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**European Research Council in Slovenia
National Institute for Chemistry 70th anniversary
European Parliament, Brussels**

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**The ERC in the European Research System
Professor Jean-Pierre BOURGUIGNON
President of the European Research Council**

Dear Prime Minister, dear Minister, dear Colleagues, Ladies and Gentlemen,

I am very pleased to be here in Slovenia today to celebrate the 70th anniversary of the National Institute for Chemistry. From my visit this morning, it is clear that this institute, with a long and distinguished history, has grand ambitions for the future. It provides a great example of how Slovenia has invested in state-of-the-art research facilities, with the help of European funds, to create an environment in which research can flourish at a high level.

I take this opportunity to thank all those who worked hard at setting up this very useful visit - both in Slovenia and in Brussels, in particular Professor Draško Veselinovič.

Today, I have been asked to speak about the development of young scientists' careers and how the European Research Council contributes to it. To deal with such a critical question, let me first take a broader view at how research is presently supported at the European level and how the ERC contributes to improving the situation from this point of view also helping to shape the reformed systems at national level. I will also take a closer look at how Slovenia is doing in this context.

The ERC was created by the European Commission in 2007 after a long struggle by the European scientific community. It showed that, at the political level, there was agreement over the critical role that frontier research can play in making Europe an attractive and competitive place scientifically and economically. There is no disruptive innovation without basic research. As you all know, European Commissioner Janez Potočnik had the responsibility of establishing the ERC as part of the Ideas component of the EU Framework Programme 7.

Many people agree that the ERC is succeeding in reaching the aims set for it. This does however not mean that the ERC Scientific Council - which has the responsibility of structuring the programme and setting its evaluation - is not aware that there are still challenges ahead.

For instance, the scientific communities in certain countries believe that the number of ERC grants they have received does not reflect the quality of the science they do.

So let me try and tackle this issue head on.

The first thing to say is that the ERC cannot, in its present size, fund all excellent basic research carried out in Europe. Its current budget hardly represents 1% of the overall funding available for research in Europe. The main task given to the ERC was to improve the worldwide positioning of the scientific research conducted in Europe, a continent which keeps producing about one third of new knowledge, ahead of any other continent, but which was still significantly lagging behind the US when considering indicators such as the production of the 1% most cited articles.

Since 2007, the ERC has funded some 6,000 researchers in 677 different research institutions across Europe. They were selected by panels consisting of leading scientists, exclusively on the basis of the scientific quality of the ambitious, curiosity-driven projects proposed by researchers.



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The guidelines that the ERC Scientific Council gives to the evaluation panels have been, and still are, very clear. They leave little room for panel members to base their decisions on factors other than the scientific quality of the proposal, for example the university's reputation.

There is now solid evidence that ERC-funded researchers have a great scientific impact, which, as I mentioned earlier, was one of the primary goals of introducing the ERC programme. There are three elements pointing to this:

- firstly, an ex-post study conducted by independent experts at the initiative of the Scientific Council on the first 200 completed ERC-funded projects shows that a remarkable 21% of these projects were considered to have led to radical breakthroughs by the experts, who had to work hard to make the case for such a claim; another 50% were considered to have led to major scientific advances; considering both these statistics, achieving a 71% level of high performance is a very satisfactory result;

- secondly, 7% of the publications by ERC grantees are in the 1% most cited scientific articles, an impressive multiplicative factor apparently not matched by any other funding mechanism in the world;

- thirdly, ERC grantees make an impact on their communities, both locally and on a much wider scale; for example, some of them take advantage of the "Proof of Concept" scheme, which was been set up by the ERC Scientific Council to help researchers reach out towards the economic sector and bring their scientific results closer to the market; this top up funding is of course important, as it enables a strictly bottom-up approach which is the cornerstone of the ERC.

The three elements I just gave you - although I could have given you several more - represent a considerable achievement in a relatively short time. However, am I here to tell you that everything is now wonderful for Europe's researchers? Of course, I am not.

Competition for ERC grants is tough. The success rates in ERC competitions are still around 11% - well below those of other comparable funding organisations in the world. ERC grantees represent about 1% of the public sector researchers in Europe, which is in line with the share of the ERC budget in the overall budget in Europe.

Let me be more specific on this. In 2014, the gross domestic expenditure on research and development (GERD) in the EU was 284 billion euros, about 100 billion of which was spent by the public sector. In the same year the ERC budget was around 1.7 billion euros that is just slightly over half percent of the total European spending and less than two percent of the total public spending. Put another way, the ERC's budget would be just enough to give each of the 885,000 public sector researchers in the EU 2,000 euros each. Nobody believes this is the right thing to do, firstly because it is administratively unfeasible; secondly because we need to push researchers to their boundaries and not be satisfied with business as usual.

It is therefore obvious that the ERC cannot address all of the issues facing science in Europe alone. And it is equally obvious that funding coming from the ERC cannot replace national funding. So now, and for the foreseeable future, the primary responsibility for funding basic research in Europe lies at the national level, and our duty - both at the European level and at the national level - is to find the optimal combination of strategies, each taking advantage of its specific situation.

