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Understanding & Assessing the Impact & Outcomes of the ERC Funding Schemes

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# The ERC's Impact on the Grantees' Research and Careers

## (Executive summary of EURECIA's work package 4 report)

## 1. Aims and approach

The aims of WP4 were (a) to develop a methodology that can identify the impact of ERC grants on the content of grantees' research and on their careers, and (b) to apply this methodology in an observation of the initial state, i.e. the situation at the moment at which grants were received.

We conducted interviews with grantees of the starting investigator scheme (18) and the advanced investigator scheme (14) as well as non-funded applicants to the starting investigator scheme who passed the quality threshold (4) and researchers in a comparable career situation who did not apply for ERC funding (4). Interviewees from all three ERC Panels were selected. The selection of countries followed the general EURECIA strategy, which included Austria, Switzerland, Germany, France, Italy, the Netherlands and the UK.

The interviews with researchers focused on the interviewees' research biography and the emergence of the project submitted to the ERC (the current projects of non-applicants). In a second part of the interview, research conditions and the factors influencing them were discussed. The interviews were analysed using qualitative content analysis. We are confident that we do not just report what interviewees told us but were able to conduct an independent analysis (see the short note on methodology at the end of this summary).

## 2. Main findings

The ERC grants had an impact on the research of grantees and, potentially, of their communities, by

- funding scientific innovations, which we defined as research findings that affect the research practices of a large number of researchers in one or more fields (i.e. choices of problems, methods or empirical objects); and
- funding research that would otherwise not be funded, or would at least have been difficult to fund from other sources.

Several of the projects we investigated fall into both categories. However, there is no unambiguous link between the innovative character of research and funding requirements, which is why we distinguish between the two perspectives.

## 2.1 Properties of ERC-funded research

### Innovations and 'big questions'

An important aspect of the relationship between research and the state of the art of a scientific community is its innovative character. We empirically categorized the funded research's impact on the knowledge production of researchers' scientific communities. The research could be categorized as planned innovations, planned answers to 'big questions', and the exploitation of recent discoveries.

*Planned innovations*

We defined *innovations* as research findings that affect the research practices of a large number of researchers in one or more fields (i.e. choices of problems, methods or empirical objects). About half of the grantees we interviewed planned such innovations and promised them in the grant proposal. Planned innovations included the *development of new methods* which, when applicable, will provide new research opportunities to many members of the community. A second type of planned innovation, which occurs across all discipline groups, promises to significantly *enhance the empirical basis of a community's research* by providing access to new empirical objects that will become central to the community's research. Similar to the development of new broadly applicable methods, the provision of new empirical objects opens up new research opportunities for a community. A third type aimed at *general explanations* which, once achieved, will alter the community's understanding of its empirical objects. Examples would include the search for a mechanism that influences protein biosynthesis or for general patterns of plant adaptation.

*Answers to 'big questions'*

Answers to 'big questions' are characteristic for the social sciences and humanities. A typical 'big question' is more general than a common research question of the social sciences and humanities and needs to be answered on an exceptionally broad theoretical, methodological or empirical basis. Researchers would, for example, study a major society-shaping historical process by incorporating all available sources across languages, locations, and types of sources for the relevant period of time. Three grantees and one unsuccessful applicant had designed research projects that addressed such big questions of their respective fields.

*Recent discoveries*

Several projects planned to exploit recent innovations. These recent innovations were serendipitous discoveries. Naturally, innovations of this type cannot be aimed for with ERC grants (or any other grants). Serendipitous discoveries occur in the course of re-

search without being anticipated at the beginning of a project. They result from unexpected observations during experiments, or they emerge as ideas triggered by the current research. Serendipitous discoveries are innovations if they affect research practices of a large number of researchers from a field. Three ERC grantees exploit their recent serendipitous discoveries (two discoveries of effects and one discovery of a new empirical object), which meet the definition of an innovation.

