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Established by the European Commission

Qualitative Evaluation of completed Projects funded by the European Research Council 2019

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1. Introduction

The European Research Council (ERC) supports excellent investigators and their research teams to pursue ground-breaking and high-gain/high-risk research. In order to monitor the impact of the research funded, the ERC organises a qualitative evaluation of the research outcome of finalised projects annually. This *ex-post* peer-review assessment complements other programme analysis and provides an overall view of the quality and the scientific impact of the research funded.

A total of 225 ERC projects funded under the European Union's 7th Framework Programme (FP7) were evaluated in the 2019 exercise in 25 peer-review panels. Each of the panels consisted of three or four independent, high-level scientists. In order to strengthen the impartiality of the panels, one of the panel members was required not to have had any prior participation in ERC. The panels were supported by external reviews, when necessary, to cover the topics of all projects.

This report presents the outcome of the 2019 qualitative evaluation of completed ERC projects.

2. Methodology

The 2019 evaluation was carried out on a representative sample of 225 projects, that had been completed two years prior to this qualitative evaluation, from all three ERC scientific domains, namely Life Sciences, Social Sciences and Humanities, and Physical Sciences and Engineering. This sample was randomly selected from a pool of 761 ERC projects funded under FP7, which ended between 1 July 2016 and 30 June 2017, and the ratio in each panel between the number of Starting Grant (StG) and Advanced Grant (AdG)[1] projects was respected. There was, thus, no selection based on the quality of the project. Each project was allocated to a review panel based on the 'best match' from the ERC's "Science Behind the Projects" initiative[2].

Independent, high-level scientists selected by the ERC's Scientific Council assisted the ERC in the evaluation process. These experts were grouped into 25 evaluation panels, each composed of three or four experts[3]: two or three experts with previous or current participation as ERC panel members or panel chairs, and one expert without any prior participation as an ERC panel member, not having been an ERC applicant in the last five years, nor a recipient of an ERC grant. Scientists who had participated in the panels that selected the funded projects were excluded from this *ex-post* evaluation. Experts with a conflict of interest with a particular project were also excluded from reviewing that project. The experts received an honorarium for their work. If additional expertise was needed for specific projects, one external reviewer per project could be called for remote evaluation. A total of 79 panel members and 59 remote reviewers participated in the evaluation.

[1] Until 2012 ERC had only two funding schemes, StG and AdG. In 2013 the old StG funding scheme was split into the current Starting Grants (StG) and Consolidators Grants (CoG).

[2] https://erc.europa.eu/sites/default/files/publication/files/ERC_Science_behind_the_projects_FP7-2007-2013.pdf

[3] Four experts were assigned to a review panel only if three experts were not sufficient to cover the scientific areas of the selected projects.

3. Evaluation results

The main output of the qualitative assessment of completed projects is a consolidated report for each evaluated project. This project report is divided into two parts:

- An overall assessment of the project's achievements;
- Nine multiple-choice questions concerning several aspects of the project such as outcomes, impact, interdisciplinarity and the high-risk/high-gain component.

This section contains the general results of the exercise: Section 3.1 presents the overall assessment of projects, Section 3.2 the answers to the questionnaire provided by the evaluators and Section 3.3 an analysis of the results.

3.1 Overall grade

The panels were asked to give an overall grade for each project based on the following scale:

A. Scientific breakthrough
B. Major scientific advance
C. Incremental scientific contribution
D. No appreciable scientific contribution

The overall results of the 2019 exercise for all of the evaluated projects and split by call type (AdG and StG) are shown in Figure 1.

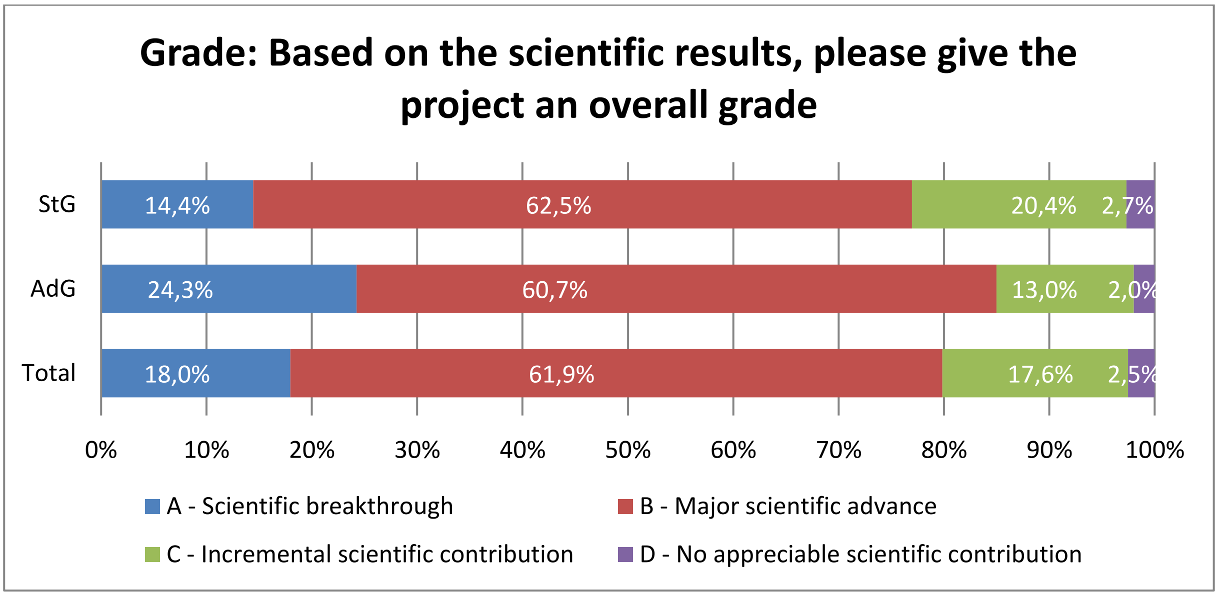

Figure 1. Overall grade: total and by grant type

The peer-review panels assessed 18% of the projects as having made a “Scientific breakthrough” (A) and 61.9% as a “Major scientific advance” (B). Therefore, taken together, 79.9% of the projects were assessed as having led to a major scientific advance or a scientific breakthrough, which demonstrates a high level of scientific output, especially given that the projects were randomly selected without taking into account any performance indicators. These results are rather consistent with previous evaluations, in which 72% to 79% of the projects were assessed as A or B (see Figure 2).

