EU Funded Research
Horizon 2020

NOKIA
Connecting People

Executive Summary

> The EU Council Conclusions of 26th May 2010 acknowledge **that research and innovation policy has moved up in terms of EU policy priorities and become widely recognised as a key enabler of competitiveness, productivity growth and sustainability to tackle global and societal challenges.**

This paper demonstrates what needs to be done to increase the value of EU funded R&D and Innovation in terms of quality and output. It is based on the experience within and outside of EU Research Programmes of one of Europe's most research oriented companies, investing 6 billion € into R&D annually.

Nokia case studies and joint expert insight from Nokia researchers, auditors and IP experts point out where the actual problems lie and to what extent the proposal for Horizon 2020 would improve the current situation. While we strongly support the priorities and content of Horizon 2020 and its funding level of 80 billion Euros, which we back-up with solid arguments, we have serious concerns regarding important provisions within the proposed rules of participation.

The Commission has improved certain aspects, such as lowering the administrative burden and making audits less cumbersome. However, more needs to be done to lower the time to grant which is currently close to one year (!) on average. Concrete measures should be agreed by Council and Parliament in this respect.

More importantly, the access to research results needs to be facilitated and the related IP rules designed more in line with commercial realities. Only this will solve the major issue of constantly declining industry participation in EU funded R&D. It is currently at such a low level that research results are not sufficiently being incorporated into products and services in Europe. We urge Parliament and Council to improve the IP rules in the proposed Rules of Participation in order to attract both SMEs and large companies to Horizon 2020.

1. Introduction

The purpose of this paper is to provide a contribution to the Horizon 2020 debate from the perspective of a large European innovator. It will concentrate on:

- providing a gap analysis to discuss whether the Commission proposals implement the reforms required to improve EU level R&D funding
- introducing new ideas which should be supported by Council and Parliament to increase the impact of Horizon 2020 on long term European research quality and quantitative output
- supporting the Commission proposal in terms of the overall budget level and on the priority research areas
- proposing direct solutions to help maintain a balanced participation in EU funded R&D by preventing a further decline of the share of participating large companies (large companies are often an important link between research institutions/ universities and SMEs and R&D and innovation)

This paper builds upon the **Nokia Innovation Paper**[1], released on October 5, 2011 which addresses the importance of increasing Europe's Innovation capacity and assesses the factors which influence it. Some key elements here are excellence in Research and the optimal use of the research results. If we get Horizon 2020 right, we have the chance to fundamentally improve Europe's competitiveness and wealth creation.

1 Contact Leo.baumann@nokia.com to receive a copy.

The development of any good policy at EU level should start with a brainstorming on the basis of a blank sheet of paper. Experience with existing policies and a benchmark of similar policies in the Member States should only be looked at as a second step in order not to blur one's mind right from the beginning. Changes should then be made building carefully on the existing structures to allow for continuity but totally new concepts should also be considered. The question is: what do we really want to achieve at EU level when using tax payer's money to fund research, development and innovation? The outcome of such a brainstorming could lead to the formulation of the following and even more goals/ objectives.

2. Brainstorming on Research in Europe – what do we want to achieve by 2020?

EU level R&D funding – what should it deliver?[2]

- More European science students
- More science students/researchers from abroad that stay in Europe because they perceive 'Europe' as a good location with an excellent science base
- More excellence in European research (solid science foundation, multi-disciplinarity, creativity, internationalization)
- The scope for pooling resources to attain critical mass, especially where a multidisciplinary approach is needed
- The ability to attract and retain top researchers in global markets and to be the location of choice for the performance of research by companies
- More research results translated into successful businesses (entrepreneurship, understanding for economics/market dynamics, risk acceptance)
- Synergies among European researchers through co-operation and improved mobility
- Concentration on grand challenges, leave other things to national R&D
- To develop and implement high quality cross-border research infrastructures

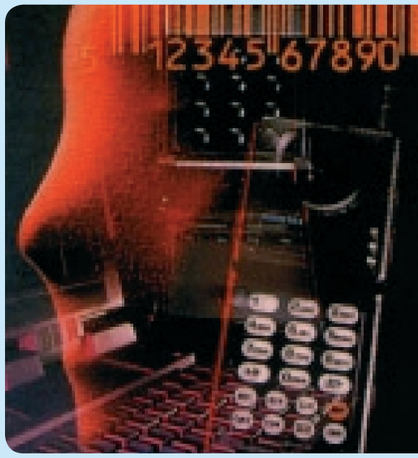
The proposals on 'Horizon 2020' effectively aim at realizing some of these objectives, but not all of them and can certainly be reinforced in many respects to better serve Europe's needs.

EU level R&D funding: what should it avoid?

- Funding of projects which are better carried out at national level
- Organisations having higher chances to receive funding because they are better used to the complex application process than newcomers.
- Always the same type of organisations receive funding: balancing of SMEs, large companies, universities, research institutes
- Lose too much money in competing for the funding: in some cases a high percentage of the funds go to consultants.
- Induce organisations to lose precious time of researchers/ other resources if they do not have high chances to get grants
- Lose too much money in compliance, control, audits. There is an imbalance if far more money is spent on this compared to what would be lost because of inaccuracies, cost calculation mistakes etc.