*Excellent research*

We distinguish innovations and answers to 'big questions' as exceptional research from 'merely' excellent research. While promising important results, excellent research is unlikely to have the community-level effects described for the other types because they provide fewer new research opportunities for others. ERC projects not containing innovations or answers to big questions can be expected to be excellent research because of the highly selective peer review they passed.

For many of these projects ERC funding was still essential. This is an important finding because it indicates that normal grant funding is not only insufficient for certain types of exceptional research but also for excellent research on topics that were crucial for the progress of one or more fields. However, there are also cases of the ERC just funding excellent researchers who are also funded well enough from other sources.

## Relationship of ERC research to the mainstream

An ERC research project can also be characterised in terms of the project's position vis-a-vis the community's mainstream. In our analysis, we identified four different types of deviation from a community's mainstream which we describe below.

*Contradicting the majority opinion*

Several projects contradicted the majority opinion, either by attempting something the community considers impossible or by addressing problems that were considered as irrelevant by the community.

*Addressing a community's blind spots*

Another version of non-mainstream research addresses a community's 'blind spot' by doing something that does not at all contradict any majority opinion but has not yet been done because nobody else seems to have thought of it.

*Applying non-mainstream approaches or methods to mainstream problems*

A third non-mainstream relationship occurs when projects apply non-mainstream approaches or methods to mainstream problems.

*Linking previously separate communities*

Finally, non-mainstream research includes attempts to link communities that have no previous epistemic connections. Such links are created by combining approaches

from two communities in one experiment, or by demonstrating the relevance of one community's empirical object to the research of the other community.

*Combinations of the above*

These versions of non-mainstream research are not mutually exclusive. The link between two communities may be a blind spot for both, the application of non-mainstream methods to mainstream problems may contradict the majority opinion, and so on. Several of the investigated projects fell into more than one category of non-mainstream research including one that fell into all four.

## 'Local' properties of the research

In addition to its relationships to the field, the research of our interviewees also has 'local' properties, i.e. properties that characterise the individual research process.

In our empirical investigation we found that in some cases there were indivisible resource requirements, i.e. necessary conditions that cannot be created partly but are met either fully or not at all. We found three types of such indivisible resource requirements, namely the need for complex task-specific equipment, the need for complex task-specific approaches, and a long 'Eigentime' of the research. Two further important properties are the strategic and technical uncertainties inherent to research.

*Complex task-specific equipment*

The need for complex task-specific equipment for specific experiments occurred in four projects. In each case, the generation or observation of empirical objects required a complicated large instrument or the integration of several instruments into a task-specific experimental system. Interestingly, all such requirements refer to projects from the Physical Sciences and Engineering. The equipment for life sciences research was often more universal and more modular, and thus could be accumulated by standard grants and utilised across projects.

*Complex task-specific approaches*

In the social sciences and humanities we observed an equivalent to the need for complex task-specific equipment in the natural sciences. In these projects, complex task-specific approaches took the form of the integration of different approaches in an 'interdisciplinary' group, in which the joint work on a common subject matter requires the co-presence of researchers mastering these approaches during the whole time of the project. 'Interdisciplinary' is meant here in the weakest possible sense and may include the mastery of different languages or the familiarity with different types of sources.

This co-presence requirement can be traced to the central role of the human mind in the selection and interpretation of empirical evidence. Approaches in the social sciences and humanities are often holistic. This is why collaborative designs that define sequential, sub-task specific contributions of collaborators who may be separated in space are not applicable.

*Long 'Eigentime'*

The 'Eigentime' of a research process is defined by material properties of empirical objects and research technologies, for example growth and reproduction cycles of biological objects. In our analysis, we found one example for an unusually long 'Eigentime', namely a project that included the observation of a biological process that takes years and required an observation time of at least three years.

A specific epistemic property of some research processes, which we assume to be an equivalent of 'Eigentime' in the humanities and non-empirical sciences, is the need for uninterrupted research time. All knowledge about the research object must be constantly kept and actualised in the mind of the researcher, which makes it extremely difficult to enter the necessary 'research mode'. In more technical terms, the properties of the human mind as the major research tool create the necessity to constantly 'run' - engage in research - without interruption by other tasks, because each interruption requires a major recalibration.

