

STUDY
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Mainstreaming Innovation Funding in the EU Budget

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Mainstreaming Innovation Funding in the EU Budget

STUDY

Abstract

This study provides a comprehensive assessment of how the EU budget supports innovation in the current programming period and analyses the approach to innovation financing in the Commission's MFF 2021-2027 proposals. The findings provide the basis on which to draw recommendations to maximize the use of EU innovation funding in the coming MFF.

This document was requested by the European Parliament's Committee on Budgets. It designated Jens Geier to follow the study.

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LIST OF ABBREVIATIONS

AMIF	Asylum, Migration and Integration Fund
CAP	Common Agricultural Policy
CCS	Carbon Capture Storage
CEF	Connecting Europe Facility
CF	Cohesion Fund
COSME	EU programme for the Competitiveness of Small and Medium-Sized Enterprises
cPPPs	contractual Public-Private Partnerships
EaSI	Employment and Social Innovation Programme
EARDF	European Agriculture Rural Development Fund
ECA	European Court of Auditors
EDF	European Defence Fund
EDCTP2	European and Developing Countries Trials Partnership Programme
EEN	Enterprise Europe Network
EFG	Equity Facility for Growth
EFSD	European Fund for Strategic Investments
EIB	European Investment Bank
EIF	European Investment Fund
EIP	European Innovation Partnership
EIT	European Institute of innovation and Technology
EMFF	European Maritime and Fishery Fund
EMN	European Migration Network
ERC	European Research Council
ERDF	European Regional Development Fund
ESIF	European Structural and Investment Funds
ESF	European Social Fund
ESF+	European Social Fund +
ETP	European Technology Platform
FIs	Financial Instruments
FP	EU Framework Programme
GNSS	Global Navigation Satellite System
H2020	Horizon 2020
HE	Horizon Europe
IA	Innovative Action

ICT	Information and Communication Technology
ISF-BV	ISF Border and Visas
ISF-P	ISF Police
JRC	Joint Research Centre
JTIs	Joint Technology Initiatives
JU	Joint Undertaking
KICs	Knowledge and Innovation Communities
LEIT	Leadership in Enabling and Industrial Technologies
MFF	Multi-annual Financial Framework
OLAF	European Anti-Fraud Office
PADR	Preparatory Action on Defence Research
PcP	Pre-commercial Procurement
PPI	Public Procurement for Innovative solutions
PPPs	Public-Private Partnerships
R&D	Research and Development
R&I	Research and Innovation
RIS3	Research and Innovation Smart Specialisation Strategy
S2R	Shift 2 Rail
SC1	Societal challenge 1: Health, demographic change and well-being
SC2	Societal challenge 2: Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy
SC3	Societal challenge 3: Secure, clean and efficient energy
SC4	Societal challenge 4: Smart, green and integrated transport
SC5	Societal challenge 5: Climate action, environment, resource efficiency and raw materials
SC6	Societal challenge 6: Europe in a changing world: inclusive, innovative and reflective societies
SC7	Societal challenge 7: Secure societies - protecting freedom and security of Europe and its citizens
SESAR	Single European Sky Air management Research
SME	Small and Medium-sized Enterprise
TENT-T	Trans-European Transport Network
TRL	Technological Readiness Level

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EXECUTIVE SUMMARY

This study provides a comprehensive analysis and assessment of how the EU budget supports innovation in the current programming period and analyses the approach to innovation financing in the Commission's MFF 2021-2027 proposals. In particular, the study:

- Proposes a conceptual framework to identify amounts of EU budget in support of innovation;
- Estimates the aggregate volume of funding directly and indirectly intended to support innovation in the 2014-2020 MFF;
- Explores existing synergies between different EU sources of innovation funding, and how these contribute to the attainment of the Horizon 2020 seven societal challenges;
- Assesses the functioning of various EU-sponsored partnerships for innovation;
- Analyses the role played by EU financial instruments and budgetary guarantees in support to innovation;
- Analyses the approach to innovation financing in the Commission's MFF 2021-2027 proposals.

The study is based on extensive desk research, including the analysis of academic publications, legislative regulations, impact assessments, monitoring reports and mid-term evaluations and reports from the European Court of Auditors on EU budgetary programmes, EU-sponsored partnerships, financial Instruments and the European Fund for Strategic Investments (EFSI). Complementing this information, 30 in-depth interviews have been conducted with officials from different Commission DGs (AGRI, CLIMA, EAC, ENER, ECFIN, REGIO, RTD), EIB and EIF representatives, members of the European Court of Auditors and OECD experts on innovation and research.

A conceptual framework to map EU innovation funding

The term innovation is used in many different ways in EU budget programme regulations and reports. A first step to map the amounts of innovation funding in the EU budget is to provide a harmonised and operational definition of innovation and innovation funding.

In the context of this study we define innovation as a new or improved product, process, service, organisational method or policy approach that constitutes a state-of-the-art change in the sector or policy area in which the actor operates. This definition is slightly narrower than the widely-used definition of the Eurostat/OECD Oslo Manual¹, which considers that a change can be an innovation if it implies a novelty for the actor adopting it (even if it is not new to the market or the world).

Innovation funding is defined as all funding aimed to support the generation, implementation and diffusion of innovations. This covers all spending for applied research but excludes funding for basic or fundamental research. It also includes actions in support to the diffusion of innovations (that is, actions intended to deploy at large-scale tested innovations in a given sector or territory), as the diffusion of innovation is largely understood as a crucial goal in public innovation policies. Finally, following a systemic approach to innovation, the study also looks at those actions intended to improve the

¹ OECD/Eurostat (2018), *Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation*.

framework conditions for innovation (i.e. establishment of innovation partnerships or networks, investments in research infrastructures).

To guide our estimation of EU budget support to innovation the study proposes a taxonomy of EU innovation funding actions. Actions are classified in five categories:

- Actions supporting the innovation process, from the generation of the idea to the market uptake
- Actions in support to the diffusion of innovations
- Actions supporting innovative firms
- Support to the exchange of knowledge and information in view of promoting innovation
- Actions aimed at improving the framework conditions for innovation

EU support to innovation in the 2014-2020 MFF

Chapter three provides the estimations of EU budget support to innovation, based on our definition and typology of innovation funding actions. We estimate that the EU budget allocates around EUR 152 billion in actions supporting innovation (14% of the overall MFF budget). H2020 provides by far the largest amount in support of innovation but the European Regional Development Fund (ERDF) is also an important source of innovation funding. According to our estimations, around EUR 53 billion of ERDF funding (7% of total ERDF budget) is allocated to actions in support of innovation. ERDF provides important support to innovative firms and to the diffusion of innovation, particularly to digitalisation (the introduction of digital services and solutions in new economic sectors). There are other programmes providing support to applied research and innovation projects, particularly in the fields of space and energy but also in agriculture (EAFRD) or climate (LIFE). Other programmes such as CEF or the EU Health programme provide funding for the large-scale deployment of innovative technologies and solutions.

Some caveats need to be considered as regards these estimations. First, these are rough estimations based on available data. In many programmes we were not able to identify the specific amounts devoted to innovation even though the programme includes specific innovation-related objectives or eligible actions. Second, it is important to make clear that we have looked at allocations on the basis on stated intent (i.e. money that is intended to support innovation) but we have no evidence of results (i.e. the extent to which this funding has effectively been used in support of innovation).

Synergies between EU programmes supporting innovation

During this programming period there have been more efforts to ensure synergies between H2020 and ERDF funding but these remain under-developed. Member States are now obliged to set up a Research and Innovation Smart Specialisation Strategy (RIS3) to plan ERDF funding on R&I activities. RIS3 are conceived to give more strategic coherence to the use of ESIF, better coordinate with national actions and create synergies with other EU funds. However, synergies with H2020 are limited in practice and references to other programmes beyond ESIF are rare. Besides, according to some interviewees,

strategic coherence is concentrated in those regions with a strong research track record and with effective governance systems and approaches.

There have also been changes in the regulations to facilitate synergies at project level, such as new rules allowing the combination of European Structural and Investment (ESI) and H2020 funding for the same project. New mechanisms have been created to facilitate ESIF's support to high-quality projects receiving good scores from H2020 but not being financed ('Seal of Excellence') or to promote the exchange of information and best practices between R&I stakeholders in different member states on how to better exploit synergies among different EU programmes/funds ('Stairway to Excellence'). Existing evaluations, confirmed by interviews, suggest that these mechanisms and rules have had limited effect in practice due to a lack of alignment between ESI and Horizon 2020 regulations and lack of familiarity and knowledge of the other EU programmes among ESIF managers.

Our analysis seem to indicate that, overall, there is complementarity between Horizon 2020 pillar three actions – which aim to stimulate a critical mass of research and innovation efforts to tackle seven pre-defined 'societal challenges' - and other EU programmes funding innovation action in the societal challenges' fields. Some observations that came out of interviews and desk research are that:

- There is much potential to roll-out H2020 funded innovation through other programmes (i.e. through CEF in the case of digital, transport and energy, through EU Health programme in the case of health, through ISF in the case of security...). While this potential is acknowledged in regulation preambles and reports it is still underexploited.
- In some areas there is a good complementarity between H2020 and other programmes because the type of projects promoted is different: In the social field, H2020 has a strong focus on ICT-enabled innovation projects and breakthrough innovation whereas the European Social Fund (ESF) and Employment and Social Innovation Programme (EaSI) support more classic innovations in terms of adoption of new approaches or new forms of organisation; in agriculture H2020 supports transnational projects whereas the European Agriculture Rural Development Fund (EARDF) supports regional/local projects. There is also a degree of complementarity in theory between H2020 and ERDF as the first finances trans-national R&I activities while the second focuses on developing infrastructure and capacity.
- The high selectivity of H2020 funding results in many high quality proposals not being funded. These projects are not funded by other programmes, despite the Seal of Excellence label.

Assessment of EU-funded public-private partnerships in research

The three public private partnership (PPP) instruments in EU research policy that receive direct funding – Joint Technology Initiatives (JTIs), contractual PPPs (cPPPs) and Knowledge and Innovation Communities (KICs) – represent three different approaches to promote networks, platforms and ecosystems. Despite all differences, all three create opportunities for knowledge sharing, to work on common projects, to build trust among diverse actors – often competitors – and to coordinate research agendas. They thereby offer policy tools to address market failures and to improve innovation system capacities.

JTIs and cPPPs receive 17.5% of H2020 funding. Funding for KICs amounts to 3.5%. The budgetary weight of the three directly funded PPP schemes under Horizon 2020 makes them an important cornerstone of European R&I policy. The analysis has confirmed – based on existing evaluations – that the partnerships broadly deliver the impact that is expected given their overarching function and added value in the FP. For JTIs and cPPPs networking and structuring effects are observable: partnerships engage leading European industrial players and structure research agendas for certain technological areas. KICs appear to create valuable innovation ecosystems and new forms of co-operation between innovation actors. Yet, research PPPs currently do not seem to exploit their full potential and there are several areas of improvement that should be addressed:

- Complexity should be reduced as there are too many parallel partnerships structures.
- The risk of lock-in should be reduced as PPPs are long-term commitments that can impede the flexibility to allocate resources in the most effective way.
- The value proposition of KICs needs to be clarified. It is still doubtful whether financial sustainability is a realistic and desirable objective for the long-term, without endangering other added values.
- Network and structuring effects are among the most important impact that research PPPs can deliver. More effort is needed to identify them adequately.
- Many partnerships overlap or fail to exploit synergies. A portfolio approach is needed so that partnerships contribute directly to strategic objectives of the Framework Programme.

The role of financial instruments in supporting innovation

In the current MFF, EU budget support to market-driven instruments amounts to EUR 48.3 billion. According to our estimations, almost one third of this funding (EUR 14.3 billion) supports innovative firms, research projects and research infrastructures. EFSI represents the largest part of this support, followed by InnovFin (a centrally-managed instrument dedicated to support R&D) and FIs financed by EU cohesion funds and set-up under shared management.

According to existing evaluations and findings from interviews, overall InnovFin has performed rather well. However, there are some areas for improvement and open questions for the next MFF:

- The eligibility criteria used to select eligible firms to InnovFin SMEG loans are too broadly defined. As a result, many firms having a very low innovative profile and even some non-innovative SMEs end up receiving an InnovFin loan.
- There are many similar national and regional schemes supporting innovative firms but no mechanism to coordinate EU and national-level actions.
- With the set-up of EFSI, InnovFin has been increasingly used to finance high-risk projects and operations. An open question raised by some interviewees is whether the proposed shift from a system composed of 100% covered FIs (such as InnovFin) and a one partially covered guarantee (EFSI) to a system based on a single, partially covered guarantee (the proposed InvestEU Fund scheme for 2021-2027) will reduce the EU's capacity to finance high-risk operations.

- Existing evaluations prove that only a relatively small number of firms receiving grants under Horizon 2020 benefit from financial instruments under Horizon 2020 for the expansion phase, which hinders their capacity to scale up. A solution for that would be the development of blending products (i.e. products combining grants and market-type instruments) to accompany high-innovative start-ups all over the stages.
- The two InnovFin thematic products (InnovFin Energy Demonstration projects and InnovFin Infectious Diseases) have worked well even if need some corrections. There is a case to explore the use of similar products in other policy areas.
- EU regulations applied to intermediated products are very complex and detailed. Too much regulation is particularly problematic for equity products: when the EIF invest in one equity fund it imposes its conditions to all the rest of investors as well as to all firms benefiting from the fund, even if some of them are non-EU firms (e.g. in the case of international funds). This make intermediaries and firms reluctant to get involved with EIF financial support.

The approach to innovation financing in the Commission's MFF 2021-2027 proposals

In the new MFF, Commission proposes that the budget for EU programmes exclusively focused on research, innovation and digital increase by 43% in real terms. This includes the new EU Research and innovation Programme (Horizon Europe), ITER, Euratom, CEF Digital, the R&D window of InvestEU Fund (the instrument replacing all Financial Instruments and EFSI) and a new EU programme in support to digital transformation (Digital Europe programme)².

The new EU research and innovation programme – Horizon Europe – includes some relevant changes as regards to the approach to innovation.

- More attention is given to bottom-up, open innovation and the promotion of breakthrough, market-making innovation with the establishment of the European Innovation Council (EIC).
- Top-down directional research becomes more strategic and flexible with the creation of missions.
- There is a clear willingness to reinforce synergies with other EU programmes.
- The landscape of EU innovation partnership is rationalised and the impact-orientation of partnerships is increased by linking them to new missions and providing exit strategies for partnerships.

Various novelties are proposed as regards EU support to innovation in specific policy fields:

- EARDF budget is expected to decrease but Horizon Europe would allocate EUR 10 billion to R&I in food, agriculture, rural development and bioeconomy.
- In the fields of energy and transport, the Innovation Fund (succeeding NER300) would increase in size and have a broader scope. CEF and LIFE proposals include provisions that could result in more funding for innovation. Synergies could also be reinforced thanks to more active

² See Table 12.

coordination through tools such as the Coal Regions in Transition Platform and the recent Energy Union Governance Regulation.

- In the social field the creation of a single instrument (ESF+) may facilitate synergies between different funding for social innovation and social experimentation.
- The newly developed European Defence fund (EDF) would allocate a significant part of its budget to R&D projects, and is supposed to develop synergies with Horizon Europe.

Main findings and policy recommendations

The main findings that emerge from the analysis are the following:

- At present, the amounts of EU innovation funding are difficult to track. There is no common understanding of innovation across the various EU budget programmes and data on allocated spending in support to innovation is not always available.
- EU budgetary regulations and reports pay little attention to the impact of innovation funding. Many programmes provide funding for innovative actions without envisioning any mechanism or indicators to assess whether this funding has produced an output and what has been the ultimate outcome (in terms of competitive gains, reduction of costs, more effectiveness in attaining social or environmental goals or other).
- There have been efforts to promote synergies between the EU research programme and other EU programmes but only in very few cases there are specific synergy-enabling rules to promote these synergies. In many fields there is much potential to roll-out H2020 funded innovation through other programmes (e.g. CEF, ESF+) but there are no enabling rules promoting that.
- In many policy areas the provision of funding helps but does not really make the difference. The real incentives to innovate come from the regulatory and policy framework.
- EU-funded PPPs in research and innovation do not exploit their full potential and there are several areas of improvement.
- EU market-driven instruments in support of R&D&I have performed well during the current programming period but need to be adapted to EU's current challenges and market gaps.

On the basis of these findings, the study formulates the following policy recommendations to maximise innovation funding in the next Multi-Annual Financial Framework (2021-2027):

- **Explore the possibility to develop a methodology to track amounts of EU budget support to innovation.** The Commission should explore the possibility to introduce an "innovation tracking" methodology in the 2021-2027 MFF. This does not need to be as complex as the "climate tracking methodology", which applies different weighting to funding activities on the basis of their expected climate impact, but should provide harmonised data on innovation funding across the MFF to judge and evaluate the contribution of the EU budget in support to innovation.
- **An impact-oriented approach to all EU innovation funding.** All EU spending programmes allocating funding to innovation actions should detail the intervention logic and expected

results and impact. There should also be indicators to assess whether the impact has materialised or not.

- **Better exploit synergies between different EU funding programmes.** While synergies will ultimately depend on political willingness, more can be done to create concrete linkages between programmes by including specific legal basis to favour the development of synergies.
- **Importance of the overall framework conditions.** Any attempt to improve the role of the EU budget in support of innovation in a specific policy area should start by analysing the overall regulatory and policy framework in order to identify what are the main obstacles to innovation in the given policy fields and the main market gaps hampering business innovation in this area.
- **Link European PPPs in research with missions to increase strategic focus and impact-orientation.** The next generation of EU innovative partnerships should be rationalised and their impact orientation should be improved with the establishment of a clear link to missions.
- **Redefine EU market-driven instruments to better respond to current challenges and market gaps** The next generation of EU market-driven instruments in support to research and innovation should better target innovative firms and provide significant support to leading, market-creating innovators, both at its start-up phase and to scale up. The use of thematic products in support of missions should be explored.

SYNTHÈSE

La présente étude fournit une analyse et une évaluation complètes de la manière dont le budget de l'Union soutient l'innovation au cours de la période de programmation actuelle, et analyse l'approche relative au financement de l'innovation que contiennent les propositions de la Commission concernant le cadre financier pluriannuel (CFP) 2021-2027. En particulier, cette étude:

- propose un cadre conceptuel permettant de déterminer la part du budget de l'Union dédiée à l'innovation;
- évalue le volume total des financements destinés directement et indirectement au soutien à l'innovation dans le CFP 2014-2020;
- explore les synergies existantes entre les différentes sources de l'Union qui financent l'innovation ainsi que la manière dont ces sources aident à relever les sept défis de société figurant dans le programme Horizon 2020;
- évalue le fonctionnement des divers partenariats pour l'innovation parrainés par l'Union;
- analyse le rôle des instruments financiers et des garanties budgétaires de l'Union dans le soutien à l'innovation;
- examine l'approche relative au financement de l'innovation que contiennent les propositions concernant le CFP 2021-2027.

La présente étude est fondée sur des recherches documentaires approfondies, et notamment sur l'examen de publications universitaires, de normes législatives, d'analyses d'impact, de rapports de contrôle, d'évaluations à mi-parcours et de rapports de la Cour des comptes européenne sur les programmes budgétaires de l'Union, les partenariats parrainés par l'Union, les instruments financiers et le Fonds européen pour les investissements stratégiques (EFIS). Pour compléter ces recherches, 30 entretiens approfondis ont été menés auprès de fonctionnaires des différentes directions générales de la Commission (AGRI, CLIMA, EAC, ENER, ECFIN, REGIO, RTD), de représentants de la Banque européenne d'investissement (BEI) et du Fonds européen d'investissement (FEI), de membres de la Cour des comptes européenne et d'experts de l'Organisation de coopération et de développement économiques (OCDE) sur l'innovation et la recherche.

Un cadre conceptuel pour définir le financement de l'innovation par l'Union

Le terme «innovation» est utilisé de différentes manières dans les normes et rapports relatifs aux programmes budgétaires de l'Union. Pour déterminer les montants qui financent l'innovation dans le budget de l'Union, il convient avant tout de fournir une définition harmonisée et opérationnelle de l'innovation et de son financement.

Dans le contexte de la présente étude, l'innovation est définie comme un produit, processus, service, méthode organisationnelle ou approche politique nouveaux ou améliorés qui représentent une avancée pour le secteur ou le domaine d'action dans lequel l'acteur évolue. Cette définition est légèrement plus restrictive que la définition du manuel d'Oslo d'Eurostat et de l'OCDE³, largement utilisée, selon laquelle un changement peut être une innovation s'il implique une nouveauté pour l'acteur qui l'adopte (même si ce changement n'est pas inédit sur le marché ou dans le monde).

³ OCDE/Eurostat (2018), *Manuel d'Oslo 2018: Principes directeurs pour le recueil, l'interprétation et l'utilisation des données sur l'innovation*.

Le financement de l'innovation est défini comme l'ensemble des financements visant à soutenir la génération, la mise en œuvre et la diffusion des innovations. Ce terme couvre toutes les dépenses consacrées à la recherche appliquée, mais exclut le financement destiné à la recherche fondamentale. Il comprend également les actions qui soutiennent la diffusion des innovations (c'est-à-dire les actions destinées au déploiement à grande échelle des innovations testées dans un secteur ou un territoire donné), cette diffusion étant communément vue comme un objectif crucial des politiques publiques en matière d'innovation. Enfin, adoptant une approche systémique de l'innovation, l'étude examine également les mesures destinées à améliorer les conditions-cadres en faveur de l'innovation (par exemple la création de partenariats ou de réseaux sur l'innovation, ou les investissements dans les infrastructures de recherche).

Pour guider l'estimation de l'appui budgétaire de l'Union à l'innovation réalisée dans la présente étude, il y est proposé une taxonomie des actions de financement de l'Union en matière d'innovation. Ces actions sont classées en cinq catégories:

- actions soutenant le processus d'innovation, de l'émergence de l'idée à la commercialisation;
- mesures soutenant la diffusion des innovations;
- actions soutenant les entreprises innovantes;
- soutien à l'échange de connaissances et d'informations afin de favoriser l'innovation;
- actions visant à améliorer les conditions-cadres en faveur de l'innovation.

Soutien de l'Union à l'innovation dans le CFP 2014-2020

Le chapitre 3 fournit les estimations de l'appui budgétaire de l'Union à l'innovation, à partir de la définition et de la typologie des actions de financement de l'innovation proposées dans la présente étude. Il est estimé que le budget de l'Union alloue environ 152 milliards d'EUR à des actions soutenant l'innovation (soit 14 % du budget total du CFP). Si le programme-cadre pour la recherche et l'innovation «Horizon 2020» fournit de loin le montant le plus important en faveur de l'innovation, le Fonds européen de développement régional (FEDER) constitue lui aussi une source non négligeable de financement de l'innovation. Selon les estimations, environ 53 milliards d'EUR du financement du FEDER (soit 7 % du budget total de ce fonds) sont alloués aux actions de soutien à l'innovation. Le FEDER apporte un soutien majeur aux entreprises innovantes et à la diffusion de l'innovation, en particulier à la numérisation (introduction de services et solutions numériques dans de nouveaux secteurs économiques). Il existe d'autres programmes qui soutiennent la recherche appliquée et les projets d'innovation, particulièrement dans les domaines de l'espace et de l'énergie, mais aussi de l'agriculture (Fonds européen agricole pour le développement rural – Feader) ou du climat (programme pour l'environnement et l'action pour le climat – LIFE). D'autres programmes, tels que le mécanisme pour l'interconnexion en Europe (MIE) ou le programme Santé de l'Union, financent le déploiement à grande échelle de technologies et solutions innovantes.

Certaines mises en garde s'imposent en ce qui concerne ces estimations. Premièrement, il s'agit d'estimations approximatives, fondées sur les données disponibles. Dans de nombreux programmes, il s'est avéré impossible de déterminer les montants spécifiques consacrés à l'innovation, même si ces programmes comprenaient des objectifs spécifiques liés à l'innovation ou des actions pouvant prétendre à un tel financement. Deuxièmement, il est important de préciser que les affectations ont été examinées en fonction de l'intention annoncée (c'est-à-dire les fonds destinés à soutenir l'innovation), mais que les auteurs de la présente étude ne disposent d'aucune preuve de résultats

(c'est-à-dire la mesure dans laquelle ces financements ont effectivement été utilisés pour soutenir l'innovation).

Synergies entre les programmes de l'Union soutenant l'innovation

Au cours de l'actuelle période de programmation, davantage d'efforts ont été déployés pour créer des synergies entre les financements du programme Horizon 2020 et du FEDER, mais cela reste insuffisant. Les États membres sont désormais tenus de mettre en place une stratégie d'innovation pour une spécialisation intelligente (RIS3) afin de planifier les financements du FEDER destinés aux activités de recherche et d'innovation (R&I). Ces stratégies sont conçues pour donner plus de cohérence stratégique à l'utilisation des Fonds structurels et d'investissement européens (Fonds ESI), pour améliorer la coordination des actions nationales et pour créer des synergies avec les autres fonds de l'Union. Toutefois, les synergies avec le programme Horizon 2020 sont limitées dans la pratique et les références aux programmes autres que les Fonds ESI sont rares. En outre, selon certaines des personnes interrogées, la cohérence stratégique est concentrée dans les régions qui ont de solides antécédents dans le domaine de la recherche et qui sont dotées de systèmes performants et d'approches efficaces en matière de gouvernance.

Les normes ont en outre été modifiées de manière à faciliter les synergies au niveau des projets: par exemple, de nouvelles règles permettent de combiner les financements des Fonds ESI et du programme Horizon 2020 pour un même projet. De nouveaux mécanismes ont été créés pour faciliter le soutien des Fonds ESI aux projets de haute qualité qui obtiennent de bons résultats dans le cadre du programme Horizon 2020, mais ne sont pas financés («label d'excellence») ou pour promouvoir l'échange d'informations et de bonnes pratiques entre les acteurs du secteur de la R&I sur la manière de mieux exploiter les synergies entre les différents programmes et fonds de l'Union («échelle de progression vers l'excellence»). Les évaluations existantes, confirmées par les entretiens, suggèrent que ces règles et mécanismes ont eu un effet limité dans la pratique, en raison de l'absence d'alignement entre les réglementations des Fonds ESI et du programme Horizon 2020 ainsi que du manque de connaissance des autres programmes de l'Union observé parmi les gestionnaires des Fonds ESI.

L'analyse réalisée aux fins de la présente étude semble indiquer que, dans l'ensemble, il existe une complémentarité entre les mesures prévues dans le cadre du troisième pilier du programme Horizon 2020, qui visent à favoriser la réalisation d'efforts considérables en matière de R&I afin de relever sept «défis de société» prédéfinis, et les autres programmes de l'Union finançant des activités d'innovation dans les domaines concernés par ces défis de société. Parmi les observations que l'on peut tirer des entretiens et recherches documentaires figurent les suivantes:

- il existe un fort potentiel de déploiement de l'innovation financée par le programme Horizon 2020 par le truchement d'autres programmes (c'est-à-dire le MIE en ce qui concerne le numérique, les transports et l'énergie, le programme Santé de l'Union pour ce qui est de la santé, le Fonds pour la sécurité intérieure eu égard à la sécurité, etc.). Bien que ce potentiel soit reconnu dans les préambules des normes et dans les rapports, il demeure sous-exploité;
- dans certains domaines, il existe une bonne complémentarité entre Horizon 2020 et d'autres programmes, car le type de projets soutenus est différent. En effet, dans le domaine social, Horizon 2020 se concentre principalement sur des projets d'innovation basés sur les technologies de l'information et de la communication (TIC) ainsi que sur l'innovation de rupture, tandis que le Fonds social européen (FSE) et le programme de l'Union européenne pour l'emploi et l'innovation sociale (EaSI) soutiennent davantage les innovations plus

traditionnelles comme l'adoption de nouvelles approches ou de nouvelles formes d'organisation. Pour ce qui est de l'agriculture, le programme Horizon 2020 soutient des projets transnationaux, tandis que le Feader soutient des projets locaux et régionaux. Il existe également une certaine complémentarité théorique entre Horizon 2020 et le FEDER, le premier finançant les activités de R&I transnationales, tandis que le second se concentre sur le développement des infrastructures et des capacités;

- en raison de la sélectivité élevée du financement au titre du programme Horizon 2020, de nombreuses propositions de haute qualité ne sont pas financées. Or, ces projets ne sont pas non plus financés par d'autres programmes, malgré le label d'excellence.

Évaluation des partenariats public-privé financés par l'Union dans le domaine de la recherche

Les trois instruments de partenariat public-privé (PPP) intégrés à la politique de l'Union en matière de recherche qui reçoivent un financement direct (initiatives technologiques conjointes (ITC), PPP contractuels et communautés de la connaissance et de l'innovation (CCI)) représentent trois approches distinctes qui favorisent les réseaux, les plateformes et les écosystèmes. Malgré toutes leurs différences, ces trois instruments créent des possibilités de partage des connaissances, de travail sur des projets communs, de consolidation de la confiance entre divers acteurs (souvent concurrents) et de coordination des programmes de recherche. Ils offrent ainsi des outils politiques permettant de remédier aux défaillances du marché et d'améliorer les capacités des systèmes d'innovation.

Les initiatives technologiques conjointes et les PPP contractuels perçoivent 17,5 % du financement du programme Horizon 2020. Le financement des communautés de la connaissance et de l'innovation, quant à lui, s'élève à 3,5 %. Le poids budgétaire des trois systèmes de PPP directement financés au titre du programme Horizon 2020 en fait une pierre angulaire de la politique européenne en matière de R&I. L'analyse confirme, à partir des évaluations existantes, que les partenariats produisent largement les résultats escomptés, compte tenu de leur fonction globale et de leur valeur ajoutée dans le Programme-cadre. Pour les initiatives technologiques conjointes et les PPP contractuels, on observe des effets structurants et de mise en réseau: ces partenariats associent les principaux acteurs industriels européens et structurent les programmes de recherche dans certains domaines technologiques. Les communautés de la connaissance et de l'innovation semblent créer des écosystèmes d'innovation précieux ainsi que de nouvelles formes de coopération entre les acteurs de l'innovation. Les PPP en matière de recherche ne semblent toutefois pas être exploités à la hauteur de leur potentiel, et il conviendrait d'apporter des améliorations dans plusieurs domaines:

- la complexité devrait être réduite, car il existe trop de structures de partenariat parallèles;
- le risque de verrouillage devrait être atténué, car les PPP sont des engagements à long terme, ce qui peut entraver la flexibilité nécessaire pour allouer les ressources de la manière la plus efficace possible;
- la plus-value que représentent les communautés de la connaissance et de l'innovation doit être clarifiée. On peut encore se demander si la viabilité financière est un objectif réaliste et souhaitable à long terme qui ne met pas en péril d'autres valeurs ajoutées;
- les effets structurants et de mise en réseau figurent parmi les incidences les plus notables que les PPP en matière de recherche sont susceptibles d'avoir. Il est nécessaire de redoubler d'efforts pour identifier correctement ces effets;

- de nombreux partenariats se chevauchent ou ne parviennent pas à exploiter les synergies. Il est nécessaire d'adopter une approche de portefeuille afin de permettre aux partenariats de contribuer directement aux objectifs stratégiques du programme-cadre.

Le rôle des instruments financiers dans le soutien à l'innovation

Dans le CFP actuel, l'appui budgétaire de l'Union aux instruments axés sur le marché s'élève à 48,3 milliards d'EUR. Selon les estimations réalisées aux fins de la présente étude, près d'un tiers de ce financement (soit 14,3 milliards d'EUR) soutient les entreprises innovantes, les projets de recherche et les infrastructures de recherche. L'EFSI représente la majeure partie de ce soutien, suivi du dispositif InnovFin (un instrument géré de manière centralisée dédié au soutien à la recherche et au développement) et des instruments financiers financés par les fonds de cohésion de l'Union et instaurés en gestion partagée.

D'après les évaluations existantes et les résultats des entretiens, le dispositif InnovFin a obtenu d'assez bons résultats dans l'ensemble. Toutefois, il reste des points à améliorer et des questions en suspens pour le prochain CFP:

- la définition des critères d'admissibilité utilisés pour sélectionner les entreprises pouvant prétendre aux prêts du mécanisme de garantie pour les petites et moyennes entreprises (PME) au titre du dispositif InnovFin est trop large. En conséquence, de nombreuses entreprises ayant un profil innovant très faible et même certaines PME non innovantes finissent par bénéficier d'un prêt InnovFin;
- il existe de nombreux programmes nationaux et régionaux similaires qui soutiennent les entreprises innovantes, mais aucun mécanisme de coordination des actions aux niveaux national et européen;
- depuis la création de l'EFSI, le dispositif InnovFin a été de plus en plus utilisé pour financer des projets et opérations à haut risque. Certaines des personnes interrogées se sont demandé si le passage proposé d'un système composé d'instruments financiers couverts à 100 % (comme le dispositif InnovFin) et d'une garantie partiellement couverte (EFSI) à un système fondé sur une garantie unique partiellement couverte (le régime proposé pour 2021-2027 par le Fonds InvestEU) réduira la capacité de l'Union à financer les opérations à haut risque;
- les évaluations existantes prouvent que seul un nombre relativement restreint d'entreprises bénéficiant de subventions au titre d'Horizon 2020 bénéficient d'instruments financiers au titre de ce programme pour la phase d'expansion également, ce qui entrave les capacités de développement de la majorité. Une solution consisterait à développer des produits de mixage (c'est-à-dire des produits combinant des subventions et des instruments axés sur le marché) pour accompagner les jeunes pousses très innovantes à chaque étape de leur développement;
- les deux volets thématiques du dispositif InnovFin (les projets de démonstration liés à l'énergie d'InnovFin et la recherche sur les maladies infectieuses d'InnovFin) fonctionnent bien, même si certaines corrections sont nécessaires. Il y a lieu d'envisager la possibilité d'utiliser des produits similaires dans d'autres domaines politiques;
- la réglementation de l'Union appliquée aux financements intermédiés est très complexe et détaillée. L'excès de réglementation est particulièrement problématique pour les instruments de fonds propres: lorsque le FEI investit dans un fonds d'actions, il impose ses conditions à tous les autres investisseurs ainsi qu'à toutes les entreprises bénéficiaires du fonds, même si certaines d'entre elles sont des entreprises qui ne proviennent pas de l'Union (par exemple

dans le cas des fonds internationaux). De ce fait, les intermédiaires et les entreprises hésitent à s'engager dans un soutien financier du FEI.

L'approche relative au financement de l'innovation contenue dans les propositions de la Commission concernant le CFP 2021-2027

Dans le nouveau CFP, la Commission propose que le budget des programmes de l'Union axés exclusivement sur la recherche, l'innovation et le numérique augmente de 43 % en termes réels. Cela inclut le nouveau programme de recherche et d'innovation de l'Union (Horizon Europe), ITER, Euratom, le MIE numérique, le volet «Recherche et développement» (R&D) du fonds InvestEU (fonds qui remplace tous les instruments financiers et l'EFSI) ainsi qu'un nouveau programme européen de soutien à la transformation numérique (programme pour une Europe numérique)⁴.

Le nouveau programme de l'Union pour la R&I (Horizon Europe) comporte certains changements pertinents quant à l'approche en matière d'innovation:

- une plus grande attention est accordée à l'innovation ascendante, à l'innovation ouverte et à la promotion de l'innovation de rupture et créatrice de marché, et ce, grâce à la création du Conseil européen de l'innovation (CEI);
- la recherche dirigée descendante devient plus stratégique et flexible avec la création de missions;
- il existe une volonté manifeste de renforcer les synergies d'Horizon Europe avec d'autres programmes de l'Union;
- le paysage du partenariat européen en matière d'innovation est rationalisé et les partenariats sont davantage axés sur l'incidence en étant reliés à de nouvelles missions et dotés de stratégies de sortie.

Diverses nouveautés sont proposées en ce qui concerne le soutien de l'Union à l'innovation dans des domaines d'action spécifiques:

- le budget du Feader devrait diminuer, mais Horizon Europe allouerait 10 milliards d'EUR à la R&I dans les domaines de l'alimentation, de l'agriculture, du développement rural et de la bioéconomie;
- dans les domaines de l'énergie et des transports, le Fonds d'innovation (qui succédera à la réserve destinée aux nouveaux entrants, «RNE 300») aura des capacités renforcées ainsi qu'une portée plus large. Les propositions relatives au MIE et au programme LIFE contiennent des dispositions qui pourraient se traduire par un financement accru de l'innovation. Les synergies pourraient également être renforcées grâce à une coordination plus active, par l'intermédiaire d'outils tels que la plateforme pour les régions charbonnières en transition et le récent règlement sur la gouvernance de l'Union de l'énergie;
- dans le domaine social, la création d'un instrument unique (FSE+) pourrait faciliter les synergies entre les différents financements destinés à l'innovation sociale et à l'expérimentation sociale;
- le nouveau Fonds européen de la défense allouerait une part importante de son budget à des projets de R&D; il est censé développer des synergies avec Horizon Europe.

⁴ Voir le tableau 12.

Principales conclusions et recommandations politiques

Les principales conclusions qui ressortent de l'analyse sont les suivantes:

- à l'heure actuelle, il est difficile de suivre les montants que l'Union octroie pour le financement de l'innovation. Il n'existe pas de compréhension commune de l'innovation dans les différents programmes budgétaires de l'Union, et les données sur les dépenses allouées au soutien de l'innovation ne sont pas toujours disponibles;
- les normes et rapports budgétaires de l'Union accordent peu d'attention aux incidences du financement de l'innovation. De nombreux programmes financent des actions innovatrices sans prévoir de mécanisme ou d'indicateurs permettant d'évaluer si ce financement a produit un résultat et quel en a été l'aboutissement (en termes de gains de compétitivité, de réduction des coûts, d'efficacité dans la réalisation d'objectifs sociaux ou environnementaux ou autres);
- des efforts ont été déployés pour encourager les synergies entre le programme de recherche de l'Union et d'autres programmes européens, mais il n'existe de règles spécifiques favorisant ces synergies que dans de très rares cas. Dans de nombreux domaines, on observe un fort potentiel pour le déploiement de l'innovation financée par Horizon 2020 par le truchement d'autres programmes (par exemple le MIE ou le FSE+), mais il n'existe pas de règles d'habilitation pour promouvoir l'exploitation de ce potentiel;
- dans de nombreux domaines d'action, l'octroi de fonds est utile, mais ne fait pas vraiment la différence. Les véritables incitations à innover proviennent du cadre réglementaire et politique;
- les PPP financés par l'Union dans le domaine de la recherche et de l'innovation n'exploitent pas pleinement leur potentiel et il reste plusieurs points à améliorer;
- les instruments de l'Union axés sur le marché qui soutiennent la recherche, le développement et l'innovation ont donné de bons résultats au cours de la période de programmation actuelle, mais ils doivent être adaptés aux enjeux européens et aux lacunes du marché actuels.

À partir de ces conclusions, la présente étude formule les recommandations politiques suivantes pour maximiser le financement de l'innovation dans le prochain CFP (2021-2027):

- **envisager l'élaboration d'une méthodologie permettant de suivre les montants de l'appui budgétaire de l'Union en faveur de l'innovation.** La Commission devrait étudier la possibilité d'introduire une méthodologie de «suivi de l'innovation» dans le CFP 2021-2027. Il n'est pas nécessaire que cette méthodologie soit aussi complexe que la «méthodologie de suivi du financement climat», qui applique une pondération différente aux activités de financement en fonction de leur incidence prévue sur le climat, mais elle devrait fournir des données harmonisées sur le financement de l'innovation, en couvrant l'ensemble du CFP, pour juger et évaluer la contribution du budget de l'Union à l'innovation;
- **adopter une approche axée sur l'incidence pour l'ensemble des financements de l'Union en faveur de l'innovation.** Tous les programmes de dépenses de l'Union octroyant des fonds à des activités d'innovation devraient impliquer une description détaillée de la logique d'intervention ainsi que des résultats et de l'incidence attendus. Ils devraient également comprendre des indicateurs destinés à évaluer la concrétisation ou non de cette incidence;
- **mieux exploiter les synergies entre les différents programmes de financement de l'Union.** Même si les synergies dépendront, en fin de compte, de la volonté politique, il est possible de redoubler d'efforts pour créer des liens concrets entre les programmes en incluant une base juridique spécifique qui permettrait de favoriser le développement des synergies;

- **prendre en compte l'importance des conditions-cadres générales.** Toute tentative visant à améliorer le rôle du budget de l'Union dans le soutien à l'innovation dans un domaine politique spécifique devrait commencer par une analyse du cadre réglementaire et politique global afin d'identifier les principaux obstacles à l'innovation dans les domaines d'action donnés ainsi que les principales lacunes du marché qui entravent l'innovation des entreprises dans ce domaine;
- **associer les PPP européens dans le domaine de la recherche aux missions afin de renforcer la concentration stratégique et l'orientation vers l'incidence.** La prochaine génération des partenariats innovants de l'Union devrait être rationalisée et davantage axée sur l'incidence grâce à l'établissement de liens clairs avec les missions;
- **redéfinir les instruments de l'Union axés sur le marché afin de mieux répondre aux défis actuels et aux lacunes du marché.** La prochaine génération d'instruments européens de soutien à la recherche et à l'innovation axés sur le marché devrait mieux cibler les entreprises innovantes et apporter un soutien important aux innovateurs pionniers et créateurs de marché, tant dans leur phase de démarrage que dans leur phase d'expansion. Il conviendrait d'examiner l'utilisation de produits thématiques pour soutenir les missions.

