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PUBLIC PRIVATE PARTNERSHIPS

STRENGTHENING
INNOVATION AND
RESEARCH IN EUROPE



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EDITORIAL

PUBLIC PRIVATE PARTNERSHIPS

STRENGTHENING INNOVATION AND RESEARCH IN EUROPE

The European Union is halfway through the Horizon 2020 (H2020) framework for innovation and the journey so far is ripe for evaluation. H2020 is unique as a Framework Program for research and development due to its sheer scale in budget and duration. With lifespan of 7 years and an initial total budget of EUR 77 billion, it encourages members of public research institutions, private organizations, and interested parties at large to come together over strategic technological sectors. It does this by boasting one of the most sophisticated and comprehensive funding portfolio enabling a variety of actors to find funding for their projects, big or small. With the noble ambition of organizing research that will contribute to “building a society and economy based on knowledge and innovation across the Union”, H2020 stands out as itself a pioneering program for innovation.

It is clear that part of its strength as an institutional tool for innovation stems from its versatile financing packages to projects of all sizes. H2020 includes a set of strategic research sectors and promises to review each bid based on potential impact. Although the effectiveness of this approach cannot be fully evaluated at this time, several ambitious initiatives have been launched, refinanced, and improved to meet a standard of excellence. One of the most exciting approaches to research that has experienced new life under H2020 is the Joint Technology Initiative (JTIs). Although some research sectors may benefit from a highly focused scope, several Strategic Research Agendas require coordination and leadership in European Technology Platforms

at a continental scale. This is because the subjects of these ETPs and their objectives are both too large in impact and necessarily unachievable through national initiatives. Having identified key research themes such as Health or Transport research, the JTIs enable large-scale programs to extend the reach of H2020’s impact potential. For example, the Innovative Medicines Initiative was created to tackle “bottlenecks currently limiting the efficiency, effectiveness and quality of the drug development activities needed to bring innovative medicines to the market”. Europe’s ability to unite all stakeholders involved in the financing, development, approval, and marketing of new medicines is crucial to maintaining a competitive pharmaceutical industry to properly address the Union and its citizens’ needs. Programs funded under JTIs each benefit from unique approaches to research and development, including measures of “open innovation” enabling cross-company collaboration and asset sharing.

In fact, H2020 wholly deserves the attention of the interim evaluation to review and revise its capacity to maintain a high level of efficacy in delivering innovation to Europe’s citizens. Doubly important is the public’s awareness and perception of these innovation initiatives. Whereas some projects may be so focused as to invite very specialized interest groups, the JTIs offer an innovation scope relevant to several Member States and its citizens. Key technological advances must have the capacity to open and drive new markets. The breakthroughs required in sectors as large as Health

and Transport, Clean Energy and--perhaps a testament to its importance in European society-- the two separate initiatives on Information and Communications Technologies lend themselves well to the management of research programs in an “integrated manner”. As the evaluation of H2020 thus far reveals certain gaps in its implementation, it is possible the European Union already possesses working solutions within the breadth of financing or organizing programs such as JTIs and the accompanying Joint Undertakings. This issue of the [European Files](#)...

LAURENT ULMANN

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PPP's for a long-term vision for competitiveness in Europe



Jyrki KATAINEN

*Vice-President and Commissioner Jobs,
Growth, Investment and Competitiveness,
European Commission*

Quality research and innovation is very important for advanced economies like Europe's. The value of Europe's future relies upon our ability to produce knowledge and how well we succeed in transforming this knowledge into innovation and growth.

Research and innovation are also crucial, if we want to create a sustainable economy, high quality jobs and strengthen the competitiveness of European industry.

Research and innovation are often high risk activities without guarantee for success or profits. Many private investors are therefore reluctant to invest even though the economic or social return could potentially be large. This unwillingness to invest dampens Europe's innovation potential.

Moreover, while on fundamental research Europe enjoys a leadership position in the world, on market-creating innovation the challenge is still ahead of us.

The European Commission is committed to take a leading role to support research and innovation. Because of the nature of research, the significant economies of scale and the importance of cross-border cooperation, this is one of those areas in which the European Union can have a real added value.

One of the most useful instruments to overcome market failures is organised partnerships between the public and the private sector. It can encourage more breakthroughs and ensure that great ideas are carried from the lab to the industry. We must make the most of the knowledge and science we produce to enhance growth, productivity and competitiveness in the long-run.

EU relies on Public-Private Partnerships (PPPs) when operating under the Horizon 2020. This is so far the biggest EU Research and Innovation programme, with nearly EUR 80 billion of funding made available over 7 years (2014 to 2020) - and in addition to this comes the private investment that this money attracts.

When teaming up with the industrial sector, the implementation of research and innovation activities further improves. Mobilising joint investments supports the competitiveness of sectors that can develop closer synergies with national and regional programmes, and encourage greater private investment.

A concrete example of an EU PPP is the *Horizon 2020 Bio-Based Industries Joint Undertaking (BBI JU)*. A EUR 3.7 billion investment in bio-based innovation - with EUR 975 million of EU funds and EUR 2.7 billion of private investments.

Here the partnerships ensure industrial research and help narrowing the gap from

research to the marketplace. For Europe this means a stronger bio-based industrial sector, which can make it possible to reduce our dependency on fossil based products, fight climate change and lead to greener and more environmentally friendly growth. Overall, PPPs can also boost sustainable development in Europe.

The world is changing faster than ever. New technologies are introduced all the time and Europe must be ready – not just to respond and adjust – but also to invent and lead in the adoption of new technologies.

Our digital economy must have trustworthy ICT products, services and software in order to develop. It is vital to secure Europe from cyber-threats and make us more resilient to cyber-attacks. That is why EU is engaged in another important PPP to support innovative solutions in the field of cyber-security, which is expected to trigger €1.8 billion of investment by 2020.

Looking at the future, we now need to strengthen further the results achieved under the current research programme. The evaluation we carried out highlighted its strengths as well as the areas for development. Horizon 2020 has proven to be a successful programme to stimulate research and innovation benefitting Europe's competitiveness. The next programme will learn from the experience and will aim to deliver even greater benefits for the competitiveness and growth of Europe.



Horizon 2020 Review: Towards a more coherent R&I funding landscape



Mailis REPS

Estonian Minister of Education and Research

Since the launch of European Research Area at the turn of the century, Framework Programmes (FP) have developed instruments to incentivize European research and innovation (R&I) partnerships to address the fragmentation of R&I efforts, better coordinate investments, priorities and programmes, and increase investments in research.

In March 2002, the European Council adopted the Barcelona objective to increase the overall spending on research, development and innovation in the Union with the aim of approaching 3% of GDP by 2010, of which two-thirds should come from the private sector. Although this goal was renewed in the Europe 2020 strategy, the EU investments in R&I have stayed at 2.03%. So let me start by saying that reaching this target should be the guide in everything we do.

In this context, the EU public-private partnerships (PPPs) form a very important part of the EU policy, especially for mobilising private sector investments and developing a long-term vision in addressing socio-economic challenges.

New types of public-private partnerships have been launched with each Framework Programme that either benefit directly from the FP or at least exert influence on its content. Currently we have six different forms

of PPPs¹ in Europe – under each one there are in turn a large number thematic initiatives. From the Horizon 2020 we co-fund altogether ten contractual Public-Private Partnerships (cPPP), seven Joint Technology Initiatives (JTIs) and six EIT Knowledge and Innovation Communities. Whilst there is no doubt that the individual partnership initiatives are doing a good job, the overall R&I funding landscape has become too complex, and therefore needs a more thorough discussion at the political level before moving into FP9. This is why we decided to address this as one of our priorities during the Presidency of the EU Council.

When we first introduced this topic during the informal meeting of research ministers in Tallinn in July, I was positively surprised by the support for this topic expressed by other countries and there was a general agreement that we need to rationalize the current complex landscape to ensure its coherence and accessibility to all parties involved. These observations have also been confirmed by the findings of the Horizon 2020 Interim Evaluation, as well as echoed in the Lamy Report and the European Parliament report on the assessment of Horizon 2020.

Current challenges

The development of different types of PPPs is very important in the context of economy and development of R&I policies. However, the multiplication of instruments has led to a new type of fragmentation and a lack of overall coherence between the different instruments and initiatives.

Although there have been efforts to clarify criteria for selecting and implementing PPPs in the Horizon 2020, these have not managed to reduce new partnership proposals or expectations on what happens to the existing ones after FP co-funding ends. I think we have reached a point where we have to reflect critically on the share of funding we should allocate to partnerships as they already take up 25% of the Horizon 2020 budget. If we do not deprioritize, there will be no room for the emergence of new topics or networks. Moreover, it makes our national selection processes extremely difficult because we often

do not know what new partnerships are in the pipeline. This is a problem for many Member States, but especially for EU-13 countries. Early access to the discussions on the identification of topics and activities to implement these is a starting point for creating more equal participation conditions.

Vision in moving forward

To realize the full potential of partnerships for EU R&I policy, we need to have a clear agenda at the EU level for defining what topics we are going to push forward, and a common framework for all partnerships. In practice this means having clear conditions when we implement certain topics via R&I partnerships, coupled with a strategic process for identifying, implementing and phasing out all EU R&I partnerships.

Coming back to the 3% R&I investments target and the current low share of private investments in the Union, we also need to look at whether the current PPP implementation modes deliver the expected leverage. First, there is the question of whether we need so many different layers of PPPs and whether they truly complement each other. Secondly, we need to reflect on whether the current PPPs in Europe have the means and tools to be dynamic and bring about a truly transformative change in addressing particular societal and economic challenges.

The preparation phase of FP9 is clearly the time to address the complexity of EU R&I partnership landscape. This is a time to rethink the EU approach to partnerships, and not just make marginal changes. I invite all stakeholders to actively contribute to the discussions on how we can ensure alignment of resources and activities in the EU, with the aim to jointly address common challenges, and reduce the fragmentation of R&I efforts. Also, I urge strong existing consortia to look outside of their traditional partners and activities and keep their minds open to new and exciting R&I players. I know that Estonia has a lot to offer in research and innovation, and hopefully we have given you a good 'sneak peek' during our Presidency. But more importantly, I am happy about the warm response that we have received from partners across all Europe to this topic and I hope we have contributed to creating a simpler and more open FP9.

1 cPPPs, JTIs, EIT-KICs, ETIPs, ETPs, EIPs.

Streamlining European Research Initiatives



Frédérique VIDAL

French Minister of Higher Education, Research, and Innovation

Why streamlining matters?

We live today in an exciting and unprecedented time: knowledge creation has never been so strong, turning this new knowledge into innovation has never been done so quickly, and the international competition has never been so intense. As public policy makers, we have to make our Research & innovation (R&I) policies as lean as possible. This is even truer for Europe.

Indeed, R&I is key to the future of Europe. Investment in this sector relies on a wide range of actors: Member States, European Commission, local governments, private sector. Yet, in spite of this undisputed political importance and of this significant number of funders the investments at EU level in R&I still lag well behind the political target coined as part of the so called Lisbon strategy almost 20 years ago and reaffirmed in the Europe 2020 strategy: indeed, in 2015, the level of research and development in the EU28 lies at 2.03% of the GDP, a far cry from the 3%.

In this context, streamlining the landscape of the European research initiatives is needed, not only to progress toward the achievement of the European Research Area, but also to simplify the whole framework and make it more efficient. This is a key issue to facilitate a major investment of the private sector in R&I. Attracting the private sector is indeed crucial for achieving the 3% goal and finding solutions to the many societal challenges our societies are facing!

State of play and ideas for the future

European R&I partnerships are essential tools for experimentation and structuration. In the last decade, a lot has been done to stimulate the co-design and co-investment of a wide range of European R&I, with the Member States and the private sector. For instance, on the co-designing side, since 2008, 10 joint programming initiatives have enabled the adoption of common agendas among the member States. Similarly, the European Commission has favored the involvement of the private sector in the design as well as in the project implementation of the private sector.

The principle of cPPP, for instance, has brought a clearer, institutionalized and more transparent dialogue between the European Commission and the stakeholders, in particular with specific industrial sectors. Moreover, when properly managed, cPPPs have a great EU added-value by pulling together Europe academics and industries and encouraging them to structure themselves, share their visions and cooperate on mid to long term research and technology challenges. As an illustration, the reports (Strategic research and innovation agenda, (SRA)) produced by cPPP associations are often of great quality and contribute to the efficiency of the European Commission programming.

With a view towards the FP9, these partnerships instruments must be further used to serve strategic objectives codesigned by Member States, the Commission and the industry, such as technological autonomy. Their input should go beyond mere calls for projects. France deems necessary to strengthen the support to public-private partnerships, namely JTI, for industry sectors matching the maturity and excellence criterias.

A few tweaks are therefore necessary to further improve PPPs impact:

- The wide range of maturity degrees across different industrial sectors has insufficiently been taken into consideration. As an example, one cannot ask the same level of common commitment and assign similar objectives to 5G and Big-Data industries! Yet, too often, extremely challenging objectives have been set uniformly across each PPP, generating a huge complexity within the governance of each initiative. In many PPPs, stakeholders complain that the processes are burdensome and

time-consuming without real added-value for them nor for the industrial sector as such. There is undoubtedly room for simplification. I therefore suggest that a common reflection should be initiated between the Commission, Member States and industry in order to take into account this diversity and differentiate mature and integrated European value-chains from more recent and unstructured ones and define PPP key performing indicators accordingly.

- PPP interactions with the Member States should be reinforced, as the latter represent more than 90% of the total R&I public investment in Europe. This dialogue is of utmost importance to help Member States take the best advantage of the very high quality of the SRAs while helping the PPP stakeholders to propose a more limited number of focused EU-level relevant R&I priorities. In this respect, Member States have to be closely involved in the governance of these partnerships.
- A right balance has to be kept between the need to provide visibility to the industry and the capacity to adapt to new emerging areas or new industrial trends. In other terms the budgetary commitments in PPPs need to be used as flexible frameworks for the programming of actions.
- Finally, finding the right balance between representativeness and openness requires fine tuning. PPPs must not turn into close clubs and be open to novel ideas and new actors especially SME and start-ups. Yet, they must remain attractive to participants. As such, PPPs may not be adapted to sector characterized by a high level integration and concentration, where the level of commitment by public authorities must be enduring, and where a very strong coordination between R&I activities is required. For this latter initiatives, very limited in number (such as European low-power processor for example), other tools are required while keeping the necessary relationships with the parent PPPs.

Based on three keywords (focus, simplification and inclusion), the incoming negotiation on the next EU FP (FP9) is a clear opportunity to correct and adjust the PPPs to enable their full impact and France will support this approach in its position papers.

Pushing a long-term vision for PPPs



Jarosław GOWIN

Polish Minister of Science and Higher Education

Globalized and competitive economy and society require new approaches to solving crucial challenges we face. Well designed, structured partnerships between the public and private sectors could gain a more prominent role in the European research and innovation support portfolio.

In order to provide sustainable economic growth and strengthen competitiveness at both European and national level as well as to adequately address societal challenges the European Union is facing nowadays we need well-structured partnerships between the public and private sectors jointly framing and implementing research and innovation agendas. Properly functioning, long-term public private partnerships in the area of scientific research are necessary to achieve the objectives of Horizon 2020 and the Europe 2020 strategy by, among others, enhancing interdisciplinary approach in tackling emerging socio-economic issues, facilitating introduction of innovative technologies on the European market, attracting international research and development investments and decreasing fragmentation of sectors by building collaborative networks.

Given the considerable advantages of the partnership instrument, it is crucial to make full use of its potential. However, it seems that the current landscape of public private partnerships, which consists of multiple initiatives operating under different rules, with different funding mechanisms and sometimes

focusing on overlapping thematic areas, is too complex and to be efficient, needs to be reviewed. Taking into consideration the fact that a need for simplification and streamlining of the partnership environment was indicated unanimously by Member States and stakeholders during the interim evaluation of Horizon 2020 and the fact that the High-Level Group on maximizing impact of the European Union's Research and Innovation Programmes chaired by Pascal Lamy recommended to cut the number of R&I funding schemes and instruments, there is no doubt that now – during the preparation of the next Framework Programme – is the time to take appropriate actions in this regard.

To fully seize the opportunities resulting from public private partnerships it is essential to adopt a strategic and holistic approach involving a broad spectrum of aspects that should be taken into account in the future definition and operation of partnerships. The above refers not only to an open and transparent process of topics selection – representing the interests of all Member States and being coherent with priorities set out at European, national and regional level in particular with Smart Specialization priorities – but also to the monitoring of established initiatives based on a set of duly elaborated Key Performance Indicators. Among criteria measuring progress towards pursued objectives the following should be included: economic and societal impact demonstrated as European Added Value of undertaken activities, as well as openness to newcomers, including smaller R&I entities and SME's, throughout their duration. As far as the latter is concerned, it is worth underlining that partnerships should be open not only at the moment of their creation but throughout all their duration. Moreover, the abovementioned approach towards PPPs should involve their mid-term evaluation and higher degree of flexibility, which would allow to implement necessary changes in justified cases including assessment of a partnership relevance in contributing directly to competitiveness and EU policy goals. Apart from the need for a strategic process of selecting and monitoring of PPPs, it is essential as well to define from the outset a phasing out strategy from the EU funding and a leverage effect for each newly established partnership.

Simplifying the partnership landscape and reinforcing effectiveness of the partnering instruments should begin with a horizontal and comparative analysis of all existing PPPs in research and innovation. Taking into consideration the importance of reducing the number of undertakings by, among others, combining the initiatives with similar intervention logic and overlapping areas of activity, modifications in the current partnerships might become indispensable. Additionally, it is necessary to be aware of the fact that the European innovation system is consistently undergoing changes and, as a consequence, requires creation and implementation of adjusted policy instruments. In this regard the comparative analysis of existing PPPs would be helpful to submit recommendations concerning replacing or adapting the current partnering instruments by the new, enhanced ones, that would be better aligned with the purposes jointly set by Member States and the European Commission.

Redefining the role of partnerships in the future European R&D&I framework is of crucial importance as it connects with the recently proposed mission-oriented approach, that should be a major new element for future Framework Programme. The concept of developing a coordinated mission-oriented approach for tackling jointly agreed challenges implemented by, among others, PPPs is an idea worth considering and needs to be further discussed.

A well thought-out design of public private partnerships system can contribute to achieving the core European policy objectives. By clearly defining the role of Member States and industry in setting priorities and steering the process, optimizing the contribution of public and private entities as well as by properly balancing top-down with bottom-up approach, the instrument could provide solutions to current and upcoming societal and economic challenges. Nevertheless, while reforming the partnership landscape it is necessary to bear in mind that any modifications should bring more simplification and transparency to the process with the aim of creating a more efficient, accessible and open next European Union's Framework Programme for Research and Innovation.

Preparing for FP9: Reinforcing JTIs and their potential



Jörg LEICHTFRIED

Federal Minister for Transport, Innovation and Technology of the Republic of Austria

The Austrian Ministry for Transport, Innovation and Technology supports since many years targeted research, technology and innovation (RTI)-programs in applied and industrial areas in domains such as transport, energy, ICT, industrial technologies, nanotechnologies, aeronautics, security and space as a building block of its RTI-policies. The procedures followed are similar to the ones in Horizon 2020. The programs have proven to be money spent well, being crucial to enhancing Austria's competitiveness, both of research and of industry.