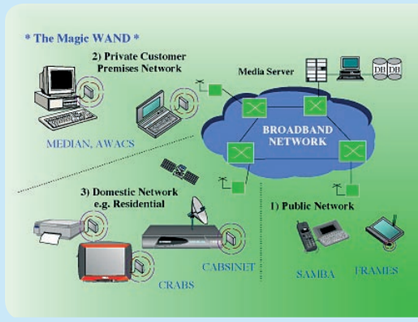
2 See also the Commission Impact Assessment accompanying the Communication on Horizon 2020 Box 4: European Added Value – Why fund research and innovation at EU level?

3. Success of EU R&D funding, especially in the area of mobile communications



The success of Research and Development at EU level depends on the excellence of the participants, their diversity and balance (large companies, SMEs, Research Institutes and Universities) operating on the basis of minimal administrative burden in order to maximise outstanding R&D results, successfully introduced to businesses and the market place.

An important strength of the European Research Framework Programmes – especially compared to research funding provided by our main global competitors, such as the USA and their National Science Foundation[3] – has always been the strong co-operation in Europe and the integration of the European research landscape. The most significant set of leading companies in the area of mobile communications have emerged in Europe: Nokia, Nokia Siemens Networks, Ericsson, Alcatel-Lucent, and many global operators. A heavy contribution to this was made by European cooperation, agreeing on the winning standards, leading the way to global competitiveness. In this respect, common research cooperation at European level has played a significant role, for instance in the case of project FRAMES[4] for 3G and WWI projects like WINNER for LTE. FRAMES has been an excellent example of co-operation based R&D and Innovation "pioneering" and generating EU level benefits out of producing an agreed specification, testing it and proposing solutions for standardization. This scale of activity was only possible by co-operation with other major European players. The European origin of the GSM standard has kick-started this success story.

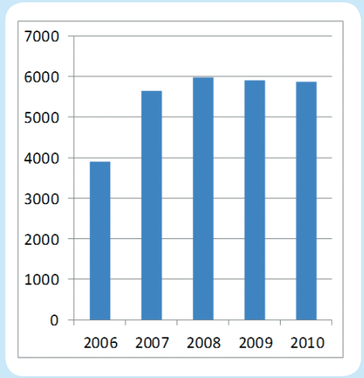


Nokia researcher experience on industry participation and Innovation.

Experience shared by a Seppo Haataja, head of Resourcing and former senior Nokia researcher who has from 1990 until today been involved in a dozen EU funded R&D projects from FP4 until FP6, partly in a leading position and who has contributed to evaluate 100+ FP7 project applications. He reports extremely positively on FP4 projects, such as FRAMES and WAND[5], which were based on "very important, large and high quality European consortia". The "research results clearly contributed to Nokia's huge business growth period".

3 Which is more used to heavy funding of organisations doing their research individually.
4 http://cordis.europa.eu/infowin/acts/rus/projects/ac090.htm
5 http://cordis.europa.eu/infowin/acts/rus/projects/ac085.htm

5. Nokia participation (results and cost/benefit analysis based on case studies)



Nokia R&D expenditure totaled EUR 5.9 billion in 2010 (13.8% of net sales)

Nokia R&D spending

Nokia relies heavily on research and development, spending close to 6 billion Euros on R&D annually, making it the 11th largest R&D investor globally and number three in the ranking of European companies.[6]

Nokia R&D Structure

The Nokia Research Center (NRC) – having celebrated its 25th birthday in November 2011 – is the companies' main instrument to secure Nokia's future technological competitiveness. The NRC started by participating in GSM standardization and has over the years engaged in a large variety of wireless research activities leading to radio, protocol, network architecture, hardware, software and application layer innovations. Today, NRC has expanded around the world into a global research network based on five labs with 500 people operating from 12 locations worldwide (EU, Switzerland, Russia, USA, China, India and Africa). These sites are strategically located to collaborate with leading universities, research institutions and industrial partners. Nokia Research Center today has three geographic labs: NRC Eurolab, NRC North America Lab, and NRC Growth Economies Lab; as well as two thematic research labs: the Multimedia Technologies Lab and the Radio Systems Lab and two supporting entities: NRC Prototyping and NRC Operations. NRC Eurolab focusses on energy aware and privacy preserving pervasive sensing technologies and contextually intelligent devices.

Nokia participation in EU-funded R&D

Nokia is participating in about 70 projects under FP6 and FP7. The below case studies aim at carving out the key benefits and problems the company has encountered concerning its participation in EU funded projects.

NRC, Helsinki

Case study 1: Specific Targeted Research Project (STREP) 'MASCOT'

MASCOT is a nice example of a small and targeted research project leading to useful results. MASCOT was supported within the Sixth Framework Program from January 01, 2006 until February 28, 2009. The Consortium consisted of Nokia and seven universities or research Institutes. The project was aimed at designing and implementing novel techniques in the area of multi-user Multiple-Input Multiple-Output (MIMO) wireless systems. Future wireless systems will require significantly higher data rates than those available today, provided at almost wireline quality, and with moderate infrastructure cost. The use of MIMO antenna technology has been recognized to hold the promise of achieving these ambitious goals. However, research in the MIMO area before this project focused almost exclusively on single-user point-to-point links. Little was known for MIMO terminals and base stations in a cellular multi-user context. The MASCOT proposal addressed such multi-user MIMO wireless systems. The research developed the design up to the prototypical implementation of the required algorithms under real-world conditions.