The panels assessed that 17.6% of projects had made an "Incremental scientific contribution" (C), and 2.5% of them were considered as providing no appreciable scientific contribution (D). The experts considered that for 36% of the projects graded C or D the main reason for the lower performance was either over-ambition or having failed in their research hypothesis.

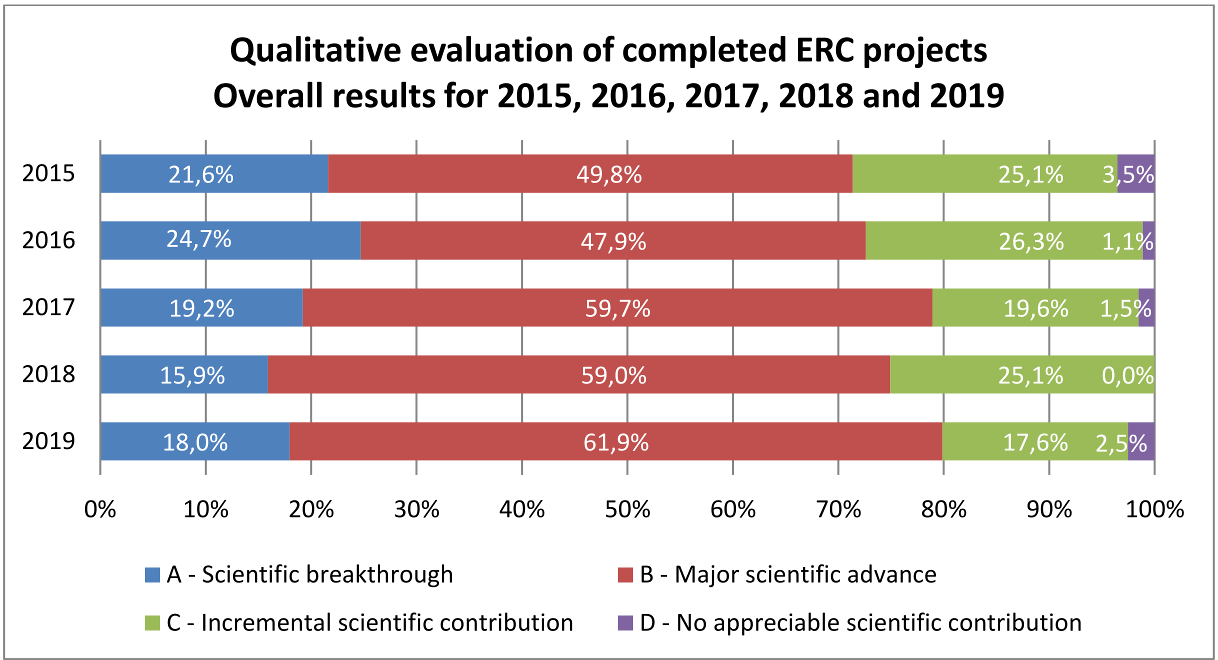

Figure 2. Overall results of the 2015-2019 exercises

3.2. Specific assessment criteria

In addition to the overall grade, the panels assessed the projects by answering nine questions covering different aspects: their level of scientific contribution (Q1, Q2 and Q3), interdisciplinary nature (Q4 and Q5), risk dimension (Q6 and Q7) and other types of impact (Q8 and Q9). The following questions were asked:

- Q1. To what extent has the project resulted in new important scientific advances of knowledge?
- Q2. Have the project findings opened a promising new research agenda (i.e., a set of new research questions, new hypotheses to be tested) or a possible paradigm shift?
- Q3. Has the project developed new research methods or instruments?
- Q4. Has the research performed found recognition or applicability outside its main field?
- Q5. Are the results of the research bringing together areas that previously did not have much interaction?
- Q6. Taking into account the state of the field at the time of funding, would you agree that this is a high-risk/high-gain project?
- Q7. Do you consider that the risk component influenced the overall project results?
- Q8. In addition to its scientific impact, to what extent has the project had other types of impact (e.g., on economy, on society, on policy-making, on industry)?
- Q9. In addition to its scientific impact, in your opinion, could the project have other types of impact (e.g., on economy, on society, on policy-making, on industry) in the future?

The possible answers to these questions (except for Q6) were: “To an exceptional extent”, “Significantly”, “Moderately”, “Slightly” and “Not at all”. For Q6, the categories “Strongly agree”, “Agree”, “Neutral”, “Disagree” and “Strongly disagree” were used. For Q4, Q5 and Q7, the option “Not applicable” was also included.

A summary of the results for each question is presented in Figures 3 to 11 and explained in the following subsections.

The achievements of the project (Q1-Q3)

The distribution of the answers to Q1 is shown in Figure 3: around 75% of projects resulted in new, important scientific advances of knowledge to an exceptional or significant extent. Q2 shows that more than 60% of projects opened a promising new research agenda for a particular field or a possible paradigm shift (Figure 4).

Regarding Q3, over 80% of the evaluated projects have developed new research methods or instruments at least to a moderate extent, while around 60% of the projects have achieved this objective to an exceptional or significant extent (Figure 5).

