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Abstract

In the frame of the Stairway to Excellence project, complex country analysis was performed for the EU MS that joined the EU since 2004, with the objective to assess and corroborate all the qualitative and quantitative data in drawing national/regional FP7 participation patterns, understand the push-pull factors for FP7/H2020 participation and the factors affecting the capacity to absorb cohesion policy funds. This report articulates analysis on selected aspects and country-tailored policy suggestions aiming to tackle the weaknesses identified in the analysis.

The report complements the complex qualitative/ quantitative analysis performed by the IPTS/KfG/S2E team. In order to avoid duplication and cover all the elements required for a sound analysis, the report builds on analytical framework developed by IPTS.

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EXECUTIVE SUMMARY

The report offers a comprehensive overview of factors and mechanisms, which contribute to the national participation patterns in Framework Programme 7 (FP7), absorption of EU Structural Funds (SF) and the synergies between these two funding streams in Poland. Its findings are based on field studies (24 interviews with Research & Innovation – R&I – performers, government organisations and funding agencies) as well as desk research.

Chapter 1 includes introductory remarks, outlining the background of the “*Stairway to Excellence*” project.

Chapter 2 discusses the governance of the R&I system, presenting institutions involved in design and implementation of SF in 2007-2013 and European Structural and Investment Funds (ESIF) for the 2014-2020 perspective. Based on interviews, specific challenges were identified, related to: co-ordination in the R&I system (including co-ordination between central government institutions and regional agencies), availability of policy instruments (with focus on competitively distributed, short-term grants, lack of R&D tax incentives, and shortcomings in the design of support measures available in 2007-2013, which were rectified in the new financial perspective) as well as complicated administrative procedures. It offers an analysis of Poland's strengths, weaknesses, opportunities and threats, focused on the institutional governance of ESIF.

Chapter 3 further explores factors that support or limit national participation in R&I calls funded by ESIF, pointing to shortcomings such as: imperfect design of some support measures, ambiguity surrounding co-funding requirements for certain projects and cost eligibility, as well as managerial capacities of applicant organisations, including specific cases of public universities and public research institutes. It also discusses the capacities of funding agencies and steps taken to reduce administrative burdens at the ESIF application and implementation stages in 2014-2020.

Chapter 4 outlines reasons for limited participation of Polish organisations in FP7 and Horizon 2020 (H2020 actions), referring to: competition with other, nationally available funding opportunities, personnel lack certain skills (including limited command of English and limited international contacts), only marginal involvement in H2020 programming and lack of adequate representation of Polish interests in Brussels, demotivating salary and intellectual property rights (IPR) regulations in H2020, and insufficient academic recognition of researchers managing externally funded R&I projects.

Chapter 5 presents policy instruments, which facilitate the participation in ESIF and FP7/H2020, outlining support for applicants, activities of the National Contact Point, financial support for FP7/H2020 project proponents, governmental plans to establish a dedicated contact point and funding for H2020 application drafting by small and medium-sized enterprises (SMEs) and the “*Pact for Horizon 2020*”, signed by the Ministry of Science and Education with universities and research institutes, including reciprocal commitments intended to increase the Polish participation in H2020.

In **chapter 6**, experiences with evaluation and monitoring of ESIF are described, demonstrating the limited role of international evaluators and shortcomings in evaluation criteria used for some support measures. It also discusses the policy learning based on ESIF monitoring mechanisms and positive changes in the wake of the 2014-2020 ESIF perspective.

Chapter 7 lists factors, which limit the synergies between ESIF and H2020, including: differences in legal frameworks, H2020 salary regulations demotivating researchers from Polish public universities and research institutes, and H2020 IPR regulations considered as problematic by some innovative SMEs, challenges in using research infrastructures established with ESIF funding, organisational barriers including accounting and auditing practices discouraging high-risk innovative projects, as well as the evolving design of Poland's ESIF support measures, as a dedicated measure intended to increase the H2020 readiness of SMEs was eliminated from Poland's operational programme. The subsequent discussion of factors supporting the synergies points to multiple support measures, directly complementing the funding available from FP7/H2020, including examples of parallel funding (“*TEAM*”, local support for KIC co-location centres), simultaneous/cumulative funding (“*IDEAS FOR POLAND*”, and two dedicated measures included in 2014-2020 ESIF: “*International Research Agendas*”, complementing *H2020 Teaming*, and “*Virtual Research Institutes*”, adding value to *H2020 Twinning*), alternative funding (“*Ideas Plus*”), as well as the ease of securing sequential funding to combine multiple funding sources and ensure continuity of research efforts. Importantly, synergies are not only found between FP7/H2020 and SF/ESIF, but also involve multiple support measures funded from the Polish state budget.

Chapter 8 offers insights into the take-up of public sector research results, discussing available support measures and providing examples of successful commercialisation of research results.

Chapter 9 includes a detailed list of policy suggestions, concerning: (a) strengthening of ESIF-H2020 synergies, (b) improvement of R&I support in Poland, and (c) actions to be taken by the European Commission to better serve the EU member states and contribute to their innovative development.

Chapter 10 summarizes the factors behind different regional levels of participation in FP7 and SF, presenting divergences in R&I performance, which influence the levels of R&D investment and applications for external funding.

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The report's author would like to thank the project interviewees for the time, which they've dedicated to the interviews and for their illuminating insights, which helped develop the report's interpretative framework. Altogether 24 interviews were carried out in February and March 2015, and each interview involved 1-3 interviewees. The anonymity of individual interviewees is ensured based on their requests preceding the interviews, and the report only contains excerpts and summaries of their opinions, not attributable to individual speakers. The editorial support by Dr. Nicholas Harrap, the IPTS Country Desk for S2E project, and contributions and comments from DG-REGIO are also gratefully acknowledged. The author expresses his gratitude to Mr. Maciej Młynarski, who conducted some of the interviews. Additional interviews and electronic communication were needed to prepare two case studies, which supplement the report and outline examples of good practices in combining FP7 and ESIF funding. The author would like to thank prof. Dorota A. Pawlak from ITME (Institute of Electronic Materials Technology), Warsaw and prof. Janusz Bujnicki from IIMCB (International Institute of Molecular and Cell Biology), Warsaw for their support in preparing these case studies.

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1 INTRODUCTION¹

Background of the “Stairway to Excellence” project

The European Commission Framework Programme (FP) for research and technology development has been vital in the development of European knowledge generation. However, there is considerable disparity across EU countries and regions in terms of FP participation and innovation performance.

Horizon 2020 will continue to provide funding on the basis of excellence, regardless of geographical location. However, it will also introduce novel measures for “spreading excellence and widening participation” by targeting low Research & Innovation (R&I) performing countries - most of whom are eligible for innovation funding under Cohesion Policy for the period 2014-2020.

In addition, the new regulations for ESIF aim to use funds more effectively to build regional/national excellence and capacities. By doing so, the key funding sources (ESIF and Horizon 2020) can complement one another along the entire innovation process.

Objective of S2E

The Stairway to Excellence (S2E) project is centred on the provision of support to enhance the value of the key European Union (EU) funding sources for research, development and innovation: European Structural and Investment Funds and Horizon 2020 but also the Competitiveness of Enterprises and Small and Medium-sized Enterprises (COSME), Erasmus+, Creative Europe, European Union Programme for Employment and Social Innovation (“EaSI”) and the digital services part of the Connecting Europe Facility by actively promoting their combination. The S2E project is funded by the European Parliament and entrusted by DG-REGIO to JRC-IPTS. The project has two main objectives, namely:

- Providing of assistance to regions and countries that joined the EU since 2004 in closing the innovation gap, in order to promote excellence in all regions and EU countries;
- Stimulating the early and effective implementation of national and regional Smart Specialisation Strategies.

Main purpose of the document

In the frame of the project, complex country analysis is performed for all 13 EU MS with the objective to assess and corroborate all the qualitative and quantitative data in drawing national/regional FP7 participation patterns, understand the push-pull factors for FP7 participation and the factors affecting the capacity to absorb cohesion policy funds. This report articulates analysis on selected aspects and country-tailored policy suggestions aiming to tackle the weaknesses identified in the analysis.

The report complements the complex qualitative/ quantitative analysis performed the IPTS/KfG/S2E team. In order to avoid duplication and cover all the elements required for a sound analysis, the report builds on analytical framework developed by IPTS.

¹ Contents of the introductory chapter were provided by JRC-IPTS and incorporated in all national S2E reports.

2 QUALITY OF THE GOVERNANCE

2.1. Overview. Polish public administration is often regarded as overly bureaucratic and not sufficiently reactive, but even the interviewed critics highlighted positive changes in recent years, concerning the governance of the R&I system. These changes included the establishment of new agencies, reassignment of ESIF-related tasks and shortening administrative procedures. The government and funding agencies drew important lessons from the 2007-2013 financial perspective and prepared the new ESIF-related programmes and procedures taking into account good practices and comments of beneficiaries. It should also be noted that in the World Bank's ranking "*Doing Business 2015*", Poland was ranked the 32nd in the world, and the 14th in the European Union, with only Estonia, Latvia and Lithuania ranking higher among the new EU member states (World Bank, 2014).

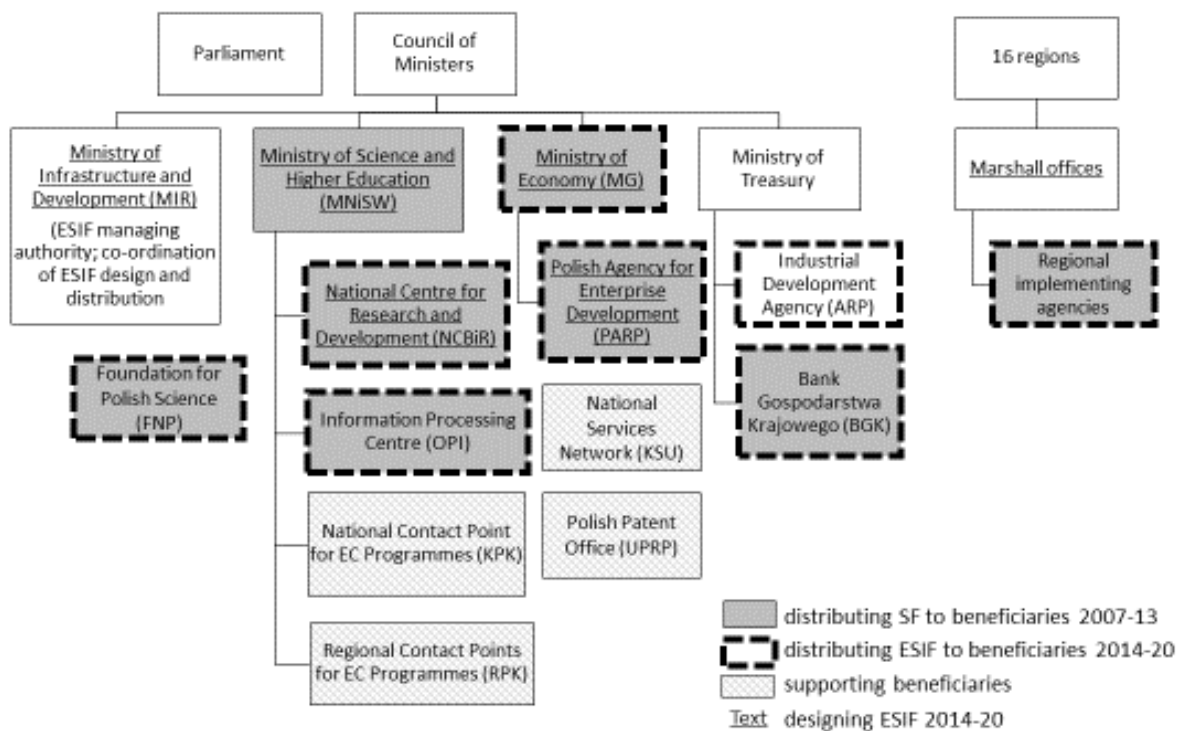


Figure 1. Organogram – governance of R&I funds (including structural funds for R&I).

2.2. Governance of the R&I system. Figure 1 offers an overview of institutions in the Polish R&I system, with particular focus on the design and implementation of relevant SF/ESIF instruments. It uses different background and border patterns to indicate institutions active in the 2007-2013 and 2014-2020 perspectives.

In 2007-2013, a multiplicity of intermediaries was distributing ESIF funds through various, sometimes overlapping support measures. This eclectic landscape resulted from governance changes resulting from the 2010-2011 reform of the science and higher education sector, which established or empowered dedicated agencies (Klincewicz, 2014). The main co-ordinating role for SF/ESIF was played by the managing authority, the Ministry of Infrastructure and Development (MIR, *Ministerstwo Infrastruktury i Rozwoju*, www.mir.gov.pl), previously named "Ministry of Regional Development". Poland had 6 centrally implemented operational programmes (including one dedicated to the development of regions of the Eastern Poland), supplemented by 16 regional programmes (MIR, 2015a). R&I-related support measures were included in several centrally managed programmes and in all regional programmes, covering R&D, support for innovations in business sector, establishment of research infrastructures, training and innovative doctoral studies. Regional programmes were designed by individual regions with substantial diversity of support measures, evaluation

criteria, eligible costs and modalities. On the central level, R&D-related measures were initially offered by the Polish Agency for Enterprise Development (PARP, *Polska Agencja Rozwoju Przedsiębiorczości*, www.parp.gov.pl), focused on business enterprises, and by the Information Processing Centre (OPI, *Ośrodek Przetwarzania Informacji*, www.opi.org.pl), working with scientific organisations. In 2010, the National Centre for Research and Development (NCBiR, *Narodowe Centrum Badań i Rozwoju*, www.ncbir.pl) expanded its operations and took over the most important, SF-based R&D support measures (Kliniewicz, 2014: 12-14). The change was welcomed by many beneficiaries, and interviews revealed substantial improvements in streamlining procedures and pursuing more open attitudes towards applicants and beneficiaries by NCBiR. This change needs to be taken into account when interpreting the results of interviews: general comments, concerning the governance of SF in 2007-2013, might consider either the pre-2011 period (with relevant measures implemented by PARP, OPI) or the post-2011 period (with the new role of NCBiR). Some measures were directly offered by the Ministry of Science and Higher Education (MNiSW, *Ministerstwo Nauki i Szkolnictwa Wyższego*, www.nauka.gov.pl) and the Ministry of Economy (MG, *Ministerstwo Gospodarki*, www.mg.gov.pl), while financial instruments were distributed by the state-owned bank BGK (*Bank Gospodarstwa Krajowego*, www.bgk.pl). More narrow, well-targeted measures intended to strengthen the research excellence in the science sector were distributed by the non-public Foundation for Polish Science (FNP, *Fundacja na rzecz Nauki Polskiej*, www.fnp.org.pl), and while the overall SF budget distributed through FNP was comparatively small, these measures offered important synergies with FP7 funding and will further be discussed in the present report. The 2007-2013 SF governance structures suffered from imperfect co-ordination, overlaps of support measures and competitive struggles between agencies and ministries, trying to demonstrate their usefulness in the future R&I framework. Importantly, Poland also had a substantial number of relevant R&I support measures funded from the state budget, and distributed by NCBiR and PARP, alongside with additional programmes managed by FNP and funded from the Foundation's own sources.

The design of new ESIF operational programmes and support measures coincided with a wide-ranging institutional reform of the R&I system, resulting from the adoption of high-level strategic documents "Strategy for the Innovation and Efficiency of the Economy" (SIEG, "*Strategia Innowacyjności i Efektywności Gospodarki*") (RM, 2013) and "Enterprise Development Programme" (PRP, "*Program Rozwoju Przedsiębiorstw*") (RM, 2014), which defined policy objectives and assigned responsibilities to specific public bodies. With SIEG and PRP in place, the design of ESIF operational programmes was relatively easier, as key R&I support directions had been extensively consulted with stakeholders and discussed within the government before designing the individual support measures. In 2014-2020, R&I funding will be focused on specific thematic areas of KIS (National Smart Specialisations, "*Krajowe Inteligentne Specjalizacje*") (MG, 2015) or regional specialisations, and large research infrastructure investments will be linked to the contents of PMDIB (Polish Roadmap for Research Infrastructure, "*Polska Mapa Drogowa Infrastruktury Badawczej*") (MNiSW, 2014b). These planning documents were defined through bottom-up processes, with large-scale foresight projects, calls for submission and consultations with stakeholders. This presents a substantial improvement compared with the previous financial perspective.

The main R&I funding programme in the 2014-2020 perspective, the Operational Programme Smart Growth (POIR, "*Program Operacyjny Inteligentny Rozwój*") (MIR, 2015b) was designed by MIR, MNiSW, MG, NCBiR and PARP, with extensive involvement of stakeholders representing R&I performers, financial institutions as well as other public and regional bodies. POIR clearly defines the intervention priorities as: R&D funding (co-ordinated by NCBiR), support for innovations in private sector and enabling environments for innovations (co-ordinated by MG and PARP, with specific instruments also expected to be offered by BGK and ARP - Industrial Development Agency, *Agencja Rozwoju Przemysłu*, www.arp.pl), and support for the science sector (with measures offered by NCBiR, OPI and FNP). POIR funding is distributed based on 19 national smart specialisations (KIS, "*Krajowe Inteligentne Specjalizacje*"), and KIS development and updates are co-ordinated by the Ministry of Economy (MG, 2015). All 16 regional operational programmes include complementary support measures, focused on establishing research infrastructures consistent with the regional smart specialisations (identified locally in each region), and supporting smaller R&I projects. While preserving regional variations, these measures followed standardized templates to ensure comparable forms of support in various regions, and agencies from several regions signed co-operative agreements with NCBiR to benefit from the Centre's experiences in application evaluation and its extensive pool of evaluators.

Additional, important roles are played by: the National Service Network (KSU, *Krajowy System Usług*, www.ksu.parp.gov.pl), which includes private-sector training and consulting companies, commissioned to support SMEs in matters including R&I and the Polish Patent Office (UPRP, *Urząd Patentowy Rzeczypospolitej Polskiej*, www.uprp.pl), managing SF/ESIF-based systemic projects to support research performers and promote IPR protection. National governance of FP7/H2020 participation is based on the National Contact

Point (KPK, *Krajowy Punkt Kontaktowy Programów Badawczych Unii Europejskiej*, www.kpk.gov.pl) in Warsaw, with a network of small, regional contact points (RPK, *Regionalne Punkty Kontaktowe*). The NCP with its regional network reports to the Ministry of Science and Higher Education.