We are also active in supporting Austria's participation in the industry-driven European Public Private Partnerships corresponding to the above-mentioned RTI-domains since their beginnings. This international collaboration in large-scale consortia with the best industrial and research actors across Europe is of high relevance both for achieving European goals and for increasing the quality of our national programs. This collaboration allows us - as a comparably small RTI-actor - to play prominent roles in large consortia - this would otherwise not be possible. One example is the JTI ECSEL (Electronic Components and Systems for European Leadership). The Austrian participation is linked to our national programs in ICT as well as in nanotechnologies and the Austrian contribution is financed by these programs. The collaboration within ECSEL offers immeasurable opportunities to

research and industry that would otherwise not be possible, the recent founding of the initiative "Silicon Austria" as an investment programme to establish Austria as a prime location for electronic based systems being closely related.

We welcomed the founding of the PPP "Shift2Rail" in 2014 and supported the joining of the "Virtual Vehicle Austria Consortium+" and the company Kapsch CarrierCom AG as associate members. With its ambitious targets Shift2Rail helps to meet technology oriented as well as societal needs, much in line with the goals of Austria's as well as of Europe's policy to develop competitive and sustainable transport solutions and boost the competitiveness of industry at the same time. Again RTI of this scale and scope requires long-term collaboration of the best in Europe and their sustained commitment, supported by the European Framework Program.

Alongside these two examples we are interested and active in particular also in the PPPs FCH2 (Hydrogen and Fuel Cells), CS2 (Clean Sky 2), BBI (Biobased Industries) and SESAR (Single European Sky Air Traffic Management Research), all of them corresponding both to RTI and policy goals of the Ministry. Compared to the support of individual collaborative projects these large European initiatives require long-term commitment and investment by the actors involved but they offer a great range of opportunities for

top-level RTI and are the basis for competitive products and services in return. The participation in PPPs has thus become an integral part of the Austrian RTI-ecosystem.

In January 2017 the Austrian Ministry for Transport, Innovation and Technology has published its position on FP9, following an intense discussion with the major representatives of Austrian industry and applied research. Based on the experience in FP7 and in Horizon 2020 this Position confirms the high relevance and value of PPPs, however a more transparent process when setting up new initiatives and more openness towards new partners have been asked for by some. Noticeably the European Commission's generally very positive Mid-Term Evaluation of the PPPs confirms this analysis.

To conclude, we believe that JTIs will have to be of continued relevance in FP9 and will have to be reinforced, closely linked to enhanced national support of RTI and more ambitious efforts in aligning national with European priorities by European Member States. The support for PPPs within the Framework Program for RTI will continue to be of undisputed European added value, helping at the same time to meet societal challenges, pursue European policy goals and boost the competitiveness of Europe's industry."

IMIP Private
Shift2Rail
Public Program
Partnerships
Austria
ECSEL
Clean
FCH2
BBI
JTIs
Silicon Austria
Framework



Regional Impact of Joint Technology Initiatives and Public-Private Partnerships for European Competitiveness and Innovation



Markku MARKKULA

The First Vice-President of the European Committee of the Regions (CoR) and City councillor of Espoo

Europe today is different than it used to be. In the face of economic and political turbulences as well as global megatrends, there is an increasing will to incorporate the voices from regions and cities from the bottom-up into decision-making in Brussels. The European Committee of the Regions CoR has a crucial role to represent these opinions and concerns.

Our work is guided by our political priorities, agreed in the June 2015 Plenary for the whole five-year mandate until 2020. One of the major CoR initiatives is the Reflecting on Europe project. Our starting point is to show that the European Union can and must work for our communities and citizens. However, for this to happen, we need to achieve a mindset change – a transition towards entrepreneurship and open innovation, experimentation and action instead of planning, planning and planning. This can be done together with closer cooperation between regions and cities but also industries in public-private partnerships.

We need good governance, public and private, for implementing better policies for better lives and solving today's challenges in different parts of Europe and its neighbours. We need a new way of thinking. This means that we need to focus on *how* we do things better, instead of only focusing on *what* we do. New cross-border and cross-institutional partnerships are needed and we must embrace a

strategic priorities, multidisciplinary approach and investing better in project preparation and contract management.

For bench-learning and awareness raising of cities and regions and a step towards European partnerships, joint initiative Knowledge Exchange Platform was launched two years ago between CoR and DG RTD. The Joint Technology Initiatives (JTIs) are the aims to attract more consistent private investment, promote research and innovation along whole value chains, to overcome fragmentation, to avoid duplication and to coordinate better innovation activities. JTIs like BBI intend to de-risk in research, demonstration and commercialization of technologies and to respond to the challenge of creating and maintaining a competitive position of Europe. The main positive effects in terms of competitiveness of technologies come via encouragement and support of value chain driven cooperation across sectors ('the structuring effect') and via innovation driven mobilization of key stakeholders ('the mobilizing effect'). Flagships projects are one of the distinctive measures of JTIs. Overall, JTIs have created a stimulating research and innovation environment in Europe, which we should continue to foster for the European competitiveness.

According to benchmark study done, one of the main challenges is the preparation; we need better well-structured public-private partnership (PPP) projects to attract emerging markets and private sector investments to make regional impact on European competitiveness. There is considerable scope to improve practices related to the disclosure of information as well. In addition, we should find the right balance between strategic priorities and encouraging companies to submit innovative project ideas and maintaining the transparency and efficiency gains of a competitive tender process.

The future is built on increasing synergic collaboration between regions and cities throughout Europe. Good start has been the thematic Smart Specialisation Platforms which have brought together 100 regions working in 20 interregional partnerships in a broad range of areas.

Innovation arises from the ground, from the everyday needs of the everyday users. Innovation is co-creation, and the Joint Technology Initiatives are an inspiring example. They represent positive change at EU level. By getting people, researchers and businesses – together with the public sector – to think, plan and execute is the best way forward for European competitiveness.

The European Committee of the Regions can make a difference. Our focus is on kick-starting sustainable growth based on more partnerships. Local and regional authorities have proven their worth in identifying local needs, bringing partners together and stimulating investment in the real economy. Entrepreneurship, capacity building, smart specialisation and risk-taking must be the mantra of EU spending. Every region and city can be a pioneer in societal innovation and public-private partnerships.

To conclude, geography matters and productivity in regions are directly connected with aspects that have a strong impact on people's wellbeing: wellbeing indicators can help rally behind strategic objectives. Regions and cities are at the heart of European competitiveness and innovation. The European Union must become a union of citizens; the CoR reconnects Europe with its citizens by encouraging dialogue and collaboration with local and regional representatives as well as enforcing subsidiarity – taking decisions closest to the citizens. We need to be true believers of Europe and European competitiveness and innovation.

IMI contributes to efforts to accelerate access to affordable, innovative medicine



Miroslav POCHE

Miroslav Poche, MEP (S&D Group), Member of the ITRE Committee

Every person eventually becomes a patient. Our health is our priority and we are very sensitive to anything connected with the well-being of ourselves and our nearest and dearest. The medical development has made fantastic progress in recent decades, which can be illustrated, for example, by drastically decreased cancer mortality. Yet many suffer because of non-existing or even inaccessible treatment. Widely-spread but not fully explored illnesses exist in parallel to rare illnesses for which the drug development process simply is too expensive. And many patients don't have enough time.

The pharmaceutical industry is often criticized for being too profit-led; however, the development of any new drug is an immensely complex process that costs plenty of money. Profitability is an essential condition for the sustainability of every business, including the pharmaceutical one, and whereas you cannot buy health for any money, without money you cannot develop new treatments. Companies logically hesitate in situations of high risks and uncertainties. Fast development of new drugs requires involvement of a large number of stakeholders (hospitals, research institutes, patients, SMEs or medical regulators together with pharma-industry) because a lot of data and other inputs are necessary.

Doing all of this at a European level is much more efficient than at a national one because

a bigger market means bigger potential. That is why the Innovative Medicines Initiative Joint Undertaking (IMI) was created in 2007.

The key objective of IMI is to speed up development of innovative medicines and their accessibility to patients. It serves as a platform for cooperation of dozens of participants on every project such as academics, doctors, researchers or SMEs. IMI even managed to bring together big competitors from the pharmaceutical sector, which illustrates the significant potential of the JU. The ever-growing engagement of patients is another big plus of the concept.

IMI's project portfolio is varied. While generally focused on challenging diseases (brain disorders, cancer, metabolic or infectious diseases or development of vaccines), the projects seek to reach specific research goals of both a qualitative and a quantitative nature. The backbone of IMI consists of the EU and a pharmaceutical consortium called EFPIA, but previous successes have attracted international partners like the Bill and Melinda Gates Foundation, the International Diabetes Federation or Autism Speaks.

With a total budget of €3.276 billion for the period 2014-2020, the EU should contribute 1,638 billion euro through Horizon 2020 to be matched by the private sector (namely EFPIA and its members), financially or in-kind. Pharmaceutical industries are never recipients of any funding from the programme. On the contrary, universities, researchers and patient organizations, SMEs and mid-sized companies receive funding, often from industrial members of the same project consortium. This financial model has proven to be a success and has become a model for financing other JUs.

The significant budget allows the Joint Undertaking to deliver remarkable results and its financial management is under a permanent scrutiny. The European parliament plays an essential role in this respect as the final authority in the auditing process granting the discharge for IMI. The European Parliament also decides about the budget, in particular when it comes to EU money going to the envelope for Joint Technology Initiatives/Joint Undertakings and a degree of co-financing. The outcome from the mid-term review of Horizon 2020 will outline the future support

for JTIs in the MFF for 2020+. The discussions have already started. For future EU financial support, high quality outputs are essential.

What are they? Around 90 projects run under the IMI I and IMI II, which represents hundreds of new discoveries. By end of 2016, 33 patent applications were filled, mostly by academia, research organizations or SMEs from 15 countries, some patents have already been awarded. Many projects resulted in spin-off activities. They generated new foundations, non-for-profit organizations, national platforms, research hubs or spin-out companies. The citation of IMI projects in scientific publications has been more than double compared to the world average, with fields of genetics and clinical neurology topping the list. IMI projects delivered almost 200 new definitions and mechanisms in the sphere of drug discovery, concerning for example Alzheimer and Parkinson. It speeded up development of innovative medicines in the areas of autoimmune and inflammatory diseases, vaccination or drug-resistance. Projects identified different biomarkers or new plasma proteins and contributed to the development of new antibiotics. Thanks to IMI, unprecedented pan-European platforms, networks and databases have been set up to speed up the process of clinical testing. Thousands of people have been educated and trained for a successful implementation of discoveries.

The challenges for medical research and industry are endless and the resources are limited. The IMI Joint Undertaking projects have demonstrably boosted medical research and development and thus diminished the forever-existing gap between needs and resources. Measurable results such as the number of studies or patents are easily proven; however, the unmeasurable effects - cooperation, best practices or changing business thinking - are equally important. In my opinion, IMI does exactly what should be done at a Europe-wide level and I believe that this will be reflected in the EU budgeting for the 2020+ period.

PPPs: The Patients' View



Nicola BEDLINGTON

EPF Secretary General

Putting patients at the centre of research projects is a long-standing priority for the European Patients' Forum (EPF) and its membership, and is a pillar of the vision of the organisation. EPF has been participating in projects of various shapes and forms for more than a decade now and our credo has always been to represent patients as meaningful partners, with co-deciding roles and strategic positions in the governing bodies.

Governance and Ethics

The economic crisis had a massive impact on budgets of EU Member States, including budgets for research and public health projects. This new situation accelerated the development of public-private partnership (PPP) funding mechanisms in research, a cooperation arrangement between two or more public and private actors, putting together resources for potential projects.

PPPs can offer a sustainable alternative to research funding. By leveraging larger resources, it enables more projects to be funded or continued and allows initiatives to grow with stability.

However, their complex and hybrid funding mechanism require a sound and serious budget management, with proper in-house checks and controls process while retaining flexibility and trust for the participants of the potential project.

This is where governance and ethics play an important role. We believe a true and mature

partnership can only be achieved through solid and transparent governance measures and a strong ethical culture between all partners. The European Patients Academy on Therapeutic Innovation – EUPATI project, for instance, offers a good example of a clear and genuine ethical governing structure.

EUPATI

This patient-led academy leads an ambitious programme to develop educational material, training courses and a public Internet library to educate patient representatives and the lay public about all processes involved in medicines development, with a current focus on training courses and expert meetings. Under the framework programme of EPF, EUPATI brings more than 30 partners from academia, civil society, patient organisations and pharmaceutical industry together.

The governance principle of EUPATI sees an Executive Board comprising two representative of each stakeholder involved in the PPP with equal voting rights: patient organisations, NGOs & Academia, pharmaceutical industry, and the EUPATI National Platforms Network (national level PPPs replicating the EUPATI model). This ensures patient organisations are involved in all strategic decisions of the programme, with equal rights when it comes to steering the wheel in one direction or another.

However, a balanced and democratic governance structure is only one part of the equation. Having in place a strong ethics policy is another essential component of a well-organised PPP.

The EUPATI Ethical Framework establishes the core ethical principles to which all EUPATI Consortium members, as well as the members of sub-committees, are required to adhere to.

The elaboration of this EUPATI Ethical Framework was provided under the IMI project which established the EUPATI Programme by the EUPATI Ethics Panel (2 co-leaders from academia and a patient deputy co-leader).

The core remit of the EUPATI Ethics Panel was to provide the infrastructure and access to the required intelligence and genuine expertise in ethics and law as pertains to the medicines development processes and patient advocacy. It advised the Project Steering Committee, Executive Committee and Work Packages on

ethical aspects of the project, including conflicts of interest, including – amongst others:

- Interaction and communication within the Consortium;
- Generation and dissemination of information to patients;
- Communication within the EUPATI Network;
- Communication to patients and public at large.

Adherence to the EUPATI Code of Conduct by all EUPATI members ensures trustful and successful execution and completion of the project. The EUPATI Code of Conduct was collated with reference to:

- WMA Declaration of Helsinki, 2008 and 2011;
- CIOMS 2002 International Ethical Guidelines for Biomedical Research Involving Human Subjects;
- EMA Policy on the handling of conflicts of interests of scientific committee members and experts, April 2012.

The 'EUPATI Code of Conduct' outlines the working culture and spirit of "assumed good intent" within the Project Consortium, while the 'Ethical Framework' outlines the ethical ground rules of the project.

Members of the ethics panel and advisory network continue to offer guidance to the EUPATI Programme since it was established as a permanent programme under EPF in April 2017. We believe governance and ethics are critical success factors for a PPP to achieve its goals, whilst maintaining the credibility, quality and resonance of their work, will be the strength of the collaboration between the partners and the creation of an environment and working culture for each of them to contribute in a constructive, productive way, and in a spirit of respect and dynamism.

The **European Patients' Forum (EPF)** is an umbrella organisation that works with patients' groups in public health and health advocacy across Europe. Our 74 members represent specific chronic disease groups at EU level or are national coalitions of patients. EPF reflects the voice of an estimated 150 million patients affected by various chronic diseases throughout Europe.

More information: www.eu-patient.eu - info@eu-patient.eu

The Innovative Medicines Initiative: taking open innovation to the next level



Pierre MEULIEN

Executive Director, Innovative Medicines Initiative

The Innovative Medicines Initiative (IMI) has now launched close on 100 projects, and these are delivering results that are already making a difference to the medical research and drug development community. Looking to the future, we are committed to pushing the boundaries of open innovation, by expanding the involvement of other sectors (including diagnostics, medical technology, digital technologies, human nutrition and animal health) in the IMI community, and by strengthening our ties with similar initiatives elsewhere in the world, especially on issues with a global impact like Alzheimer's disease and antimicrobial resistance.

IMI was launched in 2008 as a public-private partnership (PPP) between the European Union and the European Federation of Pharmaceutical Industries and Associations (EFPIA). Since then, we have launched almost 100 projects, all of which take a collaborative, open innovation approach to some of the biggest challenges in medical research and drug development today. Our successes amply demonstrate the value of this approach, as our projects are delivering knowledge, tools and resources that scientists are using in their daily work to improve the drug development process.

IMI projects are accelerating the medicines development process

During the earlier stages of drug discovery and development, scientists deploy a range of tests and tools to study diseases, identify potential drugs, and determine whether a potential drug will actually be safe and effective in humans. Currently, the results of these tools are often unreliable as they do not accurately replicate what is happening inside the human body. To address this issue, many IMI projects are delivering improved tests and tools.

For example, our ORBITO project designed a new tool, based on an artificial membrane, for predicting how a drug will be absorbed in the body. Several companies have integrated ORBITO tools into their R&D processes. Elsewhere, our PREDECT project developed the first animal model of a common form of breast cancer that faithfully replicates the human disease. The model has been hailed as 'a potential game-changer for breast cancer research'.

In the respiratory disease field, our PRO-active project developed patient-reported outcome (PRO) tools for chronic obstructive pulmonary disease (COPD) which accurately assess patients' activity levels and the impact of the disease on their daily lives. The tools are being used by companies, including at least one from outside the project, and are currently under review with the European Medicines Agency (EMA).

Another project whose outputs have received support from both the EMA and the US Food and Drug Administration (FDA) is SAFE-T. The SAFE-T team developed improved tools for the prediction, detection, and monitoring of drug-induced injuries to the kidney, liver, and vascular system, using markers in patients' blood and/or urine. Application of these biomarkers will make drugs safer, and reduce the number of drugs that have to be abandoned late in development.

IMI projects are also delivering new networks for running clinical trials. In antimicrobial resistance, IMI's COMBACTE family of projects is building self-sustaining, pan-European antibacterial development networks and is using them to run high-quality clinical studies. For example, CLIN-Net is a network of over 800 hospitals in 42 European countries capable of quickly and reliably recruiting

patients for clinical trials. To date, there are seven clinical trials and studies involving the COMBACTE networks, covering studies on the incidence, treatment and outcomes of certain types of infection, as well as clinical trials of novel anti-infectives.

In the field of Alzheimer's disease, our EPAD project is establishing a group of 6 000 people at risk of developing Alzheimer's who could be rapidly recruited into innovative clinical trials of drugs designed to prevent or at least delay the onset of the disease. Currently 10 sites across Europe are recruiting volunteers, and the project hopes to start the first trials in 2018.

IMI projects deliver resources that are accessible to the wider research community

Many IMI projects are delivering resources for drug discovery that are open for use by the wider research community. These include online platforms that allow scientists to rapidly find the information they need in just a few clicks, as well as physical facilities that offer researchers the opportunity to identify and further develop potential drugs. A catalogue of resources developed by IMI projects can be found in the 'Projects and results' section of the new IMI website.