Overall assessment: very positive

The project needed public funding mainly to support the academic partners. The part of the funding Nokia received ensured a two-way knowledge transfer between academia and industry, and to maintain associated 'deeper' research topics on Nokia's research agenda. The project has resulted in continuous collaboration with some of the partners. The overall amount of funding was in the range of 375 person-months altogether for all partners, with a total cost of approximately 4 Million €. (Nokia's part consisted in 33PM, cost 520 thousand €, 50% paid by EU). The project was useful in the sense that it consisted of a small number of participants/people involved and there was true collaboration (e.g. people visiting each other over an extended period of time.) **This even included visiting professors and students which were paid by Nokia during the project which helped to work around difficulties regarding the access to results and IPR rules. The EU projects, like any other collaboration, should be like this, as opposed to everyone working on their own things, and then making it look in the end as if it had been joint research work.**

It was good to carry the project out at EU level because there was not enough 'world-class' expertise available in this area in Finland. Nokia is already collaborating with many Finnish research institutes and the EU partners made valuable and novel contributions.

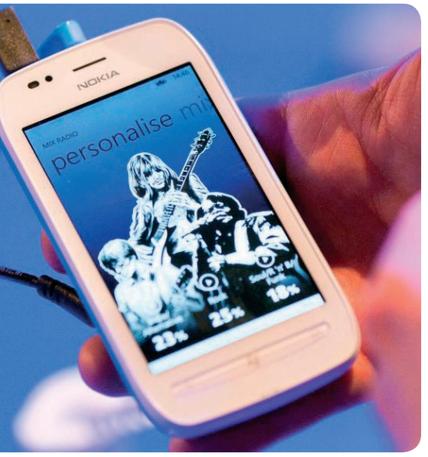
The project generated a substantial amount of new information/technology related to the practical implementation of multi-antenna systems (ETHZ test bed), and nearly **200 journal and conference publications. Eight patents have been applied for by Nokia. At least four have been granted in at least one country.** Research leading to six of these patent applications was performed by Mascot participants visiting Nokia (as Nokia visiting scientists, or MASCOT visitors). The patents are related to topics that are currently studied in 3GPP LTE and Wireless LAN (IEEE 802.11) standardization bodies. The outcome was therefore worth the money invested. **The project also generated publicity within the research community for EU research funding in general and for Nokia.**

Downsides:

For the Nokia researchers, there was no downside in terms of administrative burden since the project coordinator from Vienna handled these issues very well with the EU contact. The number of partners (8) seemed like a good match to the projects targets and tasks.

However, **the patenting ownership rules should be improved.** Having jointly owned patents as a result cannot be desired, due to the complexity and difficulty in terms of administering them (potentially over a period of 20 years). Some simple procedure for allowing a partner to 'obtain' the full rights to innovations performed by other partners would be good (agreed before project begins). As things currently stand, it is easy to make scientific breakthroughs together but **it is a huge burden to exploit jointly owned IPR.**

6 The 2011 EU Industrial R&D Investment Scoreboard page 21



Case study 2: WSI Wireless Strategic Initiative

This small project running over three years with four participating organizations (Alcatel, Ericsson, Nokia and Siemens) started in May 2000. Despite of modest involvement of research personnel from four companies, **this project created a huge momentum via a global research forum WWRF (Wireless World Research Forum), becoming the global place for harmonizing views on beyond 3G, and facilitating the creation of successful EU research projects worth of more than 100 million euros.** Main example of these projects is the WWI (Wireless World Initiative), including also the integrated projects WINNER and WINNER II, paving the way for continued success of Europe in fundamental wireless technologies.

The public funding framework facilitated the creation of this project. The start might not have happened without the funding. The funding also allowed invitation of several guests to international meetings paving the way to the great end results. **The European level was an optimal stepping stone leading to the global research forum on a strong European basis.**

Case study 3: Integrated project (IP) "End-to-End Efficiency (E3)

E3 was funded within Call 1 of FP7 from January 01, 2008 until December 31, 2009. The Consortium consisted of 21 partners: 10 industry players, 7 universities/research institutes, and 4 national radio frequency regulators. Industry partners included network operators, infra-structure vendors, mobile device vendors, and a market research consultancy. The project was targeting the introduction of cognitive wireless systems into the future communication world ("B3G"). The B3G world was characterized by the cohabitation of multiple systems causing increased overall complexity. To overcome this complexity and to achieve End-to-End Efficiency by exploiting all available resources, E3 was to develop, validate and introduce cognitive functions into all relevant parts of the system. **The type of research has been highly innovative, close to market and truly collaborative since a variety of players (private and public) were needed to overcome obstacles to market introduction.**

Overall assessment: positive

E3 has been the largest IP of FP7 Call 1, with total personnel effort of 1386 person months and around 11 M€ funding. Overall the project consortium was very good especially on industry side as it represented a balanced participation of the key players and stakeholders in the field. Also the inclusion of the radio frequency regulators in this project tackling cognitive radio was very useful, as it allowed the challenging discussions related to future frequency licensing approaches to take place project internally. **This shows how useful the concept of involving key stakeholders of all types can be – a concept which underlies also the European Innovation Partnership**[7] **model – as long as there is enough funding to support the joint efforts.** E3 was very active and successful in standardization, and especially in forming new standardization forums for cognitive radio systems. This includes for instance IEEE P1900 and ETSI Technical Committee on Reconfigurable Radio Systems (ETSI TC RRS), where E3 was one of the key founding members. Of these standardization forums ETSI TC RRS is still continuing today on this path, carrying forward standardization work covering the scope of research results achieved by the project.

