The Netherlands' position paper on the Interim Evaluation of Horizon 2020

Introduction

Horizon 2020 (H2020), as well as future excellence and impact-based Research and Innovation Programmes, are key to the future of Europe. H2020 enables vast common European investments and cross-border cooperation in R&I; it boosts the development of Europe's scientific, innovative and technological potential; it brings about economies of scale and provides (financial and other) benefits through a joint approach, and it contributes to the development of the digital single market and the European Research Area (ERA), which includes free circulation of knowledge. Boosting growth and jobs remains a top priority for the EU, as President Juncker stated in his recent State of the Union speech. H2020 is a driver of economic growth and jobs and addresses grand major societal challenges on an international scale. As such, it benefits society at large and is a major factor in strengthening Europe's global competitive position. *In short, H2020 and future R&I programmes, based on excellence and impact, are essential for a strong and competitive EU, and therefore a central priority in the EU budget*.

H2020 has already proved to be a successful programme. Major progress has been made compared to previous Framework Programmes, for example the *3-pillar structure, which very successfully supports excellent research as well as mission-oriented R&I with impact, and industry participation*. Yet, there is still room for improvement in specific areas and new challenges impacting the R&I landscape lie ahead. The Interim Evaluation of H2020 offers an opportunity to assess which improvements could help to achieve the programme's objectives and to prepare for future developments: increased competition from other continents, lack of strong venture capital activity, new or greater societal challenges, the increased speed of technological developments, digitisation and new business models present new opportunities and challenges to H2020 and its successor. *The Interim Evaluation of H2020 should be discussed in a broader context of economic and financial developments, Brexit and other funds and programmes, such as the European Fund for Strategic Investments (EFSI) and the European Structural and Investment Funds (ESI Funds)*. Against this backdrop, the Netherlands offers the following priorities and recommendations for the interim evaluation of H2020.

1. Secure Europe's competitive position: keep investing in Research and Innovation

Investments in R&I are crucial for future economic growth and for addressing the grand challenges society is facing and for continuous scientific progress. The ex-post evaluation of the seventh framework program (FP7) has shown that the impact is impressive: each euro spent under FP7 generated approximately 11 euro of estimated direct and indirect economic effects through innovations, new technologies and products.[i] At the start of H2020, the Netherlands very much welcomed the (approximately) 30 percent increase in the budget for H2020 (compared to FP7), from €55 bn. to €80 bn. Today, with Europe's main competitors increasing their investments in R&D (China and Singapore up to 20%) the importance and impact of the H2020 investments in R&I have become even more prevalent. *There is a serious risk that Europe's relative position as a R&I location may deteriorate in the medium and longer term, if steps are not taken to ensure investments today*. It may result in a loss of talent, a loss of investments, a loss of innovative solutions and a loss of jobs to locations in the world which are more favorable to science, innovation and business. It is therefore essential to make further progress towards Europe 2020 objective of 3% R&D intensity by increasing both public and private investments on a European level. Not only for the sake of further improving the quality of public investments but to leverage investments in private R&D.[ii]

2. Scientific excellence and impact as the only drivers

Excellence and impact are crucial governing principles of R&I policy for Europe to retain a leading role and to compete internationally. *This is what makes the H2020 programme a success: globally, it attracts top researchers and innovators and funds the strongest proposals and brightest ideas. These leading principles, which contribute greatly to Europe's competiveness, should not be*

compromised in any way. Investments in domains with great scientific, societal and economic impact have been enhanced and should be continued. In line with this, H2020 and its successor should retain their focus on improving the quality of R&I, by organising competition and multidisciplinary, cross-border cooperation between talented researchers and innovators. To that end, it is necessary to set the right framework conditions for attracting investments and creating a thriving R&I ecosystem. To strategically assess impact, more insight into the use, application and implementation of research results could prove valuable.