One important contribution of our projects to the wider community is knowledge, as disseminated through publications in scientific journals. By the end of 2016, IMI projects had published over 2 600 papers in the scientific literature. What's more, the citation impact (which measures how often a paper is cited in subsequent papers) for all IMI papers is 2.03. This is almost twice the EU average and is comparable to that of other organisations with a similar remit to IMI, namely the Wellcome Trust (2.05) and the US Foundation for the National Institutes of Health (1.96). Analyses also reveal that just over a quarter of papers from IMI projects are 'highly cited', meaning they are in the top 10 % of papers by journal category and year of publication.

One of IMI's most high-profile projects delivering resources for the scientific community is the European Lead Factory. Here, 7 pharmaceutical companies contributed compounds from their own collections to create an initial joint collection of over 300 000 compounds. Since the start of the



project, academics and SMEs from across Europe have added further compounds to the collection, which now boasts some 470 000 compounds. Studies have demonstrated the quality and diversity of the compounds in the collection. Scientists can apply to use the library and associated high throughput screening centre to advance their own drug development and research projects. The project has run 62 screens for public partners, including 14 small and medium-sized enterprises (SMEs), and covering disease areas such as antimicrobial resistance, Alzheimer's disease, diabetes, cancer, and neglected tropical diseases. The results of these screens have triggered patents and the creation of at least one spin-out company.

In the antimicrobial resistance field, ENABLE is creating a platform that helps organisations with promising potential antibiotics through the challenging earlier stages of drug development. Organisations whose applications to join the platform are accepted gain funding from IMI, as well as access to the significant expertise and resources of the consortium. The platform has proven particularly popular with SMEs.

The future: taking open innovation to the next level

Over the years, and thanks to the sterling work carried out in our projects, IMI has established itself as a pioneer of open innovation and a world leader in public-private collaboration in health research. However, medical research, drug development and healthcare are changing rapidly, and we must be bold, step outside our comfort zone, and take account of and even try to anticipate these changes.

So far, our industrial connection has been almost solely through the pharmaceutical industry. However, many other sectors have much to bring to IMI; we will not make transformational progress in Alzheimer's disease without the imaging industry, and our AMR programme will need a diagnostics component for it to be impactful. We also need to boost the involvement of the medical technology, information and communication technology (ICT), nutrition, and animal health sectors.

A number of companies from these fields have started to join IMI projects, however we need to do much more to bring these sectors

into the IMI community and give them a stronger voice within the organisation.

Digitalisation increasingly affects everything we do and we need to take specific measures to integrate the latest developments into our work.

We also need to build a strong internationalisation strategy that will make it easier to work more closely with major initiatives elsewhere in the world, especially on big global issues like AMR, dementia and cancer.

Finally, while IMI has always placed patients at the centre of what we do, we need to continue and expand our engagement with both patients and civic society as a whole at all levels.

This is an exciting time to be involved in medical research and drug development. The trend towards openness and collaboration, and the advent of new technologies, give me hope that we will soon see breakthroughs in even the most challenging areas. And if IMI can keep pushing the boundaries of open innovation, we will be a part of the story.

Find out more about IMI:
www.imi.europa.eu | @IMI_JU

The Innovative Medicines Initiative: Carrying the torch of medical innovation



Magda CHLEBUS

Executive Director, Science Policy & Regulatory Affairs, European Federation of Pharmaceutical Industries and Associations (EFPIA)

Our healthcare systems are facing unprecedented challenges from an ageing population and increased prevalence of chronic disease. It is only through innovation and collaboration tackling diseases like dementia, cancer and diabetes we will be able to meet the needs of patients, healthcare systems and society as a whole.

Public private partnerships in a form of Joint Undertakings established under the last two R&D funding framework programmes (FP7 and Horizon 2020) provided platforms to exploit such opportunities and bring large scale investments from industry into collaborative research initiatives. In constant evolution, these PPPs pioneer every day new models of working together.

The Innovative Medicines Initiative is the largest public private partnership in life science globally. Its overall budget of €5.2 Billion € is jointly provided by EFPIA member companies as in-kind and by the European Commission as cash funding to academic and public participants.

EFPIA is proud to be a partner in IMI, an open innovation model that addresses some of the major challenges in new drug development, such as reducing late stage attrition, getting new medicines to patients faster and more safely, as well as improving health outcomes.

The process of researching and developing new therapies is long, complex and risky. These are three challenges that IMI seeks to address by finding novel R&D solutions and harness the potential of new frontiers like genomics and data analytics through a combination of company collaboration (big, mid-cap and SMEs), public investments and a funding model that enables participation of health technology assessment bodies, payers, regulators, patients and charities in addition to academic institutions.

IMI provides tangible, practical tools to accelerate research in areas of high unmet patient need, increase efficiencies in the R&D process and critically, improve patient outcomes.

Dr. Elias Zerhouni, President of R&D at EFPIA member company and IMI partner,

Sanofi, explains the very tangible impact IMI is having in diabetes.

"Today more than 400 million diabetic patients are estimated worldwide and the number is expected to even rise to 552 million by 2030. Diabetes with its associated complications is a severe and pandemic disease causing human suffering but also represents a major burden both for society and healthcare systems and hence one of the biggest social economic challenges of our time."

Within the IMI, 16 EFPIA companies have joined forces to develop unique innovative projects addressing bottlenecks in order to deliver better health care solutions for diabetes. As of today 250 Million € are allocated to this task.

The first IMI projects have recently been completed and delivered impressive results.

An outstanding example is the IMIDIA project dealing with the insulin producing beta-cell function. It has successfully developed the first disease relevant human beta-cell line as well as disease specific in-vivo models strongly



improving research and development in type-2 diabetes.

Ongoing IMI projects like DIRECT and RHAPSODY address the heterogeneity of type-2 diabetes and aim to identify biomarkers for a better classification of patients for existing or novel therapies and thus deliver more individualized therapies.

Other ongoing IMI 2 projects are addressing severe complications in the later stage of type 2 diabetes. BeatDKD aims at diabetic kidney disease, a severely and progressively debilitating condition, the LITMUS project addresses fatty liver disease commonly accompanying obese diabetics (not related to alcohol abuse), being a starting point to irreversible tissue destruction (fibrosis and cancer). The objective of those projects are to better understand the mechanisms and development of these complication by identifying easy accessible indicators (e.g. in blood) that would facilitate diagnosis and enable prediction of disease progression and in turn improved therapy.

A new IMI 2 project strives to elucidate the underlying mechanisms of hypoglycemia, which hinders optimal insulin therapy in patients with insulin-dependent diabetes. In parallel, another new diabetic cardiomyopathy IMI 2 project investigates what makes diabetics 4-fold more susceptible to this heart failure condition through in-depth analysis and comparison of medical profiles of heart failure patients with and without diabetes.

Another focus is on type 1 diabetes, presenting most typically in children and adolescents. It lacks scientific understanding of the triggering events and disease progression. Within the INNODIA consortium the scientists are aiming to understand and differentiate the multifaceted mechanisms. They will create novel tools for diagnosis, models to improve researching the disease mechanisms and a clinical network allowing accelerated, specialized and standardized clinical studies.

Indeed, we must acknowledge that no single institution, company, university, country, or government has a monopoly on innovation or could succeed in deciphering the complexity of human diseases.

I was impressed to see the yield of already available tangible, and intangible achievements, enabled by strict governance along agreed demanding objectives, paving the way to novel, safe and cost-effective solutions empowering life."

The same multifaceted approach is applied to other public health challenges such as dementia or antimicrobial resistance.

Carrying the torch of medical innovation through IMI is a journey EFPIA and its members are committed too.



Value of Private Public Partnerships to address Infectious Disease Risks and needs for epidemic prevention



Jean LANG

MD, PhD
Associate Vice President R&D
Global Health, Partnerships & Funding,
Sanofi Pasteur



Corinne BARDONE

Pharm D
Head of Global Vaccines Public Affairs
for Polio, Pertussis and Hib Vaccines,
Sanofi Pasteur

The key question of the 21st century, facing the increasing resistance to antibiotics, global warming, urbanization and international movements (travel, migration) is how do we manage the epidemic risks? It seems that we have not learned the lesson. We are waiting for the epidemic to occur, media to amplify it, a global echo to be reached before having everyone mobilizing, budget released and industrial partners involved. Then, the epidemic ends, followed by the end of the funding, and everything comes to a halt until the next one. This vicious cycle is based on a purely reactive model, which is always late and is not sustainable each time. So called “lessons learned” become more like observations since it would seem that we reinvent the wheel each time. We must apply the “lessons learned” if we ever hope to be better prepared. One must also take into consideration the dramatic evolution of regulatory standards and requirements for pre-clinical and clinical trials, the cost of R&D, global licenses, and industrial equipment for a new vaccine is estimated between 500 and 1 billion Euros. As a result, the philanthropic role expected from the private sector to develop vaccines at risk, without any visibility on a possible return on investment, has become utopian.

Interesting, new approaches have emerged as either public-private partnerships (PPP) or with the addition of philanthropic partners (PPPP) e.g.: Wellcome trust or Bill & Melinda

Gates Foundation. These are new sources of value sharing, coordination and cooperation for Europe and for the world.

For Europe: The *Initiative for Medical Innovation (IMI)* is the largest public-private European partnership, with a budget 3.3 billion Euros over ten years, from 2014 to 2024. The pharmaceutical industry and its partners contribute 1.4 billion Euros.

Every pharmaceutical group has a specialty and is working in coordination, with the public sector and the European Commission. To be ready to develop vaccines, drug and

therapeutic solutions, for all targets, bacteria and viruses, partners are divided into several groups:

- **Bacterial risks** with the antibiotics resistance, knowing that antimicrobial resistance represents a global risk
- **Viral infections**
- **Fungal infections** (fungi)
- **Zoonosis** covered by the veterinary group: which is interested in the consumption of antibiotics by animals, very important to reduce resistance in humans
- **Respiratory infections**



- **Diagnosis**
- **Epidemic** preparedness and response, to which we contribute.

For the world: CEPI, *Coalition For Epidemic Preparedness Innovations*, is another illustration of public-private partnerships. A general consensus has been reached that the model previously used for the development of vaccines or therapeutics to contain epidemics is outdated, not responsive enough and no longer viable. It has been decided, after a long reflection under the aegis of the WHO and facilitated by the World Economic Forum¹ (Davos, January 2017), to create this partnership aimed at stimulating the financing and coordinating the development of vaccines, diagnostic products and therapeutics against emerging diseases. Recent outbreaks – SARS, Ebola and Zika – reveal gaps such partnerships should fill. We need to prepare the response

to “any new Public Health Emergency of International Concern» using principles of equitable access and shared costs and benefits. The expected benefit for the industry is the reduction of financial risks and the possibility of return on investment, even if it remains low. The expected benefit for the public authority is better socio-economic index for its population.

The first three targets identified by CEPI and WHO are zoonoses. :

- **Lassa fever** transmitted by rats
- **Nipah fever** transmitted by bats with previous epidemics
- **Middle East Respiratory Syndrom (MERS) fever**, transmitted by camelids: Joint development of an animal vaccine could make sense.

These new models of R&D partnerships should be complemented by new models of access to prevention or treatment that would be based on pharmaco-economic data, but which should also use tiered pricing approaches. (price depending on the

economic level of the country). These models of access to health products could then be both more equitable and sustainable through shared costs and benefits

- For the public sector: preventive or therapeutic solutions that bring a benefit in terms of morbidity and mortality
- For the private sector a fair return on investment that encourages maintaining industrial and R&D investments and takes into consideration opportunity costs.

All in all, these innovative public-private partnerships represent an interesting approach to emerging infectious diseases preparedness, that take into consideration upstream commitments associated with R+D programs and attempts to share the risks and benefits of the partners. Combined with new access models better adapted to the socio-economic realities of today's world, these new partnerships could, bring solutions that improve our preparedness and increase our ability to rapidly respond to emerging infectious diseases and epidemics.

¹ Media Release on CEPI launch at the World Economic Forum in Davos <http://cepi.net/cepi-officially-launched>



PPP initiatives in the context of the European Energy Union

A powerful element for a sustainable energy system



Paul RÜBIG

MEP (EPP Group), Member of the ITRE Committee

Just a few days ago, on November 24th, the third state of the Energy Union communication has been presented while in parallel the biggest legislative framework change in Europe's Energy system is already underway with the Clean Energy Package being negotiated. While the European Parliament and Council are now in the midst of their legislative work on the European Commissions proposals, discussions on the next Multiannual Financial Framework and the successor of Horizon 2020 the FP9 are already on many policy maker's minds. The challenges in the energy sector that lie ahead are time-sensitive and complex in their nature and will require a high degree of innovation and investment both from public and private sectors stakeholders.

With very ambitious energy and climate action plans being put in place, Member States will have to dedicate to a careful and well-thought-out, market-based implementation of these. In order to reduce dependency on energy-imports and make better use of renewable energy sources, investment into infrastructure capacity and smart energy solutions have to be facilitated. This however, will not just pertain to fields like electricity generation, but also innovative solutions in the field of energy storage, demand response systems, interconnectors between Member States, smart energy management in transportation and a deeper market integration

of renewable energy sources and in-between Member States.

It is therefore a more than suitable time to talk about the state and potential of public-private-partnerships in the context of Europe's Energy future. According to the European Investment Bank, the aggregated value of European PPP transactions across all sectors totalled € 12 billion in 2016¹, a 22% decrease in comparison to 2015. Nevertheless, the total number of 69 transactions reaching financial close has been significantly higher than in the previous year. While the number of PPPs in the energy sector that reached financial close has been relatively low in the last couple of years their potential in this sector is certainly high. PPPs can be an advantageous vehicle in particular for investment intensive projects due to the possibility of resource and risk pooling and a market oriented alternative to subsidy based financing of new technologies. Additionally, the collaboration between the public, industry and research organisations bears a huge potential for more efficiently distributing and leveraging on knowhow and skills stored in these 'knowledge silos'. A more decentralized energy system will make it necessary to better identify such 'knowledge-silos' and interconnect them via 'knowledge pipes' on an European level.

One of the latest and most promising PPP additions under the Fuel Cell and Hydrogen Joint Undertaking (FCH JTI) is the H2Future project in Austria, an example of green hydrogen production by using green electricity². The project, with an investment volume of 18 million Euros has been announced in early 2017 and is being carried by four industrial and two research partners supported by the FCH JTI. Its goal is to create hydrogen for a wide spectrum of use cases in what is planned to be the world's largest electrolysis facility. The required electricity will be sourced from renewable power generation and the facility's output of 6 megawatt in hydrogen is to be utilized as industrial resource and for demand-response capabilities in the energy market. In the long run it could

potentially enable CO2 free steel production in Austria. This PPP could serve as a powerful example for many other future projects in the energy sector.

While SMEs participation in PPPs is still relatively low but could be enhanced, as their potential should not be underestimated! Due to their focussed know-how, high degree of specialisation and innovativeness, the participation of SME in PPPs can be of great added value for PPPs. This potential is particularly heightened with energy systems becoming increasingly decentralised, context and region specific.

According to a report by the EIB from November 2016³ however, several hurdles still exist, which have to be addressed in order to increase the likelihood for an increase in the number and volume of successful PPP investments. Among others legal and regulatory frameworks should be better informed by experiences from existing PPP markets and need improvement with respect to reducing excessive restrictions. Equally, approval processes need to be defined more clearly and efficiently. Moreover, due to the complexity of PPPs at all stages, capacity building for public and private sector stakeholders is a crucial factor. Consequentially the exchange of best practices and other know-how across projects and markets should be facilitated. The ex-ante assessment of large infrastructure projects as lately suggested by the European Commission could be a very effective mechanism to that end. While the most recent reform on European public procurement legislation in 2014 also included measures aiming at increasing the participation of SME, its implementation into national law has been slow and its impact will now have to be closely monitored. Their contribution as part of PPPs could become an integral element of a successful a sustainable European Energy Union.

¹ <http://data.eib.org/epcc>

² <http://www.fch.europa.eu/press-clippings/siemens-voest-and-verbund-build-largest-green-hydrogen-site>

³ <http://www.eib.org/infocentre/publications/all/hurdles-to-ppp-investments.htm>

Joint Undertakings: an efficient tool toward the energy transition



Dominique RISTORI

*Director-General, DG Energy,
European Commission*

The energy sector is facing important transformation due to the geopolitical and economic context. It is also faced with the global challenges of decarbonisation, decentralisation and digitalisation. The energy transition is a key opportunity for achieving the objectives of a secure, sustainable and competitive energy. It plays a decisive role in the implementation of the Paris Agreement as two thirds of greenhouse gas emissions are related to the use and production of energy.

In Europe, significant progress has already been made in reducing greenhouse gas emissions thanks to the development of energy efficiency and renewable energies. They are the key drivers for the decarbonisation of the economy. And already today, around 30% of our electricity is coming from renewables. By 2030 this share will be over 50%. At the same time, the costs of renewables are falling, contributing to accelerate their development. According to the International Energy Agency, the costs of wind power decreased by 30% and those of solar power by almost 80% since 2008.

With the growing share of variable renewable energy, the energy system is becoming more complex and needs to be more flexible. Digital technologies are also playing an increasing role – with new intelligent components and ICT complementing the existing technologies – to integrate the variable renewable energy generation in a secure and cost-competitive way.

To underpin the transformation of our energy system and meet the challenges ahead, the Commission proposed in November 2016 the Clean Energy for All Europeans package. Focussing on energy efficiency, on renewable energy and on adapting our electricity market design, this package sets the right regulatory framework to adapt our energy system and support clean energy technologies and innovation in order to make the energy transition both secure, sustainable and competitive.

The benefits of the Clean Energy for All Europeans package go beyond the energy sector and have impacts at macro-economic level. Indeed, it is about boosting the EU jobs and growth potential while decarbonising the economy and benefitting all consumers. It will also contribute to the creation of a strong European industrial basis in support of the clean energy transition.

With the development of renewable energy sources, the challenge of their large-scale integration and the need for more flexibility of the electricity grid, energy storage is expected to play a growing role. Storage is indeed a key enabling technology in our efforts to decarbonise our energy mix. There is a wide range of possible solutions currently being pursued such as pumped hydro, batteries, compressed air and hydrogen. Some of these solutions are already well established but hydrogen appears as a promising technology which has the potential to contribute to the energy transition.

Indeed, hydrogen can help integrating the large share of renewable energies and developing more efficient energy system through potentially lower large scale storage cost. In addition, it is a flexible option which allows for off-grid end uses. In particular, hydrogen can contribute to a more sustainable transport system through the use of fuel cell electric vehicles and it can also be used for combined heat and power applications. Hydrogen produced from renewable energies can also be a vector supporting the decarbonisation in other economic sectors, in particular in energy intensive industries such as refining, chemical and steel.

The clear and stable policy and regulatory framework set by the Clean Energy for All

Europeans package will benefit to the development of storage and hydrogen technologies. But if we want to accelerate technological development and innovation, policy makers, producers and consumers and all relevant stakeholders also need to contribute to the transformation of the energy system.

To be able to catalyse and steer the efforts of the industry and research community in the area of hydrogen and fuel cells, the Council of the European Union formally established the Fuel Cells and Hydrogen Joint Undertaking (FCH JU). It is organised since 2008 as a public-private partnership between the European Commission, European industry and research organisations and its mandate was renewed and strengthened in a second phase, for the period 2014-2020.

