements as the general term that encompasses different kinds of agreements or contracts between two or more international partners with the intent of facilitating cooperation in research.

The definition of 'success' or what an 'effective' Agreement as well as a 'non-effective' STI agreement is, was also left open to ensure that MLE participants can find examples that fit to these categories according to their national standards. This report is for a large part based on the templates that have been filled in by the MLE participants complemented with a short review of the literature on Internationalisation and STI agreements in particular. It was agreed that the templates with the examples remain confidential. MLE participants could opt to describe a particular case without identifying which specific STI agreement it related to.

We received templates from 14 MLE countries and some countries provided more than one case. Of the sample of 16 success cases 13 have identified the specific STI agreement so the geography of those cases is known. Three cases have either synthesised the findings of a number of successful cases or have not revealed the specific partner country. Of the sample of 14 non-successful cases (from 11 MLE countries) 9 cases included information on the partner country so the geography was known. Three MLE countries made a synthesis of several agreements that are not functioning well without disclosing the partner countries. Two MLE countries described a specific agreement not naming the specific partner. One MLE country with a limited number of STI agreements reported that they are all successful so they could not provide a non-successful case.

The following Chapter 2 gives a short summary of the recent literature on STI agreements as a tool in internationalisation and in particular their success factors. Chapter 3 elaborates the analysis made on the basis of the success and non-success cases provided by the MLE participants complemented with the discussions held in the two-day workshop during the second Country Visit. Chapter 4 has summarised the discussions on the future of STI agreements that were held in the Country Visit in Romania. Finally, Chapter 5 provides a reflection on what the participants of the Country Visit have learned from this part of the MLE.

2 STI AGREEMENTS IN THE INTERNATIONAL COOPERATION TOOLBOX

2.1 The use of STI agreements in EU countries

The STI agreements represent a frequently used policy tool in the wider STI cooperation toolbox in all European countries. As the SFIC Working Group Report (2018) on Tools for STI cooperation noted, they frequently constitute important mechanisms for promoting and facilitating international cooperation, often by forming legal bases and platforms for further cooperation.[3]

The literature on STI agreements is mostly focused on providing an overview on the types of STI agreements and their use in international cooperation by European Member and Associated States. A EUROHORCS study of 2009 found that a great majority of its members (European research funding agencies and organisations) have cooperation agreements with countries outside Europe, and ten of their members had more than ten agreements.[4] The German Research Foundation (DFG) topped the list with 60 agreements, followed by the French CNRS with 50 agreements at that time. In 2009, the top partner countries were (in order of frequency) China, USA, Japan, India and Russia.

In the same year a report on Drivers for International Collaboration in Research (2009) found that for activities beyond Europe, bilateral agreements are the most common types of interventions by far, although not necessarily the type of instrument that attracts the most research funding.[5] Often the agreement functions as an umbrella, which hosts a multitude of collaboration modes: grant and fellowship programmes, exchange programmes, joint research programmes, etc. Information on the amount and type of bilateral agreements is far from transparent let alone the funding which is attached to them. The report also noted that very few of them are terminated. At that time, few countries had developed a good impact assessment and measurement system to evaluate whether international collaboration policies have desired effects. Furthermore, there were large gaps in the data provision that could support these assessments.

Vullings et al (2012) have described the use of STI agreements by a selection of EU countries that are the most active in international cooperation.[6] The study elaborated on their rationales and the geographical orientation. Here again the most frequent EU partner countries identified were USA, Brazil, India and China. The purpose of the report was to propose a EU wide monitoring system for international cooperation. The report concluded that there are significant data gaps regarding internationalisation activities and poor financial data and made suggestions and recommendations on how this could be improved in the future.

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[3] SFIC Working Group, (2018), Overview of Tools for International Research Cooperation in Science and Technology Matters, Brussels

[4] EUROHORCS, (2009), Creating the ERA "bottom-up". Cross-border Research Cooperation in Europe – Contributions from National Research Organisations

[5] Boekholt, P., Edler, J., Cunningham, P. and Flanagan, K. (2009), Drivers for International Collaboration in Research, Report for the European Commission, DG Research, Brussels.

[6] Vullings, W., Boekholt, P., van Til, J., Steinz, H., Cunningham, P. and Flanagan K. (2012), Overview of international science, technology and innovation cooperation between Member States and countries outside the EU and the development of a future monitoring system, ERAWATCH Report on behalf of DG Research, Brussels.

A report by Fikkers and Horvat (2014) gives an extensive summary of the use of bilateral STI agreements.[7] The report describes the rationale for signing these agreements, their thematic priorities, implementation and the framework conditions that affect them. The report also looks into the impact of the STI agreements in so far as they have been evaluated. Fikkers and Horvat do not find the overall landscape of STI agreements very promising in terms of their effectiveness. They conclude that: "*In general, agreements signed by EU Member States are of relatively little weight in comparison to agreements signed by the EU. Due to the investment needed for signing new agreements, many are relatively old, and therefore not specific enough. The impacts of the agreements are modest. Their evaluations show that they usually contribute to an increased bilateral participation at project level, but also that in terms of reciprocity impacts are still low; that the mobility of researchers increases only slowly; that awareness of the agreements amongst policy makers and the STI community is still too low, and that the intensity of the policy dialogue decreased shortly after the signing of the agreement*."[8]

The sample of MLE success cases shows that there are quite some well-functioning and strong STI agreements in place (see Chapter 3). The cases also show that their success does not necessarily depend on the weight of the formal agreement itself. Nevertheless, it is good to have a critical reflection on the role and function of STI agreements today and in the future.

Thus, the European oriented literature mostly sketched the European landscape of international STI cooperation policies and positioned the STI agreements in a quite central place in the cooperation toolkit. The focus is mainly on their rationales, how they relate to wider national strategies for internationalisation and their geographical orientations. There has been much less attention in the literature on the interaction of these formal STI agreements with other tools for international cooperation. For instance, how the STI agreements are used to mobilise existing R&I funding, to what extent mobility hurdles are eliminated, whether they are used to support Research Performing Organisations (RPOs) and Higher Education Institutions (HEIs) to invest in partner countries or the question of what makes them work or not work.

In more recent years, international collaboration with third countries has gained momentum and attention for its tools has increased. The Strategic Forum for International Cooperation (SFIC) has delved more deeply into the role of tools for internationalisation and set up a working group in the autumn of 2015 to develop a toolbox for the implementation of international STI cooperation activities. The 2018 SFIC report that resulted from this Working Group distinguishes among different types of STI agreements, according to their contracting parties: a) EU level agreements, b) intergovernmental multilateral agreements, c) bilateral STI agreements at the ministerial (or governmental) level, and d) bilateral (or multilateral) STI agreements at the level of public research funding agencies. They are all not strongly binding in the legal sense, according to the SFIC report. The survey on behalf of the 2018 SFIC report showed that the most frequently cited partner countries of EU Member States (MS) and Associated Countries (AC) are China, India and the USA, followed by Japan, South Africa, Russia, South Korea, Brazil and Israel. Thus, the picture in 2018 is not much different from what was found in the EUROHORCS report in 2009. Indeed, the majority of case studies include one of the above-mentioned partners.