ZUSAMMENFASSUNG

In der vorliegenden Studie wird umfassend untersucht und bewertet, wie Innovation im laufenden Programmplanungszeitraum aus dem EU-Haushalt unterstützt wird, und analysiert, welchen Ansatz die Kommission in ihren Vorschlägen für den MFR 2021-2027 mit Blick auf die Innovationsfinanzierung verfolgt. Wichtige Aspekte der Studie sind:

- Vorschlag eines Rahmenkonzepts zur Feststellung der Beträge, die aus dem EU-Haushalt zur Innovationsförderung bereitgestellt werden;
- Abschätzung des Gesamtfinanzvolumens, das im MFR 2014-2020 direkt und indirekt zur Innovationsförderung vorgesehen ist;
- Untersuchung bestehender Synergien zwischen verschiedenen Quellen von EU-Mitteln zur Innovationsfinanzierung und ihres Beitrags zur Bewältigung der sieben gesellschaftlichen Herausforderungen im Rahmen von Horizont 2020;
- Bewertung der Funktionsweise unterschiedlicher EU-geförderter Innovationspartnerschaften;
- Untersuchung der Rolle von EU-Finanzinstrumenten und Haushaltsgarantien bei der Innovationsförderung;
- Untersuchung des Ansatzes für die Innovationsfinanzierung in den Vorschlägen der Kommission für den MFR 2021-2027.

Die Studie stützt sich auf umfassende Sekundärforschung, darunter die Analyse von wissenschaftlichen Publikationen, gesetzlichen Regelungen, Folgenabschätzungen, Überwachungs- und Fortschrittsberichten sowie Berichten des Europäischen Rechnungshofs über EU-Haushaltsprogramme, EU-geförderte Partnerschaften, Finanzinstrumente und den Europäischen Fonds für strategische Investitionen (EFSl). Ergänzend zu diesen Informationen wurden 30 ausführliche Befragungen mit Mitarbeitern verschiedener Generaldirektionen der Kommission (AGRI, CLIMA, EAC, ENER, ECFIN, REGIO, RTD), Vertretern der EIB und des EIF, Mitgliedern des Europäischen Rechnungshofs und OECD-Experten im Bereich Innovation und Forschung durchgeführt.

Ein Rahmenkonzept zur Erfassung der Innovationsfinanzierung in der EU

Der Begriff Innovation wird in den Vorschriften und Berichten über EU-Haushaltsprogramme in vielfältigen Zusammenhängen verwendet. Ein erster Schritt zur Erfassung der zur Innovationsfinanzierung verwendeten EU-Haushaltsmittel besteht darin, eine harmonisierte Arbeitsdefinition für die Begriffe Innovation und Innovationsfinanzierung zu entwickeln.

Im Rahmen dieser Studie werden als Innovation neue oder verbesserte Produkte, Prozesse, Dienstleistungen, organisatorische Verfahren oder Politikansätze bezeichnet, mit denen nach dem jeweiligen Stand der Zeit in dem Wirtschafts- oder Politikbereich, in dem der Akteur tätig ist, eine Änderung eingeführt wird. Diese Begriffsbestimmung ist etwas enger gefasst als die vielfach verwendete Definition des Oslo Manual von Eurostat und OECD⁵, wonach als Innovation auch Änderungen betrachtet werden können, die für den Akteur, der sie einführt, eine Neuerung darstellen (auch wenn sie für den Markt oder die Welt nicht neu sind).

Als Innovationsfinanzierung werden alle Finanzmittel bezeichnet, mit denen die Entwicklung, Einführung und Verbreitung von Innovationen gefördert wird. Dies schließt alle Ausgaben für

⁵ OECD/Eurostat (2018), *Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation*.

angewandte Forschung ein, nicht aber die Finanzierung von Basis- oder Grundlagenforschung. Eingeschlossen sind auch Maßnahmen, mit denen die Verbreitung von Innovationen unterstützt wird (d. h. Maßnahmen zur flächendeckenden Einführung getesteter Innovationen in einem bestimmten Bereich oder Gebiet), da die Innovationsverbreitung weithin als entscheidendes Ziel der öffentlichen Innovationspolitik gilt. Schließlich werden in der Studie anhand eines systemischen Ansatzes die Maßnahmen untersucht, mit denen die Rahmenbedingungen für Innovation verbessert werden sollen (d. h. Einrichtung von Innovationspartnerschaften oder -netzwerken, Investitionen in Forschungsinfrastrukturen).

Um die aus dem EU-Haushalt für Innovationen bereitgestellte Unterstützung methodisch abschätzen zu können, wird für die EU-Maßnahmen zur Innovationsfinanzierung eine Systematik vorgeschlagen.

Die Maßnahmen werden fünf Kategorien zugeordnet:

- Maßnahmen, mit denen der Innovationsprozess von der Entwicklung der Idee bis zur Marktakzeptanz unterstützt wird;
- Maßnahmen, mit denen die Verbreitung von Innovationen unterstützt wird;
- Maßnahmen, mit denen innovative Unternehmen unterstützt werden;
- Maßnahmen, mit denen zur Förderung von Innovationen der Austausch von Wissen und Informationen unterstützt wird;
- Maßnahmen, mit denen die Rahmenbedingungen für Innovation verbessert werden.

Innovationsförderung der EU im MFR 2014-2020

Auf der Grundlage der vorgeschlagenen Definition und Typologie von Maßnahmen zur Innovationsfinanzierung enthält Kapitel 3 die Schätzungen für die zur Innovationsförderung verwendeten EU-Haushaltsmittel. Demzufolge werden aus dem EU-Haushalt für Maßnahmen zur Innovationsförderung etwa 152 Mrd. EUR bereitgestellt (14 % der Gesamtausstattung des MFR). Der weitaus größte Teil dieser Mittel stammt aus Horizont 2020, doch auch der Europäische Fonds für regionale Entwicklung (EFRE) ist eine wichtige Quelle für Investitionsfinanzierung. Aus dem EFRE werden schätzungsweise 53 Mrd. EUR (7 % seiner Gesamtausstattung) für Maßnahmen zur Innovationsförderung bereitgestellt. Mit dem EFRE werden innovative Unternehmen und die Verbreitung von Innovationen insbesondere im Bereich Digitalisierung in großem Maße unterstützt (Einführung digitaler Dienste und Lösungen in neuen Wirtschaftszweigen). Daneben gibt es weitere Programme, mit denen Projekte für angewandte Forschung und Innovation vor allem im Bereich Raum und Energie, aber auch in den Bereichen Landwirtschaft (ELER) oder Klimaschutz (LIFE) gefördert werden. Andere Programme wie die Fazilität „Connecting Europe“ oder das EU-Gesundheitsprogramm stellen Finanzmittel für den großtechnischen Einsatz innovativer Technologien und Lösungen bereit.

Im Hinblick auf diese Schätzungen sind einige Einschränkungen zu berücksichtigen. Erstens handelt es sich um grobe Schätzungen, die anhand der verfügbaren Daten vorgenommen wurden. Obwohl bei verschiedenen Programmen innovationsbezogene Ziele oder förderfähige Maßnahmen festgelegt sind, konnte in vielen Fällen nicht ermittelt werden, welche Beträge speziell für die Innovationsfinanzierung bereitgestellt wurden. Zweitens ist zu beachten, dass die Mittelzuweisungen anhand von Absichtserklärungen analysiert wurden (d. h. Gelder, die zur Innovationsförderung vorgesehen sind), aber keine Nachweise über die Ergebnisse vorliegen (d. h. inwieweit diese Finanzmittel tatsächlich zur Innovationsförderung verwendet wurden).

Synergien zwischen EU-Programmen zur Innovationsförderung

Obwohl im laufenden Programmplanungszeitraum verstärkt versucht wurde, zwischen der Finanzierung aus Horizont 2020 und dem EFRE Synergien herzustellen, sind diese noch immer unzureichend erschlossen. Die Mitgliedstaaten sind nunmehr verpflichtet, eine Forschungs- und Innovationsstrategie für intelligente Spezialisierung (RIS3) zu erarbeiten, auf deren Grundlage die EFRE-Finanzierung von Ful-Maßnahmen geplant wird. Die RIS3 sollen dazu führen, dass die Europäischen Struktur- und Investitions-Fonds (ESI-Fonds) strategisch kohärenter genutzt werden, eine bessere Abstimmung mit nationalen Maßnahmen erfolgt und Synergien mit anderen EU-Mitteln geschaffen werden. In der praktischen Anwendung sind die Synergien mit Horizont 2020 jedoch beschränkt und ein Zusammenwirken mit anderen Programmen über die ESI-Fonds hinaus ist selten. Nach Aussage einiger der Befragten konzentriert sich die strategische Kohärenz überdies auf jene Regionen, in denen bereits viele Forschungserfolge erzielt wurden und wirksame Verwaltungsstrukturen und -ansätze zur Anwendung kommen.

Zudem gab es Änderungen bei den Vorschriften zur Synergieförderung auf Projektebene, darunter neue Regelungen, wonach für das gleiche Projekt kombinierte Mittel aus den ESI-Fonds und aus Horizont 2020 eingesetzt werden können. Neue Mechanismen wurden eingerichtet, um hochwertige Projekte, die durch Horizont 2020 positiv bewertet, aber nicht finanziert werden („Exzellenzsiegel“), besser aus den ESI-Fonds unterstützen zu können, oder um zwischen Ful-Akteuren in verschiedenen Mitgliedstaaten den Austausch von Informationen und bewährten Verfahren zu fördern, die die Frage betreffen, wie Synergien zwischen verschiedenen Programmen und Finanzierungsmöglichkeiten der EU besser erschlossen werden können („Leiter zur Spitzenforschung“). Die bisherigen Bewertungen lassen, bestätigt durch die Befragungen, darauf schließen, dass diese Mechanismen und Vorschriften in der Praxis nur begrenzte Auswirkungen hatten, weil die Vorschriften für die ESI-Fonds und Horizont 2020 nicht ausreichend aufeinander abgestimmt wurden und die für die Verwaltung der ESI-Fonds zuständigen Stellen über die anderen EU-Programme nicht ausreichend informiert waren.

Die Analyse deutet darauf hin, dass zwischen den Maßnahmen der dritten Säule von Horizont 2020 – mit denen eine kritische Masse von Tätigkeiten in Forschung und Innovation (Ful) angeregt werden soll, um sieben vorgegebene gesellschaftliche Herausforderungen anzugehen – und den Maßnahmen im Rahmen anderer EU-Programme, mit denen innovative Tätigkeiten zur Bewältigung gesellschaftlicher Herausforderungen finanziert werden sollen, im Allgemeinen Komplementarität besteht. Aus den Befragungen und der Sekundärforschung ergeben sich unter anderem die folgenden Feststellungen:

- Es bestehen viele Möglichkeiten, die durch Horizont 2020 finanzierten Innovationen über andere Programme am Markt einzuführen (über die Fazilität „Connecting Europe“ in den Bereichen Digitalisierung, Verkehr und Energie, über das EU-Gesundheitsprogramm im Bereich Gesundheit, über den Fonds für die innere Sicherheit (ISF) im Bereich Sicherheit usw.). Obwohl auf dieses Potenzial im Erwägungsteil von Rechtsvorschriften und in Berichten hingewiesen wird, ist es noch immer nicht ausreichend erschlossen.
- In einigen Bereichen besteht eine gute Komplementarität zwischen Horizont 2020 und anderen Programmen, weil mit ihnen unterschiedliche Arten von Projekten gefördert werden: Im Bereich Soziales liegt der Schwerpunkt von Horizont 2020 auf IKT-gestützten Innovationsvorhaben und bahnbrechenden Innovationen, während aus dem Europäischen Sozialfonds (ESF) und dem Programm der Europäischen Union für Beschäftigung und soziale Innovation (EaSI) konventionellere Innovationen wie die Einführung neuer Verfahrensweisen

oder Organisationsformen unterstützt werden; im Bereich Landwirtschaft werden durch Horizont 2020 transnationale Projekte, aus dem Europäischen Landwirtschaftsfonds für die Entwicklung des ländlichen Raums (ELER) hingegen regionale und lokale Projekte gefördert. Eine gewisse Komplementarität besteht theoretisch auch zwischen Horizont 2020 und dem EFRE, da aus dem einen transnationale Ful-Tätigkeiten finanziert werden, während der andere vorrangig auf den Infrastruktur- und Kapazitätsausbau abzielt.

- Die hohe Selektivität der Förderung über Horizont 2020 ist der Grund, weshalb für viele hochwertige Vorschläge keine Finanzmittel bereitgestellt werden. Diese Projekte werden, obwohl sie das Exzellenzsiegel erhalten, auch nicht durch andere Programme gefördert.

Bewertung EU-finanzierter öffentlich-privater Partnerschaften im Bereich Forschung

Die drei Instrumente der EU-Forschungspolitik für öffentlich-private Partnerschaften (ÖPP), die direkte Zuweisungen erhalten, d. h. gemeinsame Technologieinitiativen (GTI), vertragliche ÖPP (vÖPP) sowie Wissens- und Innovationsgemeinschaften (KIC), stellen drei unterschiedliche Ansätze zur Förderung von Netzwerken, Plattformen und Ökosystemen dar. Trotz ihrer Unterschiede werden durch alle drei Instrumente Möglichkeiten geschaffen, um Wissen auszutauschen, an gemeinsamen Vorhaben zu arbeiten, Vertrauen zwischen unterschiedlichen Akteuren – die häufig Konkurrenten sind – aufzubauen und Forschungspläne zu koordinieren. Somit dienen sie als politische Instrumente, mit denen auf Fehlentwicklungen am Markt reagiert werden kann und die Kapazitäten des Innovationssystems verbessert werden können.

Auf GTI und vÖPP entfallen 17,5 % der über Horizont 2020 bereitgestellten Finanzmittel. Die Finanzierung von KIC macht 3,5 % aus. Ihr haushaltsbezogener Anteil macht die drei ÖPP-Mechanismen, die im Rahmen von Horizont 2020 direkt finanziert werden, zu einem wichtigen Eckpfeiler der europäischen Ful-Politik. Durch die Analyse wurde ausgehend von bisherigen Bewertungen bestätigt, dass die Partnerschaften die Auswirkungen, die angesichts ihrer Querschnittsfunktion und ihres Mehrwerts im Finanzierungsvorschlag zu erwarten sind, weitgehend erbringen. Bei GTI und vÖPP sind Vernetzungs- und Strukturierungseffekte zu beobachten: Durch Partnerschaften werden führende europäische Wirtschaftsteilnehmer eingebunden und die Forschungspläne für bestimmte Technologiebereiche strukturiert. KIC tragen dazu bei, dass wertvolle Innovationsökosysteme und neue Formen der Zusammenarbeit zwischen Innovationsakteuren entstehen. Dennoch entsteht der Eindruck, dass die ÖPP in der Forschung derzeit noch nicht ihr volles Potenzial entfalten, und es gibt mehrere verbesserungswürdige Bereiche, die angegangen werden sollten:

- Die Komplexität sollte verringert werden, da zu viele Partnerschaftsstrukturen parallel zueinander existieren.
- Das Lock-in-Risiko sollte verringert werden, da ÖPP langfristige Verpflichtungen sind, die die Flexibilität bei der möglichst effektiven Zuweisung von Ressourcen beeinträchtigen können.
- Der Wertbeitrag von KIC muss klargestellt werden. Es bleibt weiterhin zweifelhaft, ob finanzielle Tragfähigkeit auf lange Sicht ein realistisches und erstrebenswertes Ziel ist, ohne dass andere Mehrwerte gefährdet werden.
- Netzwerk- und Strukturierungseffekte gehören zu den wichtigsten potenziellen Auswirkungen von ÖPP im Forschungsbereich. Es müssen weitere Anstrengungen unternommen werden, um diese Effekte in geeigneter Weise festzustellen.

- Bei vielen Partnerschaften kommt es zu Überschneidungen oder bleiben Synergien ungenutzt. Ein Portfolioansatz muss verfolgt werden, damit Partnerschaften direkt zu den strategischen Zielen des Rahmenprogramms beitragen.

Die Rolle von Finanzinstrumenten bei der Innovationsförderung

Im laufenden MFR werden aus dem EU-Haushalt für marktorientierte Instrumente 48,3 Mrd. EUR bereitgestellt. Nach den Schätzungen im Rahmen dieser Studie dient fast ein Drittel dieser Finanzmittel (14,3 Mrd. EUR) dazu, innovative Unternehmen, Forschungsprojekte und Forschungsinfrastrukturen zu unterstützen. Der größte Teil dieser Förderung entfällt auf den EFSI, gefolgt von InnovFin (einem zentral verwalteten Instrument zur FuE-Förderung) und Finanzierungsinstrumenten, die aus EU-Kohäsionsfonds finanziert und unter geteilter Mittelverwaltung eingerichtet werden.

Bisherigen Bewertungen und den Ergebnissen der Befragungen zufolge hat sich InnovFin insgesamt als recht leistungsfähig erwiesen. Dennoch gibt es einige Verbesserungsmöglichkeiten und offene Fragen für den nächsten MFR:

- Die Förderkriterien zur Auswahl der Unternehmen, die für Darlehen der InnovFin-KMU-Bürgschaftsfazilität in Frage kommen, sind zu weit gefasst. In der Folge erhalten viele Unternehmen mit sehr niedrigem Innovationsprofil und sogar einige nicht innovative KMU ein InnovFin-Darlehen.
- Es gibt zahlreiche ähnlich gelagerte nationale und regionale Programme zur Förderung innovativer Unternehmen, aber keinen Mechanismus, mit dem die auf EU- und nationaler Ebene erfolgenden Fördermaßnahmen koordiniert werden.
- Seit der Einrichtung des EFSI werden im Rahmen von InnovFin vermehrt Projekte und Geschäftstätigkeiten mit hohem Risiko finanziert. Für einige Befragte blieb die Frage offen, ob der vorgeschlagene Übergang von einem System mit vollständig abgesicherten Finanzinstrumenten (wie InnovFin) und einer teilweise abgesicherten Garantie (EFSI) zu einem System, das auf einer einzigen, teilweise abgesicherten Garantie (dem für den Zeitraum 2021-2017 vorgeschlagenen Fonds im Rahmen des Programms „InvestEU“) beruht, die Fähigkeit der EU einschränken wird, Geschäftstätigkeiten mit hohem Risiko zu finanzieren.
- Bisherige Bewertungen zeigen, dass Unternehmen, die im Rahmen von Horizont 2020 Finanzhilfen erhalten, relativ selten aus dem gleichen Programm auch in der Expansionsphase finanziert werden, und dass dadurch ihre Skalierfähigkeit eingeschränkt wird. Eine Lösung wäre die Entwicklung von Produkten zur Mischfinanzierung (d. h. Produkte, bei denen Finanzhilfen mit marktähnlichen Instrumenten kombiniert werden), mit denen hochinnovative Start-ups über alle Phasen hinweg begleitet werden.
- Die beiden themenspezifischen InnovFin-Produkte (InnovFin – Demonstrationsprojekte im Energiesektor und InnovFin – Infektionskrankheiten) haben sich bewährt, auch wenn bei einigen Aspekten Korrekturbedarf besteht. Daher erscheint es sinnvoll zu prüfen, inwieweit ähnliche Produkte in anderen Politikbereichen genutzt werden können.
- Die für Zwischenprodukte geltenden EU-Vorschriften sind sehr komplex und detailliert gestaltet. Eine zu starke Regulierung ist vor allem für Eigenkapitalprodukte problematisch: Bei Investitionen des EIF in einen Aktienfonds gelten die Bedingungen des EIF auch für alle anderen Anleger und für alle Unternehmen, die diesen Fonds in Anspruch nehmen, selbst wenn einige von ihnen Nicht-EU-Unternehmen sind (z. B. bei internationalen Fonds). Aus

diesem Grund zögern Intermediäre und Unternehmen, finanzielle Unterstützung aus dem EIF in Anspruch zu nehmen.

Der Ansatz für Innovationsfinanzierung in den Vorschlägen der Kommission für den MFR 2021-2027

Im neuen MFR schlägt die Kommission vor, die Mittelausstattung für EU-Programme, die ausschließlich auf Forschung, Innovation und Digitalisierung ausgerichtet sind, um 43 % zu erhöhen. Zu diesen Programmen zählen das neue EU-Rahmenprogramm für Forschung und Innovation (Horizont Europa), ITER, Euratom, CEF Digital, die FuE-Sparte des InvestEU-Fonds (das Instrument, das alle Finanzinstrumente und den EFSI ersetzen wird) sowie ein neues EU-Programm zur Förderung des digitalen Wandels (Programm „Digitales Europa“)⁶.

In Horizont Europa, dem neuen Rahmenprogramm der EU für Forschung und Innovation, sind einige maßgebliche Änderungen bei der Herangehensweise an Innovation vorgesehen.

- Mit der Einrichtung des Europäischen Innovationsrats (EIC) wird mehr Gewicht auf von der Basis ausgehende (Bottom-up), offene Innovationen und die Förderung bahnbrechender, marktschaffender Innovationen gelegt.
- Durch die Einführung von Aufträgen wird die Top-down-Forschung strategischer und flexibler.
- Es besteht eine klare Bereitschaft, die Synergien mit anderen EU-Programmen zu verstärken.
- Die Landschaft der EU-Innovationspartnerschaften wird rationalisiert und Partnerschaften werden wirkungsorientierter gestaltet, indem sie mit neuen Aufträgen verknüpft und Ausstiegsstrategien vorgesehen werden.

Für die EU-Innovationsförderung in bestimmten Politikbereichen werden verschiedene Neuerungen vorgeschlagen:

- Die Mittelausstattung des ELER wird voraussichtlich gekürzt, aber im Rahmen von Horizont Europa sollen 10 Mrd. EUR für Forschung und Innovation in den Bereichen Lebensmittel, Landwirtschaft, ländliche Entwicklung und Bioökonomie bereitgestellt werden.
- In den Bereichen Energie und Verkehr sollen das Volumen und die Reichweite des Innovationsfonds (Nachfolger von NER300) vergrößert werden. Die Vorschläge für CEF und LIFE sehen Bestimmungen vor, die eine Aufstockung der Innovationsfinanzierung zur Folge haben könnten. Durch eine aktivere Koordinierung mithilfe von Instrumenten wie der Plattform für Kohleregionen im Wandel und der kürzlich verabschiedeten Verordnung über das Governance-System für die Energieunion könnten auch die Synergien verstärkt werden.
- Im Bereich Soziales könnte die Einrichtung eines Einzelinstruments (ESF+) Synergien zwischen verschiedenen Finanzierungsmöglichkeiten für soziale Innovation und soziale Erprobung ermöglichen.
- Aus dem neu eingerichteten Europäischen Verteidigungsfonds (EDF), bei dem ein beträchtlicher Teil der Mittel für FuE-Vorhaben bereitgestellt wird, werden sich voraussichtlich Synergien mit Horizont Europa entwickeln.

⁶ Sie Tabelle 12

Hauptergebnisse und politische Empfehlungen

Aus der Analyse leiten sich die folgenden Hauptergebnisse ab:

- Derzeit ist es schwierig, den Umfang der Innovationsfinanzierung der EU zu verfolgen. In den verschiedenen EU-Haushaltsprogrammen wird der Begriff Innovation nicht einheitlich verwendet, und Daten über die Ausgaben für die Innovationsförderung liegen nicht immer vor.
- In den EU-Haushaltsvorschriften und -berichten werden die Auswirkungen der Innovationsfinanzierung nur in geringem Maße berücksichtigt. Bei vielen Programmen werden Mittel für innovative Tätigkeiten bereitgestellt, ohne dass Mechanismen oder Indikatoren vorgesehen sind, mit denen bewertet werden kann, ob mit dieser Finanzierung Wirkungen erzielt und welche endgültigen Ergebnisse erreicht wurden (im Hinblick auf Wettbewerbsgewinne, Kostensenkungen, einen höheren Wirkungsgrad bei der Verwirklichung sozialer, umweltbezogener oder anderer Ziele).
- Trotz der Bemühungen, die Synergien zwischen dem Rahmenprogramm der EU für Forschung und Innovation und anderen EU-Programmen zu fördern, gibt es diesbezüglich nur sehr selten spezielle synergiefördernde Regelungen. In vielen Bereichen bestehen zahlreiche Möglichkeiten, die unter Horizont 2020 finanzierten Innovationen über andere Programme (z. B. CEF, ESF+) am Markt einzuführen, aber es bestehen keine Regelungen, mit denen diese Möglichkeiten unterstützt werden.
- In vielen Politikbereichen ist die Bereitstellung von Finanzmitteln von Nutzen, bewirkt aber keine großen Veränderungen. Die eigentlichen Innovationsanreize werden durch den verordnungsrechtlichen und politischen Rahmen geboten.
- Die mit EU-Mitteln finanzierten ÖPP im Bereich Forschung und Innovation entfalten nicht ihr volles Potenzial und es gibt mehrere verbesserungswürdige Bereiche.
- Die marktorientierten EU-Instrumente zur Förderung von Forschung, Entwicklung und Innovation haben sich im laufenden Programmplanungszeitraum als leistungsfähig erwiesen, müssen jedoch an die aktuellen Herausforderungen und Marktlücken in der EU angepasst werden.

Auf der Grundlage dieser Ergebnisse werden die folgenden Politikempfehlungen abgegeben, die dazu dienen sollen, die Innovationsfinanzierung im nächsten mehrjährigen Finanzrahmen (2021-2027) zu optimieren.

- **Prüfung der Möglichkeit, eine Methodik zu entwickeln, mit der die EU-Haushaltsausgaben für Innovationsförderung verfolgt werden können.** Die Kommission sollte die Möglichkeit prüfen, im MFR 2021-2027 eine Methodik zur Verfolgung von Innovationsausgaben einzuführen. Diese muss nicht so komplex sein wie die Methodik zur Verfolgung von Klimaschutzausgaben, bei der die Fördermaßnahmen abhängig von ihren erwarteten Klimawirkungen unterschiedlich gewichtet werden, sollte jedoch über den gesamten MFR hinweg harmonisierte Daten zu Innovationsfinanzierung liefern, auf deren Grundlage der Beitrag des EU-Haushalts zur Innovationsförderung beurteilt und evaluiert werden kann.
- **Ein wirkungsorientierter Ansatz für alle Formen der EU-Innovationsfinanzierung.** Für alle EU-Ausgabenprogramme, aus denen Finanzmittel für Innovationstätigkeiten bereitgestellt werden, sollten die Interventionslogik und die erwarteten Ergebnisse und Auswirkungen

ausführlich dargelegt werden. Des Weiteren sollten Indikatoren vorgesehen werden, mit denen bewertet werden kann, ob die Auswirkungen eingetreten sind oder nicht.

- **Synergien zwischen verschiedenen EU-Finanzierungsprogrammen besser ausschöpfen.** Auch wenn Synergien letztlich vom politischen Willen abhängen, kann noch mehr dafür getan werden, konkrete Verknüpfungen zwischen Programmen zu schaffen, indem eine spezifische Rechtsgrundlage zur Förderung von Synergien einbezogen wird.
- **Bedeutung der allgemeinen Rahmenbedingungen.** Jeder Versuch, die Rolle des EU-Haushalts für die Innovationsförderung in einem bestimmten Politikbereich zu verbessern, sollte damit beginnen, dass der allgemeine verordnungsrechtliche und politische Rahmen anhand der Fragestellung untersucht wird, welches die größten Hindernisse für Innovation in den betreffenden Politikbereichen und die wesentlichen Marktlücken sind, die Unternehmensinnovationen in diesem Bereich behindern.
- **Verknüpfung europäischer ÖPP im Bereich Forschung mit Aufträgen, um die strategische Ausrichtung und Wirkungsorientierung zu verstärken.** Die nächste Generation innovativer Partnerschaften in der EU sollte rationalisiert und ihre Wirkungsorientierung verbessert werden, indem eine klare Verknüpfung mit Aufträgen erfolgt.
- **Neudefinierung marktorientierter EU-Instrumente, mit denen besser auf aktuelle Herausforderungen und Marktlücken reagiert werden kann.** Die nächste Generation marktorientierter EU-Instrumente zur Förderung von Forschung und Innovation sollte besser auf innovative Unternehmen ausgerichtet sein und führende, marktschaffende Innovatoren sowohl in der Gründungs- als auch in der Expansionsphase umfassend unterstützen. Die Möglichkeit sollte geprüft werden, zur Unterstützung von Aufträgen thematische Produkte einzusetzen.

1. INTRODUCTION

The role of the European Union (EU) budget in support to innovation has evolved over time. Being long-time confined to the support provided by the EU Framework Research programme, since the early 2000s innovation is increasingly understood as a cross-cutting priority that should be supported through all EU spending policies and funding instruments. The approach to innovation has also changed over time: innovation is no longer seen as a linear process that translates knowledge obtained in a laboratory into market products but as a more complex process that requires interaction between various actors exchanging funds, knowledge and skills and that increasingly involves citizens and users. In coherence with this, EU budget support to innovation is more varied. It not only encompasses direct funding to research and innovation projects but include actions to promote knowledge exchanges between different actors, encourage the demand for innovations or improves the framework conditions for innovation. There is also more emphasis on establishing complementarities and synergies between different policy fields and more attention given to non-technological forms of innovation.

This process of both ‘widening’ (the diversification of policy instruments) and ‘deepening’ (an expansion of the realm of action for innovation policy) will be reinforced in the next programming period. The Commission’s legislative proposals are under negotiation but according to the Commission, if there are no major changes in the proposals, an increasing proportion of the Multi-Annual Financial Framework (MFF) resources will be devoted to innovation. Following the recommendations of the High Level Group chaired by Pascal Lamy⁷, more efforts will be made to increase the complementarities between different EU programmes in support to innovation and facilitate links between them. The new MFF is also expected to reinforce the policy strategic approach, already present in the current Horizon2020 programme. A key objective is to steer significant amounts of public and private research and innovation funding towards the attainment of some pre-defined ‘missions’ that respond to societal challenges⁸.

To evaluate and judge the amounts proposed and the overall approach adopted in support to innovation in the Commission’ MFF legislative proposals one needs to have a clear picture of the overall volumes devoted to innovation and approach to innovation in the current MFF. This information is lacking: there are reports and mid-terms evaluations of different EU programmes potentially supporting innovation but not all of them provide information on the role of the programme in support to innovation and, when the information is provided, it is not based on the same understanding of innovation.

This study aims to fill this gap. The overall objective is to analyse how the current MFF supports innovation, particularly beyond Horizon 2020, to compare the approach to innovation financing in the

⁷ Lamy, P. et al (2017), *LAB – FAB – APP — Investing in the European future we want-Report of the independent High Level Group on maximising the impact of EU Research & Innovation Programmes*, DG Research and innovation, July 2017

⁸ Mariana M. and Semieniuk G.(2017).,“Public financing of innovation: New questions”, *Oxford Review of Economic Policy*, Volume 33, Number 1, 2017, pp. 24–48; Mazzucato, M.(2018) ,“ Mission-oriented innovation policies: challenges and opportunities”, *Industrial and Corporate Change*, 2018, Vol. 27, No. 5, 803–815

current MFF and the Commission's MFF 2021-2027 proposal and to formulate recommendations on how to better mainstream innovation in the next MFF.

The study is structured as follows:

- Chapter two proposes a conceptual framework to map the amounts of innovation-related funding in the EU budget. This includes an operational definition of innovation funding and a taxonomy of EU innovation funding actions.
- Based on this conceptual framework, chapter three provides an estimation of the aggregate volume of innovation funding in the current MFF and per type of innovation funding action.
- Chapter four explores existing synergies between different EU sources of innovation funding, and particularly how different programmes contribute to the attainment of the seven societal challenges defined by the Horizon 2020 regulation.
- Chapter five and six focus on two specific questions: the functioning and impact of various EU-sponsored networks and partnerships aimed at supporting innovation (chapter five) and the role played by EU financial instruments and budgetary guarantees in support to innovation (chapter six). The two chapters analyse the situation in the current programming period and draw lessons for the next MFF.
- Chapter seven analyses the approach to innovation financing in the Commission's MFF 2021–2027 proposals.
- Chapter eight summarises the main findings and formulates some policy recommendations on how to improve the use of EU funding in support of innovation in the next MFF.

1.1. METHODS

The analysis undertaken has been based on a review of existing literature on innovation and EU innovation policy, extensive documentary research and in-depth interviews. Desk research has included the analysis of legislative regulations, impact assessments, monitoring reports and mid-term evaluations and reports from the European Court of Auditors on EU budgetary programmes, EU-sponsored partnerships, financial Instruments and EFSI. When available, we have also consulted academic publications on the functioning and impact of these programmes and instruments.

To complement the information from documents and reports we have conducted semi-structured face-to-face and phone interviews with public officials from different Commission DGs (AGRI, CLIMA, EAC, ENER, ECFIN, REGIO, RTD), EIB and EIF representatives, members of the European Court of Auditors and OECD experts on innovation and research policies. Overall, we have interviewed 30 people. The list of people interviewed is presented in Annex 2. Although the information provided by interviewees has been very valuable, we would like to clarify that responsibility for the analysis and recommendations set out in the study lies entirely with the authors and do not necessarily reflect the views of the interviewees.

2. A CONCEPTUAL FRAMEWORK TO MAP EU INNOVATION FUNDING

KEY FINDINGS

- In the context of this study **innovation** is defined as a new or improved product, process, service, organisational method or policy approach that constitutes a state-of-the-art change in the sector or policy area in which the actor operates. This is a slightly narrower definition than the widely-used definition of the Eurostat/OECD Oslo Manual, which considers that a change can be an innovation if it implies a novelty for the actor adopting it (even if it is not new to the market or the world).
- **Innovation funding** is defined as all funding aimed to support the generation, implementation and diffusion of innovations. This covers all spending for applied research but excludes funding for basic or fundamental research. It also includes actions in support to the diffusion of innovations (that is, actions intended to deploy at large-scale tested innovations in a given sector or territory) and those actions intended to improve the framework conditions for innovation (i.e. establishment of innovation partnerships or networks, investments in research infrastructures).
- The EU budget provides **support to innovation in different ways**: by financing R&D projects, supporting the implementation or commercialisation of innovations (through prototyping, testing, pilot projects, etc.), supporting the large-scale deployment of tested innovative technologies or solutions, providing generic support to innovative firms, promoting the exchange of knowledge and information or improving the framework conditions for innovation.

The term innovation is used in many different ways in EU budget programme regulations and reports. A first step to map the amounts of innovation funding in the EU budget is to provide a harmonised and operational definition of innovation and innovation funding.

2.1. DEFINING INNOVATION

The most widely-used definition of innovation is that of the Eurostat/OECD Oslo Manual: “a new or improved product or process (or combination thereof) that differs significantly from the unit’s previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)”⁹. Defined as such, innovation encompasses the development of new products and services on the basis of scientific and technological result but also the use of existing technologies in novel applications or the adoption of non-technological and social innovations (e.g. a new business model). It can refer to changes adopted by firms, public authorities, non-for-profit institutions, households or individuals. It can consist of radical or disruptive changes but also incremental improvements.

⁹ OECD/Eurostat (2018), *Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation*.

An important feature of innovations is the fact that they must be put into use (e.g. commercialised or made available for others to use in the case of non-business innovations). In this respect, innovation differs from **inventions**, which can be defined as the first occurrence of an idea for a new product or process. Whereas the distinction is clear in theory, in practice inventions and innovations frequently come in a continuous process. Besides, from a policy perspective, it is often difficult to distinguish both aspects as in many cases public programmes are designed to support both the development of the idea and its implementation.

Another basic feature of innovation is the degree of **novelty**. According to the Oslo Manual, a change is considered an innovation if it implies a novelty from the actors' previous products or business processes. This renders the definition highly subjective as the degree of novelty ultimately depends on each actor's capabilities and context. To remedy that, the Oslo manual recommends the use of some objective measures of 'innovativeness' when conducting surveys. In studies on business innovation, the most widely used approach is to determine the novelty of a firm's innovations in comparison with the state of the art in the market or industry in which the firm operates. We will take the same approach for the purposes of this study. We will define innovation as a new or improved product, process, service, organisational method or policy approach which constitutes a **state-of-the-art** change in the sector or policy area in which the actor operates.

Finally, innovations are adopted with the intention to pursue some form of value creation (be it more profits for a company, increased efficiency of a process or improvement of the wellbeing of users for example). Value is therefore an implicit goal of innovation even if it may not occur (innovation outcomes are always uncertain) and it takes a long time to materialise.

2.2. DEFINING INNOVATION FUNDING

In the context of this study we will define **innovation funding** as all public funding aimed to support the generation, implementation and diffusion of innovations in the economy and society.

This not only includes programmes or actions explicitly labelled as "innovation programmes" and whose main purpose is to promote innovation but also measures promoting innovation as a means to achieve other policy goals (support to deployment of innovative technologies to improve border control, support to social experimentation as a way to improve policies to combat poverty, etc...) ¹⁰.

To the extent that new ideas sometimes come from research activities, innovation policy often overlaps with science and research policy. The boundaries between the two policy domains are blurry but a distinction is often made between support to 'basic research' (i.e. curiosity-driven research, whose main motivation is to expand humankind's knowledge), and support to 'applied research' (i.e. research that seeks to answer a question in the real world and to solve a problem). It is not always easy to discern whether a given public programme supports one type of research on the other, but actions clearly supporting basic research will not be included in our definition of 'innovation funding'.

¹⁰ Some authors use the term "functional innovation policies" to refer to these types of policies (see Edler, J, et al (2016) "Introduction: Making sense of innovation policy", in Edler, J et al (ed), *Handbook of Innovation Policy Impact*, Edward Elgar)

Apart from direct funding to **Research, Development and Innovation (R&D&I) projects** in areas considered of public interest, public authorities can support innovation by providing generic **support to innovative firms** (in form of funding or tailor-made services) or promoting the exchange of knowledge and ideas between different actors (business, public bodies, users, education centres). This can be done either by establishing and promoting permanent **partnerships, networks** or alliances or through more informal arrangements (e.g. financing networking actions and the exchange of best practices).

In the literature of innovation, actions in support of entrepreneurship and start-ups are sometimes treated as part of innovation policy. While an entrepreneurial-friendly context and more entrepreneurial culture can favour the emergence of new innovative businesses, not all new firms or new entrepreneurs are innovative. Thus, generic funding for entrepreneurs and start-up is excluded from our definition of innovative funding.

As noted before, innovation implies the development of an idea and its implementation or commercialisation. Public authorities support the implementation phase in its different stages, from **prototyping, testing, creating a pilot project, scaling-up and introducing the innovation into the market**. Whereas grants are practically dominant in the generation phase financial instruments play a relevant role in helping innovators to move from ideas to market.

The ultimate impact of innovations depends very much on their adoption by other firms and markets, and thus promoting the **diffusion of innovations** is also part of innovation policies. R&D programmes usually pay little attention to the large-scale diffusion of innovations but supporting the deployment of tested innovations is quite relevant in some sectoral policies. Thus, for instance, in the field of energy and transport there is general consensus on the need to promote the deployment of innovative tested low-carbon technologies and solutions in order to accelerate the energy transition.

Actions aimed at improving the **framework conditions for innovation** are also part of our definition of innovation funding. This includes investments in research infrastructures and in the development of research and innovation skills.

A question raised when developing the conceptual framework was whether we should treat all Information and Communications Technology (**ICT investment**) as innovation funding. Indeed, ICT is often described in the literature as an enabling technology for innovation, and many innovations today are new products and services made possible by digital technologies or the use of open data platforms and software. ICT investment, however, includes very different things and not all of them are strongly connected to innovation. An important part of ICT investment under EU Structural Funds consists into investment in ICT mature infrastructure (e.g. broadband networks). While access to internet is probably a basic pre-condition for many innovations, the link is rather loose. We have thus decided to exclude these investments from our definition of 'innovative funding'. Other ICT investments, on the contrary, have a clear link to innovation and we have therefore included them in our analysis. This is the case of actions aimed at developing and scaling innovative ICT technologies (in areas such as supercomputing, big data, the Internet of Things, advanced manufacturing, robotics, 3D printing, blockchain technologies and artificial intelligence) or investment aimed at promoting the digitalisation of certain

areas or sectors (that is, the development of new ICT products and services in areas such as public administrations, health, transport, energy or education).

Finally, it is important to make clear the separation between intent and result. Something intended to support innovation does not necessarily have an impact on innovation. In our study, we classify spending on the basis on stated intent (i.e. money that is intended to support innovation) but we have no evidence of results.

2.3. TAXONOMY OF EU INNOVATION FUNDING ACTIONS

In the literature on innovation one can find different taxonomies of innovation policy instruments¹¹ but none of them are suited to the purpose of this study. Most of them distinguish interventions according to the type of instruments employed (grants, financial incentives, regulatory instruments, etc.) instead of purpose. As a result, not all categories are relevant for this study (which only focuses on support in form of funding) and those which are relevant are too broad to allow a proper analysis of different types of EU budget actions.

To carry out our analysis we have constructed our own taxonomy of EU innovation funding actions that aims at being exhaustive (covering all types of innovation funding), mutually exclusive and relevant (box 1). The taxonomy is built on the classification of areas used by DG research to explore potential synergies between Horizon Europe and other programmes¹² but has been slightly modified to address challenges and problems we have encountered by doing our analysis of EU innovation funding. It classifies actions in five main groups:

- a) actions supporting the innovation process, from the generation of the idea to the market uptake (1);
- b) actions in support to the diffusion of innovations (2);
- c) actions supporting innovative firms (3);
- d) support to the exchange of knowledge and information with a view to promoting innovation (4);
- e) actions aimed at improving the framework conditions for innovation (5).

These different categories are expected to be mutually exclusive but of course there may be some borderline cases. An example can be support provided to a firm to develop a particular innovative product or service, which could be classified as 1 (direct support to R&I activities) or 3 (support to innovative firms). We will classify this funding as “support to innovative firms” when the main objective of the public intervention is the development and expansion of innovative firms (i.e. support provided by a EU-funded venture capital fund) and as “direct support to R&I activities” when the goal is to promote the emergence of innovative products or solutions in a given policy area or to respond to a specific priority challenge (i.e. one firm winning a call for projects to develop specific innovative solutions in a specific policy area).

¹¹ Borrás, S. and C. Edquist (2013), “The choice of innovation policy instruments”, *Technological Forecasting and Social Change*, 80, 1513–1522; Reillon, V (2016) *EU Innovation Policy Part I- Building the EU innovation policy mix*, In-depth analysis, European Parliamentary Research Service, May 2016; Edler, J, et al (2016) “Introduction: Making sense of innovation policy”, in Edler, J et al (ed), *Handbook of Innovation Policy Impact*, Edward Elgar; OECD (2015), *Frascati Manual: Guidelines for Collecting and Reporting Data on Research and Experimental Development*.

