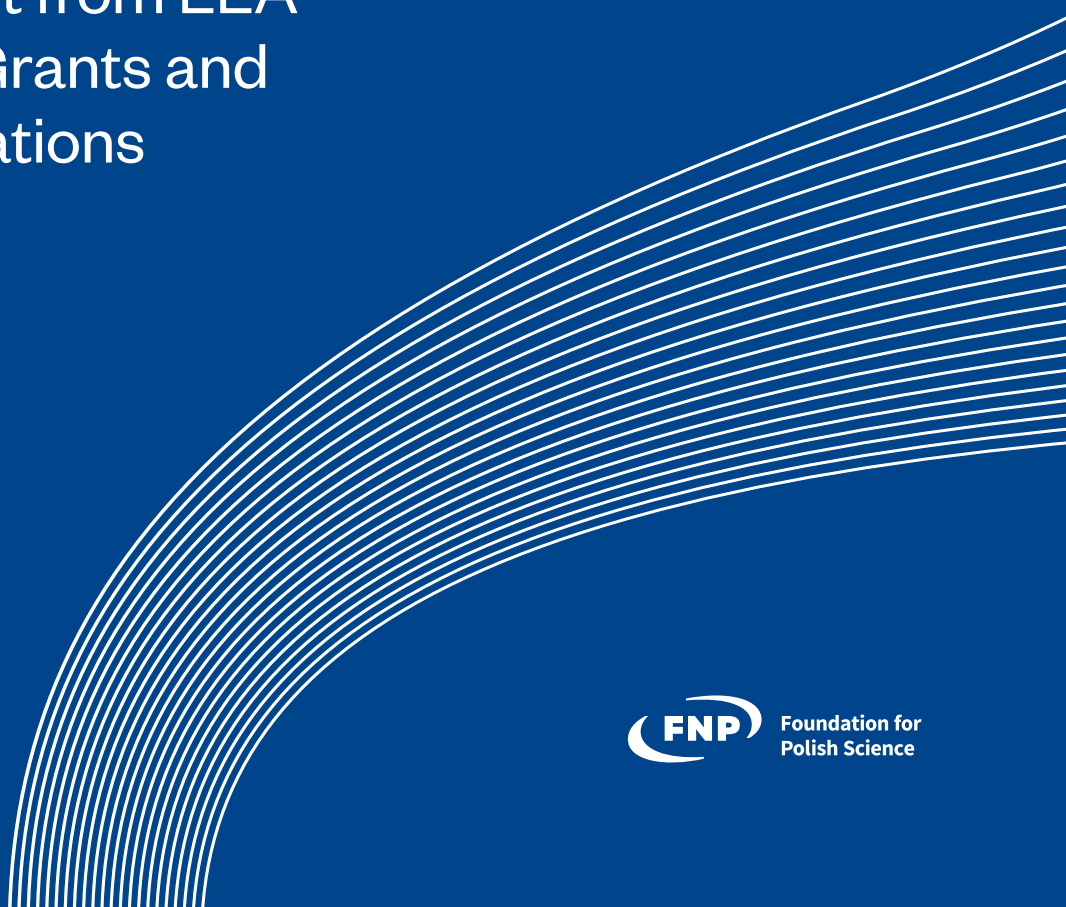
Iceland Liechtenstein Norway grants

Norway grants

Barriers to research valorisation in Poland:

Lessons learnt from EEA and Norway Grants and Recommendations for action



The Research Council of Norway

FNP Foundation for Polish Science

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The project “Barriers of research valorisation in Poland. Lessons learnt from EEA and Norway Grants and recommendations” benefits from a € 200 000 grant from Iceland, Liechtenstein and Norway through the EEA and Norway Grants. The aim of the project “Barriers of research valorisation in Poland. Lessons learnt from EEA and Norway Grants and recommendations” is to create a bilateral platform for analysis and dialogue to explore the barriers of research valorisation in Poland.

Report completed in November 2024

The Research Council of Norway

FNP Foundation for Polish Science

Contents

Acronyms

ASTP	Association of Technology Transfer Professionals
CTT	Centre for Technology Transfer
EC	European Commission
EEA	European Economic Area
ESIF	European Structural and Investment Funds
ERC	European Research Council (ERC)
FNP	Foundation for Polish Science (EN)
HEI	Higher Education Institution
IP	Intellectual Property
IPR	Intellectual Property Rights
KPI	Key Performance Indicators
M&E	Monitoring and Evaluating
NCBR	National Centre for Research and Development (EN)
NCN	National Science Centre (EN)
NGO	Non Governmental Organisation
PCP	Pre-Commercial Procurement
PoC	Proof of Concept
RCN	Research Council of Norway
SBIR	Small Business Innovation Research
SPV	Special Purpose Vehicle
TRL	Technology Readiness Level
TTO	Technology Transfer Office

Note on terminology Spinoff and Spinout

The terms 'spin-off' and 'spin-out' have very specific meanings under Polish law. Other countries and studies often use these terms interchangeably and with difficult nuances, particularly with regard to equity holdings.

Spin-off – a company whose founders include university employees and in which the university, through its SPV (Special Purpose Vehicle), has an equity holding.

Spin-out – a company whose founders include university employees, often with strong links to the parent university (e.g. use of laboratories, Intellectual Property (IP) licence) but in which the university does not have an equity holding.

To avoid confusion this report tries to avoid use of these terms and to use either 'start-up' where neither spinoff nor spinout is appropriate or to use an alternative formulation such as the simple 'new company'.

'Indirect' and 'direct commercialisation' and the role of a CTT and SPV

According to the provisions set out in articles 148–160 of the Law on Higher Education and Science (LHES) from 2018 (also known as the "Constitution for Science"), technology transfer by Polish universities can divide **direct commercialisation** (licensing) and **indirect commercialisation** (new company formation) using a dedicated unit to conduct each type of commercialisation. In Poland this has led to the prevalence of Centres for Technology Transfer (CTT) for direct and Special Purpose Vehicles (SPV) for indirect commercialisation.