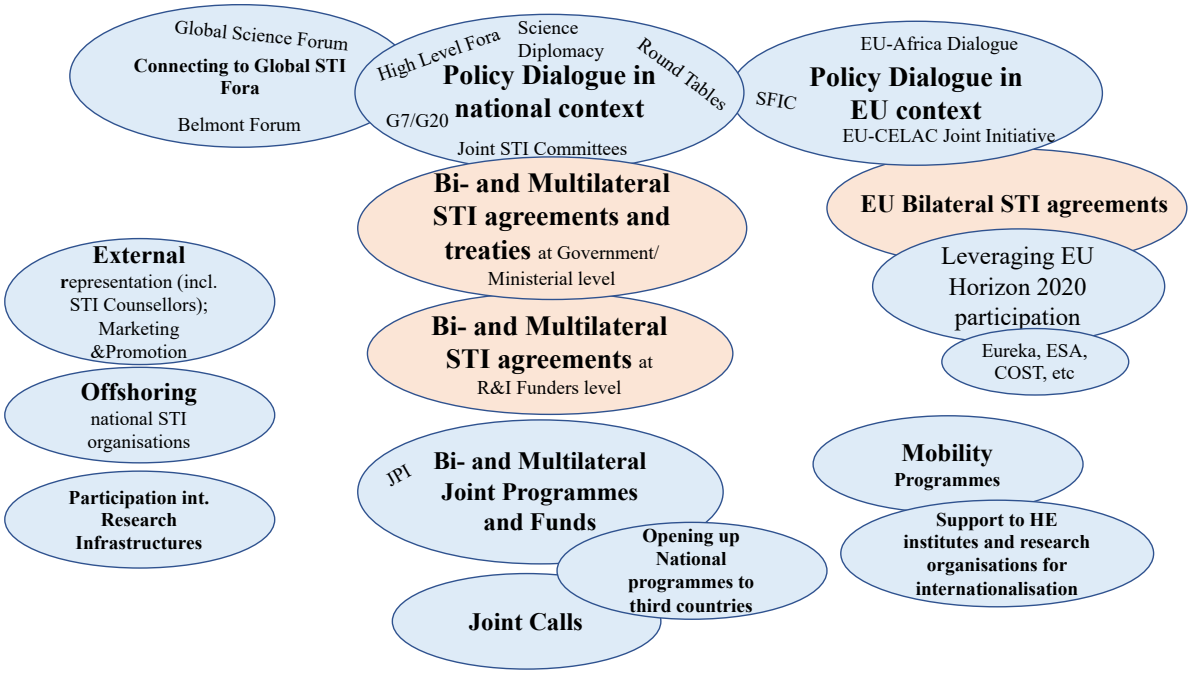
Figure 1 gives an overview of the set of tools that are mentioned in today's reports on international cooperation. STI agreements are placed quite centrally as they are a tangible demonstration of cooperation activities between two or more partner countries. As aforementioned, so far not much has been written on how these instruments interact with each other. This is highly dependent on the governance structure of countries and the

[7] Fikkers, D. and Horvat, M. (2014), Basic Principles for effective International Science, Technology and Innovation Agreements, report for DG Research and Innovation, Brussels

[8] Ibid, page 41.

different responsibilities for internationalisation across STI decision makers and funders. While some countries connect the bilateral agreement with existing funding and policy programmes, others have funding dedicated to a specific STI agreement and again many others have no ex-ante earmarked budget to implement the agreement.

Figure 1 The STI toolkit with a central place for STI agreements



There is no indication from the debates so far that STI agreements are an instrument of the past. On the contrary, there are clear signals that the numbers of them have exploded and the administrative burden to maintain all of them is becoming a problem for many countries, particularly the smaller ones with limited human resources in the implementation bodies. Agreements signed with the ambition to accomplish science diplomacy, could increase the number of signed agreements and increasingly with countries outside the core group of partner countries that have been targeted for many years. A critical review of the role and functioning of STI agreements is therefore timely.

3 WHAT MAKES STI AGREEMENTS SUCCESSFUL?

3.1 The success cases of the MLE countries

The 15 participating MLE countries were asked to provide information on their successful STI agreements in a template that was similar for all cases. We have received 17 cases of successful STI agreements.

The sample of 'successful STI agreements' is quite heterogeneous and each agreement has a **different definition of what success means**. Seven types of anticipated success were put forward by the MLE participants as their criteria for success:

- Successful implementation (fast and straightforward, smooth cooperation, good communication, professional implementation, increasing number of agency/ministry staff involved in cooperation)

- The number and quality of the proposals received and their success rates
- The number of projects initiated or volume of mobility achieved
- The continuation of cooperation between the project partners (e.g. in a Horizon 2020 project, planned joint events in future)
- Positive feedback from scientists, more opportunities for young researchers, market access for companies
- More co-publications, improved science
- The improved quality of the policy relationships with the partner country (strong financial commitment, increased co-operations between the countries and agencies)

Thus, success is connected with a mix of input, throughput, output and a few impact related indicators. Indeed, during the MLE workshop it was put forward that assessing whether an STI agreement is successful or not very much depends on the definition of success. It was also stated that very often the STI agreements and their implementation tools lack clearly stated objective or targets, making it difficult to conclude whether it has been a success or not.

The three features that stand out in being mentioned as **critical success factors** behind the agreements are the following (in order of importance):

1. Mutual interests of the beneficiaries in the thematic areas of co-operation
2. The relationship and alignment between the implementing agencies
3. Political commitment (and budgets) to support the cooperation

The above features – mutual interest of beneficiaries, alignment of implementing agencies and political commitment and budgets - are interrelated and reinforce each other (see below in paragraph 3.4).

By far the most mentioned feature is the **'mutual interest of the beneficiaries in the thematic areas'**, regardless whether they are research organisations or companies. Striking is that when asked whether the agreement is specific (with a specific focus on a theme or sector) or general, in the majority of cases the STI agreement with a partner country is rather general and open to all sciences/topics. In only three cases the Agreement or MoU itself was focused. This can be explained by how most agreements are implemented: the agreement or MoU functions as a general framework or umbrella, these are subsequently elaborated by (thematically oriented) national funding agencies. There is one example where larger public research organisations are involved in the decision-making and take part in the biannual joint meetings with the partner countries. In that country, national thematic meetings are held to discuss the interests of the research community in a particular STI agreement. It would be interesting to explore further how other agencies and ministries identify the interests of the potential beneficiaries and whether this is done prior to signing the agreement or afterwards and whether we can share good practices. An interesting example of using foresight techniques for international cooperation and particularly the development of a joint research programme in the ERA-NET on wood material research WoodWisdom-Net is described in Brummer et al. (2008).