¹² See Annex 5 (synergies) of the Horizon Europe Impact Assessment

Box 1. Taxonomy of EU innovation funding actions

1. Direct support to R&I activities and projects, including close-to-market activities

- Support to R&I projects
- Innovation inducement prizes
- Support to bottom-up innovation initiatives (e.g. co-creation or user-driven innovation projects)
- Support to prototyping, piloting, testing, demonstration and market uptake of innovations
- Support to social experimentation
- Pre-commercial procurement (PcP)

2. Support to the diffusion of innovations

- Support the deployment of tested innovative technologies to new markets or sectors (energy, health, environment) or the dissemination of innovative solutions to new users, individuals or firms.
- Public procurement of innovative solutions (PPI)

3. Support to innovative firms

- Support to the creation and development of innovative start-ups and SMEs
- Support to business R&D investments

4. Support to the exchange of knowledge and information

- Support to innovation partnerships, networks and clusters
- Support of networking actions, mutual learning and dissemination of best practices
- Actions to foster links between education/research/innovation ('knowledge triangle')

5. Support to research infrastructure, human capital and policy-making

- Research infrastructures
- R&I skills
- Actions to improve innovation policy-making at national and regional level

3. OVERVIEW OF EU BUDGET SUPPORT TO INNOVATION

KEY FINDINGS

- According to our estimations, the EU budget allocates around **EUR 150 billion** in actions supporting innovation (**14% of the overall MFF budget**).
- **H2020** provides by far the largest amount in support to innovation (**EUR 61.8 billion**) but there are other programmes providing support to applied research and innovation projects, particularly in the fields of space and energy (EURATOM, ITER, GALILEO) but also in agriculture (EAFRD), climate (LIFE) or social (EaSI).
- The **ERDF** is also an important source of innovation funding. We estimate that around **EUR 53 billion** of ERDF funding (7% of total ERDF budget) have been allocated to actions in support of innovation. An important part of this consist of funding in support to innovative firms. ERDF has been also largely used to support the diffusion of innovation, particularly the deployment of e-technologies and e-solutions in different sectors.
- There are other funds and programmes that allocate funding to innovation support without stating it explicitly. CEF or the EU Health programme provide funding for the large-scale deployment of innovative technologies and solutions.

In line with the above definition of innovation, various EU budgetary instruments provide support to innovation. This part provides an overview of these instruments and estimates of the amounts that are intended to fund innovation over the 2014-2020 period. Due to time constraints we have not been able to scrutinise all the EU budgetary programmes and funds. The choice has been made to focus on those EU programmes and funds that are usually mentioned in EU documents and reports as playing a role in support to innovation and/or having some potential synergies with Horizon2020. It should be noticed in particular that the study does not cover EU programmes in foreign and development policy. The sections below present the estimated amounts funding innovation in cross-sectoral instruments (3.1) and in programmes and funds devoted to specific policy areas (3.2).

There are five sources of funding providing cross-sectoral support to innovation: Horizon 2020 (H2020), the European Regional Development Fund (ERDF), the EFSI, the EU programme for the Competitiveness of Small and Medium-Sized Enterprises (COSME) and the digital sub-programme of Connecting Europe Facility (CEF-Telecom). The three first support innovation through a variety type of actions whereas COSME and CEF-Telecom provide specific type of support (support to innovative SMEs and support to digitalisation respectively).

Programmes or funds providing support to innovation in specific policy areas outside of H2020 are classified as follows: Energy, transport and climate; Agriculture and fisheries; Space; Security and defence; Social and health. For each policy area, **the tables present the estimated allocated amounts per EU budgetary instrument** and per group of innovation funding actions as presented in our taxonomy. These estimates are based on the analysis of the legislative basis and the interim evaluations of these programmes and funds (see Box 2 for methodological notes). Programme fiches with the detailed analysis of the programmes and funds and their funding can be found in Annex 1 of the study.

Box 2. Some methodological notes

Our estimations are based on allocated spending, not on money effectively spent. We look specifically at the allocations made in the programme legislative basis or subsequent programming documents (e.g. European Structural and Investment Funds (ESIF) operational programmes, multi-annual calls). The level of disaggregation varies from one programme to the other: sometimes we have detailed information of amounts per specific type of actions, in other cases only pre-allocations per broad priority areas or programme objectives.

We have taken a conservative approach for the estimations. We take as 'innovation funding' only those amounts which are expected to be entirely or almost entirely used to support innovation. This excludes amounts of EU funding that may have been used to support innovation activities even if not intended to do it. When there is evidence sustaining this contribution to innovation, we report about that in our individual programme fiches.

Most of the data on allocations for the whole 2014-2020 period is in 2013 prices. ERDF data is in 2019 prices (it comes from the dataset "planned categorisation data" available on the ESIF Open Data platform, which is in current prices and is regularly updated). In some cases in which there is no detailed pre-allocation for the whole period (i.e. CEF) we provide data of allocated spending up to 2016 or 2017 from multi-annual calls or mid-term evaluations. This is normally presented in current prices of the year the call is published/evaluation is made.

Apart from estimating the overall amounts of innovation funding per programme or fund, we classify the amounts according to our taxonomy of innovation funding actions. This is not always possible, however, as in many occasions the definition of the objective or type of action financed is too broad and include various categories of our innovation funding taxonomy. In these cases, we define the funding as "unclassifiable".

3.1. EU FUNDING PROVIDING CROSS-SECTORAL SUPPORT TO RESEARCH AND INNOVATION

The two main instruments providing support to innovation are H2020 and ERDF. H2020's overall budget is EUR 74.8 billion¹³ but not all this funding can be classified as "innovation funding" according to our definition. One part of pillar 1 funding is used to support fundamental research through grants from the European Research Council (ERC). If we exclude this from the calculus¹⁴ we can estimate that H2020's support for innovation amounts to EUR 61.8 billion. Most of this support is in form of direct support to Research and Innovation (R&I) projects (EUR 46.1 billion) but there is also a significant part of H2020 funding devoted to support the mobility of researchers (Marie Curie grants) and the implementation and development of research infrastructures of pan-European interest under pillar 1.

We estimate that ERDF support to innovation amounts to EUR 53.4 billion. The most important part (EUR 19.6 billion) is devoted to support innovative firms, either through grants or financial instruments. ERDF also provides significant support to the diffusion of innovation, particularly to digitalisation (the introduction of digital services and solutions in new economic sectors).

¹³ The regulation of December 2013 set a budget of EUR 77 billion for Horizon 2020 but in June 2015, the adoption of the European Fund for Strategic Investments lowered this budget to EUR 74.8 billion.

¹⁴ A tiny part of the ERC budget serves to finance 'Proof of concept' (PoC) grants, which can be considered innovation-related funding. The amounts for Proof of concept' grants are not pre-allocated but it represented 1.3% of the ERC's budget allocated over the 2014-2017 period. If we apply the same percentage to the total ERC budget, we can estimate at EUR 170.2mn the amounts devoted to PoC. We have subtracted this amount from the total ERC budget.

There are three other EU budgetary instruments providing cross-sectoral support to innovation. The EFSI provides significant support to research and innovation -see section 6.2. and Annex 1 for a detailed description of the instrument. As at end 2017, EFSI financing on RDI projects represented 35% of total EFSI signed operations¹⁵. If we apply this percentage to the total expected EFSI financing by 2020 (EUR 100 billion)¹⁶, the result is an expected volume of EUR 35 billion of EFSI financing to RDI projects by 2020. This EFSI financing, however, does not directly come from the EU budget. It consists into EIB financing backed by a EU budget EUR 26 billion guarantee. Applying this percentage (35%) to the EFSI Guarantee we can conclude that the EU budget provides around EUR 9 billion of support to RDI projects through EFSI¹⁷.

CEF Telecom allocates almost one billion euros to the diffusion of innovations, particularly to the deployment and usage of basic digital service solutions and the development of interoperable digital platforms in new economic sectors and policy areas. Finally, COSME does not have an explicit innovative dimension but the COSME equity facility can be considered a source of innovative funding as it provides venture capital for expansion and growth phases, something which is vital for fast-growing innovative start-ups.

Table 1. EU Budget cross-sectoral support to research and innovation

In billion EUR (in 2013 prices except ERDF and EFSI)	Horizon 2020	ERDF*	EFSI*	CEF Telecom	COSME
Direct support to RD&I projects, including close-to-market activities	46.1	0	0	0	0
Support to diffusion of innovations	0	10.3	0	0.9	0
Support to innovative firms	3.3	19.6	0	0	0.6
Support to the exchange of knowledge and information	2.6	8	0	0	0
Support to research infrastructure, human capital and policy-making	9.4	8.2	0	0	0
Unclassifiable	0.4	7.4	9.1	0	0
Total	61.8	53.4	9.1	0.9	0.6
<i>As % of total budget of the programme/fund</i>	<i>83%</i>	<i>7%</i>	<i>35%</i>	<i>90%</i>	<i>26%</i>

Source: Own elaboration

**ERDF amounts are in current prices. Data comes from the dataset “planned categorisation data”, available at the ESIF Open Data platform, which is regularly updated (last update in 2019).

EFSI amounts correspond to the part of the EFSI guarantee theoretically devoted to support EFSI financing to RDI projects. Since RDI represent 35% of total EFSI signed financing, we calculate this part by applying this percentage (35%) to the overall

¹⁵ European Investment Bank, *2017 EFSI annual report. Report from the European Investment Bank to the European Parliament and the Council on 2017 EIB Group Financing and Investment Operations under EFSI*

¹⁶ The expected internal multiplier effect (the relationship between the available EFSI contribution and EIB financing under EFSI) is x3. Accordingly, the estimated EIB financing under EFSI at the end of the investment period is EUR 100bn (See EFSI steering board document, *multiplier methodology calculation-update of july 2018*, https://www.eib.org/attachments/strategies/efsi_steering_board_efsi_multiplier_methodology_calculation_en.pdf)

¹⁷ It should be noticed that this calculus is only intended to provide a rough estimation of how much of the EU budget is used to support EFSI RDI projects. In practice, the EFSI guarantee works as a portfolio guarantee and its support is not ring-fenced per policy area. Besides, it is not fully provisioned. The EU budget holds a Guarantee Fund for EFSI that serves as liquidity cushion from which the EIB is to be paid in the event of a call on the EFSI guarantee, and this Guarantee Fund amounts to 9.1bn (35% of the EFSI guarantee). The non-provisioned part of the EFSI guarantee constitutes and unfunded contingent liability to the current and future EU budgets.

EFSI guarantee (EUR 26billion). Notice that the amount of EFSI financing to RDI projects will be much higher: we estimate at EUR 35billion the amount of EFSI financing to RDI projects by 2020.

3.2. EU FUNDING PROVIDING SUPPORT TO INNOVATION IN SPECIFIC POLICY AREAS (OUTSIDE HORIZON 2020)

All programmes supporting energy, transport and climate innovation are gathered in one table as they have similar objectives related to the energy transition and climate change mitigation. In total, we estimate that about EUR 13.5 billion from the EU budget contribute to funding innovation in these three areas, on top of H2020. This funding comes from different EU budgetary instruments.

A distinction can be made between:

- programmes providing funding for applied research in some specific areas (ITER, Euratom, NER300);
- programmes supporting more close-to-the-market innovation (e.g. LIFE, which provides funding to develop, test and demonstrate new policy or management approaches, best practices and solutions to tackle environmental and climate challenges) and;
- programmes which mostly support the diffusion of innovative technologies or solutions at larger scale (e.g. Connecting Europe Facility and Cohesion Fund, which support the large-scale deployment of tested innovative energy technologies and infrastructures such as smart grids, innovative storage projects or intelligent transport systems).

Table 2. EU budget support to innovation in energy, transport and climate

In billion EUR (in 2013 prices except CEF)	Euratom	NER300	CEF Tran & Ener*	ITER	LIFE	Cohesion Fund
Direct support to RD&I projects, including close-to-market activities	1.6	2.1	0.4	2.9	1.8	0
Support to diffusion of innovations	0	0	3.3	0	0	0.8
Support to innovative firms	0	0	0	0	0	0
Support to the exchange of knowledge and information	0	0	0	0	0	0
Support to research infrastructure, human capital and policy-making	0	0	0	0	0	0
Unclassifiable	0	0	0	0	0	0
Total	1.6	2.1	3.7*	2.9	1.8	0.8
<i>As % of total budget of the programme/fund</i>	<i>100%</i>	<i>100%</i>	<i>17%*</i>	<i>100%</i>	<i>52%</i>	<i>1%</i>

Source: Own elaboration

*Data for CEF Transport and Energy refers to the allocation period 2014-2016. We estimate the ratio of CEF funding in support to innovation by calculating how much represents the funding allocated to innovation in the period 2014-2016 as % of total CEF allocated in 2014-2016.

In the field of agriculture and rural development, on the basis of the actions programmed by Member States we estimate that EAFRD support to innovation may amount to EUR 1.7 billion or more. For the most part it consists into support to EIP-AGRI operational groups involving farmers, advisors, researchers, enterprises, and other actors in a targeted way to cooperate in a joint R&I project. In the field of fisheries and oceans, the European Maritime and Fisheries Fund (EMFF), has as specific objective to “support technological development, innovation and knowledge transfer” in the field of fisheries and aquaculture. The EMFF regulation gives detailed guidelines on the type of innovation activities Member States can finance and establishes some conditions (in particular, it stipulates that EMFF innovation operations shall be carried out by, or in collaboration with, a scientific or technical body recognised by the Member State which shall validate the results of such operations). The amounts of EMFF funding under central management can be also used to finance scientific research, technology and innovation projects in fields linked to fisheries, aquaculture and maritime, and indeed it has been used to finance various maritime innovation actions in the field of Blue Growth (Blue Careers, Blue Labs, Blue Technology calls for proposals). However, neither the ESIF Open Data portal (for the amounts under shared management) nor the Interim evaluation of the implementation of the direct management component of the EMFF Regulation¹⁸ provide detailed information on the precise amounts allocated to innovative actions.

Table 3. EU budget support to innovation in agriculture and fisheries

In billion EUR (in current prices)	EAFRD	EMFF
Direct support to RD&I projects, including close-to-market activities	1.7	N/A
Support to diffusion of innovations	0	0
Support to innovative firms	0	0
Support to the exchange of knowledge and information	0	N/A
Support to research infrastructure, human capital and policy-making	0	0
Unclassifiable	0	0
Total	1.7	N/A
<i>As % of total budget of the programme/fund</i>	2%	--

Source: Own elaboration. EAFRD data comes from the dataset “2014-2020: EAFRD allocation by focus area (EU planned financing)”, available at the ESIF Open Data Platform. Data is in current prices and information is regularly updated.

¹⁸ European Commission (2018), “Interim evaluation study of the implementation of the direct management component of the EMFF Regulation (Articles 15 and 125)”, final report.

In the field of space, two programmes (Galileo and Copernicus) provide funds that complement the funds available for space research within H2020. Galileo is an EU programme to develop a global navigation satellite system (GNSS). The regulation setting up Galileo allows the programme to fund research activities related to fundamental elements of the satellite system, but in fact, the whole funding can be considered as support to innovation given that the Galileo project has clear innovativeness elements. Copernicus funds the development and maintenance of an earth-monitoring programme. The programme plays a major role in support to innovation as it provides data that can be used by researchers and innovators (especially data-driven start-ups). Given this fact, we classify it as a research infrastructure.

Table 4. EU budget support to innovation in space

In billion EUR (in 2013 prices)	Copernicus	Galileo
Direct support to RD&I projects, including close-to-market activities	0	7
Support to diffusion of innovations	0	0
Support to innovative firms	0	0
Support to the exchange of knowledge and information	0	0
Support to research infrastructure, human capital and policy-making	4.3	0
Unclassifiable	0	0
Total	4.3	7
<i>As % of total budget of the programme/fund</i>	<i>100%</i>	<i>100%</i>

Source: Own elaboration

In the field of defence, the new Preparatory Action on Defence Research (PADR) provides EUR 0.09 billion in support to Member States' collaborative projects of research, development and eventually acquisition of military equipment. In the field of security and migration, both the Asylum, Migration and Integration Fund (AMIF) and the Internal Security Fund (ISF) may provide some support to innovation. In particular, Member States can use part of their AMIF or ISF envelope to support innovative techniques or solutions (AMIF regulation) or finance "measures deploying, transferring, testing and validating new methodology or technology, including pilot projects and follow-up measures to Union funded security research projects" (ISF regulation). The envelopes of AMIF and ISF under central management can also be used to finance "pilot projects, including innovative projects, based on transnational partnerships (...) designed to stimulate innovation and to facilitate exchanges of experiences and best practices" (AMIF regulation) or "support particularly innovative projects developing new methods and/or technologies with a potential for transferability to other Member States, especially projects which aim to test and validate research projects" (ISF regulation). It is

however not possible to estimate the precise amounts allocated to these innovative actions: there is no publicly available information on the use of AMIF and ISF envelopes per type of action at national level and the interim evaluations of the AMIF and ISF centrally-managed budget do not provide detailed information on amounts in support to innovation actions.

Table 5. EU budget support to innovation in security and defence

In billion EUR (current prices)	PADR	AMIF	ISF
Direct support to RD&I including close-to-market activities	0.09	N/A	N/A
Support to diffusion of innovations	0	N/A	N/A
Support to innovative firms	0	0	0
Support to the exchange of knowledge and information	0	N/A	N/A
Support to research infrastructure, human capital and policy-making	0	0	0
Unclassifiable	0	0	0
Total	0.09	N/A	N/A
<i>As % of total budget of the programme/fund</i>	<i>100%</i>	<i>--</i>	<i>--</i>

Source: Own elaboration.

There are various EU programmes providing support to social innovation outside H2020. The European Social Fund (ESF) regulation states that Member States shall promote social innovation within all areas of intervention, “in particular with the aim of testing, evaluating and scaling up innovative solutions, including at the local or regional level”. To this purpose, Member States shall identify, either in their Operational Programmes (OPs) or at a later stage during implementation, fields for social innovation that correspond to the Member States' specific needs. An analysis of the ESIF open database reveals that Member States have allocated a total amount of EUR 0.9 billion to actions labelled as “social innovation”. In addition to that, OPs from 22 Member States have earmarked EUR 2.7 billion to actions having a non-innovative goal but promoting “social innovation” as secondary objective. The total amount of ESF in support to innovation is therefore EUR 3.6 billion.

One of the specific objectives of the Employment and Social Innovation programme (EaSI) is to support social and labour market policy innovations, in particular through the use of social policy experimentations. According to the EaSI regulation, between 15 and 20% of the allocation for the axis PROGRESS (that is, EUR 0.08 - EUR 0.1 billion) has to be used to support social innovation in 2014-2020. Erasmus also provides some support to innovation. Part of the funding for specific objective 2 (“cooperation for innovation and the exchange of good practice”) can be used to finance cooperation for innovation actions, particularly the establishment of “knowledge alliances” and “sector skills alliances” aimed at strengthening the links between education/research/innovation actors. Funding for the specific objective 3 (“policy reforms”) can be also used to finance policy experimentation

projects in the field of education and training. However, both objective 2 and objective 3 envelopes provide more than funding for innovation actions¹⁹. Since the interim evaluation provides information of Erasmus+ funding per type of specific objective, it is not possible to isolate the amounts used in support of innovation.

One of the specific objectives of the EU Health programme is “contributing to innovative, efficient and sustainable health systems”. Under this objective, the Programme funds various types of actions aimed at facilitating the deployment of innovative technologies and methods (particularly e-health solutions) at national and regional level and the exchange on innovative health policy approaches between national actors. It also provides support to the European Innovation Partnership (EIP) in Active and Healthy Ageing. According to the mid-term evaluation, between 2014-2016 the programme dedicated a total amount of EUR 0.03 billion to support innovation.

Table 6. EU budget support to social and health innovation

In billion EUR (in 2013 prices except ESF and Health Programme)	ESF	EaSI	Erasmus +	Health Programme*
Direct support to RD&I projects, including close-to-market activities	3.6	0.08 - 0.1	0	0
Support to diffusion of innovations	0	0	0	0.03 ¹
Support to innovative firms	0	0	0	0
Support to the exchange of knowledge and information	0	0	N/A	0
Support to research infrastructure, human capital and policy-making	0	0	N/A	0
Unclassifiable	0	0	0	0
Total	3.6	0.08 - 0.1	N/A	0.03¹
<i>As % of total budget of the programme/fund</i>	4%	11%	--	7%

Source: Own elaboration

*ESF amounts are in current prices and come from the dataset “planned categorisation data”, available at the ESIF Open Data platform, which is regularly updated. Figures for the Health Programme are in current prices and based on funding for 2014-2016 according to the Health Programme mid-term evaluation.

3.3. CONCLUSIONS

Table 7 summarises the findings of this chapter. According to our estimates, the EU budget allocates around EUR 152 billion in actions supporting innovation (14% of overall MFF). H2020 provides by far the largest amount in direct support to innovation but there are other centrally-managed programmes

¹⁹ For instance, objective 2 actions can finance IT support platforms or capacity building actions according to the Erasmus mid-term evaluation.

providing a non-negligible amount of funding for applied research and close-to-market innovation projects, particularly in the field of space and energy. Member States have also allocated significant amounts of ERDF funding in support to innovation, with a focus on supporting innovative firms and the deployment of e-technologies and solutions in various sectors. Finally, the fact of classifying Galileo as a “research infrastructure” (a choice that we assume it can be contested) explains the existence of an important amount of funding outside H2020 and ERDF in support to research infrastructures.

Table 7. EU budget support to innovation: summary of estimations

In billion	H2020	ERDF	Other EU programmes	Total
Direct support to RD&I projects, including close-to-market activities	46.1	0	17.7	63.8
Support to diffusion of innovations	0	10.3	5.1	15.3
Support to innovative firms	3.3	19.6	0.6	23.5
Support to the exchange of knowledge and information	2.6	8	0	10.6
Support to research infrastructure, human capital and policy-making	9.4	8.2	4.3	21.9
Unclassifiable	0.4	7.4	9.1	16.9
Total	61.8	53.5	36.7	152

Source: own elaboration

4. SYNERGIES BETWEEN DIFFERENT EU PROGRAMMES PROVIDING SUPPORT TO INNOVATION

KEY FINDINGS.

- The establishment of Research and Innovation Smart Specialisation Strategy (RIS3) to guide ERDF funding on R&I activities aimed expressively to enhance synergies and complementarities between ERDF and H2020. Impact has been nonetheless limited and most RIS3 make no reference to other EU funding programmes. At project level, the different yet complementary logics of intervention between H2020 and ERDF offer opportunities for 'ad hoc' synergies (i.e. use of ERDF to exploit and diffuse R&I results developed under Horizon 2020 or to prepare regional R&I stakeholders to participate in Horizon 2020 calls). In practice however these synergies are limited due to various factors (different regulations, lack of familiarity of both H2020 and ERDF stakeholders with other programmes, different geographical coverage of ERDF and H2020 funding as well as the fact that H2020 work programmes are not designed in view of the needs for innovative solutions at regional level, nor the priorities identified in RIS3).
- Overall, there is complementarity between Horizon 2020 pillar three actions and other EU programmes funding innovation action in the seven H2020 societal challenges' fields. However, in many fields (energy, transport, security, social) the potential to use other programmes to roll-out H2020 funded innovation is unexploited.
- In some areas (i.e. agriculture, social) we observe good complementarity between H2020 and other programmes because the type of innovation projects financed is different (H2020 finance trans-national projects and radical innovation whereas other programmes support more local or regional projects, incremental innovations and R&I infrastructure).
- Some interviews and documents suggest that coordination could be improved between EU centrally-managed programmes, H2020 support to societal challenges and ERDF funding in some areas (i.e. in health and agriculture).
- In the field of security existing evaluations point out the lack of coordination and risks of duplication between H2020 and the Internal Security Fund (ISF).

Having a rough estimation of the amounts from the EU budget devoted to support innovation, this chapter explores the potential synergies between different EU sources of innovation funding. We will first look at synergies between programmes providing cross-sectoral support to innovation and will then analyse the contribution of these different EU programmes to the attainment of the seven societal challenges that guide H2020's pillar three actions:

- Health, demographic change and wellbeing (EUR 7.3 billion of H2020 funding);
- Food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the bio-economy (EUR 3.9 billion of H2020 funding);
- Secure, clean and efficient energy (EUR 5.9 billion of H2020 funding);

- Smart, green and integrated transport (EUR 6.2 billion of H2020 funding);
- Climate action, environment, resource efficiency and raw materials (EUR 3 billion);
- Europe in a changing world - inclusive, innovative and reflective societies (EUR 1.2 billion);
- Secure societies - protecting freedom and security of Europe and its citizens (EUR 1.7 billion).

Based on EU Commission's conceptualisation of synergies²⁰, we focus our analysis on three aspects:

- **Coherence** in overall intervention logic and strategic approach (i.e. whether the programmes share the same vision of the societal challenge and work in the same direction to tackle this challenge);
- **Complementarity** in the logics of intervention (i.e. whether they finance different but complementary actions);
- Existence of **synergy-enhancing rules** (i.e. whether there are rules encouraging synergies at project level such as rules allowing for the combination of funds to finance the same project, or rules providing additional points in the selection process to projects deploying H2020-financed innovations).

4.1. SYNERGIES BETWEEN PROGRAMMES PROVIDING CROSS-SECTORAL SUPPORT TO INNOVATION

4.1.1. Support to R&D infrastructures, skills and clusters

H2020 and ERDF have significantly different intervention logics that are nonetheless fairly **complementary**. H2020 mostly funds trans-national R&I projects or big public-private and public-public partnerships on the basis of excellence and supports the development of first-class research and integrated European research infrastructures whereas the ERDF supports the building of R&I ecosystems in Member States and regions (including infrastructure and competence centres - and their associated activities -, human resources, clusters and support to innovative firms).

During this programming period there have been more efforts to ensure synergies between both programmes at both strategic and project level. At the strategic level, the novelty is the requirement for Member States to develop Research and Innovation **Smart Specialisation Strategies (RIS3)** as a pre-requisite to the receipt of ESIF for R&I activities. RIS3 are supposed to provide an overall strategy and investment framework to promote innovation in the region. Indeed, they are conceived to give more strategic coherence to the use of ESIF and to build competitive advantage by developing and matching own R&I strengths in a region or country to business needs in order to address emerging opportunities and market developments in a coherent manner, while avoiding duplication and fragmentation of efforts. Results are however mixed. Their role in supporting innovation synergies remains quite under-developed and has tested the capacity/ability of regions and member states to

²⁰ Joint institute for Innovation Policy (JIIP), *Synergies between Framework Programmes for Research and Innovation and European Structural and Investment Funds*, DG RTD, January 2017; Horizon 2020 Interim Evaluation.

demonstrate how relevant domestic policies can be aligned for greater concentration of innovation efforts.

At EU level, a number of relevant programmes and initiatives exist which have strong innovation alignment potential with RIS3. These include the European Innovation Partnerships and the Knowledge and Innovation Communities which are hosted by the European Institute of Innovation and Technology. However, there is clearly significantly more scope for RIS3 to act as a strategic 'compass' in how regions and member states engage with the efforts of the EIPs and the KICs. Although RIS3 are also intended to create synergies with other funds, references to other programmes, e.g. ESF, H2020 and national funding, are quite limited.

Regarding H2020, there is no compulsion for RIS3 to be aligned with the Framework Programme, nor with its thematic Societal Challenges. With RIS3 largely confined to the Cohesion Policy, its appeal has been markedly absent across the EU's science, research and university sectors who – in most cases - remain focused on the H2020 programme.

During interviews with Commission officials, it has emerged that strategic coherence in regional innovation is concentrated in those regions with a strong research track record and with effective governance systems and approaches. It is important to note that while RIS3 can be a driver of improvements in domestic innovation ecosystems (especially if supported by good administrative capacity), their role as an enabler of synergies with H2020 remains to be proved. Ideally, regions would be able to develop a strategy that considers companies and research institutions and their ability to access H2020 funding. This may be more difficult in less research-intensive regions, which receive significant amounts of ERDF funding but have very low participation in Horizon 2020. In practice however, very few RIS3 mention H2020, regardless of the region's R&I performance.

At project level, the different yet complementary logics of intervention offer opportunities for 'ad hoc' synergies. This is the case for example of actors participating in a H2020 project using ERDF funds to scale-up the project or, vice versa, H2020 participants using infrastructure and capacity previously built with ERDF funding. There have been changes in the **regulations to facilitate these synergies** at project level. The Common Provisions Regulation allows combining ESIF and H2020 funding for the same project and/or beneficiary (but for different expenditure items), provided that there is no double funding (art 65). Some policy mechanisms have been introduced to make synergies easier at policy level.

- Through the '**Seal of Excellence**'²¹, ESIF can finance some high-quality projects proposals that were not funded under H2020.

²¹ The Seal of Excellence is a label awarded to high-quality Horizon 2020 project proposals that, because of limited budget, were not awarded funding. Only projects that applied under the SME instruments, MSCA individual fellowships and Teaming actions are eligible to the label. The Seal is intended to help these project proposals get alternative sources of funding. For more information, see here https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/seal-excellence_en.

- Through '**Stairway to Excellence**', R&I stakeholders in different member states share information and best practices on how to better exploit synergies among different EU programmes/funds, aiming at closing the innovation gap among countries²².

Existing evaluations, confirmed by interviews with experts, however, suggest that synergies at the project level in practice are limited by a variety of factors.

- The regulations governing ESIF and H2020 are not harmonised and their intervention logics – cohesion and excellence – are very different. The funds have different co-funding rates and different timing for fund disbursement in line with the usual accounting practices and national/regional innovation support systems. Also, while H2020 funding is not considered state aid, ESIF funding is. This poses significant limitations to the uptake and implementation of the Seal of Excellence. According to the Court of Auditors, the Seal of Excellence has not been very successful in helping projects to obtain alternative sources of funding (e.g. from the ERDF)²³.
- Complexity poses a significant disincentive to actors that have to deal with two separate blocs of regulation and processes that are deemed too bureaucratic. The development of joint project proposals aiming at receiving funding from both programmes and the coordination efforts needed for joint management are a significant challenge.
- Lack of awareness, familiarity and programme knowledge is also an issue. H2020 and ESIF are directed to two different communities that often are not in touch with each other. The first targets top-level research institutions and universities in an EU-wide network, the second targets more industrial or public sector local players. ESIF stakeholders working in a national/regional context may not be familiar with directly-managed funds²⁴ and top universities and researchers may not be familiar with the ESIF funding possibilities and rules.
- There is also a lack of matching in terms of geographical coverage. Regions and member states with relatively low R&I performance usually receive significant amounts of ERDF funding but struggle to win H2020 projects, making it difficult to capitalise on complementarities²⁵.

It should be also noted that DG RTD and DG Regio seem to have slightly different visions on synergies. Whereas DG RTD officials and documents stress the potential for further alignment of ERDF and RIS3 to H2020 priorities, the view that emerges from DG Regio is that synergies should entail a rather reciprocal alignment with Horizon2020 paying more attention to regional capacities, needs and priorities– including in less R&I intensive areas.

²² For more information, see here <http://s3platform.jrc.ec.europa.eu/stairway-to-excellence>

²³ European Court of Auditors (2018), *The majority of simplification measures brought into Horizon 2020 have made life easier for beneficiaries, but opportunities to improve still exist*, Special Report No 28.

²⁴ JIIP (2017), "Synergies between Framework Programmes for Research and Innovation and European Structural and Investment Funds. Contributing to the Interim Evaluation of Horizon 2020. Final Report". Study for the European Commission.

²⁵ Similarly, H2020 participants may use infrastructure that has benefitted from ERDF funding in the past. A graphic representation of the geographical distribution of ERDF and H2020 funding is available here <http://s3platform.jrc.ec.europa.eu/synergies-tool>

Finally, there are promising potential synergies between the ESIF and the **European Institute of Innovation and Technology (EIT)** – (see Section 5.3). EIT KICs are more similar to ERDF projects than ordinary H2020 projects because they aim at having a lasting impact, at changing the industrial structure of places that are not research intensive. There is similarity in the principles and intervention logic. All EIT KICs must have a strategy for “outreaching” their activities, which are encouraged to develop in coordination with regional and local authorities in charge of defining and implementing the regional Smart Specialisation Strategies (RIS3). Additionally, the skill dimension of KICs has the potential to develop some synergies with the ESF. As both KICs and ESIF authorities aim at creating a lasting relationship with local actors, there is good potential for systematic strategic synergies, although their uptake in practice remains weak.

4.1.2. Support to innovative SMEs

There are three EU funding programmes (COSME, H2020 and ERDF) providing cross-sectoral support to innovative SMEs. According to evaluations there is strong complementarity between COSME and H2020 financial instruments²⁶. An open question is additionality of these instruments with respect to similar instruments put in place by national or regional authorities (see section 6 below).

Evaluations also point out the need for stronger coordination between grants and loan-based schemes in support to innovative firms. In particular, according to H2020 Interim Evaluation, H2020 invests EUR 400mn per year in risk financing through InnovFin but only a small number of firms receiving H2020 grants benefit from such financial instruments. Similarly, H2020 invests EUR 500 mn per year in the SME Instrument (an H2020 programme providing tailor-made support in form of grants and technical assistance to highly innovative SMEs) but once the grant support finishes, the SMEs benefiting from it are faced with a lack of private funding to facilitate the commercial exploitation of their innovations and scale-up.

4.1.3. Support to digitalisation

Various parts of the EU budget provide support to digitalisation but three programmes are particularly relevant: H2020, CEF Telecom and ERDF.

There is a high degree of complementarity between H2020 and CEF Telecom. H2020 supports research, development and demonstration actions of new innovative digital technologies (under LEIT-ICT) whereas CEF focuses on the deployment and diffusion phase. In particular, CEF supports the deployment of basic digital service solutions (called “building blocks”) such as e-signature, e-identification (eID), e-invoicing, e-delivery or automated translation, which are already tested technologies but not yet largely deployed. It also supports the implementation and maintenance of cross-border and interoperable digital service platforms for specific sectors (such as e-procurement, the European e-justice portal, the Business Registers Interconnection System or the Online Dispute

²⁶ In some occasions, both funds have combined resources to set up a multistage fund covering both early- and growth-stage investments. An example is the Pan-European VC Fund-of-Funds, which combines resources from InnovFin (up to EUR 200 million), COSME (up to EUR 100 million) as well as EFSI (up to EUR 100 million).

Resolution for instance). DG connect and DG RTD coordinate in their actions in support to digital technologies, and in various cases CEF has been used to deploy digital solutions developed under pilot programmes with H2020 money or with the former Competitive and Innovation Programme (CIP programme, running from 2007-2013).

As regards ERDF, it may be too soon to say whether CEF telecom and ESIF act in synergies. Commission officials mentioned that DG Regio advises ESIF Managing Authorities (MAs) to build on the standards and platforms developed by CEF when planning ERDF investment in digital service infrastructure. The evaluation at the end of the period will show whether MAs have put this advice into practice and whether these synergies materialise.

4.2. SOCIETAL CHALLENGE 1: HEALTH, DEMOGRAPHIC CHANGE AND WELL-BEING

With an allocation of EUR 7.3 billion, SC1 is the biggest of all SC in terms of H2020 budget. Its overall goal is to ensure better health for all and a more competitive health and care sector. Actions are structured in five specific objectives:

- Understanding health, wellbeing and disease;
- Preventing disease;
- Treating and managing disease;
- Active ageing and self-management of health;
- Methods and data;
- Health care provision and integrated care.

SC1 takes a broader approach to health challenges than the former EU research programme: it supports classic applied clinical research to improve the diagnosis and treatment of diseases but also the development of innovative solutions to health prevention and innovative solutions for the organisation of healthcare services or to promote active ageing (such as e-health or personalised medicine).

Another characteristic of SC1 is the emphasis on major partnerships. While the majority of the budget is allocated through multi-annual calls for proposals published by the Commission, a significant part (25% of funding allocated by 1st January 2017) supports joint research programmes co-funded by major partners and stakeholders. In particular, through SC1 the Commission supports:

- a) Two public-public partnerships with EU member states and third countries to coordinate research agendas on topics of common interests: the Active and Assisted Living Research and Development Programme (AAL2), which aims at creating better conditions of life for the older adults and to strengthen the resulting international industrial opportunities in ICT, and the European and Developing Countries Clinical Trials Partnership Programme (EDCTP2), which contributes to the development of new or improved drugs, vaccines, microbicides and diagnostics against HIV/AIDS, malaria and other poverty-related and neglected infectious diseases in sub-Saharan Africa.
- b) A major public-private partnership with the European pharmaceutical industry to foster the development of innovative and personalised medicines (IMI2). IMI2 constitutes the world's

biggest public-private partnership (PPP) in the life sciences with a EUR 3.3 billion budget for the period 2014-2020.

Finally, while being the SC with the largest budget the number of quality proposals received is also very high. The result is that only one in three high quality proposals is eventually funded. Besides, according to the H2020 interim evaluation, limited resources have hampered the capacity to have a significant impact to tackle new global health challenges, such as the emergence of new epidemics (Ebola, Zika). To try to increase the 'value for money' and to provide more support to the move from research to market, SC1 has introduced new instruments such as inducement prizes and the Infectious Disease Financing Facility. The latter provides support to firms developing innovative vaccines, drugs, medical and diagnostic devices or novel research infrastructures in the field of infectious diseases.

Other EU funding programmes providing support to innovation under SC1 field are the EU Health programme and ERDF.

H2020 and the EU Health programme are coherent in their strategic approach. Both share a common understanding of the major health challenges in Europe and are underpinned by a broad and multidisciplinary approach to health innovation. As H2020, the EU Health Programme has introduced new topics over time to respond to new health emergencies and priorities in the policy agenda (such as migration health). The two programmes are also largely complementary in their logics of intervention. While H2020 covers the full range of research and innovation (including close-to-market related activities such as piloting, demonstration, test-beds, support for public procurement and market uptake of innovations) most of the funding is dedicated to finance excellent health research. The H2020 interim evaluation specifically notes that "further efforts are still needed to translate the results from research into application in health care systems and into society more broadly, in particular, for personalised medicine (where the healthcare systems need to adapt to this new approach) and for e-health, in which there is a need for further support of the uptake of innovation and policy development beyond funding projects". With its focus on the deployment of tested innovative health technologies and methods at national level, EU Health programme can play this role. However, given the small size of the programme (EUR 0.4 billion for 2014-2020) and the fact that only one part of it is dedicated to innovation, the capacity of EU Health programme to promote the uptake of the results streaming from H2020 research projects is small.

There is more potential in improving the coordination between H2020 and ERDF on health investments. It should be noted that the 11 Central Eastern European countries only receive 3% of total SC1 funding. ERDF can help these countries perform better by building up the necessary health research infrastructures and support the development of necessary human capital for R&I, notably through smart specialisation strategies.

The H2020 interim evaluation points out the potential for such coordination, particularly with regions deciding to smartly specialise in health field. However, it points out that such articulation can be difficult as the areas of specialisation might be very general and not specifically match the specific priority setting of SC1, and it can be difficult to identify the best modalities for articulation due to the

lack of useful, detailed, information on which regions have defined a health-centred smart specialisation strategy and what do they intend to implement in particular²⁷.

4.3. SOCIETAL CHALLENGE 2: FOOD SECURITY, SUSTAINABLE AGRICULTURE AND FORESTRY, MARINE AND MARITIME AND INLAND WATER RESEARCH AND THE BIOECONOMY

As articulated in the various Commission documents and policy statements, Societal Challenge 2 (SC2) tackles various inter-related challenges:

- Promote a sustainable agriculture and forestry;
- Promote a sustainable and competitive agri-food sector;
- Unlock the potential of aquatic living resources while protecting the environment and adapting to climate change;
- Promote sustainable and competitive bio-based industries and support the development of a European bio economy.

H2020 budget allocation to SC2 amounts to EUR 3.85 billion, with most of the funding allocated to R&I on sustainable agriculture and forestry (32%) and the bio-based economy (28%). As regards the type of action financed, the most used ones are competitive grants to trans-national R&I projects but almost one quarter of H2020 SC2 budget goes to a public-private partnership between the European Commission and the Bio-based Industry Consortium (BIC), called “Bio Based Industry Joint Undertaking (BBI JU).

Another important source of funding for agriculture and forestry innovation comes from the EAFRD. There is no specific EAFRD budget line for innovative measures but, according to our estimations and on the basis of the actions programmed by Member States (see annex 1), EAFRD support to innovation may amount to EUR 1.7 billion or more. For the most part, it consists into support to the European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI) operational groups involving farmers, advisors, researchers, enterprises, and other actors in a targeted way to cooperate in a joint R&I project.

Interviewed experts from both DG RTD and DG AGRI agree that there is **coherence** in the overall strategic approach to agriculture research and innovation between H2020 and EAFRD. In the two programmes, innovation is promoted as a means to improve both the productivity and sustainability of European agriculture and forestry. The two programmes are also largely **complementary**: Whereas EAFRD programmes are applied within a specific country or region, H2020 mostly co-funds innovative actions at transnational level. In addition to that, the type of innovation promoted is different. The EAFRD puts more accent on bottom-up, farmer-led approach, focusing on projects which facilitate co-ownership of innovative solutions and/or in which farmers take a leading or the lead role in a project. Most of the H2020 projects are not bottom up, even if they involve to a large extent the actors that are concerned by the innovation (end-users) through the multi-actor approach.

²⁷ Commission Staff Working Document, *Interim Evaluation of Horizon 2020*, Annex 2, SWD(2017) 220 final

Complementarity between H2020 and EAFRD is guaranteed by two mechanisms:

- Management of the Societal Challenge 2 within H2020 is shared between DG Research and Innovation (DG RTD) and DG Agriculture and Rural Development (DG AGRI).
- The link provided by the EIP 'Agricultural Productivity and Sustainability' ('EIP Agri').

In contrast, the interviews as well as some documents²⁸ hint at a lack of coordination with ERDF actions on this area. This is problematic, given the significant number of regions having selected agri-food as a key research area in their smart specialisation strategies²⁹.

4.4. SOCIETAL CHALLENGE 3: SECURE, CLEAN AND EFFICIENT ENERGY

The "secure, clean and efficient energy" societal challenge reflects the importance given by the European Union to the energy transition. Since 2015, this is part of the Energy Union, which is one of the top ten priorities of the Juncker Commission (2014-2019). It is also a key element for the EU to fulfil its international commitments, especially on the Paris Agreement, and on Mission Innovation³⁰.

