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**Towards better research value in Europe:
Translating knowledge to innovation**

EU-LIFE's Position paper on FP9
September 2017

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Executive Summary

As an alliance of excellent performing life-science research institutes in Europe, EU-LIFE is committed to teaming up with European institutions and relevant stakeholders to promote better research value in and for Europe. This paper aims at contributing to the concept of the upcoming European Framework Programme 9 (FP9) and builds upon previous EU-LIFE initiatives and statements.

Key messages

- World leading Research & Innovation (R&I) is key for the realisation of the ideal of the European Union (EU) and critical to the promotion of the wealth and well-being of citizens.
- Basic research is critical for innovation. The highest value over time lies in investment in basic research. FP9 should rebalance focus towards early Technology Readiness Levels (TRLs) research.
- The principle above should apply to foster collaborative excellent research based on more bottom-up, non-prescriptive approaches that address key societal challenges.
- Excellence should be the sole criterion for selection in FP9.
- Knowledge transfer is essential. The true challenge is to pro-actively assist basic researchers with identifying and enabling commercial and/or medical use of their findings that could address key societal challenges.
- Open science will foster wider impact of excellent research. Furthermore, expected timing of impact of research outputs should be readjusted for the longer term.
- EU-LIFE urges the European Commission (EC), the European Parliament (EP) and the European Council to create a strong Framework Programme 9 by doubling its budget compared to Horizon 2020 (H2020) to 150 Billion Euros; and, within it, at least double the budget for breakthrough research.

1. Introduction

Research & Innovation at the core of the European Union

Europe is at a critical crossroad. While new major societal challenges emerge, the EU is at the same time called to revisit its founding values; and questioned on its role in Europe and the World. Therefore, refocusing on real beacons of the EU ideal is needed to secure and nurture the EU added value for citizens.

In this context, R&I emerges not only as a true success, but also as a real pillar of the EU ideal. Few other fields illustrate so clearly how crucial it is to have a strong EU that leverages local potential while guiding national and regional policies. The European Research Council, for example has become one of the most acclaimed success stories of European Research and Innovation Policy.

It is generally known that investment in R&I is at the core of economic and social development of any society at any time. However, R&I represents less than 10% of the total EU budget. Therefore, it is time that the EU promotes R&I to a higher ranking on its list of priorities.

Research framework programmes

EU-LIFE strongly supports past and current Research Framework Programmes (RFPs). As we have previously stated, through the launch of the H2020 programme the European Commission has taken an important step towards the promotion of an open, inclusive innovation and research landscape with a strong emphasis on uptake and implementation by society. It is now time to push the horizon further by truly opening up R&I to excellent, creative minds who have access to cutting edge infrastructures and who can lead the breakthroughs that Europe needs to achieve its goals.¹

The way to attain this is to allow basic research to flourish by implementing supportive policies and by a significant increase in the budget for basic research in the forthcoming framework programme (FP9).

Why basic research?

The impact of the R&I framework programmes extends beyond the explicit objective to drive economic growth and create jobs. In fact, the impact of scientific research is much broader: better health, better environment, safer food, safer societies and overall social and economic development through more knowledge and better technology.

For instance, the annual cost of Alzheimer's disease in Europe is estimated at 160 billion Euros², a figure that is expected to more than double by 2030³. Success will be achieved when basic research identifies causes of the disease at its most fundamental level, so that industry can search for possible treatments. The economic gain from any breakthrough is obvious, let alone the societal gain. If the onset of the disease is delayed by five years, the number of patients will be halved, as will the cost of treatment. The primary objective of research is the health of patients, whereas drug manufacturing and exports will be the

¹ EU-LIFE Statement January 2017 <http://eu-life.eu/tags/publication>

² Alzheimer Europe website

³ World Alzheimer Report 2015 - The Global Impact of Dementia

consequence of this research, as are job creation, profits and taxes. Economic savings in healthcare budgets will be even more massive.