Introduction and background to the report

2024

The Foundation for Polish Science (FNP) and the Research Council of Norway (RCN embarked on an initiative to explore the barriers of research valorisation in Poland

Aims and objectives

In 2024 the Foundation for Polish Science (FNP) and the Research Council of Norway (RCN) embarked on an initiative to explore the **barriers of research valorisation in Poland**. The aim was to create a bilateral platform for analysis and dialogue, leveraging the experiences of Polish and Norwegian partners, from which to deliver policy advice based on a gap analysis of the measures supporting the transfer of knowledge from the academic sector to the economy and translation of scientific discoveries and innovations into societal impacts or policy recommendations. The overall objective was to support the donors as they formulate priorities for future funding periods based on challenges that Europe in general and Poland specifically are facing and where funding agencies wish to see researchers respond to these challenges.

In taking this step, the FNP and RCN are following the lead taken by the European Commission (EC), who recognised that the research and innovation ecosystem has profoundly changed since the 2008 Commission Recommendation on the management of IP in knowledge transfer activities and that an update was needed, to focus on valorisation of all knowledge assets generated by different types of actors in a dynamic research and innovation ecosystem. The EC has emphasised that new challenges have to be addressed, such as the increasingly complex knowledge value-chains, new market opportunities created by emerging technologies, new forms of industry-academia and public sector-academia collaborations and the involvement of citizens, as well as

1 Intellectual Assets (IA) are the result of intellectual and creative activity. They can take many forms, including knowledge, ideas, inventions, artistic works and trade secrets, as well as more intangible assets like know-how, brand reputation and customer relationships. Some assets can be formally protected when they become Intellectual Property (IP). For example, an invention can be protected as a patent with associated intellectual Property Rights (IPR).

reciprocity in the management of intellectual assets[1] in the context of international R&I (Research & Innovation) cooperation. New EC guidelines address the broader scope of knowledge valorisation, compared to traditional technology transfer and dissemination. There is a stronger emphasis on the role of science for society. This new scope requires policymakers to align their policy objectives accordingly and put in place new approaches necessary for knowledge valorisation. It also requires researchers and HEIs to work more strongly with results from the AHSS (Arts Humanities and Social Sciences) and to find sustainable 'business' models that allow results with low financial value, but potentially high societal impact to be disseminated and sustained.

The FNP and RCN recognize that the capacity for knowledge and innovation forms the basis for the development of resilient, democratic societies and robust economies. In line with the policy changes in the EC and after nearly two decades of EEA (European Economic Area) and Norway Grants support of the growth and development of the Polish research sector the time was right to evaluate the situation with the overall objective of making recommendations that recognise the widening scope of knowledge valorisation and to enhance RDI (research, development & innovation) funding outcomes for socioeconomic value and benefit to society.

The action set out to explore the experiences of beneficiaries of EEA and Norway Grants as well as beneficiaries of ESIF (European Structural and Investment Funds) and domestic grants in Poland. The specific aim was to increase the effectiveness and impact of the academic ecosystem in Poland, for the sake of future EEA and Norway Grant interventions in particular, both on the development of bilateral relations and academic entrepreneurship in Poland.

The FNP and RCN set out to examine and discuss the role of scientific input in problem-solving versus the challenges expressed by the donor countries and national and European policy bodies and to identify findings and elaborate recommendations on project management and project commercialisation issues related to the exploitation of the results.

It was intended from the beginning to share the results with relevant funding bodies at the national as well as international levels so that the findings can be used in the design of future funding schemes and beyond.

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Approach and process

To carry out this study the FNP sought the expertise of seven independent experts with significant Nordic and wider international knowledge in this field and particular recognised areas of expertise:

- Karl **Klingsheim** (Norway)
- Rune Dahl **Fitjar** (Norway)
- Randi Elisabeth **Taxt** (Norway)
- Lauritz B. **Holm-Nielsen** (Denmark)
- Katarina **Chowra** (Sweden)
- Huw Alun **Edwards** (UK)
- Lisa **Cowey** (UK)

Short biographies of the experts can be found at the end of this document.

The approach adopted by the expert team combined a review of recent reports on this topic from Poland[2] with a series of workshops and interviews conducted with grant scheme beneficiaries and actors from the Polish innovation ecosystem e.g. Centers of Technology Transfer (CTTs), incubators and Science Technology Parks as well as other Funding Agencies including NCBiR (EN: National Centre for Research and Development) and the NCN (EN: National Science Centre).

Panel meetings between the experts, grant beneficiaries and other actors were held as follows:

- Warsaw, 27.05.2024
- Krakow, 10.06.2024
- Gdansk, 16.09.2024

2 Academic entrepreneurship as support for education and knowledge transfer to the economy. Summary of the discussion between the Polish Academy of Arts and Sciences, the Foundation for Polish Science and the Batory Foundation (https://www.fnp.org.pl/jak-wzmocnic-przedsiebiorczosc-akademicka-podsumowanie-dyskusji-srodowiska-naukowego-zainicjowanej-przez-fnp/)

- Warsaw, 17.09.2024 (NCBiR, NCN)
- Wrocław, 30.09.2024

In total, 24 interviews were held in four locations. A strong attempt was made to select beneficiaries from different cities and different institutions. This approach was intended to offer geographic and contextual diversity.

The panels focused on four major points of interest:

1. **gathering lessons learned from projects,**
2. **mapping of the most important barriers across different project types,**
3. **putting the findings in the context of the objectives of EEA and Norway Grants as well as those of national and EU-funded programmes in Poland,**
4. **formulating and presenting the key findings and recommendations towards more effective programmes in an actionable and engaging way.**

Experts were provided in advance with relevant input material and were able to interview the members of the research project teams to compare their perspectives on the research valorisation as well as first hand experiences.

The expert panels sought findings that would offer a clear basis for recommendations on project management and project commercialisation issues related to the exploitation of the results.

FNP and RCN staff closely followed the work of the panels and experts and observers.

24
Interviews

4
Locations

A strong attempt was made to select beneficiaries from different cities and different institutions.