Energy innovation occurs in a specific policy context as the EU has set binding energy policy targets to the European Union, its Member States and several segments of the economy (e.g. the power and industrial sectors through the European Union Emissions Trading Scheme). Those regulations set a clear incentive for innovation.

Under H2020, the 'Energy Challenge' lays out seven specific objectives and research areas:

- Reducing energy consumption and carbon footprint;
- Low-cost, low-carbon electricity supply;
- Alternative fuels and mobile energy sources;
- A single, smart European electricity grid;
- New knowledge and technologies;
- Robust decision making and public engagement;
- Market uptake of energy and ICT innovation.

A key European Commission document for clean energy innovation is the 2016 Communication on 'Accelerating Clean Energy Innovation' (ACEI)³¹ that the European Commission presented as part of the 'Clean energy for all Europeans Package' proposed in November 2016. Building on the above-mentioned H2020 seven specific objectives, ACEI identifies four 'interconnected strategic priorities':

1. Decarbonising the EU building stock by 2050,

²⁸ An evaluation of the EIP AGRI evidences weak or non-existing links between the EIP and the ERDF (J. Fotheringham et al, Evaluation study of the implementation of the European Innovation Partnership for Agricultural Productivity and Sustainability, Final report 2016)

²⁹ EIP Agri, *EU funding opportunities related to innovation in agriculture, food and forestry-Submitting your innovative project: what, how and where* (https://ec.europa.eu/eip/agriculture/sites/agri-eip/files/eip_agri_funding_for_web.pdf)

³⁰ Mission Innovation is a global initiative of the European Commission (on behalf of the EU), 9 EU Member States, and 14 third countries (including the US, India and china) to accelerate clean energy innovation globally. It was announced in 2015 at COP21. One of its aim is to reach a "substantial boost in public-sector investment in clean energy RD&D".

³¹ https://ec.europa.eu/energy/sites/ener/files/documents/1_en_act_part1_v6_0.pdf

2. Strengthening EU leadership on renewables,
3. Developing affordable and integrated energy storage solutions,
4. Electro-mobility and a more integrated urban transport system.

As one can see, ACEI's strategic priorities are more targeted than H2020's specific objectives.

H2020 budget allocation to SC3 amounts to EUR 5.9 billion (under H2020's pillar 3), with most of the funding allocated to R&I on "low-cost, low-carbon electricity supply" (29%), 'reducing energy consumption and carbon footprint' (29%) and 'a single, smart European electricity grid' (19%).

EUR 0.4 billion is allocated to the European Institute of Technology InnoEnergy, which is the EIT KIC dealing directly with energy innovation.

For SC3, there are moreover additional potential sources of EU funding. ITER provides funding for innovative projects in the sector of nuclear fusion, CEF - Energy may support innovative power transmission lines and smart grids, while NER 300 (a programme that invests the money generated from selling some of the allowances of the EU Emissions Trading Scheme -ETS) supports 'first of a kind' innovative energy projects, especially for carbon capture and storage, and renewable energy.

Overall, interviewed experts from both DG RTD and DG ENER considered that there is a decent complementarity between H2020 and other EU tools to support clean energy innovation. Most interviewees however noted:

- Strong shortcoming with NER 300. NER 300 is indeed supposed to be a key tool to finance energy innovations at a specific step in their lives: the creation of pre-commercial and/or commercial 'first of a kind' innovative energy projects. When asked about NER 300's impact, interviewees were using cautious words and regularly referred to the European Court of Auditors' report on NER 300 that assesses it severely (see NER 300 programme Fiche in Annex 2).
- Untapped potential with CEF-Energy. CEF-Energy has indeed the potential to deploy innovative energy solutions. CEF has been so far supporting 159 projects on electricity, 75 on gas and 4 on smart grids. According to interviewed experts, the support to innovation from electricity projects is likely to be limited and indirect (e.g. creating a new electricity transport line can facilitate the integration of innovative renewable energy projects), gas projects are unlikely to support innovation, and while smart grids projects are innovative projects, there are very few of them.
- Insufficient coherence of EU support to energy innovation. Not all energy innovations are in line with the EU energy-climate objectives. For instance, CEF funding to gas infrastructure is criticised by environmental Think-Tank E3G³² as a public subsidy to fossil fuel infrastructure. Some of EFSI funding was also criticised for supporting fossil fuels³³.

³² Elisa Giannelli, Lisa Fischer, *Four priorities for a future-oriented Connecting Europe Facility*, E3G, November 2018.

³³ Anna Roggenbuck, Markus Trilling, *The best laid plans – why the investment plan for Europe does not drive the sustainable energy transition*, CEE Bankwatch, October 2016.

- Synergies could be improved with EU funding tools managed by Member States or regions, especially ESIF. This would require more active coordination between the European Commission, Member States and regions.

4.5. SOCIETAL CHALLENGE 4: SMART, GREEN AND INTEGRATED TRANSPORT

H2020 Societal Challenge 4 “Smart, green and integrated transport” (H2020-SC4) aims to achieve a European transport system that is resource-efficient, climate and environmentally-friendly, that ensures better and safer mobility, while reinforcing leadership of the European transport industry.

H2020-SC4 has a significant budget of EUR 6.2 billion³⁴. The bulk of the budget goes to Joint Undertakings (EUR 4.2 billion) and to a cPPP (European Green Vehicles Initiative - EUR 750 m). The JUs are mainly Clean Sky 2 (CS2) with EUR 1.7 billion, the Single European Sky Air Traffic Management Research (SESAR) with EUR 585 m, Shift2Rail (S2R) with EUR 450 m and Fuel Cells and Hydrogen 2 (FCH2) with EUR 250 m (completing EUR 415 m from Energy SC). In terms of open calls, most of the budget goes to grants for R&I Actions and Innovation Actions (EUR 730m in 2014-2016)³⁵.

H2020 transport R&I was initially devised as a technology push but it evolved into a problem-solving approach. This is reflected for example in more focus on cross-cutting and cross-modal activities (i.e. air, rail, road and waterborne modes are considered in a systemic approach through R&I in infrastructure, intelligent transport systems and logistics), cooperation at programme rather than just project level, and more emphasis on socio-economic and behavioural aspects. Socio-economic research represents only 5% of the funding but as much as 22% of the topics covered because its costs are usually lower than for technological research.

Thanks to enhanced focus on innovation and demonstration in H2020, funding for transport projects covers Technology Readiness Levels³⁶ (TRLs) up to 7, which is more than under the 2007-2013 Framework Programme (FP7) where projects were covered up to TRL 5. However, the current bi-annual programming appears inadequate to anticipate and swiftly integrate “disruptive and counter-intuitive technologies and business models” according to the mid-term evaluation.

H2020-SC4’s projects also contribute to objectives of SC3 (energy) and SC5 (climate) as they pursue common energy transition objectives³⁷. Generally, other programmes are coherent with these

³⁴ Down from the originally planned EUR 6.34bn in the H2020 legal basis

³⁵ Commission Staff Working Document (2017), *Interim Evaluation of Horizon 2020* annex II

³⁶ The Technology Readiness Level is a scale used to assess the readiness of a technology. It goes from TRL 1 which is merely the observation of a basic principle to TRL 9 where a system is proven in operational environment (e.g. when a product is market-ready). For H2020, the [European Commission](#) defines all TRLs as follows: • TRL 1 – basic principles observed • TRL 2 – technology concept formulated • TRL 3 – experimental proof of concept • TRL 4 – technology validated in lab • TRL 5 – technology validated in relevant environment (industrially relevant environment in the case of key enabling technologies) • TRL 6 – technology demonstrated in relevant environment (industrially relevant environment in the case of key enabling technologies) • TRL 7 – system prototype demonstration in operational environment • TRL 8 – system complete and qualified • TRL 9 – actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies or in space).

³⁷ For example, the development of batteries implies collaboration of several SCs: Nanotechnologies (NMP), Energy and Transport.

objectives as they have high shares of projects contributing to sustainable development – e.g. the Cohesion Fund contribution to CEF almost fully financed sustainable transport modes.

However, the “green” dimension of transport projects in several programmes can be challenged. CEF provides funding for distribution infrastructure of fossil fuels (e.g. gas terminals), which can be accounted as deployment of innovation. For example, among Innovation labelled actions, there are projects of liquefied natural gas (LNG) technologies and distribution systems³⁸. ESIF finances numerous motorways projects that allow for more traffic and speed that can increase CO2 emissions while EFSI invests in airport developments aimed at accommodating future growth in traffic, which, in the lack of clean alternatives to carbon-intensive aviation, contributes to the rise in CO2 emissions.

In terms of complementarity, H2020-SC4 articulates with other programmes – mainly CEF, EFSI and ESIF - but the push for the uptake of SC4 projects is limited. According to several sources, the continuation of SC4 projects is hindered by the lack of information on other programmes and the complexity of application rules³⁹. This calls for improvements in coordination mechanisms in MS and regions and for the harmonisation of rules for different programmes so that high quality projects that could not get funded can easily apply in other programmes.

CEF Transport, mainly, was designed to support investment in transport infrastructure and the deployment of innovative solutions at later stages than H2020-SC4. This is facilitated by the fact that CEF and H2020-SC4 are managed by the same agency (INEA). Additionally, innovation is an externality that can be taken into account in the selection process for CEF funding. While some stakeholders identify overlaps between CEF and SC4 funding, these should be limited as they target different stages of market maturity. ESIF is also complementary to CEF deployment; the former on internal sections while the latter on TEN-T core network. This is enabled by the close cooperation of DG MOVE and DG REGIO in project selection and monitoring.

Box 3. Complementary funding of alternative fuels infrastructure

CEF Transport financed in 2014-2015 calls for the deployment of standard fast electric chargers in Germany and in Belgium as well as ultra-fast chargers on the TEN-T corridors. The deployment of this infrastructure benefitted from research done through H2020 and earlier through FP7 – from basic research (e.g. battery technology), then applied research (e.g. electric architecture of vehicles) to pilot projects (e.g. urban electric vehicles pilots). CEF Transport is in this case funding the upscaling of FP7-H2020 projects⁴⁰.

³⁸ See for example Annex to the Implementing Decision C(2014)1921: “Annex II referring to objectives and priorities of the CEF-Transport sector to be implemented by calls for proposals in 2015 and 2016 and to Programme Support Actions funded from 2016 appropriations onwards”, p.23.This Section 3.2.V) presents among innovation and new technology actions that can receive funding a list of alternative fuels distribution infrastructure that support the decarbonisation of transport, as follows: “This encompasses the use of electricity, hydrogen, biofuels, synthetic fuels (preferably from biomass), compressed or liquefied natural gas (CNG and LNG), preferably pure bio-methane or blended with biomethane), as well as liquefied petroleum gas (LPG, preferably biodiesel with bio-LPG), or other innovative systems

³⁹ See Commission Staff Working Document Interim Evaluation of Horizon 2020 Annex 2. Some examples of complexity are the significant differences to apply to different programmes that require efforts from applicants who are thus more reluctant to apply to programmes outside of SC4, e.g. different application formal requirements, selection criteria, procedure and funding rates.

⁴⁰ Commission Staff Working Document (2018) *Mid-Term Evaluation of the Connecting Europe Facility (CEF)*, SWD(2018) 44 final

As regards EFSI, it seems that beyond some complementarities with CEF Debt Instrument, EFSI has substituted itself to the CEF DI on several projects, a trend observed in other sectors as well.

Finally, within the CEF programme, there are incentives (such as increased funding rates) to create synergies between CEF areas. According to an EU official, the programme could target more cross-sectoral investments that have not materialised so far, i.e. sector coupling where projects include energy, transport and digital aspects. In practice, the legal framework makes it difficult to implement multi-sectoral calls and there was only EUR 40 m of budget devoted to synergy calls in CEF. More flexibility is needed in the CEF instrument to enhance synergies and facilitate its responsiveness to new technologies and priorities.

4.6. SOCIETAL CHALLENGE 5: CLIMATE ACTION, ENVIRONMENT, RESOURCE EFFICIENCY AND RAW MATERIALS

H2020 Societal Challenge 5 (H2020-SC5) aims to achieve a climate change resilient economy and society. Funding should support both mitigation and adaptation to climate change, protection of the environment and sustainable use of resources (including raw materials), eco-innovation to enable the transition towards a green economy, and the protection of cultural heritage threatened by climate change.

Climate action under H2020 is more solution-oriented than FP7 by setting overarching objectives such as increasing European competitiveness and achieving a resource-efficient economy. It has also moved from a traditional sectoral approach (water, waste) to a systemic approach (transformation of the system economic, social and environmental dimensions). The Commission also works with the European Innovation Partnerships and the EIT (e.g. EIP Water, EIP Raw Materials, Climate KIC, EIT-Raw Materials) in the implementation of H2020-SC5.

H2020-SC5 has a budget of EUR 2.97 billion that is mainly allocated to Innovation Actions and Research & Innovation Actions⁴¹ (80% of total funding in 2014-2016). However, the success rate is extremely low for these projects (less than 10% of applications for these Actions are funded) hinting that many high quality innovative projects may not get financed through this programme.

The H2020-SC5 envelope is spent in line with its objectives as the 2017 assessment reports that 96% of the budget is devoted to sustainable development, half of which to climate change actions. According to an interviewee, the approach of DG CLIMA is to mainstream climate action goals throughout all European funding such as LIFE, ESIF, EAFRD and CEF. LIFE in particular is the EU programme for the environment and climate that essentially contributes to funding SC5 objectives. About half of LIFE's EUR 3.4 billion budget for 2014-2020 finances demonstration, pilot, best practice and awareness raising projects.

⁴¹ Horizon 2020 includes types of actions with different EU funding rates: Research & Innovation Actions (mainly establishing new knowledge with some limited demonstration) have 100% EU funding rate while Innovation Actions (involve more prototyping, testing, pilots, etc.) are funded at 70% by the EU.

However, it has been difficult so far for the EC to formulate specific policy goals for LIFE projects as LIFE has historically been based on a bottom-up approach⁴². For this reason, officials from DG ENV and DG CLIMA turned more towards H2020 (and FP7) to define specific objectives rather than LIFE projects where more strategic focus would be needed.

In terms of complementarity, LIFE is thus considered as a catalyst that follows up on H2020 projects and provides funds for pilot and demonstration projects closer to the market that can be funded afterwards by larger EU, national and regional funds. However, these synergies are found to be still underused, also according to interviewees, and should be pursued to bridge the gap to larger funds like ERDF. Several LIFE pilots are also followed up and funded by rural development programmes (EAFRD)⁴³. This is highly relevant for the achievement of H2020-SC5 objectives and creates links with SC2 on food security and agriculture.

As H2020-SC5 also funds eco-innovation technologies, the frontier with SC3 on energy tends to be blurry. For example, LIFE finances projects contributing to climate change adaptation that develop resilient construction materials, i.e. they improve the energy efficiency of the buildings⁴⁴. These could thus be labelled as energy funding as well. These points of convergence between funding for energy-related projects are not an issue as they contribute towards the same energy transition and climate change mitigation goals, and can offer alternative funding considering the high selectivity of LIFE.

Complementarity can be improved in the next years thanks to the synergy-enhancing rules in LIFE as projects get a higher score if they (1) mainstream environmental objectives in other policy areas, (2) have a specific strategy to replicate its solutions, (3) are transnational or (4) plan to take up the results of H2020 R&I projects⁴⁵. According to the interim report of H2020, the share of projects funded by LIFE that take up H2020 projects is still low but this is likely to grow with more H2020 environmental and climate R&I projects delivering in the next years⁴⁶.

4.7. SOCIETAL CHALLENGE 6: EUROPE IN A CHANGING WORLD: INCLUSIVE, INNOVATIVE AND REFLECTIVE SOCIETIES

SC6 is the least funded of the seven societal challenges: it has a seven-year budget of EUR 1.2 billion and represent only 4.4% of the total budget for Societal Challenges. With a strong focus on Social Sciences and Humanities, it is structured in three specific objectives:

⁴² Commission Staff Working Document (2017), *Interim Evaluation of Horizon 2020*.annex 2

⁴³ Commission Staff Working Document (2017), *Mid-term Evaluation of the Programme for Environment and Climate Action (LIFE)*, SWD(2017) 355 final. For example, land restoration under LIFE projects in Belgium is sustained on the long-term through the rural development programme.

⁴⁴ For instance, the LIFE HEROTILE project funds the production of roof tiles that improve the energy performance of the building thanks to under-tile ventilation.

⁴⁵ For the exact awarding of points, see Commission Implementing Decision (EU) 2018/210 of 12 February 2018 on the adoption of the LIFE multiannual work programme for 2018-2020.

⁴⁶ According to the interim report of H2020, 2 out of 41 LIFE funded projects (5%) in 2014 linked their activities to formerly EU-funded activities, rising to 13 out of 41 (32%) projects in 2015. In 2014-2016, 14% of the LIFE projects are based on H2020 but as they started at the same time, the results are not there yet.

1. Inclusive societies (26% of total funding) aims to gain a greater understanding of the societal changes in Europe and of their impact on social cohesion, as well as to analyse and develop social, economic, political inclusion through cutting-edge science and inter-disciplinarity, technological advances and organisational innovations.
2. Innovative societies (28%): aims to explore new forms of innovation (public sector innovation, co-creation, social innovation) and to engage citizens, civil society organisations, enterprises and users in research and innovation.
3. Reflective societies (17%) aims to improve the understanding of its cultural heritage and of its identities in order to strengthen cohesion and solidarity and to encourage modern visions and uses of its past.

Among the three sub-objectives, the second one is the most innovation-oriented. Various calls have been published under this sub-objective, with an emphasis on supporting ICT-enabled public innovation, co-creation and user-driven innovation projects. Most of the calls have financed trans-national research and innovation projects (mostly lead by public bodies) but some funding has been used to finance single pilot and demonstration projects led by firms (e.g. there have been grants to support SMEs developing innovative mobile e-government applications).

There are two other sources of funding for social innovations: ESF and EaSI. There is overall coherence in the strategic approach underpinning action in support to innovation in these programmes: they all share a common understanding as regards to the main social challenges the EU is confronted (ageing, growing inequalities, new forms of poverty and social exclusion, emerging digital divide, etc.) and the need for new innovative solutions to tackle these problems.

The three programmes are also compatible in their logic of intervention. H2020 has a strong focus on ICT-enabled innovation and breakthrough innovation whereas ESF and EaSI support more classic innovations in terms of adoption of new approaches or new forms of organisation.

However, there are differences between the programmes as regards to their understanding of social innovation and impact orientation:

- H2020 actions are underpinned by the Oslo definition of innovation. They aim at supporting the development of new or significantly improved services, solutions, techniques or organisational modes to better tackle social challenges or improve public action. They take a clear impact-oriented approach: projects must clarify the expected impact of the innovation (in terms of efficiency and effectiveness gains, greater transparency, administrative burden reduction, increased take-up of services by citizens, user satisfaction or others). In many calls, it is explicitly required to reserve some funding to develop pilot or demonstration activities.
- EaSI, on paper, also takes an impact-oriented approach. According to the regulation, the programme shall “help to identify and to analyse innovative solutions and to scale up their practical implementation through social policy experimentation”. In practice, however, the requisite of demonstrability is rather weak and in many cases funding is given without any

requisite to validate or test the results of the innovation adopted⁴⁷. Moreover, Easi uses a definition of social innovation which is more restrictive than the one underpinning H2020 actions. Social innovations under Easi are defined as “innovations that are social both as to their ends and their means and [...] that simultaneously meet social needs and create new social relationships or collaborations, thereby benefiting society and boosting its capacity to act” (art 2 EaSi regulation).

- The ESF does not explicitly define social innovation. In practice, it is up to each Member State to define social innovation, and Operational Programmes provide a wide array of definitions and approaches⁴⁸. It does not take an impact-oriented approach: it mentions the possibility of using ESF funding for “testing, evaluating and scaling up innovative solutions [...] in order to address social needs” (art 9 ESF Regulation) but there is no requisite to do so to use ESF in support of innovation.

Finally, there are no specific synergy-enhancing rules linking these three programmes. The preamble of EaSI regulation evokes the possibility of using ESF to scale-up EaSI-financed innovations but there is no incentive in the ESF regulations to do so.

4.8. SOCIETAL CHALLENGE 7: SECURE SOCIETIES - PROTECTING FREEDOM AND SECURITY OF EUROPE AND ITS CITIZENS

The societal challenge on secure societies (SC7) focuses on enhancing research and innovation activities needed to protect society, infrastructure and services as well as the prosperity, political stability and wellbeing in the EU. In particular, this involved fighting crime, illegal trafficking and terrorism; improving resilience of critical infrastructures and resilience to crises and disasters; strengthening border and cyber security; ensuring privacy and freedom; enhancing interoperability of systems; and supporting the Union's external security policies.

In this endeavour, H2020 has a budget of EUR 1.7 billion, with most of the funding being attributed in 2014–2016 to cyber security (12.9%), border security (7.9%), fighting crime and terrorism (6.5%), and protecting critical infrastructure (5.7%). In terms of the type of action, 37% of the H2020-SC7 grants are awarded under the SME instrument (that is, serves to support SMEs developing innovation security products) whereas 22% serve to finance competitive grants to trans-national Innovation Action (IA) and Research and Innovation Action (RIA).

According to an EC official, security research has known a paradigm shift from being industry-driven under FP7 to becoming a societal challenge with H2020. Security research is supposed to be challenge-driven in order to develop new technologies and working methods that will help practitioners respond to emerging security threats. In practice however, two main problems are identified: 1) the lengthy research process is often disconnected from the quickly changing security landscape (coherence issue);

⁴⁷ For instance, in the 2016 annual work programme of EaSI there is a call to financing innovative projects supporting the job integration of those distant from the labour market, and notably the long term unemployed and the refugees. The call does not include any requisite to undertake social experimentation actions.

⁴⁸ See programme fiche ESF in the annex for more details

and 2) there is a gap between the research delivered and market application (complementarity issue). More flexibility is thus needed to coordinate better and allow practitioners to feed into regular programmes' updates with their knowledge of short term needs on the ground. Security requires short work cycles to keep to date with changing environments so that innovation can emerge.

Several solutions are implemented: project consortia now have to involve practitioners⁴⁹. The mid-term report⁵⁰ highlights that many end-users (e.g. security services, disaster relief organisations, municipalities) participating in H2020-funded projects contributed to defining a R&I programme that is more society-centric. Additionally, over the lifetime of H2020, the TRL levels of the calls in the work programme have been increasing to focus on newly-developed technologies closer to the market that can better answer current needs.

Complementarity in the funding for secure societies could further be improved to address several criticisms. First, there seems to be a lack of coordination between H2020-SC7 and related EU programmes, mainly the Internal Security Fund (ISF - EUR 3.8 billion budget). As ISF funding is mainly allocated through national programmes, there is insufficient strategic steering in the implementation of the fund and limited rolling out and adoption of H2020-funded innovation. Besides, the fund is fragmented under several objectives in Member States – pointing again to the lack of flexibility. The ISF should be a tool for Member States to work together and to create more synergies. In practice, they have no strong incentive to introduce innovation in this field, partly because they have limited co-funding, human and time resources to devote to such projects, according to an interviewee. The ISF-Police in particular – funding IT systems, police cooperation, monitoring, networking, training activities, etc.- should build on H2020 security research projects but synergies and incentives to do so are limited⁵¹.

Second, synergies between programmes tend to be underexploited as more attention has been given to avoiding overlaps between programmes (e.g. H2020-SC7, ISF, ESIF, ERDF, Customs 2020, Frontex)⁵². Assessments of the H2020-SC7 in relation to other EU programmes point out to risks of overlap and duplication between areas of research that are managed by different DGs (e.g. cybersecurity research). Some stakeholders also indicated the existence of duplicated projects between programmes at national and EU level (e.g. drone projects)⁵³. This example also relates to the fact that despite strategic coherence of the EU and national strategies, they lack coordination in their implementation.

⁴⁹ According to the Horizon 2020 Work Programme 2016-2017 for Secure Societies, "a practitioner is someone who is qualified or registered to practice a particular occupation, profession in the field of security or civil protection". Since 2016, SC7 calls have introduced a requirement to have more 'practitioners' participating in consortia (Interim Evaluation of Horizon 2020 Annex 2, p.1034).

⁵⁰ Commission Staff Working Document (2017), *Interim Evaluation of Horizon 2020 Annex 2*

⁵¹ According to interviews and EC (2018). *Interim evaluation of Internal Security Fund – Police*. Synergies are expected according to the ISF-Police Regulation

⁵² Commission Staff Working Document, *Interim Evaluation of the Internal Security Fund - Borders and Visa 2014-2017*, SWD(2018) 340 final

⁵³ Commission Staff Working Document (2017), *Interim Evaluation of Horizon 2020 Annex 2*

5. ASSESSMENT OF EU-FUNDED PUBLIC PRIVATE PARTNERSHIPS IN RESEARCH

KEY FINDINGS.

- The three **public private partnership (PPP)** instruments in EU research policy that receive direct funding – Joint Technology Initiatives (**JTIs**), contractual PPPs (**cPPPs**) and Knowledge and Innovation Communities (**KICs**) established by the European Institute of Innovation and Technology (**EIT**) – receive together about 21.5% of H2020 funding. Funding for KICs amounts to 3.5%.
- All three partnerships broadly deliver the impact that is expected given their overarching function and added value in the FP. For JTIs and cPPPs **networking and structuring effects** are observable, KICs appear to create valuable innovation ecosystems and new forms of co-operation between innovation actors.
- There are several areas of improvement: **complexity** should be reduced as there are too many parallel partnerships structures; the **risk of lock-in** should be reduced; the value proposition of KICs needs to be clarified; more effort should be done to identify network and structuring effects of research PPPs and a **portfolio approach** is needed so that partnerships contribute directly to strategic objectives of the Framework Programme.

Linkages between the diverse actors in the innovation system are a prerequisite for innovation to take place. As the funding of R&I activities by consortia of research organisations, businesses and other stakeholders from different member states has been the traditional core of European research policy promoting such linkages is – and has always been – an inherent feature of EU R&I policy.

Policies that promote stable and lasting networks or clusters go beyond the classic funding of consortia and instead seek to structure the activities of an entire ecosystem or mobilise a critical mass of investment⁵⁴. The EU sponsors innovation networks and stakeholder platforms in form of so-called partnerships. Over the last 20 years, multiple forms of partnerships have evolved, public-private as well as public-public. The report focuses on three types of partnerships that are most relevant from a budgetary perspective: Joint Technology Initiatives (JTIs), contractual PPPs (cPPPs) as well as the Knowledge and Innovation Communities (KICs) established by the European Institute of Innovation and Technology (EIT). All three are public-private partnerships (PPPs) and are the only PPPs whose activities are supported through direct funding from the EU budget.

This chapter first provides an overview of existing EU research PPPs, second assesses JTIs and cPPPs in tandem and third analyses EIT-KICs. Finally, it provides general recommendations. The assessment of the instruments proceeds in two steps: It first assesses the function of each of the tools as part the EU

⁵⁴ On innovation network policies see: Paul Cunningham and Ronnie Ramlogan (2016) the impact of innovation networks. In J. Edler et al. (Eds.), *Handbook of Innovation Policy Impact* (pp.279-317). Cheltenham, UK/Northampton, MA: Edward Elgar Publishing.

Framework Programme (FP) and identifies their main added value. Second, it analyses the performance and impact with regard to the function and added value, based on existing evaluations. Linking the two steps allows to identify the strengths and weaknesses and to elaborate the adequacy of budgetary resources of each of these instruments.

5.1. OVERVIEW OF RESEARCH PPPS IN THE EU FRAMEWORK PROGRAMME

The three partnership instruments under review have become an integral part of the FP, covering up to 21.5 percent of the H2020 budget as compared to 9.1 percent in FP7⁵⁵. This overview introduces the major features of the three directly funded PPPs as well as of two PPPs that do not receive direct funding, which are however important to understand the PPP landscape in EU R&I policy (see table 8).

Table 8. Overview of different types of EU PPPs in research and innovation

	ETPs	JTIs	cPPPs	EIT KICs	EIPs
<i>EU funding</i>	Not direct	Direct	Direct	Direct	Not direct
<i>First established in</i>	2003	2007	2009	2010	2011
<i>Number of active partnerships</i>	42	6	10	8	5
<i>Budget FP7</i>		EUR 3.1 billion	EUR 1.7 billion	EUR 309 million	
<i>Budget Horizon 2020</i>		EUR 6.6 billion	EUR 7.1 billion	EUR 2.7 billion EUR 2.4 billion after reduction due to EFSI	

Note: European Industrial Initiatives/European Technology and Innovation Platforms were neglected as their functioning does not significantly differ from ETPs. Source: European Commission (2017) Horizon 2020 Interim evaluation; Reillon (2017) Public-private partnerships in research (budget FP7); European Commission (2017) Interim evaluation JUs (budget JTIs under H2020); European Commission (2017) Interim evaluation EIT (budget EIT-KICs under H2020).

European Technology Platforms (ETPs) were the first type of PPPs in research. The Commission launched ETPs in 2003 as stakeholder fora in specific technological areas to bring together industry and science in an association. A key contribution of ETPs is the formulation of a strategic research agenda (SRA) in order to coordinate research activities in certain fields. Although ETPs do not receive direct funding, their SRAs are taken into account by the EC when formulating work programmes, which is why ETPs are considered advisory PPPs. What is more, ETPs often were the nucleus for establishing other types of PPPs. Currently, there are 42 active ETPs⁵⁶.

⁵⁵ Vincent Reillon (2017) *Public-private partnerships in research*. Briefing of the European Parliamentary Research Service.

⁵⁶ Reillon (2017) *Public-private partnerships in research*; European Commission (2017) *Horizon 2020 Interim evaluation*..

Joint Technology Initiatives (JTIs) were the first type of PPPs that received direct funding as part of the FP. JTIs are established through a regulation for the duration of a FP and take the legal form of a Joint Undertaking (JU). The regulation defines the contributions of private and public partners as well as the objectives and rules. JTIs are therefore considered an institutionalised PPPs. By establishing JTIs, it became possible to follow-up on the agendas defined by ETPs more dedicatedly and reliably⁵⁷. The first five JTIs were established in 2007 and 2008 and received a budget of EUR 3.14 billion under FP7. Under H2020 the existing JTIs were continued and two new JTIs launched⁵⁸. The budget was more than doubled compared to FP7.

Contractual Public-Private Partnerships (cPPPs) were launched in 2009, partly as a response to the financial crisis that started in 2008. The Commission proposed to create three PPPs in key industrial sectors (automotive, construction, manufacturing) to promote European competitiveness in the low carbon economy. As the experience with JTIs showed that the implementation was lengthy and complex, the Commission proposed a new contractual rather than institutional arrangement. cPPPs are therefore based on a memorandum of understanding between the Commission and an association representing the private sector defining contributions of each side. The Commission defines the calls based on cPPP input and financed through ring-fenced budget shares for each cPPP⁵⁹. Under H2020 the cPPPs became the preferred structure for PPPs. Seven additional cPPPs were created and the scheme received a larger budget than JTIs.

The **Knowledge and Innovation Communities (KICs)** were first proposed by the Commission in 2005 but the first KICs were only launched in 2010. KICs are PPPs that are managed and steered by the European Institute for Innovation and Technology (EIT), established in 2008. The major purpose of the EIT and its KICs is the integration of the so-called knowledge triangle consisting of education, research and innovation. Consequently, KICs are partnerships consisting of higher education institutions, research organisations and private companies⁶⁰. A KIC usually takes the legal structure of a company or non-profit organisation, which is set up by the involved partner institutions. Public funding to KICs provided by the EIT is limited to a maximum of 25 percent of its activities and duration of 15 years. After this period KICs are supposed to become financially self-sufficient. The first three KICs were launched in 2010 and three more were established in 2015 and 2016. The budget for the EIT and its KICs was also considerably increased in H2020 from EUR 309 million to EUR 2.4 billion.

European innovation partnerships (EIPs) were launched in 2011 as part of an attempt to gear EU R&I policy more towards societal challenges⁶¹. Similar to ETPs, EIPs are of an advisory and coordinating function with no direct EU funding⁶². EIPs are supposed to align already existing partnership activities

⁵⁷ In order to be set up, JTIs need to fulfil certain requirements, for example show an impact on industrial competitiveness but there needs also to be proof, that similar impacts cannot be achieved by other FP actions.

⁵⁸ The JTIs on nano electronics and embedded computing were merged into one on electronic components and systems.

⁵⁹ Different from JTIs, cPPP actions are implemented through the regular FP work programmes which are administered by the European Commission or implementing agencies. JTIs are implementing institutions themselves.

⁶⁰ Sometimes public authorities and non-governmental organisations are also involved.

⁶¹ A number of reports and reviews had previously suggested that ETPs should not only focus on technological challenges but also address societal challenges. Examples are the European Research Advisory Board (2004) and the ETP expert group (2009).

⁶² EIPs are provided with a secretariat at the European Commission.

not only including other PPPs but also public-public partnerships (P2Ps) that for example also involve national and regional authorities. An independent evaluation in 2014 was rather sceptical about the results that could be expected from the current method of implementation. Since the evaluation, no new EIPs were spawned but the existing EIPs are still active⁶³.

All of the above-mentioned different PPP types, except ETPs, were originally established during the lifetime of FP7 (2007-2013) and mostly expanded during H2020. During the preparation process for H2020 the impact of these instruments was still hard to determine as some were still in the early phase of implementation. Nevertheless, JTIs, cPPPs and EIT-KICs received a substantial part of H2020 funding (21,5%), which mirrors the trust of the Commission and co-legislators that PPPs are able to deliver added value that cannot be achieved by other FP actions and that justifies the long-term commitment of funds.

Table 9. Topics of research PPPs with direct EU funding launched under FP7 and Horizon 2020 (year of launch in brackets)

	JTIs	cPPPs	EIT-KICs
FP7	Innovative medicines (2007) Aviation industry (07) Nano electronics (07) Embedded computing systems (07) Fuel cells and hydrogen (08)	Green cars (2009) Energy-efficient buildings (09) Factories of the future (09)	Climate change (2010) Energy (10) Digital (10)
Horizon 2020	Electronic components and systems (merger of ENIAC and ARTEMIS) (13) Bio-based industry (13) Rail products and services (13)	Sustainable process industry (13) 5G infrastructures (13) High performance computing (13) Photonics (13) Robotics (13) Big data (14) Cybersecurity (16)	Health (15) Raw Materials (15) Food (17) Urban Mobility (19) Added-Value Manufacturing (19)

Source: European Commission, EIT.

In 2017, the Estonian Council presidency commissioned a study on the coherence and openness of R&I partnerships in the EU⁶⁴. The study finds that:

- the partnership landscape has become too complex;
- instead of replacing existing partnerships, launching new ones was the order of the day;

⁶³ Reillon (2017) *Public-private partnerships in research*, op.cit.

⁶⁴ Ptries Boekholt et al. (2017) Increased coherence and openness of European Union research and innovation partnerships. Report by Technopolis group.

- several partnerships focus on the same thematic areas which is not conducive with envisaged synergies;
- there is a lack of clear and convincing evidence of European added value achieved through partnership instruments.

In a similar vein, the Commission has proposed to rationalise and improve the partnership framework in the next FP “Horizon Europe” starting in 2021⁶⁵. By tracing the potential function and actual added value of these instruments as part of the EU R&I policy toolbox and examining past evaluations through this analytical lens, this chapter contributes to the debate on how to improve the partnership framework.

5.2. JOINT TECHNOLOGY INITIATIVES AND CONTRACTUAL PPPS

H2020 employs two classic PPP schemes – JTIs and cPPPs – both based on an agreement between EU institutions and private actors that defines the contributions of each side. JTIs are established by a regulation, cPPPs by a memorandum of understanding. The Commission lists several of the motivations for network policies mentioned in section 2.3 when promoting the use of JTIs and cPPPs, in particular reducing risks related to R&D activities, overcoming market failures such as transaction costs, building a critical mass of research in strategically important sectors, creating lasting networks among leading European innovators and stimulating private R&D investment to address societal challenges (EC, 2013, Communication on PPPs). Thus, we can expect to see the potential and realisation of such impacts when assessing JTIs and cPPPs.

5.2.1. Contribution to EU R&I policy toolbox

JTIs as the first type of EU PPP in research with direct funding was introduced because the EC saw the necessity to create a dedicated instrument to implement the research agendas developed by ETPs. cPPPs were later developed to provide an alternative instrument that could be implemented more rapidly. Both PPPs basically function as stakeholder networks that develop long-term strategic agendas for their respective thematic area. An important difference is then that JTIs function as implementing bodies that issue work programmes and calls for proposals, while, for cPPPs, these responsibilities rest with the Commission⁶⁶.

Unlike other FP activities, in PPPs EU funding is matched by a contribution from partners, mostly from businesses, sometimes also national governments. The regulation (JTIs) or contractual agreement (cPPPs) establishing the PPP defines a legal minimum contribution that needs to be reached by partners. In case of JTIs these additional resources are normally used to co-fund the calls launched as part of the work programme as well as to fund additional activities by private partners supporting the

⁶⁵ European Commission (2018) *Horizon Europe Interim evaluation*. SWD(2018) 307 final.

⁶⁶ European Commission (2013) *Public-private partnerships in Horizon 2020: a powerful tool to deliver on innovation and growth in Europe*. COM(2013) 494 final; Vincent Reillon (2015) *Horizon 2020 budget and implementation: A guide to the structure of the programme*. In-depth analysis by the European Parliamentary Research Service.

objectives of the JTI. For cPPPs, the commitments by private partners can cover administrative costs, industry-funded demonstration, training or other activities supportive to the objectives.

In PPPs, the private and the public side usually have somewhat asymmetric interests that policy makers need to consider in their policy design. To put it simple, businesses mainly have a commercial interest, while the public side wants to maximise the benefit for the society at large through leverage and knock-on effects and activities to address societal challenges. Both sides wish that the other side contributes as much as possible with minimal own contributions. As a consequence, there are two main bargaining chips: influence on the direction of R&I activities and the commitment of resources from both sides. If one side wants a larger commitment from the other side it will need to make concessions on the direction of research.

JTIs and cPPPs appear to have solved this asymmetry in slightly different ways. JTIs are more institutionalised and membership appears to be more valuable for businesses, as the JTI issues work programmes and calls by itself, oftentimes restricted to members, while the roadmaps of cPPPs are translated by the Commission into an actual work programme. Moreover, JTIs offer a stronger assurance to all partners that contributions take place in the agreed manner, as discharge and evaluation processes are more rigorous. This, however, also increases the administrative burden of JTIs for all involved parties. By contrast, cPPPs have a leaner administrative structure, are more flexible and can be set-up faster.

JTIs and cPPPs contribute to the EU R&I policy toolbox in a way that cannot be achieved on a similar scale by other H2020 actions: First, they are able to leverage big amounts of private and member state investment in certain R&I areas. Second, giving private partners a say in the allocation of EU research funding promotes a joint strategic agenda to which both sides are committed. Third, as cooperation platforms both PPPs offer unique opportunities for members to collaborate, build trust and establish stable networks.

5.2.2. Functioning and impact of the policy instrument

In how far do the latest evaluations of JTIs and cPPPs confirm measurable impact in these three areas?

(a) Network effects:

JTIs appear successful in engaging the leading industrial stakeholders in their respective fields, both in terms of market position as well as innovation potential. Yet, JTIs are generally more focused on one industrial sector and therefore rarely engage stakeholders from different sectors⁶⁷. According to stakeholders it is an important tool with added value in: integration of European research, more cross-border collaboration, engagement of companies to share expertise or building of a genuinely EU-level supply chain capability, to name only the most prominent⁶⁸.

Evidence on the networking effects for cPPPs are less conclusive. Generally, cPPP-related projects are highly relevant for industries and they realise an above average participation of SMEs. This however

⁶⁷ An example for a cross-sectoral JTI would be the Fuel Cells and Hydrogen JTI that brings together car manufacturers and energy and utility companies.

⁶⁸ European Commission (2017) *Interim evaluation of the Joint Undertakings operating under Horizon 2020*. SWD(2017) 339 final.

does not automatically imply that entities participating in cPPP-related calls also form and maintain networks. The share of funding from cPPP calls that goes to members of cPPPs ranges between 23% and 53%. Given that all calls are open especially the upper range indicates a significant concentration of activities on members, which might be problematic in terms of openness but would also allow for more structured and continued collaboration between members⁶⁹.

(b) Structuring effects:

JTIs and cPPPs have different approaches to networks that work well for different sectors: while JTIs rely on a stable set of core players, cPPPs might be more suitable in a faster-changing and more dispersed environment where more and smaller actors are involved. According to this logic one would also expect stronger structuring effects from JTIs. Indeed, the evaluations found that for example the Fuel Cells and Hydrogen JTI as well as the Clean Sky JTI appear to make important contributions to a joint research agenda for European industrial firms active in these sectors⁷⁰. The cPPP mid-term review is again less conclusive on this aspect. Evidence from individual cPPPs shows, however, that a structuring of activities along value chains and avoiding duplications in specific sectors can be observed⁷¹.

Structuring effects are a key added value of both partnerships. The development of strategic research agendas might be one of the most important added values of EU PPPs in research and innovation⁷².

(c) Leverage effects:

With regard to the leverage effect, most JTIs and cPPPs appear to be on track to mobilise at least as much private investments as public money was contributed. The leverage factor ranges between 0.7 and 2.8 (JTIs), with four out of six JTIs achieving leverage factors between 1 and 1.4. According to the Commission, JTIs are well on track to achieving and sometimes exceeding their foreseen legally minimum leverage effect⁷³. For cPPPs the Commission estimates leverage factors of 1.5 to 4.3⁷⁴. It is again difficult to compare JTIs and cPPPs against each other as cPPPs do not rely on private contributions for operational costs. However, given that cPPPs rely on less formalised commitments, their higher leverage factors are surprising. One should bear in mind here that leverage factors very much depend on the industrial sector. It is also notoriously difficult to determine the additionality of so-called “additional activities” such as pilots and demonstrations which constitute the bulk of private sector contributions under cPPPs.