Joint Undertakings are key instrument to boost the most innovative products into the market and help addressing major global challenges. By mobilising actors and investors across sectors and borders, Joint Undertakings are able to create new innovation ecosystems and work at the scale needed to deliver transformative breakthroughs and develop a strong industrial basis.

The projects undertaken in the framework of the Fuel Cells and Hydrogen Joint Undertaking supported by the European Commission brought already promising results demonstrating the potential and contribution of hydrogen to the transition to a low carbon economy. Europe is now in a good position in relation to hydrogen technologies with projects supporting cost reductions and technology development in the areas of fuel cells for energy and transport applications, of storage and of combined heat and power.

For the future we need to build on these promising results in order to make hydrogen a competitive solution towards the energy transition.

Overall, this shows the benefits of a strong public-private partnership and of joint undertakings with industry and the research community working together towards the objectives of a secure, sustainable and competitive energy.

Advantages of a JU for a Clean Energy future



Bart BIEBUYCK

Executive Director of FCH2

The Fuel Cell and Hydrogen Joint Undertaking (FCH JU) is one of seven Joint Undertakings furthering research and innovation in the form of public-private partnerships to deliver a more sustainable and prosperous future for Europe's citizens. Working with research and industry partners to develop fuel cell and hydrogen technology, the FCH JU supports early market deployment into sectors such as transport and residential energy - benefiting citizens and businesses, and building towards Europe's vision of a clean energy future. In less than ten years, more than 203 projects have been funded, with over € 1.5 billion from the public and private sectors. The 10th edition of the FCH JU Stakeholder Forum in November 2017 provided an opportunity to celebrate the achievements, and the progress made in the last decade.

The first phase of the FCH JU was funded under the Seventh Research Framework Programme (FP7), and ran for six years till 2014. With the recognition of its success, funding was extended under the Horizon 2020 Framework Programme, enabling the FCH JU to continue its core work: bringing together industry and research groupings, such as Hydrogen Europe and Hydrogen Research Europe, and working collaboratively to deliver clean and efficient fuel cell and hydrogen technologies to market and help tackle major global challenges in the areas of energy supply and security, transport, health, and the environment.

As noted in the European Commission's recently published report [LAB – FAB – APP: Investing in the European future we want](#), 'investing in research and innovation is increasingly crucial for shaping a better European future in a rapidly globalising world.' Working in an innovative triumvirate public-private partnership (PPP) structure, the FCH JU has enabled research to take place on a sufficient scale for technological breakthroughs, bringing together stakeholders from different sectors and from across borders. This is helping to position Europe competitively in the development of this strategically important technology. By overcoming price and performance barriers for fuel cell and hydrogen technology, and facilitating commercial uptake, the FCH JU's work leads to direct benefits for European industry, research, SMEs – and better quality of life for citizens.

In the European Commission's [recent interim evaluation](#) of Joint Undertakings, it was recognised that FCH JU activities are 'highly relevant to the grand challenges facing Europe by supporting the climate change objectives, helping improve energy security and contributing to raising the status of Europe as an international leader in FCH technologies'.

In the last ten years, huge strides have been made in the advancement of fuel cell and green hydrogen technologies, aimed at delivering more efficient, secure and clean energy. These technologies are now recognised as key enablers in Europe's transition to a

low-carbon economy, and are contributing to the achievement of goals such as a reduction of greenhouse gas emissions of 60% in the transport sector by 2050 and a 10% share of renewable energy in transport by 2020, to take just two examples.

The type of applications supported by the FCH JU include hydrogen fuel cell-powered buses, cars and taxis, which can decarbonise the transport sector. Other projects are aiming at the mass-scale roll-out of fuel cell micro-generation units – the latest smart home energy solution. The involvement of research and industry partners in developing these applications is, in turn, building a thriving community of European manufacturers and companies committed to scaling up production, and bringing fuel cell and hydrogen-powered clean energy solutions to the mass market.

Key achievements

The projects carried out through this programme demonstrate the technical and early economic feasibility of the hydrogen solution. Engagement with industry in order to realise the potential of the technologies involved has been central to the FCH JU's mission from the beginning. Thanks in part to the synergies of the FCH JU, Europe is now at the cutting edge in the development of hydrogen fuel cell buses, hydrogen refuelling infrastructure and renewable hydrogen production.

A series of FCH JU-funded projects has set out to improve the reliability and power yield



of electrolyzers, as the core production technology for green hydrogen. The HyBalance project focused on the feasibility of using central large-scale electrolyzers to supply grid services, as well as hydrogen for high-value markets. HyBalance proved that outputs of more than 1 MW were perfectly feasible for proton exchange membrane (PEM) electrolyzers. A subsequent project, H2 Future, will provide affordable, green hydrogen for use in steel-making processes as well as electricity grid balancing services. Significant research has also been invested in the improvement of membrane electrode assembly, the vital component at the core of every fuel cell and electrolyser.

Another key area of technological development has been in automotive fuel cell stacks for transport applications. The FCH JU worked on making Europe more internationally competitive in this area as we were lagging behind other parts of the world in this crucial technology. Their efforts culminated in the launch in 2017 of a three-year, € 60 million German consortium-led project, which will further facilitate the production of fuel cells for automobiles – a good example of European research being harnessed at a national level.

Transport

Huge progress has been made in the realm of transport in particular, where the FCH JU promotes viable and competitive alternatives to fossil fuels.

Fuel cell cars are now on the verge of penetrating the mainstream market, as hydrogen refuelling infrastructure expands, and the latest models have reliability and ranges comparable to conventionally powered cars. These advances are in part due to a series of FCH JU-funded projects, including large-scale projects HyFIVE and H2ME.

Hydrogen Mobility Europe (H2ME) is the biggest demonstration project to date. The first project – H2ME – began in 2015, aiming to deploy 29 hydrogen refuelling stations and 325 vehicles. Now, since 2016, H2ME2 is adding a further 20 hydrogen refuelling stations and more than 1,100 vehicles. Another initiative under this project was the HYPE hydrogen taxi fleet in Paris, where the largest fleet of fuel cell taxis in the world now operates. By using hydrogen from wind power, a global warming potential reduction of up to 83% is possible for a fuel cell taxi compared to a diesel taxi.

Public transport is a key sector in which advances are being made too (and fuel cell buses were very much in evidence at the COP23 in Bonn). The FCH JU co-financed the Clean Hydrogen in European Cities (CHIC) project in 2010, providing € 26 million out of a total of € 82 million to demonstrate across eight countries that fuel cell hydrogen buses

can provide a functional solution to the challenges of decarbonisation. Following CHIC, other FCH JU projects have proven that fuel cell buses can operate with the same flexibility as diesel buses without compromising the productivity of public transport.

SMEs

One of the FCH JU's top strategic priorities is to ensure that the SME sector remains a key player in hydrogen and fuel cell development. Here, the FCH JU has helped to pioneer new kinds of public-private partnerships, including a community that allowed the innovation inherent in SMEs to thrive while working with, and benefiting from, interaction with large organisations. The FCH JU structure specifically helps smaller companies to develop demonstration projects that may otherwise be too expensive. It also permits a long term, strategic perspective on the sector. With 27 % (€ 77.7 million) of its financial programme

dedicated to smaller businesses, the FCH JU has already exceeded the Horizon 2020 target of ensuring that at least 20 % of its funding is allocated to SMEs.

Future outlook

By 2020, the FCH JU aims at developing very efficient fuel cell systems; continuing the successful demonstration and roll-out of fuel cell applications for homes and businesses in many countries, and providing cleaner transport solutions. Investments by the private sector will be further leveraged by European-funded research and innovation, with knock-on societal benefits. The FCH JU will continue to drive the uptake of fuel cell hydrogen technology, drawing on the strength of its public-private partnership structure to deliver the best results, and working with other JUs to maximise the production of knowledge and its conversion into innovation.



To boost and facilitate the process of dispersion of new technologies the role of SME's is crucial through the PPP



Andor DELI

MEP (EPP Group), Member of the TRAN Committee

In recent years we could witness the emergence and expansion of numerous new technologies regarding mobility, transport and automotive industry. As an individual a customer and a consumer I have been always deeply interested in reading about the latest research and development sections of various magazines, newspapers and blogs. But after reading about it for some time, I was beginning to wonder when would all these new technological developments finally hit our streets and become a part of our everyday life? This is especially intriguing if one considers that, even though more than a decade has passed since the EU's eastern enlargement, there are still big inequalities between various regions within the EU, not to mention the ever-growing gap between urban and rural areas. To put this in the context of transport, one could argue that to achieve a breakthrough we need a much wider dispersion of alternative fuelling facilities. To facilitate this process of dispersion, we need to get SMEs and Public Private Partnerships on board. We need both these intermediaries in bringing new technologies out of the labs and into our streets.

PPPs are excellent mechanisms for public entities to procure and implement public infrastructure and/or services using the resources and the expertise of the private sector. There are two crucial parts of the partnership from the private side, those parts are resources and expertise. Public Private Partnerships enable

governments to focus on policy making by delegating day-to-day operations to private firms. PPPs also support and drive innovations. A public entity can present the problem to be solved to businesses, and the businesses can work out the innovative solution in a competitive environment. After these private businesses present their solutions they can decide which solution is the best for their goals. On the other hand, SMEs could be perceived as the final link in the long chain between industry and consumers.

In this article I will give you a short description of two European projects that I find particularly important and which are connected to my recent activities as a member of European Parliament's Committees of Transport and Tourism and Regional Development.

Recently I was an opinion shadow rapporteur to the Committee on Industry, Research and Energy (ITRE) report about the European gigabit society and 5G. The 5G Infrastructure Public Private Partnership (5G PPP) is a joint initiative between the European Commission and European ICT (Information and Communication Technology) Industry. The initiation of the 5G network will be conducted mainly through private investments, but it will require European coordination and planning which means cooperation between academia, research institutions, private sector, including SMEs and the public sector. The European Commission's 2013 Public Private Partnership initiative submits 700 million euros of public funding to enable 5G in Europe by 2020. It is going to motivate private companies to innovate and further invest. By supporting the new high-speed connectivity, we can produce substantial economic growth and have the potential to create two million jobs Europe-wide.

The other great example of PPP is the FCH JU (Fuel Cells and Hydrogen Joint Undertaking).

It is a Joint Undertaking formally agreed on by the Council of Europe. It has a budget of 1.3 billion euros for the period of 2014 to 2020. FCH technologies hold great promise for energy and transport. Recently I had the opportunity to test drive a fuel cells and hydrogen powered car. The big advantage of these cars is that unlike in case of electric cars

it takes only a couple of minutes to charge them, to fuel them, and they have a range of hundreds of kilometres. The fuel cells have a very long expected lifespan, and they are almost fully recyclable.

Both projects sound quite futuristic, and in spite all the efforts quite long time will have to pass until they are widely available throughout Europe. We are seeking 5G, but the truth is that Europe is lagging behind North America and parts of Asia even when it comes to 4G access. In 2015 more than 75% of the US population had access to 4G, while that is true only for 28% of EU population. It is hard to deploy 5G if we are still struggling with 4G. We have to work on the infrastructure and close up the gap between the EU and other parts of the World.

The same goes for the FCH. At this moment, there is only a single hydrogen fuelling station for these vehicles in the whole of Belgium, and none in Member States like Romania or Hungary. To make the fuel-shift work we have to get every Member State on board. There is already a big concern that the deployment of zero- and low-emission cars will not happen evenly throughout Europe, and that eastern parts of the EU will become a "parking lot" for dirty technologies and fossil fuelled vehicles. European institutions need to address these concerns as soon as possible and I am confident that PPPs and SMEs have a very important role in making these European policies work in our Member States for the benefit of our citizens.

The necessity to sustainable bio-based economy in the EU



Franc BOGOVIČ

MEP (EPP Group), Member of the REGI Committee

The European Parliament understands the bioeconomy and biobased industries (BBI) as a horizontal policy covering several sectorial policies: agriculture and food, forestry, energy, environmental policy, industrial policy and the creation of new jobs. Bioeconomy therefore includes the use and re-use of agricultural products, forestry, the paper industry and many other processing industries that use natural or biological resources. Therefore we can say without hesitation that BBI is the basic pillar of the circular economy!

The EU is very aware of the importance of BBI. Strengthening the EU's support for this sector has started with the beginning of the current multiannual financial framework 2014-2020 (MFF), when the BBI Joint Undertaking (BBI JU) was established. BBI JU is €3.7 billion partnership between the EU and the Biobased Industries Consortium, whose members cover the entire biobased value chain and consist of large industries, SMEs, regional clusters, European trade associations and European Technology Platforms. BBI JU's goal is to fulfil the potential of the European bio-economy and transform renewable natural resources into biobased products, materials and fuels using innovative technologies and bio-refineries. The EU contributes 975 million EUR of the Horizon 2020 research programme financial funds to BBI JU, while the private sector contributes the majority of the financial funds, 2,73 billion EUR. These

financial contributions support the large-scale commercialisation of high-quality biobased products, through investments in innovative manufacturing facilities and processes, as well as in biorefining research and demonstration projects.

Several EU Member States have included the co-financing of the BBI in their Smart Specialisation Strategies. The "champions" in this field are those Member States, who are highly developed, with a highly developed agriculture, such as the Netherlands, France and Italy, who all pay great attention to this area. I am convinced that these examples should be followed also by the other EU Member States, thereby defining the bio-economy and biotechnology as one of the most important pillars of the future development of Europe's economy. In view of the EU's environmental objectives for the year 2030 and our commitments from the Paris climate agreement, strengthening of bioeconomy is the necessary and also the only right path!

The EU therefore needs to create better conditions for the transition from fossil to natural materials. It must actively support research, development and innovation in the BBI sector. It needs to strengthen the creation of new products and enhance the competitiveness of the BBI sector, thus creating more new jobs in its regions. For logistical reasons the transport of biomass is solely economically justifiable for a distances of maximum 50 - 70 kilometres from the origin, therefore supporting BBI is an extraordinary opportunity for enhancing the development in rural areas. With the BBI production facilities located near the respective areas where raw materials are disposed we can ensure economic activity, jobs and thereby help to preserve population in rural areas. BBI is also an opportunity to make improvements to farms, as agricultural crops, such as sugar beets, are the most profitable in the crop rotation. BBI can also significantly improve the utilisation of wood biomass, as it usually exploits less quality wood residues and thus ensures sustainable forestry. Great opportunities for the development of BBI can also be found in some Eastern European EU Member States as well as in EU candidate countries, with large areas of uncultivated agricultural land. Over and above BBI can additionally help with reducing the EU's import dependency on protein feed.

Within the current framework, as well as in the legislative proposals that are currently being negotiated at the EU level, we can recognise Europe's determination to encourage the use of sustainable biobased resources as a major source of raw material for conversion into innovative industrial products and fuels, as well as energy. This goal, however, must be achieved without creating disturbances in food and feed supply. Environmental requirements must also be fully respected in this context. We must aspire to the expansion of the range and the volume of innovative products manufactured by the biobased industries from renewable biological resources. Development and production of products such as biobased plastics, chemical building blocks, ingredients for pharmaceuticals or cosmetics and advanced biofuels from agricultural and forestry residues and biowaste should therefore be more encouraged. In order to achieve these goals, innovation within established biobased industries with a long tradition of processing renewable natural resources needs to be supported and also new types of biorefineries should be developed.

I also believe that the EU's action plan for Circular Economy is an important step that the EU is taking towards a green and low-carbon economy that uses all resources in an efficient manner. It identifies the circular economy as an effective economic model that improves and simultaneously reduces the use of resources, while at the same time removing the problems related to the supply of raw materials. In this sense it is a perfect framework for the bright future of the European biobased economy.

Strengthening European bio-based industries in a competitive global market



Philippe MENGAL

Executive Director of Bio-based Industries Joint Undertaking (BBI JU)

A cornerstone of the EU Bio-economy Strategy

The Bio-based Industries Joint Undertaking (BBI JU) initiative is the €3.7 billion public-private partnership between the European Union (EU) represented by the European Commission, and the Bio-based Industries Consortium (BIC). Its objectives are to develop sustainable and competitive bio-based industries in Europe, centred around its flagship first-of-a-kind advanced biorefineries. This means developing sufficient sustainably-sourced biomass, new technologies to fill gaps in value chains, and business models which integrate all the economic actors. The aim is to help European bio-based industries become leaders in the global race towards an economically-viable sustainable bioeconomy.

BBI JU's mission is to implement the Strategic Innovation and Research Agenda (SIRA) developed by the industry and validated by the European Commission, under Horizon2020 rules. BBI JU organises Calls for proposals to support research, demonstration and deployment activities enabling the collaboration between stakeholders along the entire value chains covering primary production of biomass, processing industry and final use. It does this through implementing a broad industry-led, publically-supported research and innovation funding programme.

It's a public-private model which is proving its worth: by the end of 2016, every euro invested by the EU was leveraging €2.6 of

private investment – proof that already, bio-based industries are actively boosting European economy, and creating sustainable value for its citizens.

Using new technologies to turn renewable biological resources, including residues and wastes from agro-food, forestry and municipal sources, into greener everyday products, through innovative technologies and biorefineries, the BBI JU will contribute to meeting sustainable development goals for Europe, implementing the EU Bioeconomy Strategy, EU environmental policy and the Juncker priorities as well as playing an increasing role in the new common agriculture policy.

Contributing to Europe's economy

The bioeconomy already contributes to the economic prosperity of Europe. In 2014 the bioeconomy in the 28 European Union member states was valued at €2.1 trillion euros in turnover and supported 22 million jobs, which is a significant proportion of 10% of the total employment in the Union. Bio-based industries are a significant sub-sector of the bioeconomy, meaning those industries that exclude food and beverage sectors, primary production from agriculture, fishery and forestry, and animal feed sectors but which includes food and non-food ingredients, biofuels, biomaterials and bio-based chemicals.

Currently the European bio-based industry sector is not organised in a coherent way.

Different industries involved in the bio-economy are at different stages of readiness for commercialisation. The challenge is now to create the right conditions for investment across different actors, sectors and geographical boundaries. Even when data from 2014 shows that the combined bio-based industries contributed €674 million to the wider European economy and supported 3.3 million jobs, bio-based industries are still seen as 'emerging' and therefore risky investments for industry.

The activities of the BBI JU initiative are helping to create the critical mass needed to fully embed bio-based industries at the heart of a sustainable European bioeconomy. As an example, where private partner BIC members stated they had around €2 billion of investments in Europe in the pipeline in 2014, this has increased to almost €5 billion by 2017, putting Europe firmly back on the map as an attractive area to invest in this double-digit growth sector.

Reaping the benefits for European citizens

Europe is committed smart, sustainable and inclusive development, and as part of its response to the UN's Sustainable Development Goals for 2030, bio-based industries will contribute directly to meeting a number of these, delivered for Europe in a fiercely competitive global setting. Job creation, resource



efficiency, reducing environmental impact from industrial processes and producing high-performing new materials and products are all benefits of an advanced well-organised and productive bio-based sector in Europe.