*Strategic uncertainty*

An important and very consequential epistemic property of research is its uncertainty. S*trategic uncertainty* is the uncertainty concerning the existence of an outcome. Effects might either not exist at all or not be observable with the current experimental setting. Attempts to generalise effects might fail because what has been found is idiosyncratic. This kind of strategic uncertainty we found in seven projects, all of them from the natural sciences.

There were also cases of high strategic uncertainty where it was already clear at the time of the interview (about three years into the project) that the hoped-for effects did not exist and the most ambitious aims of the projects could not be achieved.

*Technical uncertainty*

Technical uncertainty refers to the lack of knowledge about the way in which a certain goal can be achieved. The building of experiments might include a lot of trial-and-error manipulation of equipment before the intended effects can be achieved. Stages of experiments might fail, either because the outcome is partly random or because the experimental conditions cannot be fully controlled. The equivalent in the social sciences and humanities is a situation in which data that are necessary for answering the question cannot be found in time. We identified a significant technical uncertainty in 11 projects. One of them belonged to the social sciences and humanities, where technical uncertainy emerged from the possibility that the sources would not yield enough information to answer the question. But even in this particular case the interviewee's understanding of failure was to produce different and maybe worse results than intended. None of the projects in the social sciences and humanities could fail completely.

Not all of the investigated projects were strategically or technically uncertain. The question we asked all interviewees – "In what ways could your project fail?" - was in

some cases answered by unambiguous statements to the effect that the project could not fail. In other cases, no unusual risk was described. The following conversation clearly demonstrates that the interviewee does not think of his project as risky. Another interviewee clearly denied that there is any uncertainty involved in her project.

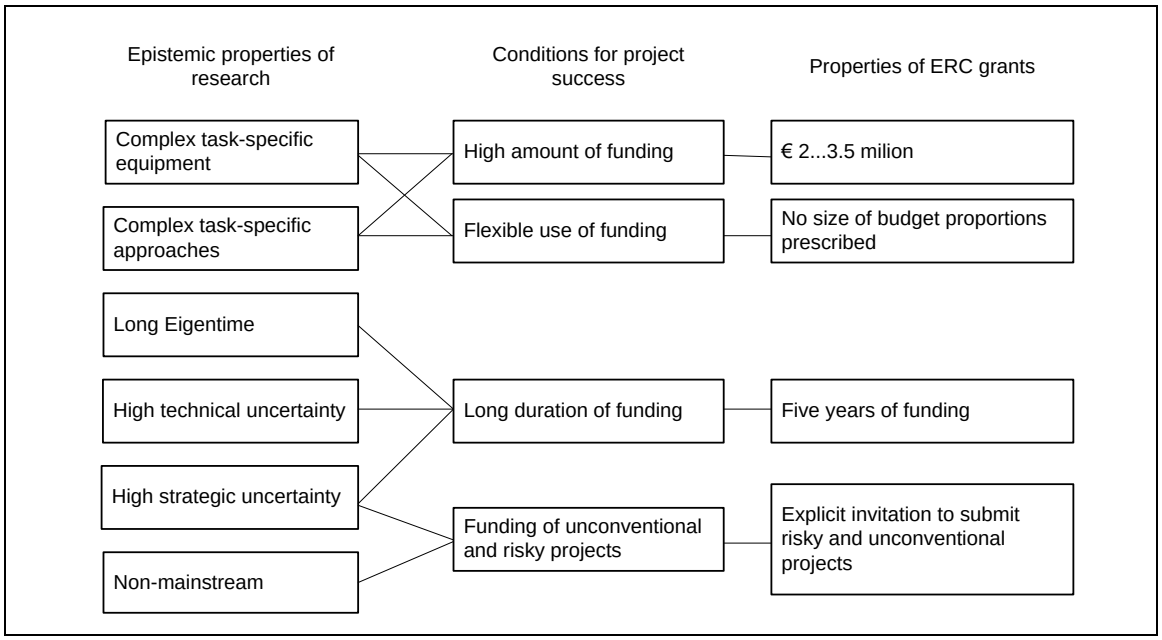
It is important to note that the ERC already with its first round triggered adaptive behaviour. For at least some grantees, the common response to a funding opportunity - writing what they think the funding agency wants to read – involved framing their projects as more risky than they were, or writing about risk although this would not have come to their minds without the ERC asking about it.