A World Café discussion session was dedicated to the topic of engaging with the beneficiaries during the MLE workshop in Bucharest. A summary of that discussion can be found in Box 1 and illustrates a variety of mechanisms to interact with beneficiaries in both partner countries.

Box 1 World Café discussion on mutual interests between beneficiaries

The key question addressed in this World Café session was how and when the Ministries and Agencies implementing STI agreements interact with the stakeholder communities of potential beneficiaries of the international cooperation.

All the participating funders seem to have routines and practices in place to work with the STI community, but the ways of doing this vary from informal to formal and structured approaches. While maintaining the contacts with national stakeholders is the common practice via direct or coordinated representative participation, the ways of establishing linkages with the STI community in established partner countries vary to a larger extent, relying often heavily on the indirect links through the partner country organisation (typically the ministry or the agency) and their own practices to engage with their stakeholders. The existing relations of national stakeholders (e.g. research institutes) with their counter parts in the partner country are also important.

Some funders organise ad-hoc panels and launch surveys to engage their STI community. Such activities provide insights but may suffer from an incomplete picture of the stakeholder interests, for instance if the survey is answered by those focused on accessing funds and not necessarily those with the competences looked for.

In France, such limitations are addressed with the structured network of representatives within the STI community who provide systemic information about the interests of their constituencies facilitated by the information system. The collected information in the same format helps also making linkages between areas.

The participating funders often rely on science attachés to have some direct contact with the partner country's STI community. Some countries, like Denmark with its innovation centres, have established an international agency structure with elaborate resources to develop connections with the partner country stakeholders. In some strategic partner countries, such activities can be launched even if the cooperation with MoUs and STI agreements are not yet in place. Hence, the centres can inform the scoping and definition of the thematic and geographic priorities and identify partner organisations.

Smaller countries may also find it useful to attract the attention of partner countries and their STI community with flagship projects of thematic scope or by deploying existing research infrastructure that may later help extend the collaboration to other fields as well.

Defining the geographical scope of good partner countries and organisations can benefit from available statistical information related co-publications and patent analysis. However, these historical data, they may not indicate the future directions of scientific and technological developments and need to be complemented by other means such as surveys and panel discussions. Science Europe networks have been considered also useful to further the scope on how to approach the partner country and find the most suitable thematic areas and organisations to work with.

Among different types of international STI cooperation one of the most widely used instruments are mobility schemes. Many participating funders consider this as an easy way to initiate cooperation with a third country as an economic, easy to monitor and low risk activity. It can also work as an indicator of the interest among the STI communities at both sides and provides valuable understanding of the partner organisation and its suitability for extending the cooperation also to other instruments. However, even if mobility schemes are relatively economic ways forward, for some smaller countries it may still require also strategic STI alignment with the scope of joint programmes to avoid the dispersal of limited resources.

Summarised and compiled by independent expert Totti Könnölä

The second set of success factors concern the implementation of the agreements and particularly the **relationship and alignment of the agencies/ministries** on both sides that have the responsibility to manage the joint activities. Regular and open communications are mentioned multiple times, the partner agency having similar missions, processes and project evaluation methods, dedicated staff at both sides and the

professionalism of the partner organisations are all considered as key success criteria. One case mentioned an earlier ERA-NET where the agencies got to know each other, while others mentioned the importance of building on previous networks between agencies. In one case the common language and culture were seen as important. The discussions during the Country Visit confirmed, indeed, that a smooth cooperation with the counterpart in the partner country implementing the STI agreement is important. Box 2 below has a summary of the discussions during one of the World Café sessions in the workshop. It illustrates some forms under which this alignment and cooperation could take place.

Box 2 World Café discussion on alignment and relationships between implementing agencies

The discussion was held at the agency level and included the communication, coordination and alignment between the domestic agency and the agency in the partner country.

In order to keep the communication alive, it was recommended to use different instruments such as mobility support or joint project funding in parallel or to alternate them year by year in order to maintain a continuous level of activity. This, however, requires sufficient financial security and capacity on side of both partners.

To overcome periods of low cooperation activity, the in-situ work of embassies and science counsellors in the partner country was highlighted. Due to their presence, they are in a position to maintain a continuous momentum and level of attention. One MLE country mentioned that it uses also committees other than the joint S&T committees to maintain a certain level of exchange and communication. The economic joint committees were mentioned to forward also R&I matters.

Periods of low activity are well known; they are not an exception. Thus, most participants find it helpful if bilateral activities can be complemented by multilateral activities such as EUREKA. In this respect, participants claimed that the previous multi-lateral INCO-NETs were extremely helpful to maintain a constant level of exchange, because these projects had a broad purpose, thus plenty opportunities to work together for certain objectives and provided also space to exchange bilaterally. The joint work under such multi-lateral schemes, which however do not exist anymore in Horizon 2020, created trust and deepened cooperation beyond the purposes pursued on bilateral level.

It was also mentioned that schemes such as the INCO-NETs allowed cooperation with countries and regions with whom most EU MS would never establish formal bilateral cooperation agreements (Central Asia was exemplarily mentioned in this respect). By joining forces at variable geometry, soft instruments such as INCO-NETs produced economies of scale for the involved partners without being entrapped to establish MoUs or intergovernmental S&T agreements. It was reported that sometimes also the international partner country asks for a multilateral approach towards EU MS instead of performing a plethora of individual bilateral agreements (Korea was mentioned, which was asking again for a reanimation of something like the previous KORANET).

One participant concluded that a truly internationalisation instrument is – at least by now – obviously missing in Horizon Europe, which can in particular become problematic if new potential international partners should be approached.

During the discussion the participants were not clear whether the EU MS would have the capacity to organise themselves bottom-up without an accompanying European scheme which is supporting such an effort.

In terms of flexibility, it was argued that the work of agencies is sometimes (however not always) perceived as less 'politicised' by the international partner country, which can be an advantage if there are political tensions between the countries.

Especially with international partner countries, which are not perceived as 'first in the row', but which also would like to establish bilateral S&T cooperation, the agency level is perceived as sufficient while the ministry to ministry level should rather be reserved for a few particularly important partners. One agency mentioned that they are preparing a joint international call with another agency-like partner without any formal superstructure at the government level.