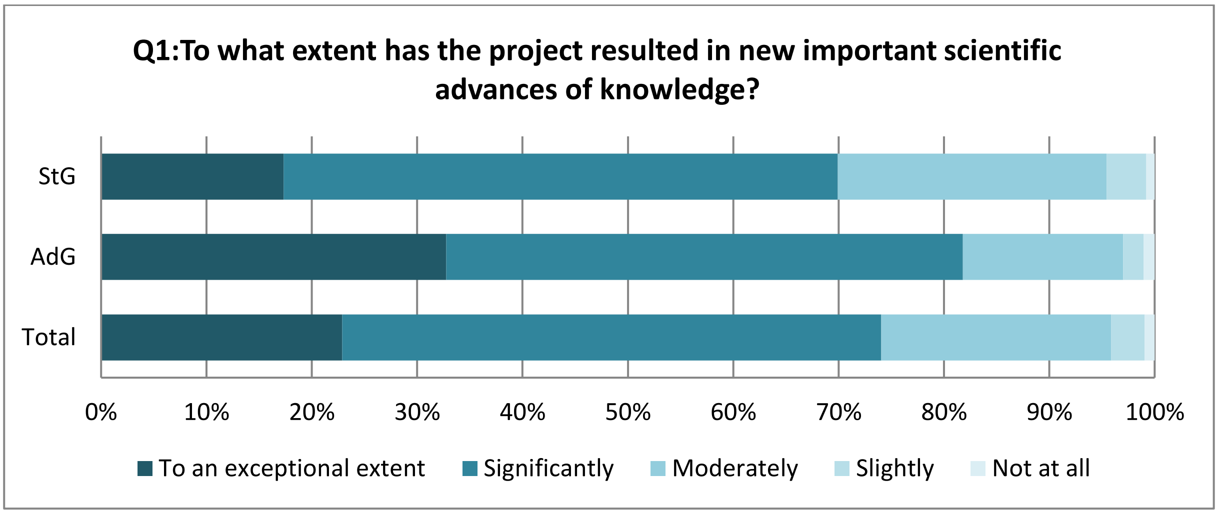

Figure 3. Results on new important scientific advances of knowledge

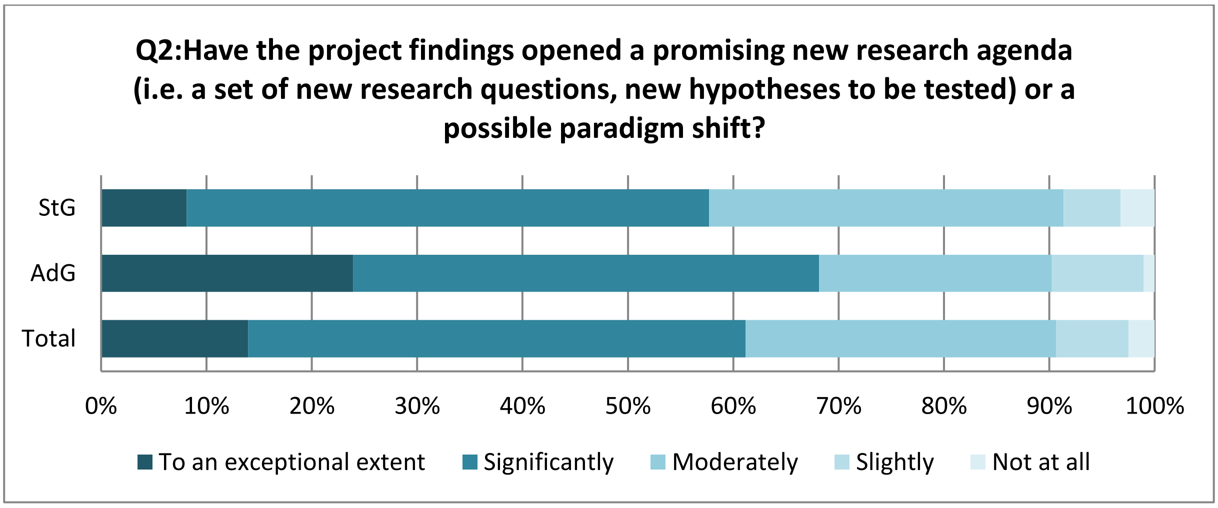

Figure 4. Results on promising new research agendas

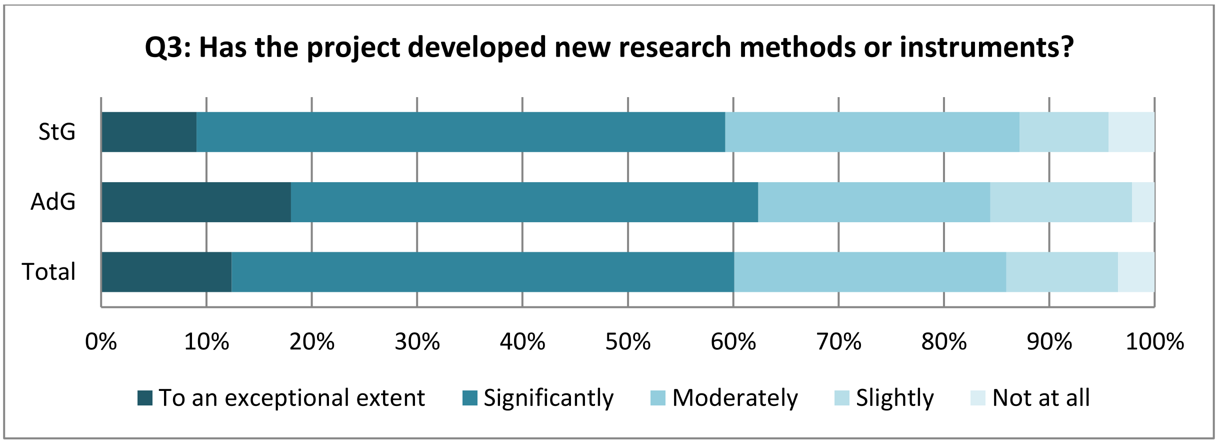

Figure 5. Results on new research methods and instruments

The interdisciplinary nature of the project (Q4-Q5)

With regard to interdisciplinarity, the assessment shows that for a large fraction of the projects the research performed found recognition or applicability outside its main field (Q4) or brought together areas that previously did not have much interaction (Q5). As shown in Figures 6 and 7, around 70% of the projects were at least moderately interdisciplinary, and around 30% shared this feature to a significant or exceptional extent.