⁶⁹ The mid-term review recommends to make the process of translating roadmap priorities (determined by cPPP members) into calls more participatory. See *ibid*; European Commission (2017) *Mid-term review of the contractual Public Private Partnerships (cPPPs) under Horizon 2020 — Report of the Independent Expert Group*. Luxembourg: Publications Office of the European Union.

⁷⁰ European Commission (2017) *Interim evaluation of the Joint Undertakings*.

⁷¹ European Commission (2017) *Mid-term review of the cPPPs*; European Commission (2017) *Horizon 2020 Interim evaluation*.

⁷² Boekholt et al. (2017) *Increased coherence and openness of EU research and innovation partnerships*, *op.cit.*

⁷³ European Commission (2017) *Interim evaluation of the Joint Undertakings*, *op.cit.*

⁷⁴ The Horizon 2020 interim evaluation by the European Commission reports leverage ratios of 1.5 to 3.5 for cPPPs in the NMBP thematic area (Nanotechnologies, Advanced materials, Biotechnology and Advanced manufacturing and processing), as well as a factor of 3 for green vehicles and of 4.3 for photonics.

Overall, PPPs show impact on the three areas identified as their main potential contribution. This impact needs to match however the resources committed to PPPs and the challenges they face.

5.2.3. Adequacy of resources and future challenges

JTIs and cPPPs receive a substantial part of the H2020 budget, combined around 17.5 percent. There is a big variation in the size of individual JTIs. The smallest receive EUR 450 million and the largest EUR 1.76 billion⁷⁵. For cPPPs, the set maximum EU funding ranges between EUR 450 million and EUR 1.15 billion depending on the partnership⁷⁶. This funding is ring-fenced as part of the H2020 budget.

The impact described above appears to justify the commitment of significant budget shares because engaging leading stakeholders – often direct competitors – to collaborate and make an effort to contribute resources, share knowledge and participate regularly in stakeholder forums requires incentives. Furthermore, in order to have structuring effects on research in a certain field a critical mass of investment needs to be mobilised. Finally, the fact that at least as much funds are mobilised among private partners also shows that the public funds resonate in the R&I ecosystem. To be sure, it seems unlikely that the same amount of networking and structuring effects could be achieved without giving private partners a certain degree of influence over the direction of public R&I support, as assurance on commitments of each partner involved seems to play an important motivating role for private businesses to contribute to PPPs⁷⁷.

Yet, assigning JTIs and cPPPs a significant share of EU research funding has also a number of downsides and attached costs that should be considered when thinking about the development of these instruments and future budget allocations.

- Both creating a JTI or cPPP is a long-term commitment likely to last longer than one FP and might result in some degree of lock-in as powerful stakeholders develop strong interests in maintaining such partnerships. As JTIs build up larger structures they appear also more difficult to close down.
- Through PPPs the EU allows additional stakeholders (industry and universities) to decide on the direction of funding. This reduces the flexibility to reallocate funding from one topic to another over the course of an FP and beyond.
- There are opportunity costs of simply using the funds for other FP activities that might perform better on specific aspects such as openness⁷⁸ and that creates no additional complexity⁷⁹. Moreover, ensuring coherence among an increasing number of partnerships and between partnerships and other parts of the FP is challenging. Today there are about 100 partnerships⁸⁰.

⁷⁵ European Commission (2017) Interim evaluation of the Joint Undertakings, Figure 3.

⁷⁶ European Commission (2017) Horizon 2020 Interim evaluation, p.139.

⁷⁷ Not least because this also guarantees that other private partners make their promised contribution.

⁷⁸ Both evaluations for JTIs and cPPPs found that there was room for improvement with regard to openness. For JTIs calls especially, SME participation was found to be below Horizon 2020 average.

⁷⁹ A key problem for partnerships in general is the rising complexity due to the increasing number and types of partnerships, which also demands from stakeholders to adjust to different funding and implementation models.

⁸⁰ European Commission (2018) *Horizon Europe impact assessment*, Part 2, Annex 8.

5.3. THE EIT-KICS AS INNOVATION NETWORKS

With the objective to integrate the ‘knowledge triangle’ of higher education, research and innovation the EIT and its KICs are tasked to promote the Union’s innovation capacity and thereby strengthen its international competitiveness⁸¹. Its approach of creating relatively autonomous and stable networks of diverse actors was at the time of its inception in 2008 quite innovative as it anticipated several trends in EU R&I policy that became later part of H2020 as well as the Europe 2020 strategy such as increased focus on entrepreneurship and smart growth as well as the increased focus on a pan-European innovation system embodied in the Innovation Union strategy.

Although the EIT’s mission has always enjoyed strong support, a performance audit by the European Court of Auditors (ECA) uncovered a range of problems such as a lack of conceptual clarity with regard to the innovation model, operational problems at the EIT, difficulties attached to the funding model and doubts raised whether KICs would be able to meet objectives both in terms of leverage as well as financial sustainability in the long-term⁸². A second external evaluation confirmed many of the found problems but also acknowledge progress in addressing them⁸³. Thus, the EIT and its KICs have yet to demonstrate that they can deliver on their mission.

5.3.1. Contribution to EU R&I policy toolbox

The EIT-KIC instrument differs in a number of ways from both traditional EU research policy that issues work programmes and calls as well as the two PPP instruments analysed above. Within the FP the EIT-KICs serve the function to promote science-industry collaboration, foster networking activities between unlikely collaborators (such as higher education institutions and SMEs), promote entrepreneurship and to some extent also support the development of local innovation clusters. The design of the EIT-KIC innovation model results in a number of unique features compared to other FP actions:

1. The EIT was originally set up as a European **impact investor** that has the capacity to spawn and direct new KICs relatively autonomously. This is a very different institutional role than other agencies involved in the implementation of the FP that act rather as funding agencies whose activities require less technical capacities⁸⁴.
2. The KICs are supposed to reach **financial sustainability** within 15 years. This prescribes a certain evolution for each KIC as it has to learn how to exploit the market potential in its field in order to survive the phasing out of funding.

⁸¹ European Commission (2006) *European Institute of Technology impact assessment*. SEC(2006) 1313.

⁸² European Court of Auditors (2016) *The European Institute of Innovation and Technology must modify its delivery mechanisms and elements of its design to achieve the expected impact*. Special Report No. 4. Luxembourg: Publications Office of the European Union.

⁸³ Charu Wilkinson et al. (2017) *Evaluation of the European Institute of Innovation and Technology (EIT) Final Report*. Luxembourg: Publications Office of the European Union.

⁸⁴ For a discussion on the potential prospects of autonomous innovation agencies in EU R&I policy see also Paul Dittrich & Philipp Staender (2017) *How would a European disruptive innovation agency look like*. Policy Brief by the Jacques Delors Institute Berlin; and Philipp Staender (2018) *Missions for EU innovation policy: Why the right set-up matters*. Policy Paper by the Jacques Delors Institute Berlin.

3. The integration of higher education and **skills formation** is an integral part of the activities of KICs. This innovation system is new to the EU Framework Programme (FP).
4. **Co-location centres** (CLCs) provides the networks with physical local hubs that enable partners to meet face-to-face and access expertise and talent pools, carry out research, training activities and provide the infrastructure for start-ups to take off (incubators).

There are two other features that are also key to understand the intervention logic of KICs but that are less unique today as several new policy instruments have been launched since the inception of the EIT-KIC model:

1. KICs have a strong focus on **entrepreneurship support**. Usually networks offer various services and access to finance, knowledge and research facilities to entrepreneurs.
2. Another key trait is its investigator-centred approach to **societal challenges**. The societal challenges pillar, which is the largest of the three pillars of H2020, follows a top-down approach. KICs that contribute to societal challenges are much more independent in their approach.

Out of these core traits, it is possible to distil two value propositions of KICs, both of which appear worthy of policy support:

- (1) **KICs as local and/or transnational ecosystems** that integrate education and training in the innovation process and provides unique opportunities for bottom-up experimentation to address societal challenges.
- (2) **KICs as market-oriented incubator** for business ideas which provides the services, networks and resources for scale-up.

KICs are supposed to fulfil these propositions at the same time, but only the second seems commercially viable and therefore fits the funding model. The subsequent analysis asks how the EIT-KICs performed measured by each of the two value propositions, based on existing evaluations.

5.3.2. Functioning and impact of the policy instrument

KICs are pan-European networks that typically consist of 50 to 200 partners – mature KICs typically have more partners than newer ones – and receive an annual budget of EUR 70 to 90 million⁸⁵. It should be noted that KICs can **choose very different paths to achieve their objectives** of integrating actors, pursuing activities in the area of education, research and innovation and business support and eventually becoming financially sustainable. A KIC may decide to focus more strongly on acceleration of start-ups (as the EIT-InnoEnergy does), while another may choose to focus on research activities that can be exploited by its partners (Climate-KIC is an example).

There is ample evidence that **KICs deliver on their first value proposition as they create a unique type of ecosystem**, which includes physical hubs (CLCs) where research and training can take place and knowledge can be exchanged and appear to result in more stable and diverse networks than

⁸⁵ European Commission (2017) *Interim evaluation of the European Institute of Innovation and Technology (EIT)*. SWD(2017) 351 final; and European Commission (2018) *Horizon Europe impact assessment*.

average FP actions. Actors that are KIC partner are more likely to participate repeatedly in collaboration and thereby strengthen network links. Moreover, KICs are also more likely to integrate different types of actors that would otherwise be unlikely to interact, including those that are not typically part of research consortia such as public authorities and NGOs. In contrast with JTIs and cPPPs, KICs appear to have a less prominent role in shaping the research agenda of the wider sector as they are found to not be very visible beyond their immediate network of partners⁸⁶.

Fostering the integration between higher education and businesses seems to result in **new types of co-operation** from which both sides benefit. Evidence suggests that curricula are shaped by research and industry and that entrepreneurship activities within KICs are indeed increasingly successful and spawn original business ideas and start-ups in a bottom-up process⁸⁷.

Yet, in creating networks there appears to be **certain trade-offs** with regard to the geographical scope and the type of participating organisations. First, KIC activities remain concentrated on few member states typically those with the strongest innovation systems. Second, there might be a trade-off between local clusters and transnational networks as partners with a closer geographical proximity tend to cooperate more in KICs. Finally, KICs are often dominated by a number of major player (firms or universities), smaller organisations such as SMEs are often not very active and membership might be of limited use for them⁸⁸.

Measured by the second value proposition of a **market-oriented incubator** for transformative business ideas the evidence is less convincing. Especially, the performance assessment of the ECA has seriously questioned the leverage effect of EIT-funded activities and the prospect for financial sustainability as EIT funding to KICs decreases. While the funding model suggests an EIT contribution to KIC activities of 25 percent, the ECA performance audit found that the leverage effect appears implausible and contributions from the EIT are more likely to make up around 85 to 90 percent of genuine KIC activities⁸⁹. When this funding starts to decrease in the phase out period, each KIC's financial sustainability will be challenged.

5.3.3. Adequacy of resources and future challenges

With an initial budget of EUR 2.7 billion the EIT received about 3.5 percent of H2020 funding⁹⁰, which is quite substantial as it is larger than budget allocations to some of the societal challenges or the high-profile Future and Emerging Technologies programme (FET programme)⁹¹, all of which were meant to create systemic impact. As funding for KICs is competitive the total budget is not predetermined, yet, a mature KIC is supposed to receive about EUR 70 to 90 million annually. Over the course of H2020 this would add up to EUR 490 to 630 million which is equal to the lower range of JTIs and cPPPs.

⁸⁶ Wilkinson et al. (2017) Evaluation of the EIT.

⁸⁷ Ibid.

⁸⁸ European Court of Auditors (2016) *Special Report on the EIT*.

⁸⁹ Ibid.

⁹⁰ With the creation of EFSI the EIT budget was reduced to EUR 2.4 billion.

⁹¹ The FET programme finances collaborative, interdisciplinary projects targeting the development of radically new technologies in a variety of scientific fields.

Taking up a sizable amount of the budget, the EIT and KICs need to clarify the objective of the policy instrument. Several evaluations have highlighted the inherent conflict between the objective of financial sustainability on the one hand and addressing market failures and promoting new types of co-operation to address social challenges on the other hand. While evaluators have been sceptical about the possibility to achieve the financial sustainability objective, new tools such as the European Innovation Council (EIC) have emerged in the FP toolkit that challenge the role of EIT-KICs as market-oriented incubators. Under Horizon Europe, the EIC, which has started as a pilot in 2017, is supposed to receive a significant budget upgrade making it much larger than EIT-KICs⁹².

5.4. CONCLUSIONS

The three PPP instruments in EU research policy that receive direct funding - JTI, cPPPs and KICs – represent three different approaches to promote networks, platforms and ecosystems, although the former two share more characteristics, while KICs provide a unique approach.

Despite all differences, all three create opportunities for knowledge sharing, to work on common projects, to build trust among diverse actors – often competitors – and to coordinate research agendas. They thereby offer policy tools to address market failures and to improve innovation system capacities.

The budgetary weight of the three directly funded PPP schemes under H2020 makes them an important cornerstone of the EU R&I policy. The analysis has confirmed – based on existing evaluations – that the partnerships broadly deliver the impact that is expected given their overarching function and added value in the FP. Yet, PPPs currently do not seem to exploit their full potential and there are several areas of improvement that should be addressed:

- (1) **Reduce complexity:** New types of partnerships create additional complexity in the already overly complex universe of EU research policy. PPPs should provide tailor-made tools to achieve specific objectives that cannot be achieved otherwise rather than creating new programme and institutional structures. Creating a framework with clearly defined functions for PPP types and generally a rationalisation of types and topics covered would be desirable.
- (2) **Reduce risk of lock-in:** Given the powerful interests involved it is difficult to discontinue PPPs. In order to be able to adjust the PPP portfolio to the needs of the FP objectives should be set in a way that allow to discontinue a PPP when it has served its purpose and the funds could be used for new priority objectives.
- (3) **Clarify value proposition of KICs:** The EIT-KIC model is in the process of reform after several difficulties were identified with the innovation model laid down in the original Regulation. Key will be to define realistically what can be expected from KICs and how they provide added value. Attention should be given to the ecosystem aspect that provides valuable opportunities for synergies with other parts of the FP.

⁹² European Commission (2018) Proposal for a Regulation establishing Horizon Europe – the Framework Programm for Research and Innovation laying down its rules for participation and dissemination. COM(2018) 435 final.

- (4) **Value and identify network and structuring effects:** These effects are difficult to measure with standard evaluation methods and are often regarded as indirect effects. More effort should be spent on identifying these effects, especially for cPPPs.
- (5) **Adopt portfolio approach to PPPs:** Beyond the impact that depends on the characteristics of the policy instruments (which has been the focus of this analysis), it is also important that directly funded PPPs contribute strategically to the overall impact of H2020. In the future, these instruments should become part of a coherent portfolio of activities, something that might have been lacking in H2020 as schemes like cPPPs and KICs were still immature when the FP was set up and several partnerships work on overlapping topics.

6. EU FINANCIAL INSTRUMENTS AND GUARANTEES AND SUPPORT FOR INNOVATION

KEY FINDINGS.

- According to our estimations, EU budget support to R&D&I through market-driven instruments amounts to EUR **14.3 billion** approximately. **EFSI** represents the largest part of this support, followed by **InnovFin** (a centrally-managed instrument dedicated to support R&D) and FIs financed by EU cohesion funds and set-up under shared management.
- The eligibility criteria used to select eligible firms to **InnovFin SMEG** loans are too broadly defined. As a result, many firms having a very low innovative profile and even some non-innovative SMEs end up receiving an InnovFin loan.
- There are many similar **national and regional schemes** supporting innovative firms but no mechanism to coordinate EU and national-level actions.
- With the set-up of EFSI, **InnovFin has been increasingly used to finance high-risk projects and operations**. An open question is whether the shift from a system composed of 100% covered FIs and a one partially covered guarantee (EFSI) to a system based on a single, partially covered guarantee (the proposed InvestEU Fund scheme for 2021-2027) will reduce the EU's future capacity to finance high-risk operations.
- Existing evaluations prove that **only a relatively small number of firms receiving grants under Horizon 2020 benefit from financial instruments** under Horizon 2020 for the expansion phase, which hinders their capacity to scale up.
- The two **InnovFin thematic products** (InnovFin Energy Demonstration projects and InnovFin Infectious Diseases) have worked well even if need some corrections. There is a case to explore the use of similar products in other policy areas
- **EU regulations applied to intermediated products** are seen as complex and too detailed by financial intermediaries. This has proven particularly problematic for equity products.

Whereas the provision of grants still constitutes the main form of EU budget support, the use of market-driven instruments (loans, guarantees or equity or quasi-equity investment) has significantly expanded over the last decades. These instruments allow public authorities to leverage private funding for bankable projects which are of public interest but perceived as too risky to be financed only by the markets.

The EU budget supports different types of market-driven instruments. From a budgetary point of view, a distinction can be made between Financial Instruments (FIs), which provide financial support by using a budgetary commitment reserved for that purpose, and budgetary guarantees, which are legal commitments to cover the risks arising from a given programme by using EU budget resources. Unlike FIs, budgetary guarantees shall not be 100% provisioned: in the case of the European Fund for Strategic

investments (EFSI), for instance, there is an EU budgetary guarantee backing the programme, which is provisioned at 35% (the EU budget has a reserve of EUR 9.1 billion to cover the eventual losses from the EUR 26 billion EFSI guarantee).

Another distinction is between instruments geared at the central level and instruments under shared management. The first are managed by the EIB group or the Commission whereas the second are set-up by ESIF national authorities using part of their cohesion envelopes and can be implemented in very different ways (by private banks, national promotional banks, the EIB group or the same ESIF managing authority).

In the current MFF, EU budget support to market-driven instruments amounts to EUR 48.3 billion. The most important part is the support through the EFSI guarantee (EUR 26 billion)⁹³, followed by budget allocations to FIs under shared management (EUR 13.3 billion as of December 2016) and allocations to centrally-managed FIs (EUR 9 billion).

According to our estimations, almost one third of this funding (EUR 14.3 billion) will support innovative firms, research projects and research infrastructures (table 10). EFSI represents the largest part of this support. Knowing that 35% of EFSI signed financing has gone to RDI projects, we can argue that approximately EUR 9.1 billion of the EFSI guarantee (35%) has been used to support RDI⁹⁴. The second source of funding is InnovFin, a centrally-managed instrument dedicated to support R&D. It has a budget of EUR 2.7 billion and it is expected to mobilise more than EUR 25 billion of support in form of equity and debt over the current MFF. Finally, according to the reporting by DG REGIO, ESIF authorities have allocated EUR 2.5 billion of their national cohesion envelopes to FIs under Thematic Objective 1 (“support to R&D”).

Table 10. Estimated EU budget support, EU investment and total expected investment mobilised by EU market-driven instruments in the field of R&D, 2014-2020

In billion EUR	Budget support	EU investment	Estimated investment mobilised
EFSI	9.1 ¹	35	175 ¹
InnovFin	2.7	2.7	25.5 ²
FIs under shared management	2.5 ³	2.5	---
Total	14.3	40.2	>200.5

Source: (1) Estimations for EFSI come from applying the % of amount of EFSI signed financing to RDI as of end 2017 (35%) to the EFSI guarantee (EUR 26 billion), total expected EFSI financing (EUR 100 billion) and total expected investment mobilised by 2020 (EUR 500 billion)(2)SWD, Impact assessment accompanying proposal of Invest EU Fund, SWD(2018) 314 final, Annex

⁹³Notice that these EUR 26 bn for the EFSI guarantee are not fully provisioned. The EU budget holds a Guarantee Fund for EFSI that amounts to EUR 9.1 bn (35% of the EFSI guarantee). The non-provisioned part of the EFSI guarantee constitute and unfunded liability to the current and future EU budgets.

⁹⁴ Even if, in practice, the EFSI guarantee works as a portfolio guarantee and does not earmark resources per policy area.

5, p. 121 (3) European Commission, DG regio, *Financial instruments under the European Structural and Investment Funds. Summaries of the data*. Situation as at 31 December 2017.

This chapter analyses the role of these various EU market-driven instruments in the current MFF. We focus in particular on the centrally-managed instruments (InnovFin and EFSI), which represent more than 70% of total EU market-driven support to R&D and for which detailed information is available. With the help of existing evaluations, reports and some interviews, we explore in particular the role these instruments have played in support to innovation and their relevance as regards current needs. We conclude with some reflections and recommendations for the next MFF.

6.1. PRIVATE FINANCING FOR INNOVATION IN EUROPE: MAIN CHALLENGES

There are clear market failures affecting private investment on R&D&I. The basic one is the existence of **positive externalities from R&D activities**, which lead to an overall under-provision of private R&D investment but there are other specific market failures that create financing constraints for firms aiming to undertake R&I⁹⁵:

- The innovation process is inherently **risky and uncertain**, thus making difficult for potential investors to assess the returns from their investment.
- Radical, breakthrough innovations have an **extremely skewed** return profile, either they end with losses or report significant benefits. This requires investors willing to take high risks such as venture capitalists.
- There is significant **asymmetric information** between the innovator/entrepreneur and the investor, which can lead to adverse selection.
- Firms engaged in innovation have a high percentage of **intangible assets**, where knowledge is embedded in the human capital of the firm's employees. As this key resource is lost if employees leave or are laid off, collateralisation is difficult for these firms, thus limiting their access to debt finance.

These are common problems in all private R&I markets, but they can be more or less salient in different periods of time (i.e. credit-constraints will be more acute in a crisis period than in a period of robust economic growth) and in different countries. Different documents from the European Commission and the EIB⁹⁶ highlight the following challenges for the coming years in Europe:

- Overall low volume of private R&D investment. Europe's investment in private sector R&D is lower than in other advanced economies (US, China, Japan, South Korea) and it has been shrinking over time. Business R&D intensity (business enterprise expenditure on R&D as a percentage of GDP) stood at 1.3 % in 2016 in comparison to almost 2 % in the US and almost 3.5 % in South Korea⁹⁷.

⁹⁵ William R. Kerr and Ramana Nanda N, "Financing Innovation", *Annu. Rev. Financ. Econ.* 2015. 7:445–62

⁹⁶ In particular the Lamy's High-Level group report, the European Commission's Science, research and innovation performance report 2018, the Horizon2020 interim report and the EIB Investment Report 2017/2018

⁹⁷ European Commission, *Science, research and innovation performance of the EU 2018: key findings*, 2018

- Major differences across Member States. Differences in levels of private R&D investment across Member States are significant, and are the major driver of differences in total R&D investment⁹⁸.
- Difficulties to transform EU's high scientific excellence into leadership in innovation. While the EU has a good record in excellent science and performs rather well as regards its capacity to develop incremental innovations in medium-tech sectors (e.g. transport, health or energy sectors) it lags behind its main competitors (US, China) in several of the emerging technologies that are leading to breakthrough innovations and enabling transformational entrepreneurship⁹⁹. Making a significant leap in these areas is not possible without mobilising large parts of private investment.
- Lack of risk and patient capital to support breakthrough innovations. One of the factors explaining the weak EU capacity to generate breakthrough innovation is the acute funding gap for "risk and patient capital". This is particularly the case for "deep tech" companies (such as firms working in Key Enabling Technologies¹⁰⁰, Life Science and semiconductor and photonics). Investment in these fields is characterised by high capital intensity needs, high technology risk, limited market potential (i.e. in the case of life sciences) and long development periods (even if the time for a product to reach the market is different across sectors). The combination of these factors make particularly difficult for "deep tech" companies to find investment in the private market, unlike innovative companies working in other areas such as ICT/digital¹⁰¹.
- Difficult access to credit for young, small firms with radical innovation projects. While access to bank finance is a general problem for innovative firms it does not affect the same way all firms in Europe. Young SMEs with less collateral and less of a track record face more financial barriers than mid-sized or large firms. Among SMEs, the level of access basically depends on firm age (whether it is a new or old firm) and, more importantly, on the radicalness of the innovative project. A recent EIB analysis using evidence from the EIB Investment Survey (EIBIS) shows that SMEs implementing existing innovations that are new to the firm but not to the market ("adopters") are not significantly more credit-constrained than non-innovative SMEs. The most credit-constrained firms are young SMEs adopting radical innovations ("leading innovators"), followed by SMEs adopting incremental innovations¹⁰².
- Undersupply of venture capital for innovative firms to scale up. Europe not only lacks venture capital for early-stages phases but also for growth/expansion phases. In the US, the ample supply of venture investment helps small firms to turn market-creating innovations into world-leading companies. In Europe, this is much more difficult as innovators struggle to access risk finance above the EUR 10 million range¹⁰³. This, together with other factors (e.g. fragmented

⁹⁸ EIB, *Investment Report 2017/2018*, p. 116

⁹⁹ European Commission, *Science, research and innovation performance of the EU 2018: key findings*, 2018

¹⁰⁰ Key Enabling Technologies (KETs) are investments and technologies that will allow European industries to retain competitiveness and capitalise on new markets. H2020 KETs programme focuses on four KETs: nanotechnologies, advanced materials, and advanced manufacturing and processing (production technologies) and biotechnology.

¹⁰¹ European Commission, *Science, research and innovation performance of the EU 2018*, op.cit.

¹⁰² EIB, *Investment Report 2017/2018*, p. 339

¹⁰³ *Horizon Europe Impact Assessment, Commission Staff Working Document, SWD(2018) 307 final part 2/3*, p74.

markets), explains the low number of 'Unicorns' (young companies reaching a market valuation of \$ 1 billion).

6.2. THE USE OF MARKET DRIVEN INSTRUMENTS IN SUPPORT TO INNOVATION IN THE CURRENT MFF

As mentioned above, there are three main sources of market-driven support to innovation in the current MFF: EFSI, InnovFin and FIs under shared management.

The European Fund for Strategic Investments (EFSI) is an EIB-Commission programme backed by an EU budgetary guarantee. It was set up in 2015, one year after the start of the MFF, as part of the Commission's Plan to revive investment in Europe. EFSI's main goal is to mobilise as much additional private investment as possible by strengthening EIB capacity to finance high-risk projects or riskier tranches of projects considered of strategic importance for Europe. It covers a broad range of sectors (digital, transport and energy infrastructures, education and research, environment and resource efficiency, social infrastructures...) and has a specific window to provide support to SMEs and mid-caps. It has no specific sector allocation target but the information available from the EIB on the amounts invested shows that it provides significant support to innovative firms and R&D related projects (see EFSI programme fiche in annex for more details).

InnovFin is an EU Financial Instrument financed by the H2020 programme. Its general goal is to increase the supply of financial support to research and innovation (R&I)-driven enterprises and other relevant entities. It was created in 2013, at the beginning of the current MFF, and builds on preceding financial instruments from the 2007-2013 period¹⁰⁴. It has an overall budget of EUR 2.7 billion and it is broken down in various financial products:

- The European Investment Fund (EIF) manages two products targeted to SMEs. This includes a debt guarantee scheme for innovative SMEs (InnovFin SMEG) and one equity facility for early-stage small enterprises, which is broken down in different components: InnovFin Technology Transfer, InnovFin Business Angels, InnovFin Fund-of-Funds, InnovFin Venture Capital. All EIF-managed products work through financial intermediates (commercial and public banks in the first case, fund managers in the equity products).
- The European Investment Bank (EIB) manages various products targeting Mid-caps, large firms and other research actors. At the start of the programme there were three main EIB-managed products: a debt guarantee scheme for Mid-caps (InnovFin Mid-cap guarantee), a programme providing direct loans to Mid-caps (InnovFin Mid-cap growth finance) and a programme providing direct loans or guarantees to R&I projects emanating from large firms, universities, public research organisations or R&I infrastructures (Innovfin large projects). In 2017, these products were recalibrated and new products were developed in an effort to correct for observed overlaps with EFSI as well as to address the lack of support in specific sector or thematic areas (see 6.2.2. for more details on new products).

¹⁰⁴ Notably the Risk Sharing Finance Facility (RSFF).

Finally, concerning **FIs under shared management in the field of R&D**, it should be noted that in the past programming period (2007-2013) FIs under cohesion policy were only authorized in the areas of support for SMEs, urban development and energy efficiency or renewables. Hence, all ESIF-financed FIs in support to R&D are relatively new. Apart from that, there is no publicly-available information about the type of financial support provided (equity vs debt), the type of beneficiaries or the distribution per country or region, as DG Regio reports on implementation of FIs under shared management do not provide such detailed information.

In the following we will analyse in more detail the support provided by EFSI and Innovfin to innovative firms and to Mid-caps, large firms and other actors. In both cases, EFSI and InnovFin's support will be discussed together as the two instruments are strongly intertwined. Part of the EFSI guarantee has been used to expand InnovFin SMEG and to develop joint EFSI-InnovFin products for small firms and Mid-caps. As regards support to large firms and other actors, there have been overlaps in the past between EFSI and Innovfin, which have been partially corrected with the recalibration of InnovFin products in 2017.

6.2.1. Support to innovative SMEs

Apart from grants provided under H2020 calls, the EU centralised support is given to innovative small firms in two ways: facilitating the access to bank financing (through the InnovFin SMEG) and participating into equity funds that invest in innovative SMEs.

Easing the access to bank finance is the main purpose of **InnovFin SME Guarantee scheme (InnovFin SMEG)**. Implemented by the EIF, it provides an uncapped guarantee to financial intermediaries (basically commercial banks and public development banks) offering loans to innovative SMEs and small Mid-caps (up to 500 employees). The original budget for InnovFin SMEG was EUR 1.06 billion but the programme has been increased to EUR 2.6 billion with a top-up provided by the EFSI guarantee.

InnovFin SMEG is the biggest InnovFin product in terms of budget allocation and final beneficiaries, with more than 15.000 small firms having benefited from its support¹⁰⁵. According to the InnovFin interim evaluation¹⁰⁶, the programme has performed rather well. It experienced a quick start at the beginning of the programming period and was able to respond to a stronger-than-expected demand triggered by the consequences of the sovereign debt crisis on bank lending, thanks to the top-up provided by EFSI. As pointed out by interviewees at DG ECFIN, the fact of providing an uncapped guarantee (unlike COSME, which provides a capped guarantee)¹⁰⁷ makes the product particularly

¹⁰⁵ InnovFin SMEG is over ten times bigger in amount than its predecessor, the Risk Sharing Instrument (RSI), and covers over 40 countries (compared to 17 under RSI). Source: The Centre for Strategy & Evaluation Services LLP (CSES), Interim Evaluation of Horizon 2020's Financial Instruments, Final Report, July 2017

¹⁰⁶ The Centre for Strategy & Evaluation Services LLP (CSES), *Interim Evaluation of Horizon 2020's Financial Instruments, Final Report*, July 2017

¹⁰⁷ In both schemes (COSME and InnovFin SMEG), the EIF compensates financial intermediaries up to half of the losses they suffer from the individual loans. The difference is that, in COSME, the total overall amount of compensation is contractually capped (that is, the EIF reimburses 50% of the losses up to reaching a limit) whereas in InnovFin SMEG there is no such gap and the EIF is obliged to cover all 50% losses from all InnovFin loans given by intermediaries. Notice also that this does not mean that InnovFin SMEG generates contingent liabilities for the EU budget: the EIF only covers half of the losses from defaulting InnovFin SMEG loans, and the overall value of these loans is limited by the InnovFin SMEG budget.

suitable to finance innovative investment. As the guarantee is uncapped, the financial intermediaries know that it will be covered from losses even if all loans make default. This allows them to go for riskier projects and make sure to support the innovative SMEs.

However, a special report from the Court of Auditors (ECA) argues that the programme has not sufficiently focused on business engaged in research and innovation activities “with a high potential for excellence”¹⁰⁸. The ECA report criticises in particular the list of “innovation eligibility criteria” that is used by intermediaries to select the eligible beneficiaries of InnovFin SMEG loans. This is a list composed of 14 innovation eligibility criteria, and the firm shall meet only one of these criteria to be eligible to InnovFin SMEG. As some of these criteria are rather broad and leave a lot of discretion in the interpretation (particularly criterion number 1, which is the most used one – see Table 11), the ECA argues that many firms having a very low innovative profile and even some non-innovative SMEs end up receiving an InnovFin loan¹⁰⁹. Based on this finding, the ECA recommends to “review the innovation eligibility criteria to ensure that any successor instrument predominantly supports companies engaging in activities with a high potential for excellence requiring risky investments”¹¹⁰.

In its reply to the ECA report, the Commission rejects the ECA argument. It argues that InnovFin SMEG is based on a broad definition of innovation enshrined in the Oslo manual, and thus targets innovation in all types of SMEs and all sectors. It acknowledges the need to review eligibility criteria but insists that the instrument should not be predominantly focused on supporting high-risk innovation.

Another issue to take into account with respect to InnovFin SMEG is the existence of many similar national or regional debt schemes co-financed by EU’s Structural Funds or funded exclusively by national or regional authorities. For the successor of InnovFin SMEG, the ECA recommends to better coordinate with these other schemes in order to ensure EU added value and avoid overlaps. In its reply to the ECA report, the Commission argues that this coordination would be welcomed but it is very difficult in practice as the Commission cannot know, at the moment of making the ex-ante assessment of the new EU instrument, what similar instruments will be implemented in the future at national and regional level. Besides, the Commission notes that complementarity with ESIF-financed FIs is in principle assured as national and regional ESIF authorities willing to set-up a FI have to undertake an ex-ante assessment including inter alia an assessment of the “consistency with other forms of public intervention addressing the same market”¹¹¹.

¹⁰⁸ European Court of Auditors, *EU-funded loan guarantee instruments: positive results but better targeting of beneficiaries and coordination with national schemes needed*, special report n.20, 2017

¹⁰⁹ The report cites for instance the case of a restaurant under a franchise licence that received an InnovFin loan to finance the expansion of the restaurant area by 25%.

¹¹⁰ ECA 2017, op.cit. p. 52

¹¹¹ Article 37(2)(b) Common provisions regulation

Table 11. InnovFin SMEG- number of transactions to final recipients by innovative eligibility criteria (as of September 2018)

Innovation criteria		Transactions to final recipients	as %
1	Will use the financing to develop innovative products/processes/services	7.999	39,8%
2	Are fast-growing enterprises	1.187	5.9%
3	Have spent on R&I more than 5% of their total operating costs in at least one of the three years preceding the loan application	253	1.3%
4	Have spent on R&I more than 20% of the requested loan amount and will increase their R&I expenses for at least their loan amount	846	4.2%
5	Will spend more than 80% of the loan on R&I activities	2.078	10.3%
6	Have received innovation support from European or national/regional schemes	4.392	21.9%
7	Have been awarded an innovation prize by an EU institution/EU body	113	0.6%
8	Have registered at least one technology right and will use the loan to exploit it	592	2.9%
9	Have received an investment from a venture-capital fund/business angel	1.300	6.5%
10	Will use the financing to enter a new product or geographical market	296	1.5%
11	Have spent on R&I at least 10% of their total operation costs in at least one of the past three years	671	3.3%
12	Have spent on R&I at least 10% p.a. or more than 15% of their total operating costs in at least one of the past three years (small mid-cap)	6	0.0%
13	Have incurred R&I expenses qualified in the past 36 months by competent national or regional bodies or institutions as part of general support measures approved by the EC	251	1.2%
14	Have been designated in the past 36 months as an innovative company by an EU or national or regional institution or body	103	0.5%
TOTAL		20.087	100%

Turning now to equity support to innovative SMEs, the main EU instrument for that is the **InnovFin equity facility**, which provides equity investment for early-stage R&I-driven SMEs and small Mid-Caps. The facility is managed by the EIF and comprises four different products covering the whole early stage phase: pre-seed and seed phase (InnovFin Technology Transfer), seed and early-stage (InnovFin Business Angels) and early-stage and expansion (InnovFin Venture Capital and Fund-of-Funds).

The interim evaluation of H2020's Financial Instruments considers that InnovFin equity facility works well, even if it acknowledges the difficulties to evaluate the performance as the implementation was in its first stage at the moment of doing the evaluation. The four financial products cover the whole needs of the early-stage and they are largely complementary with COSME equity facility, which focuses on expansion stage. Since 2015, EFSI has been used to expand both InnovFin early-stage and COSME growth equity facilities. In practice, what the EIF does in many cases is to combine InnovFin, COSME and the EFSI guarantee to finance multi-stage risk-capital funds that invest mainly on a cross-border basis.

Stakeholders interviewed in the context of the interim evaluation see the effectiveness of InnovFin equity as particularly strong with regard to the objective of increasing early-stage private investment in R&I as well as greater risk financing (number of entities and volume of funds). However, they are more cautious about InnovFin's contribution to strengthening EU venture capital market by attracting institutional and other private investments. One could argue, however, that the latter should be seen as a long-term objective given that the EU venture capital industry is relatively young and may take decades to become a mature market such as that in the US or Israel¹¹².

Another well-known problem of Europe's venture capital is fragmentation. Most European Venture Capital funds focus their activity on a European sub-region, which leads to a significant home bias of Venture Capital ecosystems. This limits the ability of European venture capital funds to utilise economies of scale and reach a critical mass¹¹³. As noted by some interviewees, the multi-country focus of most InnovFin equity investments in venture capital helps reduce this fragmentation. Another initiative in this direction is the EIF-NPI Equity Platform, a collaborative initiative launched by the EIF in 2016 which promotes knowledge sharing and best practices between the EIF and national promotional institutions (NPIs) or banks (NPBs) and aims at better match national, EU and private sources of equity funding.

Finally, a point raised by one interviewee is the complexity of EU regulations applied to intermediated products. According to this official, the requirements from the Financial and Administrative Framework Agreement (FAFA) between the Commission and the EIF have become more complex and detailed over time: the Commission is rather prescriptive in instructing the EIF how to transpose the EU Financial Regulation (FR) requirements, typically requiring the cascade of these requirements to intermediaries,

¹¹² Philipp Ständer, *Public policies to promote venture capital: how to get national and EU measures in sync*, Policy Paper 203, Jacques Delors Institut Berlin, August 2017

¹¹³ Acevedo, Miguel F. et al., *France, Germany, Italy, Spain and the United Kingdom: Building Momentum in Venture Capital across Europe*, Bpifrance, Cassa depositi e prestiti SpA, Instituto de Crédito Oficial, British Business Bank, KfW Bankengruppe, December 2016.

sub-intermediaries and final recipients, and this creates a burden for financial intermediates and final beneficiaries. This has proven particularly problematic for equity products: when the EIF invests in an equity fund, its conditions apply not only to the fund manager but to all investors in the fund, the fund governance and fund's strategy. Besides, enforcing the FR requirements at the level of the final recipients, even if some of them are non-EU firms (e.g. in the case of international funds), may make the EU-supported funds less competitive on the market vis-à-vis non-EU investors. According to this official, the complex regulation attached to the EU support have led to protracted negotiations with financial intermediaries, lengthy explanations and in some case rejection of EU support because of fear of non-compliance. Examples of EU rules which are transposed in a very onerous way are: article 136.1.a. of EU Financial Regulation (exclusion criteria), rules governing the access to underlying investee companies' information by the Commission, the European Anti-Fraud Office (OLAF) or ECA – which are also applied to non-EU firms receiving support from EU-sponsored equity funds - and record-keeping requirements of 7 years at each level of equity intervention (intermediaries, sub-intermediaries, final recipients), which are often more onerous than country standards.

6.2.2. Support to Mid-caps, large firms and other research actors

The EU supports private finance of innovation by Mid-caps, large firms and research institutes in two ways; through non-thematic products facilitating the access to capital to these firms and actors and through thematic products offering high-risk funding support for innovative projects in specific policy areas.

Concerning the non-thematic products, at the moment of launching InnovFin there were three products of this kind: one product providing guarantees to financial intermediates lending to Mid-caps (InnovFin Mid Cap guarantee) one product providing direct lending to Mid-caps (InnovFin Mid cap growth) and one product providing loans to large firms and other research actors (InnovFin large projects). These three instruments were managed by the EIB.

With the set-up of EFSI in 2015, there was a slowdown in the deployment of these three instruments. There were various factors behind this slowdown: according to the interim evaluation of H2020's financial instruments, one of the factors was that this market segment had access to relatively cheap debt financing in the context of falling interest rates, at least in the Eurozone countries. However, the most important reason according to the evaluation and various interviewees was the overlap with EFSI: with the EIB mandated to attain a significant volume of mobilised investment with EFSI in a very short time, and EFSI having as one of its objectives to promote "research, development and innovation"¹¹⁴, most projects presented to the EIB being eligible to InnovFin were ultimately financed by EFSI.

¹¹⁴ Art. 9.2 of the EFSI regulation stipulates that the EFSI guarantee shall be used to support some general objectives, among which (art 9.1.a), "research, development and innovation, in particular through: (i) projects that are in line with Horizon 2020; (ii) research infrastructures;(iii) demonstration projects and programmes as well as deployment of related infrastructures, technologies and processes; (iv) support to academia including collaboration with industry, (v) knowledge and technology transfer".

In 2017, evidence of this overlap prompted the EIB and DG RTD to re-calibrate the EIB-managed InnovFin products. Two new facilities were created with minimal overlap with the EFSI:

- **InnovFin Science**, which provides direct long-term financing for research institutes, universities and research and technology organisations.
- **InnovFin Emerging Innovators**, which provides direct and indirect financing to R&I-driven firms and other research actors in EU countries reported as less innovative in the EU Innovation Scoreboard (“moderate and modest innovators”), which are currently underunderserved by EFSI R&D and InnovFin operations.

These revisions were carried out in 2017 and it is too early to say whether these recalibrations have been sufficient to address the overlap.

In addition to creating new complementary products, InnovFin has been increasingly used for providing the riskier share of financing when co-investing with EFSI. In particular, the EIB has developed a new range of quasi-equity products (contingency loans) for innovative Mid-caps, by combining InnovFin and EFSI. Some interviewees note that FIs are 100% covered, and that this makes them particularly suitable to take the first-loss position in this new type of InnovFin/EFSI joint operations. In this respect, they wonder whether the proposed shift towards a single scheme based on a single, partially covered guarantee (the InvestEU Fund, the instrument proposed for 2021-2027) will not reduce the EU’s capacity to finance high-risk operations¹¹⁵. Other interviewees deny this problem. They argue that merging all existing instruments and using one single guarantee to back all operations will allow for a greater diversification of risks. This will be possible if the new InvestEU Fund takes a portfolio approach and allows to have in its portfolio some financial products with 100% first loss piece profile, and if there is the required flexibility in terms of risk absorption capacity of the different instruments.