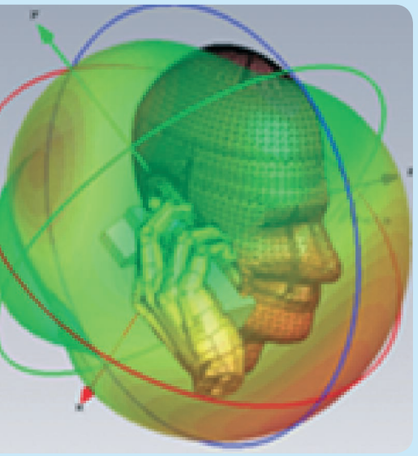
Nokia has been a partner in the core group of the project, and we were leading one of the Work Packages. On that level, the management overhead required is moderate and well worth the effort, as one can impact the decision making within the project, and one has the steering power within the Work Package.

Downsides:

Time to grant: from the planning phase to the start of the project it took approximately 15 months even though E3 was a continuation project to FP6 IP E2R. Resource commitments needed to be made one year in advance of the project start. Since E3 was a continuation project the agreement negotiations were very straight-forward and easy compared to a standard case. We tried at some point to facilitate the filling of time sheets for researchers, by letting office assistants do the reporting according to preapproved plans. For some reasons this was not allowed any longer, and nowadays researchers must do the reporting themselves.

The academic partners were not as strong as they could have been, but that did not turn out to be a major problem in this project. The main downside was the fact that Motorola, originally co-ordinating the project, closed down their European research activities in the middle of the project, and the project needed to reorganize itself "on-the-fly": find a new coordinator, re-distribute the part of the Motorola effort, and find new partners to fill in gaps. It proved to be crucial that it could rely on the presence and dedication of the other partners, especially the industry players in this case to drive the research towards success. **It has certainly been a positive experience one can learn from that also large EU projects can adapt to dramatic changes provided that they are flexible enough in their design and core members agree on the future direction, and jointly work towards the agreed targets.**

7 http://ec.europa.eu/research/innovation-union/index_en.cfm?pg=key



Cost/benefit analysis of Nokia's participation in collaborative EU funded R&D projects

Nokia Research Center has always used an Open Innovation (OI) approach to enhance its innovation efforts. Academic and industrial collaborators have been instrumental in both complementing and supplementing in-house R&D efforts. Research consortia and R&D projects funded by the EU and national governments have played a major role in the OI approach adopted by the NRC. Various internal Nokia studies have reviewed the impact of EU and government funded collaborative R&D projects. For instance, an internal analysis conducted in 2010 compared the outcome - in terms of scientific publications and patents – of 6 publicly funded research consortia with the outcome of single partner projects solely funded by Nokia. This study looked at a mix of EU and Tekes (Finnish Government) funded multiple-party projects. Per unit funding, these R&D consortia proved to generate 1.5 times the number of publications and 4 times the number of patents produced by the single-partner collaborations. Similarly, the speed at which results were created in publicly funded consortia was higher: 1.5 times more publications and almost 10 times more patents per year. This data suggest that collaborations involving multiple partners can be very effective in the more explorative and creative, early phase of innovation.

The funding framework of EU makes it also possible to create European momentum on some strategic topics. Prime examples of these have been projects generating foundations for new wireless communication generations, as also explained earlier in this section.

The potential of Nokia's participation in and contribution to EU-funded R&D is enormous but remains largely untapped today. Both Nokia and the EU-funded R&D community would benefit from more engagement of such a large European global player, active in key research areas for Horizon 2020, such as ICT hardware and software, wireless applications and sensors, nanotechnology and intelligent materials research.

5. Horizon 2020: assessment of funding level, focus and priorities

Maintain the budget at a minimum of € 80 billion

The Horizon 2020 budget proposed by the Commission should not be reduced but rather increased. The overall EU budget should be oriented towards growth and increasing Europe's competitiveness. Dedicating 80 billion to EU R&D funding from 2014 to 2020 appears to be moderate in relation to the overall EU budget of about 1050 billion € which will be contained in the upcoming overall Multiannual Financial Framework for the EU. The European Council agreed in March 2010 to improve the conditions for research and development in Europe and to bring the combined public and private R&D investment levels to 3% of EU GDP as one major target to the EU's new strategy for growth and jobs. The EU should now follow words with deeds and provide a good example. 80 billion is a very small increase anyhow if one takes into account all the parts which are included in H2020 which were previously funded separately (EIT, CIP,...).

Macro-economic impact assessment models used by the Commission indicate that every 1 € invested by FP6 and FP7 generated on average 13 € in increased value added of the business sector.[1] Any initiative requesting to lower the budget proposed by the Commission would have to provide evidence that this assessment is wrong and that the budget is to be better spent elsewhere.