BBI JU's role as catalyst is leading to the creation of a competitive bio-based sector in Europe. This is expected to significantly boost employment, as well as support regional development by expanding local economies by regenerating underdeveloped and/or abandoned regions. This will result in new, higher and more diversified revenues for farmers and cooperatives and create up to 700.000 skilled jobs by 2030, 80% of which will be in rural areas. Using sustainable resources to replace 30% of oil-based chemicals & materials will help to reduce EU's dependency on import of fossil raw materials, protein and important mined substances like potassium and phosphates. Through developing the potential of agricultural side streams & forestry residues and by moving to a bio-based economy there can be an average reduction of 50% greenhouse gasses.

Accelerating the implementation of a bio-based economy for Europe

Europe has always been at the forefront of science, innovation and the development of new technologies. However investing in scaling up these new innovative technologies tended to take place outside of Europe, where investor appetite or government subsidy created better conditions to take advantage of opportunities for the commercialisation of bio-based activities. Obvious examples of regions which have benefited greatly from this approach include the US, the Americas and Asia.

BBI JU instigates this multidisciplinary, multi-actor research & development, and stimulates new cross-sector interconnections, organizing partners along new bio-based value chains, ranging from agriculture, energy and the aquatic sector to automotive and construction; chemical industry, food & feed, forestry and pulp & paper, health, home & personal care, packaging, pharmaceutical, textiles, etc.

After 3 years and 4 Calls for proposals, BBI JU has 65 ongoing projects involving more than 730 participants from across large industry, academia and other organisations working in expert consortia spanning 30 countries. SMEs participate in the programme at a rate of 36% of all beneficiaries and BBI JU already has 6 flagships, 20 demonstration projects, 33 research projects and 6 coordination and support projects up and running. Indicators show progress against project and programme targets in a number of areas including new collaborations and value chains, new technologies

and processes, new products and business models.

The BBI JU is demonstrating itself 'to be a concrete example of the EU's efforts towards strengthening its competitiveness through scientific excellence, industry led research, openness and innovation'. According to the

European Commission findings so far for the programme, the mobilising and structuring effects of BBI JU activities are confirmed.

More information about the programme is available from the website: www.bbi-europe.eu | @BBI2020



Taking stock of Europe's bio-based industries: new sectors, new value chains, new investments



Dirk CARREZ

Executive Director, Bio-based Industries Consortium

deploy and create new markets for sustainable bio-based products such as bio-chemicals, materials and fuels were the key objectives.

The BBI JU will invest € 3.7 billion in bio-based innovation between 2014 and 2020: € 975 million have been committed by the European Commission and € 2.7 billion by the private sector organised in BIC.

Biorefineries are the heart of the Biobased economy

Innovative technologies and advanced¹ biorefineries are at the heart of the bio-based

economy concept, transforming biomass and wastes into green everyday products. In the summer of 2017, nova-Institute and BIC conducted a comprehensive survey of all European biorefineries. Finally, 224 biorefineries were identified and entered into a European map. The map distinguishes "Sugar-/starch based biorefineries" producing bioethanol and other chemicals (63), "Oil-/fat-based biorefineries - biodiesel" (64) and "Oil-/fat-based biorefineries - oleochemistry" (54), "Wood-based biorefineries" (25) excluding pulp for paper only, "Lignocellulose other than wood" (5) and finally "biowaste-based biorefineries" (13).

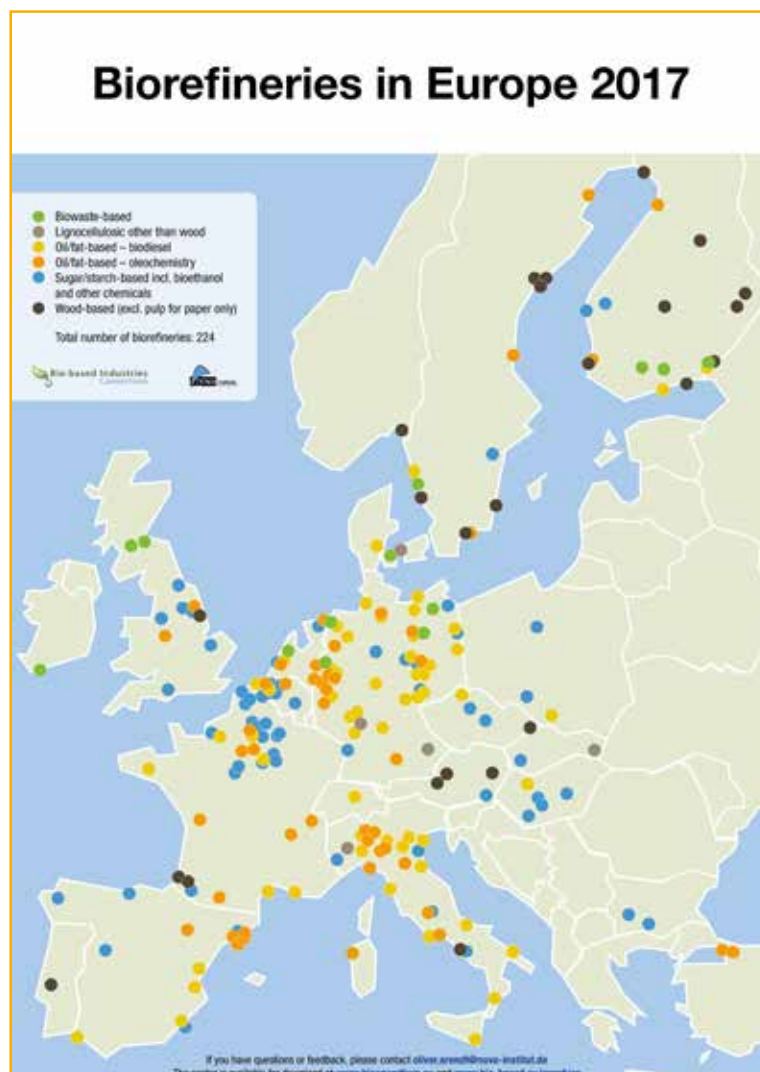
¹ Europe is gradually shifting the feedstock base to non-edible biomass.

The global paradigm shift from oil-based towards bio-based materials represents a unique opportunity for Europe to kick start a world-leading competitive bioeconomy, having significant economic, environmental and societal benefits for the continent. The bioeconomy encompasses the production of renewable biological resources and their conversion into food, feed, bio-based products and bioenergy. It includes agriculture, forestry, fisheries, food and pulp and paper production, as well as parts of chemical, biotechnical and energy industries.

The Biobased Industries Initiative, a public-private partnership, a major success of the European Bioeconomy Strategy

The European strategy "Innovating for Sustainable Growth: A Bioeconomy for Europe (2012)" called for a bioeconomy as a key element for smart and green growth in Europe. The strategy aims to integrate biomass-producing and processing sectors in order to reconcile food security, natural resource scarcity and environmental objectives with the use of biomass for industrial and energy purposes.

In 2014 the European Commission (EC) and the Bio-based Industries Consortium (BIC) joined forces in the Public-Private Partnership Bio-Based Industries Joint Undertaking (BBI JU). Crossing the "valley of death", keep knowledge and investments in Europe and to



New sectors and innovative value chains

The bioeconomy used to be fragmented with sectors and companies that in many cases were not used to collaborate across industries and geographical regions. Most industrial sectors were used to working in silos. Due to the Biobased Industries Consortium and the BBI-projects, companies are now working with partners from sectors that have never collaborated before ...

The bioeconomy involves many different value chains on land and the sea, traditional and emerging with high potential for sustainable growth. In recent years, some new trends became visible. These include new value chains in the bioeconomy and circular economy. These are found in both food & feed, forest and marine industries, for example linking food & feed side-streams to chemicals. Examples are the side streams of the milk, cheese and alcohol (beer, wine, spirits) industry to produce organic acids and bio-based plastics; side-streams of olive and orange juice industry, which can be used for the extraction of high value organic components; proteins and fatty acids from the seafood processing industry.

New bio-based value chains have been developed for: (a) bio-chemicals (eg aromatics), (b) bio-materials (eg bioplastics) and (c) bioenergy and biofuels (eg from lignocellulosic crop residues).

The BBI JU not only stimulates new cross-sector interconnections. As more and more industry sectors want to make the transition from fossil to bio-based resources, new industrial sectors are joining and discover opportunities to create value from waste and side streams, originating from the food processing sector, the aquatic-based sector, and even bio-waste and CO₂. As a result, the bio-based industries cover today many industrial sectors: food & feed additives; agriculture; energy; forestry; packaging; health-, home & personal care; paper & pulp; automotive; pharmaceutical; textiles; construction; and the aquatic sector.

BIC also observes a growing interest from brand owners. Collaboration with brand owners is essential as they develop the vision for the future, help to increase acceptance of biobased products in market applications, develop new applications for biobased products, or even create new markets

New investments

With regards to access to finance, a recent study by the European Investment Bank found that main funding gaps exist in (i) bio-based

A SUSTAINABLE AND CIRCULAR BIOECONOMY FOR EUROPE



Industries projects scaling up from pilot to demonstration projects and (ii) particularly in bio-based Industries, moving from demonstration to flagship/first-of-a-kind and industrial-scale projects.

The aim of the BBI JU was to de-risk this emerging but fragmented industrial sector, together with supporting the high costs for demonstration and deployment activities. Today, we see that the BBI JU is a world leader in upscaling bio-based demonstration projects and leads to increased private sector funding and investment. BBI JU demo and flagship projects allow to accelerate commercialization of riskier capital-intensive technologies and mobilize industry investments in Europe. After the first three years, almost € 2 billion of private contribution were already announced by beneficiaries in granted projects. Furthermore, BIC's annual survey shows that its members in general had € 2 billion worth of investments in the European bio-economy in the pipeline end of 2014, and this increased to almost € 5 billion beginning of 2017.

Fostering Europe's sustainable bioeconomy revolution

BIC calls for a continued partnership with the European Commission under the new EU Research & Innovation Framework programme (FP9) as

- Funding from the BBI JU is crucial in order to turn research into innovation and deployment in Europe and thus to develop a competitive European bioeconomy.
- BBI JU brings together different sectors and entire value chains, mobilising the relevant stakeholders, ranging from SMEs to large companies, from resource & technology providers to brand owners.

Investment framework to build a competitive, dynamic and sustainable bioeconomy in Europe



Miapetra KUMPULA-NATRI

MEP (S&D Group), Chair of the Bioeconomy Working Group, EP Intergroup "Climate Change, Biodiversity, and Sustainable Development", Member of the ITRE Committee

The magnitude of climate change and its impact to our economy and society is almost hard to fathom. The policy response has been too slow and too late - yet we must grab every opportunity. The European Union especially has a duty to show leadership in meeting the Paris Agreement goals.

A key measure to deliver on our promises is the development of a strong and innovative bioeconomy. Bioeconomy, for me, encompasses all economic activity related to better using our renewable natural resources. Bioeconomy is a part of the circular economy and as such the bioeconomy is not about using more - rather than using better what we already have.

This requires new ideas and products, but bringing innovation about is not easy. Developing new biobased product or material requires multiple steps to take it from the lab scale to a commercial product. These steps are needed to test that the technology is scalable and reproducible outside of the laboratory environment and to provide data to prove to investors that an idea is commercially viable.

A practical example is the access to scale-up equipment. Such equipment is costly and requires specialist staff to operate it. SMEs find it a particular challenge to finance trials

at a large enough scale and to develop suitable data for investment decisions to be made whilst not compromising on IP rights.

This can result in a so-called 'valley of death' - innovative products at the lab scale fail to be commercialised. The risks and large capital outlay associated with scale-up mean that it is difficult to find private investors for these kinds of plants. Public funding therefore has a crucial role to play in helping bridge this gap.

Currently the variety of different funding instruments is great. The Horizon2020, the largest research programme in the world, contains a specific target action for bioeconomy related projects. In addition, the European Structural and Investment Fund (ESIF), the European Agricultural Fund for Rural Development (EAFRD), InnovFin, the European Fund for Strategic Investments (EFSI) and European Investment Bank (EIB) provide funding, loan and guarantees.

However, access and effectiveness remain a critical issue. Funding remains fragmented with different procedures across institutions, regions, organisations making the whole application experience very lengthy and complex. It is critical for the EU, governments, regions and other funding organisations to put these theoretical synergies into practice to make investing in Europe a seamless process.

The opportunity to change this is now as the European Commission prepares to form a new bioeconomy strategy in 2018. As described in the Commission document on the review of the current strategy, EU leadership in the bioeconomy is tangible: for every euro invested in the bioeconomy by the EU, Member States have invested 3.80 and industry 2.60.

As stakeholders and institutions prepare for the new strategy process, I see three broad guidelines that should guide the work.

First the strategy needs a more clear alignment of goals and actions. We need to step up our efforts to replace fossil-based materials with sustainably sourced biomaterials in order to transform our economy. The new strategy should be more focussed and we need to ensure there is sufficient monitoring and assessment tools at place to ensure results.

The second reason is more policy-related. Bioeconomy should be seen as a crucial part in the EU's approach to tackling and mitigating to climate change. Since the previous strategy, a new policy context has been established, composed by the Paris Agreement, the Climate and energy framework, the Circular Economy package, and the Sustainable Development Goals. All of these require reframing the role of the bioeconomy within the EU policy context and ensuring that coherence among different policies is maintained.

Third, we need to ensure funding beyond the research level. While basic and fundamental research in Europe are mostly supported by EU and national/regional grants, currently, for a flagship and commercial scale investment the most important contribution comes from bank loans and investors.

The bioeconomy's PPP instrument, Biobased Industries Joint-Undertaking (BBI-JU), is a great tool for bridging some of the funding gaps but it cannot support all commercial scale projects. The new strategy and related funding initiatives should provide better access to funding for near-market-ready products and demonstration or flagship projects. In general, we need to simplify the funding landscape, reduce the administrative burden for applicants and overall raise awareness of the different possibilities.

In the heart of our efforts remains the successful partnership of the private and public sectors. We need all hands on deck to transform our economy.

Public-Private-Partnerships in Horizon 2020 and beyond



Roberto VIOLA

*Director General DG CNECT,
European Commission*

There are currently ten research contractual **Public-Private-Partnerships** (PPPs) covering a variety of industrial sectors and technological domains: Factories of the Future, Energy-efficient Buildings, the Green Vehicles Initiative, 5G, Sustainable Process Industry (SPIRE), Robotics, Photonics, High Performance Computing (HPC), Big Data and Cybersecurity. They are designed to implement strategies that increase the competitiveness impact of European R&D funding through Horizon 2020. They also offer a more active role to industry in defining R&D roadmaps, contributing to H2020 work programmes and calls.

On future connectivity, the first set of 19 5G PPPs projects is delivering on major building blocks for future 5G communication networks, where partners are cooperating on issues of common interest, such as spectrum and standards.

As regards robotics, the SPARC PPP organises consultation with the stakeholder community, which has led to the identification of R&D&I priorities in the area of healthcare, the inspection and maintenance of infrastructure, agri-food and industrial SME manufacture.

In the field of electronics, the Joint Undertaking on **Electronic Components and Systems for European Leadership (ECSEL)** provides a unique opportunity for speeding up

innovation along the complete vertical value chain, from nanoelectronics to embedded/cyber-physical systems and smart systems. It is well-positioned to have a strong impact on strengthening European industry in key application domains such as rail, aerospace, manufacturing and health.

While it is too early to assess the impact of on-going and newly funded PPPs, it is important to highlight the structuring effect of these initiatives as regards strategic research and industrial road-mapping in collaboration with industry and other private and public stakeholders. We can also be optimistic about their expected leverage effect. The more recent Public-Private Partnership on Cybersecurity is expected for example to trigger up to EUR 1.8 billion of investment by 2020 thanks to an EU investment of about EUR 450 million. SPARC, the PPP in robotics, will have received up to EUR 700 million EU funding at the end of Horizon 2020 and should trigger an overall investment of EUR 2.8 billion.

The work carried out by the Lamy Group on the subject provides a glimpse into the future: it recommends that “partnerships with industry, foundations and public authorities should be taken forward in as far as they mobilise joint investment in established missions, through a simple and flexible co-fund mechanism”.

Work is already underway to prepare the next generation of such partnerships, from the area of supercomputing to cybersecurity and artificial intelligence.

Since March this year, 13 EU Member States have signed the EuroHPC declaration and agreed to work together towards the establishment of a multi-government cooperation framework for acquiring and deploying an integrated supercomputing infrastructure of the next generation. The goal of the [EuroHPC](#) agreement is to establish a competitive [HPC ecosystem](#) by acquiring and operating leading-edge high-performance computers. The ecosystem will comprise hardware and software components, applications, skills and services. It will be underpinned by a world-class HPC and data infrastructure, available across EU, no matter where supercomputers are located. The [EuroHPC declaration](#) aims at having EU exascale supercomputers, capable of at least 10^{18} calculations per

second, in the global top 3 by 2022-2023. Access to HPC will be useful in many areas spanning from health, biology and climate change to automotive, aerospace energy and banking.

In the field of cybersecurity, the scale of the investment under way in other parts of the world suggests that the EU needs to do even more, and therefore has to overcome the fragmentation of cybersecurity capacities which are spread across the EU. Building on the work of Member States and the cybersecurity PPP, reinforcement through a network of cybersecurity competence centres with a European Cybersecurity Research and Competence Centre at its heart would be major progress in this respect. Such a network would stimulate development and deployment of technology and complement the capacity building efforts at EU and national level.

Finally, there is the challenging and promising area of Artificial Intelligence (AI): the European Council has invited the Commission to put forward a European approach to artificial intelligence by early 2018. The approach will focus on building up Europe's technological and industrial capacity in AI and facilitating its uptake. It will also address new ethical, legal and societal issues and tackling new socio-economic challenges including upskilling of workers. All this will need to be done in partnership across the European Union.

In conclusion, Public-Private-Partnerships and Joint Undertakings are a cornerstone in our work. They help boost innovation and growth in Europe, and ensure more consultation and better alignment of public support to R&I and industrial strategies. Taking into account lessons learned from the implementation of ongoing partnerships, the EU will be able leverage further partnership instruments in order to tackle major societal challenges.

ECSEL Joint Undertaking: shaping digital innovation



Bert de COLVENAER

Executive Director of the ECSEL JU

is the “grand idea” behind the programme: not just research for research’s sake but focussing on issues that will genuinely matter to people and society.

To take one example: “Smart Mobility” offers the potential to solve many of Europe’s mobility challenges: from traffic congestion (that aggravates air pollution) to accessible, useful, zero-emission and zero-accident mobility solutions for citizens, in urban and also rural contexts. But, it is not simply a contribution to developing autonomous vehicles; it is indeed developing a series of interconnected technologies working in harmony - some networked, some on-board - fully compatible each other, and so complex that they cannot be mastered by a single partner, nor even a single country. It is creating a set of systems that work together to assure secure and safe

watch guides them through a full and busy day without battery charging. Or that their smart car drives pollution-free and safely in unpredictable and sometimes potentially dangerous situations, or that they can rely on the remote monitoring and assistance of aged parents. In other words - the prospect of a longer, healthier, productive, interesting, inclusive and affordable life.