Finally, it should be noted that some doubts remain as regards to the additionality of the first EFSI R&I investments. The original EFSI regulation (see box 4) defined the criteria of additionality in very broad terms. While stating that EFSI operations must: (i) address a market failure or sub-optimal investment situation and (ii) could not have been carried out to the same extent or in the same time frame without EFSI, the article also said that “operations (...) shall be considered to provide additionality if they carry a risk corresponding to EIB Special activities” (i.e. activities with a higher-risk profile than normal EIB operations). This allowed the EIB to classify as EFSI-eligible any high-risk operation, even if the risk profile of the operation not always reflects additionality (i.e. there may be situations in which other investors could have been interested in supporting the operation with less risky structures)¹¹⁶. Besides, the original EFSI regulation defined additionality vis-à-vis the private market, the EIB, the EIF or existing Union financial instruments but said nothing about additionality of EFSI vis-à-vis other public sources of investment (such as national public investment banks).

¹¹⁵ As one interviewee puts it, absent InnovFin “who will take the first-loss position?”.

¹¹⁶ See EIB (2016), Operations Evaluation. Evaluation of the functioning of the European Fund for Strategic Investments (EFSI), p. 31 and ECA (2016), *EFSI: an early proposal to extend and expand*, Opinion No 2/2016

Box 4. Article 5.1 of the original EFSI regulation

1. For the purposes of this Regulation, 'additionality' means the support by the EFSI of operations which address market failures or sub-optimal investment situations and which could not have been carried out in the period during which the EU Guarantee can be used, or not to the same extent, by the EIB, the EIF or under existing Union financial instruments without EFSI support. Projects supported by EFSI shall typically have a higher risk profile than projects supported by EIB normal operations and the EFSI portfolio shall have overall a higher risk profile than the portfolio of investments supported by the EIB under its normal investment policies before entry into force of this Regulation.

The projects supported by the EFSI, while striving to create employment and sustainable growth, shall be considered to provide additionality if they carry a risk corresponding to EIB Special Activities, as defined in Article 16 of the EIB Statute and by the credit risk policy guidelines of the EIB.

EIB projects carrying a risk lower than the minimum risk under EIB Special Activities may also be supported by the EFSI if the use of the EU Guarantee is required to ensure additionality as defined in the first subparagraph of this paragraph.

As a result of this broad definition, and the pressure over the EIB to attain a maximum volume of investment mobilised, many of the EFSI operations that were approved at the beginning were not truly additional and provide funding to projects that could have been financed from other public or private sources. According to a recent ECA special report on EFSI¹¹⁷, nearly a third of Infrastructure and Innovation Window financed projects would have been undertaken even without EFSI support. Project promoters largely preferred EFSI financing because it was either cheaper or offered a longer payback period.

In principle, these problems of additionality have been corrected with the extension and reform of EFSI in 2017 and with the new Financial Regulation (FR). The new EFSI regulation (art 5.1.) strengthens the definition of additionality. In particular, having a risk corresponding 'special activity' is only considered as a 'strong indicator of additionality' but does not automatically classify the operation as EFSI eligible: the EFSI Investment committee shall nevertheless assess whether the operation addresses specific market failure or sub optimal investment situation and could not have been financed by the EIB, the EIF or other Union instruments without EFSI support. As regards the new FR, article 209.2.b states that all EU financial instruments and budgetary guarantees shall achieve additionality "by preventing the replacement of potential support and investment from other public or private sources".

Turning now to thematic products, there are currently two products of this type: **InnovFin Energy Demonstration projects (InnovFin EDP)** and **InnovFin Infectious Diseases (InnovFin ID)**. The two were launched in 2015, one year later than the launch of the InnovFin programme, following specific assessments that demonstrated the existence of particularly acute market gaps in these two sectors

¹¹⁷ ECA, *European Fund for Strategic Investments: Action needed to make EFSI a full success*, special report n 3, 2019

(see box 4). In the two cases, the risk profile of the projects financed is higher than for other InnovFin products and the EU budget assumes almost 100% of the first-loss risk.

The interim evaluation of H2020 Financial instruments highlights the slow take-up of these thematic instruments and a slower demand than expected, particularly for InnovFin EDP. Commission and EIB officials interviewed argue however that the take-up has improved over time and that the performance of these products is satisfying. They see these two experiences as pilot initiatives that have worked well even if need some corrections, and that can be eventually extended and/or replicated in other policy areas. A new initiative in this direction has been the creation of **InnovFin Thematic Investment Platforms** to provide debt, equity or quasi-equity support to innovative projects in a given policy area. While maintaining the thematic approach, the platform is expected to allow for more flexibility than the thematic instruments as the selection of projects will be delegated to an intermediate in charge of running the platform. The first platform that is under preparation is a platform for Biocircular economy.

Box 5. InnovFin EDP and InnovFin ID

InnovFin Energy Demonstration Projects respond to a market gap identified in the Strategic Energy Technology (SET) Plan: the lack of specific financing to support the transition of high-risk, first-of-a-kind energy projects from demonstration to commercialisation. As such, the EDP helps to bridge the “valley of death” encountered at the construction and initial operating stages by supporting cutting-edge energy technology projects that may otherwise find it difficult to raise finance. Projects funded are intended to be close to the market with a high Technological Readiness Level (TRL 7-8) but not able to obtain finance from alternative sources.

InnovFin Infectious Diseases provides loans to SMEs, MidCaps, special project vehicles, research institutions and other entities for corporate or project finance, and to large pharmaceutical companies to finance the development of vaccines, treatments and medical devices for infectious diseases. It aims to overcome the financial constraints that limit investments in these diseases, due to the low purchasing power of patients affected, the extensive delays before research feeds through to medicinal products and broader therapies and the uncertainty surrounding the market prospect and technical feasibility of the product.

6.3. CONCLUSIONS

The current MFF has witnessed a significant development in the provision of EU market-driven instruments in support to research and innovation. InnovFin represents a major improvement compared to the more modest schemes that existed in 2007-2013 and the set-up of EFSI has reinforced the EU capacity to support private financing of innovation.

The analysis shows that InnovFin products have performed rather well and have adapted to changing circumstances, responding to new market conditions and the set-up of a new EU instrument (EFSI). However, there are some areas for improvement and some open questions for the next MFF.

First, there is a need to review the eligibility criteria applied to EU debt guarantee schemes in support to innovative SMEs. The instrument has a counter-cyclical effect and, as such, following the economic

crisis it experienced strong demand which was rightly covered with the help of the EFSI top-up. At present, the programme's countercyclical role has become less important as SME's access to credit has improved, and there is a need to redefine the focus of the intervention in order to ensure additionality vis-à-vis the private market. Existing analysis show that, today, SMEs adopting innovations that are new to the firm but not to the market ("adopters") are not significantly more credit-constrained than non-innovative SMEs. The successor of InnovFin should avoid providing support to these "adopters". This does not necessarily mean being predominantly focused on high-risk innovation, as the ECA report proposes. A debt guarantee scheme like InnovFin is more appropriate to support incremental innovations than radical, market-making innovations in new sectors, which require more patient and risky capital (equity or quasi-equity support).

Apart from reviewing the definition of eligibility criteria, some interviewees point out the need to better report on the additionality of the projects financed and the impact in terms of innovation. In this respect, they argue that one could potentially consider the provision of some financial support in the form of grants for financial intermediaries, to strengthen their capacity to screen and report and/or compensate for the additional costs of reporting.

Second, there is a lack of coordination between EU and national schemes supporting innovative firms. Given that, according to ECA, the number of national instruments providing support to innovative SMEs has increased over time it seems important to track these national instruments in order to ensure complementarity with EU-level instruments. The Commission is right in pointing out the difficulties to envisage perfect coordination, but at least there should be a mechanism to update the mapping of financial instruments at national and regional level and a continuous monitoring of market gaps at national and regional level. To do this mapping, there should be more detailed reporting and monitoring of the size, design and type of FIs in support of R&D&I set up under shared management. The results of this analysis should be taken into account in the selection procedure (i.e. giving more points to projects coming from Member States where market gaps are bigger and public support schemes are less developed).

Third, as pointed out by various EU reports and documents, supporting the development and commercialisation of radical, high-risk innovations should be an EU priority in the coming years. This requires continuous efforts to develop a robust private venture capital market and more provision of high-risk financing (equity and quasi-equity support). An open question in this respect is whether the shift from a system composed of 100% covered FIs and a one partially covered guarantee (EFSI) to a system based on a single, partially covered guarantee (the proposed InvestEU Fund scheme for 2021-2027) will affect EU's capacity to finance high-risk operations. Some argue that the EU's capacity to finance high-risk operations will not be affected because a single guarantee scheme will allow for greater diversification of risks (i.e. the new InvestEU fund will be able to finance high-risk operations because the higher risk of these operations will be compensated by the low risk taken in other operations). Others argue that, unless the new InvestEU finances more low-risk operations than the current EFSI, it will not be possible to allocate the same amounts as today to high-risk R&D&I operations without the support of InnovFin.

Fourth, there is also a need to develop blending products (that is, products combining grants with loans or equity), particularly to help highly innovative start-ups in the growth phase. Existing evaluations prove that only a relatively small number of firms receiving grants under H2020 benefit from financial instruments under H2020 for the expansion phase, which hinders their capacity to scale up.

Fifth, the Horizon Europe proposal (see chapter 7) will support a more bottom-up, open approach to promote innovation through the establishment of the new European Innovation Council (EIC). This, however, will be complemented with a top-down directional R&I policy based on the notion of “missions”. The development of thematic products seems particularly appropriate to mobilise both public and private investment in these missions.

Finally, there is a case for checking the extent to which existing regulations for intermediated products can be revised to avoid complexity and negative spill-over effects.

7. THE APPROACH TO INNOVATION FINANCING IN THE COMMISSION'S MFF 2021-2027 PROPOSAL

KEY FINDINGS.

- In the new MFF proposal, the budget for EU programmes exclusively focused on research, innovation and digital is proposed to **increase by 43% in real prices**.
- The proposed EU research and innovation programme – Horizon Europe – puts **more emphasis on bottom-up, open innovation** and the promotion of breakthrough, market-making innovation with the establishment of the European Innovation Council (EIC).
- The Commission also proposes to render top-down directional research more strategic and flexible with **the creation of missions**, to **reinforce synergies** with other EU programmes, to rationalise the **landscape of EU innovation partnerships** and to increase their impact-orientation by linking them to new missions and providing exit strategies for partnerships.
- **EARDF budget is expected to decrease** but the Horizon Europe's proposal includes an important increase in the amounts of funding to food, agriculture, rural development and bio-economy compared to the current programming period.
- In the fields of energy and transport, the Commission proposes to create a new **Innovation Fund succeeding NER300**. This new Fund would have a bigger budget and a broader scope than NER300.
- In the social field it is proposed **to create a single instrument (ESF+) which, if approved, may facilitate synergies** between different funding for social innovation and social experimentation.
- The Commission proposes to create a **European Defence fund (EDF)** that would allocate a significant part of its budget to R&D projects, and is supposed to develop synergies with Horizon Europe.

7.1. COMPARING OVERALL AMOUNTS DEVOTED TO RESEARCH AND INNOVATION

The European Commission presented its MFF 2021-2027 proposal on 2 May 2018¹¹⁸. The new MFF is structured in seven headings. The first heading is entitled “single market, innovation and digital” and includes various sub-headings corresponding to R&I, key strategic infrastructures, the single market and strategic space projects.

The communication accompanying the MFF proposal states that funding for the reinforced priority “research, innovation, digital” has been increased by 64% compared to the current MFF. Given the budgetary weight that research, innovation and digital activities has already in the current MFF, this

¹¹⁸ European Commission (2018) A Modern Budget for a Union that Protects, Empowers and Defends. The Multiannual Financial Framework 2021-2027 – Communication and Annex.

looks like a substantial increase. However, a comparison of the new MFF proposal and the current MFF is confronted with various problems. First, the names and content of the programmes are not the same neither the organisation of the MFF in headings and sub-headings. Second, when comparing the 2021–2027 MFF with the 2014-2020 MFF, it is important to specify whether the figures are presented in current or constant (inflation-adjusted) prices. Third, the new MFF 2021-2027 will cover the EU-27 whereas the current MFF also covers spending in the UK.

The Commission includes the following programmes in the priority “research, innovation and digital”:

- Horizon Europe (the successor of H2020);
- ITER and Euratom programmes;
- A new programme focused on supporting digital transformation in Europe (called “Digital Europe Programme”);
- The amounts of Connecting Europe Facility allocated to the digital sector (CEF – Digital);
- The R&I window of the InvestEU Fund, the new instrument replacing EFSI and all Financial Instruments.

Table 12 compares the Commission’s proposed budget on “research, innovation and digital”, the Parliament’s position (as stated in the Parliament’s resolution of November 2018)¹¹⁹ with the current R&I spending for EU-27 countries in constant (2018) prices. As shown in the table, the Commission proposes an overall increase of 43% in real terms, with the EU research programme (Horizon Europe) increasing by 29%¹²⁰. In its resolution of November 2018, the European Parliament proposes instead an increase by 87% in real terms of all budget on “research, innovation and digital” and an increase by 79% of the budget for the EU research programme.

¹¹⁹ European Parliament resolution of 14 November 2018 on the Multiannual Financial Framework 2021-2027 – Parliament’s position with a view to an agreement

¹²⁰ For an analysis of the Horizon Europe proposal and the political questions at the centre of the negotiations see: Philipp Staender (2018) Research policy: A guide to the negotiations on Horizon Europe, Policy Brief, Jacques Delors Institute Berlin.

Table 12. Research, innovation and digital headings in ‘virtual’ MFF 2014-2020, Commission MFF proposal 2021-2027 and Parliament’s position compared (in EUR billion)

Programme	Commission proposal 2021-2027 (current prices)	Commission proposal 2021-2027 (2018 prices)	Parliament position 2021-2027 (2018 prices)	Virtual' 2014-2020 (2018 prices, EU-27)*	% change of Commission proposal vs. virtual 2014-2020 (2018 prices)	% change of Parliament position vs. virtual 2014-2020 (2018 prices)
Horizon Europe	94.1	86.6	120	67.1	29%	79%
Innovation window InvestEU Fund	3.5	3.1	3.3	2.4	29%	38%
Euratom Research and Training Programme	2.4	2.1	2.1	2.1	0%	0%
International Thermonuclear Experimental Reactor (ITER)	6.1	5.4	5.4	3.0	81%	81%
Digital Europe Programme	9.2	8.2	8.2	0.2	4000%	4000%
Connecting Europe Facility - Digital	3.0	2.7	2.7	1.0	170%	170%
TOTAL	118.3	108.1	141.7	75.7	43%	87%

Source: European Commission (MFF 2021-2027 proposal); European Parliament resolution of 14 November 2018 on the Multiannual Financial Framework 2021-2027 – Parliament’s position with a view to an agreement

* Figures for the ‘virtual’ MFF come from Matthew Parry and Magdalena Sapala, 2021-2027 multiannual financial framework and new own resources. Analysis of the Commission’s proposal, European Parliament Research Service (EPRS), 2018

In sum, the budgetary increase for R&I-focused programmes reflects its priority status in a MFF that has to adjust for the withdrawal of a major member state. Nevertheless, the comparison with inflation-

adjusted prices reveals that Commission's budget increase proposals for R&I are more modest than they appear at first sight¹²¹.

7.2. MAIN NOVELTIES OF "HORIZON EUROPE"

Like H2020, Horizon Europe is structured in three pillars¹²². The first pillar, renamed "Open Science", is largely unchanged. The main change lies in the re-organisation between the second and third pillar. Whereas the previous programme differentiated between research with industrial relevance (second pillar) and research with societal relevance (third pillar), the Horizon Europe proposal differentiates between a thematic and top-down oriented second pillar ("Global challenges and Industrial Competitiveness") and a bottom-up driven third pillar (named "Open innovation").

The second pillar ("Global challenges and industrial competitiveness") accounts for 54% of funding and integrates the previous third pillar "societal challenges" as well as the "Leadership in enabling and industrial technologies" (LEIT) programme. The new Pillar Two also re-organises thematic activities. While previously there were five different LEIT themes and seven different societal challenges, this has now been reduced to five "clusters". The consolidation aims to increase flexibility as well as enable more interdisciplinary activities¹²³ but it remains to be seen whether this will be accepted by member states that prefer earmarked funds for specific activities.

The new Pillar Three, Open Innovation, accounts for 14% of the new budget. It features the newly created European Innovation Council (EIC), one of the Commission's major novelties in Horizon Europe. 78% of its funds are supposed to go to the newly created European Innovation Council (EIC), which is already functioning on pilot basis. The EIC aims to support the emergence, development and rapid scale-up of innovative firms carrying out market-creating innovations at EU and international levels through the provision of tailor-made support in different phases. Activities subsumed under the EIC are not entirely new but were previously in thematic activities (e.g. the SME instrument). What is new is the creation of a one-stop-shop service that is mainly bottom-up driven, meaning applicants are not bound by thematic prescriptions. Consequently, the increase in funding for the EIC and the slight decrease in the share of thematic activities should be interpreted as a shift from top-down towards a more bottom-up, open approach.

Another novelty of Horizon Europe proposal is the introduction of missions. Missions will formulate relatable and measurable achievements in the context of major societal challenges such as the fight

¹²¹ For an analysis of the difficulties for research and innovation headings to remain a priority in the MFF negotiations see: Pola Schneemelcher & Philipp Ständer (2018) Why innovation could struggle to be a priority in the next MFF, Policy Brief, Jacques Delors Institute Berlin.

¹²² For a detailed analysis of the Horizon Europe proposal see Philipp Ständer, *Research policy: A guide to the negotiations on Horizon Europe*, Jacques Delors Institute, Blogpost 24.7.2018,

¹²³ For instance, 'Climate, Energy and Mobility' are grouped in one cluster while they used to be the focus of three different societal challenges. This is a coherent approach as activities in these three fields need to go in the same direction, i.e. mitigating climate change through a transition in the energy and transport sectors; and as those sectors become more intertwined (e.g. the development of electric mobility required to mitigate climate change needs an adaptation of the electricity system). This will allow for more sector coupling actions, such as energy storage projects that serve both the energy and mobility sector e.g. by enabling electricity storage at home for both electric car charging and home electricity use. However, interviews suggest that it is unlikely that this European Commission proposal will be adopted as it is by the co-legislators. The Council indeed calls for splitting this cluster into two clusters, one for energy and climate, one for mobility.

against cancer, emission-free cities or clean oceans and organise a multitude of activities to achieve the formulated objectives in a given time frame. Although the EU is not a complete beginner when it comes to top-down directional R&I policy, missions will require changes in the governance structures¹²⁴. It would mean funding fewer projects more actively and more flexibly. This would require stronger technical capacities for the executive agencies. Moreover, the current top-down structure – where the strategic and project levels are relatively far apart – would need to be open to more feedback loops, so that the strategic level can adjust quickly to developments at the implementation level and reallocate resources if necessary. Finally, a key aspect of missions will be the capacity to involve multiple levels (European, national, regional) and different public and private actors. In this respect, the new partnerships can play a major role in mobilising public and private actors towards the attainment of pre-defined societal and industrial challenges (see below).

Box 5. The European Innovation Council (EIC)

The EIC aims to provide tailor-made support to innovators that have the potential to develop market-creating innovations at EU and international levels. The EIC is organised in two main funding instruments, the Pathfinder and the Accelerator.

The **Pathfinder for Advanced Research** will provide grants for early technology stage (proof of concept, technology validation) to early commercial stage (early demonstration, development of business case and development of strategy). It will combine top-down competitive calls on key strategic areas (e.g. deep-tech) with the submission of proposals on a bottom-up basis, so as to stimulate the opportunities of serendipity and unexpected ideas, concepts and discoveries. The Pathfinder will be open to all, from academic researchers to start-ups, SMEs and mid-caps.

The **Accelerator** will support the further development and market deployment of breakthrough and market creating innovations. It will provide tailor-made blended finance (i.e. grant type support with equity financing or financial guarantee) through a single process and according to the needs, stage of development and risk profile of the innovation.

Finally, in line with the Lamy Report's recommendation¹²⁵, the new R&I programme proposal puts more emphasis on promoting synergies with other EU programmes providing support to innovation. The draft Horizon Europe regulation includes a specific annex outlining the possible synergies between Horizon Europe and around fifteen other EU programmes, which is a first for an EU research programme. However, the real materialisation of these synergies remains to be seen. This may be the case when there are new or strengthened synergy-enhancing rules facilitating the articulation between two programmes (e.g. in the case of ESIF and LIFE). In other cases, the use of two programmes in a synergetic way will depend on the willingness of the respective DG's to coordinate work programmes,

¹²⁴ See Philipp Ständer (2018) Missions for EU innovation policy: Why the right set-up matters. Policy Paper by the Jacques Delors Institute Berlin.

¹²⁵ Lamy, P. et al (2017), *LAB – FAB – APP — Investing in the European future we want-Report of the independent High Level Group on maximising the impact of EU Research & Innovation Programmes*, DG Research and innovation, July 2017

develop joint calls or take the synergy dimension into account for the selection of projects. For example, in the case of CEF, the draft Horizon Europe's regulation outlines the possibility to use CEF to deploy at large scale innovative technologies previously developed with Horizon Europe support. However, in the proposed CEF regulation possible synergies with Horizon Europe are only mentioned in the Recitals and no CEF article makes any specific mention of Horizon Europe nor of such synergies.

7.3. A NEW DIGITAL EUROPE PROGRAMME

The Commission proposes the creation of a new "Digital Europe programme". The new proposed Programme will focus on reinforcing Europe's digital capacities in new promising areas (High Performance Computing, Artificial Intelligence, Cybersecurity, advanced digital skills) and ensuring the wide use of digital technologies and services across the economy and society.

With a proposed budget of EUR 9.2 billion in current prices (EUR 8.2 billion in 2018 prices), the programme is expected to build on some existing structures and interventions (e.g. the European High-Performance Computing Joint Undertaking, the contractual Public-Private Partnership created in 2016 on cybersecurity solutions, CEF Telecom's deployment of Digital Service Infrastructures,...). The creation of a single programme responds to the willingness to scale up existing efforts in support to digital transformation and to better coordinate all these different interventions in the logic of a more mission-oriented approach.

The new programme will continue the support to wide scale implementation of interoperable digital services currently deployed by CEF Telecom. The Commission proposes to increase the budget for CEF Digital (from the current EUR 1 billion budget to a budget of around EUR 3 billion in current prices, EUR 2.7 billion in 2018 prices) but narrow its focus. The new CEF Digital will support only infrastructure development, particularly by improving digital connectivity, increasing resilience and the capacity of backbone networks, and enhancing digitalisation of transport and energy networks.

7.4. THE NEW EU COHESION POLICY AND SUPPORT TO INNOVATION

The Commission does not propose major changes as regards the use of ESIF in support to innovation. The 11 thematic objectives guiding the use of ESIF are replaced by 5 Policy Objectives. The "A smarter Europe by promoting innovative and smart economic transformation" (focusing on innovation, digitisation, economic transformation, skill upgrade and support to SMEs). This policy objective is the one to which the ERDF will earmark the most (from 35% in less developed countries to 60% in the more developed ones)¹²⁶.

Transnational innovation efforts will be promoted by a new (proposed) "Interregional Innovation Investment" initiative, which supports innovation actors from different regions to work together on joint projects/initiatives to develop European value chains. These would be financed by the ERDF

¹²⁶ ERDF and CF Proposal. COM(2018) 372 final.

through ‘component 5’ of Interreg (European territorial cooperation goal)¹²⁷. This component is proposed to receive 11.5% (EUR 970 million) of the total Interreg budget for 2021-2027, i.e. EUR 8.43 billion. The ERDF may bring “together researchers, businesses, civil society and public administrations involved in smart specialisation strategies established at national or regional levels”¹²⁸. This initiative would offer a new form of interregional cooperation that is complementary to existing cross-border and transnational cooperation for innovation.

Smart Specialisation Strategies remain an ex-ante conditionality (now called ‘enabling condition’) for ERDF funding under Policy Objective 1. These shall include an analysis of constraints to innovation, performance monitoring and evaluation, and actions to improve research and innovation systems, to manage industrial transitions and to foster international collaboration.

Overall, the interregional element of the proposed post-2020 RIS3 signals a need for regions and member states to take more of an outward perspective in their approaches to RIS3. By joining forces with other regions, there is stronger scope to boost innovation investment and to strengthen the EU’s global standing in the development of value chains.

Synergies between Horizon Europe and the ESIF, through the Seal of Excellence, are strengthened in the proposed regulations for the next programming period. Projects that are awarded the Seal of Excellence can be funded by ESIF (e.g. ERDF and ESF+) with the co-financing rate of Horizon Europe¹²⁹. This is an important change since in the current MFF Seal of Excellence projects had to be financed using the rates of ESIF. Additionally, if Seal of Excellence projects are consistent with smart specialisation strategies they can be funded by ESIF without undergoing a second selection process. These simplifications reduce regulatory constraints and could potentially incentivise the uptake of synergies with ESIF.

Additionally, combination of funding between Horizon Europe and ESIF is made easier. Willing member states will be allowed to transfer up to 5% of the financial allocations of any ESIF to any other fund or instruments (including Horizon Europe), using the co-financing rates of the latter¹³⁰. To simplify further, actions receiving funding from more than one EU programme/fund shall be audited only once¹³¹.

Promising changes are taking place concerning the bottleneck of state aid rules. A Council Regulation of November 2018¹³² excludes from state aid checks “financing channelled through or supported by EU centrally-managed financial instruments or budgetary guarantees, where the aid consists in the form of additional funding provided through State resources” (art 1). This includes ESIF that is combined with Framework Programme funding (which is centrally-managed). Member states can now

¹²⁷ European Commission (2018), COM(2018) 374 final, art 3 para 5. It must be noted that discussions between Commission, Council and Parliament are signalling that this initiative could be moved to ERDF and thus would no longer be called ‘Component 5’ of ETC.

¹²⁸ Ibid, art 61.

¹²⁹ Common Provision Regulation Proposal COM(2018) 375 final, art 67 para 5. Horizon Europe Proposal (COM(2018)435 final, art 11.

¹³⁰ Common Provision Regulation Proposal (COM(2018) 375 final, art 21.

¹³¹ According to the single audit principle established in art 127 of the new EU Financial Regulation

¹³² Council regulation 2018/1911 of 26 November 2018 amending Regulation (EU) 2015/1588 on the application of Articles 107 and 108 of the Treaty on the Functioning of the European Union to certain categories of horizontal State aid.

finance Seal of Excellence projects without having to notify the Commission and comply with state aid requirements. The same is true, for example, for Invest EU funding. This reform streamlines the implementation of joint undertakings of Framework Programme funding, as national authorities no longer have the burden to prove that they do not distort Single Market competition by co-funding centrally-selected projects.

7.5. SUPPORT TO INNOVATION IN AGRICULTURE AND RURAL DEVELOPMENT

The proposed CAP 2021-2027 retains its two pillar structure and direct payments remain the most important instruments of support but the Commission introduces a new delivery model in order to shift from compliance towards results and performance. If adopted as proposed by the European Commission, Member States will have to establish a CAP strategic plan covering both Pillar I (direct payments) and Pillar II (rural development) actions. In this new delivery context, more attention is given to knowledge and innovation: Member States will have to show how their strategic plans contribute to knowledge and innovation, which is considered a cross-cutting general objective related to fostering and sharing of knowledge, innovation and digitisation.

The proposed EAFRD continues to support to EIP-agriculture innovative operational groups but a stronger accent is put to the creation of virtuous Research-Innovation-Advice nexus. The underlying reasoning is that the success of EIP operational groups varies a lot from one country to the other and it crucially depends on the existence of strong articulations between various actors (advisors, educational systems, researchers and farmer organisations), often referred to as the Agricultural Knowledge and Innovation System (AKIS). As the role of the farm advisor stands out as particularly important in creating these nexus, the proposed EAFRD regulation obliges Member States have to include in their CAP Strategic Plans a system for providing advisory services (article 13) and to explain how these farm advisory services are integrated in a wider agricultural knowledge and innovation systems (AKIS) which also includes a link to research policy.

Finally, it is worth mentioning the important reduction proposed in the size of EARDF. The Commission proposes a reduction of EARDF budget by almost 30% in real terms (compared to a reduction of 11% of pillar 1 spending)¹³³. If this is approved, there will be less money for innovation. At the same time, according to the 2021-2027 MFF proposal, EU agriculture should benefit from EUR 10 billion dedicated to research and innovation in food, agriculture, rural development and the bio-economy coming from the Horizon Europe programme. This is a major increase from the EUR 3.85 billion from H2020 allocated to societal challenge 2.

7.6. NEW PROGRAMMES ON TRANSPORT AND ENERGY

The main change for the energy, transport and climate challenge is arguably the **evolution from NER300 to the Innovation Fund**. NER300 is a programme aimed at investing the money generated from allowances paid to the EU Emissions Trading Scheme (ETS) (see the NER300 programme fiche in

¹³³ Alan Matthews, *CAP spending in the next MFF*, Blogpost, September 23 2018, CAPreform.eu (<http://capreform.eu/cap-spending-in-the-next-mff/>)

Annex 1 for more details). NER300 funding is supposed to go, in the form of grants, to commercial demonstration projects for carbon capture and storage or innovative renewable generation technologies. As the European Court of Auditors points out, NER300 delivered less than the intended progress for several reasons

The European Commission has proposed a delegated act for the Innovation Fund¹³⁴. If adopted as proposed by the European Commission, the Innovation Fund will bring about significant changes in at least two ways:

- 1- The estimated amount¹³⁵ for the Innovation Fund is five times higher than NER300's allocation (around EUR 10 billion, compared to EUR 2.1 billion).
- 2- The scope of sectors that can benefit from the Innovation Fund has been largely expanded. Under NER300, only carbon capture and storage and innovative renewable generation technologies could benefit from NER300 support. The Innovation Fund expands this list as it can also support innovation in energy storage and energy-intensive industries, including business model innovations.

In the **new CEF proposal**, the Commission attempts to give priority to the transition to low carbon energy and mobility systems. The proposal thus sets higher co-financing rates for projects that have an innovative component contributing to this transition, e.g. projects related to smart grids and storage. More precisely, in the transport sector, the co-financing rates limited to 30% can be increased up to 50% "for actions supporting new technologies and innovation"; and in the energy sector, the EU co-financing limited to 50% can be increased to 75% of the costs for the development of projects of common interest if they "comprise highly innovative solutions"¹³⁶.

While the current CEF programme was supposed to facilitate cross-sectoral synergies between transport, energy and telecommunications, the cross-sector approach has not materialised much since 2014. According to the interim evaluation and an interviewee, while the regulation planned for increased co-funding rates for cross-sectoral actions and at least one such call for proposals, the legal and budgetary framework is found not to be flexible enough to facilitate the emergence of cross-sectoral synergies. The new CEF proposal builds on this gap. In addition to higher co-funding rates, it comprises provisions for the adoption of cross-sectoral work programmes and the possibility for ancillary components pertaining to another sector to be eligible. The award criteria for grant allocation should be defined in the work programme and take into account synergies between the three sectors to prioritise cross-sectoral proposals.

¹³⁴ https://ec.europa.eu/info/law/better-regulation/initiatives/ares-2017-3157624_en

¹³⁵ As for NER300, the Innovation Fund will not receive direct money, but emissions quotas that will be sold on the EU ETS. The amount of money allocated to the Innovation Fund will thus depend on the evolution of the carbon price on the EU ETS during the 2020 decade.

¹³⁶ Proposal for a Regulation establishing the Connecting Europe Facility COM(2018) 438 final, art. 14. The quoted co-financing rates apply for works in the transport and energy sectors.

As regards the **LIFE programme**, in the Commission’s proposal synergies with Horizon Europe are still incentivised in the evaluation of projects through a bonus awarded to projects that uptake results from Horizon Europe and former FPs. The main change from the current system is the creation of a new sub-programme within LIFE, entitled the Clean Energy Transition which, if adopted as proposed by the Commission, will pursue actions funded under H2020 Societal Challenge 3 on Energy. This new part of LIFE would finance policy support and capacity building activities while Horizon Europe would keep on supporting R&I activities and the European Innovation Council would scale up LIFE projects that demonstrate direct impact and high potential through LIFE funding.

Finally, while the Commission’s draft regulations for programmes in support of energy and transport innovation do not include specific synergy-enhancing rules, it is possible that such synergies are reinforced thanks to more active coordination between the EU central level and Member States and regions through two new tools:

- The first one concerns all the EU regions that have joined the Coal Regions in Transition Platform¹³⁷, as the development of “eco-innovative sectors” is one of the two main objectives of the Platform¹³⁸. As such, those regions are more likely to be aware of the possibility to create synergies with EU funding tools to finance such innovations.
- The second tool concerns all EU Member States but its impact is limited to climate change-related innovations (mostly in the sectors of agriculture, energy, transport and industry). As now required by the [Energy Union Governance Regulation](#)¹³⁹ that entered into force in December 2018, all Member States have to submit to the European Commission their Integrated National Energy-Climate Plans for the year 2030. This is likely to ensure a better understanding of National and regional use of EU funding for innovation as Article 25 requires all EU Member States to provide the European Commission with information on climate-change related innovation, as part of their integrated national energy and climate progress reports, especially on
 - “national objectives for total public and, where available, private spending in research and innovation relating to clean energy technologies as well as for technology cost and performance development”; and
 - “where appropriate, national objectives, including long-term targets for 2050 for the deployment of technologies for decarbonising energy- and carbon-intensive industrial sectors and, where applicable, for related carbon transport, use, and storage infrastructure”;
 - The regulation furthermore asks Member States to report all “implemented, adopted and planned policies and measures” related to the two above-mentioned elements;

¹³⁷ The Coal Region in Transition Platform is a multistakeholder platform created by the European commission in 2017 to support the economic diversification and technological transition in coal mining and carbon intensive regions.

¹³⁸ European Commission, Platform on Coal and Carbon-Intensive Regions, [Terms of Reference](#), p.8.

¹³⁹ European Union, Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action.

- It also requires Member States to report “financing measures, including Union support and the use of Union funds, in this [energy research and innovation] area at national level, where applicable.

7.7. CHANGES IN EU SUPPORT TO SOCIAL INNOVATION

In the area of social, employment and health the Commission proposes a major change with the creation of the European Social Fund+ (ESF+). This new programme would merge various existing programmes, particularly ESF, the Youth Employment Initiative (YEI), the Fund for European Aid to the most Deprived (FEAD), the Employment and Social Innovation Programme (EaSI) and the EU Health Programme.

With a budget of EUR 96 billion in current prices (EUR 89.7 billion in 2018 prices), the majority of funding would be managed under shared management by the Member States, and be allocated to actions similar to those currently financed by the ESF. The rest of the funding would be managed under central management and allocated to employment and social innovation and health actions. In its resolution of November 2018, the Parliament proposes to increase the budget up to EUR 106.7 billion in 2018 prices.

Merging these programmes may have some positive effects from the point of view of innovation. It may increase synergies between the various components. The regulation foresees in particular the use of ESF+ under shared management to scale up innovative approaches tested on a small-scale through the centrally-managed strands (art 13.2). The potential synergies between Horizon Europe and ESF+ are also acknowledged in the preamble, but there is no specific enabling rule to facilitate these synergies (i.e. a rule providing extra points to projects that mainstream and scale up innovations supported by Horizon Europe in the selection process).

Another novelty is the establishment of a clear obligation for Member States to allocate some ESF+ funding to social innovation actions, social experimentations or to strengthen bottom-up innovative approaches based on partnerships involving different actors. Innovative actions and approaches would be programmed under any of the specific ESF objectives, and each Member State would have to dedicate at least one priority to the implementation of these actions.

Finally, the proposed ESF+ regulation defines ‘social innovation’ in terms similar to the ones of the current Easi regulation, as “innovations that are social both as to their ends and their means and [...] that simultaneously meet social needs and create new social relationships or collaborations, thereby benefiting society and boosting its capacity to act” (art 2.1.16). This definition is more restrictive than the Oslo definition, as it requires interventions to be innovative as regards their ends and their means (“create new social relationships or collaborations”).

7.8. A NEW EU DEFENCE FUND

Finally, the MFF 2021-2027 proposal includes a new European Defence Fund (EDF). With a budget of EUR 13 billion, the EDF would be the continuation of the current Preparatory Action on Defence Research (PADR) created on a pilot basis. The EDF would support cross border cooperation between

Member States and between enterprises, research centres, national administrations, international organisations and universities in the research phase and in the development phase of defence products and technologies.

The proposed EDF is structured in two parts: a research part (EUR 4.1 billion) which offers grants for collaborative defence research projects and a development part (EUR 8.9 billion) which supports Member States' joint projects to develop innovative defence products and technologies. The fund is supposed to ensure complementarity and synergies with actions under Horizon Europe so that defence research and civil research can benefit from each other.

7.9. A NEW APPROACH TO PARTNERSHIPS

At the time of the drafting of H2020 two of the three analysed research PPP instruments were still relatively young. For both, the first KICs and the first cPPPs, it was too early to evaluate whether the instrument was able to deliver the envisaged impact. In its impact assessment for Horizon Europe the Commission states three major challenges for R&I partnerships:

- Need to rationalise the European R&I partnership landscape.
- Need to improve the openness and transparency to launch future European R&I partnerships.
- Need to link European R&I partnerships to future EU R&I missions and strategic priorities.

The European Commission plans to address these problems through a new integrated approach to partnerships, which it labels "European Partnerships"¹⁴⁰. The new approach aims to reduce the number of parallel structures and thereby reduce complexity and overlaps. It also seeks to increase the impact-orientation of partnerships by integrating them in a new mission-oriented approach to innovation and by providing exit strategies for partnerships to make sure that preference can be given to those partnerships with the highest relevance even if it means to discontinue older ones. Finally, the new framework places great importance on improving synergies between partnerships and the framework programme as well as among the partnerships.

The principle differentiation between different types of research PPPs discussed in this study remains intact, although the Commission seeks to integrate them into a simpler framework. In the future there will be co-programmed partnerships (cPPPs will fall under this category), co-funded partnerships (which will include various types of public-public partnerships) and institutionalised partnerships (JTI will fall under this category).

Although the simplified structure will help to navigate through the partnership landscape in the future, the impact assessment provides relatively few details of how the future partnership approach will address other challenges such as increased coherence, focus on fewer and more targeted initiatives, the phasing out of partnerships or increasing impact-orientation through changes in the type of R&I activities that partnerships undertake¹⁴¹. Much relies on a 'strategic coordination process' which "will

¹⁴⁰ See European Commission (2018) *Impact assessment of Horizon Europe*, Part 2.

¹⁴¹ The Technopolis group report criticised that the current implementation modalities „do not seem to support the development of more systematic innovative solutions for social challenges“ and called for the development of large scale

advise on selection, implementation, monitoring and phasing out” of future partnerships that has yet to take shape¹⁴².

Apart from these changes in the partnership approach, two broader changes envisaged under Horizon Europe are likely to be conducive to improving the performance of research PPPs:

- **Potential of the new pillar structure for increased coherence of partnerships.** The revised pillar structure of Horizon Europe reflects a division between two bottom-up pillars (one for research and one for innovative firms and entrepreneurs) and one thematic top-down pillar that integrates R&I activities with industrial relevance (previously pillar 2) and with relevance for societal challenges (previously pillar 3). Ending the division between an industrial and a societal challenges pillar allows in principle that the partnerships can be more clearly connected with thematic clusters as there are less overlaps and duplications among the clusters¹⁴³.
- **Potential of missions to improve impact-orientation of partnerships.** Missions have the advantage that they structure and further narrow the direction of EU R&I support, which would also be an important signal to the private sector that a specific technological area provides investment opportunities. This means that the comparatively low budgetary resources of the EU (around 10% of public spending on R&I in the EU) are more likely to mobilise a critical mass of research in the fields connected to missions¹⁴⁴. Moreover, missions provide for an opportunity to test new modes of implementation, beyond the classic project grants. In large scale experimental environments for innovative solutions like smart cities partnerships could exploit their potential of forging networks between Europe’s leading industrial players¹⁴⁵.

With the start of Horizon Europe an amendment of the EIT Regulation is also expected. The new EIT regulation is supposed to address several shortcomings in the functioning of the EIT-KIC model voiced in recent evaluations and reports¹⁴⁶. The Commission makes the important choice to maintain the role of the EIT as innovation agency and discards the option to integrate KICs directly into the FP. A key element is the intention to reinforce the complementarities between EIT-KICs and the future EIC and missions.

The analysis in chapter five highlighted the need for KICs to refine their value proposition and to solve the inherent conflict between its role as market-oriented incubator and its role as innovation

experimental real-life environments. (Boekholt et al. (2017) Increased coherence and openness of EU research and innovation partnerships, p.17)

¹⁴² European Commission (2018) Horizon Europe impact assessment, Part 2, p.113.

¹⁴³ See Philipp Ständer (2018) Research policy: A guide to the negotiations on Horizon Europe, Policy Brief, Jacques Delors Institute Berlin.

¹⁴⁴ See Philipp Ständer (2018) Missions for EU innovation policy: Why the right set-up matters. Policy Paper by the Jacques Delors Institute Berlin..

¹⁴⁵ The Technopolis group report criticised that the current implementation modalities „do not seem to support the development of more systematic innovative solutions for social challenges“ and called for the development of large scale experimental real-life environments. (Boekholt et al. (2017) Increased coherence and openness of EU research and innovation partnerships, p.17)

¹⁴⁶ In the Horizon Europe impact assessment the Commission outlines the following changes: Integration of KICs in a seamless entrepreneurship support through complementarity with the EIC, stronger alignment with strategic priorities of the FP and a reinforced role of KICs for education and training European Commission (2018) Horizon Europe impact assessment, Part 2.

ecosystem to address societal challenges. Although the Horizon Europe impact assessment stresses the importance of an integration of KICs in entrepreneurship support under the EIC and the potential to contribute to missions it provides few details how this will impact and possibly change the current EIT-KIC model and does not acknowledge a conflict between current objectives.