The contribution of EU-level funded research will in any case still remain to be very small even considering the increase as suggested by the European Commission. The funding of FP7 will, by the end of the term be around 10% of the public spending on research by Member States.[9] Regarding Horizon 2020, this figure – expressing the level of EU spending relative to national spending – will increase a little due to the budgetary increase proposed by the Commission to a total of approximately € 80 billion (11 billion per year). However, this is still extremely low.[10] We have learnt from the Eurozone crisis that better coordination of national economic policies is needed to stabilize Europe's financial system and the joint currency. Economic policies need to implement the right measures to strengthen the competitiveness of the participating countries. And the long-term competitiveness largely depends on the innovation capacity of the countries, their economies and businesses. Indispensable in this context is therefore the further development of the European Research Area which needs to increase in importance compared to national research and better integrate national

8 Commission Impact Assessment accompanying the Communication on Horizon 2020 SEC(2011) 1427 final, page 30

9 Interim Evaluation of the Seventh Framework Programme by the Expert Group, Final Report of 12 November 2010, page 6

10 The proportion of EU funds compared to national R&D spending is still very low, also when considering that national spending comprises also fixed expenses in research institutions and the ratio of the EU research spending regarding only the flexible expenses is slightly higher.

programmes. In this way, the full potential of European co-operation can be achieved and all regions will have a fair chance to find their competitive strengths through 'smart specialisation'

Priorities and fund allocation

Nokia supports the proposal for Horizon 2020 to contribute to building an economy of Knowledge and Innovation through concentrating on excellent science[11], industrial leadership and societal (grand) challenges. Our greatest challenge is to become able again to create economic growth and employment. If we fail to do that all other societal challenges cannot be addressed at all. It is crucial in this context to stress the importance of ICT as a growth sector as well as an enabler for productivity gains, energy efficiency, healthy and active ageing etc.

Boosting Europe's industrial leadership in enabling and industrial technologies (including especially ICT, nanotechnologies and advanced materials) which provide the most fundamental and widest spread of opportunities to our societies and allocating €13.781 billion to that is of central importance. Also the priorities chosen, i.e. next generation computing, cyber security, digital content/interactive media, wireless communication and applications, micro- and nanotechnologies, and intelligent materials reflect the anticipated future needs and demands of our society.

The Knowledge Triangle

There is a clear need to establish stronger and better connections between education, research, and innovation in Europe and to focus much more on the development and innovation aspects of EU funded R&D. The Commission is proposing to address the link between education and research mainly by supporting cross-border mobility through Marie Curie actions. While this is important, it is certainly not enough and a whole range of other funded activities should be considered. The EU could for instance develop a scouting and coaching program for young Europeans through its JRC or through the EIT. This could include school visits, advice, **stimulation of pupils' interest** in sciences, grants for top high-school students and university students in natural sciences and **in particular in engineering**[12], funded management/business school/entrepreneurship classes abroad for top science students over the summer.[13]

Research in Europe could further be promoted by providing a research grant to the top five percent of science students, provided they commit to an R&D project in Europe. Also, European research grants could be provided in a systematic way to science Professors based on certain eligibility criteria (number of publications, number of publications in top three journals, rating amongst peers) to employ more post docs for their research. Open funding could be made available for new (bottom up) projects to the most successful participants during their last couple of years in EU funded frameworks, with a very light and quick evaluation. The link between R&D and innovation has been strengthened in Horizon2020 with the integration of the activities running currently under FP7, CIP and EIT, with ample attention to development, demonstration, pilots and market uptake. The holistic approach proposed for Horizon2020, introducing also public procurement as an additional instrument into the FP, and the synergy with the R&D&I activities in the Structural Funds confirm the focus on all stages of the innovation chain. These good intentions now need to be supported further in the legislative process, perhaps by being more explicit on how public procurement will be used to stimulate innovation (than the mere unsubstantiated references to procurement in article 10 of the draft Council Regulation and various other parts of the text). This will help to ensure that procurement as a new concept of EU funded R&D will really be used in practice.

However, the link between R&D and innovation could be improved further, for instance by providing direct 'Innovation funding' to some of the top Horizon 2020 research projects. Also the clear lack of venture capital[14] (VC) in Europe should be addressed either by Horizon 2020 itself to improve the situation for its R&D projects or by a parallel initiative. Europe needs to consider to enhance the capacities and involvement of the EIF/EIB and/or to provide direct VC funding (which could topple private VC investments without ownership). Ultimately, the Innovation aspect needs further support by improving the draft Rules of Participation, as discussed in section 6 of this paper.

European Research Council (ERC) and button-up funding

FP7 included for the first time an EU mechanism for funding of frontier research in any field of science. The 'Ideas' program, operated by the ERC has managed 15% of the FP7 budget and is open to any idea put forward by researchers in a bottom-up procedure. This has proven to be extremely successful. Unfortunately, due to an enormous interest from researchers, only a tiny share of applications have been retained (below 10%). The substantial increase in funding as proposed by the Commission in this area is therefore highly justified.