The key question to ask is which research investment will generate the highest value over time? It is clear that the highest societal and economic impact will be generated through basic research. Translational and applied research creates more short-term benefits, but rely on previous basic research findings, which can be developed into new applications. Therefore basic research has a bigger impact, but the timeframe will be longer and the uncertainty higher. And that is exactly the area where political insight and public funding is needed. At later TRLs where the socio-economic impact can be measured with a higher degree of certainty and within the foreseeable future, the private sector will be willing to invest and commercial funding instruments may be more appropriate.

However, basic research – as such – will not suffice to drive innovation.

Research success should operate in an environment that fosters innovation. Research will drive innovation only if the local environment includes high quality technology transfer capabilities, with adequate intellectual property protection, the skills to strike appropriate licensing deals, the availability of venture capital and loans, an encouraging tax environment and access to high quality staff.

Successful projects and best practices in Europe and the US can guide decision makers how basic research can lead to societal added value and commercial innovation. They show how to bridge the gap between basic research and commercial use. It would be of interest to analyse the success stories and try to re-create the environment for success for the next research frameworks.

In short, public funding is crucial at the more risky and unpredictable stage - the basic research stage - coupled to professional knowledge and technology transfer. This is what FP9 should focus on.

2. Concept and implementation of FP9

Structure and focus

According to the H2020 interim evaluation, the three-pillar structure of H2020 has been well received by stakeholders⁴. EU-LIFE recommends that the same structure is maintained and FP9 evolves along the lines of H2020.

However, EU-LIFE wishes to state firmly that currently H2020 does not hold sufficient opportunities for excellent basic researchers to contribute to European R&I aside from the ERC and MSC schemes - which in addition have extremely low success rates therefore not unlocking the full potential of European basic research.

EU-LIFE urges the European Commission (EC) to shift the balance towards stronger funding for basic research in FP9 (including the necessary infrastructure) compared to H2020. This shift should be accompanied by strong support for efficient models of knowledge and technology transfer to foster uptake of breakthroughs by the innovation sector.

⁴ Results of Horizon 2020 Stakeholder Consultation, Interim Evaluation of Horizon 2020, DG Research & Innovation

Defence research has become a higher priority in EU. EU-LIFE is concerned that investment in defence research comes at the cost of excellent research in all other fields. The EC should by all means avoid this. Given its different requirements, we strongly advise that defence research is kept separated from FP9.

Excellence

Excellence should be the absolute key criterion to allocate budgets as it is the strongest indicator for impactful research. Support for R&I across all EU programmes should be excellence-driven, with a strong emphasis on bottom-up, open-ended research that will enable Europe to support truly innovative ideas.

Impact

The narrow definition of impact and the focus on short-term practical applications impede the participation of basic research into the collaborative consortia on all pillars of H2020 and most especially in the societal challenges (pillar 3 of H2020).

EU-LIFE urges the EC to reverse this situation in FP9 by creating a broader definition of impact.

Such a definition should take into account the different contribution of basic research to society compared to innovation. Research outputs are based on scientific publications and data – including big data – production: promoting open science⁵ will foster wider impact of excellent research.

Most importantly, the measurement of impact of research outputs must be readjusted to allow for longer-term impacts, as basic excellent research takes several years (or even decades) to develop into real benefits for society even though it brings the highest potential for true innovation.

Therefore, we call on the EC to relinquish the pressure for narrow, short-term impact research that does not support breakthrough scientific discoveries.

Knowledge and technology transfer

To achieve the desired impact, FP9 must invest in effective models of connecting Research and Innovation. Bringing researchers and innovators together is key but very challenging. Unfortunately, in our opinion forcing mixed consortia with researcher organisations and industry/SMES, as in H2020, fails to prove an efficient approach in the long run.

We believe that FP9 is the opportunity to address the gap realistically and more effectively.