The following sections of the chapter will present selected features of the R&I governance system, which were identified as important by interviewees² as they impact the national participation in FP7/H2020 and the absorption of SF/ESIF. The contents of this chapter are further expanded in chapter 3, which offers more detailed discussions of factors related to the SF funding.

2.3. Co-ordination in the R&I system. The number of institutions involved in SF/ESIF distribution is large, and results from the size of the country and substantial ESIF allocations. In the years of 2007-2013, there were some functional overlaps between SF implementing agencies, which led to competitive, inter-governmental dynamics. The institutional framework for 2014-2020 was established after an internal reshuffle within the public administration (Klincewicz, 2014: 14), informed by opinions of stakeholders and results of a comprehensive evaluation of the Poland's innovation system, carried out by the World Bank (Kapil et al., 2012). The current division of responsibilities on the national level matches institutional competencies and ensures good co-ordination. In particular, specific organisational problems identified in the 2007-2013 perspective had been addressed, and the adequacies of these solutions were verified in the course of ex ante evaluations of the new operational programmes.

However, more challenging will be the co-ordination between the national and regional levels. In 2007-2013, part of SF R&I funding was distributed by regional agencies, without clearly distinguished support measures. In 2014-2020, regions assume even more responsibility for R&I funding, but their support measures were included in the nation-wide planning process, and are expected to complement not substitute the centrally available funding. As revealed in interviews with R&I performers conducted for this project, experiences of beneficiaries with regional agencies tended to be worse than with the centrally distributed funds. According to representatives of regional funding agencies, regions had limited contacts with central ministries, and imperfect access to information, which resulted in different interpretations of the same regulations by different agencies. Since 2013, regional agencies and central ministries meet on a regular basis in the framework of the Regional Forum for Smart Specializations (*Regionalne Forum Inteligentnych Specjalizacji*), which was instrumental in sharing knowledge about design of R&I-related support measures and exchanging experiences.

Interviews with representatives of governmental institutions offered other examples of co-ordination problems in the 2007-2013 perspective. Formal acceptances of support measures and funding modalities proved to be very time consuming, with delays caused both by the Polish side and the European Commission. There might have been cases when some funding agencies had to announce calls for proposals before all the formalities were finalized (in order to fill the substantial funding gap at the beginning of the financial perspective), accepting the risk of contributing government funding to finance successful project proposals if further procedural delays occur. In early 2015, interviewees representing R&I funding agencies, reliant on ESIF, feared that similar problems might arise in the present ESIF perspective, and their apprehensions could

² **Note on research methodology.** The field research, described in this report, involved structured interviews with relevant stakeholders, based on a list of questions prepared by IPTS-JRC and common for all countries participating in the S3E project. 24 interviews were carried out in February and March 2015, and each interview involved 1-3 interviewees. The sampling was purposive, intended to increase the variance in experiences and opinions, taking into account different institutional settings, research fields, regions and organisational positions. The research sample included:

- 3 central government ministries (Ministry of Infrastructure and Development, Ministry of Science and Higher Education, Ministry of Economy),
- 4 funding agencies (National Centre for Research and Development, Foundation for Polish Science and regional funding agencies from two regions, distributing SF/ESIF funding for R&I),
- National Contact Point for Research Programmes of the European Union in Warsaw and one of Regional Contact Points,
- 5 business enterprises, including 4 R&I performers, who benefited from SF or FP7, and 1 consulting company, experienced in supporting R&I projects,
- 7 representatives of 3 public universities representing different regions of Poland and different disciplines (chemistry, computer sciences, energy, humanities, physics, telecommunications), including 2 persons in managerial positions, in charge of EC funding and project management, one of them managing a Polish co-location centre of Knowledge and Innovation Community,
- 4 representatives of public research institutes, including 2 researchers and 2 project directors.

The anonymity of individual interviewees is ensured based on their requests preceding the interviews, and the report only contains excerpts and summaries of their opinions, not attributable to individual speakers.

partly be attributed to the long-lasting strategic dialogue between the European Commission and the Polish authorities, concerning the ESIF design. Nevertheless, Poland managed to conclude the dialogue soon after the interviews and first ESIF-based calls were launched in the first half of 2015. Representatives of ministries and funding agencies expressed some critical comments concerning the dynamics of the strategic dialogue and limited flexibility of the EC with regards to ESIF 2014-2020. DG REGIO explained that the dialogue had to be based on the provisions of the Partnership Agreement signed by the EC with Poland, which outline the initial scope of the intended ESIF support measures and defined the legitimate mandate for the dialogue.

According to the interviews, some support measures, which were initially included in the draft operational programme (POIR) based on extensive public-private consultation processes, conducted in a mode resembling the proposed entrepreneurial discovery process and focused on raising private expenditures on R&D, were eliminated or thoroughly modified in the course of the strategic dialogue. When commenting on the interview results, DG REGIO explained that operational programmes and support measures were assessed taking into consideration the specificity of the funding source, aimed at stimulating innovation, technological development and applied R&D related to business needs and capabilities. One of the measures, eliminated from the POIR in the course of the strategic dialogue, was supposed to address the core theme of the present report: strengthening synergies between ESIF and H2020 (see detailed discussion in section 7.7. of this report).

Another shortcoming in the 2007-2013 perspective was the lack of consistency between several operational programmes, resulting from isolated SF programming efforts in 2006-2007. The main funding source for R&I was POIG (Operational Programme Innovative Economy), but relevant measures were also included in POKL (Operational Programme Human Capital) and POIS (Operational Programme Infrastructure and Environment), albeit with sub-optimal funding modalities, e.g. training of researchers or doctoral studies could not be combined with R&D components, or scientific infrastructure could be used only for teaching not research. These shortcomings were eliminated when programming the current ESIF perspective.

The governance of ESIF in 2014-2020 has been decided, but more problematic is the broader co-ordination of R&I policies. Several ministries and agencies are involved, but not a single governmental institution assumes the overall responsibility. Top-level policy documents SIEG and PRP define targets and implementation plans in R&I area, but the actual co-ordination between various ministries remains challenging. As one of interviewees mentioned, nobody knows who should actually assure the co-ordination. This clarity is only available for ESIF-based R&I efforts. However, as some interviewees suggested, the challenge is typical for other institutional settings as well, concerning e.g. co-ordination of R&I-related initiatives within the EC. In a similar manner, applicants and beneficiaries complained about the lack of a “one-stop shop” approach to R&I funding: no central contact points or government-maintained websites exist, listing all available support measures and funding opportunities. Poland offers a multiplicity of relevant instruments, extending beyond SF/ESIF, and new applicants might be intimidated by this variety.

2.4. Availability of policy instruments. Many of the interviewed R&I actors complained about the lack of R&D tax incentives. Two types of relevant, functionally restricted tax credits exist, but these measures are available only to a small group of organisations and do not adequately incentivize research efforts. Public co-funding for R&I in Poland is based on competitively distributed grants, and this approach has certain inherent limitations. Not every organisation can benefit from grants, and individual access to funding for R&D can never be stable or planned in a long-term. Organisations are forced to operate “*from one grant to another*”, and the continuity of funding for subsequent stages of research and technology development is uncertain. R&D tax exemptions could facilitate the planning of technology development by business enterprises. When commenting on the grant-based system, one interviewee stated that “*one carries out projects that fall into the category of things that could be [co-]funded. We would not run around for 10 years, looking for project funding, when we see that nobody is interested in financing the project, because it would be a waste of our resources. Some ideas are too innovative, too future-oriented*”. Universities and public research organisations are in turn dependent on a mixture of project and institutional funding, distributed based on past performance and research excellence, so ambitious R&D initiatives could not be pursued without relevant grants.

Interviewees representing various R&I performing sectors interpreted government actions as focused on dividing funds and controlling their use, while the R&I performers would rather expect “*partnerships*” and joint definition of long-term plans for funding specific research initiatives. At the same time, this approach is changing with the launch of new support measures in POIR, in particular: sectoral programmes, in which research agendas emerge from extensive data analysis in feasibility studies and dialogues between industry

sector representation and NCBiR, and expected deliverables, milestones and allocations are defined jointly in a public-private partnership.

Most interviewees were satisfied with the portfolio of support measures. In the 2007-2013 perspective, there were funding gaps in the innovation cycle, related to low allocation levels for certain support measures, with all available funding for certain purposes used up early during the financial perspective. These funding gaps seem to be addressed in 2014-2020, with budgets allocated for specific support measures adjusted to match the market needs.

In some cases, interviewees representing R&I performers from various sectors (higher education, research institutes, business enterprises) pointed to problems with specific criteria, used to define the scope of calls for proposals, eligibility and evaluation. In particular, some of regionally available support measures might have been defined without appropriate technical or legal knowledge, resulting in multiple impracticalities. Some calls accepted only projects with relatively high budgets (i.e. bottom line set for minimum eligible value of project budget), and applicants meeting all other criteria but proposing a project with more modest financial requirements were not able to apply. This approach might have promoted funding inefficiencies, with some applicants incorporating unnecessary expenditures into their projects merely to meet the budgetary restrictions of a call.

There was an impression shared by some interviewees, that R&I support measures in 2007-2013 did not pay adequate attention to the sustainability of project results. The examples concerned large infrastructure investments in peripheral academic centres, and overall focus on infrastructure and research rather than on the commercialisation of research results. POIR in 2014-2020 emphasises the importance of practically oriented R&D, innovations and implementation, focusing on business enterprises, and this approach resulted from the EC's and government's concerns about project sustainability as well as extensive consultations with stakeholders.

Poland's policy learning in SF/ESIF was based on a trial-and-error process, with continuous improvements of support measures and funding modalities in 2007-2013, and an overall redesign of the policy framework in the wake of the 2014-2020 period. NCBiR launched multiple small-scale pilots of R&I support measures, funded from the state budget, to test their suitability, identify challenges at application evaluation and project implementation stages and gather the feedback from stakeholders. Some of the successful measures were incorporated into POIR, others are expanded with national funding, and yet another set of instruments was discarded after the pilot stage.

The improvements incorporated in the POIR's design include:

- launch of sectoral programs to stimulate the entrepreneurial discovery processes with representative stakeholders from selected industrial sectors,
- availability of instruments covering the entire innovation cycle, including support for developing technological prototypes based on R&D results,
- streamlining application evaluation processes and internal procedures at funding agencies to offer fast-track funding instruments, i.e. radically shorten the time between application and award of a grant,
- elaboration of criteria for evaluation of applications and lists of eligible costs.

Some interviewees expressed concerns that their specific proposals were not incorporated in the new operational programmes - but as one of government representatives explained, at the stage of ESIF design, some stakeholders were expecting "*the largest possible sums of money distributed with the easiest possible conditions, preferably without any accountability*". The co-operation between policy makers and private sector might still be perceived as unsatisfactory, as the business community does not have adequate representation, capable of entertaining a policy-focused dialogue with the government or the European Commission. The public efforts centred around the design of Poland's smart specialisations and sectoral R&D programmes, as well as a nation-wide identification of key innovation clusters, are expected to strengthen this representativeness and internal co-ordination within the enterprise sector.

Poland's R&I policy was planned with the time horizon until 2020, and there seems to be no permanent feedback/policy learning mechanism embedded. Therefore, there is no guarantee that the positive, evidence-based approach characteristic for the 2014-2020 ESIF perspective, with bottom-up planning and broad stakeholder consultations, would be replicated in the future.

2.5. Complicated administrative procedures. SF application and implementation processes in 2007-2013 involved high degrees of formalization. Some beneficiaries complained that funding agencies tend to

implicitly assume a bad will and possible wrongdoings of applicants, and thus established invasive control mechanisms, or carried out project audits with the preconceived intention to identify irregularities. This relatively low level of trust results in excessive caution of beneficiaries and high transaction costs. At the same time, Poland enjoys high SF absorption rates with only a very small number of problematic projects. When asked about problems with potential corruption or discretionary decision making in R&I funding, all 24 interviewees categorically stated that they could not imagine such scenarios, in particular with reference to R&I funding based on SF in Poland. These irregularities would be impossible due to the stringency of procedures, the national implementation of anti-corruption measures, and the oversight of funding instruments by dedicated programme committees, involving stakeholder representation who regularly analyse the results of programme evaluations, carried out by independent third-parties. Interestingly, some informants highlighted the contrast between the consistency and transparency of SF in Poland and the more ambiguous approach visible in EC's framework programmes, where work programmes and calls for proposals might have been influenced by powerful lobbying organisations, and the ambiguity of some documents and evaluation criteria that diverge from standards to which Polish applicants are accustomed thanks to SF.

Dissatisfaction with the administrative burdens, related to SF funding, was common among interviewees. Many of requirements, which were perceived as inefficient, result from legal and procedural requirements of the EC. Interestingly, some interviewees noticed that the same funding agencies, which were involved in SF implementation, were able to act more efficiently when distributing state-based funding for R&I. This confirms that the perceived relative inefficiency is linked to specific SF regulations rather than being a general feature of the Polish public administration. Interviewees identified significant differences in attitudes and modes of work of funding agencies, with the measures available from FNP and NCBiR considered the most "applicant-friendly", requiring relatively simple application contents and clearly linked to the evaluation criteria.

Additionally, some organizations, which actively benefit from SF, including public universities, adopt internal regulations based on the most stringent ESIF-related requirements in order to avoid potential problems with project implementation. This behaviour unnecessarily complicates the work of researchers, and is not a feature of Polish public administration, but rather results from a risk-averse approach of organizational management. When discussing the inefficient procedures, representatives of ministries and funding agencies also provided examples of interactions with the European Commission, which resulted in substantial delays in accepting Polish proposals for improvements of certain support measures in the 2007-2013 perspective (e.g. a delay of 2 years in responding to Poland's proposal of adjustments to cost calculation methodology, as stated by an interviewed government representative), and some of the interviewees expressed dissatisfaction with the design of certain ESIF support measures adopted for 2014-2020.

When discussing the complexity of application procedures, representatives of government and funding agencies turned out to be more critical than the funding beneficiaries. As one public-sector representative explained, there is a constant struggle with "*the hydra-headed bureaucracy*" within the domestic public administration, attempts to simplify matters and reduce administrative burdens. Some requirements could not be eliminated due to legal requirements, particularly with reference to ESIF. At the same time, Poland managed to modify its legal framework in ways supporting faster absorption of funds, e.g. in 2014, the Acts on Public Procurement and on Higher Education were amended, facilitating the use of public procurement in scientific R&D projects and improving organisational IPR management practices.

In the first years of Poland's EU membership, some SF application criteria were considered unjustified. Widely-cited examples referred to included: applicants being required to fill in their applications using blue ballpoint pens, with other colours disqualifying the documents, or the need to sign and stamp every single page of application and annexes. Applications included extensive narratives concerning e.g. consistency between the proposed project and regional development strategies, which could be copied across various applications and were most likely not really evaluated. A representative of a public university pointed to another example of problematic requirements: the need to formally prove that a university with several hundred years of tradition will continue its operations after the project completion. For some types of applications, complex feasibility studies or business plans were required, and were costly and time-consuming to produce, even though not really used at proposal evaluation and project implementation stages, as actual business planning processes differed from the required templates. Interestingly, beneficiaries were less critical of the administrative burdens than the government representatives. As one company representative explained, "*in the end, we are applying for large sums of money and these people also need to verify us*". An interviewed representative of a large consulting firm, specializing among others in SF/FP application development, suggested that Polish companies can cope with the application procedures, and only about 10-20% of applications are prepared in co-operation with consultants, while SMEs usually resort to the help of

consulting firms for their first application, afterwards continuing without external help. An interviewee representing management of a large public university maintained that while applications procedures might be complicated, applicants know certain typical requirements and have mastered addressing them. As many respondents confirmed, the use of appropriate “policy language” and the inclusion of certain keywords greatly enhances the funding probability.

The government learned a lesson from these initial shortcomings, and this is visible in procedures, prepared for the 2014-2020 perspective, with streamlined application contents, easy to understand evaluation criteria, reduced number of necessary documents and reliance on electronically submitted applications, linked to an external workflow system of the funding agency. Many of these positive changes resulted from the continuous interactions between the European Commission (DG REGIO) and the Polish authorities. For the most popular R&D support measure, co-funding research projects of SMEs, NCBiR committed to complete the evaluations and communicate the funding decisions within 60 days from the application submission.

2.6. SWOT analysis. An analysis of the Polish R&I system’s strengths, weaknesses, opportunities and threats will be presented, taking into account the narrative presented above, as well as further insights from interview and desk research, which are outlined in chapter 3 of the report. The SWOT analysis is focused on the governance of the SF/ESIF, representing changes between the 2007-2013 and 2014-2020 perspectives.

Positive factors	Negative factors
Strengths	Weaknesses
<ol style="list-style-type: none"> 1) high absorption rates of SF in 2007-2013 2) high ESIF allocations for R&I in the 2014-2020 perspective 3) ethical and transparent application evaluation procedures 4) policy learning, taking into account lessons learned, results of evaluations and stakeholder consultations 5) reactivity of funding agencies and government institutions, including modifications of support measures during the 2007-2013 cycle 6) ESIF modalities for 2014-2020 improved based on 2007-2013 experiences 7) strong orientation towards the commercialisation of R&D results 8) R&I support measures covering the entire innovation cycle 9) fast-track funding decisions in R&I support measures, 2014-2020 10) good research infrastructures, established in the 2007-2013 perspective 	<ol style="list-style-type: none"> 1) lack of stable R&I funding through tax exemptions forcing companies to rely on grants 2) isolated SF programming efforts for different operational programmes in the 2007-2013 perspective 3) imbalance between ministries and funding agencies with imperfect co-ordination 4) limited co-ordination between central and regional funding agencies – and regional preferences to independently shape own R&I policies 5) lack of a “one-stop shop” approach to applicants and beneficiaries 6) high administrative burdens in SF projects 7) lack of trust, with excessive controls of beneficiaries and distance maintained between public administration and private companies 8) risk aversion of funding agencies, resulting from inability to cover ineligible costs from own sources 9) long delays accepting amendments to plans of SF-funded projects by agencies 10) complicated rules for using research infrastructures funded by SF in the 2007-2013 perspective 11) low salaries in the public science sector 12) low remuneration of application evaluators
Opportunities	Threats
<ol style="list-style-type: none"> 1) customer-oriented attitudes of funding agencies NCBiR and FNP 2) streamlining application and evaluation processes in the 2014-2020 perspective 3) planned use of expert panels to strengthen evaluation of innovativeness and commercial potential of projects 4) NCBiR’s sectoral programmes capturing the essence of entrepreneurial discovery process 5) policy focus on stimulating science-industry collaboration 6) stronger role of regions in distributing ESIF funding for R&I in 2014-2020 	<ol style="list-style-type: none"> 1) excessive focus on technology development by business enterprises in ESIF, with less support for scientific research 2) limited interests of business enterprises in R&I efforts 3) NCBiR’s work overload in the 2014-2020 perspective 4) substantial R&I funding distributed in the 2014-2020 perspective through regional agencies, with limited relevant regional experiences, as R&D support was centrally co-ordinated in 2007-2013 5) risk of evaluating the ESIF applications without sufficient involvement of business experts if numbers of applications are very high 6) ESIF applicants mastering “the art of writing

<p>7) direct complementarities between ESIF and H2020 support measures</p>	<p>applications” rather than carrying out good projects</p> <p>7) funding agencies focusing on meeting quantitative targets for ESIF with less interest in research excellence and innovativeness</p> <p>8) public universities and research institutes adopting conservative interpretations of legal regulations and thus complicating project implementation</p> <p>9) limited command of English among business enterprises, restricting their involvement in international programmes</p>
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Table 1. SWOT analysis of the governance of R&I system, focused on the governance of SF/ESIF.
Source: own elaboration.