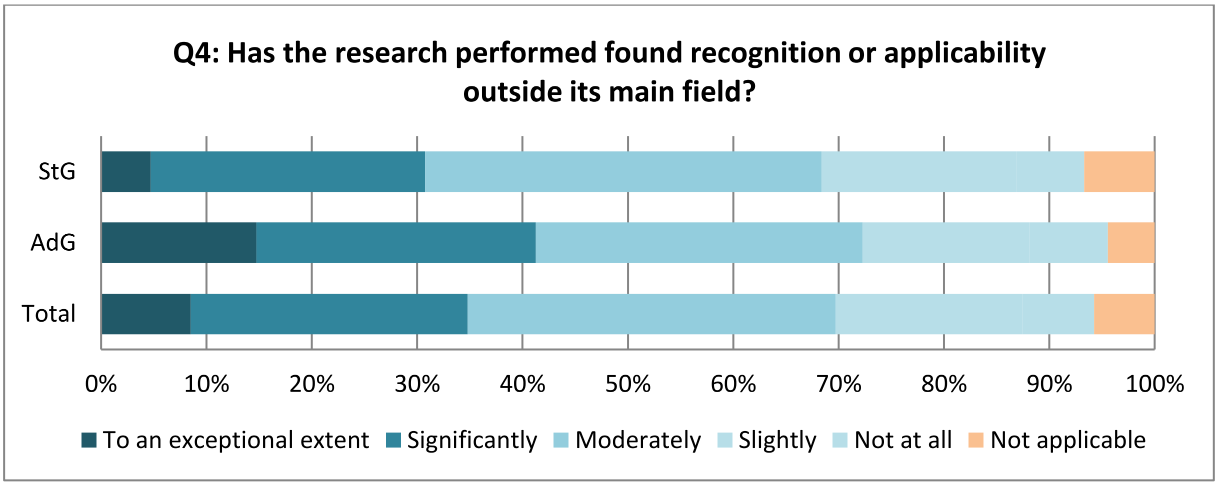

Figure 6. Results on recognition or applicability outside the main field

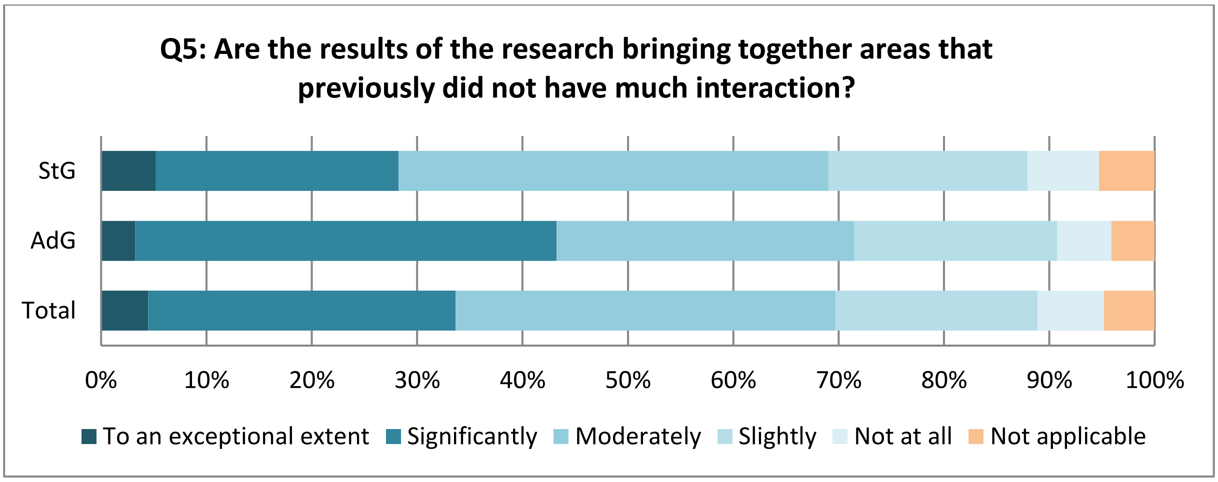

Figure 7. Results on bringing together areas with no previous interaction

The risk dimension of the project (Q6 and Q7)

Q6 addressed the degree of high-risk/high-gain of the research performed in the projects. Taking into account the long-term perspective provided by an assessment performed around seven years after the project was selected for funding, the evaluators considered that only less than 10% of the projects did not exhibit this feature (Figure 8).

The evaluators were also asked to assess the influence (positive or negative) that the risk component of the projects had had (Q7). The results indicate that this influence was at least moderate for around 60% of the projects (Figure 9).