The ECSEL JU had a great supportive role in deploying a revolutionary technology for very low power-loss electronic chips in a cost-effective way: “FD-SOI” (Fully Depleted Silicon On Insulator). Rooted in Europe, FD-SOI is already commercialized in many domains, from smart watches to cars, and massive investments are being made worldwide, keeping the EU in its leadership position.

Electronic Components and Systems are crucial to innovation for any business and everywhere in society: being the basis of all Information and Communications Technologies (ICT), they have an important impact on the daily life of all Europeans. A smartphone, a smart card, a smart energy grid, a smart city, even smart governance; everything ‘smart’ is based on integrating semiconductor chips running embedded software. They provide the fabric on which the internet runs; they give life to portable phones and tablets; they drive driverless cars and trains, fly airliners, drones and satellites. They are essential in the deployment of viable, economically valuable solutions in almost every domain. In modern times, no national economy can win in the global competition without mastering this technology, which has unparalleled systemic and strategic impact.

Building on the results of ARTEMIS and ENIAC JUs (set up in 2008 after having identified some key sectors, e.g. mobility, health, production, energy, digital society), the European Union established the ECSEL JU* with the charter to coordinate the elements that drive strategic innovation, aligning the EU, national governments and industry around the EU’s long-term goals. Europe’s world-class researchers and academics, SMEs and leading companies started collaborating around a common agenda to benefit all - public and private - from the advances they deliver. This



conditions for all users, passengers, pedestrians and other road users at all moments and in all weather conditions. And “Joint Technology Initiatives”, implemented by the ECSEL JU, are all about doing things together, to achieve common goals.

But, what does a European citizen expect in his daily life from all these connected objects anyway? Basically, we can call it a “Smart Society”. Not only will their cell phone be used to exchange family videos while comfortably nestled in a favourite sofa or that their smart

The potential of this innovation is so huge that mainstream world-wide actors are embracing the European technology, and the ECSEL JU, with the FD-SOI success, is demonstrating the capability to cross the “valley of death” between excellent science on the one side, and socio-economic benefit through growth and jobs on the other.

In short, the ECSEL JU has successfully launched a model for financing and securing important industrial and socio-economic developments through leadership in ECS, on a

stable, European base. But is this enough? And where do we go from here?

ECSEL JU is fully dedicated to securing a strong contribution towards a smart, sustainable and inclusive growth, not only by strengthening the current cooperation amongst its members but also by exploring innovative tools. This is why ECSEL JU has launched the “Lighthouse Initiatives”, which represent a further structuring of the “clustering” activities already characteristic of ECSEL JU’s model. More innovation through innovative ways, for the full benefit of European citizens and businesses, who ultimately are the true beneficiaries of the innovative work done by partners in ECSEL JU funded projects.

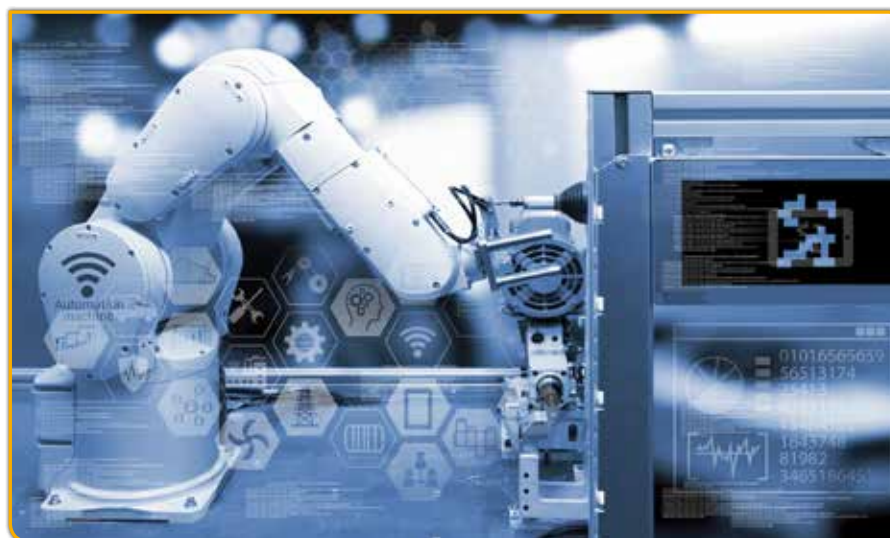
Europe needs a strong industry but - in a context where financial resources are quite scarce - there is a need to optimise the current financial tools at EU and National level, and assure maximum impact of the research and innovation programmes. There is no magic solution for incentivising investments. However, there are effective options that, by sharing risks between public and private entities, can fertilise pathways to innovation and growth in Europe. With its tripartite structure (the European Commission, Participating States and Industrial participants), we are fully convinced that the ECSEL JU model is the best way forward. The ECSEL JU is more than a funding instrument: it is an ambitious programme with a powerful mix of short, medium and long-term vision: addressing the funding gap to overcome market failures and boost the realisation of projects that otherwise would not have taken off. ECSEL’s efforts today will ensure a smarter and more advanced European tomorrow.



“Smart Energy”: to reduce pollution by burning hydrocarbon fuels, optimum use of electricity is in even more focus, especially from renewable sources. ECSEL JU is helping Europe to develop best-in class technologies that can reduce overall energy waste by up to 40%. On one hand, advanced electronics make for energy efficient controls that reduce consumption and losses, while also encouraging energy friendly behaviour in end-users. On the other, they help manage the generation and distribution of electrical energy as an intelligent “Smart Grid”.



On “Smart Health”, ECSEL JU acts as an open platform, which is crucial in the field of healthcare electronics. Here, due to a high level of competition, the element of co-operation is not so obvious. As a consequence, in recent years, many more systems companies are now trying to work together at the pre-competitive level. The ECSEL JU is playing a key role, with outcomes that are immensely important for patients and health-care providers alike.



On “Smart Production”, in a very competitive and fragmented market, reducing manufacturing times and system costs while securing the same quality level is essential. More efficiency in production methods will bring benefits to the full value chain, from an end-user perspective also (time reduction to bring high quality products to market).

*The Electronic Components and Systems for European Leadership Joint Undertaking (the ECSEL JU) is a public-private partnership set up between the European Union (through the Commission), 26 Member States and 3 countries associated with Horizon 2020, as well as three Industry Associations (AENEAS – www.aeneas-office.org, ARTEMIS-IA – www.artemis-ia.eu and EPoS – www.smart-systems-integration.org).

Joint Technology Initiatives and Joint Undertakings: speeding up Europe



Lambert van NISTELROOIJ

MEP (EPP Group), Member of REGI Committee

Over the past 10 years, Joint Technology Initiatives (JTI) and Joint Undertakings (JU) have carved out an essential role in Europe's innovation agenda, boosting the EU's competitive position in the world. On the basis of the 2006 rapport from former Finnish prime minister Esko Aho, the EU had to speed up: strengthening innovation, putting key actions from industry in the forefront. Here we direct EU funds at investments on innovation, productivity and competitiveness. In an increasingly global and competitive world, we increase investments from the research frameworks together with private and public actors in a way that never happened before in the EU.

Most of the funding went to JTIs, a special funding scheme originally used for the implementation of the previous Seventh Framework Programme (2007-2013). Implemented through Joint Undertakings, these independent entities integrate research projects by combining industrial key players with other actors in the field. Funds from several sources are jointly managed through calls for proposals. By combining excellent science with a collaborative, open innovation approach that brings together different actors, JUs increase the scale they work on and deliver effective breakthroughs. There we see that €7 billion of EU funding generates €17 billion on investments for downstream research and innovation activities in the 2014-2020 period.

In turn, this stimulates job creation and competitiveness in the private sector.

The concrete benefits of modernising industry and a strong added value on the EU level are clear. Key issues in the field of transport, environment, health, energy and computing are addressed. The JTI/JU-investments also have a significant impact in Europe's regional economy creating critical mass at national and regional level. By fostering an innovative ecosystem, specialising regions become more attractive for companies and research centres, which in turn supports both brain gain and retain. This way Europe takes position as a competitive player on the global scale, strengthening the talents needed for a stable future economy.

I took actively part in the Parliament's negotiations for two of the JTI/JU initiatives: the Joint Undertaking on Bio-Based Industries, BBI JU, and the Clean Sky Initiative. The aim of the former is to trigger investments and create a competitive market for bio-based products and locally sourced materials: 'made in Europe'. Hereby they tackle some of Europe's biggest societal challenges in the rural areas. To develop the emerging bio economy sector, €3.7 billion has been allocated into the European economy between 2014 and 2020: €975 million from the European Commission's side and €2.7 billion from the bio based industries consortium. Through financing of research and innovation projects, the BBI will create new partnerships across sectors, such as agriculture, agro-food, technology providers, forestry/pulp and paper, chemicals and energy. There we support the all over goal: more 'Made in Europe'. After a promising start in 2014, it is important to note that the European Parliament has recently adjusted the bioeconomy regulation. Now decentralised partners, like the European regions and their companies, can play a direct role in the investments at local level. Here the Structural Regional Funds will play a crucial role, especially in the rural areas.

The other JTI, the Clean Sky Initiative is a partnership between European Commission and the European aeronautics industry that aims to integrate breakthroughs in aircraft-technology. Goal is to cut CO2 emissions by 20-30%

and cut noise levels. Benefits are manifold: the public will see a decrease in noise pollution and the aeronautics sector will benefit from a highly developed labour force. Furthermore, European regions and SME's actively take on board opportunities to enter in innovation chains that attract private money for further rollout. During the last years, both Horizon2020 and the Structural Funds have strongly supported the smart specialisation in the aviation-sector.

The final JU I would like to highlight is the Electronic Components and Systems for European Leadership (ECSEL JU), a trilateral public-private partnership between the European Commission, 26 Member States and three Industry Associations. This Joint Undertaking's aim is to boost strategic innovation for smart solutions: fields which have a direct impact on the public, like for instance Smart Health, Smart Mobility and Smart Society.

Post 2020, when financial resources are scarce, we can further increase our impact by combining and focusing the financial possibilities at the public and private level, as well as EU and national level. The JTI/JU, approach developed in recent years, is fundamental to speed up Europa, shift it into a higher gear. If we had no Joint Technology Initiatives and Joint Undertakings, we would have to invent them today.



Lambert van Nistelrooij during the Innovation in Action-exhibition in Strasbourg, October 2017

Stimulating the innovation through of the PPP's



Marian-Jean MARINESCU

MEP (EPP Group), Member of the TRAN Committee

Economic development and the creation of jobs represent an ongoing requirement and one of the greatest challenges for the future.

There is a clear need for investments. In the light of the fast technological development coming from many emerging areas, EU investments in R&I are primarily needed.

The private sector takes this issue up to ensure the business activity. But the necessary funds are too high in some fields. In the same time, if different entities spend funds with the same purpose there is the risk of waste of financial resources. This can be avoided with public-private partnerships (PPP).

The EU must be competitive in the global marketplace. Combining the efforts of stakeholders from a particular field is the most efficient solution to provide our competitiveness.

There is a need of financing the implementation of the research results. This step is always the most costly one. A Joint Undertaking (JU) could complete this step for the benefit of both EU and JU bodies. The current experience with JU showed that the system is efficient. We need to continue directing the EU funds to current and new JUs.

JUs stimulate innovation by financing large-scale, longer term and high-risk research. Due to the research programs developed by JUs, the EU becomes an attractive place for investment and innovation. JUs stimulate the participation of companies, universities, SMEs, laboratories which substantially increase the chances of positive results. Moreover, JUs can conclude agreements with regions, covering in this way specific priorities to develop smart specialisations.

The stimulation of innovation is done by establishing the area of JU and by selecting research directions. These directions should be either of general interest to ensure results in European matters (Example: SESAR, Shift2rail, Clean Sky) or industrial areas where the competitiveness of the EU is a matter of security (ECSEL, ITER).

An European area where a JU can provide in the future results for a general European interest is defence and security. A common action towards this direction can generate an efficient use of investment in this field. The results would ensure a higher and yet equal level of security for all the EU citizens.

The new JTI, which I hope to be transformed into a JU for space industry, will stimulate innovation in a field where it is vital for EU to be competitive.

Space technology has already a high share in the EU GDP and in the future this share will become even more relevant. The satellite systems need to be modernised and secured. There is a need for innovation in order to keep up with the other space powers.

The third field is the one with direct impact for the citizens (IMI, Bio Based industries) and which I think that can be extended in the future.

I believe that the creation of a JU which deals with methods of detection and prevention of illnesses at early stages would stimulate innovation in this field. In

the same time, it would allow IMI to be more efficient when it comes to medicines.

Selecting the research directions within every JU is also a driver for stimulating innovation. The need for results, as well as the number of citizens for which the results would have a positive effect are elements which stimulate research/innovation.

In every field there are needs which have to be prioritised based on transparent criteria and financed through open and competitive calls for proposals.

The participation of SMEs is extremely important. SMEs flexibility, the capacity to adapt, and the interest for innovation- these are arguments for an increased involvement of SMEs in the JU projects.

The future needs to validate the results obtained until now by allocating necessary funds to continue the activity of existing JU and by establishing new JUs in fields which can ensure the competitiveness of the EU.

The efficiency and the added value of money invested in research need to be measured in results that are implemented in economy.

I believe that JUs represent the best solution to stimulate innovation in the EU and to maximise the results of investments made with European money.



The future of Joint Technology Initiatives in the field of digital transport



Henrik HOLOLEI

*Director-General for Mobility and Transport,
European Commission.*

I am very pleased to have been asked to contribute to this article on **Joint Technology Initiatives (JTIs)** as the Commission's Directorate-General for Mobility and Transport is a champion when it comes to public private partnerships. JTIs were developed at European level to pursue areas of major interest for European industrial competitiveness and issues of high societal relevance. **Digitalisation** of transport is just that:

It will significantly improve traffic and transport management through more accurate information on real traffic and infrastructure conditions, as well as on the location of vehicles. Better access to, and sharing of, digital transport data may, in the future, be the enabler for true multi-modal transport, both for passengers and freight. It will enable factories to optimise their inventory management and production. Equally, it will enable logistics service providers to update their transport operations in real-time and to react to unexpected events. Most of all, it has the potential to make transport safer, more secure and less congested, to revitalise the downward trend of road fatalities in Europe, and to facilitate our daily lives in ways we cannot even imagine yet.

One of our biggest success stories in this area is the public-private-partnership that coordinates research and development to modernise air traffic management in Europe, known as “**SESAR**”. Airports, air navigation service providers, the manufacturing industry as well as the scientific community all work together to deliver high performing technical

and operational solutions. It also explores the potential of digital technologies that provide new opportunities e.g. such as drones, with the aim to develop tangible solutions for industrialisation. While our vision is clear – we want aircrafts to fly their optimal trajectories without being constrained by airspace configuration – we need all relevant stakeholders on board and this is precisely what JTIs contribute to achieve.

Constructive cooperation is also what **Shift2Rail** - Europe's most ambitious programme of research in the rail sector - achieves. The use of digital technologies is the key tool to adapt to rail customer expectations on safety, security, punctuality, capacity, transparency, and information availability. Digital traffic management systems, e-ticketing or tracking and tracing applications are just a few examples for the technologies used in the sector. Shift2Rail is vital for the long term competitiveness of the industry and to deliver sustainable transport in Europe.

The next big area for JTIs is going to be **Connected, Cooperative and Automated Mobility (CCAM)**, which holds enormous potential. Just think of road safety for people with reduced mobility, or the potentially positive impact on our quality of life through the avoidance of congestion that would also help to decarbonise the transport sector! The challenge is greater here, as we need to bundle many different work strands and bring an even broader range of industries and other stakeholders together to join efforts at all levels to modernise road transport.

But we are not starting from scratch: the Commission has already presented the **EU strategy on Cooperative Intelligent Transport Systems** with the aim to put vehicles on the road that can communicate with each other and with the infrastructure by 2019. In order to achieve that, we are working intensively on issues such as data protection, cyber-security and ensuring systems work across borders, across brands and across modes. Our aim is to provide all road users – including vulnerable ones – with continuity of (better) services. This is but the first milestone though and more will need to follow. In particular, the promise of more inclusive (public) transport based on driverless vehicles will require the integration with existing traffic and onto the existing road infrastructure. This poses a question on liability – what if a driverless vehicle is involved in an accident?

Also, how will these vehicles interact with their environment and how will the (digital) road infrastructure need to evolve to support them? Moreover, we will need to test future systems on public roads and create a legal framework for doing so. To help answer these questions, and create a common vision on how we think CCAM can and should change mobility, the Commission has recently started a discussion on cross-border cooperation on testing with Member States. This addresses the request from Member States to the Commission to take the lead and make progress through a dedicated task force in this field.

Looking to the future, in Frankfurt, Commissioner Bulc recently spoke about the possibility of a JTI in the field of connected, cooperative and automated mobility (CCAM). The idea is to achieve a common European approach on testing as quickly as possible. The same task force in charge of cross-border cooperation should - with time - develop into a broader platform for CCAM to include everyone we need around the table - from the public and the private sector, from transport, telecom and other industries - to agree on the way forward. This should lead to a common ‘to do list’, or a masterplan, with clear objectives, responsibilities and deadlines, which should in turn enable a public-private partnership to bundle research and innovation activities and to link research and innovation with deployment.

Ultimately, it is essential that we ensure the **interoperability of services across Europe**. Without interoperability we would not be able to make significant progress and to reap the benefits of the Single Market. Furthermore, we need to secure the appropriate level of infrastructure investments to support the development of the transport sector.

It is also essential that we maintain a broader focus of the transport sector, because automation is not only limited to road transport but is a horizontal thread that will transform mobility across the sectors. In this regard, Member States and industries can benefit from the wide experience of the Commission with JTIs. Not only does the Commission have a track record of dealing with similarly complex challenges, but it is also in a unique position to guide these developments in ways that protect and promote European solutions and European interest around the globe.

Aviation Strategy for Europe, the importance of JTIs



Pavel TELIČKA

MEP, Vice-President of the European Parliament Committee for Transport and Tourism Group of the Alliance of Liberals and Democrats for Europe

Aviation is undeniably the transport mode that has been undergoing the most changes over the last twenty years. The high level of air connectivity achieved, coupled to a growing demand and an increased competition within and outside Europe open a potential for opportunities and investment.

I believe the role of policy makers is to set the right framework for this potential to be matched, and the fact is that until today we partly failed to do so and allowed some of this potential to grow outside the EU.

Having been the Rapporteur for the European Parliament report on an Aviation Strategy for Europe, I had the opportunity to go and see how the aviation sector is evolving outside the EU, in particular on the other side of the Atlantic. There is no question that the EU aviation market is more developed and more challenging, but still some of our industries finds it easier to engage in research activities and programmes elsewhere.

We are sitting on enormous educational and financial capitals, but in too many cases we let the academic and industrial worlds walk on separate pathways and pursue different objectives. It certainly does not mean that academic research or innovation should only be oriented in State interests, but that we should aim at striving for complementarity and synergies between the two.

