## TEN YEARS OF THE EUROPEAN RESEARCH COUNCIL A VIEW FROM THEORETICAL COMPUTER SCIENCE

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The European Research Council (ERC)<sup>1</sup> turned ten this spring. This event has been celebrated in Brussels and in many European countries with thematic events, highlighting success stories in research related to the ERC and examining possible future developments for this remarkable funding agency. Helga Nowotny, the first President of the ERC, has written an editorial in Science<sup>2</sup> looking at the future of the ERC. In that editorial she summarized the first ten years by saying that, since its inception, through international competition, the ERC has awarded grants amounting to over 12 billion euros to about 7,000 researchers in Europe. Two-thirds of those awards went to young scientists with 2 to 12 years of experience after receiving their PhD. Helga Nowotny wrote that:

Their careers have received a substantial boost, and their research teams are among the most international in the world. Scientific colleagues elsewhere envy the ERC's mode of funding, which is centered on the principal investigator, without thematic priorities, and is open to any field of study, including social sciences and humanities.

In a piece on the state of computer science in Europe published in the Bulletin of the EATCS<sup>3</sup>, our colleague Thomas Henzinger (President of IST Austria) confirmed Helga Nowotny's opinion by writing:

The most significant development can be found, perhaps surprisingly, on the European level. I am referring to the creation of the European Research Council, which supports frontier research based purely on scientific criteria. This program has no counterpart in the United

https://erc.europa.eu/

<sup>&</sup>lt;sup>2</sup>http://science.sciencemag.org/content/355/6329/997.full

<sup>3</sup>http://bulletin.eatcs.org/index.php/beatcs/article/view/393/373

States, but if it manages to remain scientifically independent and well-funded, I am confident that its impact will change the game. These are big if's, of course, and the ERC is constantly being threatened by national interests and sectorial lobbies that favor traditional programs which distribute the available funds to more different countries, sectors, and groups. Given that politicians love to pride themselves with the founding of "strategic" consortia, centers, and flagships, and industry likes to get every possible cut of public money, the initial success of the ERC has been all the more remarkable. Let's work together so that it will trump the less effective funding formats and lift the strength of computer science in Europe.

As an interested, and somewhat casual, observer of that funding agency over the last ten years, I have the feeling that the ERC has indeed played a very useful role for basic research in Europe and that it has indeed funded excellent science. Moreover, my impression is that theoretical computer science has been treated well by the ERC and that research in our field has benefited from ERC funding. However, the issue of Science magazine featuring Helga Nowotny's editorial includes also an editorial by Kai Kupferschmidt<sup>4</sup> describing some of the calls for changes to, and criticisms of, the way the ERC has influenced science funding in Europe.

Of course, one should expect a variety of opinions on such a high-profile funding agency, which distributes a large amount of research funding for basic research. So I believe that it is natural to ask oneself whether the ERC is playing a positive role for European research and what could be done to improve it. My interest in this matter started because the ERC is ten (and so it might be a good time to draw a preliminary assessment of its impact on the European research environment) and was piqued by the opinions aired by the Italian physicist, and shrewd analyst of science-funding policies, Francesco Sylos Labini, who has gone on record saying that the ERC has become the main problem in European research funding. According to Francesco Sylos Labini, there are three problems with the ERC.

- 1. The first is that it uses 'research excellence' to mask political choices.
- 2. The second is that rewarding today's excellence does nothing to support the excellence of tomorrow. Moreover, one does not reward excellent research by giving money to the top 5% of those who apply.
- 3. The third is that the ERC gives a bad example to national funding agencies in Europe, who also reward excellence.

<sup>4</sup>https://doi.org/10.1126/science.aal0891

Francesco Sylos Labini makes a cameo appearance in the aforementioned, critical Science editorial, in this paragraph:

But some chafe at the singular focus on excellence. Countries in southern Europe have cut their research budgets during the economic crisis, and now ERC is further weakening these countries by essentially redistributing their EU contributions to the research powerhouses in the north, says Francesco Sylos Labini, a physicist at the Enrico Fermi Center in Rome. And it's not just the money: "The few Italian researchers that get an ERC grant go to Germany or another country to do their research," he says.