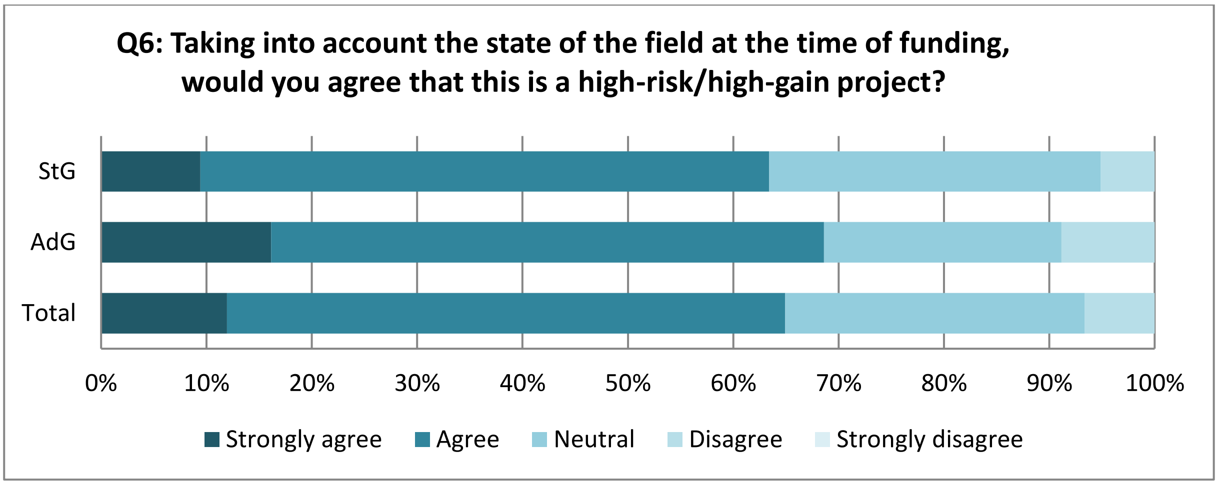

Figure 8. Results on the degree of high-risk/high-gain nature

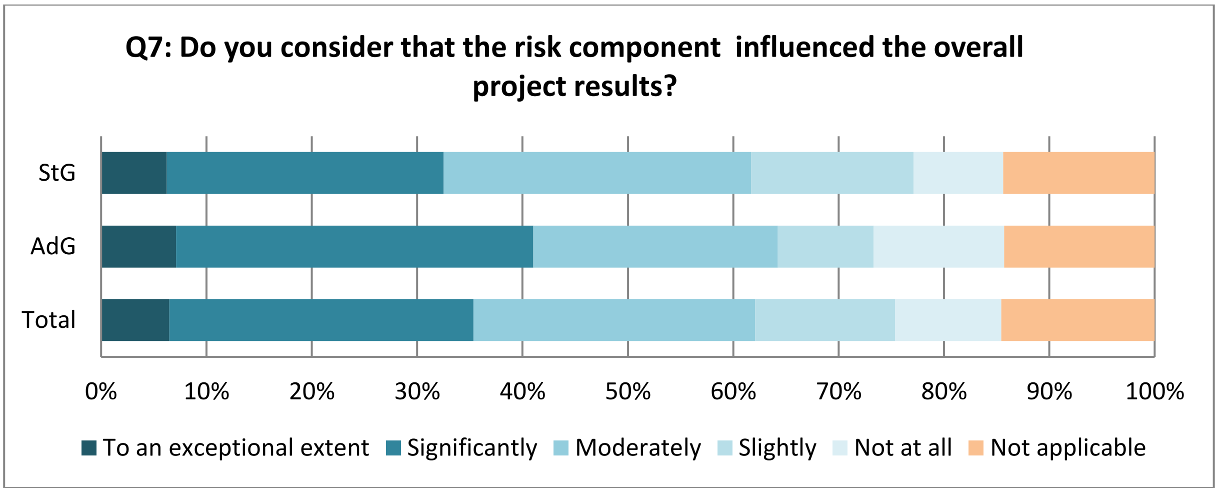

Figure 9. Results on the influence of the risk component

The wider impact of the project (Q8 and Q9)

As regards impact (Figures 10 and 11), the data show that in nearly 50% of the projects, the research performed has already had at least a moderate in other fields different than science (e.g., on economy, society, policy-making, or industry), Q8, while over 65% of them are predicted to have this feature in the future (Q9).