Digitalisation is a relevant example for this disconnection. We – policy makers, industrials, academics, users – agree that this is the biggest game breaker of these last years and it will continue to be so in a near future. However, we became so blinded by digitalisation that we sometimes today tend to consider it is the *aim* rather than a mean. Building a digital aviation makes no sense if it is not to deliver, for instance, a more efficient airspace architecture, a more pleasant travel experience or more effective security screenings. While we forget why we are even aiming at “digitalisation”, we miss on the fact that the EU invested in a solid space programme, for which one could envisage a hundred of different “digital opportunities”, but that we are not yet using to its fullest capacity.

The transport sector – and even more so the aviation sector – is moving very slowly for it requires heavy investment and infrastructure. On the contrary, innovation is, by definition, sudden and disruptive. The two are obviously not incompatible but the extent to which aviation will benefit from the latest innovation relies on our own capacity to adopt a forward looking, comprehensive and strategic vision for the sector as a whole.

In turn, a strategic vision becomes effective if it is accompanied by the adequate regulatory environment which attracts investment, fosters innovation and bridges between all stakeholders from researchers to manufacturers and eventually to users. In short, the key is to build a whole ecosystem.

I highly welcomed the Commission’s initiative to re-launch the debate on the future of aviation and its will to define a proper aviation strategy. In the past the EU has successfully delivered on strategic research objectives, including for the aviation sector with the establishment of Clean Sky. And I hope that the discussions around the new aviation strategy can trigger an equally successful change.

Increased connectivity through low emission mobility is the indisputable objective of all transport policies in the Union, as one without the other is bound to fail. No one can reasonably hope to continue to develop transport connections without taking into account the implications for the environment,

but all together it is an illusion to think the solution to achieve less emission is less transport.

It is in this framework that Clean Sky became the largest EU research programme aiming at reducing CO₂ and gas emissions and noise levels. Less than ten years after, it managed to bring together public and private investors and partners, from SMEs to universities. Clean Sky has and will continue to produce tangible results in terms of emissions reductions, but its real success is the conditions it created.

The success of Clean Sky is inspiring when considering the number of opportunities ahead of us in the aviation sector: automation or digitalisation to mention only these two, but also the number of challenges we are facing: fragmentation of the European Sky, security and cybersecurity, worldwide competition between airlines as well as between manufacturers. Equally inspiring is the observation that the EU already benefits from solid programmes on which it can rely, like Galileo and SESAR, and maybe now is the moment to define what the future of these two programmes could be in the framework of a new aviation strategy.

Discussions on the future of aviation only started and if I am to contribute, the message I wish to convey would be the following: the opportunities are there, the EU has the expertise, the resources and past achievements to replicate. Let us not create the barriers on our own path to success.

Upgrading Europe's skies, digitally



Florian GUILLERMET

SESAR's digitalised "Solutions" aren't just averting a capacity crunch in Europe's skies - they're paving the way for a new era in air transportation, says Florian Guillermet, Executive Director, SESAR Joint Undertaking

If you've ever gazed out of the cabin window at the long queue of aircraft ahead of you waiting to take off, or found yourself circling in a holding stack before your plane commences its descent (of course you have, on both counts) - you'll have had a glimpse into the congestion issues facing Europe's skies. Today's airspace (within which traffic will double over the next 20 years) is managed using an air traffic management (ATM) system whereby aircraft fly within fixed air corridors, separated vertically and horizontally by prescribed distances. It's a safe and reliable system that's worked well for decades, but its reliance on ageing technology and infrastructure means that it's inefficient in terms of cost, time and fuel-burn - aircraft fly an average 20 km further than the most direct route between two points.

The Single European Sky ATM Research (SESAR) project is the EU's answer to this and much more: Back in 2004, SESAR was launched as the technological pillar of the Single European Sky (SES). Its role is to define, develop and deploy what is needed to increase ATM performance and build Europe's intelligent air transport system. In 2007 the SESAR Joint Undertaking (SESAR JU) was set up as public-private partnership to coordinate and concentrate all ATM relevant research and innovation efforts in the EU.

The JU brings together over 3,000 experts from airlines, airports, manufacturers, public authorities, the military, research centres and universities. Its mandate is to modernise ATM and make interoperable Europe's disparate systems, with a view to contributing to the objectives of the Single European Sky. In other words, double capacity, improve safety, reduce delays by 30%, lower airline costs by 40% and cut aviation emissions. It's doing this through the research and development of innovative ATM technologies and procedures ("Solutions" in SESAR parlance), thereby improving how Europe's airspace is managed, supporting European competitiveness, generating business growth and smoothing traffic-flow for EU citizens, in line with the EU's Aviation Strategy.

Digitalised Solutions

Delivering these benefits requires a systematic and coordinated approach, and it is this mode of partnership which is enabling SESAR JU to fast-track solutions through research and development, ready for implementation. Together the SESAR JU and its members have conducted more than 350 tests and 30,000 flight trials to deliver over 90 industrial prototypes and 60 new or improved ATM solutions, bringing tangible improvements to Europe's air traffic infrastructure and providing a better transportation experience for its citizens.

Here are just a couple examples of SESAR's Solutions:

Firstly, those holding stacks - E-AMAN (Extended Arrival MANagement) is a system which will eventually make them a thing of the past. Instead of aircraft reaching their destination and then queuing up in a stack before they're sequenced to land, the "delay" at the end of the journey is absorbed into the more fuel-efficient cruise stage of the flight, up to 200 miles from the airport. It's made possible thanks to digitalisation of many processes - satellite-based navigation and tracking, weather sensors, and fuel-burn data.

In November 2015, E-AMAN was deployed at Heathrow, which recorded a reduction of up to one minute in holding times, equating to annual savings of 15,000 tonnes of CO₂, 4,700

tonnes of fuel, or €4 million. The Solution is due for synchronised roll-out across Europe.

Another Solution is Remote Towers - a system which uses digitalisation and augmented reality to replace the traditional control tower with a mast equipped with multiple cameras and sensors. These capture and securely relay live video and data to a remotely located operations centre where a panoramic array of video screens recreates the conventional 360 degree view around the airport that controllers are familiar with. Aircraft vector and weather information is superimposed on the screens, providing controllers with a safer "heads-up" user experience. By segregating the tower from the airport, operations centres can serve several small airports, significantly reducing air traffic control costs in Europe's regional communities.

SESAR validation results prompted Sweden to implement the world's first Remote Tower at Örnköldsvik Airport, controlled from Sundsvall ATC 150 km away. Now certified, Remote Tower deployments are underway in Sweden, Norway, Hungary and the UK.

Results, and new challenges coming our way

The 60 plus delivered solutions are available from SESAR's Solutions Catalogue have been developed in line with the European ATM Master Plan, the roadmap for ATM modernisation. These solutions exemplify how European research and innovation meets EU performance targets in terms of cost, operational efficiency, capacity, safety, security and the environment. The success of SESAR 1 has been acknowledged by stakeholders across the aviation sector, and is documented in the recently published "Final Evaluation of the SESAR JU (2014-2016) operating under SESAR 1".

As indicated in the European aviation strategy, SESAR's progress in delivering innovation is regarded as a key enabler for the growth of Europe's aviation industry. This is now paying off as synchronised deployment of SESAR solutions get underway across Europe, promising approximately €12.1bn worth of performance gains for the aviation

industry alone. Passengers will see the benefits for themselves since the solutions will help shave 20 minutes off average door-to-door travel times, save 10 kg in fuel and 15 euros off tickets.

SESAR also supports Europe's role as a world leader in aviation, as solutions are globally interoperable, contributing to the global harmonisation efforts. This has been achieved by SESAR through extensive worldwide outreach through cooperative agreements with key regions including Asia, America and the Middle East, and relevant organisations such as the International Civil Aviation Organization (ICAO).

Europe's changing skyline

Ten years on from its inception, SESAR isn't just tackling capacity challenges - there's the added complexity of autonomous, connected, and smarter new vehicles in Europe's airspace: drones, balloons or even suborbital aircraft - an aeronautical "Internet of Things". Drones in particular will become ubiquitous, assisting medical rescues where helicopters can't land, providing courier services, monitoring crop yields, and facilitating aerial surveillance for public safety and security.

To deliver these new services, digitalisation is key - whether it's through harnessing the IoT, big data, artificial intelligence, augmented reality or quantum computing. Recognising the need, in 2016, the SESAR JU launched SESAR 2020, the next wave of research and innovation, to address new opportunities and challenges for aviation, in line with EU Aviation Strategy and with stakeholders' needs both now and in the future.

But this is only the start as digitalisation will play an increasingly important role in the future safety and efficiency of the aviation industry, not to mention ensuring greater air connectivity with the lowest carbon footprint. Realising this ambition cannot be achieved by any one organisation alone as the infrastructure is shared and needs to rely on homogeneous standards to foster innovation. That's why the SESAR JU's collaborative model is so critical to achieving this digital transformation as it breaks down silos and brings together both established aviation players and new entrants, such as digital start-ups, SMEs, academia, research centres, as well as other industries.

Our project-based model also encourages risk taking, and is more agile and responsive to emerging trends both within aviation and in the broader industry landscape. Proof that this approach is paying off is the acceleration of the innovation lifecycle from 30 years to 5 years and the ability to demonstrate the scalability

of technology solutions in real operations, thereby encouraging broader uptake.

SESAR has set in motion the digital transformation of aviation and its infrastructure. New SESAR innovations will continue to be delivered, increasing the pace of change towards this new era in aviation.

Read more about SESAR and the digital transformation: www.sesarju.eu



Clean Sky: Innovative results for a more competitive Europe



Tiit JÜRIMÄE

Interim Executive Director, Clean Sky 2 Joint Undertaking

Excellent European research and innovation is key to ensuring a high quality of life, economic growth and job creation, and a sustainable future for European citizens. The seven European Joint Undertakings play a crucial role in this mission: as public-private partnerships (PPPs), they bring together all actors across specific sectors for the best innovative results. Clean Sky 2 works towards ambitious environmental and competitiveness goals – developing innovative technologies to reduce CO₂, NO_x and noise from aircraft, while contributing to strengthening European aero-industry collaboration and global leadership.

The last few months have been very important for Clean Sky. Two independent reports have recently reached completion: the FP7 Clean Sky final evaluation report and the Horizon 2020 Clean Sky 2 interim evaluation report. This detailed review exercise, managed by the European Commission, is key to not only assessing the impact of Clean Sky, but also to drawing lessons that will help Clean Sky 2 to perform at its best for the rest of the programme. The overall tone of the Clean Sky reports is very positive, with the panel of independent experts in charge of the report clearly impressed by Clean Sky's performance and finding the Joint Undertaking a very effective approach to research management. The main areas of achievements of Clean Sky 2

are highlighted, such as a high-quality research capability, a good balance of industrial, research and aeronautics activities and high engagement of European SMEs. In particular, the independent experts underlined the “unprecedented level of collaboration of its research participants in a focused and coherent programme that significantly reduces the fragmentation of other funding instruments”. The report also emphasises the key added value of Joint Technology Initiatives being realised on a European scale, with the public-private approach being considered very effective in the governance and execution of the Clean Sky programme. In addition, a number of critical messages and points for reflection raised by the experts will be translated into measures to improve Clean Sky 2's functioning under H2020 and, even more importantly, will serve as an input for the design of the future FP9 programme and Clean Sky 3.

Clean Sky had previously welcomed the recommendations of the Horizon 2020 evaluation report “*Research & Innovation – shaping our future*”, presented on 3 July under the leadership of Pascal Lamy. This report explicitly mentions the Joint Undertakings' ability to build long-lasting relationships throughout the supply chain. Indeed, halfway through the programme, Clean Sky 2's figures speak for themselves: 462 single participants in 25 countries of which 151 are small and medium companies, 63 are research centres and 61 are universities. A truly open and inclusive European partnership!

Along with those assessments and high-level reflections, Clean Sky has been continuing

with its Demonstration programmes. A milestone was reached by Clean Sky's Breakthrough Laminar Aircraft Demonstrator in Europe (BLADE) test aircraft in September, when it made its successful maiden flight. The BLADE project, featuring 21 partners from across Europe, aims to reduce wing friction by up to 50% and CO₂ emissions by up to 5%. A second recent milestone for Clean Sky was the start of ground tests for the Open Rotor engine in October. Designed to power future generations of single-aisle commercial jets, the Open Rotor aims to reduce fuel consumption and CO₂ emissions by about 30%. Its revolutionary architecture marks a significant break with current engine technology. The Open Rotor project involves some 50 participants across Europe.

The successful start to these tests proves that Clean Sky is an excellent partnership which not only stimulates cross-border collaboration, but is also able to deliver well. To continue these efforts, Clean Sky 2 recently launched its 7th Call for Proposals - the programme's biggest call to date, with 72 topics and €73 million total indicative funding.

As Clean Sky does not operate in isolation, it is important to look at the broad horizon around Clean Sky 2 with a focus on programmes and projects closely related to research in aeronautics, as well as considering the potential of working together with interested Member States and regions.

Clean Sky has signed Memoranda of Cooperation with SESAR and EASA with the aim of working together on issues of common



interest such as optimisation of air traffic management and early certification issues related to new technologies. Beyond aeronautics, Clean Sky has close links to two European Joint Undertakings, Fuel Cells and Hydrogen (FCH) in energy and Shift2Rail in rail transport, whose remits share with us the goals of energy efficiency and reducing the environmental footprint of a number of strategic industrial sectors.

With regard to Member States and regions, Clean Sky's increased cooperation with those means that we have become one of the pioneers at European level, and the concrete projects and synergies on smart specialisation are starting to bear fruit. We have signed 16 Memoranda of Understanding to date. Some interesting cases to note include the mechanism launched in the Andalucía region to promote international R&I proposals with a Clean Sky evaluation and synergy label certification; the Portuguese national call 'PT2020' supporting R&I projects, demos and pilot lines including complementarities with Clean Sky; Occitanie's regional aeronautics call 'Readynov' which mentioned Clean Sky among its scope and objectives; and the upcoming Czech Republic ESIF national call on synergies with Clean Sky. It is clear that Clean Sky has the potential to be a key factor in bridging the innovation gap in Europe and involving stakeholders in these countries and regions in a truly collaborative European programme, building on their capabilities and potential to grow by pooling resources in the aviation sector linked to Clean Sky's research and industrial agenda.

Finally, the European Parliament's Sky and Space Intergroup produced a report titled 'European Aeronautics: A strategic proposal beyond 2020' as an outcome of the 3rd EU Aeronautics Conference on 18 October in Brussels. The report clearly highlighted the



Contra-Rotating Open Rotor – SAFRAN



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need to “support Europe’s continued leadership in sustainable and more environmental-friendly aviation, which is highly dependent on continued funding for civil aviation research programmes through [...] launching Clean Sky 3, which should encompass the full scope of aeronautic research from upstream to full scale demonstrators involving the whole industrial ecosystem (from large companies to SMEs, Academia and Research Organisations), in order to further develop cleaner technologies and safeguard EU industrial competitiveness.”

Taking into account the excellent results of the public-private partnerships so far as well as the private sector’s continuous commitment to invest in these partnerships, there is a strong momentum to continue to build on the results achieved, towards more sustainable aviation for a stronger, more competitive Europe.

Learn more: www.cleansky.eu

Shift2Rail: no train, no gain



Dominique RIQUET

MEP (ALDE Group), Vice-Chair of the TRAN Committee

Budgetary talks haven't officially started yet but the corridors of the EU are starting to rustle with a wide variety of assumptions regarding the next Multiannual Financial Framework (MFF). The uncertainties caused by Brexit - far from calming budding bookmakers to seriously suggest any farfetched hypotheses in such an unpredictable context - just serve to electrify the discussions and worsen the global situation. With UK leaving the EU, the European budget is foreseen to be reduced by 10 % at the least.

For every beneficiary of European Funds, whether big or small, the anxiety is palpable. Whereas the two biggest receivers, which

are the European Structural and Investment Funds (ESIF) and the Common Agricultural Policy (CAP), are unlikely to emerge unscathed from the future negotiations, they will nevertheless undoubtedly find dogged advocates to preserve them.

The danger will be greater for other programs that will not have gathered sufficient support or will not be capable to demonstrate and highlight the quality and the unique European added-value of their projects.

In that context, Shift2Rail (S2R) will assuredly find mouthpieces and be able to prove the added-value of its actions and of its model of Joint Technology Initiative. Clearly, Shift2Rail is an original tool tailored to bring together European funds from Horizon 2020 (H2020) and funds from private companies in the railway sector, while collaborating with major universities or research centres. Its goal is to triple-tackle fragmentation among railway ecosystems (regional and national systems, networks and technical operating standards disparities), among the subsystems of the rail sector (infrastructure, rolling stock and signalling equipment manufacturers, railway undertakings and infrastructure managers), and along the innovation life cycle. Here lies the EU added value. These financial resources are then put at the service of research and innovative projects, which have been made possible through co-financing provided by S2R, helping more broadly to progress the entire sector. These financed programs are results-oriented and market-driven solutions

aiming to improve innovation as well as to increase the capacity and the quality of rail transportation in Europe.

While it is too soon to draw a definitive conclusion, the early results are nonetheless already quite convincing. A total of 900 million EUR over the period 2014-2019 - with 450 million EUR coming from the EU - allows the realization of dozens of projects, providing work for hundreds of SMEs throughout almost all the Member States. These projects cover the widest range of areas, such as improving the passenger capacity of trains, reducing energy consumption or decreasing noise and vibrations related to haulage, improving safety and security of trains, facilitating the standardization of components, developing the smart maintenance, bringing digital benefits for materials into the sector, traffic management or passenger information.

The examples are numerous and each one of them, made possible only by the co-financing of S2R, perfectly illustrates the high leveraging effect of European funds in the field of industrial innovation.

By the end of 2017, there will already have been 332.2 million invested in R&I activities. By continuing in this way, many benefits are predictable and will be measurable not only in money invested, wealth and the number of jobs created, but also in exports or savings made by industrialists, as well as synergies given to the European railway sector for the future:



- An indirect leverage on industry R&I related to the development of industrial products exploiting H2020 innovations, worth up to EUR 9 billion in the period 2017-2023;
- Creation of additional GDP at EU level worth up to EUR 49 billion in the period 2015-2030, and spread among a large number of Member States;
- Creation of up to 140 000 additional jobs in the period 2015-2030;
- Additional exports worth up to EUR 20 billion in the period 2015-2030 thanks to the worldwide commercialisation of new rail technologies developed under H2020;
- Life-cycle cost saving worth around EUR 1 billion in the first 10 years and then, through continued implementation, worth around EUR 150 million per year.

Whereas we could be satisfied with these ongoing or achieved results of S2R, if we put the successes obtained in perspective against the scale of what remains to be done in order to restore the railway sector as a mass-transit, modern, sustainable, competitive and pleasant mean of transportation, it presents a different image. On the contrary, this is the moment to accelerate and heighten the participation of S2R into innovative and disruptive R&I projects.

This is why, despite the tense context of the upcoming MFF negotiations, S2R should not seek to minimize its loss of funding, or even to secure its budget, but should aim to increase its European funding to amplify its already convincing results.