Definition of Valorisation

The European Commission's valorisation policy includes:

Citizen engagement

Involving citizens, civil society organizations, and communities in turning research results into innovative solutions

Intellectual assets management

Managing intellectual assets to accelerate the adoption of innovative solutions

Dissemination and exploitation

Disseminating project results and achievements, and exploiting them to adapt them to other beneficiaries

Mainstreaming and multiplication

Transferring successful results to decision-makers, and convincing end-users to adopt them

In approaching this assignment the expert team were aware that valorisation conveys different meaning to different individuals and organisations. The definition used by the European Commission (EC) was adopted by the expert team. However, they remained aware that others who they met and interviewed may have a somewhat different understanding of the term.

The European Commission defines valorisation as *the process of creating social and economic value from knowledge by linking different areas and sectors and transforming data, know-how and research results into sustainable products, services, solutions and knowledge-based policies that benefit society.*

EU knowledge valorisation policy covers both technological and non-technological solutions that can derive benefits to the society as a whole.

This cross-fertilisation of knowledge among different actors and sectors happens through academia-industry collaboration and mobility, the creation of spin-offs and start-ups, intermediaries and knowledge transfer professionals, citizens and local communities engagement, intellectual assets management, standardisation, knowledge dissemination and policy uptake.

In December 2022, the Council of the European Union adopted Recommendation 2022/2415 on guiding principles for knowledge valorisation[3]. The goal of these non-binding principles is to increase the socioeconomic benefits of research and innovation.

The European Commission's Knowledge Valorisation Platform connects players in Europe to turn research results into sustainable products and solutions.

3 See https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2022%3A391%3AFIN&qid=1660055341349

Key Findings and Recommendations towards more effective commercialisation and project implementation conditions

This chapter lays out the key findings and main recommendations made by the expert panel. Where possible the recommendations have been illustrated by a Good Practice example.

Grant scheme design and funding landscape

Key Findings:

Existing research grants do not make valorisation a clear component in its own right. They do not impose an associated M&E (monitoring and evaluation) system or require a mentor or advisor to drive valorisation forward, including after the end of the project. In addition, the terms of a grant agreement are often burdensome and can even block further valorisation, particularly for economic purposes.

Researchers do not perceive a strong need to follow through with their research results beyond the end of the grant and the final reporting of KPIs.

At the same time, researchers are willing to 'bend' their proposals to the call without creating added value for valorisation. They frequently seek to achieve the KPIs of their grant scheme but view these as final outputs rather than as future inputs for valorisation. Researchers do not perceive a strong need to follow through with their research results beyond the end of the grant and the final reporting of KPIs.

Recommendation 1

Review and update existing grant schemes to strengthen outcomes

Many grant schemes benefit from regular review to ensure that aims, objectives and priorities are clear and that these are fully aligned with the evaluating criteria as well and the monitoring and evaluation (M&E) frameworks. Grant schemes that have not been reviewed for a while often have small changes introduced e.g. to the evaluation criteria or the KPIs, that move them away from their central purpose. Funding institutions in Poland are strongly recommended to undertake a review of their grant schemes to ensure that they have not crept away from full alignment and that they still fully reflect their desired aims and objectives.

If the framework for selecting grantees seems to be fully in-line with aims and objectives and valorisation still seems to be low then the grant awarding bodies are advised to review and strengthen the M&E framework including the activities that they fund and monitor across the course of a grant, designed to ensure that it has greatest impact.

Involving scientists from previous grants into such a review could offer a valuable external perspective. It may also be useful to incorporate different 'readiness' scale into revised grants e.g. Societal Readiness (ST), Sustainable Readiness, and Commercial Readiness (CR) alongside the established Technology Readiness Level (TRL).

Including funding to undertake valorisation activities and making these a mandatory part of the research plan can help to ensure that simple quantitative KPIs become part of a wider qualitative action. For example, the filing of a patent application should be merely a part of the requirement to develop an IP strategy and plan for its execution. In this situation, it is important to make clear to grant beneficiaries what the concrete expectations are of the grant awarding body and how these may be divided between a researcher and an external support organisation. This allows

researchers to ensure they can either deliver the activities themselves or that they can identify the necessary support from the beginning e.g. from a CTT. For example, the identification of potential future partners should be linked to the requirement for the researchers to be strongly involved in the development of technical promotional materials and their use to engage with the potential partners.

Involving a named and approved business/valorisation advisor as part of the eligible funded activities, either an external one or from the CTT, should also be considered. This action would ensure that valorisation activities have a clear point of reference and responsibility alongside the research actions.

Finally, the funding bodies are recommended to seek input from grant beneficiaries to identify any issues in the grant agreement that are seen to block valorisation. These could be both aspects that are currently omitted such as a requirement to define the ownership/exploitation structure between partners, or current aspects that may need to be modified such as onward transfer to new owners. This could be done at grant exit but also at intervals after the grant has finished to see if they have arisen at a later date e.g. related to ownership or transfer of IP rights.

Overall, when grant schemes are not yielding the results anticipated and desired by the grant awarding body, then a review is a highly practical starting point that is under the control of the funding organisation and helps to eliminate reduced performance that is actually due to imperfect grant scheme design, 'creep' from the original aims and objectives or a lack of alignment with changed external circumstances that may be influencing behaviour e.g. changed HEI/researcher assessment KPIs.

Key Finding: Valorisation in Poland is largely interpreted narrowly as 'commercialisation' with the emphasis being on economic value rather than wider societal benefit.

Key finding

Valorisation in Poland is largely interpreted narrowly as 'commercialisation' with the emphasis being on economic value rather than wider societal benefit.

Recommendation 2

Emphasise the broad nature of 'impact' when encouraging 'valorisation' in grant calls.

Many research projects have the potential to contribute value and impact to the 'triple-bottom-line' e.g. economic, social and environmental benefit. If this is not emphasised in the call then applicants can focus quite narrowly on economic value and tie this to traditional indictors such as the filing of a patent application. If the project does not yield results of strong commercial potential then applicants may feel no requirement to take them further. Some may actually feel shy about seeking further support that is not focused on economic outcomes. This economic focus of a grant awarding body can also have an effect on supporting organisations like TTOs who feel that their focus should be on the commercial projects.