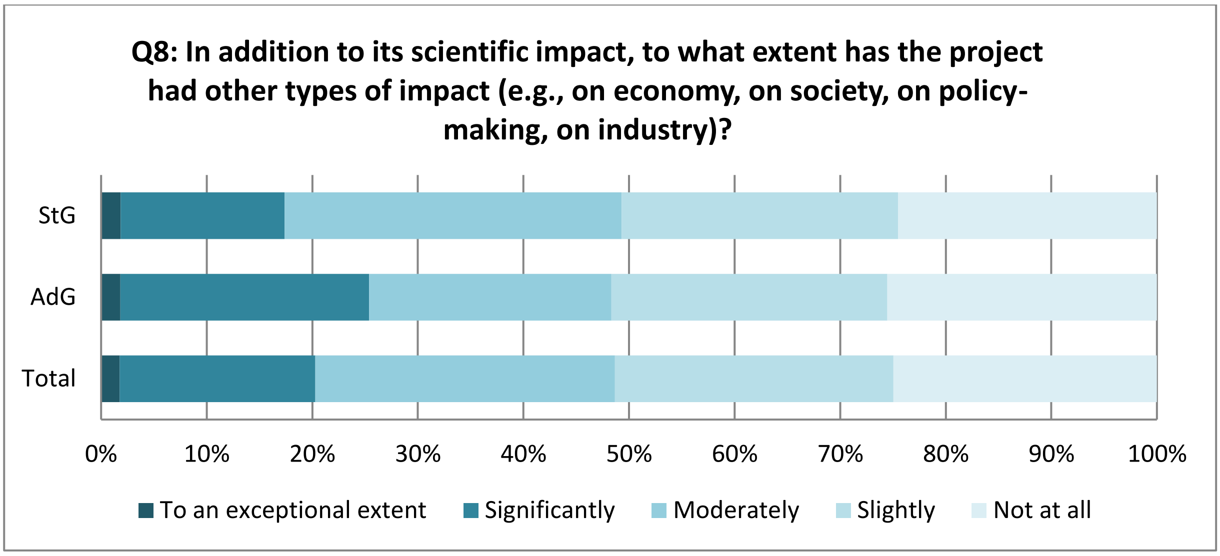

Figure 10. Results on current economic and societal impact

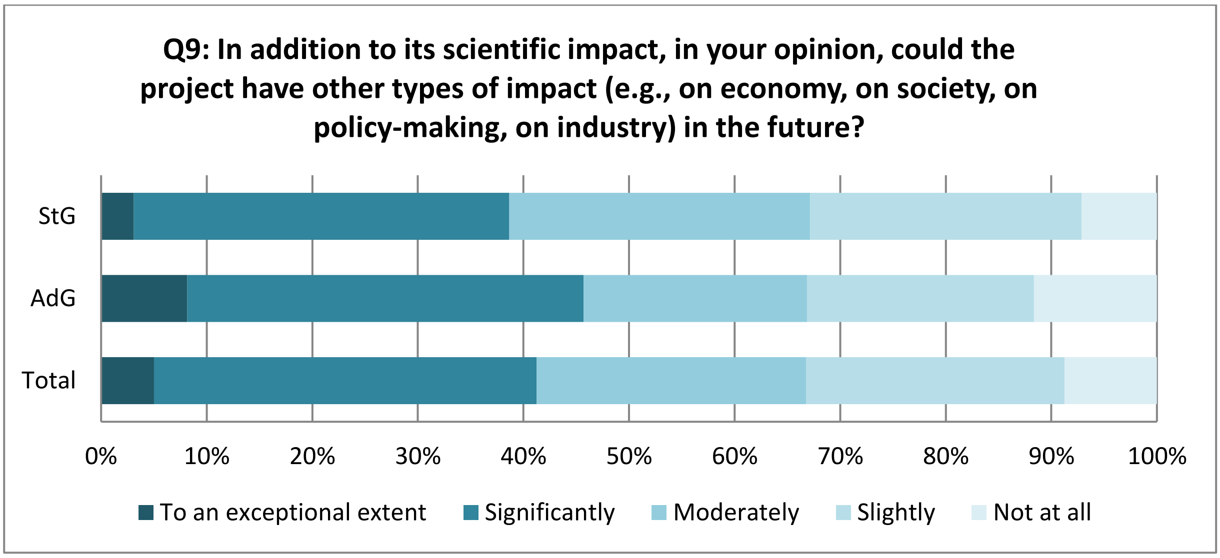

Figure 11. Results on future economic and societal impact

3.3. Analysis of the results

A correlation analysis was performed between all of the questions. In this section, the most relevant results are presented.

It was investigated whether projects with a higher level of interdisciplinarity tended to have a higher overall grade, and this was indeed found to be the case. As shown in Figure 12, there is a positive, significant correlation between the projects whose research found recognition or applicability outside their main fields (Q4) and their overall grade: the distribution of projects classified as A peak in the "Significantly" category and projects classified as C and D have a peak between "Slightly" and “Moderately” categories. These data indicate that interdisciplinary projects are more likely to lead to significant scientific advances or breakthroughs.

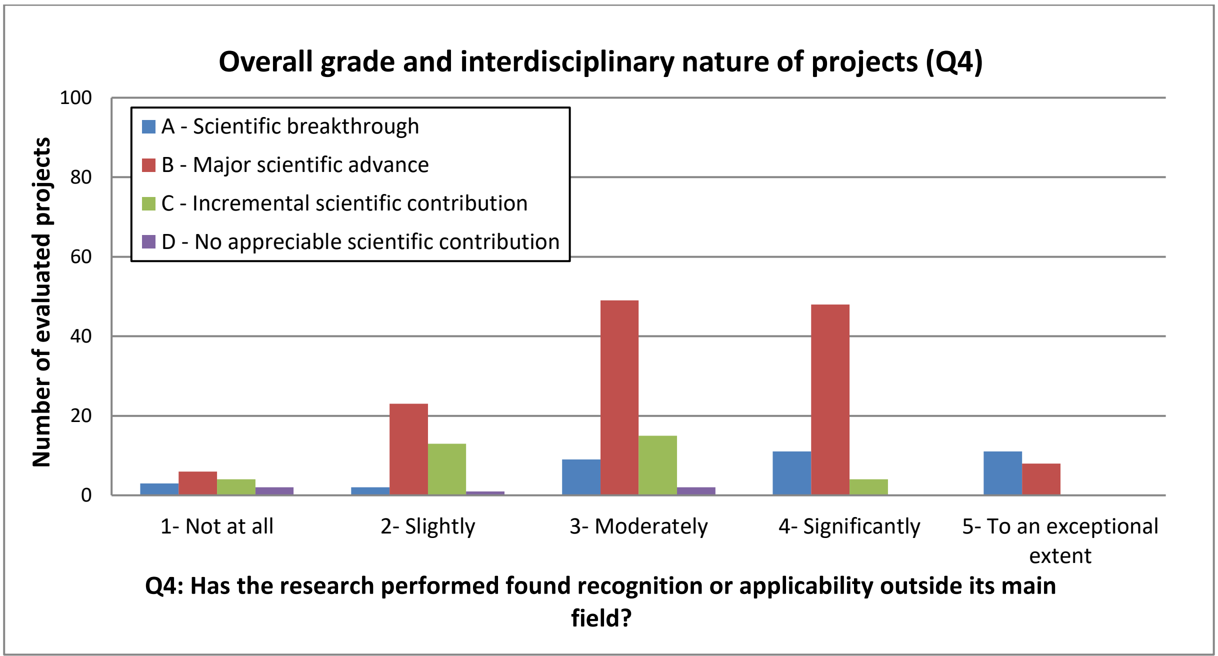

Figure 12. Histogram of answers to Q4 measuring the recognition or applicability of the research of the project outside its main field, split by overall project grade

An analysis was carried out to assess whether high-risk/high-gain projects were more predominant amongst those that had a high overall grade. It was found that there is a statistically significant relationship between the project's overall grade and the answer to Q6 (Figure 13). The majority of ground-breaking projects (A) were classified as high-risk/high-gain (answer to Q6 “Agree” or “Strongly agree”), in contrast to the rest of the projects. Those projects which are considered to be high-risk/high-gain, thus, seem to have a higher probability of producing breakthrough results. A similar pattern is found for projects with an overall grade of B.