3 FACTORS THAT SUPPORT OR LIMIT THE NATIONAL PARTICIPATION IN R&I CALLS FUNDED BY SF/ESIF

3.1. Design of ESIF support measures. In the 2007-2013 period, SF funding instruments for R&I included a wide selection of measures, matching requirements of various applicant groups. As the interviewed government representatives suggested, certain support measures were premature (e.g. support for innovation clusters, as such clusters did hardly exist in 2007), certain levels of allocations proved insufficient (e.g. too scarce funding for commercialisation of R&D results, contrasted with substantial budgets for early-stage technology development). ICT companies complained about the use of patent-based measures as expected project results, as software patents are not admissible in Poland. At the same time, the speed of SF absorption in recent years proved that the majority of interventions were designed in adequate ways. For 2014-2020, the contents of operational programmes replicate the best, proven support measures from the previous financial perspective, and introduce new measures, taking into account the experiences of pilot programmes initiated by NCBiR.

Some interviewees expressed apprehension that the strong prioritisation and targeting mostly projects compliant with smart specialisations in 2014-2020 might have a negative impact on the R&I system as this limiting approach diverges from the rapid pace of technological changes, restricts creativity and discourages explorations of radically new research areas. Others were more positive, arguing that the lack of prioritisation in the previous perspective resulted in dispersion of funds and smaller project budgets, and the present, focused approach could be beneficial.

Representatives of ministries and funding agencies confirmed the over-supply of applications in 2007-2013. Submitted applications included both excellent project proposals as well as sub-standard documents, which were receiving negative feedback already at early evaluation stages. Some applicants mastered “the art” of writing compelling project documentation meeting the evaluation requirements, while not always delivering real added value through project implementation. This challenge will be addressed in 2014-2020 with the use of expert panels, supplementing the evaluation of written applications and offering opportunities to more thoroughly verify a project's feasibility, business benefits, innovativeness and research excellence.

More general criticism concerned the overall approach to ESIF as a financial leverage for the R&I system. One of the interviewed scientists criticized the strong orientation towards applied R&D driven by business enterprises, stating that: *“the question is, what the [Polish] state would like to get out of it. Does it want to have a commercial product within 5 years, or [ambitious] research, which could deliver something, within 10 years?”* In this view, the use of ESIF in Poland seems to be oriented towards short-term economic benefits, which are faster to achieve but not necessarily substantial and long-lasting. Understandably, the representatives of scientific organisations are dissatisfied with the design of ESIF for 2014-2020, as universities and research institutes will benefit from R&D funding primarily as partners in consortia, led by business enterprises, and this raises a question: *“does the government want to turn universities into [contract] research back-offices of companies, or [would it prefer] to establish new firms [resulting from academic research] in a longer time perspective?”* An experienced researcher from a large public university criticized the tendency to form science-industry consortia for publicly co-funded R&I projects, which has become increasingly popular in recent years in Poland: *“these [consortia] are often coincidental, ad hoc liaisons of scientists with businessmen”*. This statement could however be contrasted with an opinion expressed by a representative of a technological company, who suggested that Polish scientists displayed opportunistic behaviours by lobbying for the introduction of dedicated SF/ESIF measures that would not contribute to the increased innovativeness of the economy. A respondent, representing a large enterprise, complained also about the preferences for SMEs in SF, and limitations of maximum number of projects that could be submitted by one applicant.

3.2. National co-funding. Lack of national co-funding was not considered a problem in the 2007-2013 perspective. For SF projects executed by public universities and research institutes, 100% of costs were covered by combination of the EU SF and the state budget. This approach changes in the 2014-2020 ESIF cycle, as for the majority of support measures, scientific organisations will need to secure co-financing from their own financial surplus or bank loans, and this might prove particularly challenging for large research infrastructure projects. At the same time, the requirement to provide co-funding is considered an important self-selection mechanism in ESIF, and funding agencies intend to reduce the possibility of using in-kind contributions by business enterprises, as the need to financially co-fund projects from their own sources

ensures that applicants carefully consider the feasibility of their projects. Nevertheless, SMEs experience problems with securing commercial credits for R&I projects, as both banks and private investors favour less ambitious and less innovative projects, from which the returns on investment are more certain. Some beneficiaries complained about the lack of clarity with regards to the use of in-kind contributions in SF co-funding in 2007-2013, and unwillingness of funding agencies to provide straightforward answers concerning these possibilities.

In the 2007-2013 perspective, problems with co-funding for university projects in SF arose in one of Poland's regions. They were induced by the specific design of a regionally available support measure, which diverged from the centrally developed template. In consequence, based on the interpretation of the Office of Competition and Consumer Protection (UOKiK, *Urząd Ochrony Konkurencji i Konsumenta*), the applicant universities were required to provide 50% co-funding, which would be free from public aid, i.e. would not include financial sources repurposed from the institutional funding, distributed among the universities by the government. According to an interview with a representative of a regional funding agency, this shortcoming in the design of a regional SF support measure resulted in a substantial distortion of R&I projects, with about 400 funded projects carried out by business enterprises and only three projects delivered by public higher education institutions. This negative example could serve as a warning in the wake of the new financial perspective, suggesting that the SF participation rates of scientific organisations could drastically fall due to the requirement for co-funding.

3.3. Eligibility of costs. Problems with eligibility of costs in SF projects were identified only by several interviewees. In 2007-2013, support measures had individual lists of eligible costs, with upper limits for some cost categories, and these lists were considered sub-optimal, e.g. some research projects could not include expenditures on participation in workshops or trainings, while projects focused on competence development or infrastructure implementation could not include R&D components. The most problematic scenario concerned projects establishing research infrastructures, in which salaries of researchers were ineligible, even though the scientists were required to allocate substantial work efforts on implementing, configuring and testing the acquired equipment.

Certain cost categories were unclear to applicants, and required further communication with funding agencies. An interesting tendency was also observed at some public universities and research institutes: whenever the eligibility of certain expenditures was uncertain, the management preferred to avoid potential risks and eliminate the expenditure from the project budget instead of further investigating its admissibility. A comparable risk aversion was observed at some funding agencies, which were not willing to accept deviations from the initial, detailed cost schedules. Amendments to project budgets were only accepted after lengthy processing delays, with decisions made sometimes too late for the project changes to actually be implemented, although funding agencies differed with regards to their flexibility. The need to amend budgets is not always understood by agency staff, but often needed in R&I projects, as e.g. component technologies are constantly being improved and project teams would like to benefit from the newest available generations. Similarly, when completed project tasks demonstrate limited feasibility of the originally planned approach, project changes would be desirable to generate the positive project results instead of sticking to the initially agreed schedules.

The tendency among funding agencies, which enforced the above-described inflexible approach to project plans and budgets, was mirrored by a positive phenomenon: the relative stability of regulations, impacting project implementation. Agencies were consistent in applying specific regulations to beneficiaries from a given SF call, even though modalities for subsequent calls could be more elaborated.

The above-described unwillingness to accept amendments to project plans and the risk-averse approach to eligibility of expenditures can be linked to the budgetary restrictions of funding agencies, which fear that any mistakes would need to be covered from their own, limited budgets. As a director of one of these agencies explained, *"institutions such as ours mostly learn from people who control them and from what they complain about, from reasons why [certain sums of] money cannot be reimbursed. And this is of course a question of choice, whether one decides to act otherwise, despite these experiences, and to [risk] refunding money from own sources. This could always be done, [covering] ineligible expenses can always be done. And to say: 'why should I explain expenses amounting to 500 Polish zloty [~ €122], if I could cover them from my own funds. This would be the most desirable approach to beneficiaries in critical situations, when doubts arise. These doubts could be resolved in two ways: either by analysing the problem for many months, or by covering the [questionable] payment from own sources. [...] Most long-lasting problems concern small contingencies, questionable things with small [financial values]. Of course, we are a country, in which [public] institutions are still not particularly rich, so they could not bear the [financial] burden of the ineligible costs, [they could not]*

accept the [questionable] expenditures as eligible, without collecting evidence that the case was exceptional or resulting from force majeure". According to the interviewee, the minuteness in analysing project expenditures and lengthy considerations of eligibility are related to the financial standing of the Polish government and its inability to take the financial risks by accepting potentially ineligible expenditures, which would later need to be covered from the state budget. As one of interviewees hypothesized, this aspect might differentiate approaches to SF/ESIF by funding agencies in the Central and Eastern European countries, and some of the more wealthy member states of the European Union.

3.4. Administrative capacity of funding agencies. Interviewees highlighted significant differences in the administrative capacities and approaches of various funding agencies, which distributed SF in the years of 2007-2013. While appreciating the efficiency of some agencies and positive attitudes of their employees (FNP, NCBiR), interviewees also provided examples of problems with other institutions (OPI, PARP, regional agencies). In some cases, applicants and beneficiaries could not receive answers to their detailed questions from specialists employed by the agencies, who only had limited knowledge of specific regulations or in some extreme cases they were actually learning about the subject matter from beneficiaries. According to the interviews, some agencies avoided offering in-depth answers or interpretations of problematic matters, and did not respond in a timely manner. In one of cases described by an interviewee, a funding agency offered answers only after the call's deadline. One of the government representatives shed light on these problems by referring to an informal international benchmarking exercise, involving one of Polish SF agencies and its counterpart from a Western country. According to the interviewed government representative, the foreign agency was supposed to process 30 project applications, while the Polish institution had to cope with over 16,000 applications in the same time period, having headcount restrictions and strong anti-corruption procedures, which were influencing response times and restricting contacts with applicants.

In contrast to the above-mentioned challenges, FNP and NCBiR received strongly positive ratings from beneficiaries, and were praised for possessing the right competencies and displaying "*creativity in solving problems*". According to the opinion expressed by a representative of a technology firm, who had experiences with multiple funding agencies at both central and regional levels, "*NCBiR is the best institution, with which I've collaborated. It seems to me that there is a good team of well-trained people. They are simply down-to-earth. One can call them, communicate by e-mail, talk on the phone, and they do not act as if they were behind [Chinese] walls, invisible, unreachable*". Similarly positive comments were presented by scientists who had experiences with FNP.

NCBiR started taking over SF support measures from other implementing agencies in the middle of the 2007-2013 cycle, and some beneficiaries noticed positive changes with reference to the same ESIF instruments thanks to this reassignment. The Centre seems to function as a "well-oiled machine", but it remains uncertain if it could cope with the substantially increased workload in POIR, when it will be in charge of the most critical R&I support measures. Before the 2014-2020 perspective, the government analysed the availability of human resources in ESIF-implementing agencies concluding that both the headcounts and the competencies are adequate, and in 2015, both ministries and agencies claim that the numbers of employed specialists match their actual needs. These claims will soon be put to a test. Agencies increasingly rely on specialists with short-term contracts including staff employed through outsourcing partners to circumvent the hiring freeze in the government, and tend to outsource the processing of financial documents and project audits.

In 2013-2015, FNP organized several editions of a free-of-charge training cycle "*Academy of Programme Managers*" ("*Akademia Menedżerów Programowych*") to strengthen skills of employees of various funding agencies, including their legal, financial, social and ethical competencies. The trainings were supplemented by short international internships at the leading European R&I funding agencies. The Academy's timing was synchronized with the preparations for the new financial perspective, and many specialists in charge of the present ESIF support measures have completed the study programme.

3.5. Delays and timing of calls. While the interviewed beneficiaries did not identify delays in announcing calls for R&I funding, government representatives mentioned some incidental cases when delays occurred due to complicated legal matters. Some SF calls in the 2007-2013 perspective had deadlines foreseen during the holiday season or at times, which were inconvenient for applicants, and submission dates were announced only several weeks in advance. At certain times of the year, submitting an application might have been challenging for many organisations, as the extensive, paper-based documents required signatures of representatives of the company or university applying, and the authorised person might not be available. As one of interviewees suggested, "*funding agencies probably assume that the best project applications will come from the most desperate applicants*". For the 2014-2020 perspective, Polish law stipulates that time

schedules of ESIF calls should be published on an annual basis, thus giving applicants sufficient, advance notices, and electronic submissions will facilitate the process.

The length of application evaluation process was considered problematic by many interviewees, who reported that they had to wait on average for 4-7 months for evaluation reports, while R&D projects in highly competitive areas require much faster decision making. Many organisations could even benefit from negative funding decisions, as long as they were made quickly and allowed for identifying other sources of financing or redesigning the project. There were problems with long time periods between subsequent SF calls (6-12 months), which did not correspond to the reality of industrial research. Also, some funding agencies were not able to comply with initially planned evaluation schedules, probably due to the unexpectedly large numbers of applications and higher than estimated workloads. These problems seem to be rectified at present by the fast-track application handling and continuously open calls for proposals offered by NCBiR, embedded in the new ESIF implementation procedures.

Payment delays occurred if beneficiaries were falling behind project execution schedules, or if there were concerns about some of their previous expenditures. Mistakes in payment requests submitted by beneficiaries were not uncommon, including failures to attach all of the required financial documents. The only payment-related element, which was considered as problematic by beneficiaries, was the rule that the last part of SF project budget could not be paid in advance but only refunded after the successful completion of the project and its final audit. While this approach was understood and accepted, the audits were often substantially delayed, and some interviewees even maintained that some audits were organised 18 month after the project finished, thus putting unnecessary financial pressures to secure bridge financing and manage cash-flow problems linked to these project contingencies.

3.6. Managerial capacity of applicant organisations. Interviewees identified another problem, related to the managerial capacities of applicant organisations. Many potential applicants are not aware of the existence of suitable support measures, or mistakenly believe that they could not meet the criteria, the grants are very difficult to apply for, or that the competition is prohibitively high. The problem with insufficient access to information can also partly be attributed to the communication strategies of funding agencies and government organisations, but at the same time, they were constantly promoting the available support measures in the 2007-2013 perspective.

The majority of business enterprises are not interested in R&I, or do not understand the essence of R&I and think that their efforts in the area of product development do not fall into this category and thus, could not be co-funded. As suggested by an interviewee representing one of ministries involved in ESIF programming, SF/ESIF applicants need to ensure "*a certain level of organizational culture*" in order to prepare successful applications and adequately manage the projects. A representative of a large consulting firm admitted that some of their prospective clients in Poland cannot describe their R&I ideas and expect consultants to draft the entire contents of the application, while others mistakenly believe that their proposed technical solution is innovative, without performing a basic prior art analysis using search engines or patent databases. These problems concern only a small group of organisations, but they highlight the importance of practical managerial education as another factor, which could enhance the national participation in R&I calls funded by ESIF.

Many public universities and research institutes have offices, which are supposed to support researchers at the stages of applying for projects and implementing them. In some cases, their focus is rather on approving documents prepared by researchers instead of proactively supporting them. Researchers need to employ their own project administrators, whose salaries could only be covered from the grants, and employment relations are terminated as soon as the projects finish, thus creating "*a guerrilla approach from one project to another*", as described by one of interviewees. A funding agency admitted that scientific organisations in Poland used to commit various, minor accounting errors, which revealed the limited legal and financial awareness, and were uncovered during SF audits.

3.7. Administrative burden at the project implementation stage. Interviewees, who benefited from both SF and FP funding, confirmed that SF-based projects required substantially more administrative work. The most burdensome part of the work referred to reporting obligations, which were precisely defined in co-funding agreements. Various support measures had different reporting rules in the 2007-2013 perspective, with some measures requiring submission of reports even on a monthly basis, and interviewees highlighted the particular stringency of regional agencies in this respect. Most agencies were asking for detailed descriptions of financial documents and linking them to project deliverables. For some scientists, these requirements seemed excessively bureaucratic, but others suggested that R&I projects require a structured, methodological approach, involving regular reporting, team meetings, e-mail co-ordination and verification of

work performed by other team members. Certain particularly onerous requirements were imposed by some public universities not funding agencies, e.g. young researchers managing projects were obliged to collect multiple initials from senior university staff for each project-related decision, or internal financial departments insisted on certain, inconvenient courses of action threatening that in other cases, they would not process accounting documents of the project.

Further problems arose during project audits, which tended to be invasive and sometimes took a long time, until at least some irregularities were identified. When the project audit function was outsourced to specialized firms, the stringency increased as argued by the interviewed R&I performers, who were discussing examples of audit-related problems, concerning both universities, research institutes and business enterprises. Auditors tended to focus on relatively basic financial metrics, which nevertheless required substantial effort to compile the necessary data, and the audited beneficiaries were expected to prepare the documents for auditors according to a pre-defined structure, spreadsheets or tables, even though the auditors were actually remunerated for this type of analytical work themselves. According to one interviewee, auditors were primarily interested in verifying whether funds had been spent and all the deliverables declared in the initial application delivered, without looking into the specificity of the results achieved, i.e. it was important to have the specific number of deliverables but their quality or research excellence was of minor importance: *"it is easier for the officials to 'tick the boxes' in this way, but science cannot be measured like this"*. The excessive focus of audits on formal and financial aspects of projects was also confirmed by an evaluation report concerning RDI support in 2007-2013 SF (OPI – MillwardBrown, 2014: 130).