Reading those opinions prompted me to hold a small opinion poll within the theoretical computer science (TCS) community to try and find out what TCS researchers think of the first ten years of the ERC and to see how this, undoubtedly very successful, funding agency can be improved. To this end, I wrote to 26 colleagues in TCS, who cover a fairly broad spectrum of topics within TCS research and have a diverse geographical distribution. Some of those colleagues have received at least one ERC grant at various stages of their careers, but some haven't so far. From the replies I received, I also learned that two of those colleagues had served on ERC evaluation panels in previous years.

I received 21 replies, so my emailing effort had a good 80.7% success rate. I thank the colleagues who took time from their busy schedules to reply to my questions.

In what follows, I will summarize the opinions I received, before concluding with a personal summary of what I have learned. Let me state at the outset that this small survey was never meant to be an exercise in big-data analytics and has no statistical significance. My intention was simply to gauge the satisfaction of the TCS community with the ERC and, possibly, to start a healthy and rational discussion on the role of this funding agency in European research funding and on its possible development—a discussion in which the EATCS can play an important role. Finally, I have no personal stake in this matter, since I am not ERC-advanced-grant material myself, have never applied for ERC funding and have no axe to grind.

## 1 The opinion of past and present ERC grant holders

The questions I asked to the colleagues who have received funding from the ERC were the following ones.

- What is your opinion on, experience of, the ERC?
- Is it more bureaucratic than other funding sources, such as your national funding agencies?
- Do you feel that receiving an ERC grant has been beneficial for your research?

Perhaps unsurprisingly, all the ERC grantees I contacted have a very high opinion of the ERC. In order to make this statement concrete, here are some excerpts from some of the answers I received to this question:

The ERC supports fundamental research, putting an emphasis on quality rather than immediate impact. This is extremely valuable, in particular for someone like myself working on more theoretical questions. (ERC Starting Grant holder)

It was a valuable experience for me. First, it was important for me (at this time in my career) to have some funding agency speak about funding research linked to high-risk, the big picture, science, and excellence. Second, writing a proposal for the ERC was, in itself, important since I needed to work out what the big picture was and how to achieve it. If it wasn't accepted, I still would have had a coherent, multi-year effort mapped out in my head. (ERC Advanced Grant holder)

I think very highly of the ERC not just because they gave me funding. They are much much better in every way that our national funding agency [name omitted] which is incompetent on several fronts and inclined to encourage research which they can sell to the politicians. The ERC funding is an order of magnitude greater than that of the [name omitted] so can be a really step changer — I've felt that very strongly for my research. (ERC Advanced Grant holder)

The experience is extremely positive. The ERC projects are coming with an important and very flexible budget that can be spent over 5 years. Also, it has allowed me to buy out teaching duties at [name omitted] and so I could concentrate on research for 5 years. It is quite unique. (ERC Starting Grant holder)

I was very happy with ERC, because of the focus on novelty, visibility, size and the flexibility of the grant. (ERC Advanced Grant holder)

The ERC is a fantastic funding agency — run by scientists for scientists, committed solely to scientific excellence, transnational, the best

initiative for research that has come out of the European Union. (ERC Advanced Grant holder)

By and large, the ERC grant holders think that the bureaucracy that accompanies the management of an ERC grant compares favourably with that of a grant funded by a national agency, especially given the amount of funding that accompanies an ERC grant. To wit, here are some excerpts from some of the answers I received.

The bureaucracy is minimal and the support team is very good. All in all, I think it is one of the best funding mechanisms in the current landscape. (ERC Starting Grant holder)

The bureaucracy from my perspective was light. Here, [institute name removed] helps a lot so maybe I was protected by a staff familiar with the EU and ERC. During the 5 years, there were only three mid-term reports and one final report. These could be done online and I didn't find this difficult or time c onsuming. I have had much less funding for less time from some agencies with more bureaucracy. (ERC Advanced Grant holder)

Opinion is very positive! While it is more bureaucratic than our national funding agency ([funding agency removed] is much less demanding from this perspective), in general, ERC is much less hassle than other EU programs. (ERC Advanced Grant holder)

The ERC are less bureaucratic than the [funding agency removed] (though the ERC do have silly time sheets they give researchers considerable freedom); are better informed (the [funding agency removed] have the ridiculous policy of those heading areas like CS not knowing the area — to avoid bias; fight back against the politicians who are repeatedly asking for economic gain and naively thinking this can be steered towards through 'economic-gain' projects; are fairer in assessment — though there can be difficulties coming through the first general committee as their composition is inevitably a bit biased; my assessors at the second round of evaluation were very well-informed. (ERC Advanced Grant holder)