## 2.2 Funding requirements of projects and funding opportunities provided by the ERC

The causal link between ERC grants and the properties of projects described in the previous section can be established by demonstrating that the ERC grants were necessary to fund the research. A first link can be established if the ERC grant is the only source of funding for the researchers conducting the innovative research, which was the case for most interviewees from the social sciences and humanities. A second link can be established if the ERC grant has unique properties that match requirements of the research. The properties of the research described in the previous section create requirements that must be met by the funding for the research to be conducted with some chances of success. These conditions for project success, namely high amounts and flexibility of funding, the duration of funding, and the funding of unconventional and risky projects, are not easily met by the grantees' common sources of funding. Figure 1 shows the links between epistemic properties, conditions for success, and properties of ERC grants, which we now discuss in more detail.

As we already mentioned, scientific innovations are defined by their impact on the field, and therefore do not necessarily have exceptional funding requirements. This is why the property of being an innovation is not included in figure 1. However, most of the innovations also showed one of the properties that do require exceptional funding conditions, and are therefore prominent in the following discussion.

*Figure 1 Links between properties of research, conditions for project success, and properties of ERC grants*




Causally attributing the projects with specific epistemic properties to the ERC funding requires establishing that no alternative source would have provided this funding. Table 1 illustrates that, *at least from the perspective of many grantees*, this was indeed the case. 'Objectively' establishing that no alternative existed would require a systematic investigation and comparison of all relevant national funding schemes, which was beyond the scope of our project. We did, however, ask grantees of their perception of funding opportunities that would have provided an alternative to ERC grants. Additionally, we investigated the responses to the rejection of ERC grant proposals of four applicants who passed the quality threshold but did not receive funding. Three of them tried to conduct the project submitted to the ERC. Of these three, one obtained most of the necessary resources from recurrent funding of his (non-university) research institute, which made it possible to fund the project from common funding schemes. A second researcher received the equivalent of ERC funding from an external funding source that rewarded all applicants who passed the quality threshold but were not funded by the ERC. The third researcher obtained funding from national sources and worked on the ERC topic with less than half the personnel, about half the equipment, and at a much slower pace.

Only three of our interviewees assumed that there was a funding opportunity for their research which is equivalent to the ERC grant. In all other cases, alternative funding was deemed impossible, possible only for a changed project, or possible only with the combination of several grants from different sources.

*Table 3 Alternative funding opportunities for the ERC project as perceived by grantees and non-funded applicants (numbers of cases in brackets, cases where fully equivalent grants were assumed to exist are written in italics)*

| Country | Starting Grantees | | | Advanced Grantees | | |
|---|---|---|---|---|---|---|
| | LS | PSE | SSH | LS | PSE | SSH |
| NL | Combination of several grants (2) | *Vici grant*[1] (1) Combination of several grants (1) | None (2) | Combination of several grants (1) | Combination of several grants (1) | None (1) |
| D[2] | None for the risky part and *DFG* for the other part (1) | None (1) | Emmy Noether grant (1) | *Reinhart Kosselek grant* fort the risky part and *DFG* for the other parts | Combination of several grants (3) | None (1) |
| UK[3] | None for the risky part and *BBSRC* for the other part (1) | EPSRC (1) *EPSRC* for the risky part and none for the other parts (1) | None (1) | | | None (1) |
| CH[4] | None (1) | None (1) | | None (1) | None (1) | |
| IT[5] | None (1) | ? (1) | | | None (1) | ? (1) |
| F | Combination of several grants (1) | | none (1) | | | |
| AT | Combination of several grants (1) | | START grant[6] (1) | | | |

[1] Vici grants are awarded to researchers between eight and 15 years after their PhD. The maximum amount is 1.5 million Euros, the duration is five years.