In fact, we believe that Europe's lagging behind in innovation compared to other continents is not the result of "a lack of uptake of innovation". The true challenge is to pro-actively assist the basic researchers with identifying and enabling commercial use of their findings. This requires a significant investment in education, industry contacts, intellectual property rights' frameworks, business consulting, licensing deals.

Interesting models exist in the United States, where for instance Massachusetts Institute of Technology (MIT), researchers are encouraged to create spin-offs by having very favourable financial incentives and intellectual property rights, even if the basic research is funded with public money. At the same time, big companies have their own place in the MIT labs to explore how new fundamental findings can fuel industrial and consumer product environments.

⁵ Open Innovation, Open Science, Open to the World, DG Research & Innovation

In the United States, “Between 1980 and 2002 alone, U.S. universities generated a tenfold increase in patents, launched more than 2,200 university spin-offs to further develop research arising from campus labs, created 260,000 jobs in the process and contributed \$40 billion annually to the U.S. economy”⁶. Similar pockets of successful tech transfer can also be found in Europe. They are characterized by a strong management effort to guide basic insights towards commercial value.

In Europe, one such example is the Flanders Institute for Biotechnology (VIB), an entrepreneurial life science research center in Flanders, Belgium with focus on basic research in life sciences, and supported with a professional tech transfer team. Between 1996 and 2016, this institute received a significant research grant from the government of Flanders, representing a total investment of 715 Million Euros. In the same period, VIB research resulted in numerous scientific breakthroughs, which were the basis of 553 patent applications, over 1000 partnerships with industry, and 18 start-up companies, directly employing 796 employees. The economic added value represents 6,9 Billion Euros. Extrapolating these results to the Horizon 2020 budget of 80 Billion Euros, such a performance at the European level would result in 62.000 patent applications, 2.000 European start-up companies, directly employing some 90.000 employees and resulting in a European economic added value of about 770 Billion Euros.

Budget and financing

The demand for an increased budget for FP9 compared to H2020 is widely supported⁷. The broad oversubscription to H2020, its extremely low success rates and the high percentage of excellent projects that are abandoned due to lack of funding are the most obvious proofs that Europe is not efficiently fostering its innovation potential. The only viable action to combat talent waste is to increase the budget for the post-2020 R&I framework programme.

EU-LIFE urges the EC, the EU Council and the EP to seriously consider the recommendations of the Independent High Level Group Chaired by Pascal Lamy⁸ and endorse an FP9 budget that doubles the H2020 budget to **150 Billion Euros**. This budget should include at least a doubling of the budget dedicated to basic research to re-create a balance with the more market-oriented and technical innovation.

We have stated previously that the number one purpose of public funding is to support high-risk research that has no immediate economic impact but has excellent long term potential. If the immediate economic impact is clear, private investors will play their role and take the relative lower risk with the expectation of generating a high return on investment. FP9 should therefore make sure to invest where it is needed and where the commercial markets fail. A too strong emphasis on socio-economic impact may be contradictory to the core purpose of public funding.

In fact, basic research can have a strong multiplier effect on applied research. Taking cancer research as an example, the fundamental insights into how our immune system can assist to fight cancer has led to a significant increase in private research spending in oncology. Today,

⁶ AUTM Briefing Book 2015

⁷ E.g. European Parliament – REPORT on the assessment of Horizon 2020 implementation in view of its interim evaluation and the Framework Programme 9 proposal, June 2017

⁸ 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, July 2017

7.8 Billion Euros is invested annually by the European pharmaceutical industry in new oncology research; and there are more than 1,000 drugs in development against cancer. Breakthrough basic research has fuelled these developments.

Regarding funding instruments, FP9 should act as a provider of **grants**. Other instruments, such as loans, venture capital and tax breaks do not fit in the reality of the scientific research landscape and the needs of research organisations. Again, the focus should be on excellence in research in those areas for which public funding is essential; funding of large private companies should be avoided. In fact, whereas universities, research institutes, start-ups, and SMEs can benefit from funding from European R&I programmes, the added value for large private companies is on access to talent, ideas and networking rather than on funding.