It goes without saying that the level of domestic investment affects the quality of research carried out in the country. There is indeed a close correlation between the gross domestic expenditure on R&D (GERD) of a country and the number of ERC grants hosted there.

I am aware that for Slovenia the picture is mixed. In one sense it is positive. Overall research expenditure in Slovenia rose steadily until 2013 which resulted in one of the highest research intensities in Europe. However, I am also aware that a big share of this investment comes from the private sector presently and that lately, like in many other EU countries following the economic crisis, there have been significant cuts to public sector research expenditure.



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So let me try and put these numbers into further context to show the level of competition for ERC grants. Presently, the university with the largest number of ERC grants is Oxford University in the UK with some 170 grants. The expenditure of Oxford University in the financial year 2014/2015 was about 1.6 billion euros. Some 820 million euros of that was for staff costs. In other words, Oxford University alone spends almost as much on staff as the entire economy of Slovenia spends on research (890 million euros in 2014). And of course Oxford University is just one of the many well-established, excellent research institutions in Europe at present.

To give another perspective, the number of ERC grants received by researchers based in a given country correlates most closely with the number of scientific publications which the host country has within the 10% most cited scientific publications worldwide. The statistics show that around 8% of publications authored by researchers based in Slovenia are in the top 10% most cited publications worldwide. This is the second highest level amongst the Central and Eastern European countries. On the other hand, it is still below the overall EU average, 11%, and it only accounts for half of the 16% average in the top performing countries such as the Netherlands and Denmark. Now, these general figures do not tell us anything about any particular individual researcher or the quality of his or her work. But it shows that in order to have a competitive track record as compared to the best researchers in Europe, a scientist based in Slovenia must be much further above the average for Slovenia than a Dutch researcher must be above the average for the Netherlands.

The fact that 50% of the grants have gone to more than 600 research institutions (over 200 of which host only one ERC grant), including institutions here in Slovenia, could be seen as evidence that the ERC can recognise scientific excellence wherever it is to be found.

It makes no sense, of course, to write off the work of the vast majority of researchers based in Europe who have not received an ERC grant. There are many thousands of researchers producing very significant work that the ERC will never be able to fund with its current budget. It is the responsibility of the national authorities to invest and create the conditions for national research to flourish and excel more broadly. What the ERC can do is set a clear and inspirational target for frontier research across Europe. And, if the number of ERC grants can serve as one amongst other benchmarks for the quality of each national research system, it would be a big mistake to exaggerate its importance.

One of the clearest lessons offered by the ERC is that the most competitive systems are the most open and attractive to foreign researchers. For example, 660 of the 1366 ERC grantees in the UK are non-UK nationals.

This should not be surprising: Science has always been and must remain a collective, public and international endeavour. It depends on exchange and cooperation and does not recognise borders. New ideas have always found a way to spread rapidly. Discoveries made anywhere are available almost instantly to the global scientific community. In 2013, over 35% of articles with an EU author were co-publications involving international partners. The top research institutions benchmark themselves at the global level.

National and European policymakers therefore need to help their scientific communities to take part in and contribute to this overall enterprise. Such an endeavour is necessarily a long-term effort as it takes years to create a group which attracts top researchers in the world. There is no such thing as national or European science, but there are institutions which prove themselves as magnets. Most of the time, they combine great scientific leadership of some outstanding individuals and quality facilities with flexibility to accommodate the needs of top research.

Yes, people say that is all very well. But European science should deliver European jobs. Slovenian science should deliver Slovenian jobs. But it is of course not true that countries or regions grow economically by secretly inventing new technologies which are then deployed in that



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country alone. Autarky is not a viable economic strategy. There is not, and has never been, any country on Earth that uses only technology invented in that country.

That is why science is perhaps the ultimate “public good”. As economists say, scientific discoveries are “non-rival” and “non-excludable”. Non-rival, because they can be consumed without being used up. And non-excludable, because it is hard to stop people getting access to them.

Once an idea is out there, it is very hard to stop others from using it. And that is why, in the modern world, we all essentially use the same technologies. Science is not a zero-sum game. And this is why it is inappropriate to look only at where ERC grantees are based, rather than what they are contributing to the sum of human knowledge and how we can all benefit from it.

So how can ERC help to develop science and make it stronger? There are three main elements which I believe are essential for the development of science:

- First, we must not forget that the most essential element is the researchers themselves, the human beings that make it work;
- The second element I want to emphasise is the need for researchers to have the time and freedom to explore new scientific paths;
- And thirdly I would like to emphasise the need for diversity, interdisciplinarity and risk taking in science.

Without the right basic conditions for researchers, the quality of research is affected. Anybody entering any working environment wants to be reassured that there is a chance to have a career, to advance and to get rewarded. If these basic conditions are not met in a particular place, we should not be surprised that the best researchers simply leave to carry out their research elsewhere, or that they even leave research altogether. Any country or region that wants to develop its science, needs to get these conditions right.