[2] In Germany, the DFG (*Deutsche Forschungsgemeinschaft*) is the most important public funding agency for university research with many different funding schemes. These include the *Emmy Noether* funding programme, which enables young researchers (two to four years after their PhD) to build their own research groups. Funding is for five years with no formal limit to the amount. The Reinhart Kosselek funding programme funds researchers with outstanding scientific achievements (usually university professors) for five years, the maximum amount is 1.25 million Euros. About two researchers are funded per year.

[3] The BBSRC is the UK's Biotechnology and Biological Sciences Research Council. The EPSRC is the UK's Engineering and Physical Sciences Research Council.

[4] All Swiss grantees stated that they would have reduced their project and tried to receive funding from the Swiss National Funds for the reduced project.

[5] In two Italian cases the information in the interviews was not sufficient for categorising the cases.

[6] START grants are awarded to researchers two to ten years after their PhD. The maximum amount is 1.2 million Euros, the duration is six years. Up to eight researchers are funded each year.

These perceptions are clearly discipline-specific and country-specific. The interviewees from the natural sciences (Life Sciences and Physical Sciences and Engineering panels) often thought it possible to achieve the ERC grants' level of funding by combining several national grants. The remaining cases are interviewees who did not assume their risky projects or project parts would be funded by other agencies, and interviewees who assumed that there is no funding for their projects because costs for equipment were indivisible and exceeded the limits of all funding schemes known to them.

In the social sciences and humanities, finding alternative sources of funding is even more difficult. Most interviewees from this discipline group did not expect another funding source to fund their project. A major reason for this pessimism probably is the opportunity to build research groups, which is provided by the ERC grant but is still very unusual for the social sciences and humanities and thus not commonly provided for by national grant schemes.

## 2.3 The ERC grants' impact on careers and independence

The most important effect on grantees' organisational careers appears to be that some organisations respond to the reputation of ERC grants by promoting grantees or by offering them permanent positions. These effects occurred only for starting grantees. The changes in organisational positions were often difficult to attribute because the impact of the ERC grants was overlaid by other factors. We observed similar effects for non-grantees who were awarded prestigious national grants.

The variation in effects between countries can be explained by the difference between the 'lecturer system' of the Netherlands and the UK and the 'chair system' that is in place in Germany, Austria, Switzerland, and Italy. In the lecturer system, most academics enter the university at a low-level entrance position (Lecturer or Senior Lecturer in the UK, Universitair Docent in the Netherlands) and subsequently can be promoted through several levels and, in the end, can become professor at the same university. In the chair system, positions below the professorial level are often untenured, and the move to a professorial position requires applying for such a position at a different university. As a result, there are only very few – if any – opportunities to be promoted in a chair system.

ERC grants also differ from most national grants in that they are portable. This means that in addition to being a marker of performance in recruitment and promotion situations, ERC grants create a negotiation situation in which the grantee has the power to provide or withdraw a benefit to the host organisation (the prestige and income of an ERC grant). Several of our interviewees used that opportunity for negotiating their situation with their (potential) host organisation.

In chair systems there are very few situations in which having a grant can be utilised in negotiations. Fixed-term positions cannot usually be turned into permanent professorial positions. The only way of receiving tenure is to be appointed as a professor, which traditionally requires a move to a different university.

Although the portability of the grant – the opportunity to take it to another organisation – is an important property of ERC grants, the grants played only a minor role in promoting organisational mobility. Only three of the interviewed thirty grantees took their grant and changed their research organisations before starting the project. All three grantees were from the Social Sciences and Humanities panel.