The funding agencies are strongly recommended to emphasise social and environmental benefit alongside economic outcomes in their Calls and to provide an indicator system that reflects non-economic outcomes e.g., Societal and Sustainable Readiness. They should also emphasise the benefits of developing projects that act to reduce existing negative impacts when they are implemented in society e.g., reduction of toxic waste. Collecting, publishing and celebrating examples of wider impact from funded projects is also a valuable way to ensure a diversity applications and encourage researchers to take steps to valorise results further when they do not hold strong economic promise, including by seeking support from their home institution. This should include examples that show how alternative pathways to impact that include Non-Governmental Organisations, (NGOs), Not for profits, Associations etc. can provide sustainable solutions as an alternative to 'industry'.

This recommendation is linked to the EC Guiding Principles for KV (Knowledge valorisation in research and innovation policy and Relevancy in public funding schemes).

Key finding

The overall landscape of grants in Poland does not seem to be optimally designed to 'graduate' a project to a further support scheme based on the output indicators of the completed scheme or the TRL of the project.

Key Finding: The overall landscape of grants in Poland does not seem to be optimally designed to 'graduate' a project to a further support scheme based on the output indicators of the completed scheme or the TRL of the project.

RCN, FNP and other funding agencies are encouraged to undertake a mapping of the funding landscape to identify current gaps, including those related to TRL and also those between different funding schemes at national and EU level.

Where there do seem to be gaps in the funding landscape, then it is recommended that agencies consider introducing new schemes as well as some bridging funding for projects wanting to advance towards possible EU funding. Where individual schemes do not seem to 'fit' well together e.g. in a way that allows a strong project to advance smoothly up the funding escalator then it is suggested that funding agencies work together to make adjustments - see Recommendation 4 below.

Recommendation 3

Undertake a mapping of the current funding landscape to identify gaps and lack 'forward 'fit'.

In an optimised funding landscape, a strong project can easily and rapidly graduate to a new funding source that allows it to continue to mature and create value. Poor projects should also be filtered out by such a system. This approach is visible in European level funding where the sliding scale of grants covers the range from pure research (European Research Council (ERC)), to pre-commercial research (Horizon Europe) and then further research/commercial development which can be part funded via EIB (the European Investment Bank). The scale of funding ranges from Euro 10 thousand to Euro millions to reflect the progress towards the market. This funding ladder is mimicked in many countries internationally. Many specific and focused schemes also exist such as the US SBIR (Small Business Innovation Research) and the European PCP (Pre-Commercial Procurement).

While funding agencies frequently look towards this kind of coverage of the research and innovation landscape e.g. with regard to TRL, it can be very useful to also examine pre-defined outputs from the research project, particularity when linked to a KPI, and consider if these can become a clear input for further support. This has the advantage of reducing the number of outputs that are simply discarded once a KPI has been reached or lost due to lack of funding e.g. a patent application which

Recommendation 4

Work strongly with other funding agencies to ensure that outputs can be used as inputs for further funding support.

Key findings

Awareness of international funding that will support large scale research valorisation seems low while national funds for start-ups are perceived to be either too large or too burdensome for a start-up.

should be followed through into a granted patent and then licensed right. Polish funding agencies are strongly recommended to liaise with other granting bodies, including European funding, to see if they can better shape outputs to fit inputs on further grant schemes and to reflect this in the indicator system. However, when changing indicators the issues raised in recommendation 1 of maintaining alignment with aims and objectives needs to be held in mind and lack of an input should not make it impossible for a good project to secure funding. For this reason qualitative output indicators can sometimes work well as inputs e.g. a convincing IP strategy while eligibility of actions for funding can be appropriate to secure outputs e.g. funding to take a national patent application into an international one.

Key Findings: Awareness of international funding that will support large scale research valorisation seems low while national funds for start-ups are perceived to be either too large or too burdensome for a start-up.

Recommendation 5

Raise awareness of follow on funding sources that would fit to the aims and objectives of the original scheme

To try and smooth the passage of a project from one funding source to another, the agencies are recommended to try and promote follow on funding that supports further valorisation of promising projects that have been supported under their own grant schemes. This requires a proactive approach towards maintaining awareness of the funding landscape and will have more impact if individual projects can be advised of possible follow on funding as they come to the end of their activities. Such an approach is facilitated if recommendation 3 is being followed when awareness of other sources of funding is likely to be good.

Motivation and impact (3rd stream mission)

The two traditional missions of teaching and research are well established at universities across the world including the EU Member States. The third stream mission – often loosely described as supporting 'innovation' is newer and continues to evolve, moving away from economic, revenue

generating impact, to embrace both societal and environmental benefit and including knowledge exchange rather than technology transfer.

The Polish Law on Science incentivises third stream activity through a system of financial rewards linked to indicators. Government funding is strongly linked to educational performance and research publication but also to indicators of wider activity that generate external sources of funding, including externally funded research, industry collaboration and contract research, IP licensing and spinoff activity as well as more qualitative capture of impact for society and the environment.

The EC recognises the importance of providing incentives to engage in 3rd stream activity in its new Guiding Principles for KV (System of incentives).

Key Findings: In common with their international counterparts, most Polish scientists are not strongly motivated by financial rewards and while most have a strong desire to create impact for society from science, it does not provide a concrete benefit to an academic career path. At the same time, the third stream mission is currently narrowly interpreted at all levels in Poland as commercialisation for economic benefit and HEIs are not proactive or particularly supportive regarding wider valorisation of research projects. HEIs are also not well connected to society in Poland.

Key findings

In common with their international counterparts, most Polish scientists are not strongly motivated by financial rewards and while most have a strong desire to create impact for society from science, it does not provide a concrete benefit to an academic career path.

To align with their inherent motives and drivers, Polish researchers need more examples of how they can use their results for non-financial benefit. They would also benefit from more support from their CTTs to investigate and pursue non-classical business models to transfer results to a wider audience than 'industry'. There should be an expectation, expressed by funding agencies, HEI and the Ministry that efforts will be made by researchers to valorise beyond the end of a research project and that support will be available to help them do this. Implementing this recommendation is linked to the examples given for developing an entrepreneurial mindset and strengthening support for valorisation.

Action to support this recommendation could come from researchers themselves, sharing good practice and experience via a national

Recommendation 6

Support researchers to engage more strongly in valorisation for drivers beyond monetary gain

platform managed by one of the Funding Agencies or the Ministry. Researchers and CTTs should also be incentivised by research funders to make better use of and contribute to platform such as the EU knowledge-repository platform[4].