3. Keep, balance & connect the current three-pillar structure,

At the start of H2020, research and innovation were brought together in one strategic programme, which is a step forward and a real strength. Excellent science and smart innovation reinforce and feed into each other. Similarly, curiosity-driven research and mission-oriented R&I are both crucial for innovation. Science and innovation are like two legs: you need both to run and compete. These topics are interrelated. The Netherlands strongly favours keeping the three-pillar structure, which should include:

I. Excellent science: continue the ERC

Excellent, frontier, curiosity-driven research is crucial and the essential basis of future growth, solutions to societal challenges and scientific progress. The ERC is the biggest international funding scheme for frontier, curiosity-driven research and has proven to be so successful and invaluable (it has contributed to numerous Nobel prizes!) that it is pivotal that it should be continued and strengthened. The ERC encourages Europe-wide competition and as such strengthens and impacts the quality and effectiveness of the whole European science system, crucially contributing to building the European Research Area (ERA). Support for researchers' mobility via Marie Skłodowska Curie Actions (MSCA), support for advanced multidisciplinary science and cutting-edge engineering in Future Emerging Technologies (for example on quantum technology, which the Netherlands welcomes) and investments in excellent Research Infrastructures, is also of great importance.

II. Industrial leadership: continue public private partnerships and involvement of industry

Technological progress, such as the development of key enabling and industrial technologies, may lead to (disruptive) innovation, strengthened European competitiveness and solutions to (future) societal challenges. Public-private partnerships play a pivotal role in this pillar as they engage large corporations and SMEs strategically.[iii] Joint Technology Initiatives (JTI's) focus on large scale R&I projects with public and private stakeholders. These projects are expensive, need critical mass and have potentially a huge impact. Individual public research organizations and businesses simply cannot realize these projects on their own. Therefor it is important to build these ecosystems - involving all stakeholders- to address these issues on a European scale.

An example: The JTI ECSEL covers (nearly) the whole value chain of electronic components and systems (including microprocessors) and their applications. This JTI strategically connects the activities of businesses (including SMEs) and public research organizations (including universities). The multi-year international strategic cooperation of these stakeholders has resulted in an European and Dutch ecosystems which made it possible to perform R&I faster, broader, deeper and more successfully. In the Netherlands these activities have become integrated in national roadmaps and innovation contracts with the Dutch Topsector High Tech Systems & Materials.

A key question in the example above is whether these activities and investments would also have taken place without the JTI ECSEL. An indicator of the added value of the JTI is, what happens with the high quality proposals which were rated just below the funding threshold: these high quality proposals have not been followed up/invested in by industry (or any other stakeholder).

The role of large companies in these eco-systems should not be underestimated: they offer a platform for SMEs to act on a European level. Furthermore they contribute roughly 50% to the partnership. *If we want to foster Europe's innovation-based competitiveness it is vital that participation of industry is promoted in these innovation ecosystems. Otherwise we risk producing excellent knowledge, perhaps even spin offs, which will be farmed of to our main competitors. As such, Europe is at risk of becoming the incubator of the world.*

Therefore, the Netherlands strongly supports the need to address industrial leadership and supports public-private partnerships, in specific JTI's for their long term commitment with industry (larger companies and SMEs), public research organizations and government. It is vital to join forces on technological and societal issues.

III. Societal challenges:

It is important that research and innovation also provides answers for the questions raised by society. Urgent and persistent societal challenges (such as a transition towards sustainable energy, a healthy life for all, an inclusive society and global security) require R&I and commitment of public and private actors over prolonged periods of time. It also requires interaction between R&I actors and society at large (citizens, companies and civil organisations) and flexibility in programming. Moreover, given the political, ethical, economic and cultural dimensions of many issues, it is vital that R&I projects recognize the complex a multi-facetted nature of the challenges ahead, and include expertise from the social sciences and humanities.