An example of superfluous requirements presented by auditors was for a thorough verification whether a large public university was regularly paying social security contributions for each project employee, even though the checks of source documents could easily be substituted by a quick analysis of the university's bank account statements. Another example of useless but typical verifications involve controlling whether every piece of equipment purchased within a SF project has the correct stickers, including logos of the operational programme and symbols of the EU, even though sticking such labels to certain high-precision infrastructure might not be possible due to the fears that the laboratory environment becomes contaminated or damaged. Another discussed example of audit problems was related to a publication in a scientific journal, which for editorial reasons could not include the formally required logotype, only an acknowledgement text. Some audits initiated lengthy exchanges of correspondence between beneficiaries and funding agencies to appeal negative decisions. Some interviewees described also their experiences with audits of the European Court of Auditors, which in their opinions were unexpectedly more pleasant than their interactions with Polish auditors.

3.8. Specific situation of public universities and research institutes. Public universities and research institutes in Poland belong to the public sector, and need to comply with specific regulations concerning finance, procurement and employment. These regulations are bound to pose additional challenges when executing SF/ESIF-funded projects. Public procurement regulation were widely considered by interviewees as the source of sub-standard project results, unnecessary, time-consuming efforts and project delays. Interestingly, even though Poland amended in 2014 the Act on Public Procurement, relaxing the requirements for scientific organisations to facilitate the use of single-source procurement, these amendments did not directly influence the SF projects. Even though certain levels of expenditures on research equipment are freed from the obligation to organize public tenders, problems arise when the same items could be used both for research and office or manufacturing work, as e.g. in the case of personal computers. University administration, experienced in dealing with invasive controls by tax officers, might prefer to organize a public tender to avoid any potential problems. Tenders limit the cost efficiency of certain purchases, which could be acquired faster and cheaper online or through direct contacts with foreign suppliers, but need to be processed by local intermediaries, who charge high margins but are willing to submit bids in the procurement procedure in Poland. Flight tickets for project-related trips need to be purchased through a supplier selected in a public tender, and materials used in projects might also be subject to tenders in the likely scenario of the overall value of materials, acquired annually by a scientific organisation, exceeding the upper legal limits for the single-source procurement. Internal procedures concerning project purchases at scientific organisations are in some cases more stringent than national regulations.

Other challenges concern the recruitment of project team members, which might be difficult and time-consuming even though their salaries are covered by the project budget. Some organisations recruit doctoral candidates only once per year, regardless of project-related needs, and others - do not offer doctoral studies and need to make arrangements with another institution to officially admit the Ph.D. candidates into a formal educational programme.

Researchers at universities might also find it difficult to combine their teaching and research responsibilities, and the reduction of teaching duties while managing a publicly co-funded R&I project is not always possible or turns out to be insignificant compared to the project workloads. As one of scientists explained, *“people are afraid of the burden and the lack of support. A project manager needs to take care of all aspects of the project. [...] Nobody wanted to share with me this responsibility. Everything was done by myself: finance, public procurement...”* Some interviewees referred also to a demotivating climate at certain scientific organisations, where successes of ambitious, younger researchers might be disapproved of (*“if someone is overreaching himself, his head might be cut off”*), so young scientists managing ambitious R&I projects might experience additional, organisational challenges.

4 PUSH – PULL FACTORS FOR R&I PERFORMERS TO PARTICIPATE IN FP7 / H2020

4.1. Competition with other funding opportunities. Competition with national funding opportunities is an important demotivator for FP7/H2020 applicants. R&I grants available in Poland are attractive, relatively easy to obtain and applicants are already familiar with the logic of the application and reporting processes. R&I support measures based on the state budget combined with SF/ESIF instruments offer so much funding that many Polish applicants do not want to look for more difficult sources of financing abroad. As one of interviewees explained, *“in Poland, one competes against 100,000 organisations, while in the EU, against 5 million applicants”*. One of the most successful SF/ESIF support measures, available both in 2007-2013 and 2014-2020, targets innovative SMEs and can be perceived as direct competition to the H2020 SME Instrument, but the application is in Polish and funding decisions already cover the entire project, not merely the preparation of a feasibility study. Collaborative projects in FP7 and H2020 are in turn based on a different institutional logic, and require mature collaboration with international partners. ESIF support measures allow individual project delivery or formation of local consortia, in particular with scientific organisations, and they are focused on developing technologies for commercial purposes rather than on pursuing research excellence. In addition, Polish applicants tend to think that H2020 applications are more difficult than preparation of comparable documents for ESIF, and these beliefs are actually not correct, as ESIF-related regulations involve relatively higher administrative burdens both at the application and project implementation stages. Many representatives of scientific organisations combine SF/ESIF and FP7/H2020 funding, while business enterprises tend to focus on SF/ESIF, with only a small group of firms deciding to apply in the EC framework programmes. Interestingly, only a very limited number of business enterprises combined both SF and FP7 funding, and most private sector beneficiaries of FP7 were not using SF at all.

4.2. Personnel lack skills. Lack of qualified professionals, capable of managing publicly co-funded projects, might be another factor contributing to the limited popularity of FP7/H2020, but the same problems should concern SF/ESIF as well, as both scientists and business enterprises in Poland actively apply for this type of funding. There are many training opportunities, concerning managing R&D projects or general project management, including courses co-funded from SF. Certain shortcomings are visible in R&I projects of scientific organisations, where experienced scientists tend to nominate themselves as project managers, without having the relevant managerial or organizational skills. This behaviour might sometimes result from the lack of permanently employed project specialists at universities and research institutes: scientists need to secure funding for projects and administrative positions can only be funded from project budgets, without continuous guarantees of employment. Moreover, many researchers and business enterprises do not maintain active international collaborations and the lack of competencies necessary to form and manage networks of partnerships limits the involvement in collaborative projects. According to interviews, the most critical factor, related to competencies, seems to be the limited command of English among business enterprises, as project applications cannot simply be translated by external interpreters, and the linguistic fluency is required to ensure engagements with partners while preparing and implementing the project. Limited availability of H2020 documentation in Polish language is considered another barrier by some potential applicants. At the same time, key R&D support measures offered in the 2014-2020 perspective by NCBiR require parts of the project applications to be prepared in English, and it is likely to further stimulate the use of international communication by R&D personnel of business enterprises in Poland.

4.3. Experiences with FPs and involvement in H2020 programming. Participation in FP schemes is path dependent, i.e. previous participation as beneficiary or evaluator of projects helps prepare better applications in subsequent calls for proposals. Even though many Polish experts acted as FP evaluators in the past, there is no matching mechanism, which would allow potential applicants to benefit from the knowledge and experiences of people who have evaluated proposals in previous calls. In addition, Polish applicants do not have adequate representation on the European level, which could support their application efforts, participate in consulting FP work programmes or offer practical advice concerning projects. Most researchers are not aware of the existence of PolSCA (*Polish Science Contact Agency*) in Brussels, which was established by the Polish Academy of Sciences in 2005 and delivers free advisory services to the entire scientific community. PolSCA's capacity is limited by its headcount (3 employees), and the Agency organizes networking meetings, offers expert support and information sharing. One of successful Polish FP7 beneficiaries described positive experiences with PolSCA's support in Brussels, but the remaining interviewees were not even aware of the Agency's existence. Similarly, Polish government is perceived by some interviewees as insufficiently engaged in H2020 programming efforts, as contents of many work programmes do not correspond to Polish research specialisations or technology areas particularly important to the national economy. Contrary to perceptions of many interviewees, Polish government employs diplomatic experts in Brussels, directly involved in R&I policy setting processes, but the problems might also demonstrate an EU-wide institutional mismatch, as H2020 programming was disjoint from the parallel planning processes for ESIF, which involved identification of national and regional smart specialisations. In H2020 programming, important roles were played by DG Research & Innovation, European Research Area and Innovation Committee and on the country level, the Ministry of Science and Higher Education. Smart specialisations identification was in turn coordinated by the Polish Ministry of Economy and DG REGIO, and insights gained from the local entrepreneurial discovery processes have in no way influenced the work programmes of H2020, even though the Framework Programme should also take into account existing strengths and opportunities. Some interviewees indicated this lack of "science-oriented lobbying" in Brussels as the source of the design of H2020 work programmes, which according to their views disadvantage project proponents from Central and Eastern Europe, and promote interests of more experienced applicants from Western European countries. Three KIC co-location centres, established in Poland and operating in fields consistent with national smart specialisations, support international networking of innovative firms, and the KICs' operations benefit from the support of central and regional governments. Polish government and NCP were also actively promoting the involvement of local enterprises in European technology platforms, but those players who participate in such initiatives do not seem to derive from them direct benefits.

4.4. H2020 salary regulations. Scientists employed at public universities or public research institutes had additional financial motivation for participating in FP7 projects, as they were able to benefit from higher hourly rates than their actual remuneration stipulated in employment contracts. This FP7 regulation was justified by substantial disproportions in salaries of researchers between Poland and other parts of Europe. H2020 salary regulations are different, and only base salaries of researchers can be reimbursed (EC, 2015a: 41), alongside an annual bonus of up to €8,000, which could only be considered eligible in project budgets if the institution meets certain conditions, unlikely to be fulfilled by many scientific organisations in countries like Poland (Greenhalgh, 2014). This leads to proportionally lower budgets for Polish participants of collaborative projects, when project expenditures mostly concern salaries of researchers.

Table 2 compares average salaries of researchers (both from public and private sector) representing different EU member states in 2006 and 2012. It reveals substantial differences in remuneration, with Polish researchers receiving in 2006 on average only 23% of salaries of researchers from EU-15 countries (annual salary of €11,659 in Poland compared with the average salary of €50,364 in EU-15) (CARSA, 2007: 19). The data for 2012 reveals that the researcher salaries in Poland did not increase notably in comparison with the period preceding the launch of 7FP (IDEA Consult, 2013: 41). Salaries of Polish researchers employed by public universities and public research institutes are likely to be lower than the values listed in Table 2, which also include employees of R&D centres of technological companies.

Country	Gross annual salary of researchers in 2006, €	Gross annual salary of recognised researchers (R2 level) in 2011-2012, €	
		minimum	maximum
Austria	€62,406	NA	NA
Belgium	€58,462	€46,756	€72,888
Denmark	€61,355	NA	NA
Finland	€44,635	€33,000	€50,000
France	€50,879	€14,484	€20,322
Germany	€56,132	€38,244	€58,812
Greece	€25,685	€23,355	€33,912
Ireland	€60,727	€19,665	€81,456
Italy	€36,201	€34,898	€45,367
Luxembourg	€63,865	NA	NA
Netherlands	€59,103	€33,200	€69,360
Portugal	€29,001	€35,172	€43,428
Spain	€34,908	€25,200	€35,314
Sweden	€56,053	NA	NA
United Kingdom	€56,048	NA	NA
Average EU-15	€50,364	NA	NA
Bulgaria	€3,556	NA	NA
Croatia	€16,671	NA	NA
Cyprus	€45,039	NA	NA
Czech Republic	€19,620	NA	NA
Estonia	€11,748	NA	NA
Hungary	€15,812	NA	NA
Latvia	€10,488	NA	NA
Lithuania	€13,851	NA	NA
Malta	€28,078	NA	NA
Poland	€11,659	€8,415 (35,220 PLN)	€14,106 (59,040 PLN)
Romania	€6,286	NA	NA
Slovakia	€9,178	NA	NA
Slovenia	€27,756	NA	NA
Average EU-13	€16,903	NA	NA

Table 2. Gross annual salaries of researchers from public and private sector in 2006 and 2012. Source: CARSA (2007), IDEA Consult (2013) (NA=not available).

The differences in salaries of researchers from EU-15 and EU-13 members states impact the budgets of projects funded from FP7 and H2020, as comparable R&I efforts of different consortium partners are disproportionally remunerated. Table 3 presents data on average project budgets in FP7 and in H2020 (79 calls). The data are derived from the Seventh FP7 Monitoring Report (EC, 2015b: 111-172) and from a report summarizing results of H2020 calls closed between December 2013 and February 2015, based on e-Corda database (KPK, 2015: 5).

Country	Number of FP7 grant holders	Average contribution per participation in FP7, €	Number of H2020 applicants with retained proposals	Average contribution per participation in H2020, €	% change in average contribution between FP7 and H2020
Austria	3,516	€336,806	492	€386,198	+14.66%
Belgium	5,458	€337,466	764	€402,982	+19.41%
Germany	18,088	€394,542	2,249	€672,992	+70.58%
Denmark	2,754	€385,113	376	€405,451	+5.28%
Greece	3,706	€269,960	481	€289,611	+7.28%
Spain	11,164	€291,681	1,614	€324,693	+11.32%
Finland	2,650	€330,619	332	€360,713	+9.10%
France	12,590	€408,476	1,533	€455,491	+11.51%
Ireland	1,957	€319,852	260	€373,432	+16.75%
Italy	11,845	€303,066	1,431	€328,288	+8.32%
Luxembourg	246	€245,488	67	€296,524	+20.79%
Netherlands	8,151	€408,535	1,124	€478,584	+17.15%
Portugal	2,348	€221,763	398	€271,412	+22.39%
Sweden	4,506	€379,019	524	€422,896	+11.58%
United Kingdom	17,561	€395,197	2,214	€408,581	+3.39%
EU-15		€359,241		€433,232	+20.60%
Bulgaria	702	€140,499	94	€89,939	-35.99%
Croatia	397	€225,466	72	€126,598	-43.85%
Cyprus	460	€201,913	95	€201,284	-0.31%
Czech Republic	1,415	€203,852	202	€189,182	-7.20%
Estonia	543	€173,591	99	€142,998	-17.62%
Hungary	1,602	€181,348	183	€182,968	+0.89%
Latvia	329	€147,416	61	€145,566	-1.26%
Lithuania	419	€131,527	51	€118,895	-9.60%
Malta	191	€109,581	32	€82,309	-24.89%
Poland	2,210	€198,769	289	€162,426	-18.28%

Country	Number of FP7 grant holders	Average contribution per participation in FP7, €	Number of H2020 applicants with retained proposals	Average contribution per participation in H2020, €	% change in average contribution between FP7 and H2020
Romania	1,057	€135,705	202	€116,047	-14.49%
Slovakia	484	€162,025	85	€104,820	-35.31%
Slovenia	918	€186,133	161	€195,446	+5.00%
EU-13		€178,130		€154,294	-13.38%

Table 3. Average contribution per participation in FP7 and H2020 (79 calls, December 2013 – February 2015). Source: EC (2015b), KPK (2015).

In FP7, EU-15 countries benefited from total EC contributions of €38273.58m (95.24%) compared with only €1910.8m awarded to EU-13 grant holders (4.76%), and EC contributions provided to Polish beneficiaries of FP7 amounted to €439.28m (1.09%) (EC, 2015b). In the first 79 calls of H2020, EU-15 countries received €6,004.17m (95.99%), EU-13: €250.88m (4.01%) and Poland: €46.94m (0.75%). The low values of R&I project budgets available to Polish beneficiaries can directly be attributed to the divergence in base salary levels across EU countries. The value of Pearson correlation coefficient between gross annual salary of researchers in 2006 (Table 2) and average contribution per participation in FP7 (Table 3) indicates a strong correlation between the variables (0.747). The relative worsening of position of some EU-13 countries including Poland between FP7 and H2020 might further be linked to the salary regulations, which decreased the average EC contribution per project by 18.28%. Average EC contributions to Polish beneficiaries in FP7 amounted to 48.65-89.63% of average contributions allocated to EU-15 countries, but in H2020 the span ranges from 24.13% to 59.84% of contributions awarded to EU-15 countries, and these disparities can also be found in individual budgets of international collaborative projects.

Galsworthy and McKee (2013) referred to this problem as to "the unspoken Eastern European underinvestment scandal" (Galsworthy, McKee, 2013: 184) when discussing disparities in FP7 funding to EU-15 and EU-13 participants, and argued that *"all researchers must use local salaries, so that the bulk of the budget moves to northwest Europe, reflecting the higher salaries there. To believe the differences reflect living costs ignores the financial hardship of Eastern European researchers. EU project salary compensation offers no respite, rather it reinforces the tilted playing field and fuels the brain drain"* (Galsworthy, McKee, 2013: 184). Greenhalgh (2013) discusses specific problems with the H2020 salary regulations and the failure of H2020 bonus schemes to address the challenges of the less wealthy EU-13 member states.

In Poland, the levels of base salaries at public universities are regulated by a government ordinance (MNiSW 2013a), so employers cannot easily increase them in ways allowing them to absorb more funding from H2020 without a major reshuffle of an organization's entire compensation system, and irregular performance-based bonuses are popular motivation instruments at Polish higher education institutes. This situation practically disincentivizes participation of Polish scientists in H2020, in particular employees of public universities, who have substantial teaching workloads and might not find sufficient justification for administrative burdens in H2020 projects, especially as R&I projects funded from ESIF or the state budget could be a source of additional income, added to the existing salaries.

4.5. Administrative burdens and lack of recognition. Academic researchers tend not to benefit from FP7/H2020 participation in terms of prestige at home institutions or academic rewards, as academic promotions tend to be based on specific scientific achievements, including publications, citations, patented inventions and scientific discoveries rather than funding attracted by a researcher. Researchers might fear the project responsibilities, expect only limited organisational support and be afraid of problems with combining project management, research and teaching obligations. Institutional assessments of scientific organisations take into account their performance in FP7 and H2020, and results of these assessments directly translate into the level of institutional funding allocated by the government, but the organisations rarely introduce corresponding motivational bonuses for employees, who were instrumental in securing and managing the international grants.

4.6. Quality of projects. Another challenge impacting the low Polish participation rates in FP7/H2020 is the approach to research excellence and innovativeness. Many interviewees representing the science sector maintained that Poland's science system does not promote quality but quantity (measurable scientific output, e.g. counts of publications or patents), while FP funding focuses on high quality achievements (including research impact measured by citations or other forms of scientific recognition). One of the interviewed researchers explained that scientific excellence is necessary to become a viable consortium partner, *“and not everyone is capable of it”*. Similar problems concern the commercialisation proposals by business enterprises, which often focus on solutions that are innovative only at a country level, as such project proposals were sometimes able to secure funding from SF. As explained by a consulting company representative, helping corporate clients apply for H2020 funding, *“one needs to do breakthrough projects [to apply for H2020], and we only go with ‘our’ innovativeness”*, and descriptions of innovative ideas are often less sophisticated than proposals submitted by applicants from other countries, who use rich descriptions with facts and figures to position their proposed solutions in the market context.