The EIT-KICs can indeed provide valuable complementarities for both the EIC and missions but the question remains whether this role can be filled in a financially self-sufficient way or whether support models for KICs need to be developed that allow for continued funding if the added value to EU R&I policy justifies it.

7.10. A SINGLE EU INSTRUMENT TO REPLACE EFSI AND ALL FIS: THE INVESTEU FUND

As regards the use of EU market-driven instruments, the Commission proposes to move from a system composed of 15 EU Financial Instruments and one EU guarantee scheme (EFSI) to a single EU investment support scheme (InvestEU Fund) covered by a single EU guarantee.

Although the “InvestEU Fund” would roughly receive the same amount of EU budget allocations than EFSI and the current FIs together (EUR 15.2 billion, compared to the EUR 14.2 billion currently earmarked to EFSI and centralized FIs) it would provide more volume in EU investment. In effect, the proposed EUR 38 billion guarantee backing the InvestEU Fund is 21% higher than the total EU financing volume provided by the EFSI guarantee and the 15 existing EU financial instruments¹⁴⁷. This is because InvestEU fund guarantee would be partially provisioned (at 40%) whereas in the current system there are various 100% provided Financial Instruments. In other terms, the Invest EU fund would allow the EU to “do more with less”, as expressed in the Invest EU impact assessment¹⁴⁸.

While EFSI is only subjected to indicative sectoral targets, the InvestEU Fund would be organised in four policy windows: sustainable infrastructure; research, innovation and digitisation; SMEs and mid-caps; and social investment and skills. Each window would have a separate budget, even if the Commission would hold the right to adjust these amounts by up to 15% to adapt to evolving policy needs and market demands.

If we compare the allocation to the R&D window under the InvestEU Fund to the allocation of InnovFin and the amounts spent so far by EFSI in R&D&I projects, we can notice that the new proposed scheme implies an increase by +33% of funding for “research, innovation and digitisation” projects.

The InvestEU regulation proposal does not detail the type of products or projects supported by the new scheme, but it is mentioned that the guarantee would be implemented through different products targeting different risks that would inherently require high, medium or low provisioning rates. In particular, the R&W window would be used to deploy generic financing products (e.g. debt, equity) as well as thematic instruments and pilot initiatives targeting high risk and first-of-a-kind projects, as

¹⁴⁷ For a detailed analysis of the InvestEU proposal see Rubio, E. and Virel, Fleurilys (2018), *InvestEU fund: a rebranded Juncker Fund?*, policy brief, Jacques Delors Institute, September 2018

¹⁴⁸ Commission Staff Working Document, *Impact assessment accompanying the proposal for a regulation establishing the InvestEU Programme*, SWD(2018) 314 final

currently done under InnovFin. As pointed out in section 6, some interviewees have raised doubts as regards the capacity of Invest EU Fund to support these sort of high-risk instruments. Some consider that it would be better to set-up thematic, high-risk instruments outside InvestEU Fund, 100% provisioned, which could work in complementarity with InvestEU Fund.

Finally, there are major changes as regards the functioning of the new EU guarantee scheme. If adopted as proposed by the Commission, implementation will not be exclusively entrusted to the EIB group, as it is the case for EFSI. The EU's bank will remain the main implementing partner but direct access to the guarantee will be offered to a plurality of eligible implementing partners such as National Promotional Banks or other International Financial Institutions (such as the European Bank for Reconstruction and Development or the Council of Europe Development Bank). It is unclear to which extent the participation of these other actors will have an incidence on the capacity of InvestEU to support innovation.

8. CONCLUSIONS AND RECOMMENDATIONS

The objective of this study is to provide a comprehensive analysis and assessment of how the EU budget supports innovation in the current programming period and analyse the approach to innovation financing in the Commission's MFF 2021-2027 proposals. The analysis has included five elements:

- An estimation of the overall volume of spending supporting innovation in the current MFF;
- An analysis of synergies between different EU sources of innovation funding;
- An assessment of the functioning and impact of various EU-sponsored networks and partnerships aimed at supporting innovation;
- An analysis of the role played by EU financial instruments and budgetary guarantees in support to innovation;
- An analysis of the approach to innovation financing in the Commission's MFF 2021-2027 proposals.

This final section draws together some general conclusions and recommendations.

8.1. EXPLORE THE POSSIBILITY TO DEVELOP A METHODOLOGY TO TRACK AMOUNTS OF EU BUDGET SUPPORT TO INNOVATION

To maximise the use of EU innovation funding in the coming MFF we need to have a clear picture of how much does the EU currently spend in support to innovation. At present, the amounts of EU innovation funding are difficult to track due to various reasons:

- There is no common understanding of innovation across the various EU budget programmes. Some programmes (e.g. European Social Fund, ISF) are underpinned by a broad vision of innovation, they consider any action that implies a novelty for the actor adopting it as an innovative action (even if it is not new to the market or the world); in other cases (e.g. H2020) actions supporting innovation are mostly focused on promoting the generation, commercialisation and diffusion of products, processes ideas or approaches which constitute a state-of-the-art change in the sector or policy area in which the actor operates, still other programmes (e.g. EaSI programme) follow a narrow and precise definition of innovation which is not entirely in line with the Oslo manual. Through desk-research and interviews we have also observed different meanings of innovation, and tendency in some cases to treat all spending related with ICT investments, low-carbon transition or support to entrepreneurship as innovation funding.
- Data on allocated spending in support to innovation is not always available. Various EU programmes have specific innovative objectives or eligible actions with an innovative dimension but data on allocations is presented in aggregate terms, making impossible to determine the precise amounts going to such actions or objectives. Programme's mid-term evaluations not always report on the role of the programme in support of innovation. In some cases, there is no information at all, in others there are mentions to the impact of the programme on innovation but without concrete data.

- In particular, support to the diffusion of innovation is difficult to track. Whereas various EU programmes support the large-scale deployment of innovative technologies and solutions (e.g. CEF, EU Health programme), the latter is not always labelled as “innovation funding”. Additionally, when looking at the data on allocations per type of projects it is very difficult to disentangle the amounts of funding to the deployment of innovative technologies and solutions from funding to the deployment of mature technologies and solutions.

The Commission should explore the possibility to introduce an **“innovation tracking” methodology** in the 2021-2027 MFF. This does not need to be as complex as the “climate tracking methodology”, which applies different weighting to funding activities on the basis of their expected climate impact, but should provide some basic data to judge and evaluate the contribution of the EU budget in support to innovation.

A pre-condition for the establishment of this tracking methodology is that **all EU spending should be underpinned by a common definition of innovation**. This definition should not be too broad as to include any action subjectively defined as innovative action by the actor adopting it, and which may have little or no impact for the whole society and economy. It should embrace all types of innovations (technological and non-technological, public and private, incremental and radical). Our suggestion is to build on the definition we have developed for this study, which is objective-based and focus on innovations that constitute a state-of-the-art changes in the sector or policy area in which the actor operates. This is slightly narrower than the widely-used definition of the Eurostat/OECD Oslo Manual¹⁴⁹, which considers that a change can be an innovation if it implies a novelty for the actor adopting it (even if it is not new to the market or the world).

Another pre-condition is the **establishment of clear innovation objectives or pre-allocated reserve budgets to finance innovative actions in the relevant programmes**, as well as the introduction of specific reporting requirements in the legal basis so as to track the funding allocated to these objectives or eligible actions.

8.2. AN IMPACT-ORIENTED APPROACH TO ALL EU INNOVATION FUNDING

This study estimates that the current MFF allocates a significant amount of funding in support of innovation (EUR 153.8 billion, which represents 14% of overall MFF). The estimation however is made on the basis of stated intent (i.e. money allocated in actions intended to support innovation) but we have not looked at results (i.e. the extent to which this funding has effectively been used in support of innovation).

A finding that emerges from the analysis is the **low attention given to the impact of innovation funding in EU budgetary regulations and reports**. Ultimately, innovation funding should aim to have a transformative impact. And yet, many programmes provide funding for innovative actions without envisioning any mechanism or indicators to assess whether this funding has produced an output (i.e. whether the funding has effectively served to generate, implement or commercialise a new

¹⁴⁹ OECD/Eurostat (2018), *Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation*.

idea) and what has been the ultimate outcome (in terms of competitive gains, reduction of costs, more effectiveness in attaining social or environmental goals or other).

The next generation of EU budget programmes should adopt a more impact-oriented approach when supporting innovation. When allocating funding to innovation actions, the programmes shall detail the intervention logic and expected results and impact. There should also be indicators to assess whether the impact has materialised or not.

There are some good practices from which the legislations could get inspiration:

- Annex V of the proposed Horizon Europe regulation details various indicators to assess Horizon Europe's performance in delivering benefits and impact through R&I missions and strengthening the uptake of innovation in society ("societal impact indicators") and influencing the creation and growth of companies, creating direct and indirect jobs, and by leveraging investments for research and innovation ("economic/innovation indicators"). Indicators are defined for the short, medium and long term and are supposed to structure the monitoring of HE's performance towards its objectives.
- Another good practice is what is included in the European Maritime and Fisheries Fund regulation. The regulation allows Member States to spend part of their envelopes to finance innovative projects, on condition that they be "carried out by, or in collaboration with, a scientific or technical body, recognised by the Member State or the Union. That scientific or technical body shall validate the results of such operations" (art 26.3).

8.3. BETTER EXPLOIT SYNERGIES BETWEEN DIFFERENT EU FUNDING PROGRAMMES

In line with the recommendations from the High Level Group chaired by Pascal Lamy¹⁵⁰, the new R&I Framework programme puts more emphasis on promoting synergies with other EU programmes providing support to innovation. The Horizon Europe regulation includes a specific annex outlining the possible synergies between Horizon Europe and around fifteen other EU programmes, which is a first for an EU research programme. There has also been a reinforcement of some synergy-enabling rules, particularly to promote the combination of Horizon Europe and ESIF. However, in some cases (i.e. CEF, ESF+) the potential for synergies is recognised in the preamble of the regulations but there are no enabling rules to promote them (i.e. rules providing extra points to projects that mainstream and scale up innovations supported by Horizon Europe in the selection process). This makes synergies dependent on the willingness of the respective DG's or ESIF authorities to coordinate work programmes or take the synergy dimension into account for the selection of projects.

While synergies will ultimately depend on political willingness, more can be done to create concrete linkages between programmes in order to ensure real coherence and complementarity. When negotiating the legal basis of the next generation of EU budget programmes, the Parliament and the

¹⁵⁰ Lamy, P. et al (2017), *LAB – FAB – APP — Investing in the European future we want-Report of the independent High Level Group on maximising the impact of EU Research & Innovation Programmes*, DG Research and innovation, July 2017

Council should explore the possibility of including specific legal basis to promote the development of synergies.

8.4. IMPORTANCE OF THE OVERALL FRAMEWORK CONDITIONS

Another conclusion that emerges from desk-based research and interviews is the **importance of creating the overall framework conditions for innovation**. In many areas funding does not make the difference, the real incentives to innovate come from the regulatory and policy framework. This is the case for instance in the energy or transport field, where an important incentive to innovate is the need to adjust to EU binding energy policy targets and rules.

Thus, any attempt to improve the role of the EU budget in support of innovation in a specific policy area should start by analysing the overall regulatory and policy framework in order to identify what are the main obstacles of innovation in the given policy fields and the main market gaps hampering business innovation in this area. In the case of agriculture, for instance, the amounts devoted to innovation from EAFRD will not make the difference unless accompanied by changes in the overall CAP policy framework. In particular, CAP pillar one should be significantly shifted from direct payments to payments linked to agri-environmental outputs if we want to change farm behaviour and create the right incentives to innovate on sustainable agriculture practices and technologies¹⁵¹.

Finally, providing effective support to innovation also implies having appropriate procurement and funding rules in place. EU financial rules have been recently revised and the impact of this revision on the financing of innovation throughout the EU budget deserves further analysis.

8.5. LINK EUROPEAN PPPS IN RESEARCH WITH MISSIONS TO INCREASE STRATEGIC FOCUS AND IMPACT-ORIENTATION

The PPPs instruments should be regarded as tools to engage leading industrial players in priority areas of EU R&I policy. They provide opportunities to foster knowledge sharing, build trust among competitors, create innovation ecosystems and coordinate research agendas. The potential of these instruments, however, has not been fully exploited.

The establishment of missions can help improve the impact-orientation of partnerships. Missions have the advantage that they structure and further narrow the direction of EU R&I support. This means that the comparatively low budgetary resources of the EU (around 10% of public spending on R&I in the EU) are more likely to mobilise a critical mass of research in the fields connected to missions. Moreover, missions provide for an opportunity to test new modes of implementation, beyond the classic project grants, that require large networks of actors to collaborate over an extended period of time. Missions can also help increase synergies between PPS and other parts of Horizon Europe and avoid possible overlaps.

¹⁵¹It should be pointed out that current CAP pillar 1 payments may not necessarily hinder innovation. As pointed out by Détang-Dessendre C et.al (2018) they may instead favour it by stabilising farmers' income and allowing farmers to do risky investments. However, as they are designed today, they do not provide the right incentives to innovate on sustainable agriculture practices and technologies.

Last but not least, it is important to create clear paths for discontinuing existing PPPs that do not fit with established missions, so as to make sure that only highly relevant PPPs in areas of strategic priority are funded.

8.6. REDEFINE EU MARKET-DRIVEN INSTRUMENTS TO BETTER RESPOND TO CURRENT CHALLENGES AND MARKET GAPS

The current MFF has witnessed a significant development in the provision of EU market-driven instruments in support to research and innovation. InnovFin represents a major improvement compared to the more modest schemes that existed in 2007-2013 and the set-up of EFSI has reinforced the EU capacity to support private financing of innovation. However, both InnovFin and EFSI were set-up in a post-financial crisis context. During the first years of implementation an important number of EU countries experienced economic stagnation, persistent low levels of overall investment and credit constraints due to the fragility of the banking sector.

The context today is not the same. Access to credit has improved. A recent EIB analysis shows that SMEs implementing existing innovations that are new to the firm but not to the market (“adopters”) are not currently significantly more credit-constrained than non-innovative SMEs. Firms that continue to be credit-constrained are young SMEs adopting radical innovations (“leading innovators”), followed by SMEs adopting incremental innovations. Moreover, over the last years it has become clear Europe’s difficulty to transform EU’s high scientific excellence into leadership in breakthrough, market-making innovations. Making a significant leap in these areas is not possible without mobilising large parts of private investment.

Taking into account this context, the next generation of EU market-driven instruments should:

- Make sure that EU debt schemes are clearly targeted to innovative firms suffering from credit-constraints and coordinate with similar national and regional schemes.
- Create blending products (products combining grants and market instruments) to help highly innovative start-ups to scale up. These products could be provided within the EIC framework or outside it.
- Explore the possibility to create thematic products to support missions.
- Evaluate the potential advantages and costs of creating separate high-risk instruments outside InvestEU Fund.

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ANNEX 1: PROGRAMME FICHES

List of programme fiches presented below:

- Asylum, Migration and Integration Fund (AMIF)
- Cohesion Fund (CF)
- Connecting Europe Facility (CEF) – Telecom
- Connecting Europe Facility (CEF) – Transport and Energy
- Copernicus
- COSME
- Employment and Social Innovation programme (EaSI)
- Erasmus+
- EURATOM Research and Training Programme (RTP)
- European Agriculture Rural Development Fund (EARDF)
- European Fund for Strategic Investments (EFSI)
- European Maritime and Fisheries Fund (EMFF)
- European Regional Development Fund (ERDF)
- European Social Fund (ESF)
- Galileo
- Health Programme
- Horizon 2020 (H2020)
- Internal Security Fund (ISF)
- International Thermonuclear Experimental Reactor (ITER)
- LIFE
- NER300
- Preparatory Action on Defence research (PADR)

ASYLUM, MIGRATION AND INTEGRATION FUND (AMIF)

A) OBJECTIVES AND STRUCTURE OF THE PROGRAMME

The aim of AMIF is to contribute to the efficient management of migration flows and to the implementation, strengthening and development of the common policy on asylum, subsidiary protection and temporary protection and the common immigration policy, while fully respecting the rights and principles enshrined in the Charter of Fundamental Rights of the European Union.

The fund is structured in four specific objectives:

- To strengthen the **Common European Asylum System**, basically by strengthening Member States' capacity to develop, monitor and evaluate their asylum policies and procedures as well as actions aimed at the resettlement and transfer of applicants for, and beneficiaries of, international protection.
- To support **legal migration**, in particular through the backing of actions of national, local authorities and civil society engaged in the process of fostering integration and mutual trust.
- To improve the **return process and combat irregular migration**; by strengthening and improving Member States' return policies and actions to combat irregular migration
- To improve **solidarity between Member States**, especially towards those that are most affected by migration and asylum flows.

The budget of AMIF was increased from the planned EUR 3.1 billion to EUR 6.9 billion due to the migration crisis. 82% of the funding is implemented through shared management: EU Member States prepare multiannual National Programmes for the whole period 2014-2020. The remaining AMIF budget (18% of the total amount, EUR 1.2 billion) is managed by the Commission, and serves to finance three types of actions:

- **Union Actions** (transnational activities or actions of particular interest to the Union).
- **Emergency Assistance** (EMAS), assistance in Member States and third countries in the event of an emergency situation.
- **European Migration Network** (EMN), a transnational network that provides up-to-date, objective, reliable and comparable information on migration and asylum with a view to supporting policymaking in the European Union and inform the population.

Initially, the Regulation foresaw that 30% of the envelope managed by the Commission will be allocated to Union Actions and EMN but this target has deviated due to the migration crisis and more funding is likely to be allocated to emergency support.

B) DOES THE PROGRAMME SUPPORT INNOVATION?

While promoting innovation is not a key objective of the Fund, AMIF **Union actions** shall, among other objectives, support "the setting-up of transnational cooperation networks and pilot projects, including innovative projects, based on transnational partnerships between bodies located in two or more Member States designed to stimulate innovation and to facilitate exchanges of experiences and best

practices” and “studies and research on possible new forms of Union cooperation in the field of asylum, immigration, integration and return and relevant Union law¹⁵²”. Member States can also use part of their AMIF envelope to support innovative techniques or solutions. The mid-term evaluation gives some examples of Member States having financed innovative projects with AMIF, but these seem to be very marginal¹⁵³.

C) CAN WE ESTIMATE THE AMOUNTS OF FUNDING FOR INNOVATION?

It is not possible to estimate how much of AMIF funds is allocated to innovative projects.

¹⁵² Art. 20 of the AMIF regulation

¹⁵³ For instance, in the field of integration of migrants, France used AMIF to develop innovative digital tools to set up collaborative platforms mapping integration actors in given territory (see European Commission, 2018, Interim evaluation of the asylum, migration and integration fund, p.71).

COHESION FUND (CF)

A) OBJECTIVES AND STRUCTURE OF THE FUND

The Cohesion Fund (CF) has as objective to reduce disparities and promote sustainable development in the EU. It is aimed at Member States whose Gross National Income (GNI) per inhabitant is less than 90 % of the EU average and provides funding for two types of investments:

- Trans-European Transport Networks (TEN-T) e.g. railways, motorways, bridges, notably those in the list of 'priority projects of common interest'.
- Investment in the environment: projects in transport and energy that have a beneficial effect on the environment, e.g. renewable energy, energy efficiency, and reducing road transport.

The Cohesion fund is implemented under shared management except for a part of the budget (EUR 10 billion out of EUR 63.4 billion) that is transferred to the transport pillar of the Connecting Europe Facility (CEF) to finance core network projects and is managed at central level.

B) DOES THE FUND SUPPORT INNOVATION?

The CF does not have as objective to support innovation, neither is innovation a cross-border goal. However, some of the Fund's investments in low-carbon energy and transport infrastructures may have a strong innovative technological component.

C) CAN WE ESTIMATE THE AMOUNTS OF FUNDING FOR INNOVATION?

Knowing how much of CF funding has financed innovative projects would require a project-by-project analysis which is clearly out of this research. We can, however, provide a rough estimation of the amounts from Cohesion Fund in support of innovation by looking at the dataset of ERDF/ESF/Cohesion Fund funding per categories of intervention elaborated by DG REGIO.

Among the 18 ESIF intervention categories we have classified as "innovation funding" (see box 6, ERDF fiche 2) receive funding from the Cohesion Fund: Intelligent energy distribution system at medium and low voltage levels (including smart grids and ICT systems (EUR 0.14 billion) and intelligent transport systems (including the introduction of demand management, tolling systems, IT monitoring control and information systems) – EUR 0.62 billion.

In total, CF funding in support to innovation is **EUR 0.76 billion** (classified as diffusion of innovations).

CONNECTING EUROPE FACILITY (CEF)- TELECOM**A) OBJECTIVES AND STRUCTURE OF THE PROGRAMME**

The Connecting Europe Facility (CEF) is a programme whose goal is to support trans-European networks and infrastructures in the sectors of transport, energy and telecommunications. In the area of Telecoms, CEF has a budget of 1 billion Euros. Most of the funding (870 mn) is dedicated to support the deployment of **Digital Service Infrastructures (DSIs)** delivering networked cross-border services for citizens, businesses and public administrations. The remaining funding is dedicated to invest in cross-border broadband infrastructure.

B) DOES THE PROGRAMME SUPPORT INNOVATION?

CEF-Telecom supports the digitalisation of Europe's economies and societies. It funds the deployment of basic digital service solutions (called "building blocks") such as e-signature, e-identification (eID), e-invoicing, e-delivery or automated translation, and which are key enablers for the development of sector-specific digital services. It also supports the implementation and maintenance of cross-border and interoperable digital service platforms for specific areas (such as e-procurement, the European e-justice portal, the Business Registers Interconnection System or the Online Dispute Resolution for instance).

CEF support is classified as "support to diffusion of innovations" in our taxonomy. In effect, CEF Telecom provides support only for deployment of mature solutions, not for testing/piloting. There is a high degree of complementarity with Horizon 2020, which funds the development of innovative digital technologies), and in some occasions CEF has served to deploy digital solutions that have been developed under pilot programmes with H2020 money or with the former Competitive and Innovation Programme (CIP programme, running from 2007-2013).

CEF is also strongly connected with the ISA² programme (Interoperability Solutions for European Public Administration). This is a small EU programme which aims at promoting innovative digital solutions for public administrations. Whereas Horizon 2020 mainly covers the research & development phase, ISA² supports the development and piloting phase, while CEF provide support in the deployment and operation phase.

C) CAN WE ESTIMATE THE AMOUNTS OF FUNDING FOR INNOVATION?

CEF support to Digital Service Infrastructures amounts to EUR 0.9 billion.

CONNECTING EUROPE FACILITY (CEF) – TRANSPORT AND ENERGY

A) OBJECTIVES AND STRUCTURE OF THE PROGRAMME

The Connecting Europe Facility (CEF) is a funding programme for transport, energy and telecommunications infrastructures. CEF's prime focus is to support cross-border infrastructure, the European-wide interconnected systems and the deployment of innovative technologies.

Telecom is analysed in a distinct fiche. This fiche focuses on the transport and energy pillars which are main contributors to EU climate action-related spending.

Transport is the largest CEF pillar (79% of the total budget). Its budget for 2014-2020 is EUR 12.7 billion to which add up EUR 11.3 billion under the Cohesion Fund directly managed within CEF. CEF Transport has 3 funding objectives¹⁵⁴:

1. Removing bottlenecks, improving interoperability and bridging missing links (80% of budget): It includes the largest share of the CEF Transport budget financing Core Network Corridors and other sections (EUR 17 billion in 2014-2016), the European Rail Traffic Management System (ERTMS) and rail interoperability.
2. Ensuring sustainable and efficient transport in the long run (5%): it includes funding for innovation and new technologies (such as alternative fuel supply points) for the decarbonisation of transport (incl. electricity, hydrogen, liquefied natural gas and petroleum gas) and safe and secure infrastructures.
3. Optimising integration and interconnection of modes and enhancing interoperability (15%): it includes the Single European Sky Air Traffic Management Research and Development project (SESAR), Intelligent Transport Systems (ITS), Motorways of the Sea (MoS), multimodality, and other telematics applications.

The **CEF Energy** pillar has EUR 5.4 billion of budget (18%). It has three main objectives:

1. Increasing competitiveness through further integration of the internal energy market and the interoperability of electricity and gas networks across borders;
2. Enhancing Union security of energy supply;
3. Contributing to sustainable development and protection of the environment (integration of energy from renewable sources and development of smart energy networks and carbon dioxide networks).

¹⁵⁴ Annex 1, Part IV of the CEF Regulation

B) DOES THE PROGRAMME SUPPORT INNOVATION?

In **CEF Transport**, the deployment of innovative low-carbon technologies is an explicit objective¹⁵⁵. There is specific funding to support studies, pilot projects and the roll-out of innovative solutions in at least 2 Member States. Studies can be financed without pilot deployment but priority is given to projects with pilot deployment¹⁵⁶. Innovation calls should fund innovative solutions that encompass several innovative elements (e.g. both single ticketing and alternative fuels). A project with innovative telematics at its core for instance has to refer to calls for the transport mode concerned (e.g. ERTMS).

Following our taxonomy, CEF funding for 'innovation and new technologies' is considered as direct support to innovation while funding for the deployment of EU-wide new systems in traffic management and safety that improve efficiency and reduce emissions (i.e. ERTMS for railways; SESAR for aviation; ITS for road; RIS for rivers and Motorways of the Sea for maritime) is accounted as support to the diffusion of innovations.

CEF Energy contributes to the large-scale deployment of clean energy technologies and infrastructures that are needed for the energy transition, in particular in smart grids and innovative storage projects. However, assessments show that CEF Energy funds few smart grid projects¹⁵⁷ compared to numerous gas projects (49 projects with over 60% of the allocated funds in 2014-2016). This is questionable from a sustainable development point of view. Latest data from 2018 show that EUR 1.25 billion out of EUR 2.46 billion CEF Energy allocations funded electricity transmission and smart grids¹⁵⁸.

C) CAN WE ESTIMATE THE AMOUNTS OF FUNDING FOR INNOVATION?

We estimate amounts that financed innovation in **CEF Transport** based on 75% of the CEF spending allocated between 2014-2016¹⁵⁹ as we do not have precise data on the whole funding period:

- FO1: EUR 1.07 billion in funding for ERTMS;
- FO2: EUR 0.41 billion in funding for innovation and new technologies;
- FO3: EUR 2.2 billion in funding for SESAR, ITS, MoS, RIS and other telematics applications.

According to the mid-term report, out of the 34% of the total **CEF Energy** envelope that have been allocated in 2014-2016, EUR 40.5 million were allocated to one smart grid action. We do not have more recent or specific data on the amounts for newer smart grid projects and on the type of electricity transmission projects funded¹⁶⁰.

¹⁵⁵ See CEF Regulation, art. 46 and definition of new technologies and innovation in Article 33 of Regulation (EU) No 1315/2013 (TEN-T regulation).

¹⁵⁶ See Annex 3 to the Implementing Decision C(2014)1921

¹⁵⁷ <https://www.e3g.org/library/reassessing-the-eu-energy-infrastructure-needs>

¹⁵⁸ CEF Impact assessment, May 2018

¹⁵⁹ EC (2018). Mid-term report CEF.

¹⁶⁰ CEF Impact assessment, May 2018

In 2014-2016, **EUR 3.7 billion** of the CEF Transport and Energy budgets funded innovative actions, of which EUR 0.41 billion funded direct support to innovation and EUR 3.32 billion funded the diffusion of innovation.

COPERNICUS

A) OBJECTIVES AND STRUCTURE OF THE PROGRAMME

Copernicus is the European Union’s Earth monitoring programme for the 2014-2020 period. It aims at monitoring the Earth notably to support civil security efforts and the protection of the environment. Copernicus articulates three key components:

- Space component (e.g. Sentinel satellites);
- In-situ component (e.g. ground based monitoring system that can use drones to gather information and imagery);
- Copernicus Services component, that uses data to produce six different services (i.e. (1) land monitoring, (2) Marine Environment Monitoring, (3) Atmosphere Monitoring, (4) Emergency Management, (5) Services for Security applications, and (6) Climate Change).

B) DOES THE PROGRAMME SUPPORT INNOVATION?

Copernicus plays a major role in support to innovation as it provides data that can be used by researchers and innovators (especially data-driven start-ups). The Copernicus Regulation (art 23) explicitly states that Copernicus shall “[support] the European research, technology and innovation communities” and article 3.9.b specifies that Copernicus users includes “research users: universities or any other research and education organizations”.

C) CAN WE ESTIMATE THE AMOUNTS OF FUNDING FOR INNOVATION?

Copernicus has an overall funding under the 2014-2020 MFF of EUR 4.3 billion, including EUR 3.5 billion only for the space component. All this funding can be considered as “research infrastructure” in our taxonomy of innovation funding.

COSME

A) OBJECTIVES AND STRUCTURE OF THE PROGRAMME

COSME is an EU programme aimed at strengthening the competitiveness and sustainability of EU enterprises, particularly SMEs. It is structured around four **specific objectives**:

Objective 1 (*Improve access to finance for SMEs*) is the most important one, with an indicative allocation of 60% of total COSME budget. It includes two financial instruments in support to SMEs, a debt instrument (**COSME Loan Guarantee Facility -LGF**), and an equity instrument (**COSME Equity Facility for Growth -EFG**).

Objective 2 (*supporting internationalisation and access to markets*) is the second largest, with an indicative allocation of 21.5%. It basically funds the **Enterprise Europe Network (EEN)**, a network of 600 business service centres which aims to serve SMEs that have international ambitions by providing advice, partnership services and support for innovation.

Objective 3 (*creating an environment favourable to competitiveness*) has an indicative allocation of 11%. It supports very different actions intended to develop new competitiveness and business development strategies (sharing of good practices on SMEs policies, promotion of transnational collaboration among clusters and business networks, etc...)

Objective 4 (encouraging an entrepreneurial culture) has an indicative pre-allocation of 2.5%. It encompasses the actions geared towards fostering entrepreneurship. The **Erasmus for Young Entrepreneurs (EYE)** programme is the largest action. It facilitates exchanges between new entrepreneurs and more experienced ones in other countries to help them acquire and build skills

B) DOES THE PROGRAMME SUPPORT INNOVATION?

COSME does not have as goal to promote innovation but many of the actions financed may support innovation:

- **COSME Loan Guarantee Facility** is not focused on innovative SMEs but it has a ceiling of EUR 150.000 (compared to InnovFin SMEG, which provides loans of more than EUR 250.000). As a result, part of COSME LGF support goes to innovative entrepreneurs and small SMEs.
- The **COSME Equity Facility for Growth (EFG)**, even if not specifically earmarked to support innovative business (like the InnovFin equity facility), it covers a gap of venture capital for expansion and growth phases, a major obstacle for innovative business. According to interviews¹⁶¹ and evaluation reports, it works in a very complementary way with InnovFin equity instrument and in many occasions the European Investment Fund combines funding from InnovFin and COSME to invest in multistage funds (i.e., covering both early- and growth-stage investments). This is the case of the Pan-European VC FoF, which combines resources

¹⁶¹ Interview with officials from the Dg Ecfm

from Horizon 2020's InnovFin Equity scheme (up to EUR 200 million), COSME EFG (up to EUR 100 million) as well as the EFSI Equity Instrument (up to EUR 100 million).

- The **Enterprise Europe Network (EEN)** has among its objectives to “facilitate cross-border business cooperation, R&D, technology and knowledge transfer and technology and innovation partnerships”. According to COSME mid-term evaluation, the EEN has been supporting innovation by promoting partnerships and through advisory services¹⁶², but it is not possible to disentangle these actions from other non-innovative actions (e.g. support to internationalization).

C) CAN WE ESTIMATE THE AMOUNTS OF FUNDING FOR INNOVATION?

As said above various COSME measures may contribute to innovation but it is difficult to single-out what is innovative funding within these actions. The only measure that can be considered largely innovative funding is **COSME Equity Facility for Growth**, which works in complement with other EIF-managed equity facilities and covers the gap of venture capital for expansion and growth phases, a major obstacle for innovative business. The overall budget envelope for COSME EFG is EUR 0.6 billion¹⁶³.

¹⁶² COSME Mid-term evaluation

¹⁶³ ANNEX to the REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL on financial instruments supported by the general budget according to Art.140.8 of the Financial Regulation as at 31 December 2016 {SWD(2017) 312 final}

EMPLOYMENT AND SOCIAL INNOVATION PROGRAMME (EaSI)

A) OBJECTIVES AND STRUCTURE OF THE PROGRAMME

EaSI is the budgetary programme supporting EU action in the field of social and employment. The programme is structured in three axes:

- The **PROGRESS axis** (60% of the budget) aims at supporting the modernisation of Member States' employment and social policies by financing studies, reports, evaluations, information-sharing and mutual learning activities.
- The **EURES axis** (18% of the budget) finances a European job mobility network that provides information, guidance and recruitment/placement services to employers, jobseekers and any citizen wishing to take advantage of freedom of movement for workers.
- The **Microfinance and Social Entrepreneurship (MF/SE) axis** (21% of the budget) which includes two financial instruments managed by the EIF:
 - The EaSI guarantee provides access to microfinance for vulnerable persons who are at risk of losing their job or have difficulty in entering or re-entering the labour market, micro-enterprises which employ vulnerable persons or social enterprises both in their start-up and development phases
 - The EaSI capacity building which aims at building the institutional capacity of financial intermediaries operating in the microfinance and social entrepreneurship space

B) DOES THE PROGRAMME SUPPORT INNOVATION?

One of the specific objectives of PROGRESS is to support social and labour market policy innovations. In particular, the regulation establishes that between 15 and 20% of the total PROGRESS budget shall be used to support social policy experimentations, defined as "policy interventions that offer an innovative response to social needs, implemented on a small scale and in conditions that enable their impact to be measured, prior to being repeated on a larger scale, if the results prove convincing".

The EaSI Financial Instruments (EaSI guarantee and capacity building) support social entrepreneurs and social enterprises in their start-up and development phases. In doing so they may support innovative social entrepreneurs but the facilities are not explicitly intended to support innovative actors and there is no publicly available information on the profile of the beneficiaries having received EaSI financial support.

C) CAN WE ESTIMATE THE AMOUNTS OF FUNDING FOR INNOVATION?

60% of the total EaSI budget (EUR 0.6 billion) is allocated to PROGRESS. According to the EaSI regulation, between 15 and 20% of this budget (between EUR 0.08 billion and EUR 0.1 billion) will be used to support social innovation.

ERASMUS+

A) OBJECTIVES AND STRUCTURE THE PROGRAMME

Erasmus+ aims to support education, training, youth and sport in Europe. It has two objectives: supporting mobility of individuals and supporting cooperation, networking practices between institutions working in the field of education, youth and sport. The programme is structured in three key actions:

- 1) **learning mobility of individuals** provide mobility grants to individuals (students, trainees, apprentices, young people and volunteers, professors, etc..).
- 2) **cooperation for innovation and the exchange of good practice** finances collaborative platforms, transnational or international projects promoting cooperation, innovation, exchange of experience and know-how between different types of organisations involved in education, training and youth.
- 3) **policy reform** supports national authorities and stakeholders in defining and implementing policies in the field of education, training and youth.

In addition to that there are two stand-alone sub-programmes for **sport** (support to cooperation projects, events, studies and other initiatives aimed at implementing EU strategies and priorities in the field of sport) and **Jean Monnet activities** (actions aimed at supporting teaching on European integration studies).

B) DOES THE PROGRAMME SUPPORT INNOVATION?

While Erasmus+ is well-known for its individual mobility grants, Key action 2 and 3 aim at promoting more permanent, institutional and structural changes in education, training and youth policies. Both KA2 and KA3 have an innovation component. KA2 supports the development, transfer and implementation of innovative practices through **Strategic Partnerships** between public authorities, enterprises and civil society active in education, training or youth. It also fosters the links between education/research/innovation ('knowledge triangle') by supporting two types of education/work partnerships (**knowledge alliances** and **sector skills alliances**).

Under Key action 3, some support has been given to policy experimentation projects in the field of education and training¹⁶⁴.

According to the mid-term evaluation, however, the impact of these actions on innovation is very modest. In particular, the evaluation shows that "while there are some examples of innovations that emanate from funded projects, these are rather ad-hoc, soft and of modest scale compared to the volume of projects funded rather than significant and mainstreamed. Although Erasmus+ has potential

¹⁶⁴ For instance, the 2016 call for proposals for Forward-Looking Cooperation Projects (FLCPs) supports projects providing innovative solutions to long-term challenges in the education and training field.

to enhance innovation (collaborative approaches, specific KA3, brand attractiveness), its added value cannot be said as emanating significantly so far from a role model in that respect.”¹⁶⁵.

C) CAN WE ESTIMATE THE AMOUNTS OF FUNDING FOR INNOVATION?

Existing reports provide information of Erasmus+ funding per type of action. Since KA2 and KA3 provide more than funding for innovation projects it is not possible to estimate the amounts of innovation funding.

¹⁶⁵ Commission Staff Working Document, Mid-term evaluation of the Erasmus+ programme (2014-2020), Brussels, 31.1.2018 SWD(2018) 40 final p. 75

<i>EURATOM RESEARCH AND TRAINING PROGRAMME (RTP)</i>

A) OBJECTIVES AND STRUCTURE OF THE PROGRAMME

The Euratom Research and Training Programme (RTP) is an EU-funded thematic research and training programme operating in scientific and technical areas covered by the Euratom Treaty.

The programme funds research on nuclear safety, safeguards and security, radioactive waste management, radiation protection and fusion energy, with an emphasis on continually improving nuclear safety, security and radiation protection notably to contribute to the long-term decarbonisation of the energy system in a safe, efficient and secure way.

The current Euratom programme will end on 31 December 2018. On 1 December 2017 the Commission submitted to the Council a proposal to extend this programme until 2020 to bring it into line with the current seven-year MFF, running from 2014 to 2020.

B) DOES THE PROGRAMME SUPPORT INNOVATION?

All RTP funding can be considered innovation funding as it supports applied research on nuclear energy.

C) CAN WE ESTIMATE THE AMOUNTS OF FUNDING FOR INNOVATION?

The Euratom programme for 2014-2018 had a budget of EUR 1.6 billion. The Council was supposed to extend the programme for two years to match the seven-year duration of the MFF but to our knowledge this has not been done. All the Euratom funding is classified as “direct support to R&I projects” in our taxonomy.

EUROPEAN AGRICULTURE RURAL DEVELOPMENT FUND (EARDF)

A) OBJECTIVES AND STRUCTURE OF THE FUND

The European Agriculture Fund for Rural Development (EAFRD) aims to promote sustainable rural development throughout the Union by fostering the competitiveness of agriculture; promoting the sustainable management of natural resources and climate action and promoting a balanced territorial development of rural economies and communities. It is one of the two funds financing the Common Agriculture Policy (CAP).

The Fund has **six Strategic Priorities** (promoting knowledge transfer and innovation, competitiveness and viability of farm, food chain organization, ecosystem management, low carbon and climate resilience and social inclusion). Each priority is broken down into two or more sub-areas for targeted intervention, giving in total **18 different focus areas of intervention (FA)**. The regulation also provides a list of **20 eligible measures (M)** through which the different objectives and focus areas can be attained.

The EAFRD is implemented through multiannual **rural development programmes (RDP)** drawn by Member States. Each RDP should cover at least four of the six above-mentioned EU priorities. MSs have considerable flexibility in choosing the measures to address the various priorities established in their RDPs.

B) DOES THE FUND SUPPORT INNOVATION?

Actions under the strategic priority 1 are explicitly aimed at promoting innovation ("*Fostering knowledge transfer and innovation in agriculture, forestry and rural areas*"). This includes two types of actions (FAs):

- Actions to foster innovation, cooperation and the development of the knowledge base in rural areas,
- Actions aimed at strengthening the links between agriculture, food production and forestry and research and innovation.

Actions under other objectives such as objective 5 (low-carbon and climate) may also have a strong innovative potential.

C) CAN WE ESTIMATE THE AMOUNTS OF FUNDING FOR INNOVATION?

Priority 1 ("*knowledge transfer and innovation in agriculture, forestry and rural areas*") applies horizontally in relation to the other Union Priorities, and for that reason there is no counting of a separate budget in the National Development Plans.

Another way to try to single out “innovation funding” is by looking at allocations per type of Measure. M16 (“cooperation”) is explicitly aimed at supporting the cooperation between different actors active in rural areas to implement innovative projects.

M16 can support different types of innovative cooperation projects but, in particular, it can support the set-up and running of European Innovation Partnership Agriculture (EIP agriculture) Operational Groups. EIP operational groups are local groups made up of a combination of different actors (farmers, forest managers, researchers, NGOs...) whose aim is to develop bottom-up co-creation innovation solutions to address problems or seize opportunities for farmers/foresters.

According to the Cohesion Open data portal¹⁶⁶, out of the EUR 100.1 billion EAFRD budget, EUR 1.7 billion (2%) have been allocated to cooperation actions.

Some studies¹⁶⁷ include other eligible measures as measures supporting innovation, in particular M1 (“knowledge transfer and information actions”), which finance vocational training and skills acquisition actions, demonstration activities and information actions and M2 (“advisory services”). However, the type of actions financed under M1 and M2 are quite broad and not all are clearly innovative. For instance, M1 includes training actions for farmers but also information and assistance to farmers to help them adapt to the regulatory environment associated with the implementation of the CAP. M2 finances advisory services to farmers and forest managers to help them improve their economic and environmental performance or climate friendliness but improvements may not necessarily entail innovations.

¹⁶⁶ Database “2014-2020: EAFRD allocation by focus area (EU planned financing)”

¹⁶⁷ Détang-Dessendre Cécile, Geerling-Eiff Floor, Guyomard Hervé and Poppe Krijn, 2018. *EU Agriculture and innovation: What role for the CAP?*, INRA and WUR, 32p.

EUROPEAN FUND FOR STRATEGIC INVESTMENTS (EFSI)

A) OBJECTIVES AND STRUCTURE OF THE PROGRAMME

The European Fund for Strategic Investments (EFSI) is an EU programme backed by a budgetary guarantee of EUR 26 billion from the EU budget. On the basis of this guarantee, combined with some funding from the EIB's own capital (EUR 7.5 billion), EFSI enhances the risk-bearing capacity of the EIB allowing the Bank to finance projects considered of strategic importance for Europe which would not have been financed, or not to the same extent, by other public or private sources.