Recommendation 7

Broaden the scope of 'valorisation' and ensure this is reflected in the 3rd stream indicator system

The Ministry, University managers and researchers need to be more strongly incentivised to engage in valorisation of their research. This will require both strategic and operational changes to the current system as well as the involvement of other stakeholders including funding agencies, CTTs and the wider ecosystem. It may also require changes to the legislation and regulation of framework conditions.

Rectors, faculty deans and departmental heads need to see research valorisation as an important driver for the 1st and 2nd stream missions e.g. teaching and research, and not linked to simple metrics like national patent filings, that will help them secure a larger core budget for the institution.

It is recommended that policy makers, and in particular the Ministry for Science, revisits the current metrics system and considers introducing more indicators that capture non-monetary impact. This should include indicators that capture human resource circulation e.g. collaborations and staff and student placements. It should also make provision for demonstrating that transfer of research results has led to benefit for society or the environment. Overall, Poland is recommended to ensure that the current metric system reflects the revised European Commission Guiding Principles for Knowledge Valorisation including the Codes of Practice on the Management of Intellectual Assets[5] and Standardization[6].

This recommendation is linked to the EC Guiding Principles for KV (Metrics and Monitoring and evaluation).

4 See https://projects.research-and-innovation.ec.europa.eu/en/research-area/industrial-research-and-innovation/eu-valorisation-policy/knowledge-valorisation-platform/repository

Education (skills, capacities and competencies)

Knowledge and skills in the research base are critical for starting the process of valorisation of research results in all countries. This is clearly recognised by the EC in their new Guiding Principles for Knowledge Valorisation (Skills and Capacities). Skills need to be developed for each new intake of researchers implying a rolling education and training programme. While some researchers will have a natural tendency to being entrepreneurial, others may be interested in developing an entrepreneurial mindset[7] through training. Others may have little interest beyond developing excellent research practice but will be willing and interested to acquire the entrepreneurial knowledge and skills needed to continue to secure and fully implement a grant scheme to meet the aims and objectives of the funding agency.

Poland has previously set up training for researchers to support technology transfer including the i-Core, FNP-Skills project and 'Top 500' programs. There is less evidence of ongoing systematic training schemes in 2024 and it is clear that many HEIs would lack sufficient demand to offer a significant course for each new intake of researchers or to support those who want to become strongly involved with valorisation e.g. by setting up a new company to realise the results. Polish researchers demonstrate that many do not have commercial knowledge or skills even with basics such as the dual publication and patenting systems or an understanding of how a viable and sustainable business model may allow them to bring results to market that do not have clear direct commercial value.

This recommendation is linked to the EC Guiding Principles for KV (Intellectual asset management)

Key Finding: Commercialisation knowledge amongst researchers in Poland remains on a low level and valorisation is a very new term. There is currently little support for scientists to help them develop an entrepreneurial mindset and business skills.

Key finding

Commercialisation knowledge amongst researchers in Poland remains on a low level and valorisation is a very new term. There is currently little support for scientists to help them develop an entrepreneurial mindset and business skills.

5 See https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX-%3A32022H2415&qid=1670573108748

6 See https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX-%3A32023H0498&qid=1678171117168

7 An entrepreneurial mindset is characterised by openness and self-efficiency. It can help a researcher to thrive in a fast moving environment.

Recommendation 8

Offer training for grant scheme beneficiaries to help them understand how to strengthen research project outcomes

Individual Polish grant scheme agencies should consider running short training courses alongside their own grant schemes to help educate grant scheme beneficiaries on some of the common issues they will encounter e.g. the need to secure appropriate intellectual property rights that would support a valorisation strategy. Such an approach could involve national experts with particular areas of competency e.g. the relevant national legal framework as well as graduates from the grant scheme who could share their experience and answer questions from those at the beginning of their research career. Funding agencies should consider making attendance at such training, either in person or virtually, a mandatory requirement of the grant.

While there is a clear financial cost from implementing such training it could be offered online to encourage take up and minimise travel expenses. The costs might well be justified if outcomes are seen to strengthen project outcomes.

A focus for information dissemination and promotion of training activities linked to the Norway grants could also be the existing National Contact Points, particularly those located in the larger HEIs.

Recommendation 9

Establish larger capacity building programmes at national or sub-national level that would foster an entrepreneurial spirit in the academic research basis

Poland has previous experience of implementing capacity building at national level in order to bring together the most ambitious and motivated researchers and valorisation support staff from the country – most notably the Top 500 Innovators programme, funded with European Funds and delivered with the support of international partners, including the Stanford Centre for Professional Development. Some of the Top 50 alumni became members of *US-Poland Innovation HUB team*. They provided organizational and coaching support on cultural plug-in into Silicon Valley for the participating companies during Innovation HUB sessions in Poland and in Silicon Valley and assisted Innovation HUB participants in the creation of their network with the business and science communities.

It is strongly recommended that Poland continues similar programmes, also exploring other locations than Silicon Valley. Good examples beyond Top 500 that could be considered include i-CORPs Teams[8] from the US National Science Foundation (NSF) and Engineering Unleashed[9] or a new FNP-PRIME project in partnership with an external organisation. Inclusion of a clear theme of valorisation for social and environmental impact should be part of such a program. Other examples to consider include Sweden where interest in this topic has grown in recent years and some initiatives have emerged, such as the SPIRIT program, which is partly inspired by the ICURE program in the UK and I-CORPs in the USA.

Recommendation 10

Fund more collaborative projects that enable researchers to work with and inside a company or similar non-commercial entity to help bridge the gap and enable them to develop a non-academic skills set

Strong research collaborations have been shown in many countries to enable knowledge exchange and the development of skills that cannot easily be acquired in the home environment. At its most extreme, this can include time spent working in a partner organisation. Moves toward this are seen in the PL-Applied Research calls which required all their bilateral research projects (POLNOR and POLNOR CCS calls) to include industrial/SME partners. A similar approach can be seen in the IdeaLab call which involved NGOs and municipalities while the IdeaLab call in the PL-Basic Research programme also involved NGOs. An important learning point from these projects was the importance of establishing a common language across sectors, and the importance of this skill to researchers.