The Dutch National Research agenda: For science and research being able to contribute to answers for societal challenges, interaction with society is needed. The Netherlands therefore launched an innovative citizen science experiment to build up the new National Research Agenda in 2015. We asked citizens to come up with questions to science. This resulted in an overwhelming amount of nearly 12.000 questions, spanning the entire spectrum of science. The science, research and innovation community in the Netherlands used this input and reduced this amount to 140, and combined questions with current strengths, programmes and priorities. This resulted in 25 'routes through the questions', which can be regarded as a concise overview of what Dutch science can offer: The National Research Agenda. In the next phase, the National Research Agenda will be developed in harmony with the Topsector approach, in which companies, researchers, non-profit organisations and government already work together for some years on the strongest Dutch economic sectors. Gradually, this approach has been shifting towards creative solutions for societal challenges. This development brings our science, research and innovation policy eve more in line with the H2020 approach towards excellent science, societal challenges and key enabling technologies.

The Dutch approach of the National Research Agenda and Topsector approach are in line with the approach of H2020 when it comes to societal challenges. Overall, maintaining the H2020 societal challenges and a transition towards a mission oriented approach is preferred, as thematic national programming in the Netherlands has been aligned increasingly with H2020 challenges over the past years.

Finally, with regards to the three pillar structure, it is vital to a) enhance coherence and promote interaction between the activities of the different pillars - while keeping the pillars' own identity -, b) ensure that the entire knowledge chain is covered, and c) retain a degree of flexibility in jointly setting the agenda for the duration of the programme in order to be able to respond quickly to new societal demands and to give room to disruptive innovation. Involvement of R&I stakeholders in that agenda setting process will contribute to a comprehensive and widely supported programme.

4. Prioritise and further integrate Open Science

Research financed with public money should optimally benefit society. The Framework Programme should therefore enforce open science (open access and optimal reuse of research data in particular) and make the results of publicly funded research available in an as open as possible manner. Scientists can learn from and build on results across borders and disciplines, companies can innovate more and faster and societal challenges can be addressed more effectively. Opening up science has the potential to increase the quality, impact and benefits of research and innovation. The focus on open science, i.e. one of Commissioner Moedas' three O's, has led to the mainstreaming of open access to publications and open research data in H2020, and merits further integration and emphasis in the future. That includes rewarding researchers in open science. The Netherlands promotes optimal reuse of research data, using the FAIR principles (data should be findable, accessible, interoperable and re-useable) and provided the need for different access regimes and the right of opting out is recognised when needed for reasons of intellectual property rights, personal data protection and confidentiality, security concerns, as well as global economic competitiveness and other legitimate interests.[iv] Compliance with the requirements for open access publishing and making research data optimally available for reuse through H2020 needs to be assured, as is done in nationally by the Netherlands Organisation for Scientific Research (NWO). In addition, continuous integration and coordination of research infrastructure and e-infrastructures is needed, especially in the field of open research data (which requires standardisation). This calls for appropriate funding and support on the European level, with an emphasis on realising the European Open Science Cloud.

5. Strengthen strategic international cooperation

The Netherlands supports efforts to encourage strategic international cooperation in H2020 and future R&I programmes, based on excellence, impact and reciprocity. The majority of publications and patents are generated outside of Europe. Ninety per cent of the market growth takes place outside of Europe. Global competition and the level of investments in R&I in other parts of the world are increasing. EU stakeholders need to have access to excellent knowledge, as well as to non-EU markets, and should cooperate with the best partners in the world. This enables exchange of knowledge and provides access to expertise in upcoming hot spots and markets, encouraging innovation. H2020 and its successor should facilitate international cooperation as effectively as possible, without unnecessary barriers, such as administrative hurdles.