The issue of tolerating discrepancy versus alignment necessity was perceived as less problematic for bilateral intergovernmental S&T agreements, provided that there is a joint political understanding among both signatories. These (often designed as umbrella) agreements allow flexibility, but at the level of operational activities performed by agencies (e.g. coordination of joint calls) some level of alignment was regarded as indispensable. Lack of alignment can impede

the implementation of more complex instruments such as multilateral calls for proposals. The Black Sea ERA-NET was seen as problematic case in this respect.

Agencies claimed that they reach out to international agency partners which work in a similar way in order to reduce transaction costs. It was also argued by them that international ERA-NETs and INCO-NETs were helpful because they helped to partly reduce the transaction costs for the involved agencies when they had to deal with complex structures on the side of the partner country/ies (such as ASEAN).

In general, a metaphor for good cooperation is when you can pick-up the phone, and you have a dedicated (and known) person on the other side with whom you can openly discuss problems. Only problems which cannot be resolved at the agency level are usually then brought upwards to the ministry level.

Moldova mentioned as a good practice of a well-functioning relationship the cooperation of the Academy of Science of Moldova with partners in Romania. The same language and similar culture are perceived as helpful. Moreover, if an agreement also includes the usage of research infrastructures, a less interrupted working relation is perceived as more feasible.

Summarised and compiled by the MLE Rapporteur Klaus Schuch

In eight of the success cases, the STI agreement was implemented by an R&I funding agency on the European side, in two cases by a ministry and one case by a dedicated international cooperation agency. On the side of the partner countries, the majority were also R&I funding bodies (8) and in three cases a ministry.

This finding corresponds with what the 2018 SFIC report concluded about the design of an STI agreement: *"The parties should also have capacities to deliver on the obligations undertaken in the STI agreements in question".* The fact whether the counterpart has a similar status (e.g. either ministry or agency) is less important than whether they both have the (human) capacity and resources to deliver on an agreement.

Political commitment, regular high-level meetings and, related to that, the availability of budgets are also mentioned more than once in the MLE survey, but nearly not as often as the previous two features. One explanation for the finding that the availability of budgets is not top on the list, as one might expect, could be that in many cases the official agreement is only the 'shell' or the general framework, which needs an annual or multi-annual programme or sets of calls that need to be elaborated by the implementing agencies. There are quite some examples where the budget comes from regular programmes or general budgets from the implementing agencies and/or the ministries involved. Thus, the financial commitments needed to keep the collaboration alive are not always directly dependent on high-level (inter-governmental) political support. The Country Visit workshop debates made it clear that on this particular topic the national context and the constellation of Ministries and Agencies has a large effect on what type of political commitment and financial backing is needed. Comparing countries with each other on this aspect is quite difficult. Box 3 summarised the debates during a World Café session on this particular topic.

Box 3 World Café discussion on Political Commitment and Budgets

The following questions were discussed at the World Café table:

1. If political commitment fails, what can be done to revive it?

The reasons for failure were seen as crucially important for how political commitment could be revived, and also for deciding whether it should be revived. It was claimed that if the reason for failure was a change of government maybe nothing should be done immediately. Some argued

that in certain countries the distribution of power over budgets is such that political commitment is a plus, but not always a necessary condition for action. Therefore, if political commitment fails, in such a context this might not be a big problem. On the other hand, if political commitment fails after pressure for an STI agreement from research communities or funding agencies, increased dialogue is usually the best way forward even if such a process takes time. If a previous political STI agreement was signed for science diplomacy reasons with no support from research communities, the ambition should not be to revive it.

2. *Can we allow ourselves sufficient time to prepare an STI agreement, build relationships with the counterpart and - if necessary – mobilise consent of our funding agencies before being faced with a ´fait accompli´ of a politically signed STI agreement?*

The answer to this question was generally YES, this should ideally be done if there is an ambition to implement the STI agreement. It was, however, also argued, that the STI agreement could be successfully implemented if the support for it was gained afterwards. In a political context where a policy-window is opened for an STI agreement which provides opportunities that could be foreseen to be supported by research funding and/or performing organisations, the agreement can be a push, which is welcomed. This kind of situation does not exist everywhere and is more easily accomplished in countries where there is trust based on previous circulation of knowledge and dialogue. It was claimed that in some countries a `fait accompli` of a politically signed STI agreement might work because the culture is more "top-down". It was also argued that STI agreements signed for science diplomacy reasons should also be allowed and that "science for diplomacy" could sometimes be turned into "diplomacy for science".

3. Should the high-level policy-makers involved in science diplomacy be better informed by the STI (policy) community on what works and what does not work?

The participants in the World Café discussed if different ministries especially the Ministries of Foreign Affairs and the Ministries of Research and Higher Education should have better information flows between each other. It was generally considered that this was needed because of the high risks for "research implementation failure" or "diplomacy implementation failure" that could occur if this was not accomplished. Thus, better information links were considered to be needed in order to avoid harming trust both within the political system itself and between policy-makers at different levels on the one hand and research communities at large on the other.

4. Should governments refrain from signing new STI agreements if no budgets can be allocated to its implementation?

There were different opinions in response to this question. Some argued that science diplomacy could be worthwhile and even important without allocation of budget, as the ambition might not be the implementation of a scientific funding program. Others found this to be harming the respect for the political system, and some thought that budgets could also be allocated later. The discussion was partly overlapping with questions 2 and 3.

5. Should intergovernmental agreements with countries with a very low level of R&D capacity be supported from a development policy perspective rather than a science and technology perspective?

The discussion highlighted that there are many examples of support for R&D capacity building from a development policy perspective. The experiences of this were not reported to be very positive. It was claimed that development policy actors often seem to have problems to stop ongoing projects when these are not needed any longer and even sometimes have become harmful. There was rather general agreement on the need to build R&D capacity in countries where this is low. Some argued that this is important not least in order to solve global challenges such as climate and that highly developed countries with regard to R&D could learn a lot from perspectives that less developed countries with regard to R&D can bring. It was claimed that research cooperation between countries, which are differently positioned on the R&D capacity scale, can bring valuable awareness of the need for research as well as awareness of the importance of exchange of information. However, most participants did think that the science and technology perspective was far more important than the policy development perspective.

Summarised and compiled by the MLE Chair Gunnel Gustafsson

Other features that were described in the survey templates stand out less in the horizontal analysis of cases.

Governance features are difficult to compare as each country has different structures and divisions of labour, particularly between ministries and agencies. The cases show different models. Some are high-level agreements at the intergovernmental level, where representatives of ministries meet with their counterparts regularly to discuss the progress and direction of the STI agreement. In other examples, ministries have delegated the responsibility to agencies and the regular meetings between partners take place at funding agency level. A third model is characterised by agencies taking initiatives with little involvement at the governmental level.