The bureaucracy is kept minimal and it has nothing to do with the classical EU projects (STEPs and the likes). (ERC Starting Grant holder)

My experience with ERC funding is very positive; there is little bureaucracy other than timesheets to fill out for those who are not 100% funded by the project (such as myself), but these timesheets can be dealt with in batch mode quite quickly. One great advantage (at least

for those based in the [country name removed]) is that you can fund graduate students using ERC money (even non-EU students, whose fees are higher than EU students), whereas standard [funding agency removed] funding does not allow PIs to fund students at all. (ERC Consolidator Grant holder)

There is bureaucracy, some of it more onerous than for [country removed] research councils, such as timesheets and financial reporting, and some of it comparable, e.g. reporting outputs.

The scientific reporting, on the other hand, is relatively straightforward — just two reports per grant — but you need to have good things to report. (ERC Advanced Grant holder)

The bureaucracy is comparable to national. The size of ERC grants is such that in order to spend the money, you should have a team of around 6 people, which is way more than you need for theory research, and requires substantial management/being busy. (ERC Starting and Consolidator Grant holder)

I think the ERC grant is great and enables me to do much more work than I would be able to do otherwise.

I also don't think the bureaucracy involved with it is too bad, except for one aspect: I made the mistake of saying in my grant application that I would use "real-life data" for experiments and even though I am only using publically available data, I am required to have an ethics review (done by a slow committee in my department and taking 3 month in the average) for any experimental evaluation involving real-life data. Additionally I have to write an ethics report every time I have to do a financial r eport. As I said, I am only using publically available data [sources removed]. So I feel that this part is an unnecessary burden. (ERC Advanced Grant holder)

My experience is positive. The ERC is less bureaucratic than the [names removed], with which I have an experience. I greatly enjoyed it. It enables me not to think twice before recruiting PhD students and postdocs to my group. The ERC was very considerate in my case — I asked for an extension of it in one year (due to my heavy administrative job at [name removed]), and after several iterations (with more bureaucracy than I suspected, but it was to the point), my request was approved. On the negative side, I should write that I thought that the reviews I got to my application were not of a high level ..., and the panel that sat in my presentation (I got the "consolidator" and the application involved a presentation to a panel) didn't seem to include

an expert in formal methods. I still think that the presentation is an important part of the evaluation. Another point — I was allowed to submit as a consolidator even though I was about [number removed] years after graduation since I gave birth to [number removed] kids after the graduation, which is a very good policy. (ERC Consolidator Grant holder)

Bureaucracy is lower than or as low as any other funding scheme I know of. The only thing I would change is the evaluation: Much emphasis is put on the project description, but it may be difficult in some areas of theory to present realistic and ambitious plans for a 5-year period. (ERC Starting Grant holder)

Let me conclude by reporting the opinions I received from two ERC Starting Grant holders from France.

I find the bureaucracy of the ERC project rather light compared to other FP7 collaborative programs..., and compared to our French ANR projects. I have no deliverables to produce, and only few reports (one financial report every 18 months, and two scientific reports, one mid-project and one at the end of the project). Note that I have not done yet the last scientific report, so I don't know if this is light or not.

The host institution (and hence the admin with whom you are in contact for managing the project) plays an important role. So you may have troubles if the host institution is not fully competent. I had some troubles with my host institution (CNRS), which was quite timid in accepting some of the costs (so in these cases I had to interact with my PO directly in Brussels). The problem is that they (HI) pay in advance and get the payments back afterwards (but only if costs are accepted!). (Researcher A)

Overall, I think this was not so bureaucratic for the quantity of money it offered, compared to the ANR in France for example.

Europe in itself did not ask for so much work, however, the ERC in some sense 'delegates' the administrative stuff to local agencies (CNRS as far as I am concerned): if the verifications were not sufficiently strict in the country, Europe may refuse to refund the local agencies. The CNRS did lose a lot of money for such reasons. The result is that the agencies are much stricter than ERC itself. Nevertheless, the biggest hassle was to fill 'time sheets' for every person involved in the project, every month, and the CNRS (after several

years) has developed an interface that makes it now much easier. In the end, this was very reasonable.