4.7. Use of research infrastructures. Research infrastructure in Poland can no longer be perceived as a limiting factor. SF support measures from 2007-2013 significantly improved the standing of Polish organisations and as one of interviewees suggested, after these substantial investments in research infrastructures, *“nobody has any excuses now”* when it comes to preparing grant applications. Nevertheless, many potential international partners mistakenly perceive Polish scientific institutions as still having low quality, obsolete equipment. The SF-funded infrastructures might also be subject to certain contractual limitations and the public aid regulations might prevent part-time leases, use in commercially-oriented R&I projects or for delivery of contract research services. The situation is further complicated by the diversity of SF-based support measures, which were used to acquire the research infrastructures, with regulations ranging from encouraging commercial uses to prohibiting them. This complexity might intimidate some universities and research institutes, preferring to avoid any legal problems and thus abstaining from applied research projects based on the concerned equipment.

H2020 IPR regulations. Interviewees with substantial experience in FPs indicated also an additional factor, which might limit the programme's participation. Protection of intellectual property rights presents challenges to some highly innovative SMEs, which fear that joining an international consortium would offer their larger, Western partners disproportional advantages. These partners would benefit from access rights to the “background”, definition of which - formulated in article 2 of *“Horizon 2020 Rules for Participation”* (Regulation (EU) No. 1290/2013) - is very broad and encompasses among others any data, know-how and information, also intellectual property rights, held by a participant before starting the H2020 project and identified by consortium members as needed to carry out the project. Businesses relying on protection of trade secrets rather than patenting might have valid concerns about H2020 participation, e.g. SMEs specialized in biotechnology or advanced materials. On the other hand, many Polish firms do not seem to understand the benefits, which could be derived from accessing the background of their project partners, while this could actually be an important factor motivating them to apply for H2020 funding.

5 POLICY INSTRUMENTS FACILITATING THE PARTICIPATION IN (FP7) H2020 / (SF) ESIF

5.1. Support for SF/ESIF participation. For SF/ESIF, no public administration offices offer direct assistance with drafting project proposals, as such actions would be contradictory to national regulations concerning public aid, and the funds should be distributed through open and competitive calls for proposals. Nevertheless, applicants were able to receive information through regular information events, online guidebooks and contact points for each SF support measure. Beneficiaries emphasized that these communication channels were useful for beginners rather than experienced applicants. In addition, the government commissioned services of specialist advisory companies, ensuring additional communication channels with SMEs. This National Service System (KSU) consisted of entities, which went through a formal certification process and participated in the country-wide introduction of new services (including trainings) based on centrally pre-defined templates, and these services were publicly co-funded. KSU network members were also offering support in identifying suitable sources of financing for projects and could potentially offer advice on drafting SF applications, in ways corresponding to the functions of NCPs and EEN contact points in the EC Framework Programmes. However, the support of KSU was rarely used due to the limited awareness of applicants - not a single SF/FP beneficiary interviewed when preparing this report has mentioned the KSU as a relevant support instrument. For the 2014-2020 perspective, the government plans to setup “*the Registry of [Human Resource] Development Services*” (“*Rejestr Usług Rozwojowych*”), a central database of training and consulting services providers, who went through a formal verification process related to quality assurance. The database will inform about available training services (both commercial and publicly co-funded, including from ESIF), but could also be used to identify potential providers of consulting services. There is also a network of 77 Contact Points for European Funds (“*Punkty Informacyjne Funduszy Europejskich*”), spread across the entire country, and co-ordinated by MIR.

As confirmed by many interviewees, the preparation of SF applications in 2007-2013 was relatively easy, as long as the applicant had learned the necessary concepts and understood the issues of cost eligibility and evaluation criteria. One of interviewees, representing a large consulting company, which has SF/ESIF-related services among its revenue sources, maintained that only a small percentage of applicants from the business sector use consulting services when preparing applications, and these clients are either large multinational companies, which tend to outsource this type of activities in many countries, or inexperienced SMEs, which commission the services when preparing their first project application but try to acquire the necessary knowledge in this process so no repeat business is guaranteed. Some applicants decided to outsource to consulting companies certain time-consuming parts of the documentation, including financial projections in feasibility studies and business plans. In some SF support measures, expenditures related to specific project-related analyses, performed while preparing the project application, could partially be eligible after a positive funding decision. Otherwise, no dedicated financial instruments were available for SF applicants.

5.2. Activities of NCP. Public support for FP7/H2020 applicants is more extensive than for SF/ESIF. The National Contact Point (KPK) employs over 30 specialists with diverse educational backgrounds, usually corresponding to the R&D areas they oversee. About 25% of them have doctoral degrees, and all are fluent in English, trained in legal aspects of the EC funding programmes and project management. The NCP's complex services cover all areas of H2020, and its work is organized by thematic areas. In addition, a network of 11 regional contact points covers the extensive territory of Poland. NCP's experts focus on specialist issues, while regional contact points offer more generic support as the first contact to applicants, and channel requests to relevant experts at NCP. At the same time, the NCP also maintains direct contacts with applicants from various regions of Poland, carrying out activities that partly overlap with the efforts of regional structures, and a lot of time of centrally employed experts is dedicated to answering questions asked by applicants, who did not have prior contacts with the relevant regional contact point.

The network of contact points in Poland is subsidized by the Ministry of Science and Higher Education, with sizeable budgets amounting to: 9.63m PLN in 2012 (€2.30m), 9.46m PLN in 2013 (€2.26m) and 10.13m PLN in 2014 (€2.42m). The NCP benefits directly only from part of this budget (approximately €1.2m per annum) (MNiSW, 2013b: 114; MNiSW, 2014d: 112; MNiSW, 2015c: 42).

The NCP offers mentoring to applicants, support in selecting the most relevant funding instruments, financial and legal consultations (including IPR and project budgets) and pre-screening of applications. When working with business enterprises, non-disclosure agreements are usually signed if a potential applicant intends to

share with NCP details of his project. The NCP also offers an extensive range of information events, trainings and mailings, and is active in promoting H2020 participation at events of other public or private organisations.

The information sharing function of the NCP was positively evaluated by the interviewed beneficiaries, including its well-received, country-wide tour promoting H2020. Opinions of interviewees about specialist advice provided by NCP were more divided. While some interviewees declared that NCP was always able to answer their questions in a timely manner, others complained that for certain H2020 calls, NCP employees only have the same knowledge as any person who thoroughly reads the publicly available documents, and are not able to answer some detailed questions concerning budgeting, accounting and reporting in H2020 projects. One interviewee complained that the NCP answers to certain problematic questions involved referring to specific paragraphs of legal documents instead of using “*down-to-earth examples*”. This might however be linked to the perceived complexity of H2020 and the newness of relevant EC regulations in 2014. Also, certain issues cannot be easily explained over the phone, while not all applicants are willing to invest their time into e-mail exchanges in order to clarify the interpretations.

Another identified challenge is the strong orientation of NCP towards scientific organisations and its more limited experiences with SMEs. NCP nurtures synergies with Enterprise Europe Network (EEN) contact points in Poland, particularly in reaching out to companies and encouraging them to apply for H2020 funding. The identified problems concerning SMEs include their specific set of attitudes and misunderstandings surrounding the H2020 fundamentals (i.e. research excellence and innovativeness), and for many calls a lack of established collaborations with foreign partners. Some potential applicants from the business sector expect that NCP or external consultants would ensure the success of their applications, without own efforts to strengthen the project quality. Even though the NCP declares that it offers support in matching consortium partners, it actually could not engage in such activities for a large number of interested applicants due to the existing work overload. It does, however, organise regular events for SMEs, promoting H2020 and in particular, the H2020 SME Instrument, and has deepened relations with the business sector compared with the FP6/FP7 times.

In addition to the NCP, dedicated contact points exist also for COSME and LIFE programmes, but they are not covered by the present report. Poland also has a separate National Contact Point for Financial Instruments in EU Programmes, managed by the Polish Bank Association (*Związek Banków Polskich*), which was appointed to this role by the Council of Ministers. This specialist Contact Point co-ordinates the efforts of financial institutions, offering preferential financing for SMEs. These operations are focused on distribution of instruments defined in FPs (including CIP, FP7, COSME, EaSI and H2020 instrument “*InnovFin SME Guarantee*”), but the engagement of Polish financial organisations raised their awareness of opportunities related to financing innovative projects.

In May 2015, the Ministry of Science and Higher Education published a draft ordinance on financing international scientific cooperation, which is supposed to comprehensively regulate various relevant support measures (MNiSW, 2015b) and defines modalities for funding contact points for EU research programmes.

5.3. Financial support for FP7/H2020 participation. H2020 applicants can benefit from co-funding of the preparation of applications, including meetings with potential consortium partners and specialist consulting services. The available support measures referred to as “grants for grants” are differentiated, depending on the type of beneficiaries (i.e. scientific organisations or SMEs), and funded from the state budget. The support for scientific organisations (including universities and research institutes) has been offered by MNiSW for many years, with support rules adjusted to H2020 conditions in 2014 (MNiSW, 2014a). Funding is available to organisations planning to act as project co-ordinators. Applications can be received at any time, without specific call deadlines. Applicants can also apply for reimbursement of previously incurred costs of successful H2020 applications. However, some beneficiaries suggested that the contents of application forms and reports for these scientific “grants for grants” are relatively complex, thus discouraging potential applicants. The maximum reimbursement levels are also perceived as low, with restrictive types of eligible costs and detailed reporting requirements (MNiSW, 2015a). The “grants for grants” support measure involved budgets of 2.81m PLN in 2012 (€0.67m, 79 projects funded), 1.48m PLN in 2013 (€0.35m, 49 projects) and only 0.62m PLN in 2014 (€0.15m, 23 projects) (MNiSW, 2013b: 113; MNiSW, 2014d: 111; MNiSW, 2015c: 44), with annual expenditures dependent on the number of incoming applications.

In FP7, scientific organisations were also able to apply to MNiSW to cover parts of the expected national contributions in project budgets. The co-funding for FP7 was covering up to 75% of the own contribution required from the Polish FP7 beneficiary. Budgets allocated to this form of support were substantial: 72.45m

PLN in 2012 (€17.31m), 59.84m EUR in 2013 (€14.29m) and 57.16m PLN in 2014 (€13.65m) (MNiSW, 2013b: 111; MNiSW, 2014d: 109; MNiSW, 2015c: 41). Ministry of Science and Higher Education co-funded also participation of scientific organisations in other, non-EU R&I programmes, but the allocations were substantially lower than for FP7: 3.43m PLN in 2012 (€0.82m), 3.36m PLN in 2013 (€0.80m) and 4.09m PLN in 2014 (€0.97m) (MNiSW, 2013b: 111; MNiSW, 2014d: 109; MNiSW, 2015c: 41). In addition, Polish KIC co-location centres benefited from state co-funding of 4.88m PLN in 2013 (€1.17m) and 1.77m PLN in 2014 (€0.42m) (MNiSW, 2014d: 39; MNiSW, 2015c: 40).

Small and medium-sized business enterprises benefit from a dedicated funding scheme “*Support for securing a grant*”. The scheme is offered since 2011 by the Polish Agency for Enterprise Development (PARP) based on a dedicated ordinance of the Minister of Economy concerning financial support offered by PARP (MG, 2014). The support is available both to project co-ordinators and consortium partners. Applicants are only able to apply for reimbursement of cost previously incurred if the project application met formal FP evaluation criteria (up to 75k PLN, €18k for project co-ordinators, 35k PLN, €8k for consortium members). This funding for SMEs has not been offered since 2013, but new call for proposals was announced in April 2015 (PARP, 2015). The budget for this support measure in 2015 amounts to 2m PLN (€478k), and funds can be used for applications in “international innovation programmes”, which support R&D co-operation with entities from other countries (i.e. cannot be used for applications to the H2020 SME Instrument, CIP or COSME), with reimbursements going as far back as 2007, providing that the applicant can produce the required financial documents. In previous years, PARP allocated the following budgets to the support instrument: 313k PLN in 2011 (€76k, 10 projects, 4 beneficiaries), 489k PLN in 2012 (€117k, 15 projects, 10 beneficiaries) and 1,310k PLN in 2013 (€313k, 40 projects, 12 beneficiaries) (PARP, 2011; PARP, 2012; PARP, 2014). The budgets increased, but there was only a small group of SMEs applying for the support, with multiple applications from the same beneficiaries: 7 organizations received 4-8 grants each, and their grants accounted for 58% of all funded projects. The PARP’s instrument for SMEs differs from “grants for grants” offered by MNiSW to scientific organisations, as the MNiSW can only reimburse costs of H2020 applications, which surpassed the evaluation threshold set for a given call (MNiSW, 2015a), while PARP refunds costs of preparing applications only taking into account the outcomes of their formal evaluations (PARP, 2015), and this could potentially promote opportunistic behaviours by applicants, but at the same time significantly reduces the risks incurred by SMEs preparing applications, and the numbers of Polish business enterprises applying for FP7/H2020 funding might justify this approach.

In the draft version of Operational Programme Smart Growth (POIR) for 2014-2020, Polish government included a dedicated support measure intended to increase the readiness of SMEs for participation in H2020, but the measure was deleted from the finally adopted version of the Programme based on the outcomes of the ESIF strategic dialogue between the European Commission and the Polish authorities (more information about this measure is available in section 7.7 of the report).

5.4. Support for SMEs in H2020. Support activities, concerning business enterprises, are carried out in accordance with the high-level policy document “*Enterprise Development Programme*” (PRP, “*Program Rozwoju Przedsiębiorstw*”), adopted by the Council of Ministers in April 2014 (RM, 2014). PRP outlines policy measures, which are going to be implemented until the year of 2020, intended to strengthen the innovativeness and competitiveness of the Polish business sector. Among support measures included in PRP, measure no. 1.2.10 concerns “*Promotion and preparation of entrepreneurs to use support measures in international programmes*”. According to PRP, the measure should be implemented by PARP and NCBiR. Two specific, listed actions included: offering the previously described “*Support for securing a grant*” for SMEs (reimbursing expenses incurred while preparing applications to international programmes, including H2020) and the establishment of a dedicated contact point for SMEs, supporting their participation in international programmes, which would complement the operations of NCP. The dedicated contact point has not yet been established, and but in 2015, a new call for proposals was announced in “*Support for securing a grant*” by PARP (PARP, 2015).

H2020-related awareness raising activities are extensive, but mass media in Poland do not seem interested in reporting about them, focusing on ESIF instead. In 2014, NCBiR co-funded the establishment of a vertical web portal “*INN Poland*”, focused on R&I news, managed by an experienced media company and the portal became an important source of practical, business-oriented information concerning funding opportunities in H2020. Relevant information sharing is also initiated by MNiSW and PARP, including through regular mailings, for example the Ministry of Science and Higher Education sends weekly newsletters reaching mailboxes of over 80% of researchers in Poland. In addition, some large international consulting companies started

actively promoting H2020 in Poland, anticipating potential new sources of revenues. The publicly-driven promotional campaigns seem to have a limited appeal to business enterprises, who are less interested in learning about H2020 than scientists. Nevertheless, after slightly more than one year of promoting H2020 in Poland, it can firmly be stated that the awareness of the existence of the programme, its benefits and application possibilities is much broader than the past awareness of FP7, and this can be attributed in large extent to the government-driven actions.

Numerous training opportunities related to R&D management exist in Poland, including publicly funded programs, and some of them were supported by SF in the 2007-2013 perspective. An interesting example was postgraduate studies “*Managing research project and commercialisation of research results*”, offered in 2010-2013 in several regions of Poland by a consortium of 7 universities, NCP and the Project Management Association, with study programme focused on preparing and managing FP7-funded projects.

5.5. “Pact for Horizon 2020” and support for scientific organisations. In order to promote H2020, the Ministry of Science and Higher Education initiated the process of signing the “*Pact for Horizon 2020*” (MNiSW, 2014c) with scientific organisations, formalizing mutual obligations with respect to national participation in the programme and promising additional incentives to beneficiaries. Signatories of the Pact declare that they would offer effective administrative support for researchers applying for H2020 funding, reward researchers who manage grants or act as evaluators, engage in partnerships with business enterprises and accept the European Charter for Researchers. MNiSW outlined in the Pact its reciprocal obligations, including:

- amendment of rules for institutional assessment of scientific organisations to promote beneficiaries of H2020,
- introduction of “grants for grants” support scheme, funding preparations of H2020 applications,
- introduction of motivational bonuses for researchers carrying out H2020 projects,
- improvement of operations of H2020 contact points,
- support for the involvement of Polish experts in EU-level initiatives,
- carrying out information campaigns.

In the Pact, MNiSW committed also to ensure synergies between H2020 initiatives and ESIF support measures dedicated to the science sector, and indeed, this commitment was implemented through the design of ESIF operational programmes for 2014-2020, with specific support measures complementing H2020 Teaming, Twinning and ERA Chairs.

The Ministry uses the Pact as the basis for powerful promotional messages, highlighting its support for H2020 applicants and beneficiaries. The actual policy impact seems however slightly less impressive. “*Grants for grants*” only concern project co-ordinators and have small budgets (up to 30k PLN, ~€7k), thus not having substantial financial influence on the overall government budget. The amounts of funds allocated to this instrument were also decreasing year by year, going down from 2.81m PLN (€0.67m) in 2012, to 1.48m PLN (€0.35m) in 2013 and only 0.62m PLN in 2014 (€0.15m) (MNiSW, 2013b: 113; MNiSW, 2014d: 111; MNiSW, 2015c: 44), but according to MNiSW, the levels of funding were corresponding to the numbers of applications. In the past, MNiSW covered up to 75% of the required national co-funding in FP7 projects with the involvement of Polish scientific organisations, amounting to €17.31m in 2012, €14.29m in 2013 and €13.65m in 2014 (MNiSW, 2013b: 111; MNiSW, 2014d: 109; MNiSW, 2015c: 41). This expenditure is no longer needed due to the different design of H2020, with the exception of projects implemented based on the H2020 COFUND scheme. As of June 2015, no motivational bonuses for researchers or organisations carrying out H2020-funded projects were introduced, despite the declaration in the Pact, which stated that the bonuses would be distributed starting from the first quarter of 2015. This practically means that MNiSW currently spends proportionally less with respect to H2020 than it used to spend in the past as co-funding for FP7 participation. In May 2015, the Ministry published a draft ordinance intended to comprehensively regulate funding for international scientific co-operation (MNiSW, 2015b). The proposed legislation offers financial transfers to beneficiaries of EU research programmes including H2020, which amount to 10-20% of the project budget, with additional 10% offered to organisations acting as project co-ordinators. According to the draft, beneficiary organisation may use this additional funding as bonuses paid to researchers involved in the concerned project. This measure – popularly called “*Bonus on Horizon*” (“*Premia na Horyzoncie*”) – corresponds to the MNiSW commitments from the “*Pact for Horizon 2020*”, but its design might still change based on the inputs received in the course of public consultations, and the timing of its introduction is uncertain. Moreover, the planned amendments of the rules for institutional assessment of scientific organisations cannot be expected to induce breakthrough results, as these assessments already include criteria related to grant funding attracted from external sources, in particular international R&D programmes,

and thus future modifications could merely elaborate further modalities for the assessments and increase the relative importance in the scoring model.