An increased FP9 budget should be coupled to an increased co-ordination with other European programmes namely structural funds, regional funds and the European investment Bank. This is particularly relevant for R&I with high TRLs whose nature is closer to regional and structural development.

The majority of the Member States (MS) lag behind the target of the Europe 2020 Strategy of investing 3% of its GDP to achieve a European Research Area and spur economic growth. Figures range from 3.26% to a mere 0.46% in 2015. Only 3 MS invest above 3% of their GDP in research whereas 15 MS are below 1.5% (including several below 0.5%)⁹. A bold FP9 should be accompanied by clear measures to push for stronger public and private investment in R&I by Member States. EU-LIFE strongly supports the policy that **European framework programmes should not substitute national or regional investment** and measures should be adopted to incentivise prioritisation of R&I in MS budgets aiming at 3% GDP at least¹⁰.

3. Specific sections in FP9

European Research Council - ERC

The ERC has shaped excellent science in Europe. In only a decade, the ERC has become a flagship for excellent scientific research worldwide. The most striking thing is that ERC is an open, bottom up funding tool specifically focusing on basic research.

The ERC has proven to be very successful in attracting top researchers to Europe and in increasing the competitiveness of Europe's research on a global scale. It allows the brightest scientists to perform excellent research that sooner or later will pave the way to disruptive innovation in all scientific fields. Thanks to ERC grants, European research institutions can attract many of the best scientists in the world.¹¹

However, Europe's scientific potential is just beginning to be unfolded. Many great research ideas fully fitting the ERC evaluation criteria (unfunded "A"s) cannot be realised, simply because of the current ERC budget limits. With an increased ERC budget excellent research in Europe will further flourish, making it even more attractive for top researchers.

In order to fulfil its role, a substantial increase of the ERC budget is needed with strong investment in individual grants. Therefore, EU-LIFE strongly supports the Statement from the

⁹ Eurostat news release 238/2016, November 2016

¹⁰ E.g. European Parliament – Opinion of Regional Development Committee, April 2017

¹¹ EU-LIFE statement 13 March <http://eu-life.eu/article/erc-10th-anniversary>

ERC Scientific Council and its recommendation for a minimum annual budget of **4 Billion Euros** for the ERC in FP9.¹²

Marie Skłodowska-Curie Actions

Like the ERC, Marie Skłodowska-Curie actions (MSCA) are a success story of the European RFPs. The programme – and especially the individual MSCA fellowship programmes – is a cornerstone for the progress of researchers' career, training and mobility, and a good tool for spreading excellence. However, the current budget restricts success rates of MSCA fellowship schemes to a mere 13% which means that determining which excellent proposals should be actually funded has virtually become a lottery.

We believe Europe cannot afford to continue to forego leveraging talent and expertise in research. We recommend to **double the budget** of MSCA in FP9 with particular emphasis in MSCA individual fellowships (the junior version of future ERC grantees) in a basic research environment, where they are most productive for their career.

Collaborative Research & Innovation in societal challenges

The world faces key global challenges that need to be addressed such as healthcare, climate change, and migration. We strongly support the EC's goal to promote R&I that brings benefits to society; Europe cannot and should not afford research that does not promise useful results. However, it is important to acknowledge that it is not always possible to anticipate which new ideas will result in improved wellbeing and prosperity, or lead to disruptive innovation. In that sense, FP9 should encourage a wide approach to participation of excellent research.

Collaboration is at the heart of the Framework Programmes. Consortia should bring people together with high-level expertise in diverse fields who can bring value to a common project, regardless of their nationality. The Framework Programmes exist to encourage excellent researchers to work together, but currently there is not enough scope for early TRLs to participate in collaborative projects on societal challenges. We therefore ask the European Commission to support large and medium-scale consortia in FP9 with a specific focus on participation of early TRLs.