We need to plot out a sustainable new career path for talented young researchers, no matter where they come from. Many of us made our careers in very different times. We cannot expect that what worked at a time of steadily expanding budgets and positions will work now.

In line with this, I want to stress that the ERC Scientific Council decided early on that two-thirds of the overall ERC funding is reserved for young researchers: this is why today two thirds of the ERC laureates are between 30 and 40 years old (some are even younger!). These are the Starting grant and Consolidator grant holders representing around 4000 young researchers who have been given scientific autonomy and a chance to build their leading status in research. Some 40,000 PhD students and post-doctoral fellows are also working in ERC teams, 25% of them coming from outside Europe. This is Europe’s future, and we need to nurture this talent!

Let me share a wonderful example with you! Last year, I met a brilliant Hungarian researcher Csaba Pal, a biologist working in Szeged on new approaches to antibiotics resistance. He had just received his second ERC grant. He started his research career in Oxford, but, at some point, with the help of a Hungarian return grant, he considered coming back to his home country. I heard that the quality of his research and his enthusiasm has transformed the very good institute he had come back to, and made his attitude contagious. The Institute has now attracted other former students who began their careers elsewhere, and they came back for several reasons: home is home, and, as Pal said, the music in Szeged is great. Now, that’s an inspiring story to me - and I hope to you too.

We must consider employment and working conditions, open, transparent and merit-based recruitment, without forgetting to encourage more women to engage in research. This can only be achieved if an appropriate balance is found between competitive and institutional funding. We must look to enhance the training, skills and experience of researchers in Europe. We must give



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consideration to reconciling professional and private life. Most of all, we need to consider researchers, not just as researchers, but as people.

What's more, one of the key conditions which researchers need is scientific freedom. There has always been an inherent tension between the demands of policy-makers for relevance and impact - a legitimate concern because they link it with productivity and economic growth - and the deeply-rooted interests of scientists in curiosity-driven research. But I believe that this apparent contradiction is mostly a false one.

Understanding has to come before application. And we really do not know what we do not know. So, funding cannot be short-sighted if science is to make truly influential innovations. To maintain a healthy research ecosystem, investing in long-term curiosity-driven research is indispensable. This is, of course, a difficult path to follow as it means making some sort of "bet". But we must keep in mind that the most important scientific results, those that make the biggest impact, often came about when scientists are not looking to solve any particular societal or technological problem. There is no reason to expect that this will change. People responsible for industrial strategy know that very well and they keep on insisting on this matter with public policymakers.

Ensuring scientific freedom is not just an issue for the funders. We must also look at ourselves. The academic community tends to be conservative. But we need to be able to take risks. We cannot ask for scientific freedom and then tie our own hands behind our backs.

The hard part is to find a satisfactory balance between evaluating the novelty and the credibility of an idea. When you look at new ideas proposed by scientists, then of course they must be evaluated by experts. But I think that it is critical to guide this process: to give the right guidance and to engage the right people. Because we can be conservative not just in terms of science but in what we regard as the right way to do science and the right type of scientific career.

The ERC's philosophy is that applicants must be challenged to demonstrate the ground-breaking nature and ambition of their scientific proposal. We want to know the extent to which the applicant is capable of creative independent thinking and of conducting ground-breaking research. In other words, we encourage scientists to take risks. And I would like this approach to spread because it is key for the specific task given to the ERC, here I repeat myself, to improve the international standing of research conducted in Europe, therefore making Europe more attractive.

The decisive and key element to achieve this is the quality of the selection. This is why for every call (the ERC carries out three calls a year), we rely on around 350 high-level hand-picked scientists appointed as panel members and on around 2,000 remote reviewers from all over the world.

So, in conclusion, let me stress that ERC grants are a means created to an end, and not an end in themselves - for neither individual researchers nor for countries.

Individual researchers should be using their creativity and talent to explore and discover new facts about the natural and human worlds. From this, recognition will inevitably follow even if it takes longer than one might like!

National policymakers need to create the conditions in which their researchers can flourish. Each country faces a different set of conditions, a different history which has shaped the institutional environment. It's a fact that those countries which now enjoy good conditions for research, do so only because of wise and patient investment that has been taking place over many years.

For me, this is not at all a pessimistic conclusion. It just makes some of the rules of the game clear. Because in the meantime, all of us can benefit from the results of frontier research wherever it is carried out, and wherever we live or work. Today more than ever, it is scientists' responsibility to call for the support of frontier research, including basic curiosity-driven research, to make the many different ways science contributes to society tangible, and to prove that taking the long view wins over an impatient approach of short-term results.



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Let me end by encouraging researchers in Slovenia, in particular young ones, to consider competing for ERC funding. To succeed, you need to work on your best ideas - ideas that are high-risk and high-gain. For me it is obvious that scientific excellence can be found everywhere, and of course also in Slovenia.