It may seem incongruous to seek an increase in funding while the overall budget of the next MFF may be revised downwards due to the UK's departure, but it is also in this context that we can best explain this intention. We need to safeguard European programs which are the most efficient and capable to deliver to our industry and people. Most of all, we need programs that enable cooperation between stakeholders, help public and private players from all sides to work together and overcome fragmentation in order to set up the environment for European innovation and growth for a prosperous common future. Shift2Rail is definitely such an example. Helping our citizens to trust the EU follows from being able to show them good management, concrete achievements and beneficial outcomes for all.

With S2R, we can achieve all of these targets. The results stemming from the public money

invested are excellent and visible to all, as well as profitable to society and the environment in general. To increase the contribution from 450 million Euros to 900 million Euros to allow such a number of positive spin-offs is far from heresy, but on the contrary, a very intelligent investment in the long term for the benefit of every European citizen.



JTIs in Rail: Tackling a European transport challenge with a new comprehensive approach



Carlo BORGHINI

Executive Director of Shift2Rail

As the world's resources become scarcer and climate change poses an ever-increasing threat, the future of Europe lies in embracing sustainable development strategies and investing in sustainable solutions to meet its long-term challenges. Despite the progress achieved in the recent years, one of the most critical sectors—transport—is still “off track” to sustainability, producing one quarter of Europe's greenhouse gas emissions and pollution which is set to nearly double in the next 25 years.

The overall actions put in place by the European Union—and in particular the Joint Technology Initiative (JTI) activities—should bring European transport back on track to sustainability with a committed, targeted investment into greener innovative solutions. Established under Horizon 2020, the Shift2Rail Joint Undertaking is a public-private partnership designed to carry out strategic rail sector objectives and encourage a modal shift to rail—the cleanest, most efficient form of mass transport. The Shift2Rail JU represents a cutting-edge new approach to innovation through a cooperative effort between the public and private sectors, guiding the future of the rail industry and answering Europe's challenges.

Addressing Europe's challenges through sustainability

As Europe plans for its future, sustainable long-term solutions are key. Europe must simultaneously tackle present-day challenges posed by youth unemployment, an ageing population, pollution, and migration, all while addressing the needs of future generations. Climate change is now recognised as one of the world's major long-term challenges, both for its devastating consequences for the environment and for its profound effects on human activities. As the international community grows more aware of the hazards of an unchecked warming climate, the demand for energy-efficient and green solutions has risen dramatically. To preserve Europe's social model and strong economy, it is essential to promote sustainable long-term growth while confronting today's issues. This can be achieved through a transition to a zero-carbon, climate-resilient circular economy, while simultaneously promoting new opportunities for business and employment through a committed investment in research and innovation.

The EU has committed to answering these challenges. In the past, the EU launched and renewed several Sustainable Development Strategies which have since been mainstreamed into the Europe 2020 strategy, and more recently committed to adopting the Sustainable Development Goals set out by the UN. The European Commission's 2014 Investment Plan for Europe—also known as the Juncker Plan—provides massive investment to help meet these goals.

Rail transport: vital for a sustainable European future

Transport serves the essential role of moving citizens and goods throughout the continent while having a large impact on growth and employment, but the sector also produces one quarter of Europe's greenhouse gas emissions and has not seen the same gradual decline as other sectors. Considering the crucial function that transport holds in the future of Europe, there is a critical need to incorporate long-term sustainable solutions to passenger and freight transport, while at the same time encouraging economic growth and investment in the transport sector.

Rail—already the most efficient and greenest form of mass transportation—is on track to achieving Europe's goals.

Rail's long-term attractiveness comes from a number of sustainable and environmentally-friendly features. Trains produce far fewer harmful greenhouse gas emissions and air pollutants than other modes. Clean, sustainable types of alternative energy are already used—and more will come—to power electric trains, further reducing rail's carbon footprint. Rail transport has a low energy consumption due to low friction between rail and wheels, uses less land for infrastructure, and boasts high safety and comfort for passengers.

In the last two decades, rail has also benefited from a surge in innovative technologies. Customers will also benefit from innovations in user-friendly technology and numerous improvements in safety, passenger comfort, and reduced noise and pollution. Ongoing Shift2Rail JU research and innovation is promising, moreover enhancing rail's attractiveness and increasing its share of the future transport market. Further EU investment into innovation is crucial to meeting its goals for sustainability by focusing efforts on improving efficiency and reducing energy usage, waste, noise, and harmful environmental emissions.

The role of JTIs in innovation

Past efforts in research and innovation have been insufficient in targeting broader policy goals. Furthermore, the market uptake of new technology created through some research projects is often slow. To address these issues, the European Commission adopted different concrete actions, including the establishment of Joint Technology Initiatives (JTIs): ambitious public-private partnerships which involve industry and the research community to carry out shared research objectives. Managed at the EU level, and incorporating both public and private funds, JTIs represent a commitment to invest in European innovation which supports large-scale international research that is highly relevant—both to industrial interests and to societal needs. They play a key role by serving as a powerful platform for driving innovation and steering the direction of the sector. JTIs have the following criteria: an importance to broad EU objectives including benefit to

society, a strong financial commitment from industry, a far-reaching impact on industrial competitiveness and growth, and the ability to attract support and leverage current and future sector funding.

The Shift2Rail JU, the newest JU, was established under Horizon 2020's transport research and innovation proposal to provide a platform for coordinating long-term research and innovation in the rail sector. Shift2Rail JU's purpose is to fulfil the main priorities in Horizon 2020 by making rail transport 1) more sustainable, through improving resource efficiency and respecting the environment; 2) seamless, by providing better mobility, less congestion, and greater safety and security; 3) competitive, upholding the European transport industry as a global leader; and 4) research-responsive, performing socio-economic research and forward-looking activities for policy-making.

Shift2Rail JU upholds EU's goal of sustainability

The Shift2Rail JU's vision pledges "to deliver, through railway research and innovation, the capabilities to bring about the most sustainable, cost-efficient, high-performing, time driven, digital and competitive customer-centred transport mode for Europe."

This vision is realized through a set of Innovation Capabilities: succinct, primarily technical outcomes, each boasting an improvement in rail technology or an approach that will 1) improve efficiency, reduce energy usage and waste, or 2) make rail transport more attractive for passengers and freight, encouraging a modal shift from other less efficient, unsustainable forms of transport. Through involvement both from the Union and from the sector, the Shift2Rail partnership

benefits from a wealth of ideas and active participation from actors throughout the value chain who are committed to achieving their mutual goals.

The Shift2Rail JU is on the way to deliver the following results:

- Cutting the life-cycle cost of railway transport (i.e. costs of building, operating, maintaining, renewing and dismantling infrastructure and rolling stock) by as much as 50%;
- Doubling railway capacity;
- Increasing reliability and punctuality by as much as 50%.

Through these efforts, the Shift2Rail JU paves the way for the rail sector towards a circular economy approach—a system that aims to eradicate resource and energy waste through highly efficient practices and long-lasting design, construction, and maintenance.

The environmental benefits of such a system for Europe are tremendous – leading to cleaner air and water, a reduction in the use of limited resources, and a firm contribution to mitigating climate change, to name just a few. The economic value is equally impressive, lowering costs throughout the value chain and contributing to growth and job creation through a surge of innovative technology and solutions. As limited resources become scarcer, costs will soar, and the current wasteful "take, make and dispose" mentality becomes indefensible. By embracing the circular economy model, the rail sector has an opportunity to become greener and more competitive, ensuring its long-term future.

By carrying out its compelling vision, the Shift2Rail JU serves as a figurehead in creating a sustainable future for Europe.



Energy efficiency in the field of transport, a societal requirement



Gesine MEISSNER

MEP (ALDE Group), Member of the TRAN Committee

Transportation is a key component in an Integrated European Economy. It serves as a tool for the free movement of goods, capital, and people within and between European Countries. Today, as demand for transportation is continuously growing, it is important that the industry is developed in a way that accounts for energy efficiency.

The rail and air transport are two of these sectors which are facing an increase in demand in Europe. Additionally, they both serve as contributors to greenhouse gas emissions from transport. Railways contribute 0.5% to the 1000 million tons of CO₂ emitted into the atmosphere from European transportation each year whereas aviation contributes 13.3% to total emissions from European transport.

In the spirit of holding the European Transportation sector to a certain standard, the European Union has initiated a number of Private/Public Partnerships (PPPs) focusing on the development of new technologies to make European transport more environmentally efficient. Private/Public Partnerships are agreements between a public agency (in this case the EU) and an entity of the private sector. Through collaboration, the public and private sector use their assets to deliver service for the good of the general public.

Three particularly interesting PPPs developed by the European Commission under Horizon 2020, a European Union

research and innovation programme, include Shift2Rail, Single European Sky ATM Research Joint Undertaking (SESAR) and Clean Sky. Through such initiatives, the EU pushes to set a societal standard for energy efficiency in the transportation sector.

Clean Sky is a Joint Undertaking launched in 2008 and aims to promote the growth of the aviation sector bearing in mind the environmental impact of growth. They aim to increase passenger capacity and efficiency in an environmentally conscious way. Clean Sky is currently working towards meeting two target concepts. The first of these is the Ultra Green Air Transport System which works to reduce the impact of air transport on the environment. The second, High Cost-Efficient Air Transport System uses innovative technological developments in order to fill society's needs in air transport and position Europe as a leader in aerodynamics. Clean Sky has already worked to decrease CO₂, gas and noise footprints.

Single European Sky ATM Research Joint Undertaking (SESAR) coordinates European Union research and development activities in Air Traffic Management. Where Clean Sky focuses on the development of new technologies to make planes that burn less fuel, SESAR works more with increasing the efficiency of air travel through the development of a Single European Sky with common Air Traffic Management (ATM), thus making aviation more energy efficient. Their goal is to reduce fuel burn by 250kg to 500kg per flight by 2035. They also are working towards limiting air and noise pollution due to air travel. SESAR 1, the project that lasted from 2008-2016 had a number of achievements delivering 90 industrial prototypes and 60 new or improved operational solutions.

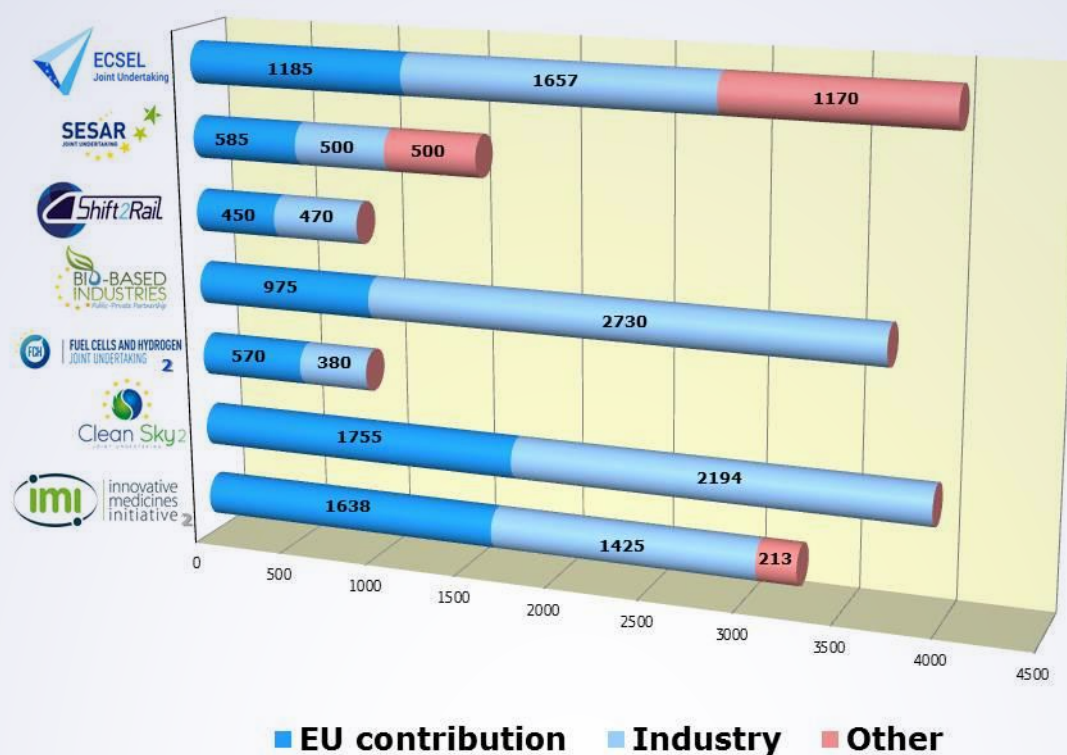
Finally, Shift2rail is a Joint Undertaking for the improvement of the efficiency of railways. They aim to improve infrastructure and provide missing links between countries to allow Europeans to not only travel within their home country but throughout the entire European Union. Shift2rail promotes competitiveness in the European rail industry and plans to meet the growing demand for railway transport in Europe through innovation. Similarly to SESAR, the organization aims for

further integration of European rail transportation in order to increase efficiency through the development of the Single European Railway.

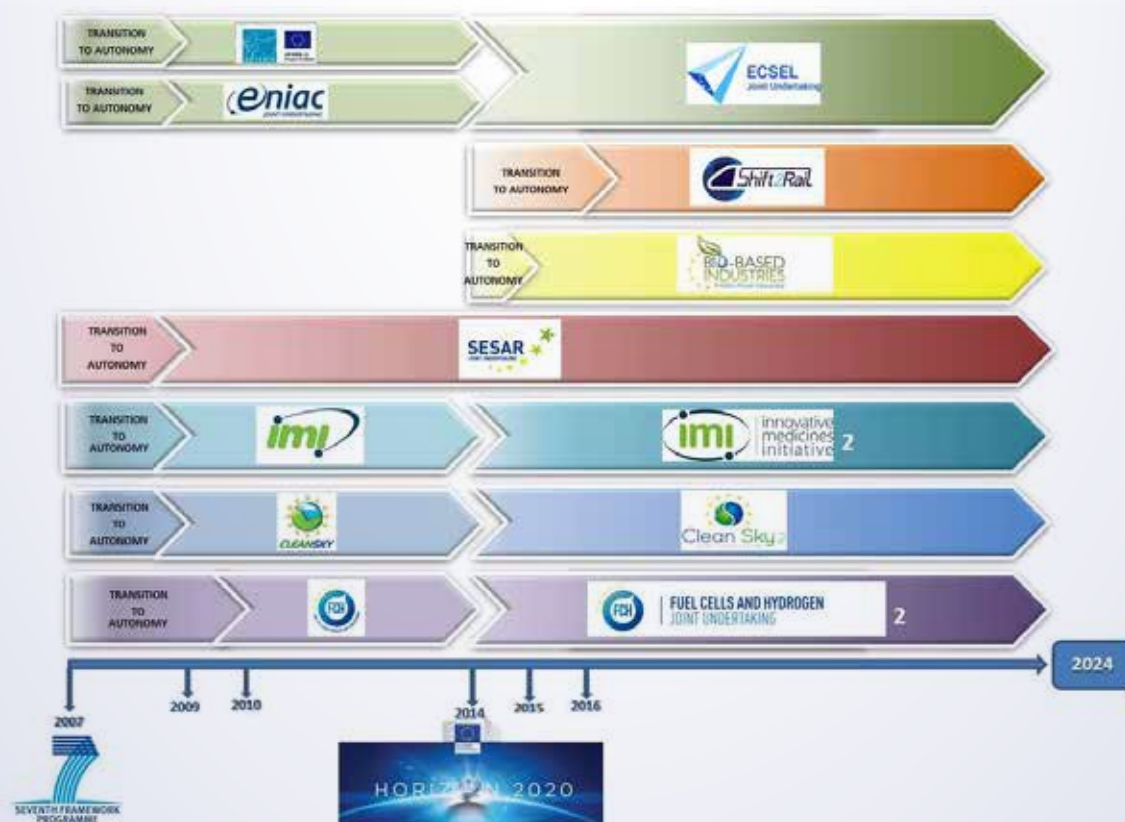
The Commission contributes one third to half of the funding to each of these initiatives. Clean Sky has two separate initiatives, the accomplishments, and results from the first of which acts as the foundation for the second. The Commission contributes €0.8 Billion to Clean Sky 1 and €1.8 billion to Clean Sky 2, accounting for half of Clean Sky funding, where the remainder is funded by private investors and companies. The Commission also contributes 1.6 billion to SESAR 2020 (2016-2024) and €450 million to Shift to Rail. Commission funding accounts for a third of the total funds for each of these joint undertakings.

In each of these initiatives, the involvement of the private sector is incredibly important. The European Commission works for a sustainable development of transportation, but they do not have the resources to research, develop, or innovate the means to this end. In Public/Private Partnerships, the private sector is essential to actually make a difference through research, development, and innovation. In the three Joint Undertakings I mentioned, the private sector is responsible for the technological achievements and the plans that are currently contributing to a more energy efficient transportation sector in Europe.

These Public/Private Partnerships in European transportation sectors are working to make energy efficiency in the sector as a societal standard. With private and public working together these ideas can and will come to fruition.



Source: EC calculation based on the Council Regulations establishing the JUs



Source: EC based on the Council Regulations establishing the JUs

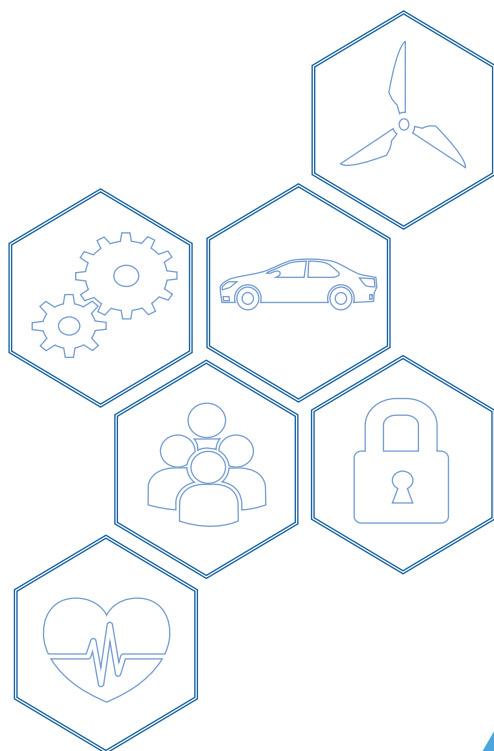


ECSEL Joint Undertaking

Electronic Components and Systems for European Leadership

2nd Symposium

June 2018, Brussels



SHAPING
DIGITAL
INNOVATION

Who?

European and global stakeholders in the Electronic Components and Systems (ECS) field, from Industry, Research and Financial Communities as well as European, National and Regional decision makers and international partners, will get together for the second time to discuss and evaluate major developments within the ECS sector in Europe.

Why?

The event will give opportunity and space for the ECSEL JU projects to present their progress and results to date, to disseminate the scientific and technological achievements, and to cast light on their contributions to the programme. Two dedicated project exhibition tours will allow interaction and networking with ECSEL JU project participants.

Where?

Brussels is the ideal location to gather the ECS community, involve the EU policy makers and other potential stakeholders in view of the FP9 decision making process. After a very successful first edition held in Malta, we look forward to seeing you in the heart of Europe. **Follow us for regular event updates!**



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