This implies a stronger focus on **bottom-up**, non-prescriptive approaches. Research, and especially frontier research is hard to predict or to decide upon using a top-down approach. Research findings are often the result of repeated failures and the ability to change course, to identify new opportunities, to explore new insights and hypotheses as they arise. Breakthroughs are often the result of serendipity, the moment when insight and chance meet. A top-down approach is probably of more interest for the higher TRL levels, when innovative uses need to be developed based on basic insights. EU-LIFE recommends that the European Commission uses a top down approach in defining a number of grand challenges for European R&I, that can be turned into practice using a bottom up approach by consortia of European researchers. Bottom up competitive applications, based on the most recent insights in science and technology and selected based on the excellence of the researchers; the research proposals and the technology transfer capabilities in their environment.

¹² Building on a European Success Story to Further Empower European Researchers, Statement by the ERC Scientific Council on the position of the European Research Council in the next European Union Framework Programme for Research and Innovation (15 May 2017)

Research infrastructures

The Research Infrastructure (RI) needed to boost European capacity, jobs and economic growth works at many different levels. Alongside ESFRI, FP9 should create a generic support programme that promotes the development of European networks of small scale scientific platforms focusing not only on the technology per se, but on their interoperability, complementarity and access. Such a programme is currently lacking in Europe and is key to a sustainable RI ecosystem.

In fact, small-scale research infrastructures, including core facilities, are technological facilities that provide highly specialised technological expertise as well as state-of-the-art technology where they are needed and serving a wider number of researchers.

Fostering European networks of technological facilities in FP9 can prove cost-effective enabling access of researchers and innovators to technology and talent (e.g. data analysts) in all corners of Europe.

This should be coupled to measures to promote the investment of Member States in research infrastructure such as for example co-funding from these Member States.

European Innovation Council

EU-LIFE published a position paper about the concept, role and funding for a European Innovation Council (EIC) in April 2016¹³. As stated there, R&I is a complex environment where different stakeholders such as the research community, industry, funders and many other sectors including end-users, make their own contribution. Only by addressing each stakeholder's assets and building realistic expectations on how they contribute to R&I outputs can we succeed in transferring knowledge and technology to the benefit of the citizens.

We strongly advise that the EIC should focus on bringing research and innovation together, i.e., working at the intersection of researchers and innovators.

Spreading Excellence and Widening Participation

Bridging the gap in talent and expertise retention across Europe will be key for the future of Europe. Regarding R&I, we believe that Widening, Spreading and Twinning programmes are good tools for that and should be increased in FP9. These programmes must not concede on excellence. They should focus on promoting the best conditions for institutions within the research and innovation ecosystem to host excellence irrespective of location, and welcome newcomers.

Such programmes must be well coordinated with European Structural Funds and coupled to the key condition that Member States co-invest in R&I and ensure continuity of the European effort to retain talent and expertise.

Science With And For Society

The SWAFS programme lays the foundations for integration of society and science and targets extremely relevant transversal topics such as open science, Responsible Research and Innovation (RRI), gender balance, citizen science and science education.

The programme is a real example of how the EU can take the lead and show the way to Member States, R&I organisations and diverse stakeholders in implementing necessary initiatives to foster R&I and enable its embedding in society. SWAFS initiatives provide a unique tool for institutions like research performing organisations, funding agencies and other relevant stakeholders to promote institutional change; and develop and share good practices. It should remain a separate programme, otherwise its focus will be lost.

¹³ On the Concept of an EIC, April 2016 <http://eu-life.eu/tags/publication>



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In addition, in FP9 the SWAFS programme should consider a better balance between small and large projects, providing more freedom for the development of innovative ideas and actions and broadening the participation of stakeholders. This will have a positive impact on leveraging open science, RRI and gender balance and embedding science in society.



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EU-LIFE is an alliance of research centres whose mission is to support and strengthen European research excellence (www.eu-life.eu). EU-LIFE members are leading research institutes in their countries and internationally renowned for producing excellent research, widely transferring knowledge and nurturing talent.

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