Also, some of the projects are audited afterward. That was not my case (at least so far). This seems quite painful. (Researcher B)

All the ERC grant holders I contacted thought that the grant was very beneficial for their research. Apart from the opinions I already presented earlier, here is what some colleagues wrote:

My project is terminating ... and I will definitely try to get another one. It has boosted my research a lot. (ERC Starting Grant holder)

Was it beneficial for the r esearch? I would say, y es: I had the occasion to work with many people, travel freely, I have some remaining money, this also has highlighted my research, etc..... However, this is also a change of principle: you leave a situation with not much responsibilities for another one where hiring and managing takes much more time (just for using the money). Some are more or less good about this. The benefit is probably much less important for purely theoretical subjects as in our field. (ERC Starting Grant holder)

But globally this is a very positive experience. I have broadened the scope of my research, and have gone up to the development of a tool (I have hired a post-doc with good skills in implementation). And I have done that because I had promised it in my project! Otherwise I would probably not have done it. (ERC Starting Grant holder)

Yes, without a question the ERC was beneficial for myr esearch. It also allowed me to hire a number of postdocs and PhD students: we really need funding to support entry level scientists. I am considering writing another ERC application. I may not only because I think it's time for me to focus on the 'small picture' (i.e., organize the technical material that has appeared over the past 5 years). If I had another big picture project in mind, I would not hesitate to try again. (ERC Advanced Grant holder)

I view the grant as (also) a service to the community, by giving money to hire foreigners in [city in Eastern Europe]. (ERC grant holder)

## 2 The opinions of researchers who have not received ERC funding

To those colleagues who haven't received ERC grants I asked the two questions below:

- What is your overall opinion on the ERC?
- Do you think that it is good for European research?

I feel that I should let the colleagues who responded to those questions speak for themselves in unedited form. I will draw some conclusions and express some personal opinions in the concluding section of this article.

"I once tried to get a grant. I failed in the very first round, the feedback I got was that I have 'not enough impact' to be considered for an ERC. ... Then I learned a few more weird things about the ERC. At this point, I guess it is fair to say that my opinion about the ERC is on the level of 'politics, the EU way'."

"First let me say that I did not (yet) apply for an ERC grant, but that the pressure is steadily growing — pressure coming from the lab, the [name omitted], ministry etc. One negative point is that ERC is misused (to my opinion) as potential source of money. For example officials in our university say that theoreticians should apply rather to Europe than claim for local funds (that should be used for applied research).

My problem with the ERC grant system is that it puts a lot of money on individuals. I don't think this is an efficient form of support for any kind of research, at least not for CS. High quality research in our domain is not necessarily something that starts to shine in one brain over night. ERC grants look like start-ups, but this is not the way research works (at least in our area)."

"My personal opinion in general is quite positive about the conception and the results of the ERC grants, with some caveat.

Let me start with the positive points. First of all, I like the fact that the ERC grant is given to a single researcher and not to a consortium (in my experience, people often created fictitious networks of collaboration just to be able to apply for a collaborative project program). Second, in principle I like the 'excellence' idea, in contrast to 'indiscriminate financing' (although I have a lot of reservations

about its implementation, see below). Third, in my own experience, all the people I know who have received ERC grants are excellent researchers and have done a very good use of the resources.

On the negative side, there are a lot of excellent people who have applied and not succeeded. I think this is due to the following problems:

- 1. Financing only the top 5% is clearly too little. Besides the loss of the occasion of financing excellent research, there is an enormous waste of human resources (researchers obliged to spend a lot of their time to write proposal for extremely competitive programs, instead of doing research). I think that there should be at least 15–20% acceptance rate, possibly (if necessary) with smaller budget.
- 2. I have the impression that there is a lot of bias and subjective judgement in the juries (people in the jury tend to help their friends and/or people from their community). This is not only a problem of the ERC, but all funding programs in general, and I would not know how to solve it.
- 3. I have the impression that there is a lot of incompetence in the juries (people who are not qualified enough to evaluate certain proposals, but they evaluate them anyway, often because they are young and not experienced enough to recognize their own limitations). Again, this is not limited to the ERC, it holds for all European programs. This problem could be solved by enforcing more control on the competency of the evaluators, and try to recruit among the evaluators more senior, balanced, and experienced people.