11 Regarding the 'excellence' criterium: it is important to not accept any other considerations in this respect – such as making sure that minimum amounts of funds are to be distributed to all Member States or regions. This would inevitably lead to the funding of mediocrity and research results will not lead to innovation and enhanced competitiveness but rather constitute employment programmes for researchers. EU cohesion policy should continue to be deployed via dedicated instruments.

12 Nokia researchers report – also based on discussions with their peers in other larger companies, SMEs and start-ups – that it is increasingly difficult to find EU-trained young engineers. This is also a serious impediment with respect to turning European research results into real-life products and services.

13 In the event that EU competencies are deemed not to be sufficient to support the organisation and funding of such kind of activities at EU, the Member States should better co-ordinate and benchmark their related activities and provide separate funding.

14 Regarding the VC situation in Europe do also read the Nokia Innovation Paper 'The EU Innovation Union', page 8-9

Simplify the rules and make it attractive for industry to participate!

Companies are the major drivers in bridging the gap between research results and innovation. Yet, despite the acknowledged importance of both large companies and SMEs in this role, industry participation has continuously declined from 39% in FP4 to 31% in FP6 and it currently accounts for only 25% in FP7. Only one company figures amongst the top 50 recipients of FP7 funds (excluding JTI) and a company such as Nokia, investing 6 billion € annually into R&D is not even part of the industry listing of the top 50 EU R&D fund recipients. Most European global businesses only participate at an insignificant level which is totally out of proportion with their capacities. It is clear that industry is deterred to a greater degree than other research performers by the weight of bureaucratic burdens, by the extreme difficulties and uncertainties regarding result exploitation resulting from the bad design of IPR rules, and, on occasion, by a perception of insufficient flexibility. Without addressing these challenges, Horizon 2020 will not deliver its contribution to innovation in Europe.

6. Governance of Horizon 2020

Time to grant

It is important that the time to grant (i.e. the time between deadline of the call for proposals and the signature of the grant agreement) of research projects is kept as short as possible. If it is too long, the momentum for the research work may already have disappeared. Research in competing regions in the world might for instance already have progressed too much or the strategy and research focus of the applicants of the grant may have changed in between.

Time to grant in FP7 has been as long as 350 days on average[15]. There seem to be quite substantial differences regarding the time to grant comparing different Commission services, DG Information Society achieving an average of about 270 days.[16] The Commission's aim is to reduce the average time to grant by 100 days.[17] This is not satisfactory given the fact that DG Information Society achieves this almost today. **The average time to grant should not be longer than six months**. Two months should be used by the external evaluators to evaluate the applications and to come up with a shortlist, one further month to take the decision and three months to conclude the contractual negotiations with the consortium.

No concrete measures are taken within the proposals to achieve time reductions, other than applying the same level of funding to all participants (which is a good start and will speed up negotiations). The plan to fully outsource the Horizon 2020 EU R&D project management to an EU agency which can dedicate its full attention to project management is also to be welcomed. It is worrying however, that while the Commission has to reduce the number of its staff, it is not clear at this point how the Research Executive Agency or an additional agency yet to be created can be sufficiently staffed, including the re-affectation of about 1000 current project managers employed in DG Research. There is an urgent need for the European Parliament and the Council to lend their support to the Commission to find a solution before Horizon 2020 gets operational.

The Commission has so far aimed at shortening the time to grant partly by specifying a time limit for negotiations and terminating the negotiations thereafter if no agreement has been reached. This is also a step into the right direction. Regarding Horizon 2020, Council and Parliament should in addition introduce a deadline limiting the time to grant as specified above. The overall success of EU funded R&D can arguably be better guaranteed through spending some funds on project management instead of having research consortia wait and lose time before starting to carry out the research.

15 Interim Evaluation of the Seventh Framework Programme by the Expert Group, Final Report of 12 November 2010, page 20/21
16 Figure provided by Dr Zoran Stancic, European Commission Deputy Director-General, DG Information Society at the Science Business meeting on Cloud Computing on the 9th of December 2011 in the European Parliament
17 Horizon 2020 Communication, COM(2011) 808/3 page 8

Funding rules/reimbursement of costs

Despite the many changes adopted since FP6 under the banner of simplification, the frustration about the administrative burdens of involvement in FP7 persists among the participants. This has scared away many European researchers and innovators from participation in EU funded R&D and calls for a major reform of those rules. According to the Commission, the costs to the participants under the rules envisaged by Horizon 2020 are reduced by around 15–20%. Nokia feels that 20% are achievable and should be achieved but that the proposals fall short of enabling savings of such magnitude. The following points need to be addressed by Council and Parliament.

Generally the cost calculation and reimbursement procedures have been simplified and this is to be welcomed. However, there is still a need to improve the proposals. Regarding direct costs, **the idea that the grant reaches 100%**[18] **of the eligible costs**[19] **should be strengthened by clarifying in the Regulation that this will be *the rule*.** It should also be made explicit that personnel costs from affiliated entities are reimbursed as direct costs in a single cost report.

