



# Writing Successful Research Proposals

## Going for the Big Funds

**Kristinn R. Thórisson**

*School of Computer Science  
Reykjavik University  
Reykjavik, Iceland*

If you are a researcher, like me, or plan to become one, you will write proposals to competitive funding agencies. The agencies with the largest funds – and thus those with the greatest ability to propell your research into the future – are those which serve a large number of states, such as the National Science Foundation (NSF) in the U.S. and the Research Executive Agency (REA) in the European Union. The E.U. has established a number of funds to support scientific research and related activities. The primary goal of such funds is to advance the state of science, to produce knowledge that can benefit humankind.

When you write research proposals for getting funding from these you are competing with some of the best researchers in your field, so the competition can be tough. It typically takes a lot of work to put together the research team, plan the work and allocate the budget in a way that can achieve the goals of the research. I have had some experience in both writing and evaluating proposals submitted under E.U.'s Seventh Framework Programme (FP7), and a few under the FP6. As a faculty member at Reykjavik University and co-director of CADIA, the university's artificial intelligence research laboratory, I have also had some success in writing national proposals and

directing research projects funded by the Icelandic Research Funding Agency (Rannis).

In this short article I describe my own understanding of what it takes to write a winning proposal under the FP7, with the hope that it will give others a head-start on submitting proposals to the E.U. and becoming successful and well-funded scientific researchers. I have based them on the fundamental principles of scientific research progress, so I find most of them rather likely to apply generally to a wider range of scientific research topics and proposals types, even outside the E.U.

The main research funding mechanism now in place in Europe can be traced back to 1984 when the first so-called “Framework Programme”, FP1, was launched. The first FP spanned three years; since then six Framework Programmes have been run; the current one is FP7, which started in 2007 and will end in 2013. The E.U. allocated €32 billion to research projects in FP7 that focus on particular fields and that encourage close collaboration between its member states. Examples of these fields – called “Themes” by the Eurocrats – are “Information and Communication Technologies”, “Socio-economic Sciences and the Humanities”, “Health”, etc. There are ten of these in total under FP7. Proposals take mainly one of two forms – “STREPs” - small, targeted research proposals, and “IPs” - integrated projects. The E.U.'s system for organizing the funding efforts can be confusing – giving a full overview of the competitive research budget breakdown here would make this article long and boring. Those interested can take a look at Wikipedia, which provides a reasonably short overview of the structure (use e.g. search string “seventh framework programme”).

The Information and Communication Technologies (ICT) Theme has roughly €9 billion that will be distributed over the FP7's lifetime – the money gets distributed via so-called “calls”, which appear at roughly 12 month intervals; each time a portion of those 9 billion is partitioned out. My advice in this article is largely based on experience in both submitting and reviewing STREP proposals in the ICT Theme over the last 3 years, more specifically in the Cognitive Systems and Robotics calls.

A typical STREP project includes a consortium with 5-8 participants (there must be participants from at least 3 member states), a budget of roughly €2 million and a 3-year plan (these figures vary of course from proposal to proposal, these numbers only serve as a reference). The participants can be from academia, industry, or both, depending on the needs of the work to be done, and the budget is divided roughly equally between the parties. The project plan is broken down into “work packages” (WPs), typically between 5 and 9 in number. The proposal document itself is often organized as follows: 1-3 pages describe the idea in a nutshell and another 1-3 pages define the objectives and evaluation methods. Then follow 10 pages that describe how the project will bring knowledge beyond state-of-the-art. After that roughly 30-50 pages describe the WPs, followed by 10 pages describing the management of the project and the individual participants – both the people and their institutions. Towards the end is a short section on how the intellectual property rights will be handled, the expected impact of the work, followed by references/bibliography.

## **Principle #1: Focus on one main fundamental scientific problem**

While a few proposals that have been funded in the past focus on the development of particular technologies or systems, the vast majority of those that are funded target a single, key scientific challenge. This should be an obvious challenge, that doesn't take too much space to explain. When deciding on how much detail to give in this respect, keep in mind that those whom the E.U. has enlisted and assigned to review your proposal are likely to be well-versed in your field of expertise, so they will probably know exactly what are the major challenges in your field. You should then organize everything else in the proposal around this topic: The methodology you propose should be the best (cheapest, most efficient, most powerful) way to study the problem and help understand it, put forth solutions or advance theories. The objectives section, the consortium and in fact the whole project must be directly derived from the challenges presented by your main scientific conundrum.

When writing the description of the project(s) to be addressed, I recommend writing it up in various ways, to try out different perspectives (think about how reviewers with different backgrounds may understand and possibly misunderstand each alternative). In many fields, for instance computer science, a fresh viewpoint may change an old problem, with seemingly no visible solution, to one that seems worthy of readdressing. Sometimes a new tool or methodology may be what is needed to make a challenge worth taking on. However, in my experience placing a tool or the creation of an application in the center of a STREP proposal is much less likely to get funded than one that keeps the science in the foreground.

No matter what anyone may tell you about the scientific research proposal process in the E.U., everything in your proposal should be driven directly by the topic (and sub-topics thereof). If you don't have a scientifically worthy, fairly obvious and challenging topic, your chances of getting funded are significantly reduced.