Amongst the high-risk/high-gain projects (answer to Q6 “Agree” or “Strongly agree”), there is also a significant portion of projects that produced incremental results, i.e. they were given an overall grade of C or D (see Figure 13). These results indicate that in the *ex-ante* evaluation, panels took a moderate amount of risk.

The relationship between the project overall grade and its potential economic or societal impact in the future (Q9) was also analysed. The results show that there is a positive correlation (see Figure 14): the distribution of projects classified as A and B peaks on the "Significantly" category while projects classified as C in the "Slightly" category.

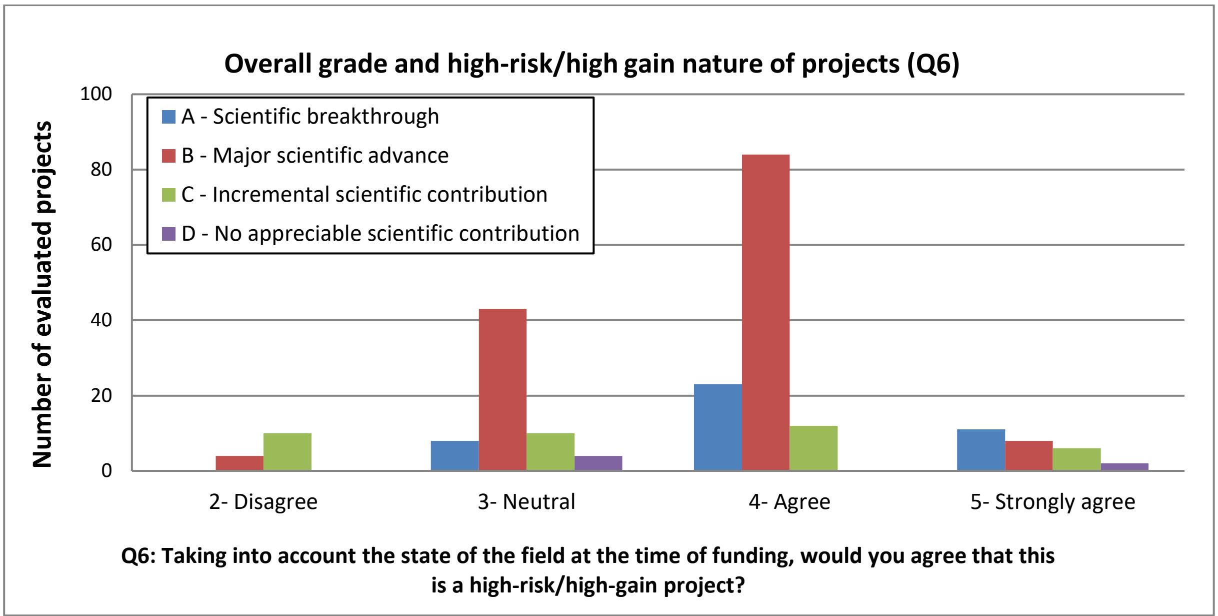

Figure 13. Histogram of answers to Q6 measuring the high-risk/high-gain nature of the projects, split by overall project grade

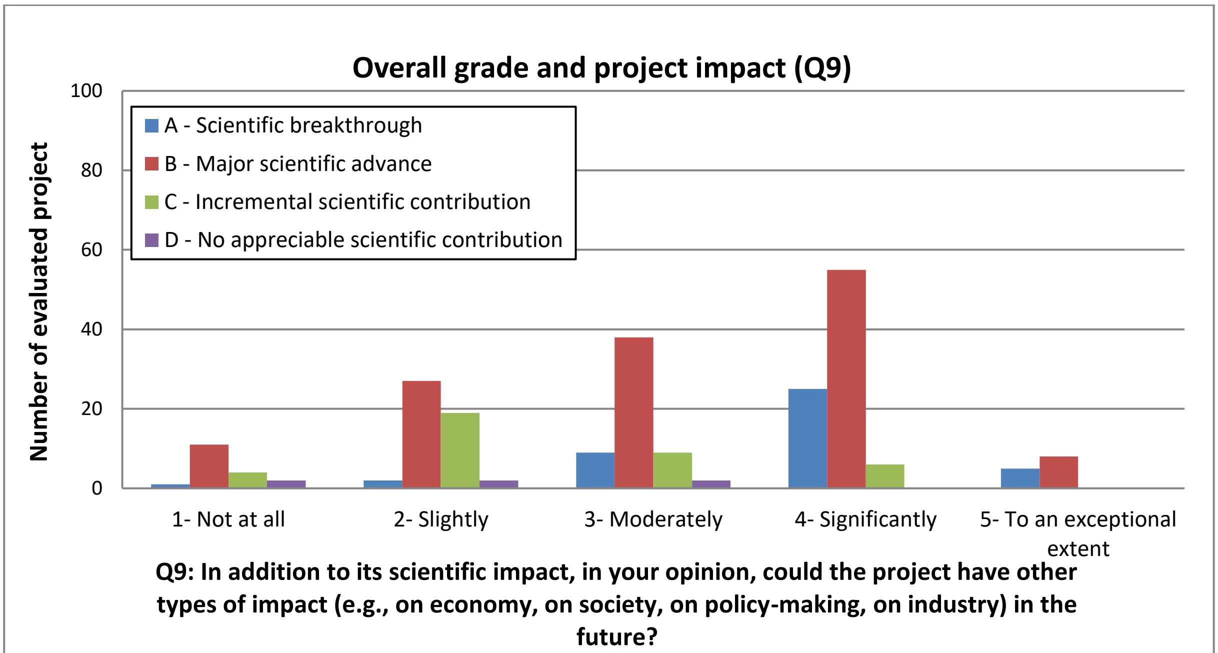

Figure 14. Histogram of answers to Q9 measuring the economic or societal impact of the research of the projects in the future, split by overall project grade

The results also show a significant relationship between projects classified as high-risk/high-gain (Q6) and those that opened new promising research agendas (Q2). For example, projects that opened new research agendas (answer to Q2 “Significantly” or “To an exceptional extent”) were identified as being more high-risk/high-gain at the time of funding (see Figure 15).