Relevant Polish authorities, including both the Ministry and the funding agencies are encouraged to establish more grant schemes that permit exchange of personnel between partners, with a focus on skills development. Useful examples are provided by the Norwegian Industrial PhD scheme 'Doctoral Projects in Industry'[10] and the Finnish mobility schemes Tandem Industry Academia (TIA) Postdoc and Tandem Industry Academia Professor. TIA Postdoc funding focuses on two-year projects during which the postdoctoral researcher works for 12 months on company premises. TIA Professor funding supports professors' work in companies for 12 months.[11] It is also suggested to examine the actions of other countries that make use of Adjunct Professor positions and industrial placement schemes e.g. the EU Collaborative Doctoral Partnership programme (PCP)[12] and similar initiatives the UK (SBRI) and US (SBIR) schemes).

8 See https://new.nsf.gov/funding/initiatives/i-corps/about-i-corps

9 See https://engineeringunleashed.com/

Key finding

There is a lack of critical mass, necessary skills and competencies within TTOs. Specialised support is not easily available internally and funding is not readily available to enable access to external specialised support.

In addition, the Ministry and Funding agencies are urged to support the development of associated skills in the research community. A strong starting point is the Researcher Development Framework, originally developed in the UK and now translated into the EU context[13].

Support for Knowledge Valorisation

Support is vital to realising the third mission and specifically research valorisation but needs to be delivered in the right way. A TTO is a gateway: it cannot be expected to have expertise in all areas but must be able to access relevant support and expertise to cover a very wide range of research inputs and to recognise that good scientists are not often the best people to lead a business venture as they lack both skills and motivation. Thus, a TTO typically needs in-house expertise from technology brokers on key issues such as licensing, contracts and commercial networking. External expertise on specific technology areas, specific industries and markets also needs to be available on a project by project basis; this can be achieved by securing external expertise provided funding is available and the expertise can be sourced.

Expecting a TTO to generate a profit for the HEI is not easy in any country except from a small number of research intensive HEIs. In addition, the benefits to society from technology transfer may not be evident until many years later. This means that the metric system used to evaluate a TTO should be tailored to the HEI mission and performance evaluation should be based on reviewing its project portfolio at regular intervals – with emphasis on how all projects in the portfolio advances through pre-defined stages and milestones in its project management system. Such an approach should be applied to Polish CTTs.

Key Finding: There is a lack of critical mass, necessary skills and competencies within TTOs. Specialised support is not easily available internally and funding is not readily available to enable access to external specialised support.

10 See https://www.forskningsradet.no/en/financing/what/industrial-phd/

11 See https://www.vaikuttavuussaatio.fi/en/impact-assessment/

12 See https://joint-research-centre.ec.europa.eu/working-us/collaborative-doctoral-partnership-programme_en

13 See https://research-and-innovation.ec.europa.eu/document/download/7da29338-37bf-4d51-b5eb-a1571b84c7ad_en?filename=ec_rtd_research-competence-presentation.pdf

CTTs in Poland provide the most visible first point of contact for a research project. However, they are often not involved in valorisation until the project is over or in order to achieve a KPI such as a patent application. There is a need to involve the CTT at an earlier stage and to help them to take responsibility for valorisation actions, including those that will extend beyond the end of the project.

Grant awarding agencies in Poland can strengthen TT and valorisation outcomes on projects that they have financed by including funding in the grant for activities that can be coordinated and managed by the CTT e.g. access to external sources of expertise such an industry specific experts. Funding can also be provided for the development of business plans or commercialization strategies.

CTTs themselves, as well as their counterparts in Poland the SPVs (Special Purpose Vehicles) should be encouraged to engage with wider capacity building activities including via ASTP (EU), PraxisAuril (UK) or AUTM (USA) and to professionalise the service using Registered Technology Transfer Professional (RTTP) designation[14].

Recommendation 11

Strengthen support from CTTs for projects with results that could be valorised

In the long term, increased support for CTTs themselves to develop and retain expertise is needed in Poland; this includes a move away from such a high proportion of 'project based' contracts and the development of a critical mass of specialised services. The status of technology transfer as a profession and the corresponding remuneration must be increased to allow CTTs to recruit and retain competent staff.

Establishing larger CTTs that could serve as national or sub-national regional resources should be considered. This could include CTTs that were specialised in a particular technical field and that were linked to sector specific industry networks, clusters and Smart Specialisation initiatives. Such organisations would be charged with interacting with foreign multinational companies to help move results beyond the national market.

Recommendation 12

Consider new delivery models of TT support that create critical mass and ensure longevity of accrued expertise

Pooling Technology Transfer activities from several HEIs to create critical mass has been shown to be challenging but successful examples do exist of countries that have developed models to successfully achieve the objective of critical mass and, in some cases, sector specialism.

A very relevant example of Multi-Institutional TTOs (MiTTO) are those established by Norway who serve multiple organisations but also offer a wider range of innovation support activities that the traditional technology transfer pallet. See case study below. If adoption of such a model would require changes to current legislation in Poland governing SPVs and/or CTTs then policy makers are urged to consider this.

Also worth considering is the French SATT model (Technology Transfer Acceleration companies) see box below. Other countries that have set up similar centralised Technology Transfer resources include Switzerland. The Swiss model allows for sector specialisation, see for example the Advanced Manufacturing Technology Transfer Centers (AM-TTC) and the Swiss Cobotics Competence Center (S3C) and the Swiss Photonics Integration Center (Swiss PIC).

This recommendation is linked to the EC Guiding Principles for KV (**Peer Learning**).

SATT: French Technology Transfer Acceleration companies

Within the framework of the Future Investments Program (Programme des Investissements d'Avenir, PIA) and the "Development" work of the "Centers of excellence" program, €900 million is set aside for maturation and proof of concept through the creation of technology transfer acceleration companies (SATT) across France.

SATTs are intended to bring together all university development teams and put an end to the fragmentation of institutions. Their goals are to improve the efficiency of technology transfer and increase the economic value created, to professionalize the development of research and to build skills.

The 14 French SATTs face the challenge of competitiveness by transforming researchers' most creative ideas into innovative products and services, adapted to the market.