EFSI's budgetary guarantee is only partially provisioned. There is a Guarantee Fund for EFSI in the EU budget which constitutes the liquidity cushion from which the EIB is to be paid in the event of a call on the EFSI guarantee. This Guarantee Fund amounts to EUR 9.1 billion (35% of the EFSI guarantee).

EFSI's scope of action is very large. Art 9.2. of EFSI regulation defines eight thematic areas eligible under EFSI: RDI, energy, transport, smaller companies, digital, environment and resource efficiency, social infrastructure and sustainable agriculture. The Fund operates along two windows: the Infrastructure and Innovation Window (IIW), managed by the EIB, aims to provide financing to strategic projects, and the SME Window (SMEW) managed by the EIF, provides support SMEs and mid-caps (enterprises with up to 3 000 employees). Each of the windows has debt-type and equity-type operations.

B) DOES THE PROGRAMME SUPPORT INNOVATION?

One of the thematic areas eligible to EFSI support is "research, development and innovation". EFSI shall in particular invest in (art 9.2.a):

- (i) projects that are in line with Horizon 2020;
- (ii) research infrastructures;
- (iii) demonstration projects and programmes as well as deployment of related infrastructures, technologies and processes;
- (iv) support to academia including collaboration with industry;
- (v) knowledge and technology transfer;

The role of EFSI in support of innovation, however, may go well beyond the projects labelled as "RDI". This is because EFSI additionality vis-à-vis other public and private sources comes basically from its capacity to finance high-risk projects or high-risk tranches of projects considered of strategic importance. This focus on high-risk finance makes the instrument particularly appropriate to support operations having an innovative component.

C) CAN WE ESTIMATE THE AMOUNTS OF FUNDING FOR INNOVATION?

EFSI results are reported annually in EFSI reports prepared by the EIB. In these reports there is some information on the distribution of EFSI support per sector. The data provided by annual reports, however, is not harmonized. Whereas the 2016 and 2017 EFSI annual reports provide information about EFSI signed financing (both IIW and SMEW) per sectors, the 2018 EFSI report provides information on the sectoral distribution of total public and private investment mobilized.

If we look at data from the 2017 EFSI report, by the end of 2017 EFSI had provided up to EUR 12.9 billion to RDI projects, which represents 35% of total EFSI signed financing at that time. More than half of it (EUR 7.1 billion) was financing made through the SMEW, representing 70% of total SMEW signed financing. The rest (EUR 5.9 billion) was financing under the IIW, which represented 23% of total IIW

financing. If we apply this percentage to the total expected EFSI financing by 2020 (100 billion¹⁶⁸), the result is an expected volume of EUR 22 billion of EFSI signed financing to RDI projects by 2020.

Another source of information is the list of EFSI-financed projects which is updated regularly in the EIB website. This only covers IIW operations, but gives more detailed information on the sectors covered. According to the data from this website (which is not part of formal EIB reporting on EFSI and should therefore be taken as provisional), as of end 2018 the IIW had provided up to EUR 10.7 billion to RDI projects, representing 27% of total IIW support. This includes some RDI projects with a digital component or providing support to smaller companies, and few innovative projects in the field of energy, environment or social infrastructures.

Table 13. EFSI investment under IIW to RDI projects (signed projects as of end 2018)

	Number of projects	EFSI amounts (in EUR billion)	EFSI amounts (as %)	Total investment mobilised	Total investment mobilised (as %)
Digital; RDI	6	1.4	13%	4.6	12%
Digital; Smaller companies; RDI	1	0.0	0%	0.4	1%
Smaller companies; RDI	26	1.5	14%	10.5	29%
RDI	93	6.9	65%	19.0	52%
Digital; Energy; Transport; Environment and resource efficiency; RDI	1	0.1	1%	0.8	2%
Energy; Environment and resource efficiency; RDI	1	0.0	0%	0.1	0%
Energy; Smaller companies; RDI	3	0.1	1%	0.6	2%
Energy; Social infrastructure; RDI	1	0.0	0%	0.1	0%
Energy; Transport; Environment and resource efficiency; Smaller companies; RDI	1	0.0	0%	0.0	0%
Environment and resource efficiency; RDI	1	0.3	3%	0.0	0%
Smaller companies; Social infrastructure; RDI	1	0.1	0%	1.4	0%
Social infrastructure; RDI	5	0.3	2%	0.7	2%
Total	140	10.7	100%	36.7	100%

Source: EFSI project list, EIB webpage

¹⁶⁸ EFSI is expected to generate EUR 100 bn of additional financing by the EIB Group (an internal multiplier effect of approximately x3) which, in turn, have to mobilise up to 500bn of additional public and private investment (an external multiplier effect of x5).

EUROPEAN MARITIME AND FISHERIES FUND (EMFF)

A) OBJECTIVES AND STRUCTURE OF THE PROGRAMME

The European Maritime and Fisheries Fund (EMFF) aims to support sustainable and competitive fisheries and aquaculture economy and to promote a balanced and inclusive territorial development of maritime and aquaculture areas. It underpins the Common Fisheries Policy and the EU Integrated Maritime Policy.

These broad objectives are structured around various priorities:

- Almost 50% of the budget goes to the first two priorities, support to **fisheries** (26.9%) and **aquaculture** (21%). EMFF support under these two priorities focus on innovation and added value that can make the fisheries and aquaculture sector economically viable sustainable and competitive.
- 19% of the budget serves to foster the implementation of the **Common Fishery Policy** through the collection and management of data to improve scientific knowledge and through support to monitoring, control and enforcement of fisheries legislations.
- 9% is dedicated to actions aimed at promoting **economic growth and social inclusion** in coastal and inland communities depending on fishing.
- 17.6% finances actions aimed at improving the market and process organisation for fishery and aquaculture products.
- 1.2% finances actions aimed at fostering the implementation of the **Integrated Maritime Policy**.

The EMFF is one of the European Structural and Investment Funds (ESI Funds). Almost 90% of the funding is allocated to the Member States according to the size of their fishing industry. The rest is managed by the Commission.

B) IS THE FUND EXPECTED TO SUPPORT INNOVATION?

Innovation is not a goal in itself but it is seen as vital to promote the transformation of the fishery and aquaculture economies (preamble of the EMFF regulation). In coherence with this, “support to technological development, innovation and knowledge transfer” is included as one of the specific objectives to support fisheries and aquaculture (priority 1 and 2).

The EMFF regulation gives detailed guidelines on the type of innovation activities to be financed¹⁶⁹. It also stipulates that innovation operations shall be carried out by, or in collaboration with, a scientific

¹⁶⁹ In the field of fisheries, EMFF may support projects aimed at developing or introducing new or improved products, processes, techniques or organisational or marketing arrangements to improve the productivity of fisheries or to reduce the impact of fishing activities on the environment. In the field of aquaculture, EMFF may support the development of new or improved products, processes, techniques and organisational and marketing practices but also new technical or scientific knowledge in aquaculture or knowledge for the introduction of new species in aquaculture.

or technical body recognised by the Member State which shall validate the results of such operations, and the results of operations shall be adequately publicised by the Member State (art 26.3).

In addition to that, Member States can use EMFF funding to:

- finance partnerships between scientists and fishermen (art 28);
- finance community-led local development strategies which can be used, among other things, to “promote innovation at all stages of the supply chain of fishery and aquaculture products”.

Finally, part of the EMFF funding under central management is used to finance scientific research, technology and innovation projects in fields linked to fisheries, aquaculture and maritime. This includes for instance the financing of the European Marine Observation and Data Network (EMODnet), defined as “one of the success stories of the EMFF” in a Commission evaluation report. EMODnet gathers over 150 public and private organisations in a partnership to deliver marine data that is reliable, accessible and free of restrictions of use. EMFF has also been used to finance various maritime innovation actions in the field of Blue Growth (Blue Careers, Blue Labs, Blue Technology calls for proposals)¹⁷⁰.

C) CAN WE ESTIMATE THE AMOUNTS OF FUNDING FOR INNOVATION?

The total budget for the EMFF allocated for 2014-2020 is EUR 6.4 billion. EUR 5.6 billion (89%) is managed by the Member States and EUR 0.6 billion is managed by the Commission.

Concerning the EMFF budget managed by Member States, it is not possible to find EU aggregate data on volumes invested on “support to technological development, innovation and knowledge transfer” (EU database on EMFF funding presents national EMFF allocations per overall priorities but not broken down per specific objectives).

Concerning the part of EMFF funding under central management, research and innovation activities are eligible for different specific objectives (foster the development and implementation of integrated governance of maritime and coastal affairs, support for sustainable economic growth, employment, innovation and new technologies in emerging and prospective sectors, collection, management and dissemination of scientific advice under the CFP,...) and thus it is not possible to estimate how much of the total funding goes in support to innovation.

¹⁷⁰ European Commission (2018), “Interim evaluation study of the implementation of the direct management component of the EMFF Regulation (Articles 15 and 125)”, final report.

EUROPEAN REGIONAL DEVELOPMENT FUND (ERDF)

A) OBJECTIVES AND STRUCTURE OF THE FUND

The ERDF aims at reducing the disparities in the level of economic development among EU regions by investing more heavily in the less developed ones. It can finance activities under all the 11 Thematic Objectives (TOs) structuring ESI support at national level¹⁷¹ but Member States are required to allocate between 50 and 80% of their ERDF envelope to, at least, two of the first **four Thematic Objectives**¹⁷²:

- TO1: strengthening research, technological development and innovation;
- TO2: enhancing access to, and use and quality of, ICT;
- TO3: enhancing the competitiveness of SMEs;
- TO4: supporting the shift towards a low-carbon economy in all sectors.

As with other ESI funds, the ERDF fund is implemented under shared management: Member States are in charge of planning and implementing ERDF funded-actions in their territory in accordance with their specific needs, following a Partnership Agreement and Operational Programmes previously agreed with the Commission.

B) DOES THE FUND SUPPORT INNOVATION?

ERDF actions under TO1 aim to contribute to the strengthening and improvement of regional research and innovation systems. This includes two types of investment actions (art 5 ERDF regulation):

- investments in regional research and innovation (R&I) infrastructure and capacities and;
- other actions aimed at promoting business investment in R&I, developing links and synergies between enterprises in R&I and promoting investment in product development among others.

Member States cannot invest ERDF funds under TO1 without having a national and/or regional smart specialisation strategy (RIS3) defining the strategic approach to innovation on the basis of the state or region's competitive advantage.

There are other ERDF investment priorities with an explicit innovation dimension:

- Under TO2, the ERDF can support the adoption of emerging technologies and networks for the digital economy, developing ICT services and strengthening the diffusion of e-government and e-health, among others.
- Under TO3, the ERDF can promote entrepreneurship, in particular by facilitating the economic exploitation of new ideas and fostering the creation of new firms, including through business incubators, and support SMEs in engaging in innovation processes, among others.
- Under TO4, the ERDF can promote research and innovation in low-carbon technologies.
- Under TO6 the ERDF can promote innovative technologies to improve environmental

¹⁷¹ ESI Funds are articulated around 11 Thematic Objectives (TOs) defined in article 9 of the Common Provision Regulation – an EU regulation setting common rules for all five ESI funds (Regulation No 1303/2013). Each TO includes is broken down in various investment priorities.

¹⁷² At least 80% of total ERDF resources in more developed regions, 60% in transition regions and 50% in less developed regions (see art. 4 ERDF regulation).

protection and resource efficiency in the waste sector, water sector and with regard to soil or to reduce air pollution.

Finally, ERDF can also support innovation as a means to attain other goals:

- Under TO 5 (climate change adaptation) the ERDF can support innovative technologies as a means to support climate adaptation and risk prevention;
- Under TO7 (sustainable transport) the ERDF can promote innovative solutions for environmentally friendly and low-carbon transport systems;
- Under TO 11 (public administration reforms), administrative capacities can be enhanced through innovation.

C) CAN WE ESTIMATE THE AMOUNTS OF FUNDING FOR INNOVATION?

The ERDF funding allocated to the strengthening and improvement of regional research and innovation systems amounts to **EUR 41.8 billion**. However, looking only to TO1 allocations does not provide a full account of all ERDF support to innovation.

Another way of estimating ERDF amounts in support of innovation is by looking at the dataset of ERDF/ESF/Cohesion Fund funding per categories of intervention elaborated by DG REGIO¹⁷³: This dataset classifies all ERDF allocated spending according to 123 categories of intervention fields in order to better monitor and report the use of funding. Only 9 out of the 123 intervention categories are explicitly labelled as “research and innovation” action but a total of 18 classify as innovation funding according to our taxonomy. The total amount of funding allocated to these interventions is to **EUR 53.4 billion**. More than two thirds (37%) is in form of “support to innovative firms”. Other important parts go to support to the diffusion of innovation (19%), and particularly to digitalisation actions. Less important amounts go to research infrastructure (15%) and support to the exchange and knowledge and information (15%).

Table 14. ERDF support to innovation per type of intervention

	Total amount (in EUR billion)	As %
Direct support to R&I activities and projects, including close-to-market activities	0	0
Support to diffusion of innovations	10.3	19%
Support to innovative firms	19.6	37%
Support to the exchange of knowledge and information	8	15%
Support to research infrastructure, human capital and policy-making	8.2	15%
Unclassifiable	7.4	14%
Total	53.4	100

¹⁷³ Cohesion Data “ESIF 2014-2020 categorisation ERDF-ESF-CF” retrieved on 15/01/2019 from <https://cohesiondata.ec.europa.eu/2014-2020/ESIF-2014-2020-categorisation-ERDF-ESF-CF-planned/9fpg-67a4>

Source: Cohesion Data “ESIF 2014-2020 categorisation ERDF-ESF-CF” retrieved on 15/01/2019 from <https://cohesiondata.ec.europa.eu/2014-2020/ESIF-2014-2020-categorisation-ERDF-ESF-CF-planned/9fpg-67a4>

Box 6. List of ERDF/ESF/Cohesion Fund categories of intervention classified as innovative funding

- Access to public sector information (including open data e-Culture, digital libraries, e-Content and e-Tourism).
- e-Government services and applications (including e-Procurement, ICT measures supporting the reform of public administration, cyber-security, trust and privacy measures, e-Justice and e-Democracy).
- e-Inclusion, e-Accessibility, e-Learning and e-Education services and applications, digital literacy.
- ICT Services and applications for SMEs (including e-Commerce, e-Business and networked business processes), living labs, web entrepreneurs and ICT start-ups.
- ICT solutions addressing the healthy active ageing challenge and e-Health services and applications (including e-Care and ambient assisted living).
- Intelligent Energy Distribution Systems at medium and low voltage levels (including smart grids and ICT systems).
- Intelligent transport systems (including the introduction of demand management, tolling systems, IT monitoring control and information systems).
- Investment in infrastructure, capacities and equipment in large companies directly linked to research and innovation activities.
- Investment in infrastructure, capacities and equipment in SMEs directly linked to research and innovation activities.
- Productive investment linked to the cooperation between large enterprises and SMEs for developing information and communication technology(ICT) products and services, e-commerce and enhancing demand for ICT.
- Research and innovation activities in private research centres including networking.
- Research and innovation activities in public research centres and centres of competence including networking.
- Research and innovation infrastructure (private, including science parks).
- Research and innovation infrastructure (public).
- Research and innovation processes in large enterprises.
- Research and innovation processes in SMEs (including voucher schemes, process, design, service and social innovation).
- Research and innovation processes, technology transfer and cooperation in enterprises focusing on the low carbon economy and to resilience to climate change.
- Technology transfer and university-enterprise cooperation primarily benefiting SMEs.

EUROPEAN SOCIAL FUND (ESF)**A) OBJECTIVES AND STRUCTURE OF THE FUND**

The European Social Fund (ESF) aims at improving access to the labour market, supporting education and training, and combating poverty and social exclusion. ESF funds contribute to the following Thematic Objectives (TO)¹⁷⁴:

- TO8: promoting sustainable and quality employment and supporting labour mobility;
- TO9: promoting social inclusion, combating poverty and any discrimination;
- TO10: investing in education, training and vocational training for skills and lifelong learning;
- TO11: enhancing institutional capacity of public authorities and stakeholders and efficient public administration.

All Member States shall allocate at least 20% of their ESF envelope to actions under TO9. The ESF also finances the Youth Employment Initiative (YEI) which is a dedicated budget envelope for regions with very high youth unemployment rates. YEI exclusively supports measures targeting young people not in education, employment or training (NEET).

B) DOES THE FUND SUPPORT INNOVATION?

Innovation is a cross-cutting objective of the ESF. Art 9 of the ESF regulation states that Member States shall promote social innovation within all areas of intervention, “in particular with the aim of testing, evaluating and scaling up innovative solutions, including at the local or regional level, in order to address social needs in partnership with the relevant partners and, in particular, social partners”. To this purpose, Member States shall identify, either in their Operational Programmes (OPs) or at a later stage during implementation, fields for social innovation that correspond to the Member States' specific needs and the Commission shall facilitate capacity building for social innovation (supporting mutual learning, establishing networks, and disseminating and promoting good practices and methodologies). A recent report¹⁷⁵ analyses how Member States have planned to use ESF to support social innovation. The report concludes that:

- most of OPs plan and/or implement actions relevant to social innovation, in particular to Thematic Objective (TO) 9, Social Inclusion;
- there is a wide diversity of approaches to support social innovation and a wide array of loose definitions on what is social innovation. Some put the accent on the empowerment of local communities, others on the improvement of the effectiveness of social policies;
- Despite the emphasis of the ESF regulation to use the Fund to “test, evaluate and scale up innovative solutions” very few OPs follows an experimental approach with pilot projects being carried out and their effects evaluated.

¹⁷⁴ The 11 Thematic Objectives of the ESI Funds are defined in article 9 of Regulation No 1303/2013.

¹⁷⁵ Fondazione G. Brodolini (2018), *ESF performance and thematic reports. The ESF support to social innovation final report*, Directorate-General for Employment, Social Affairs and Inclusion

C) CAN WE ESTIMATE THE AMOUNTS OF FUNDING FOR INNOVATION?

A total amount of EUR 0.9 billion has been allocated for Social Innovation in the ESF 2014-2020, corresponding to 0.8% of total ESF allocations. In addition to that, OPs from 22 MS have earmarked EUR 2.7 billion to actions having a non-innovative goal but promoting “social innovation” as secondary objective. The total amount of ESF in support to innovation is therefore EUR 3.6 billion.

<i>GALILEO</i>

A) OBJECTIVES AND STRUCTURE OF THE PROGRAMME

Galileo is a global navigation satellite system (GNSS) that, at the end of its completion, should consist of 24 satellites, plus spares. It is an infrastructure owned by the European Union and which rules were set up by Regulation (EU) No 1285/2013 (so-called 'GNSS Regulation').

This system articulates three key components:

- Hardware space component, (e.g. satellites launched by Ariane 5),
- Hardware land component, (e.g. Galileo control centres, network of sensor stations),
- Software component (e.g. software to manage Galileo data).

Galileo is an autonomous system. It is furthermore interoperable with the US GPS and the Russia's Glonass.

B) DOES THE PROGRAMME SUPPORT INNOVATION?

Article 7.2 of the GNSS Regulation specifically mentions that Galileo can "finance activities relating to research and development of fundamental elements, such as Galileo-enabled chipsets and receivers". On a broader note, the entire Galileo project can be considered an innovation in itself. Indeed, no satellite navigation system is able to provide such precise pieces of information.

C) CAN WE ESTIMATE THE AMOUNTS OF FUNDING FOR INNOVATION?

Under the MFF 2014-2020, and under Council Regulation No 1311/2013, Galileo benefits from a funding of EUR 7 billion. Given the innovativeness of Galileo, all funding can be considered "direct funding for R&I projects, including close-to-the market".

HEALTH PROGRAMME

A) OBJECTIVES AND STRUCTURE OF THE PROGRAMME

The EU Health Programme is designed to complement, support and add value to Member States health policies, with the aim of promoting health, encouraging innovation, boosting the sustainability of health systems and protecting Europeans from serious cross-border health threats. The programme is structured in four specific objectives:

1. promote health, prevent diseases and foster supportive environments for healthy lifestyles;
2. protect Union citizens from serious cross-border health threats;
3. contribute to innovative, efficient and sustainable health systems;
4. facilitate access to better and safer healthcare for Union citizens.

Each objective is broken down in 4-7 thematic priorities, which gives a total of 23 thematic priorities.

B) DOES THE PROGRAMME SUPPORT INNOVATION?

The Health programme supports innovation under objective 3 (“contributing to innovative, efficient and sustainable health systems”) and in particular under thematic priority 3.2 (“innovation and e-health”), 3.4 (“setting up a mechanism for pooling expertise at Union level”) and 3.5. (“support to the European Innovation Partnership in Active and Healthy Ageing”). Under these three thematic priorities, it provides funding to facilitate the deployment of innovation technologies and methods at national level, both in public health intervention and prevention strategies.

C) CAN WE ESTIMATE THE AMOUNTS OF FUNDING FOR INNOVATION?

The regulation does not pre-allocate amounts of funding per specific objectives and thematic priorities, this is done through annual work programmes.

According to the mid-term evaluation, between 2014-2016 the programme dedicated a total amount of EUR 0.03 billion to support innovation, particularly to facilitate the uptake of tested innovative technologies, e-health solutions and policy approaches at national and regional level.

- EUR 0.0028 billion to promote the uptake of **e-Health** innovations by increasing the interoperability of patient registries and other e-Health solutions, support cooperation on e-Health in the Union and its uptake by health professionals;
- EUR 0.013 billion to support the European Innovation Partnership in Active and Healthy Ageing;
- EUR 0.0020 billion to promote the pooling of expertise and supporting Member States undertaking health system reforms, inter alia by facilitating the **uptake of the results streaming from research projects supported under Horizon 2020**¹⁷⁶.

¹⁷⁶ 3.4.themematic priority, annex I of the EU Health programme regulation

HORIZON 2020 (H2020)

A) OBJECTIVES AND STRUCTURE OF THE PROGRAMME

H2020's general aim is "to contribute to building a society and economy based on knowledge and innovation across the Union by leveraging additional research, development and innovation funding" (art 5). The programme is built along **three pillars** ("excellent science", "industrial leadership" and societal challenges"), each one having their own specific objectives. In addition to the pillars there are two **cross-cutting objectives** ('spreading excellence and widening participation' and 'science with and for society') supported by specific programmes. Furthermore, Horizon 2020 general objectives are also pursued through the **Joint Research Centre - JRC** (the Commission's own science and knowledge service) and the **European Institute for Innovation and Technology- EIT**, as well as through **joint programming initiatives (JPIs)** with Member States¹⁷⁷ (see Figure 1).

The first pillar ("**Excellent science**") focuses on fundamental research activities. Most of the funding (53%) goes to the European Research Council (ERC) which provides grants to investigator-driven frontier research. In addition, the first pillar includes support to research projects on future and emerging technologies (FET actions), Marie Curie grants to support the training and mobility of researchers and support for the implementation and operation of new research infrastructures of pan-European interest (including ICT based e-infrastructures)

H2020's second pillar ("**Industrial leadership**") aims to speed the development of some key competitive-enhancing technologies and promote innovation in the private sector. 80% of pillar 2 funding goes to the LEIT programme ("Leadership in enabling and industrial technologies"), which supports research, development and demonstration actions of key enabling technologies for R&D. The programme is organised in three sub-areas: ICT technologies (LEIT-ICT), space technologies (LEIT-space) and nanotechnology, advanced materials, advanced manufacturing and processing and biotechnology (LEIT-NMPB). Support comes in form of R&I grants but also public-private partnerships. Apart from that, pillar 2 includes the InnovFin programme, which provides easier access to debt and equity financing to private firms and other research actors (research centres, universities) and the SME instrument (now part of the European Innovation Council pilot) which provides tailored financial support and technical assistance to top-class innovative SMEs.

H2020's third pillar ("**Societal challenges**") aims to stimulate a critical mass of research and innovation efforts to tackle seven pre-defined 'societal challenges'. This includes funding for basic research, applied research, knowledge transfer and innovation projects, mainly through calls for proposals outlined in multiannual Working packages.

¹⁷⁷ There are currently 10 JPIs designed to coordinate research funding at national and EU level in certain areas (climate, agriculture, oceans, urban Europe...) JPIs are open to all Member States but follow the principle of variable (not all MS participate in all initiatives). For more details see Horizon 2020 Interim Evaluation, p. 210.

The specific programme for “spreading excellence and widening participation” (**SEWP programme**) finances different actions (“twinning”, “teaming”, “ERA chairs”) aimed at strengthening the capacities of centres of excellence located in low performing regions through partnerships with internationally leading institutions and researchers.

The specific programme “science with and for society” (**SWAFS**) supports projects aimed at promoting responsible research and innovation (RRI) agendas.

The **Joint Research Centre (JRC)** receives 2% of total H2020 funding. Its goal is to provide scientific and technical support to Union policies.

The **European Institute for Innovation and Technology (EIT)** receives 4% of total Horizon 2020 funding. Its goal is to integrate the knowledge triangle of higher education, research and innovation in order to reinforce the Union's innovation capacity

B) DOES THE PROGRAMME SUPPORT INNOVATION?

Unlike past EU research programmes, H2020 puts a strong emphasis on close-to-market research and provides support to the development, demonstration and market uptake of innovative solutions through different types of actions:

- Financing close-to-market research, demonstration and market uptake actions (under 2nd and 3rd pillar, but also under 1st pillar through the so-called ERC “proof-of-concept” grants¹⁷⁸).
- Stimulating demand for new innovative solutions with instruments such as innovation procurement and inducement prizes (under the 2nd and 3rd pillar).
- Reinforcing firms’ R&I capabilities and providing access to risk capital (under “access to risk finance” and “innovation in SMEs”).
- Investing in new research infrastructures and strengthening the capacities of research centres in low-performing regions (under pillar 1, “research infrastructures” and special programme SEWP).
- Promoting the training and mobility of researchers (under pillar 1, Marie Curie actions).
- Promoting knowledge exchange and technology transfers through Joint Technology Initiatives, contractual Public-Private Partnerships and the EIT.

¹⁷⁸ Proof of Concept (PoC) is an ERC grant scheme that aims to explore the commercial and social potential of ideas arising from ERC grants.

C) CAN WE ESTIMATE THE AMOUNTS OF FUNDING FOR INNOVATION?

Horizon 2020 has a total budget of EUR 74.8 billion¹⁷⁹. If we exclude from it the only part of the budget dedicated to finance fundamental research, the European Research Council (ERC)¹⁸⁰¹⁸¹, we arrive at the figure of EUR 61.8 billion of Horizon 2020 supporting innovation.

As shown in table 15, 75% of Horizon 2020 funding serves to provide direct support to R&I activities and projects, including close-to-market activities. 15% is used to support research infrastructure, human capital and policy-making. Support to innovative firms and to the promotion of the exchange of knowledge and innovation represents 5 and 4% of total funding respectively.

Table 15. H2020 support to innovation per type of innovation action

	Total amount (in EUR billion)	As %
Direct support to R&I activities and projects, including close-to-market activities	46.1	75
Support to innovative firms	3.3	5
Support to the exchange of knowledge and information	2.6	4
Support to research infrastructure, human capital and policy-making	9.4	15
Unclassifiable	0.4	1
Total	61.8	100

¹⁷⁹ The regulation of December 2013 set a budget of EUR 77 billion for Horizon 2020 but in June 2015, the adoption of the European Fund for Strategic Investments lowered this budget to EUR 74.8 billion.

¹⁸⁰ A tiny part of the ERC budget serves to finance 'Proof of concept' (PoC) grants, which can be considered innovation-related funding. The amounts for Proof of concept' grants are not pre-allocated but it represented 1.3% of the ERC's budget allocated over the 2014-2017 period. If we apply the same percentage to the total ERC budget, we can estimate at EUR 170.2mn the amounts devoted to PoC. We have subtracted amount from the total ERC budget.

¹⁸¹ ERC, together with Marie Curie actions and SEWP programme, were exempted from budget cuts at the moment of the creation of EFSI. Therefore, we take the ERC budget as approved in the Horizon 2020 regulation and subtract the estimated amounts corresponding to PoC.

INTERNAL SECURITY FUND (ISF)

A) OBJECTIVES AND STRUCTURE OF THE PROGRAMME

The Internal Security Fund's objective is to promote the implementation of the Internal Security Strategy, law enforcement cooperation and the management of the Union's external borders.

The Internal Security Fund is composed of two instruments:

- **ISF Borders and Visa** (ISF-BV) has a budget of EUR 2.8 billion for 2014-2020. It aims to ensure a common visa policy and an integrated border management across the Union. 57% of the budget is implemented under shared management, and a majority of it is used to strengthen Member states' capacity for border control (e.g. purchase of new equipment). The rest of the funding is used to finance emergency assistance, union actions and also developing an IT system for the management of migration flows.
- **ISF Police** (ISF-P) has a budget of EUR 1 billion. It aims at preventing and fighting cross-border, serious and organised crime and terrorism. 66% of this budget is implemented under shared management and is mostly used to enhancing Member States' capacity to manage security-related risks. The rest of the funding is implemented by the Commission and it is used to finance Union actions and emergency assistance.

B) DOES THE PROGRAMME SUPPORT INNOVATION?

While ISF does not have as objective to promote innovation, Union actions under both ISF-BV and ISF-P can be used to "support particularly innovative projects developing new methods and/or technologies with a potential for transferability to other Member States, especially projects which aim to test and validate research projects"¹⁸²¹⁸³. In the case of ISF-P, national programmes can be also used to finance "measures deploying, transferring, testing and validating new methodology or technology, including pilot projects and follow-up measures to Union funded security research projects"¹⁸⁴. The ISF-P interim evaluation also pointed out the possible synergies between Horizon 2020 funding on security research and ISF-P funding, which can be used to implement H2020 innovative projects related e.g. to new technologies for crime prevention and crisis management¹⁸⁵.

C) CAN WE ESTIMATE THE AMOUNTS OF FUNDING FOR INNOVATION?

It is not possible to extract the amounts that are devoted to innovative Union actions and to national actions funding innovative actions.

¹⁸² Art 13.2.i of REGULATION (EU) No 515/2014 of 16 April 2014 establishing, as part of the Internal Security Fund, the instrument for financial support for external borders and visa and repealing Decision No 574/2007/EC

¹⁸³ Art 8.1.h of REGULATION (No 513/2014 of 16 April 2014 establishing, as part of the Internal Security Fund, the instrument for financial support for police cooperation, preventing and combating crime, and crisis management

¹⁸⁴ Art 4.1.g REGULATION (No 513/2014 of 16 April 2014 establishing, as part of the Internal Security Fund, the instrument for financial support for police cooperation, preventing and combating crime, and crisis management

¹⁸⁵ COMMISSION STAFF WORKING DOCUMENT Interim Evaluation of the Internal Security Fund - Borders and Visa 2014-2017 Brussels, 12.6.2018 SWD(2018) 340 final

INTERNATIONAL THERMONUCLEAR EXPERIMENTAL REACTOR (ITER)

A) OBJECTIVES AND STRUCTURE OF THE PROGRAMME

ITER ('International Thermonuclear Experimental Reactor') is an international scientific collaboration project aiming at demonstrating the scientific and technological feasibility of nuclear fusion, with a view to using it to produce energy for civilian use. It is based on an agreement signed in 2006 by China, India, Japan, Korea, Russia, the United States and the European Union.

The EU Member States participate to ITER by virtue of their membership of Euratom. Under the Euratom Treaty, the EU set up an agency called Development of Fusion Energy (F4E) Joint Undertaking for a period of 35 years, which manages the EU contribution to ITER.

ITER significantly differs from other programmes because the European Commission regards it as a contribution to an internationally agreed collaborative effort to which Europe has committed itself for at least 35 years, i.e. across multiple MFF periods. The EU's contribution to ITER represents 45% of ITER total costs.

B) DOES THE PROGRAMME SUPPORT INNOVATION?

All the ITER budget can be considered innovation funding as it supports applied research in the field of nuclear fusion. On top of the EU direct investment, the ITER Project has strong innovative spillovers. According to the Commission Staff Working Document supporting the ex-ante assessment of the proposed EU contribution for ITER in 2021-2027¹⁸⁶, over 400 European companies and 60 scientific and research entities—from more than 20 countries—have concluded contracts with the European Domestic Agency for a total of approximately EUR 4 billion.

C) CAN WE ESTIMATE THE AMOUNTS OF FUNDING FOR INNOVATION?

In the current MFF, the EU contribution to ITER amounts to EUR 2.9 billion. ITER funding is classified as "direct support to R&I projects" in our taxonomy.

¹⁸⁶ https://ec.europa.eu/commission/sites/beta-political/files/budget-may2018-iter-swd_en_1.pdf

LIFE

A) OBJECTIVES AND STRUCTURE OF THE PROGRAMME

LIFE is the EU’s funding instrument for the environment and climate action. It is structured in two sub-programmes: **Environment** (EUR 2.6 billion – 75% of the budget) supports projects in the areas of environment and resource efficiency; nature and biodiversity; and environmental governance and information and **Climate action** (EUR 0.8 billion- 25% of the budget) supports projects related to climate change mitigation; climate change adaptation; and climate governance and information.

LIFE provides funding to different types of projects:

- **traditional projects** are projects which aim to test a new potential best-practice or to demonstrate a technique or a method that has not been applied or tested before or to support communication, dissemination of information and awareness-raising. They must include activities to ensure the project’s sustainability and/or replicability.
- **integrated projects** are projects aimed at implementing environmental or climate plans or strategies on a large territorial scale.
- **capacity-building projects** provide funding for selected Member States to improve their capacity to participate more effectively in the LIFE programme.
- **preparatory projects** are projects identified by the Commission in cooperation with Member States to support specific needs related to the development and implementation of EU environmental or climate policy and legislation.
- **operations funded by financial instruments** (NCFE and PF4EE¹⁸⁷): implemented by the EIB, these instruments mobilise private investment on energy efficiency and natural capital projects.
- **operating grants**, financing the operations of NGOs working on environmental and climate issues at European level.
- **Commission procurement and support activities**., aimed for instance at supporting the preparation of EU environmental and climate action policies and the EU’s role in international fora (e.g. preparatory work for COP21).

B) DOES THE PROGRAMME SUPPORT INNOVATION?

One of the goals of LIFE is to provide funding to develop, test and demonstrate new policy or management approaches, best practices and solutions, or to develop and demonstrate innovative technologies, systems, methods and instruments to tackle environmental and climate challenges, suitable for being replicated, transferred or mainstreamed. This is supported through the so-called ‘traditional projects’.

¹⁸⁷ LIFE supports two types of Financial Instruments: the Natural Capital Finance Facility (NCFE) and the Private Finance for Energy Efficiency (PF4EE).

According to the mid-term evaluation¹⁸⁸, between 2014 and 2015 52% of the funding went to “traditional projects”. 76% of the projects were projects in the fields of environment and resource efficiency and biodiversity, 6% were climate mitigation projects and 5% climate adaptation projects, and they were all close-to-the-market projects (TRL 7 or higher) due to awarding based on the potential for replicability and to more emphasis on the business perspective of projects.

It should also be noted that there are some specific synergy-enhancing rules in LIFE: in the selection procedure for ‘traditional projects’, proposals receive higher points if they are planning to take up the results of environmental and climate-related research and innovation projects financed by Horizon 2020 or by previous framework programmes’.

C) CAN WE ESTIMATE THE AMOUNTS OF FUNDING FOR INNOVATION?

The total financial envelope of LIFE for 2014-2020 is EUR 3.4 billion (in 2014 prices). There is no ex-ante pre-allocation per type of action financed. However, as said before, between 2014-2015 52% of the funding went to traditional projects. Assuming that this ratio will be maintained all over the programme, we can estimate that LIFE funding for innovative projects is approximately EUR 1.8billion.

¹⁸⁸ EC (2017). Report on the mid-term evaluation of LIFE

NER300

A) OBJECTIVES AND STRUCTURE OF THE PROGRAMME

NER300 is a programme aimed at investing the money generated from allowances paid to the EU Emissions Trading Scheme (ETS)¹⁸⁹. NER300's goal is to support commercial demonstration projects in two fields: carbon capture and storage of CO₂ (CCS) and innovation renewable energy technologies.

B) DOES THE PROGRAMME SUPPORT INNOVATION?

NER300 is aimed at supporting the demonstration and commercialization of projects that are needed to go from TRL 5-7 to TRL 8-9. In particular, NER300 covers up to 50% of the expected investment cost and operational costs for a specific duration (up to 10 years for CCS projects, up to 5 years for renewable energy projects). The money is received only once the project enters into operation –unless a Member State requests and guarantees upfront funding. This choice puts a lot of risk on the shoulders of project promoters.

NER300 only focuses on two sectors: carbon capture and storage of CO₂, and innovative renewable energy projects. By 2018, almost all of the money granted by NER300 has gone to financing offshore wind projects and no successful carbon capture and storage project has been delivered.

C) CAN WE ESTIMATE THE AMOUNTS OF FUNDING FOR INNOVATION?

All EUR 2.1 billion of NER300's money can be considered innovative funding (under the category "direct support to R&I projects, including close-to-market activities"). However, because of a lack of successful projects, it seems that, by February 2018, only less than EUR 0.3 billion of NER300 money is likely to be actually received by beneficiaries.

Not a single CCS project received funding from NER300, while six CCS projects received funding from the European Energy Programme for Recovery. The only CSS project to which the European Commission awarded NER300 funding was a project in the United Kingdom that stopped its activities after the United Kingdom withdrew national support.

As for renewables, in February 2018, of the 38 projects selected by the European Commission between 2012 and 2014, 8 projects were withdrawn, 14 projects are still in planning, 10 have reached the final investment decisions, while only six are in operation (four wind and two bio-energy projects). Of the EUR 1.8 billion awarded to those 38 projects, EUR 0.5 billion was awarded to projects that have so far been withdrawn. Only less than EUR 0.3 billion seems to have gone to projects that were in operation as of February 2018 (Source ECA, op cit, Figure 7). The two bio-energy projects have reached a production level that is below the 75% threshold¹⁹⁰ needed to claim full grants, and will thus not benefit from the entirety of the awarded grant (a total of around EUR 40 M).

¹⁸⁹ In 2005, the EU introduced the EU Emissions Trading Scheme (ETS). As a result, the EU power plants and most of EU industrial facilities had to possess specific rights (called 'ETS allowances') to be able to emit CO₂. In the article 10a.8 of Directive 2009/29/EC, the European Union decided that 300 million ETS allowances would be set aside within a "new entrants' reserve". This led to the creation of the NER300 (i.e. a new entrants' reserve (NER) with 300 million ETS allowances). The EIB was tasked to sell those allowances on the ETS market. This generated a sum of money that depended on the evolution of the ETS price. It eventually generated a total of EUR 2.1 bn.

¹⁹⁰ To receive 100% of the NER300 grant, a project should meet 75% of the expected amount of energy produced, within five years of operation

PREPARATORY ACTION ON DEFENCE RESEARCH (PADR)**A) OBJECTIVES AND STRUCTURE OF THE PROGRAMME**

The Preparatory Action on Defence Research (PADR) is the first ever EU budget programme providing support to the defence sector. It was announced by the European Commission in 2017 as a way to pave the way for the European Defence Fund (EDF) that is set to be implemented in the 2021-2027 period. PADR was created after a significant political push from several Member States, especially France and Germany, following the year 2016 marked by political concerns over the future of European security after the June 2016 Brexit referendum and the November 2016 election of Donald Trump as president of the United States of America.

The overall aim of PADR, as well as the forthcoming European Defence Industrial Development Programme (2019-2020) and the European Defence Fund (2021-2027), is to support joint EU Member States projects of research, development and eventually acquisition of military equipment. It cannot fund activities that are not related to defence technologies, such as military operations.

The legal status of PADR is a 'Preparatory Action', i.e. a tool to prepare a proposal for a new legal framework (in that case, the EDF). Each Preparatory Action is limited to a three-year duration and a maximum of 100M EUR. This is why PADR is to last from 2017 to 2019, with a 90M EUR budget, with 25M EUR approved for 2017 and 40M EUR approved for 2018.

The money comes from the EU budget. PADR's design is attempted to be as close as possible to H2020. It is managed by the European Defence Agency. The money is mostly spent through grants that finance 100% of direct eligible costs and finances indirect costs through a flat rate of 25% of direct eligible costs –excluding subcontracting, like H2020.

B) DOES THE PROGRAMME SUPPORT INNOVATION?

PADR supports applied research and development of new defense equipment. Given the design and aim of the programme, it is likely to fund mostly technologies between TRL 1 and TRL 7.

C) CAN WE ESTIMATE THE AMOUNTS OF FUNDING FOR INNOVATION?

All PADR budget (0.09 billion EUR between 2017 and 2019) can be considered innovative funding (under the category "direct support to R&I projects, including close-to-market activities").

ANNEX 2: LIST OF PERSONS INTERVIEWED

Interviews with the following experts were conducted throughout the study

- Rebecca Allinson, Director at Technopolis and author of a recent interim evaluation of EIT KICs
- Sylvia Appelt, Directorate for Science, Technology and Innovation, OECD
- Salvatore Amico Roxas, DG EAC, responsible for the EIT KICs
- Vladimir Bilek, Financing of innovation, competitiveness and employment policies / of climate change, infrastructure & Euratom, DG ECFIN
- Olivier Debande, Managerial Adviser in the Education and Public Research Division, European Investment Bank
- Magda De Carli, Head of Unit, Sharing Excellence – Country Intelligence, DG RTD
- Marc Duponcel, Head of Sector, Research, DG AGRI
- Maria Echanove, European Court of Auditors
- Lisa Fischer, Researcher, E3G
- Alvaro Garrido-Lestache Angulo, European Court of Auditors
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This study provides a comprehensive assessment of how the EU budget supports innovation in the current programming period and analyses the approach to innovation financing in the Commission's MFF 2021-2027 proposals. The findings provide the basis on which to draw recommendations to maximize the use of EU innovation funding in the coming MFF.

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