One feature that is described in almost all cases is the functioning of a **Joint Committee** (or a similar management team) that meets regularly (from once every two years to several times a year). In these committees, decisions are often taken on priorities, budgets and assessments made of the progress of the agreement. In one case the Joint Committee was reported to decide on the proposals for projects thus acting as review panel, however in most cases these Joint Committees deal with high-level considerations leaving the daily management to the agencies. While the functioning of these Joint Committees is not mentioned as a critical success factor, the regular and smooth communication that is considered key as aforementioned relies on such well-functioning joint platforms to discuss the STI agreements. Indeed, the non-successful cases reported the absence of such Joint Committee Meeting or a failure to keep the committee active.

Other features mentioned as key success factors are:

- Easy procedures for the beneficiaries
- A common understanding of the added value of the agreement
- Reciprocity
- Having an agency on the ground in the partner country
- Flexibility of the agreement (the contents can be adapted when needed)
- Agreement allowing access to new partners

Indeed, **reciprocity,** although not explicitly mentioned very often, seems to be an essential element in the success cases. In all cases there is an explicit agreement that the partner country also provides a budget for the cooperation activities. In most cases beneficiaries are paid by their own organisations. So this means that the budgets on both sides could differ if one partner country has allocated more funding than the other, particularly when the co-operations focus on mobility. Some mention that this disbalance is not a problem and it is foreseen that partners either have less or more resources. For other cases this is considered to be a problem, particularly in agreements that support joint R&I projects that need ample investments from both sides.

There are a number of features which are less pronounced as influencers of the success of the agreements.

In our small sample of success cases, the agreements have different types of legal status. A majority (9) are bilateral intergovernmental agreements, while there are four success cases based on Memorandums of Understanding (MoUs) and one case of a multilateral intergovernmental agreement. The sample is too small to suggest that bilateral intergovernmental agreements are more successful, as they are also the most frequently used STI tool. And indeed, the non-successful cases are also in majority bilateral intergovernmental agreements (7) followed by bilateral MoUs (5).

Another set of indecisive characteristics is whether the cases are focused on (public) research only, a combination of research and innovation or only on innovation (and companies as beneficiaries). The sample of success cases has a mix of all these types of collaborations. In half of the cases, companies are excluded in the STI cooperation activities, while two of the examples were solely focused on cooperation between companies.

As aforementioned, in a vast majority of the STI agreements in the sample, the official agreement itself is **very general and open to all topics and S&T domains**. In two cases the official agreement mentions specific areas of interest and in three cases the STI agreement is only focused on specific domains. However, during the operational implementation of the general S&T agreements, specific themes are mostly defined in:

- annual cooperation plans,
- by teaming up existing (thematic) national programmes of the implementing agencies,
- the decentralisation of the agreement to (thematic) national agencies or,
- through the definition of specific thematic calls as part of the agreement.

It seems that a well-functioning pattern is one where a high level 'umbrella' agreement that is quite general (often for a period of 3-5 years) is combined with active implementation mechanisms that can adapt the focus of cooperation in a more flexible manner on a yearly or ad hoc basis. The challenge here is: how to get the implementing bodies (most often agencies) motivated to keep the cooperation active. This finding corresponds to what was reported in the first Thematic Report of this MLE, namely that it is common practice that the broader defined themes in the STI agreements are broken down into narrower sub-themes for joint calls within S&T agreements.[9]

There is **no clear pattern of geography** in the success cases. Most of the MLE inputs have specified the partner country of the STI agreement, although in three cases there is no specific partner country information and one is a multi-lateral agreement. China was the partner in three cases and India in two of the success cases. All other success stories had different partners from different parts of the world (Africa, Asia, North and South America, Middle-East and Europe). Of the cases that identified a specific partner country, five have an R&D investment lower than 1% of their GDP, four have an R&D spending of more than 2% of their GDP and two partner countries an R&D spending of more than 3% of their GDP.[10] Thus, success does not so much depend on partnering with world leaders in science and technology according to the sample of cases presented.

Interestingly, two MLE countries had both one successful and one unsuccessful case with the same partner country. The difference between the success and non-success of agreements with the same partner country was related to the lack of implementation mechanisms (no joint committee, not enough personnel resources, restructuring at the partner side) in the first case and a mismatch in the understanding of the objectives of the MoU and a lack of interest from the beneficiaries in the second case. Thus, implementation was the key factor in both those cases, not the relationship with the country as such.

The types of collaboration activities to be funded are already explicitly stated in about half of the success cases. In most instances, this concerns the mobility of researchers (5 cases), funding for networking (2) and/or funding for joint research and innovation projects (4) or a combination of these. There is no clear pattern standing out that defines success. In the cases of agreements that concern mobility only the financial hurdles are less pronounced, as the budgets remain modest for both sides.

[9] Schuch K. (2019), National Strategies and Roadmaps for International Cooperation in R&I, MLE Final Report on Topic 1, Brussels.

[10] Using global R&D data from www.uis.unesco.org with data extracted on 29 August 2019.

There is no explicit mentioning of a positive or negative role of IPR in the STI agreements and in only one case the importance of ethics standards is mentioned.

Even the successful cases have flaws and risks. The most frequently mentioned ones are maintaining the commitment for budgets (on both sides) and, related to that, changes in the priorities and political swings in the partner country. Other issues mentioned are the long time to take decisions (in the case of big agreements), the narrow scope of the agreement (e.g. mobility only) or that without repeated measures the agreement becomes an empty shell. For five success cases no flaws or risks are anticipated.

3.2 The non-successful cases of STI agreements

Similar to the success cases the majority of un-successful cases are bilateral intergovernmental agreements and again almost all have a broad generic S&T coverage which could be elaborated in thematically focused domains in the actual implementation of the agreement. There is little difference with the success cases in this respect.

The stated objectives of the unsuccessful agreements are similarly general (typically *'to establish and promote STI co-operation between the countries'*) as those of the successful examples and in some cases exactly the same. A noted difference is that the successful ones have often elaborated the objectives in more operational terms, whereas these are not reported in the unsuccessful cases. This is likely as there have been little efforts made to elaborate the operational side of the agreements. The beneficiaries of the non-successful ones are again similar to the success cases, albeit with slightly more agreements that focus on the mobility of researchers. This could be explained by the fact that this is the first step towards international cooperation with a new international partner.

What is different from the success cases is the **geography** of the STI agreements. Two partner countries also featured in the success cases (China and Israel), the other partner countries – with the exception of one additional R&D developed country– are mostly countries with medium to low R&D development levels. Of the cases which identified a bilateral partner, six cases were with a partner with an R&D expenditure lower than 1% of their GDP, the other three cases had an R&D spending of respectively more than 1, 2 and 3% of their GDP.[11] In three cases, partner countries have in recent years experienced political and/or economic turmoil.