So, in conclusion: I like very much the idea of the ERC, I like less the way it is implemented now."

"I think ERC is a way to award excellent research. It should not be considered a way to fund good research. Specifically, ERC does not even try to fix the problems created by the shrinking research budgets in countries going through a recession. Maybe we (I mean Europe) need a way to address this problem but this does not have anything to do with excellent research.

Not sure if ERC uses 'research excellence' to mask political choices. By looking at the awardees in [research area removed] the percentage of excellent researchers is very high: there are some false positives/negatives but they are within acceptable margin errors.

Italians going abroad with their ERC grants is an Italian problem and we should not ask others to solve other problems. Neither should we blame ERC (or Germany, for that matter)."

"The ERC is the way to assure that real science advances, giving a fair amount of money to individual researchers with good ideas and with an established research CV. That is the way countries with a solid recent history of successful research distribute public research funding.

In the best of my knowledge the influence of politics or national interests are rather minor, in particular when compared with other EC programs like the classical Frameworks (e.g. H2020) or other programs.

The successes so far of the ERC are well documented. However, for a long time I have been asking the EC for information and data on which FW programs can be considered to be successful over the whole mass of invested European Taxpayer money, since the ESPRIT programs until now, and I am afraid the data is too scandalous to be made public."

I also received some reactions to the three problems with the ERC raised by Francesco Sylos Labini and mentioned earlier in this article. In response to the claim that the ERC uses research excellence to mask political choices, two colleagues who served on Panel PE6 in charge of selecting ERC Grants in Computer Science a few years ago wrote to me saying:

"This opinion is not reflecting what I observed in P E6. To the contrary, the panel is running with no a priori on the topics (even if, as individuals, we may have biases towards some topics). This may lead to delicate and difficult discussions about how to compare, e.g., a project on vision for detecting tumors with a project on computational complexity. Nevertheless, the panel members are always referring to scientific arguments on the quality of the projects and on the quality of the PIs, and never to political choices. Judging from my own experience, I would say that ERC is in fact perhaps the EU program where political choices have the smallest impact."

"I think this is completely refuted by how the panels work. When I served on such a panel, there was no mechanism that the administrators could have used to make political choices, even if they'd wanted to. The decisions were made by the academics, on the basis of research excellence."

A colleague responded to the claim that rewarding today's excellence does nothing to support the excellence of tomorrow, and that one does not reward excellent research by giving money to the top 5% of those who apply, thus:

The discrepancy between the level of ERC grants and the amount of money dedicated to research is indeed huge in many countries. However, I am not sure that ERC has to be blamed for that. I would rather say that many governments in Europe have to be blamed for not supporting research, and not giving enough to their researchers. In fact, nothing prevents a department or an institution to use part of the overheads given to ERC grants for internal redistribution. When such a mechanism is implementable (which depends on the national rules, and on the local rules of the institution to which the ERC grant belongs), having an ERC in a department may benefit the whole department.

Another colleague, who never received an ERC grant, pointed out that

That is not my experience, and I am afraid we are mistaking 'political choices' (whatever that means) with personal rejection of applications. ... About the excellence of yesterday, today or tomorrow, for what I know the claim is not true, in the case of ERC (unless you consider the excellence of tomorrow as wishful thinking).

Regarding the third issue pointed out by Francesco Sylos Labini, a colleague I also quoted above said:

Again, the national governments are rather to be blamed, not much ERC. Academics are not well paid in, e.g., France and Italy, compared to other countries like, e.g., those in Northern Europe or Switzerland. This is, however, part of a more general problem, and ERC is poorly related to that. With or without ERC, some academics will be willing to move to other countries for improving their working conditions anyway. In fact, from the EU perspective, ERC is viewed as a good mechanism for preventing EU researchers to move to US. If France and Italy aim at preventing their researchers to move to other EU countries, they should probably improve their working conditions (positions, salaries, teaching loads, grants, career prospects, etc.). I am not sure that cancelling ERC will help much for that.

This view was shared by some colleagues based in Mediterranean countries, some of whom expressed strong views on the pernicious role that low salaries, bureaucracy and political influences play in their research environment.