6a. Ensure that structural funds stimulate the building of R&I capacity

Firstly, H2020 (€ 80 bn.) is meant for research and innovation that is excellent and has impact in order to enhance growth. Complimentary, the substantially larger ESI funds (€ 454 bn.) are meant to build R&I capacity. *The Netherlands strongly supports maintaining these two separate, but complimentary approaches* (e.g. avoid trying to kill two birds with one stone). Capacity building is about providing facilities and building a foundation on which excellence and impact can flourish. This can include tailor made solutions for impediments to participate in international R&I consortia like training and advice. In addition, capacity building may require reforms of R&I systems on national, regional or institutional level in order to the improve quality of R&I and leverage private investments. The ESI funds should (continue to) stimulate this, not H2020.

6b. A coherent and consistent EU policy framework on societal challenges

To address societal challenges and to improve Europe's competitiveness effectively, coherence is needed within the European policy framework, which include schemes like the Framework programmes, EFSI, ESIF and COSME. This resonates in the calls of the Competitiveness Council (May 2016) and the General Affairs Council (June 2016), for more synergies between ESI Funds and the Framework programme. This will equip the EU to remain a top global competitor, deliver excellent R&I and attract international partners, while at the same time strengthening the entire R&I ecosystem by unlocking innovative potential in regions across the EU. While keeping the

rationales and objectives of the various programmes, *clear mission-oriented objectives at the basis of the various programmes is needed, focused on the most pressing societal challenges, advancing key enabling technologies and fostering a rich innovation and investment climate*. The strength of the programmes lies in their different rationales, objectives and instruments. These cannot be interchanged. It would be a weakness not to make use of the potential synergies between the various programmes.

At project level, joint funding from different programmes should never be conditional within H2020, and synergies should on no account come at the detriment of the simplifications under H2020. One of the elements meant to create synergy between H2020 and ESI Funds and relieve pressure on the low success rates in H2020, is the introduction of a Seal of Excellence (SoE). Unfortunately this has not had the desired effect in the pilot, that was executed in the Netherlands.[v]

7. Promote smart funding instruments

The Framework Programme, the European Institute of Technology and Innovation (EIT), the EFSI and the ESI Funds are all programmes or instruments which support research and innovation. This has resulted in a broad and complex range of instruments and funding mechanisms. An important challenge is to ensure that each programme has its own specific objective and that the objective determines the choice of funding instrument. Moreover, an appropriate balance between grants and other (new) financial instruments is needed.

It is vital to boost private R&D investments and create a smart funding ecosystem, keeping in mind that loans and grants are complimentary and both lead to innovation. The entire value chain of research and innovation (R&I) needs to be covered. Innovfin can be seen as the bridge to private capital.

To further increase the impact of investments in R&I, revolving funding mechanisms could prove effective, especially for SMEs. However, larger corporations may need other financial arrangements. Furthermore, the effectiveness of revolving funding instruments will increase if they allow for convertible loans and/or a-symmetrical profit sharing in favour of private investors where appropriate (like the Dutch seed capital instrument). These measures should always be aimed at crowding in private capital and - if possible - investing on a pari passu basis. Another way to increase the impact of investment in R&I is to use 'blended finance' (a mix of grants and loans; for example in the early development phase of technology), which has already proved to be effective in the Netherlands.

It should be stressed that not all categories or stages of R&I are suitable for innovative forms of funding. This is why grants should continue to play an important role, even for higher TRL levels. Careful consideration should be given to the types of instruments used for the funding of R&I projects in H2020 and future R&I programmes in relation to their objectives as well as spillover effects which may benefit society and the economy at large.

8. Enhance innovative capacity: scaling up and disruptive innovation

When it comes to facilitating disruptive innovation and scale-ups, the EU appears unable to keep up, which hampers the EU's competitive position and is at the expense of growth and jobs. To address this, appropriate R&I framework conditions are necessary (such as legislation, i.e. use of the innovation principle). H2020 has a pivotal role in this as well, as it strives to accommodate research and innovation in all stages, from idea to market. A bottom-up approach without predefined themes will create more room for experiments by innovators.