14 See https://attp.global/

SATTs carry out shared actions in order to increase the attractiveness, readability and visibility of technologies resulting from French academic research among companies. The SATT network, which covers the entire country, aims to professionalise the technology transfer system with more homogenous, simple and efficient practices.

Based on laboratory results, the maturation objective is to build a technological solution that demonstrates a real benefit for future clients. SATTs invest in the maturation of innovations from French public research before commercialising them via licences to companies.

MiTTOs: Norwegian Multi-Institutional TTOs

TTOs in Norway are generally organised as external companies which provide services to, and are typically fully or partly owned by, one or more universities. Most TTOs provide services to several research institutions, including to universities, research institutes and university hospitals, typically those located in its local region. Each university signs a contract with the TTO for technology transfer services.

Some TTOs are also embedded within larger integrated innovation companies which provide services along the innovation value chain. For instance, Validé serves as the TTO for the University of Stavanger, Stavanger University Hospital, the research institutes Nofima and NIBIO, and a research centre of the Norwegian University of Life Sciences. Besides TTO services, it also operates an incubator, an accelerator programme, an industry cluster and a pre-seed investment programme, serving both academic and other innovative entrepreneurs. This enables it to support commercialisation ideas through a range of mechanisms depending on the needs of the project. For instance, if an academic inventor decides to create a new company, Validé can help secure IP protection, provide incubation services and be an early investor in the company. A similar model is operated by ViS for research institutions in Vestland region.

Key findings

Rectors and senior university management in Poland are apprehensive of contravening regulations relating to IP valuation and State Aid Rules. This, combined with a more general inertia to change in university management and inefficient decision making slows technology transfer, produces non-optimum outcomes from public procurement and inhibits access to specialised faculties.

Legal and regulatory issues

Key Findings: Rectors and senior university management in Poland are apprehensive of contravening regulations relating to IP valuation and State Aid Rules. This, combined with a more general inertia to change in university management and inefficient decision making slows technology transfer, produces non-optimum outcomes from public procurement and inhibits access to specialised faculties.

There is also a lack of national legislation and university regulations that would allow researchers to spend time away from teaching duties to support a start-up/ spinoff/spinout.

Recommendation 13

Introduce clear guidelines that reduce the perceived risk for Rectors of engaging in commercial activity

The Ministry is encouraged to endorse a valuation framework for early stage technology and to ensure reasonable access to independent professional valuation support. Rectors should be able to feel confident that they can fall back on a legal defence of having demonstrably taken "reasonable steps" if they encounter legal challenge to a valuation at a later date.

HEIs are also recommended to work with each other to establish a database of benchmarks based on concluded sale and licenses of IPR that they can also refer to when negotiating for transfer. This could be led by PACTT (Polish Association of Centers of Technology Transfer).

Polish HEIs are urged to make best use of EU and National Law with regard to both procurement of eligible expenditures and access to equipment. It is recommended that HEIs review their current approach to public procurement to see if this can be more streamlined, e.g., by supporting research grant procurements in small 'batches', by being willing to accept that lowest price may compromise quality or prepared to launch a new invitation to tender for unexpected needs of a project. An optimised approach for research and valorisation may mean not adopting the easiest or lowest risk approach to purchasing commercial items. Support for a revised approach should come from the Ministry and grant funding agencies who should make clear their support for outcomes over price.

Recommendation 14

Encourage HEIs to revisit their approach to public procurement to accelerate research activity and support valorisation

Poland is urged to strengthen legal clarity around the commercial activity of academics and HEIs. Clear rules remove risk and should encourage more entrepreneurial activity among the risk averse and more active engagement with Open Innovation. Where legislation has already regulated a situation, HEIs and funding agencies are urged to make sure that this is clearly communicated to the academic body.

For grant awarding bodies this should include provisions for the ownership of IP created under grant schemes, particularly those involving more than one party. Information regarding ownership should be clearly communicated to those involved in funded research e.g. as a clear part of the funding contract. This would facilitate further transfer and valorisation after the end of the grant.

Employment contracts with HEIs should be clear and unambiguous regarding time that can be allocated to commercial activity around teaching and research responsibilities. Making provisions for Polish academics to take time away from their teaching job to work in a new company while offering the security of a return to academia after some fixed time may be beneficial. HEIs and the Ministry are recommended to examine the legislative regime for employment as well as internal HEI regulation to try and make this situation possible. The examples below may prove useful.

Recommendation 15

Strengthen legal clarity around the commercial activities of academics and ensure it is communicated to all relevant parties

Examples – academic job security and new company creation

France attempted to address the issue of academic job security by allowing academics back to their original job for one year, to their institution for two years and to the French academic system for three years following setting up a university spin out.

Other HEIs have taken the approach of agreeing time-share between academic and new company activity. This can range from an informal approach of monitoring if the academic responsibilities are still being met, with no formal agreement on the time division, to an contractual agreement that sets out a clear division between academic work and company.

Finally, Polish HEIs are urged to introduce clear regulations that facilitate long term access to research facilities, particularly those that would be beneficial to a new start-up in its early years.

Key findings

Attracting the best international researchers to Polish research teams is challenging.

Ecosystem

A knowledge transfer ecosystem is complex and to some extent cultural. Apart from the academic knowledge providers and the industry base many other stakeholder need to be involved. Grants for research and commercialisation have a role to play; private and institutional funders also contribute. There are many intermediaries in the system including lawyers and market specialists. The key issue is that all the players interact effectively.

Key Finding: Attracting the best international researchers to Polish research teams is challenging.

Polish HEIs are struggling to attract the high-quality post-docs needed to support the development of strong research teams. Such teams are often critical to raise results to a higher TRL and enable scale up and vertical integration.

Funding agencies and the Ministry are urged to dedicate funding to mobility and exchange programmes to address this issue and help build critical mass at the right level into Polish research teams. In particular, levels of remuneration for post-doc and PhD salaries need to be revised to make them more competitive compared to other EU MS. In addition, universities should leverage the international networks of researchers who have returned after periods abroad, e.g. as PhDs or post-docs, to attract other international researchers into the teams.