There are three reasons why mobility, and thus the ERC grants' capability to bring researchers to the best possible environments, is limited:

1) Grantees may already work in an optimum research environment.
2) Both starting and advanced grants are given to researchers several years after their PhD, mostly in fairly advanced career stages. At this time, most grantees have a partner and children. This means that moves to another university require a move of the whole family, which is difficult to accomplish due to the complex interests of a whole family.
3) In the sciences, researchers at a grantee's career stage already have their own laboratory, PhD students, staff, and collaborators. Moving to another university requires an enormous investment of time and effort.

It can be assumed that as a result of these obstacles to mobility, at least some grantees remained in sub-optimal research environments.

## 3. Outlook

This project delivered a methodology and an identification of early impact of ERC funding schemes. Owing to the time at which it was conducted, several important questions could not be answered:

1) What impact does the funded research have on the grantees' research fields? This impact will show only after the projects are completed.

2) What happens if risky projects fail? If highly risky projects were funded by the ERC, at least some of them are likely to fail. This provides the rare opportunity to study the impact of ambitious but failed research on both the researcher's biography and the community. Again, this question can be answered only after the projects are completed.

3) What impact do the ERC grants have on the career of grantees after their research is completed? The impact on careers can be assumed highest after the ERC projects are completed because a phase of possible career moves will occur at this time.

## 4. A note on the methodology

The methodology applied in this project proved effective in that changes in research and careers could be identified and causally attributed to the ERC funding (or proven to be independent of ERC funding). The findings demonstrate that the applied methodology enables insights into change mechanisms that are not easily obtained by other methods, if at all. The validity of our findings crucially depends on the possibility to

draw conclusions about change and its causes from interviewees' statements about their research content.

How did we make sure that we did not just report the aggregated opinions of grantees who wanted to please the ERC that gave them so much money? We are confident that we sailed clear between the Scylla of just reporting researchers' self-descriptions and the Charybdis of making decisions about the scientific content of our interviewees' research. We focused on structural properties of this research – its links to the interviewee's previous research, to the research of the community, of collaborators, and of competitors. Most of the categories used in our analysis were not directly asked about in the interviews. By soliciting scientific narratives on epistemic properties of the research such as time characteristics, approaches and equipment, and uncertainty, we limited the opportunities for interviewees to produce ad hoc rationalisations or to respond in ways they could assume are expected by the ERC. We triangulated findings with information from many different sources, and used information from these sources in the interviews. Interviewees reported failure as well as success, many of there statements could have been corroborated from additional sources (as some of them were), and a significant proportion of the research did not surface in the analysis as exceptional. This is why we are confident that in the cases we investigated, our findings are not artefacts.

How can we causally attribute change to the ERC's funding schemes? The most important argument is the demonstration that the ERC's offer of funding changed the 'self-identification mechanism' of potential grantees. Some of the grantees turned ideas they had for quite some time into project proposals because with the ERC, they saw a chance of getting them funded for the first time. Others who had failed repeatedly with national funding councils turned to the ERC. Some researchers developed new project proposals for the ERC. The ERC offered a match for unusual properties of projects, which include the risk, the deviation from a community's mainstream, a relatively long duration and significant unusual expenses.

We also demonstrated that in many cases the changes in grantees' research occurred because the grantees responded to the opportunities provided by the ERC. We further demonstrated that several grantees thought there was no alternative to fund their projects, and that some of them actually had experienced rejection by other funding agencies prior to their ERC application. While the 'objective' proof that some of the ERC-funded projects could not be funded in other existing schemes was beyond the scope of our project, we showed that some of the projects would not have happened in this form because the grantees *would not have tried*.

How can valid conclusions be drawn from so small a sample? There are more ways to arrive at causal statements than the interpretation of statistical associations between variables measured for a representative sample of interviewees. Our argument is based on the demonstration that research with certain properties, which would have been difficult to fund at all because of these properties, was funded by the ERC. Thus, our argument is that whenever the conditions specified by us are given, the ERC has an impact on research, researchers, and their communities.