## 3 Conclusion

As the opinions I have collected from members of the TCS community, some of which I have quoted above, show, not surprisingly, the ERC has both strong supporters and critics. I do not feel that I have collected enough data to speak on behalf of the TCS community, but it seems to me that, by and large, the ERC has served the growth of our field well over the last ten years. To my mind, the ERC has funded excellent research and top-class scientists at various stages of their careers. Moreover, the fact that two-thirds of those awards went to young scientists who had received their doctorates 2–12 years earlier seems to indicate that the ERC has invested significant resources in the future of European basic research. Of course, I know of several colleagues with a truly stellar research profile or with great potential who haven't received ERC funding for their work yet. However, we are familiar with this phenomenon in the presence of a scarce resource for which a large number of worthy recipients compete. It suffices only to think of our top conferences and journals, of the most prestigious national funding sources and of scientific awards.

The ERC has also contributed to putting some of the research in our field and some of our colleagues in the limelight. I think that this publicity is good for TCS, even though the myth of the genius can be overplayed at times. Indeed, an ERC grant recipient wrote to me saying that

in [country name removed], if you get an ERC grant people start to worship you (television, magazine articles, etc.), which can result in you worshipping yourself.

On balance, I do hope that the ERC is here to stay and that the European Union will decide to invest more resources in this remarkable funding agency. I am sure that the acceptance rate for the ERC could be increased to, say, 10% without compromising on the quality threshold of the selected projects and on the scientific credentials and potential of the grantees. Perhaps, this might be achieved by increasing the funding to the ERC and slightly decreasing the amount for each 'theoretical' project. Indeed, some of the colleagues I contacted felt that ERC funding is perhaps overly large for TCS projects. For example, one ERC Starting Grant recipient wrote:

The amount of money is really huge. In some sense, I believe it would be better if the amount of money was not that high, but if there were more recipients. I am also afraid about the post-ERC period: I will no more have 'easy' money for hiring people, and I am a bit stressed about that.

Whether having that amount of funding is good might also depend on the individual researcher. I know colleagues who would prefer to have less funding, if that meant fewer managerial responsibilities. On the other hand, others have relished the opportunity to build a fairly large research group and to attract researchers to institutions that would have found it hard to hire researchers from Western Europe otherwise. As a case in point, to my mind, Warsaw is one of the hotbeds of TCS research worldwide and the ERC grants to some of the scientists based there have helped them entice colleagues from all over Europe to contribute to the local research environment. Moreover, a new research institution like IST Austria has benefited from the ERC greatly. According to Thomas Henzinger, 30 of the 45 professors at IST Austria are funded by the European Research Council. This shows what can be achieved, in a very short time, with ERC support by hiring high-class scientists in a new and ambitious research institution in Europe.

However, I do believe that the existence of the ERC should not be used by European governments to reduce the amount of funding they devote to basic research and to their university systems. The goal of the ERC is to support 'excellent research' (whatever that might be). As the history of science has shown, such research can only emerge from the work of many scientists who build the edifice of scientific knowledge brick by brick and whose daily research work is adequately supported. In my experience, a healthy and productive scientific ecosystem thrives best at the top level if young researchers are properly nurtured and given a chance to develop their skills and to achieve their potential in an environment in which they are exposed to cutting edge research, in which they can interact with scientists from all over the world and which can attract researchers nationally and internationally. My (perhaps forlorn) hope is that the governments and university systems in European countries will help their scientists build and sustain such centres of learning by providing adequate funding, reducing political meddling and bureaucracy, and improving the salaries and working conditions of scientists. Coupled with an increase in the number of ERC grants, I trust that this combination of national and ERC funding for basic research would help to maintain Europe as a major player in TCS research, in stimulating a healthy exchange of researchers between various European countries and in attracting researchers at all stages of their careers to Europe.

To conclude, I feel that the best I can do is to quote a few words from an ERC Advanced Grant holder, who expressed my hopes for the future better than I ever could do myself:

One of the best things I feel about the ERC is that it is focused on science and excellence. My experience—also as a reviewer of proposals—is that it is really focused on enabling good science. In a world where short-term goals often sway funding agencies and our

colleagues, having some agency take the long view perspective gives one some confidence in government and in Europe. I suspect others have different feelings (bad reviews, political infighting, etc.) but my own story/myth gives me some solace.