## **Principle #2: Well-formed proposal**

The first thing to think about, and the most important goal to achieve, is a well-formed proposal. As a whole the proposal should stand as a complete, integrated and “perfect” thing, free of warts, moles and blemishes, with no extra bells and whistles, no extra participants, and even more importantly, no *missing* participants. Well-formedness means that no matter which angle the reviewers look at your proposal from they cannot find any major flaw, oversight or weakness in your proposal. Think of what Mozart supposedly said about his symphonies: Take out or add one single note and the whole piece collapses.

To achieve this well-formedness several things are worth mentioning. First, when picking the topic for your proposal remember that you are not getting an unlimited amount of money to do the work – the people reviewing your proposal will be thinking how realistic

your plan is, given your proposed budget. If you aim too high your plan may be considered unrealistic. If you aim too low someone else's proposal to address the same or similar issue may be selected instead of yours.

Second, it is very important to pick a topic that can be measured, and to design and describe methods that are good for measuring your progress in the project. If you don't have a good idea of how to measure and thus prove that you are inching towards the goals you have set for the project, pick another topic! There is no way the E.U. will support work where the proposers do not have a good idea how to measure their own success.

*The consortium should be necessary and sufficient to do the work, as described in the proposal. The same goes for the budget: The budget should be necessary and sufficient to do the work, as described in the proposal. Remember to justify clearly why the team is there, and why the budget is as stated. When picking a consortium, think about who (in the E.U., primarily) will be the best person/team/institute to be responsible for each part of the project. No matter how amazingly good a certain candidate is, if there is little evidence of this amazingness in the form of CVs, publications, institutional achievements, or staff then there is no way to prove this amazingness to the proposal reviewers, and you have no choice but to find another partner instead.*

As far as I can tell, most reviewers like it when the intellectual property created in a project are promised to be made publically available, and this makes sense since the rest of the scientific community may benefit much more from this than if consortium members keep things secret for e.g. intended use in future products. Regarding the management structure: Don't try to impress the reviewers with overly complex management schemes yet again, use the principle of necessary and sufficient.

### **Principle #3: The proposal document**

Many people think that writing long essays takes longer than writing short ones. This is not the case for E.U. research proposals it typically takes a significant effort to weed out the key points from the side points and less important details (Oscar Wilde once said "I would have written a shorter letter, but I didn't have enough time."). Keep in mind the breadth of expertise that the three reviewers who will read your proposal are likely to have (while they are not picked at random their background and opinions are unlikely to match directly those of your consortium). The broader their background is, the more difficult it is to write short text. Generally speaking, the proposal should be as long as it needs to be to *tell a convincing story*. Whatever you do, however, it should *not be longer than 90 pages*.

Interestingly, in my experience all proposals I have seen that are longer than 100 pages have gotten bad reviews. Those (very few) I have seen that are shorter than 40 pages have met the same fate. The ideal length is between 65-75 pages if you make it any shorter you are compromising on including information that is absolutely vital for the reviewers

to make a decision about its importance; make it any longer and you will test the patience of the reviewers (reading these proposals requires significant focus of attention), make it more difficult for them to find relevant information and very possibly include details that are unnecessary and/or besides the point.

## Summary

So, to summarize in a few bullets:

- Worthy scientific challenge: Pick a key scientific challenge, preferably one that is obvious to everyone in the field. You probably will want to define some sub-challenges derived from this one, that are smaller and can more easily be implemented and evaluated.
- Well-formed proposal: Hone your research plan, your evaluation methods, your consortium and budget until all potential weaknesses have been eradicated. Describe all this as well as you can (several iterations are likely to be needed) and keep it to 70 pages.
- Consortium: Pick the team that you believe is necessary and sufficient to do the job, and make the budget reflect the same. Note: You may need to revise the team and/or the proposal to achieve the goal of well-formedness.
- E.U. research funding exists to advance science (not to enable you to keep your job), so: (a) pick problems you believe *should and must* be researched, and (b) be as convincing as you can be (which should not be too difficult if you picked a worthy scientific challenge).

There is a lot of information that you must and should read before starting to write a proposal – in addition to reading this article – to understand what can and cannot be funded with the E.U. money, how to structure the proposal, what information must be included, how to set up the budget, etc. This information is sometimes a bit difficult to find (the E.U.'s websites are badly organized), but it is all available, more or less, online. What I have focused on here, therefore, is what I feel is needed *in addition* to all that information, that is, the *writing principles that can help maximize the probability that your proposal gets accepted and funded*. These principles, especially principle #1, are, if anything, more important than any guidelines you may find online or in one of the official courses on how to write E.U. proposals. So now you know. Good luck!

Kristinn R. Þórisson has been involved with artificial intelligence research for two decades. He got his PhD from the M.I.T. Media Lab in 1996 and has since been VP of Engineering at Soliloquy and Adjunct Professor at Columbia University, both in New York, Chief Wizard at LEGO (Denmark) and consultant for British Telecom (UK). Since joining Reykjavik University in 2004, Kristinn and his collaborators have secured close to 1 Billion ISK in funding from competitive research funds in Iceland and Europe.



Kristinn R. Þórisson