The main reasons why the STI agreement was not a success can be divided in three categories (in order of importance):

1. **Politics and high-level policy**. The most frequently mentioned reason behind the failure was that the agreement was signed for **diplomatic reasons only**, often done too quickly and with no clear idea what the collaboration was meant to do. In two cases, with too many national policy stakeholders involved, the agreement became a broad wish list with subsequently no owner to ensure the follow-up. In one case, it is stated that there was no intention to follow it up. So, these are the so called 'empty shell' type agreements. In a few other cases, the intention to implement cooperation was there; however, a shift in the political priorities on the partner side, an unstable political environment or the lack of budgets for cooperation prevented the agreement from becoming operational.

2. **Implementation.** In about four of the cases, management teams or joint committees were foreseen and agreed upon, implementation mechanisms defined, but they simply were not made active. The reasons were lack of human resources on the partner side, changing political situations, a failure to meet budget requirements in final negotiations, and a lack of interest from the R&I community.

[11] Using global R&D data from www.uis.unesco.org with data extracted on 29 August 2019.

The large majority of the cases do not have a joint management team or committee, and no budgets are foreseen to implement the agreement. In these cases, the STI agreement never got beyond the signing of the papers. There is the open question of whether a better implementation process would have been able to mobilise more interest from the R&I community.

3. **Lack of demand for cooperation.** In a majority of cases the agreement had no visibility in the research and innovation community and there was little interest in the thematic areas. One case mentioned that stakeholders from the R&I community were not involved in the process and, more than once, it was stated that the research capacities in the partner countries were low. Two of the cases went through the process of launching calls but came to the conclusion that there was no sufficient support from the R&I community. In one case the implementation was set up, joint calls were even launched but not enough eligible proposals were received. This particular agreement was subsequently terminated because of lack of interest from the R&I community. Some of the responses stated that the R&I capacities of the partner countries were simply too low to make the cooperation viable. There was no chance of developing any reciprocity in these cases. That is likely in the cases where the partner country has limited R&I capabilities.

The discussion in the MLE workshop suggested that failures could hardly be avoided if political frameworks and priorities change. What was considered more problematic was the repetition of similar mistakes, for example using inappropriate evaluation processes, made in a succession of STI agreements, without any policy learning taking place. Most of the failing STI agreements were indeed 'empty shells' that remained dormant for a certain period. In the discussion it emerged that these were considered as less problematic than often discussed and instead of risking diplomatic damage the sleeping beauty approach – *let them sleep and kiss them awake if needed* -could be more appropriate.

3.3 Monitoring, evaluation, results and impacts

Many reports on international cooperation and STI agreements have commented on the lack of good data and evaluations of the impacts of STI agreements, as described in Chapter 1.

In our sample of 15 success cases, five have reported that inputs and outputs are monitored (at the activity level, e.g. mobility volume, collaborative projects, scientific outputs) and another two do this at the level of the agreement itself (satisfactory progress). Three have stated that there is no monitoring and in another three cases no information is given.

Only three STI agreements have been evaluated, while two more MLE countries have indicated that evaluation is done at a high-level of international cooperation but not on a specific agreement. In three cases, evaluations are foreseen in the future, while in the remaining five cases no evaluation has taken place nor is foreseen. The evaluated agreements reported quantitative and qualitative results and impacts:

- joint publications, continuation of collaboration between researchers and career improvement for young researchers
- improved quality of R&D by bringing together complementary skills, experience and infrastructure
- access to new markets
- engagement in new R&D networks in Europe
- establishment of joint infrastructures

- improvement of diplomatic relations and intensified policy cooperation between the partner countries

One evaluation of an industry-oriented agreement has also analysed the numbers of jobs created and patents filed as a result of the calls under the bilateral agreement.

Another effect reported was that cooperation allows the implementing agency to benchmark its own procedures with those of the partner country.

For the 15 non-successful cases the situation is quite different. In most cases non-success means that no STI collaboration activities have taken place. So, there is simply nothing to monitor or evaluate. In a few cases normal monitoring of the small number of activities is carried out as usual but none of the STI agreements is evaluated.

The MLE survey has not specifically delved into the financial weight of the public funding that these STI agreements generate or mobilise, nor in the administrative costs needed to maintain them. That will be a difficult task as some of these agreements are high-level umbrellas that are subsequently 'mainstreamed' and decentralised across various agencies. One successful case reports a considerable budget available for collaboration projects (approx. €10 million for two years) and subsequently its evaluation shows considerable impacts. Judging by the number of proposals and projects that have been reported in quite some other successful cases, the number of people and organisations that have benefitted from these STI agreements remains relatively small. *This raises a more general question whether the potential impact of the STI agreements on the science and technology eco-systems, in relation to their administrative costs, are in balance.* An external evaluation of the Austrian bilateral science and technology agreements conducted in 2013 also raised this issue of efficiency concluding that administrative costs in relationships to the research and innovation funds being mobilised was about 1:4.[12] This was considered to be relatively high administrative costs for STI support, mostly because the amount of public funding involved in the bilateral agreements was low. This particular evaluation is a good example of using a multidisciplinary approach to assess qualitative and quantitative impacts of STI cooperation.

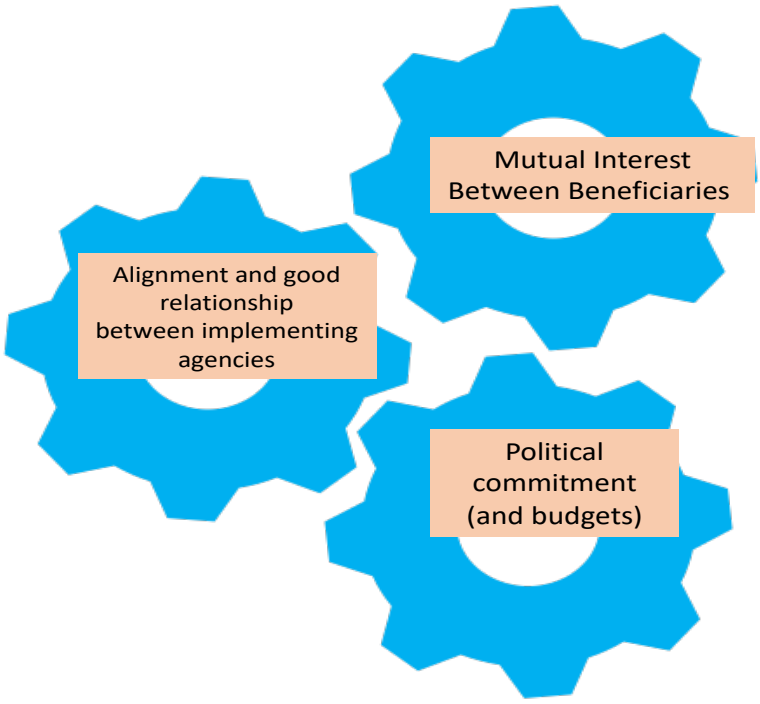
Given the fact that of the sample of 15 success cases only three have been previously evaluated and another three have indicated that this will happen in the future, it seems that there is still more work to be done to collect evidence on the effects of STI agreements.