Key Findings: Research valorisation in Poland focuses strongly on the domestic market however there is limited Polish industry to support adoption of many technologies and no city or region in Poland seems to have a comprehensive ecosystem for innovation in place. Trust between science and business remains low. Entering international market is highly competitive. International linkages formed under Norway/EEA grants do not appear to be playing a strong role in forging meaningful links between science and business.

Recommendation 16

Dedicate funding for Polish universities to attract international PhD students and post-docs, e.g. through mobility or exchange programmes

Key findings

Research valorisation in Poland focuses strongly on the domestic market however there is limited Polish industry to support adoption of many technologies and no city or region in Poland seems to have a comprehensive ecosystem for innovation in place. Trust between science and business remains low. Entering international market is highly competitive. International linkages formed under Norway/EEA grants do not appear to be playing a strong role in forging meaningful links between science and business.

Recommendation 17

Develop local ecosystems around sector specific clusters and embed them in international networks.

Highly functioning innovation ecosystems allow technology and knowledge to gain access to a variety of adopters at local, national and international levels. By providing access to wider 'markets' they help to overcome lack of local up-take and reduce the barriers of international competition.

Some Polish research teams are located close to relevant sector specific industry, even if this is at an early stage of development. This provides the nucleus for cluster development.

The Government is encouraged to dedicate funding to develop local clusters and allow them to engaging in trust building activities. This will require active support in terms of joint events for all relevant parties, good intercommunity communications and active champions of the process. This could take the form of a calendar of events for a particular region, a person dedicated to communication between the players and a champion to promote the whole process.

Local clusters should be supported to become members of wider cluster networks e.g. at EU and international level to further expand opportunities for knowledge exchange. This would further brain circulation of talented researchers. CTTs and SPVs should become more strongly embedded in their associated international networks e.g. ASTP (Europe), AUTM (USA).

Expert Panel biographies

Karl Klingsheim (Norway)

Professor Klingsheim is a seasoned educator with tenure in Norway and in Poland. He was formerly the Science & Technology Counsellor with the Royal Norwegian Embassy in South Africa, and he has served as executive officer and board member for multinational companies as well as for university spin-offs in Norway and in USA. He is a registered Technology Transfer Professional (RTTP), and he was Chief Executive Officer of NTNU Technology Transfer AS, a subsidiary of the Norwegian University of Science and Technology, from its inception in 2003 to a successful operation with 30 technology transfer professionals.

Rune Dahl Fitjar (Norway)

Rune Dahl Fitjar is Professor of Innovation Studies at the Department of Innovation, Management and Marketing within the UiS School of Business and Law of the University of Stavanger, and Director of the Centre for Innovation Research. Rune chairs the board at the innovation company Validé and at the Centre for Welfare and Labour Research at OsloMet, serves on the Norwegian Research Councils portfolio boards for innovation and for the research system, and has co-founded the academic spin-off DiveOpp. He holds a PhD in Government from the London School of Economics (2007). His research examines innovation and regional development.

Randi Elisabeth Taxt (Norway)

Randi Elisabeth Taxt is a Senior Advisor at Vestlandets Innovasjonsselskap AS (VIS), with experience spanning research and management in higher education, innovation, and technology transfer. She holds a PhD in Innovation Studies, a Master's degree (cand.scient) in Cell Biology from the University of Bergen, and a Master's in Technology Management (MTM) from the Norwegian University of Science and Technology (NTNU), in partnership with the Massachusetts Institute of Technology (MIT) and the Norwegian School of Economics (NHH). She is also a registered Technology Transfer Professional (RTTP). With over 30 years of cross-sector experience in project management and leadership, Randi has experience from a wide array of projects on both national and international levels. Her background also includes roles on program committees for various funding organisations, board positions in biotech and bioeconomy startups, and active involvement in several cluster organisations.

Lauritz B. Holm-Nielsen (Denmark)

Lauritz B. Holm-Nielsen is an internationally experienced leader in higher education, research and innovation. He has had critical roles in Denmark's reform efforts since initiating the reform of doctoral training 1986. He was managing director Sino-Danish University Center, Beijing 2013-18, rector of Aarhus University 2005–13, the World Bank's Global Lead Specialist for higher education, Washington 1993–2005; and active in international organisations as president of EuroScience 2012-18, vice-president of the European University Association 2012–15, and founding chair of Nordic Academy for Advanced Study, now NordForsk (Oslo) 1986-93. He worked in more than 50 countries, chairs Poland's excellence program IDUB, and was/is member of EU/PSF expert panels for Poland, Romania, and Bulgaria.

Katarina Chowra (Sweden)

Katarina Chowra has extensive experience in innovation and sustainability within Sweden's innovation ecosystem. She leads the development of SPIRIT, a national program aimed at increasing the utilization of Deep Tech research. In 2017, she spent 11 months in Silicon Valley, learning about key success factors in the region. Katarina has supported accelerators and innovation offices in developing tools like the Sustainable Innovation Canvas and the SRL scale and KTH IRL, which is widely used in Sweden and beyond. She is also creating guidelines for public procurement of innovation to advance the circular economy in collaboration with WWF.

Huw Alun Edwards (UK)

Huw is a technology transfer and commercialization professional with 35 years' experience of working with Universities, Research Institutes, Ministries of Science, Technology and Business, with a focus on the life sciences. His work spans the Americas, Africa, Europe, the Middle East and Asia. Projects undertaken include supporting the development and commercialization of individual technologies, delivery of programmes to encourage the development of university technology transfer processes and establishing technology transfer offices and incubator facilities. Huw has developed and delivered programmes to create viable research commercialization ecosystems, including support for investment by business angels, venture capital and grant awarding bodies.

Lisa Cowey (UK)

Lisa Cowey has been working for over 30 years in the field of University Technology Transfer and enterprise innovation with a particular focus on transitional economies. She has worked intensively since 2007 in the newer EU Member states and the Western Balkans and Eastern Partnership counties. She is specialised in intellectual property rights and grant scheme design and evaluation.

Lisa works regularly for the European Commission, World Bank and UNECE both in capacity building actions and technical assistant programmes. She is currently leading the IMPAC^{3}T IP CSA, funded under HORIZON EUROPE. This project is supporting new approaches to sustainable licensing of assets under a number of different scenarios including Co-creation, Crisis and Classical Plus.

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