A European Innovation Council (EIC) should support the process of fostering market-creating innovation, complementary to the instruments within H2020 which mainly stimulate incremental

innovation. Within H2020 this can be enabled by using/adapting instruments like inducement prizes, Fast Track to Innovation (FTI), Eurostars and a fully bottom-up instrument for innovative SMEs. Furthermore, existing innovation instruments should be streamlined to benefit end-users. A part of the relevant budget could be considered for non-sustaining technology/disruptive innovation. More flexibility in programming, in order to accommodate pressing issues and small short-term consortiums and projects, may also contribute.

9. Improve success rates

One of the key concerns and priorities is to address the historically low success rates in H2020 (12.3%; in some parts even as low as 4%-8%). This results in a relative disinvestment for too many applicants. *There is a serious risk that this will discourage the most promising and best initiatives from applying for H2020 funding and eventually diminish the quality of H2020.* This would be detrimental to the success of the EU R&I programme. It is crucial, therefore, that the agreed budget for the EU R&I programme matches its ambition.

Further incremental improvements concern the selection and evaluation process. The introduction of the two-stage procedure has proved a useful measure in some instances. The JTI ECSEL, for instance, has yielded good results in this respect (success rates are satisfactory). However, these procedures should be refined and applied in a targeted way in order for the instrument to be effective. The application of a two-stage procedure for broad calls with a high budget (and higher success rates in stage two) could be an effective solution, but for narrow calls or calls with a smaller budget, a single stage procedure is preferable. At the same time, in highly dynamic domains characterised by large investments, single-stage submissions may be preferred to reduce time to grant. Finally, the evaluation process could be improved by providing clearer evaluation criteria for interdisciplinary project proposals and impact.

10. Further improve simplification and transparency

It remains important to continue simplification efforts, to increase the effectiveness of H2020 and to prevent unnecessary bureaucracy and costs for participants. As well as time which could also be spend on doing research and teaching, which results in innovations. It needs to be underlined that simplification does not necessarily translate into a 'one size fits all' approach. Different target groups of beneficiaries may require different approaches.

Further progress on the transparency of certain parts of H2020 is necessary. A transparent and open approach is needed in all parts of the programme, including the public private partnerships, as these initiatives have grown significantly. As the unlocking of more private investments in R&I remains an important challenge at EU level, more insight into the effectiveness of these public private partnerships could prove highly valuable from a policy perspective.

The simplification of the funding mechanisms has led to a very strict definition of direct costs. Consequently, this has increased the administrative burden and resulted in a more complicated auditing process. Besides, the current system of internally invoiced costs has proved very difficult to execute and places a heavy administrative burden on beneficiaries. Further simplification of the funding mechanisms is necessary, also in view of synergies with other programmes (such as ESIF), and this should reflect both common practices in the participating organisations and national requirements.

Therefore the Netherlands pleads for keeping the present H2020 structure based on excellence and impact as governing principles to fund research and innovation, based on the three pillar structure of H2020. Thus being able to address societal challenges and secure Europe's competitive position.

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i Louise O. Fresco, et al, *Commitment and Coherence: essential ingredients for success in science and innovation (Ex -Post-Evaluation of the 7th EU Framework Programme (2007-2013),* (November 2015).

ii The business sector accounts for 64% of all R&I expenditure (EUROSTAT, 2015); the gap in R&D intensity of the EU in comparison to its main competitors is mainly due to lagging R&D in the private sector.

iii Louise O. Fresco, et al, *Commitment and Coherence: essential ingredients for success in science and innovation (Ex-Post-Evaluation of the 7th EU Framework Programme (2007-2013),* (November 2015).

iv As concluded by the Competitiveness Council (Research) on 27 May 2016.

v During the pilot phase of the Seal of Excellence, the added value in the process of finding alternative funding turned out to be very limited due to varying criteria (e.g. in the case of the European Regional and Development Fund), state aid rules and funding percentages at Member State level.