[12] Schuch, K. Smoliner, S. Wagner, I., Degelsegger, A and Dall, E. (2013): Evaluierung der Forschungskooperationen im Rahmen der bilateralen wissenschaftlich-technischen Abkommen und Vereinbarungen. Wien: Zentrum für Soziale Innovation. Studie im Auftrag des BMWF.

3.4 Summing up

Comparing all the cases presented by the MLE countries suggests that there are three necessary elements in the 'engine' of STI agreements that are strongly interrelated. These three 'gears' are graphically depicted in Figure 2. We have to realise that the sample of MLE cases is relatively small and more research could be done to further test these findings.

Figure 2 The three 'gears' of successful STI agreements



Political commitment is very often an important starting point to open the dialogues, define the rules of the game, provide the mandates to organisations in the STI landscape to deliver on the agreements and in some, but not all cases, allocate funding. However, this is not a sufficient condition for STI agreements to work well. Without the good relationship and alignment of agencies/ministries on both sides to implement the STI agreement there is a great risk of creating 'empty shells'. These two together are again not a sufficient condition for successful agreements, if the interest from the research and innovation community to cooperate with a specific partner country is low (or if the visibility of the STI agreement is poor). There is a risk of a certain circularity in finding causes while assessing why a certain agreement is not working. For instance, the fact that Joint Committees are not meeting even though this was agreed can be attributed to a lack of political commitment, alternatively to a lack of implementation capabilities of one or both partners or more likely a combination of both.

If the findings of these MLE templates are representative for STI agreements in a wider sense and (thematic) interest of the research and innovation community is the most important factor for success, then we should pay more attention to how and when policy-makers and R&I funders identify the interests of the stakeholders. Some of the cases indeed highlighted processes to involve the stakeholders in the dialogues with a (future) partner. In one case, representatives of RPOs are present when the high-level dialogues take place discussing the direction of the STI agreement. Other cases report networking, joint seminars and brokerage events so that beneficiaries can meet each other. But these

usually take place after the agreement has been signed and the implementation plans developed.

The wider lessons that MLE participants draw from their success and non-successful case studies which they would like to share with other countries are also very interesting and are mostly in line with the above summary. The lessons from the MLE participants, as phrased in their survey answers, are listed in Box 4, and reflect the individual country respondents, thus are not necessarily shared by all MLE participants.

Box 4 Lessons on successful STI agreements put forward by MLE participants

- *By agreeing on fundamental aspects of the cooperation in the MoU and defining details of calls for joint projects in separate documents, the flexibility for a long term cooperation is assured;*
- *Make sure to have an open and transparent communication with the foreign funding institution so you can clarify and openly discuss the various calls as well as framework conditions;*
- *Try to have a joint panel for the evaluation and selection of the projects (this panel is composed of experts from both partner countries);*
- *When partner funding institutions have more or less the same mission and procedures (e.g. peer review, evaluation criteria, …) a smooth implementation of the STI agreement is facilitated;*
- *Reciprocity: equal financial contribution and/or scientific contribution (two-way exchange of expertise);*
- *The agreement strikes a balance between being flexible and precise on thematic areas. It covers the whole STI-ecosystem in both countries. It makes it possible for all of the ministry's stakeholders to take part;*
- *It is positive to collaborate with research and entrepreneurial community of neighbouring countries;*
- *Our success stories here, as in many other cases, are largely based on close ties within the national research and innovation field. Ministries, agencies, research institutes and universities as well as large companies have unproblematic contacts and there are incentives to cooperate. In the bilateral STI cooperation contexts, this means in the best case that we can offer the partner larger joint initiatives, which combine research and business components, supported flexibly by government actors;*
- *In the perspective of a stronger and more unified approach of the EU on a global scale, it may be of interest for representatives of EU ministries in charge of R&I (as well as Commission) to know more about their reciprocal approach towards international partner countries;*
- *Openness to new forms of cooperation and dedication of the implementing bodies are important;*
- *The easiest way to collaborate is the one based on mobility. When having a limited budget important is to offer the right instruments to stimulate dialogue and partnership between collaborative partners in order to access much more easily a more complex frame of cooperation;*
- *Agreements are mainly political instruments to bring countries closer together as one of several instruments;*
- *Good cases can learn that interpersonal relations are very important in establishing a successful cooperation in various fields, including STI;*
- *After the signature of this bilateral MoU there has been a permanent phase of inactivity on both sides but which has to be avoided from the early beginning of the implementation of the MoU. It is important to stay continuously in touch with your counterpart persons/organisations to keep the agreement alive. Agreed modes of cooperation and working procedures have to be followed;*
- *It is important to stay in touch with the relevant contacts, monitor the changing R&I environment in the country and seek windows of opportunity for reviving cooperation efforts;*

- *Never try to sign a document with not enough time;*
- *Scientific reasons should dominate instead of political ones when signing scientific agreements;*
- *The importance of collaboration being at a sufficiently advanced stage before entering into a bilateral agreement;*
- *The Governmental Agreement sets the framework of the bilateral cooperation and the willingness of both countries to cooperate. The Agreement implementation mechanism through the bilateral programme has shown that a set of common criteria on the profile of the project partners, evaluation of the project proposals are compulsory in addition to common forms, common areas of interest, impact or partnership agreement;*
- *If there is a need on political level to sign an agreement it should be followed by assignment, and directed funding, that funding agencies are required to work together;*
- *There needs to be interest on both sides, both in the research community and at ministry/agency level, for an agreement to actually be followed up;*
- *It is good to have agreements with countries that are interested. It is better, for small countries, to have STI agreements with states that are more developed and thus can be a catalyst to improve research capabilities in smaller countries. Common research interests can stimulate a better cooperation.*

4 THE FUTURE OF STI AGREEMENTS

The exercise with the successful/non-successful cases focused very much on what exists in the STI landscape today. For all cases of successful agreements there is no doubt on the validity of the rationale in the coming 3-5 years and the agreements are expected to continue or being renewed. Some noted considerations such as the fact that it depends on the interest from the research/business community and future reviews. Flexibility of the agreement is mentioned several times as a reason for the agreement to have a long-term rationale: if priorities change, the agreement allows a change of focus. This would support an approach for a relatively general framework agreement (risking to become an empty shell) combined with more frequent implementation plans that can be adapted more frequently.