Regarding indirect costs, it is useful to work with a flat rate as proposed by the Commission, however the proposed flat rate needs to better reflect realities; the current proposal of 20 % is for instance well below the current de facto rate of indirect costs within the Nokia Research Center which is close to 100% of direct costs. **Given the fact that EU funding is not 'full' but 'co-funding' and provided that as a rule grants reach 100%, the reimbursement of indirect costs may stay well below the actual costs but an increase to at least 30-40% seems justified.**

The new control/auditing strategy based on placing more trust on researchers will further reduce the administrative burden. Audits will be more efficient because of the flat rate applicable to indirect costs which are otherwise naturally much more difficult to audit than direct costs. The European Parliament as a watchdog should exercise its finance-control powers effectively but with careful tact and should tolerate small error rates of 2 to 5% regarding cost calculation etc. as proposed by the Commission in order not to induce the Commission to be overly cautious and detailed concerning the negotiated contracts clauses which will prolong negotiations. A right balance needs to be found.

To be welcomed in the proposal is the reduction of the number of certificates on financial statements to one per beneficiary. It should be introduced to a single portal which allows also the printing of cost reports.

18 Except for actions primarily consisting of activities, such as prototyping, testing, demonstrating, piloting etc. as stipulated in article 22.5 of the proposed rules of participation.
19 Please read also the DIGITALEUROPE position paper on the rules of participation. A definition should be added to the Commission proposal on the 'total eligible direct costs' which should to reflect the thinking expressed in this Nokia paper. The New Financial Regulations should also be drafted accordingly.

Modern tools for project management and application evaluation

It is time for a change in management culture. The Commission should fully adapt its project management, application process and application evaluation procedures to current ways of working. All modern R&D funding agencies and scientific journals have already since a long time ago moved to on-line management tools. Electronic means can be designed to better assist applicants to submit good proposals in terms of clear project ideas, aims and goals on the one hand (the "what") and in terms of competencies, balance and structure of the work on the other ("the how"). Evaluators would receive applications, perform their joint assessment work and give their feedback on-line. Project reporting could easily happen through a share point solution, etc. Moving to on-line management would save costs and time significantly without compromising confidentiality.

Substantial flaws in Research Result Exploitation Rules, worsening of the Innovation deficit

In order to fulfill its main objectives, namely to create European industrial leadership based on excellence in science, Horizon 2020 has to be designed in a way to enable businesses to push innovations into the market. This will give European economic and industrial competitiveness a boost. **Effective exploitation of research results, resulting in competitive products and services and/or utilized IPR is the key to success.** It is indispensable to this extend that the rules governing the access to research results are optimised. This holds true especially concerning collaborative projects which include partners from industry and academia. **Unfortunately, the Commission proposals are far from stimulating a rapid and extensive use of research results.**

Especially the IPR provisions have again been deteriorated compared with FP7 and even more so compared with FP6.[20] In particular, they do not ensure that at the beginning of each project the principles are agreed in detail, the **protection of research results and IP rules can be designed according to the needs of the participants.**

With regard to joint ownership of IP, the default regime of the proposed rules foresees **prior notification and compensation for non-exclusive licensing to third parties**. **The joint ownership creates substantial barriers for the exploitation by companies** as notification is in most cases not possible due to cross-licensing regimes and confidentiality requirements and compensation leads to a non-justified uncertainty. If used as a starting point for contractual negotiations among the partners, it will unnecessarily complicate and potentially prolong them. Ultimately it could act as a **discouragement to real research cooperation leading to joint ownership.** The joint ownership of patents is never a preferable, or even feasible, solution. The rules of procedure should be limited to ask beneficiaries to agree among themselves how to share joint inventions.

Further uncertainly regarding the nature of the funding and the freedom to design IPR rules is added into the proposal by making reference to EU state aid rules. This reference needs to be removed as State aid rules should only apply to the Member States and not to EU R&D funding. Other proposed access rules for instance affecting affiliated entities and the transfer of ownership need to be made less burdensome by the EU legislator. **The way the rules are currently conceived, they will act as a deterrent to industry to participate in EU funded research.** And as stipulated above, industry participation and straightforward access to the results are key to increase innovation in Europe. Otherwise Horizon 2020 will merely create artificial employment projects in the area of research, instead of R&D enablers for European businesses to innovate and create a much higher number of real competitive jobs.

20 Read also the DIGITALEUROPE position paper on the draft Rules of Participation for Horizon 2020

Industry experience: Strong linkage between IPR rules and Research Result Exploitation:

Experience shows that Public Authorities as well as universities and research institutes apply rules – stipulating that a financial compensation is due when licenses are granted to third parties to exploit jointly owned results, or that State Aid Rules apply – by the letter. There is a tendency to determine 'the right price' for every single piece of IPR or Know How which leads to an overwhelming degree of bureaucracy. Consequently, industry players often refrain from obtaining licenses from research entities because of the overly burdensome process. The following two case stories illustrate the problem:

It is almost impossible to come to practical solutions without inacceptable bureaucracy when exploiting Joint Ownership. Many academic contributors ask for financial compensation, preferably in form of running royalties or even revenue-based royalties. Given many thousands of patents are allegedly used in products integrating many technologies such as smartphones, and that such contributors usually have no licensing experience or understanding of the market value of such IPR, negotiating such licensing terms would be totally unmanageable. This will deter from jointly developing anything.

There should not be any reference to State Aid Rules.