In return, universities and research institutes signing the Pact are expected to cover additional costs of administrative support for H2020 applicants and motivating researchers to act as applicants or evaluators. Contents of the Pact are vague and written in a non-legal language, leaving the one-page document open to multiple interpretations. Some scientific organisations initially hesitated in signing the Pact as they feared that it could establish direct financial obligations, but in 2015, over 300 institutions are among the Pact's signatories. Some interviewees suggested that the Pact shifts the administrative and financial burdens from the government to research performing organisations, so presenting the Pact as a support initiative would be questionable. The Pact could nevertheless be described as a good practice example, as the formal process of signing increases the awareness of H2020 among management of scientific organisations in Poland and might have some motivational effects. It does however fall short of inducing major behavioural changes or adding substantially new funding streams to entice the participation in FPs. Importantly, the Pact only concerns the scientific organisations and the Ministry of Science and Higher Education has no direct implications for business enterprises.

Large public universities have specialized offices, providing support to own research teams applying for external funding, both for SF/ESIF and FPs. The effectiveness of these establishments seems differentiated at various institutions. In some organisations, centrally provided services include professional support with difficult legal and administrative matters, as well as substantial help in securing all necessary documents, signatures and internal confirmations. Offices at other scientific organisations might focus on foreseeable, procedural matters instead and function rather as gate-keepers than advisors, i.e. restrict their work to verifications whether a scientist complies with numerous internal regulations and has secured formal consents before an application could be signed by the head of the university. The quality of internal support at universities seems correlated with the effectiveness in securing external funding. In contrast to universities, few public research institutes offer their scientists extensive, administrative support for applications.

6 EVALUATION AND MONITORING MECHANISMS

6.1. Evaluation of SF/ESIF applications. In the 2007-2013 perspective, SF funding agencies were responsible for co-ordinating the evaluation of applications for their respective support measures. In the beginning of the period, each of them organized an open, nationwide call for experts, allowing interested persons to register by submitting documents based on pre-defined templates. Agency employees were verifying the documents, confirming the qualifications and areas of competence. There was a duplication of efforts by various agencies, on central and regional levels, each organizing separate expert recruitment processes, and regional agencies were using evaluators from the entire country. The experts involved in R&I evaluations tended to be scientists, with only limited numbers of specialists experienced in R&D commercialisation.

As some agencies admitted in the interviews, unexpectedly large numbers of applications made the evaluation processes even more complicated. Expert remuneration was relatively low and uncompetitive, impacting their levels of involvement. Experts requested to evaluate specific applications were randomly selected from the expert database, based on their areas of specialisation, and requested to confirm lack of conflict of interests. NCBiR and FNP adopted a slightly different approach, and agency employees were identifying suitable reviewers on a case-by-case basis, depending on specific topics, by using external databases of scientists and through individual contacts. As the director of FNP explained, about 90% of experts approached in this manner were not interested in participating in the evaluation process, but the time-consuming approach still resulted in selecting more specialized and competent experts. Problems with insufficient numbers and availability of experts were also reported by other agencies (OPI – MillwardBrown, 2014: 124). Apart from evaluating written applications, FNP also organized meetings of applicants with panels of experts to increase the probability of selecting the most credible and professional projects, not merely the most impressive applications. NCBiR tested a similar approach in instruments funded from the state budget, and in 2015 introduced them in their new ESIF support measures.

Evaluators remained anonymous to applicants, but feedbacks and copies of evaluation reports were provided to them by the agencies. Evaluation processes were governed by formalized by-laws, adopted for each call, and supervised by monitoring committees, which involved stakeholder representation. According to some of the interviews, there were infrequent cases of experts infringing the impartiality rules, and those individuals were eliminated from further evaluations. Each application was evaluated by more than one expert (usually: by three experts working independently).

Some beneficiaries complained about unsatisfactory depth of reviews by evaluators, who were often thought to limit their analyses to glancing over the application, focusing on keywords and on the most explicit parts of the contents only. According to unsuccessful applicants, some evaluators might not have fully grasped the essence of projects and their context, disregarding things which were not precisely explained and highlighted in the applications. An additional problem concerns the ineffectiveness of appeals against decisions to refuse funding, when the SF allocations for a certain support measure are used up. Even though the funding agency accepted an appeal and admitted a shortcoming in the evaluation report's contents, nothing more can be done due to the budgetary restrictions, and there is a sense of injustice among the affected applicants.

One interviewee representing a scientific organisation complained about cases when one of evaluators might have been a scientific competitor of the applicant, and his or her assessment might have been motivated by the desire to undermine the applicant's academic standing. Some beneficiaries complained that funding agencies did not critically analyse the contents of evaluation reports, and were accepting them without further investigations even if there were substantial discrepancies between the views of evaluators. This problem is addressed in the 2014-2020 perspective, as evaluation reports are further scrutinized by the selection committee and decisions will not be made automatically, based only on the written evaluation reports, as expert judgments or other contents of some reports might be questionable. In the SF/ESIF support measures co-ordinated by NCBiR, evaluation reports are further used by the selection committee, consisting of external experts-evaluators, which analyses the reports' contents and makes final decisions based on additional justifications.

In the past, particularly problematic cases involved evaluators questioning the project budgets. For some support measures, this triggered an automatic rejection of the application, without the possibility of amending the problematic elements of the budget. Controversies surrounded the salaries of project employees, with large financial divergences between individual Polish regions, not always understood by evaluators.

There were no pre-defined rules regarding the shares of international evaluators, and SF applications were submitted in Polish language, thus limiting the possibility of using foreign experts. FNP, which managed SF support measures promoting research excellence in the science sector, was the only agency requiring applicants to submit documents in English, and consistently using international experts, with over 50% of evaluators coming from abroad (also members of expert panels meeting the applicants). It must however be noted that the calls for proposals, organized by FNP, concerned highly selective instruments, with up to 100 applications per call, while other funding agencies had to cope with substantially higher workloads and thus could not replicate the same approach. NCBiR required submission of parts of applications in English in selected calls, e.g. for large-scale sectoral R&I programmes, and used some foreign evaluators. There might however be concerns about risks of unintended knowledge spillovers when foreign experts evaluate projects of business enterprises (OPI – Millward Brown, 2014: 124), Starting from 2015, NCBiR requires substantial parts of ESIF applications for R&D funding to be written in two language versions, both in Polish and English. As ministries and funding agencies suggested, command of English is still relatively limited among business enterprises. Legal regulations stipulate the compulsory use of Polish language when dealing with public administration, and requirements to prepare English-language applications for public funding could potentially constitute a reason for effectively appealing a negative funding decision. At the same time, foreign reviewers are more costly than local experts, and the interviewed agencies mentioned substantial delays in the evaluation process, caused by relatively low involvement of some international experts. Experts would also need to get acquainted with specific funding modalities in order to assess the suitability of project proposals, eligibility of costs and conformance to the overall objectives of a specific support measure, and many of these detailed documents are only available in the local language. While considering the use of international reviewers as unnecessary, regional agencies emphasized the benefits of using experts from other regions of Poland.

The evaluation of proposals in 2007–2013 included some criteria, which were not relevant to projects, but rather to characteristics of applicant organisations, and were meant to promote certain attitudes among business enterprises or enforce selected horizontal policies. For example, additional points were awarded for having environmental management system compliant with Eco-Management and Audit Scheme (EMAS) or for employing representatives of certain under-represented groups. In competitive calls with substantial numbers of applicants, these non-core criteria could have been decisive for shortlisting the successful proposals. ICT companies complained about the use of patent-related criteria, which discriminated against software developers, who were not able to patent computer-implemented inventions in Poland. Some criteria seemed unclear to applicants, e.g. in one of calls, it wasn't explained whether the expected increase in the number of employees should concern the R&D department or the entire enterprise. The same criterion could have been differently interpreted by two different agencies, and description of certain criteria was considered too general by some interviewees. In the 2014–2020 perspective, the approach will be changed with only a small number of clear, relevant criteria, focusing on the quality of projects not broader societal goals, broadly interpreting intellectual property rights (to avoid biased decisions related to the ICT sector) and detailed manuals for evaluators and applicants, describing the evaluation criteria. In addition, evaluations of written applications will be supplemented by the subsequent use of applicants' interviews with panels of experts.

In the 2007–2013 financial perspective, criteria concerning the innovativeness and the commercial potential of projects were particularly challenging. For some support measures, including measures offered at the regional level, innovativeness was evaluated by taking into account formal, written opinions about innovativeness, prepared by a scientific organisation and commissioned by the applicant to include in his application. Unsurprisingly, applicants were almost always able to find experts willing to positively evaluate a project's innovativeness. This approach practically undermined the usefulness of the innovativeness criterion, which was met by almost all applicants, and agencies had to rely on other criteria in the evaluation process. One of interviewees, representing an innovative SME, explained these challenges as follows: *“If applications can be submitted by somebody, who makes bolts and declares that these bolts are innovative, and by somebody else, who makes a drug against cancer, and the drug is also innovative... For me, these are two different things, but they are competing in the same call for proposals”*. In a similar manner, another respondent emphasized the need to draw lessons from the previous SF perspective and avoid direct comparisons between *“innovative ballpoint pens and innovative robots”*. Another problem concerned the assessment of commercialization potential of research results, as experts with scientific backgrounds were not always in a position to adequately respond to the evaluation questions.

The approach based on opinions about innovativeness has been abandoned in the wake of the 2014–2020 period as ineffective and leading to distorted evaluation results. Currently, experts evaluate the project's innovativeness in combination with economic impact and market potential of the proposed solutions. The

methods of evaluating innovativeness and commercial potential were extensively discussed with stakeholders while designing the 2014-2020 ESIF support measures. The new criteria are expected to better correspond to the economic potential and market needs for new technological solutions. Proposals submitted to NCBiR are analysed both by scientific experts, who focus on their specialist technical criteria, and by commercialisation experts, who are supposed to analyse the market potential and innovativeness of the proposed solutions. Moreover, written evaluation reports of these experts will not be the only basis for funding decisions, and will further be supplemented by consensus opinions of panels of experts, who meet the short-listed applicants, in order to further increase the comparability and multidimensionality of the assessments.

Many improvements of criteria used to evaluate proposals submitted for specific ESIF support measures were implemented during the 2007-2013 perspective based on lessons learned, and the benefits of these changes were recognized both by beneficiaries and funding agencies (OPI – MillwardBrown, 2014: 122-123). The overhaul of the ESIF evaluation processes for 2014-2020 was motivated by the European Commission's and the government's willingness to ensure that co-funding is only allocated to projects which are sustainable, correspond to identified market needs and are expected to have substantial economic impact. While this approach yields first positive results on the national level (POIR), the regional processes might be more problematic, as regional authorities are highly autonomous in their implementation of regionally available support measures and have less experience in RDI support than central agencies. Moreover, ESIF allocations dedicated to RDI are relatively small in some regions, making it difficult to evaluate the submitted project proposals in accordance with standards adopted for POIR support measures.

6.2. SF/ESIF monitoring mechanisms. Funding agencies regularly survey their beneficiaries, and while preparing the 2014-2020 financial perspective, numerous evaluations and stakeholder consultations were organised. The Ministry of Infrastructure and Development (MIR), which co-ordinates the SF/ESIF system in Poland, also commissioned a meta-evaluation to analyse among others specific challenges related to evaluation processes and criteria across different instruments. There were regular analyses of lessons learned from subsequent calls and mid-term evaluations, and during the 2007-2013 perspective, operational programmes and individual support measures had been modified several times in order to better address the problems identified. In the wake of the new financial perspective, NCBiR tested several pilot instruments, organizing smaller-scale test calls for proposals in order to better prepare for the design of new ESIF support measures. In many regions, innovation councils operate as representations of stakeholders from different sectors, advising the regional authorities in design and implementation of SF/ESIF-based instruments. Accordingly, each operational programme has its monitoring committee, which also offers important opportunities for feedback from the representatives of sectors benefiting from the funding.

Understandably, some beneficiaries complain about their specific proposals not having been incorporated into the design of instruments or evaluation criteria. The views about public consultations of operational programmes are divided, with some interviewees maintaining that the process was ineffective and the final contents of the programmes diverge from the broad consensus based on interactions between industry, academia, social partners, regional and central government authorities. The actual reason for this divergence seems, however, to be the dynamics of strategic dialogue between the European Commission and the Polish authorities, as government representatives explained. In particular POIR, the main operational programme supporting R&I in Poland, had to be substantially modified following requests from the EC, and no longer contains some measures originally planned, with other instruments thoroughly modified (see section 7.7 of this report).

Another criticism, coming from one of beneficiaries, referred to the negative aspects of learning processes at SF funding agencies. According to the interviewee, agency employees learn over time, which actions they could take without triggering appeals, lawsuits or complaints to upper levels of government. This means that they start to understand what they could do without being punished, even though this may lead to treating applicants or beneficiaries in a way that might not conform to the official procedures and could constitute abuses of power (e.g. shifting burdens to beneficiaries by requiring them to provide documents or take additional, time-consuming actions not foreseen by procedures). Since these hindrances are considered minor by beneficiaries, they do not file official complaints, but are dissatisfied with the approach. The same interviewee emphasized the positive change, which happened when NCBiR took over the implementation of some SF support measures, as apparently the Centre works in ways rather untypical for other administrative agencies, paying a lot of attention to the needs and concerns of beneficiaries. Some other interviewees mentioned that similar, negative behaviour was also observed among project auditors (external firms -

outsourcing partners of the funding agencies), who quickly learn how much power they could use in relations with the audited beneficiaries, burdening them with additional tasks during audits.

7 ENHANCING OR LIMITING THE SYNERGIES?

7.1. Different legal frameworks. The divergences between ESIF and H2020 result primarily from their different legal foundations and diverse approaches to projects and beneficiaries. SF/ESIF regulations impose limits on expenditures incurred abroad, while collaborative projects in FP7/H2020 stress the international dimension. Differences also concern public aid rules, which affect ESIF-based projects, whereas H2020 funding is not considered as public aid. While ESIF funding distribution relies on the identified national and regional smart specialisations, the EU state aid rules with the General Block Exemption Regulation and regional aid regulations do not offer preferences for specific sectors or types of technologies. Some interviewees suggested that these discrepancies demonstrate inconsequence in the EU's legal and institutional R&I framework, and the lack of adequate delineations between various funding streams. In the financial perspective 2014-2020, overlaps exist between instruments offered at the European, national and regional levels, and certain H2020 measures such as the H2020 SME Instrument might cannibalize similar offerings funded from ESIF.

7.2. H2020 salary regulations. H2020 salary regulations restrict potential synergies with ESIF in Poland, in particular with respect to public universities and research institutes. Their employees receive relatively uncompetitive base salaries, resulting from national legislations (MNiSW, 2013a). These salaries can nevertheless be supplemented by bonuses resulting from R&I projects funded from ESIF or state budget. The EC Framework Programmes cover salary costs and only limited bonuses, and while the problem had been addressed in FP7 by allowing some EU member states to deviate from these rules and multiply the rates in order to compensate for the salary disparities, these rules change in H2020, where only the base salary can be refunded, and bonuses are only available if the beneficiary organisation and employee meet additional, restrictive criteria (EC, 2015a). The H2020 participation problems resulting from comparably low salaries of researchers in Poland were described in detail in section 4.4 of this report. Apart from discouraging H2020 applications by public scientific organisations, the H2020 salary regulation weakens potential ESIF-H2020 synergies, as beneficiary organisations need to adopt diversified rules for remunerating employees depending on the type of funding which the project receives. Polish regulations impose also restrictions on the number of hours worked in all externally funded projects, combined with the need to prepare time sheets accounting for project work. These regulations were introduced to eliminate unhealthy cumulations of project tasks and resulting payments to single individuals, who might not realistically be able to cope with the officially declared workload.

7.3. H2020 IPR regulations. IPR regulations in H2020 discourage some potential applicants from combining work funded from SF/ESIF or national sources with international collaborative projects. H2020 regulations related to granting access to background, which encompasses know-how, information and IPR relevant to a project and controlled by a project consortium member, are perceived as sources of potential business risks. Smaller, innovative companies might show reluctance in joining international consortia, in which all partners would have free access to their "crown jewels". In particular, companies might want to avoid upstream sequential funding scenario, in which SF/ESIF project generates new IPR and technological solutions, which can afterwards be freely appropriated by participants of H2020 collaborative project. Many Polish R&I support measures based on SF in 2007-2013 were focused on developing innovative products and processes, which will be owned by the research performing organisation, and the same approach is followed in the 2014-2020 perspective. Such beneficiaries might intentionally avoid direct synergies between SF/ESIF and H2020, and rather consider launching a separate, unrelated project based on H2020 funding.

7.4. Regulations concerning the use of research infrastructures. The use of SF-funded research infrastructure is subject to a multiplicity of legal regulations, involving public aid and specific modalities for individual SF support measures. Some of them literally prohibit using the infrastructure for purposes, which are related to the development of technologies, which might become commercially available, while others stimulate or even require the commercial use of the equipment. When looking for research infrastructure funding in 2007-2013, many applicants did not consider these diverse modalities, and opted to apply for the first call available in a specific quarter of a year, but now some of the investments induce multiple practical problems, particularly when trying to implement an upstream sequential funding combination, with SF-funded infrastructure being a starting point for a H2020 project. In the 2014-2020 perspective, the above-described challenges related to research infrastructure are addressed, and all infrastructures acquired by both private companies and scientific organisations need to be available for commercial research projects and thus are uniformly subject to public aid regulations.