The findings of the non-successful cases raise some questions for science diplomacy. Clearly many of these cases can be described as 'empty shells' or agreements that were created from a political motive, but with no clear idea on how this should be implemented, combined with low levels of interest /visibility from the research and innovation community. A question that needs to be raised is whether science diplomacy is going to create even more empty shells in the future? Could this be avoided through better preparation by assessing the potential interest in the R&I community beforehand and designing the implementation mechanisms to make the cooperation operational?

This raises a related question whether having the 'empty shells' is a real problem? In the template responses there seem to be different views on that. From the perspective of the **ministries** involved, the dormant agreements are mostly an opportunity for the future: they keep the door open if in the future more interest arises for cooperation. In addition, one response was that at least the STI agreement has set the framework for cooperation which can be used in the future. From the perspective of the **implementing agencies** there seem to be more concerns about the efforts needed for keeping the communications going and renegotiating the agreements. Thus, here the human resources that have to be invested for something that is 'not working' is an issue. Across all non-success cases many suggested that the political damage to close down or not renew an agreement was too big. Hope for future revival of the non-successful cases is still there for most of the MLE participants. Nevertheless, governments should be aware of the negative aspects of keeping alive 'empty shells' and minimise the burden for their administrators (often agencies) to continue and renew them.

As abovementioned, the MLE workshop discussion shed light on the diplomatic importance of these agreements and confirmed that they are not so problematic. The workshop also contributed to a better understanding of the different perspectives of ministries and agencies. More communication between these two types of bodies in an early stage of the signing process was considered necessary.

The MLE workshop in Bucharest addressed the future of STI agreements and the European portfolio of agreements in a number of years from now. Key outcomes of that discussion are:

- While MS/AC are thinking of new and more flexible ways to arrange international agreements, the signing of 'classic' intergovernmental STI agreements is still considered as politically important. There was little expectation that the portfolio of national STI agreements would be streamlined or reduced in a significant way in the future.

- It was signalled that indeed more can be done in the cooperation between MS/AC to launch multilateral STI agreements with third countries. The use of schemes under the EUREKA umbrella was mentioned as a possible way forward. There is a need for new platforms to take action on this.

- The roles of innovation and the economic objectives in STI agreements are clearly rising. A possible danger could be that this becomes a separate trajectory from the scientific STI cooperation and leading to even more STI agreements.

- Given that new partnerships are mostly with less R&D intensive countries, it is likely that more flexible agreements or MoUs will be used that can be easily adapted if priorities change.

- A joint EU approach on how to tackle frontier technologies (e.g. artificial intelligence, quantum technology) would be needed.

5 THE TAKE-AWAYS FROM THE SECOND COUNTRY VISIT

The MLE workshop and second Country Visit hosted by Romania gave ample opportunities to share and discuss experiences on STI agreements between the MLE participants. In a short exercise finalising the Topic 2 of this MLE, participants were asked to write down their main 'take-aways' from this workshop. These can be grouped into three main categories.

The first is the **appreciation of learning from other countries** and the way they deal with the issues surrounding STI agreements. Understanding how others MS/AC approach partner countries was considered as insightful. While some countries have a more formal and legalistic approach, it was interesting to learn from countries that have a more informal and pragmatic approach. What was considered as very useful is that the MLE has both Ministries and Agencies represented. A better understanding of each other's perspective was mentioned a few times as a take-away from the meeting. It was enlightening to understand that others share the same problems and challenges. It was positive to learn how the European Commission is going forward on international cooperation. Several inputs mentioned the positive role the Commission is already playing with the Framework Programmes, helping countries to stimulate international cooperation.

A second category of take-aways is a **deeper understanding of how STI agreements can work better**: the drivers behind success as well as operational information on how other MS/AC manage their STI agreements. It was an eye-opener to some that a few countries have started to cooperate, even with large countries like China, without a formal intergovernmental agreement or MoU, but simply by launching joint calls between agency to agency. The need for more flexible agreements, - particularly with less developed third countries - was one take-away. Nevertheless, the insight that intergovernmental and more

formal national agreements will remain important in the future was stressed by several MLE participants.

A better understanding of the broadening policy context in which STI agreements exist was frequently mentioned. The science diplomacy and foreign affairs angle becoming more active on the one hand and the increasing role of innovation in international collaboration on the other hand. This led others to consider a broader configuration of cooperating ministries that will be needed to prepare STI agreements in the future.

As the Chair of this MLE pointed out in the stocktaking of this workshop, the broadening of the concept of STI agreements and science diplomacy has changed the whole implementation chain for international cooperation. The whole chain from policy-making to implementation has to be taken on board if we want to develop successful STI agreements.

There was considerable discussion in the workshop on STI agreements that are not working or the 'empty shells' as they are often referred to. The discussions provided a better understanding of the political drivers behind this sort of agreement and the possible damage terminating 'sleeping' agreements could do in terms of foreign policy. Again, here bringing together the ministry – agency perspectives seems to have a positive effect.

A third category of take-aways concerns a better insight in the **future trends on STI agreements** and the role both the European Commission and SFIC could play in taking next steps. As abovementioned, the discussions mostly led to the insight that an increase of bilateral and multilateral agreements is more likely than a consolidation and alignment between countries. Nevertheless, some put an argument forward that a better coordination between MS/AC and the Commission is needed in future.

The workshop gave inspiration to quite a number of participants to think more in terms of tri-lateral or multilateral agreements, especially when dealing with Sustainable Development Goals (SDGs) and global science issues. One contribution suggested that the SDGs should be made more concrete in order to become a starting point for more alignment and multilateral agreements supported by EU MS/AC.

A number of inputs suggested that the European Commission could play a greater role in the future. For instance, as the driver for more multilateral cooperation between several MS/ACs and third countries, particularly with the SDG approach of Horizon Europe in mind. There were quite some notes pleading that Horizon Europe should have a specific international cooperation instrument. A bigger role for SFIC was also suggested by a number of participants. In the first instance, SFIC should facilitate the information sharing. One argued that the repository (database) of EU/MS bilateral agreements and MoUs is still needed, while another suggested that a common template for new agreements and MoUs would be needed to make comparison and analysis easier.

Some suggested that SFIC could become a stronger facilitator to link national and European STI agreements and coordinate the interaction between MS/AC and the Commission. It could become an initiator of new Joint Actions such as multilateral STI agreements, as well as a platform to discuss common standards, problematic issues and ethics.

The MLE workshop led to very fruitful discussions and exchanges on STI agreements and MoUs. This fertile learning opportunity will continue in the Third Country Visit taking place in Stockholm (12/13 November 2019) on framework conditions for challenge-driven international R&I cooperation.

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This paper constitutes the second Thematic Report of the Mutual Learning Exercise (MLE) devoted to national strategies and frameworks for international cooperation in R&I. The focus of this paper is on STI agreements as significant tools for international cooperation.

Studies and reports