Academic partners often try to sell their inventions (patentable Foreground) in addition to the basic price for the research order as they do not regard prior inventions as part of the overall project results. Industry participants despite also contributing with their existing know-how, technology and inventions are often willing to pay this additional sum (as a lump sum agreed upon already in the order) for a prior invention from academic partners to demonstrate their good will. However, more recently controversial discussions with academic partners are in the increase because they argue that the State Aid Rules may require the identification of "the right price" instead of agreeing to a lump sum. This is, according to them, only possible ex-post when the results are out and the price for inventions is claimed when the industry partner cannot step out any longer of the project. If academic partners introduce inacceptable claims, the industrial partners are left with two options: a) accept any price the academic partner asks for b) leave the invention to the academic partner although the industrial partner has financed the order.

Lack of possibilities to monitor/audit that IP-related rules are followed

The Commission needs to become much more active in practice to ensure that patents resulting from EU-funded research are not filed by affiliates or parent companies of project participants in a way that rules/commitments for instance to grant royalty free licenses are circumvented. Also the requirement to indicate in the patent application that the innovation is originating from EU funded project should be much better monitored and enforced. These requirements should be reinforced in the rules of participation.

Waste of resources invested in failed applications

Success rates of applications have stayed too low[21] and result in a waste of research resources invested in failed applications. Many of these are excellent (according to peer reviews) and therefore deemed worthy of funding but are not being selected due to the high number of applicants. The Commission has not addressed this problem. A variety of solutions are imaginable and a combination of several approaches should be introduced by Council and Parliament. Reserves could be set up so that some selected “second-best” competing proposals of high quality can also be retained. In some cases the Commission could offer an increase in funding if additional partners of a failed application are allowed to join the winning consortium, provided that such ‘ex-post matchmaking’ makes sense for the project. Some suggest resorting to a system of two-stage calls where on a first stage applications can be eliminated on the basis of a less detailed level of input. However, this is not recommendable since it risks prolonging the procedures.

21 Just under 20% in the years 2007–2009 according to Interim Evaluation of the Seventh Framework Programme by the Expert Group, Final Report of 12 November 2010, page 28

Flexibility in the adaptation of projects to market developments

Flexibility has only been introduced regarding the adaptation of priorities and actions to take account of the evolving nature of science, technology, innovation, markets and society. However, also ongoing projects need to be flexible to adapt to market developments and retain their industrial relevance. In this respect, the change request procedure familiar from Eureka projects (e.g. in the ICT clusters) would be a good example and the Horizon 2020 rules should be amended accordingly.

7. Concluding Remarks

Nokia is ready to take a fresh look at considering how to become more active in participating at EU funded R&D activities under Horizon 2020 and to make this part of its European research strategy. This would help to reverse the trend to ever lower industry participation, increase Innovation and the exploitation of research results. However, the design of Horizon 2020 including its rules of participation need to facilitate such a move. In this respect, especially the IPR-related chapter requires a serious rethink and improvement.

Let us build a Horizon 2020 which leads to excellent Papers & Speeches but also to competitive Products & Services!

Nokia Research: Superspeed MIPI M-PHY℠ connects everything

MIPI M-PHY℠ may be new to you but the chances are you'll be reaping the benefits of it in your next phone. The fruit of a decade's hard research and development work, it's the new high-speed interface capable of 12 Gigabits transmission rates that joins up all the modules, components and sensors in your phone, promising to up speeds, cut costs and save power.

"MIPI M-PHY℠ is used to transfer data between different components like display and processor, and was designed so that it can be used for all purposes in mobile devices like phones, tablets, laptops," says Martti Voutilainen, principal researcher at Nokia Research Center (NRC). It uses optical connections: light waves rather than electrical transmission for connections longer than 10 centimeters.

A decade ago, phones were starting to get smart – and demanding. We saw that data transfer speeds would need to be increased dramatically to support this. For instance, a 10 megapixel camera sensor requires a data transfer rate of 1600 Megabits per second to move all the information off before it is lost in the sensor. Recording video is even more demanding. The bar rose higher with each passing year.

In 2001 when the need for a new interface was found, a Gigabit per second appeared to be enough, but by 2002 the requirement was already three Gigabits per second.

It's altogether a huge achievement, and it's not just a success story only for Nokia: everyone wins. Using the same connection for all modules inside your next phone, be they cameras, flash drives or even other gadgets, drastically reduces cost and despite its massive speed boost it cuts power usage potentially by up to 90 percent, paving the way to a world of greener mobile computing.

The related open standard[20], was agreed upon late last year, but it all started with an idea more than ten years ago - dreamt up by the clever researchers at NRC. After one year of individual research, NRC opened up and teamed up with four semiconductor companies. After another two years of joint research the results were brought into the MIPI alliance[21], consisting of 200 members including all major phone and semiconductor companies.

Part of the project could have been carried out also as EU funded project, especially before going into standardization. However, the target and used technologies were so near to commercial products that it would not have been easy to fit the activity into an existing EU research programme. Horizon 2020 aims at facilitating the funding of such innovative research which is close to the market.

22 http://www.rethink-wireless.com/2012/01/17/mipi-alliance-publishes-specs-handset-cost.htm
23 The Mobile Industry Processor Interface Alliance is a non-profit corporation that operates as an open membership organization developing interface specifications which drive consistency in processor and peripheral interfaces, promoting reuse and compatibility in mobile devices. http://www.mipi.org/working-groups/phy

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