7.5. Accounting and auditing practices. Accounting and auditing practices constitute another potential barrier. Even though the legal framework allows the combination of funding sources in synergistic ways as sequential or parallel funding, beneficiaries might voluntarily abstain from implementing such scenarios. Some interviewees exercised utmost care when discussing their previous R&I projects as if they were afraid that somebody might accuse them of attempts to finance the same research efforts from two parallel sources. Even though cost eligibility rules are relatively clear, and project reporting standards facilitate unambiguous allocation of costs and deliverables to each individual project, some beneficiaries had negative experiences with post-project audits and might even consider potential synergies as a source of problems not benefits, thus preferring to clearly differentiate projects and funding sources. One of examples presented in interviews concerned the need to carefully consider how to formulate acknowledgements for project funding sources when publishing research results in order to avoid double financing allegations. In such cases, legal regulations or implementation modalities do not present actual barriers to synergies, but the unwillingness to combine funding sources can be attributed to perceptions of beneficiaries or project auditors.

7.6. Psychological barriers. Another, more psychological than formal barrier might be related to a specific mentality, common for managers of R&I projects funded from SF. This was directly confirmed by some of the interviewed representatives of ministries and funding agencies, but could also be inferred from the explanations offered by SF beneficiaries. SF regulations and their practical implementation in Poland promote detailed planning, high levels of accountability (with extensive project and financial documentation), and consequent sticking to the initially declared project plans, even if they no longer seem feasible. This mentality was shaped by experiences with SF implementing agencies and auditors, but cannot be perceived as a good practice for high-risk, innovative ventures, which should be far more flexible. R&I performers accustomed to the above-presented approach to projects might not function well in the FP7/H2020 environment, nor be able to implement synergies between these different modes of funding.

7.7. Evolving design of ESIF. Finally, additional barriers to ESIF-H2020 synergies resulted from the ESIF strategic dialogue between the European Commission and the Polish authorities, concerning the main Polish ESIF programme for R&I, the Operational Programme Smart Growth (POIR). POIR's draft submitted to the EC included measures dedicated to directly entice synergies with H2020 with respect to public scientific organisations and private companies. The measures related to science sector were intended to complement the H2020 Teaming and Twinning instruments. They were accepted in the course of the strategic dialogue and are now being implemented in the 2014-2020 perspective. However, the proposal to establish mechanisms increasing readiness of Polish business enterprises to participate in H2020 was eliminated from the final version of POIR.

The draft POIR adopted by the Polish government in January 2014 and submitted to the EC included in the priority axis no. 3 a measure called *“Support for business enterprises and scientific organisations in preparing their participation in international programmes”*. It aimed at increasing the participation in R&I programmes including H2020 and COSME through *“increasing awareness of the science and business sectors related to the opportunities of using support offered by international programmes”* (MIR, 2014: 57). The support measure was supposed to include two types of activities: (1) information and promotion activities and monitoring of beneficiaries (establishment of a dedicated contact point for SMEs, specialist trainings and advice) as well as (2) co-funding for science-industry consortia, clusters and technological platforms, facilitating their co-operation with European organisations and preparation of grant applications.

Formal observations issued by the EC to Poland in July 2014, based on the Commission's assessment of the draft POIR, addressed the support measure in the following way: *“The Commission remains opposed to financing the support for preparation of enterprises and scientific entities for their participation in international programmes (e.g. Horizon 2020, COSME etc.). [...] The support of preparation of project applications and promotion of such programmes (where combining ESI Funds with the other funds is possible) should thus not be allowed under specific objective III.01.1b.4”* (quote provided by the EC). As agreed in the course of the strategic dialogue by both the EC and the Polish authorities, the support measure in question was deleted from the final version of POIR, but PARP started carrying out the concerned activities based on the state budget funding in 2015. In other EU members states, actions interpreted as compliant with the EC guidelines for enabling synergies between ESIF and H2020 (EC, 2014) were accepted for ESIF financing, e.g. in the Spanish region of Aragon, where ESIF are used to explicitly increase the participation of domestic organisations in international projects funded from H2020 (Aragón FEDER, 2015: 31-33) or in Castile and Leon region, using ESIF to co-fund the preparation and submission of international projects involving universities and business enterprises (Castilla y León FEDER, 2014: 48). However, this information needs to be interpreted in the broader context of diverse conditions of EU member states, objectives for ESIF

intervention formulated in the Partnership Agreements, logic and coherence of each operational programme, as well as the EC's preferred policy intervention areas in individual countries or regions. As explained by the EC, "Each operational programme and each individual instrument was assessed on 'a case by case' basis, and it has to be stressed, that the primary consideration of the Commission was always related [to] the specificity of the relevant ESI Fund – in this case the European Regional Development Fund (ERDF). [...] In the context of Poland, the Commission found very limited justification to use the ERDF as a sort of a technical assistance proxy for the Horizon 2020 or any other international research programme. [...] During the strategic dialogue, the Commission was not presented with sufficiently compelling argumentation that would justify the revision of the initially formulated opinion. At the same time, the EC endorsed other instruments directly complementing the teaming and twinning instruments of the Horizon 2020."

7.8. Factors supporting the synergies. The design of ESIF for 2014-2020, in particular of POIR, took into account the H2020 focus areas, application rules and programme modalities. There are thematic synergies between the Polish list of national smart specialisations and H2020 work programmes. Application contents, catalogues of eligible costs and evaluation criteria for main R&I support measures take into account H2020 practices so that beneficiaries of one programme will find it easier to submit applications to the other programme. However, detailed legal regulations need to remain differentiated due to the presence of public aid in ESIF, and specific accountability and reporting requirements, resulting from the EC relevant regulations. Specific modalities for ESIF funding are adopted by programme monitoring committees, composed of broad stakeholder representations, so potential complementarities could not have been single-handedly decided by the government but needed to be elaborated and accepted by these different interest groups. Apart from similarities of applications and evaluations, there are multiple analogous standards in ESIF and H2020, including e.g. shared definitions of SMEs, types of R&I efforts, Technology Readiness Levels, etc. Most of the above-described similarities were established in the 2014-2020 perspective, while in the previous programming period, divergences between FP7 and Polish SF instruments were more substantial, and policy makers did not pay adequate attention to the potential interoperability of funding programmes.

7.9. Complementary support measures. Poland has implemented numerous support measures directly complementing FP7/H2020 and strengthening the synergies. In the 2007-2013 perspective, the Foundation for Polish Science (FNP) was offering an SF-based support measure "TEAM", with research funding for breakthrough scientific projects of young researchers, using application, evaluation and implementation modalities similar to ERC Starting Grants, and requiring the beneficiaries to pursue international collaborations. Many "TEAM" beneficiaries were also benefiting from FP7 funding, so the instrument could be considered an example of parallel funding. The support measure helped educate a large group of researchers, embedded in international scientific networks, focused on research excellence and capable of applying for continuous funding on the EU level. Not surprisingly, both case studies of SF-FP synergies, included as annexes to the present report, involve projects managed by the past beneficiaries of "TEAM".

FNP also offers a smaller-scale programme "IDEAS FOR POLAND", funded from the Foundation's own budget not SF, subsidizing beneficiaries of ERC Starting Grants, who decide to carry out their projects in Poland. This cumulative funding was helpful in achieving critical mass in research projects.

Ministry of Science and Higher Education (MNiSW) offered in the years of 2010-2014 a support measure "Ideas Plus" to offer alternative funding for project proposals positively evaluated in ERC IDEAS competition, which did not receive ERC financing.

In its 2014-2020 ESIF programmes, the Polish government included several support measures directly complementing H2020 as simultaneous/cumulative funding to achieve greater impact and efficiency of R&I projects. The measure called "International Research Agendas" (MAB, "Międzynarodowe Agendy Badawcze") complements H2020 Teaming and involves Polish research centres, establishing co-operation with a renowned international partner to carry out world class R&D projects. ESIF funding can be used to cover the costs of these research efforts, co-operation among partners, knowledge transfer and specialist training, thus complementing the H2020 funding for the establishment of centres of excellence through the H2020 Teaming calls. Accordingly, "Virtual Research Institutes" (WIB, "Wirtualne Instytuty Badawcze") accompany H2020 Twinning by enhancing international networking of researchers. In both cases, synergies were intentionally designed while programming ESIF.

In addition, the Polish co-location centre of KIC InnoEnergy works with regional funding agencies to complement H2020 SME Instrument by promoting innovative energy companies and co-funding their projects as parallel funding.

Multiple R&I support measures in SF/ESIF can also facilitate commercialisation or other stages of the innovation cycle for technologies, which resulted from FP7/H2020 projects, and while this type of synergies was not intentionally planned, one could expect numerous success stories resulting from such a combination of sequential funding in the coming years. In a similar manner, measures intended to increase the internationalisation of Polish R&I sector could contribute to better performance in H2020, even though these sequential funding synergies are not directly embedded in the institutional setup of these measures.

When asked about ideas concerning further possible synergies, some interviewees proposed supporting from ESIF the unsuccessful H2020 applicants, whose proposals were positively evaluated but could not secure funding (alternative funding). However, as government representatives explained, automatic short-listing of such proposals would not be consistent with ESIF rules, which promote open competition among all eligible applicants, and the approach could only be relevant for some H2020 measures with single applicants not international consortia.

8 TAKE-UP OF PUBLIC SECTOR RESEARCH RESULTS

The government actively supports the transfer of publicly-performed research and the creation of academic spin-offs, with dedicated support measures: “*SPIN-TECH*” (co-funding the establishment of companies owned by universities or research institutes, acting as holding companies for spin-offs), “*Innovation brokers*” (sponsoring the employment of sales professionals, helping universities commercialise their research results), “*Top 500 Innovators*” (training researchers and administrative specialists in technology transfer at leading US universities) and “*Incubator of innovativeness*” (creating innovation incubators at universities). Three latter measures were co-funded from SF, 2007-2013. FNP offered a dedicated programme “*SKILLS*”, including technology transfer training (“*SKILLS – Szkolenia*”), coaching of scientists (“*SKILLS – Coaching*”) and supporting financially the most promising commercial ideas (“*SKILLS – IMPULS*”). NCBiR offered complementary measures “*BRIDGE Mentor*”, with free consulting services available to scientists interested in commercialisation of research results (in particular: beneficiaries of previous R&I funding projects, including SF-based measures), and “*SIMS*” (“*Science Infrastructure Management Support*”), with dedicated consulting and legal services to support commercial use of research infrastructure, co-funded from SF. Polish Patent Office publishes guidebooks and organises free training sessions to further promote the science-industry co-operation and encourage commercial implementation of research results. NCBiR’s “*PATENT PLUS*” scheme offers funding for international patent protection of inventions, developed by scientists or business enterprises.

For the 2014-2020 perspective, NCBiR launches ESIF-based support measures “*BRIDGE Alfa*” (seed capital for academic start-ups) and “*BRIDGE VC*” (VC-type of funding for innovative, research-intensive companies), combining EU funding with capital provided by private investment funds, and sectoral programmes, focused on co-funding innovative research agendas of selected industry sectors, consistent with national smart specialisations and involving public and private research actors. In 2014, the Act on Higher Education was amended to facilitate the transfer of IPRs to scientists, who created the inventions and promote the commercial use of research infrastructure of universities.

Poland does not require beneficiaries of R&I funding to diffuse the data and publications based on open access standards, but costs of open access publications are eligible in many R&I funding programmes. An analysis based on Elsevier Scopus database revealed that in 2008-2011, 42% of scientific publications with Polish affiliations benefited from “gold”, “green” or hybrid open access, compared with the EU average of 45% (Science-Metrix, 2013: 18). 67.8% of local peer-reviewed journals, published in Poland and included in the official journal ranking system of MNiSW, offer open access to their entire repositories, or older issues with temporary access embargoes (Szprot, 2014: 57).

R&I support measures available in Poland facilitate the take-up of public research results by co-funding the subsequent stages of innovation cycle, and their uses intensified after the 2010-2011 reform of the science and higher education, which provided motivation to commercialize academic inventions and empowered R&D funding agencies, including NCBiR. NCBiR’s comprehensive portfolio of R&I support programmes, mostly funded from the state budget, includes: support for young researchers carrying out applied R&D projects (“*LIDER*”), funding for projects by science-industry consortia addressing challenges related to specific sectors/technology types/applications (“*INNOLOT*”, “*INNOMED*”, “*CuBR*”, “*RID*”, “*BLUE GAS*”, “*GRAF-TECH*”, “*STRATEGMED*”, “*BIOSTRATEG*”, “*GEKON*”) or generic technologies, including KETs, requiring consortia with scientific and private institutions (“*INNOTECH*”, “*PBS - Applied Research Programme*”).

The main ESIF-based R&I funding source for 2014-2020, Operational Programme Smart Growth (POIR) offers R&I funding primarily to business enterprises, with support measures encouraging co-operation with scientific organisations and formation of science-industry consortia, based on experiences from support measures previously introduced by NCBiR.

Industry representatives can meet scientists during multiple cross-sectoral meetings, facilitated by public institutions, but interviewees tended to be critical of this type of events, arguing that they turn into series of monologues by business and academia, without real exchanges of ideas. Scientists maintained that Polish enterprises have no ambitions to be innovative on the global scale, as they focus on serving their local customers. One of the interviewed researchers suggested that “*the business does not understand the mission of science and has inadequate expectations, while on the other hand, the scientific community also formulates inadequate expectations. [...] They should be listening to each other, but unfortunately the dialogue often consists in reciprocal shouting at one another*”. While looking for potential consortium partners,

researchers encounter rather limited local interests and in many cases, they prefer to partner with foreign companies.

It seems too early to thoroughly evaluate the efficiency of this policy approach. It resulted from 2010-2011 legal reform, facilitating co-operation between academic and business organisations, and dedicated funding only has been available for a few years, and most projects funded in this manner have not yet finished. Tangible outcomes of the policy actions include: formation of technology transfer companies and introduction of by-laws related to IPR management by most public universities, hundreds of instances of science-industry co-operation (consortium agreements signed due to the joint delivery of publicly co-funded R&D projects), as well as numerous partnerships of academics with companies to commercialize the results of their research. There have also been substantial changes in attitudes, as before the 2010-2011 reform, scientists and business people had almost no reciprocal communication, with separate support measures and limited reasons to co-operate, and now they have opportunities to co-operate, multiple discussion fora and even financial incentives. A large consulting company KPMG surveyed large and medium-sized companies asking them about their co-operation with academics, and over half of respondents (52%) declared that the effects of corporate R&I projects subcontracted to universities or public research institutes were very positive (KPMG, 2013: 18), while almost one third (32%) of the surveyed companies informed about plans to engage in R&I co-operation with scientific organisations in the future (KPMG, 2013: 35).

There are multiple examples of knowledge flows between public universities or public research institutes and private sector. One of the most important optoelectronics companies in Poland, Ammono (www.ammono.com), was created to commercialize an innovative gallium nitride (GaN) production technology, developed by the founder Robert Dwiliński during his doctoral studies at the University of Warsaw, and thanks to its partnership with the global market leader in GaN-based diodes and lasers, Japanese firm Nichiya, Ammono assembled a large portfolio of international patents and made breakthrough successes in international markets (Klincewicz, 2010). Interestingly, Ammono's founder returned to the University of Warsaw and currently manages the University's technology transfer office.

Other examples of commercial successes of the University of Warsaw, which was the most active Polish participant of FP7, include: development of metathesis olefin catalysts by prof. Karol Grela (used by chemical companies in Poland and other EU countries) (www.karolgrela.eu) and establishment of local production of radiopharmaceuticals to reduce the Polish dependency on imports of these life-saving substances needed to diagnose and treat cancer (by the University's spin-off company UWRC jointly with a French partner Advanced Accelerator Applications) (<http://en.uw.edu.pl/cooperation/research-collaboration>). Corresponding, positive experiences with commercialisation of research results have also many other academic institutions in Poland. The first globally available commercial method for mass manufacturing of graphene was developed by researchers from the Institute of Electronic Materials Technology (ITME) in collaboration with the University of Warsaw, and the technology was commercialised by a newly established company Nano Carbon, which started selling graphene sheets to researchers and electronics companies in 2013, attracting investments from the largest Polish metal mining company KGHM and the key player in Poland's defence sector PGZ (www.nano-carbon.pl). Numerous research laboratories were also involved in close collaboration with exploration and utilities companies to develop technologies used for shale gas exploration, as the solutions used in the US turned out not to be suitable in Poland due to the specific geological formation and environmental standards of the EU, and these efforts were co-funded by NCBiR in "BLUE GAS" programme (www.ncbir.pl/en/domestic-programmes/blue-gas-polish-shale-gas). Prof. Jan Lubiński from the Pomeranian Medical University in Szczecin established a well-known academic spin-off READ-GENE, specializing in genetic testing of DNA, with the initial focus on BRCA1 mutations increasing the likelihood of developing cancer, and the company is currently listed on the high-tech stock exchange market *New Connect* (www.read-gene.com). Prof. Janusz Bujnicki from the International Institute of Molecular and Cell Biology (IIMCB) used multiple funding sources for his large-scale research programme, including FP7 and SF, to make a breakthrough discovery of an enzyme, which can cut double stranded RNA molecules and act as molecular "scissors" in ways similar to enzymes commonly used to cleave DNA (www.genesilico.pl). The research outcomes are currently being commercialized in a partnership with a specialist company A&A Biotechnology, in a project co-funded from national sources, and the successful story forms the basis of one of case studies attached to the present report. Another attached case study concerns prof. Dorota A. Pawlak from the Institute of Electronic Materials Technology (ITME), whose work on metamaterials (i.e. materials displaying properties that could not be found in nature, including the illusion of invisibility), funded both from FP7 and ESIF, has important potential applications in the military area, with follow-up funding coming from the US Department of Defence. Among the 2014-2020 ESIF support measures, dedicated funding instruments exist specifically

for commercialisation of innovative results of academic research, so even more intensive knowledge transfer between public and private sectors can be expected in the coming years.

9 COUNTRY TAILORED POLICY SUGGESTIONS

The extensive discussion of bottlenecks in the Polish R&I governance system, accompanied by the analysis of specific factors influencing the FP7/H2020 and SF/ESIF participation levels, allows the author to formulate policy suggestions, which could strengthen the synergies between H2020 and ESIF, and help better use the ESIF-based support measures to strengthen the Polish system of innovations.

Firstly, recommendations concerning the achievement of **better ESIF-H2020 synergies** are presented.

- 1) Polish public administration should continue its involvement in H2020 programming efforts, and Polish regional administration should become more involved in these efforts, participating in the preparation of new work programmes in the coming years. With the existing insights about national and regional technological strengths, resulting from the smart specialisation effort, the government could be in a better position to influence the shape of future H2020 calls for proposals. The Polish representation in Brussels should be strengthened to further engage in R&I-related dialogues with the European Commission, and facilitate better sharing of information at early stages of programming efforts.
- 2) Poland's R&I strengths, scientific potential and quality of research infrastructures should be better promoted internationally, so that potential H2020 consortium partners from other EU member states are motivated to liaise with Polish research teams.
- 3) The operations of PolSCA (Polish Science Contact Agency) in Brussels should be strengthened, by increasing its headcount and raising awareness of the intermediary services that it could provide to scientists in Poland. PolSCA operates within the structures of the Polish Academy of Sciences, but its services can be used by any interested scientific organisation, so a central government source of funding seems appropriate. Its efforts should also be better aligned with the operations of the National Contact Point. Alternatively, a Brussels-based structure embedded in the network of H2020 contact points could be created.
- 4) Ministry of Science and Higher Education (MNiSW) should implement all of its commitments from the *"Pact for Horizon 2020"*, including in particular the promised introduction of motivational bonuses for organisations, managing H2020-funded projects.
- 5) Polish Agency for Enterprise Development (PARP) should implement its commitments from the Enterprise Development Programme (PRP), related to: (a) the establishment of a dedicated contact point for SMEs, interested in participation in international programmes, including H2020, and (b) the continuous supply of funding for SMEs applying to H2020 to cover their applications (i.e. continuity in funding for the existing support measure *"Support for securing a grant"* after 2015).
- 6) Polish government should concentrate international efforts to initiate EU-wide discussions about the revision of H2020 salary regulations, so that consortium partners representing public universities and public research institutes from Central and Eastern European countries would be able to benefit from budgets comparable to H2020 funds available to consortium partners from Western European countries, especially if personnel costs account for the majority of expenditures in a given H2020 action.
- 7) The activities of the National Contact Point should be strengthened, by enhancing its advisory role and increasing number of trained specialists to cope with the increasing workload. Regional structures of NCP should also be expanded, potentially by using funding coming from budgets of 16 Polish regions, which would directly benefit from the increased participation of regional R&I actors. NCP should also consider how to benefit from additional funding provided by organisations representing business stakeholders, which could be based on performance contracts.
- 8) Ministry of Infrastructure and Development (MIR) should further elaborate the legal framework and modalities to facilitate the use of SF-funded research infrastructures in new R&I projects, including H2020 actions. While the possible uses of research infrastructures funded from some SF support measures from 2007-2013 are straightforward, there are still legal uncertainties surrounding other support measures, in particular from the Operational Programme Infrastructure and Environment (POIŚ) and MIR does not take adequate steps towards clarifying the situation.
- 9) Ministry of Science and Higher Education (MNiSW) should offer better support to potential H2020 applicants at universities and research institutes by co-funding the establishment of dedicated offices, helping with project applications and management. While substantial funds are allocated by MNiSW to establish technology transfer operations within the universities, no corresponding funding is available to stimulate the professionalization of R&I projects. In many cases researchers need to rely on their own skills and resourcefulness to prepare applications and manage the projects, and lack of permanently employed project specialists restricts the H2020 participation levels.

- 10) R&I policy instruments should consequently promote positive tendencies, which help bridge the gap between Polish and Western European H2020 participants: research excellence, world-class innovativeness and use of English language in professional communication.

Subsequently, policy suggestions concerning the **improvements of R&I support in Poland** are proposed.

- 1) The existing R&I support measures, consisting mostly of grants, should be supplemented by R&D tax credits. The usefulness of such fiscal instruments was highlighted by many interviewed R&I actors, who expect them to offer continuous funding for research efforts at business enterprises, as distinct from grants, which provide only temporary support to a small group of successful applicants, and involve high transaction costs.
- 2) The government should strengthen its communication with potential applicants by promoting diverse R&I funding opportunities, helping identify and select the most appropriate instruments. The current information campaigns concern isolated operational programmes and support measures, while scientific organisations and business enterprises cannot benefit from a centralized Internet portal, guidebook or phone contact centre, profiling all of the available support measures.
- 3) The government should further nurture the entrepreneurial discovery processes by involving business stakeholders in designing and updating the R&I policies, benefiting from the successful experiences of NCBiR's sectoral programmes, included as ESIF support measures. The business community should be more involved in shaping R&I policies, and policy makers should also ensure a better representation of Polish experts in R&I policy setting processes at the EU level.
- 4) Co-operation between scientific organisations and business enterprises should further be promoted, with opportunities for joint collaboration in publicly co-funded R&I initiatives and dialogues, facilitated by public institutions.
- 5) Procedures for application, implementation and reporting in ESIF should be streamlined and simplified, and bureaucratic attempts to increase the ESIF complexity should be opposed. Funding agencies should remain responsive to expectations of beneficiaries, in particular support flexibility in innovative R&I projects by allowing changes to plans of publicly co-funded projects if R&I performers demonstrate their importance.
- 6) R&I funding agencies and ministries should be less risk-averse and have trust in applicants and beneficiaries, including more open communication, less complicated reporting procedures and less invasive post-project audits. When certain activities involving contacts with beneficiaries are outsourced by the agencies to external partners, these partners should be adequately motivated to ensure their positive co-operation with beneficiaries.
- 7) Headcount restrictions at funding agencies should not prevent the smooth implementation of ESIF or other support measures. In particular, the agencies should not be forced to rely on short-term employees or specialists working based on contracts other than employment contracts, instead of full-time, permanently employed and adequately trained experts.
- 8) Funding agencies need to strengthen the evaluation of innovativeness and commercialisation potential of ESIF project proposals so that only sustainable projects with real value added are selected. The implementation of ESIF should focus on promoting innovative projects with long-term economic impact, instead of being concerned with meeting pre-defined, aggregate quantitative targets related to the absorption of EU funds. ESIF distribution should include mechanisms ensuring the support of visionary, high-risk projects, alongside less risky and easier to implement commercial initiatives.
- 9) R&I policies should focus on promoting excellence - not quantitatively substantial outputs, as sometimes single publications or patents have more economic impact than sizeable scientific production. This calls for revision of institutional assessment rules, applied to scientific organisations. According to an analogy, suggested by one of interviewees, "*literary awards are not given for the largest number of books written*".
- 10) R&I support should be streamlined so that a positive evaluation of a project proposal in one call opens up opportunities in other funding streams. Projects positively evaluated but not funded from H2020 should be shortlisted for funding from ESIF or state budget, thanks to a dedicated, nationally available support measure.

Finally, specific recommendations are proposed by the report's author **for the European Commission**, taking into account insights gained from the interviews with Polish policy makers, funding agencies and R&I performers, commenting on their interactions with the EC and experiences related to the ESIF 2014-2020 strategic dialogue, and comments to the draft report, provided by the European Commission.

- 1) EC should ensure better internal co-ordination so that initiatives related to ESIF do not contradict the H2020 directions. H2020 work programmes should take into account the identified smart specialisations of member states and regions, so that the efforts at strengthening research excellence and innovativeness are not isolated from the identified potential.
- 2) Synergies between ESIF and H2020 could only be regarded as a means, not an end - the EC objective should be strengthening the R&I outputs in all member states thanks to more innovative research with substantial economic impact. In some cases, a competition between diverse funding sources might be positive, and there might also be specific situations when synergies do not actually offer added value.
- 3) EC should aim at eliminating legal differences between the modalities related to using ESIF and H2020 for R&I efforts, in particular synchronise the relevant public aid rules in the General Bloc Exemption Regulation. It does not seem appropriate that similar R&D projects, benefiting from two diverse funding streams, based on the same EU budget, would have different status with respect to the public aid element.
- 4) EC should further facilitate access to H2020 funding to R&I performers from Central and Eastern Europe by adjusting the H2020 salary regulations so that H2020 promotes a genuinely common European Research Area rather as opposed to stimulating brain drains due to disparities in salaries, which stimulate the relocation of best researchers to Western European countries. The disproportions in EC funding allocated to EU-15 member states (95.24% in FP7, 95.99% in H2020 until February 2015, see section 4.4 of this report) and EU-13 countries (4.76% in FP7, 4.01% in H2020) cannot simply be explained by internal factors, as demonstrated by average EC contributions per project (see section 4.4 of the report). The problem deserves a broader pan-European discussion, as the restrictive EC regulations related to FP7 and H2020 budgeting seem to contribute to a phenomenon, which has already been identified by British researchers as *“the unspoken Eastern European underinvestment scandal”* (Galsworthy, McKee 2013: 184).

10 REGIONAL ANALYSIS

Poland is composed of 16 NUTS2 regions, so-called voivodeships (pl. *województwo*). Regions have relative autonomy in defining their publicly co-funded support measures, and both in the 2007-2013 and 2014-2020 perspectives, there are 16 independently developed RPOs (Regional Operating Programmes), based on SF/ESIF. Some measures included in the 2007-2013 RPOs were overlapping with the centrally available opportunities. In 2013-2014, regional authorities were working on the design of their new RPOs based on pre-defined templates, provided by the Ministry of Infrastructure and Development (MIR), so that the new measures are more consistent with the nation-wide support framework, and application procedures more streamlined. Therefore, an important concern of regional funding agencies was addressed, as previously they seemed to only have limited dialogue with the central government, and they were disadvantaged due to the lack of knowledge related to complicated legal interpretations of SF modalities. Some regional agencies decided in 2014 to formalize their co-operation with NCBiR, in order to access the Centre's expertise in R&I application evaluations and the pool of experts. Polish regions have their representation in Brussels, but the respective employees were not engaged in H2020 programming and have no expertise in R&I matters.

The cross-regional heterogeneity in FP participation and SF absorption can be attributed to different factor conditions, including the availability of qualified human resources, including R&D personnel, the presence of scientific research centres and knowledge-intensive companies, and the performance of R&I projects, leading among others to patent applications. Figure 2 presents selected factor conditions, influencing the R&I performance of Poland's regions. It reveals substantial regional disparities concerning the presence of public universities and public research institutes, with the central region of Masovia (pl. *województwo mazowieckie*), including the country's capital Warsaw, accounting for the majority of such institutions. Regions differ significantly in their size, so comparisons need to normalize data by the counts of employees or residents. The data series concerning the R&D personnel per 1,000 people employed also confirms the polarisation, with Masovia and Lesser Poland (pl. *województwo małopolskie*) standing out from the rest of the country, followed by Lower Silesia (pl. *województwo dolnośląskie*) with the regional centre of Wrocław, and by Pomerania (pl. *województwo pomorskie*) with the city of Gdańsk.

Factor conditions influencing R&I performance of Poland's regions (2013): No. of public universities and public research institutes / R&D personel per 1,000 employed / National patent applications per 1m residents	
pomorskie: 14 / 6.7 / 102.1	warmińsko-mazurskie: 5 / 2.8 / 51.1
zachodniopomorskie: 6 / 3.3 / 100.0	podlaskie: 4 / 3.7 / 68.5
kujawsko-pomorskie: 5 / 3.8 / 80.7	mazowieckie: 124 / 12.2 / 178.4
wielkopolskie: 22 / 4.5 / 103.9	łódzkie: 17 / 4.1 / 123.5
lubuskie: 1 / 2.0 / 38.2	lubelskie: 11 / 3.8 / 90.3
dolnośląskie: 14 / 7.7 / 134.3	świętokrzyskie: 2 / 1.7 / 65.3
opolskie: 4 / 2.9 / 77.5	śląskie: 27 / 4.5 / 113.1
	małopolskie: 27 / 8.8 / 139.4
	podkarpackie: 2 / 5.4 / 53.1

Figure 2. Factor conditions influencing R&I performance of Poland's regions (2013). Sources of data: Central Statistical Office (GUS, 2015).

Figure 3 compares R&D funding, FP7 participation and absorption of SF for R&I in 2007-2013 (including relevant support measures from several operational programmes, both on the national and regional levels, as represented in the Annual Implementation Report 2013). It is based on data from the Central Statistical Office (GUS, 2015) and JRC-IPTS (EC, JRC-IPTS, 2015).


pomorskie: 0.99% / 13.2 / 179.5		R&I funding in Poland's regions: GERD / GDP in 2013 (%) / FP7 funding per 1M residents (m€) / SF funding for R&I, 2007-2013 per 1m residents (m€)	warmińsko- mazurskie: 0.37% / 2.9 / 191.6	
zachodniopomorskie: 0.30% / 4.6 / 166.9			podlaskie: 0.57% / 1.4 / 257.1	
kujawsko-pomorskie: 0.32% / 1.8 / 87.2			mazowieckie: 1.61% / 36.9 / 111.4	
wielkopolskie: 0.65% / 14.6 / 121.5			łódzkie: 0.69% / 9.0 / 144.8	
lubuskie: 0.27% / 0.9 / 108.5			lubelskie: 0.63% / 7.0 / 223.4	
dolnośląskie: 0.66% / 9.6 / 136.6			świętokrzyskie: 0.35% / 0.5 / 171.5	
opolskie: 0.23% / 1.1 / 153.7			podkarpackie: 1.27% / 3.4 / 191.3	
			śląskie: 0.62% / 4.1 / 89.3	małopolskie: 1.34% / 14.8 / 95.9

Figure 3. R&I funding in Poland's regions. Sources of data: Central Statistical Office (GUS, 2015), (EC, JRC-IPTS, 2015).

The data series for the ratios between GERD (Gross Expenditure on Research and Development) and regional GDP (Gross Domestic Product) explain tendencies in attracting the FP funding, as the strongest regions in terms of R&D investments are also the best performing applicants for R&I co-funding. Data on SF-based R&I funding differ from the tendency, as in the 2007-2013 perspective, certain support measures were targeting regional deficiencies so unsurprisingly, some poorly performing regions attracted much higher R&I funding per capita than the more technologically advanced regions. At the same time, effectiveness of these targeted interventions is questionable, as GERD levels in 2013 still remain relatively low in regions, which benefited from disproportionately high R&I support in the recent financial perspective.

The interviews, conducted for the S2E project, included beneficiaries and funding agencies from three regions, with different intensities of R&I efforts. Regardless of the regional differences, the interviewees seemed to share similar views regarding their opinions about the SF and FP frameworks, conditions motivating and discouraging applicants, and more problems with support coming from regional agencies compared with the centrally distributed R&I funding. Regional differences in using FP7 and SF do not seem to result from diverging regional policies or approaches to supporting R&I performers, but rather rest upon the path-dependent character of regional efforts, requiring the existence of "critical mass" of scientific institutions, innovative companies and researcher personnel. Regions underperforming in FP7 benefited from substantial SF-based R&I funding during the 2007-2013 perspective, and with the notable investments in research infrastructure and innovative projects, a good basis was established for future H2020 applications from these regions.

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12 ABBREVIATIONS

ARP	Industrial Development Agency (Agencja Rozwoju Przemysłu)
BGK	Bank Gospodarstwa Krajowego
COSME	Competitiveness of Enterprises and Small and Medium-sized Enterprises
DG REGIO	EC Directorate-General for Regional and Urban Policy
EaSI	European Union Programme for Employment and Social Innovation
EC	European Commission
EEN	Enterprise Europe Network
EMAS	Eco-Management and Audit Scheme
ERA	European Research Area
ESIF	European Union Structural and Investment Funds
EU	European Union
EU-13	13 member states, which joined the European Union between 2004 and 2013
EU-15	15 member states of the European Union as of 31 December 2003
FNP	Foundation for Polish Science (Fundacja na rzecz Nauki Polskiej)
FP6	6 th Framework Programme
FP7	7 th Framework Programme
GDP	Gross Domestic Product
GERD	Gross Expenditures on Research and Development
H2020	Horizon 2020
ICT	Information & Communication Technologies
IIMCB	International Institute of Molecular and Cell Biology
IPR	Intellectual Property Rights
ITME	Institute of Electronic Materials Technology (Instytut Technologii Materiałów Elektronicznych)
KIC	Knowledge and Innovation Community
KIS	National Smart Specialisations (Krajowe Inteligentne Specjalizacje)
KPK	National Contact Point for Research Programmes of the European Union (Krajowy Punkt Kontaktowy Programów Badawczych UE)
KSU	National Service System for Small and Medium-Sized Enterprises (Krajowy System Usług)
MAB	International Research Agenda (Międzynarodowa Agenda Badawcza)
MG	Ministry of Economy (Ministerstwo Gospodarki)
MIR	Ministry of Infrastructure and Development (Ministerstwo Infrastruktury i Rozwoju)
MNiSW	Ministry of Science and Higher Education (Ministerstwo Nauki i Szkolnictwa Wyższego)
NCBiR	National R&D Centre (Narodowe Centrum Badań i Rozwoju)
NCP	National Contact Point
NUTS2	Level 2 of regional division in the Nomenclature of Territorial Units for Statistics

(Nomenclature des Unités Territoriales Statistiques)

OPI	Information Processing Centre (Ośrodek Przetwarzania Informacji)
PARP	Polish Agency for Enterprise Development (Polska Agencja Rozwoju Przedsiębiorczości)
PLN	Polish zloty
PMDIB	Polish Roadmap of Research Infrastructure (Polska Mapa Drogowa Infrastruktury Badawczej)
POIG	Operational Programme Innovative Economy (Program Operacyjny Innowacyjna Gospodarka)
POIR	Operational Programme Smart Growth (Program Operacyjny Inteligentny Rozwój)
POIŚ	Operational Programme Infrastructure and Environment (Program Operacyjny Infrastruktura i Środowisko)
POKL	Operational Programme Human Capital (Program Operacyjny Kapitał Ludzki)
PolSCA	Polish Science Contact Agency of the Polish Academy of Sciences
PRP	Enterprise Development Programme (Program Rozwoju Przedsiębiorstw)
R&D	Research and development
R&I	Research and innovation
RPO	Regional Operational Programme (Regionalny Program Operacyjny)
SF	EU Structural Funds
SIEG	Strategy for the Innovation and Efficiency of the Economy (Strategia Innowacyjności i Efektywności Gospodarki)
SME	Small and Medium-sized Enterprise
S2E	Stairway to Excellence
UOKiK	Office of Competition and Consumer Protection (Urząd Ochrony Konkurencji i Konsumentów)
VC	Venture Capital

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