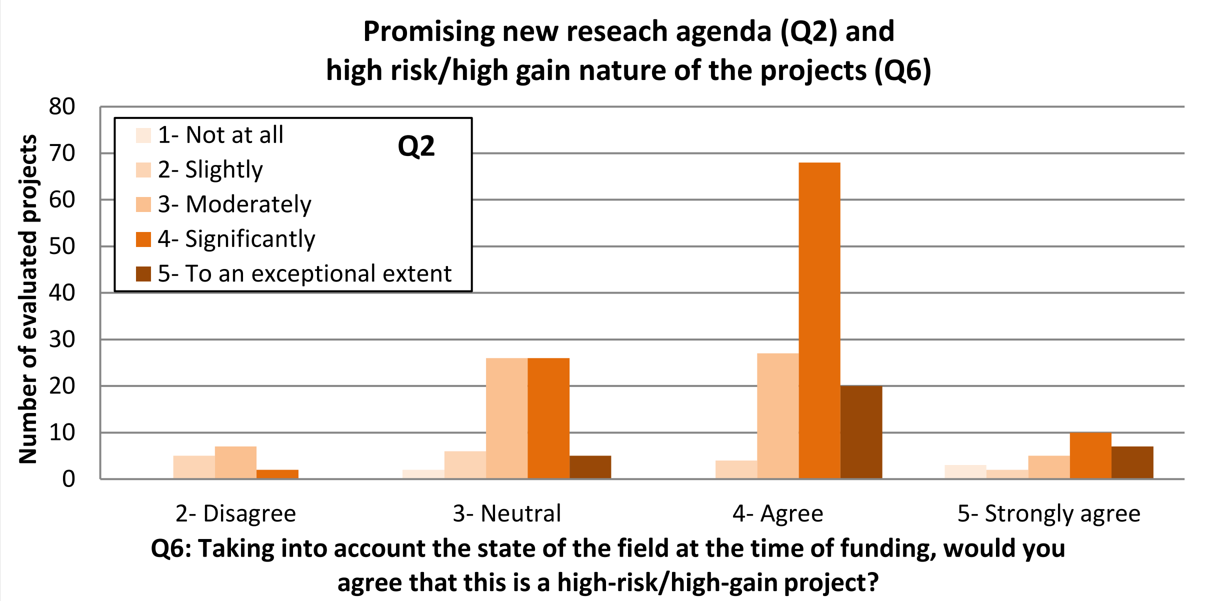

Figure 15. Histogram of answers to Q6 measuring the high-risk/high-gain nature of the projects, split by promising new research agendas

The relationship between the interdisciplinary nature of the projects (Q4 and Q5) and their future economic or societal impact (Q9) was also analysed. The data show that there is a positive correlation between these two types of category. This is shown in Figures 17 and 18, where the distribution of projects with a potential high impact in the future (answers to Q9 “Significantly” or “To an exceptional extent”) peaks around the "Significantly" category, while those with a low impact (answers to Q9 “Not at all” or “Slightly”) have a peak around the "Slightly" category.

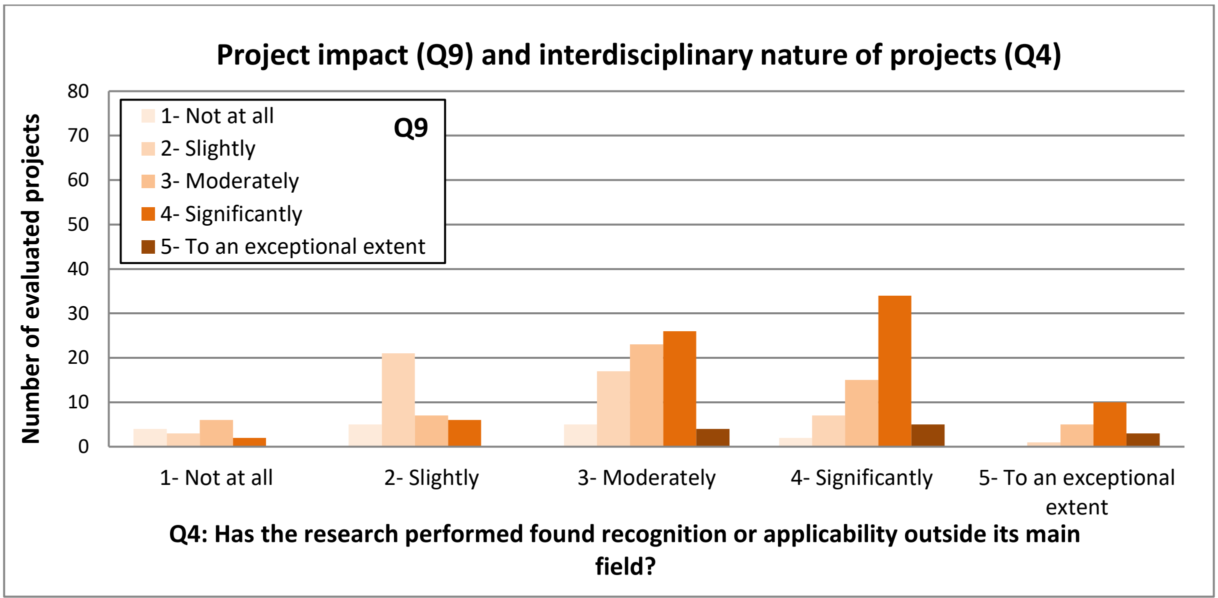

Figure 17. Histogram of answers to Q4 measuring the recognition or applicability of the research of the projects outside their main field, split by the future impact of projects

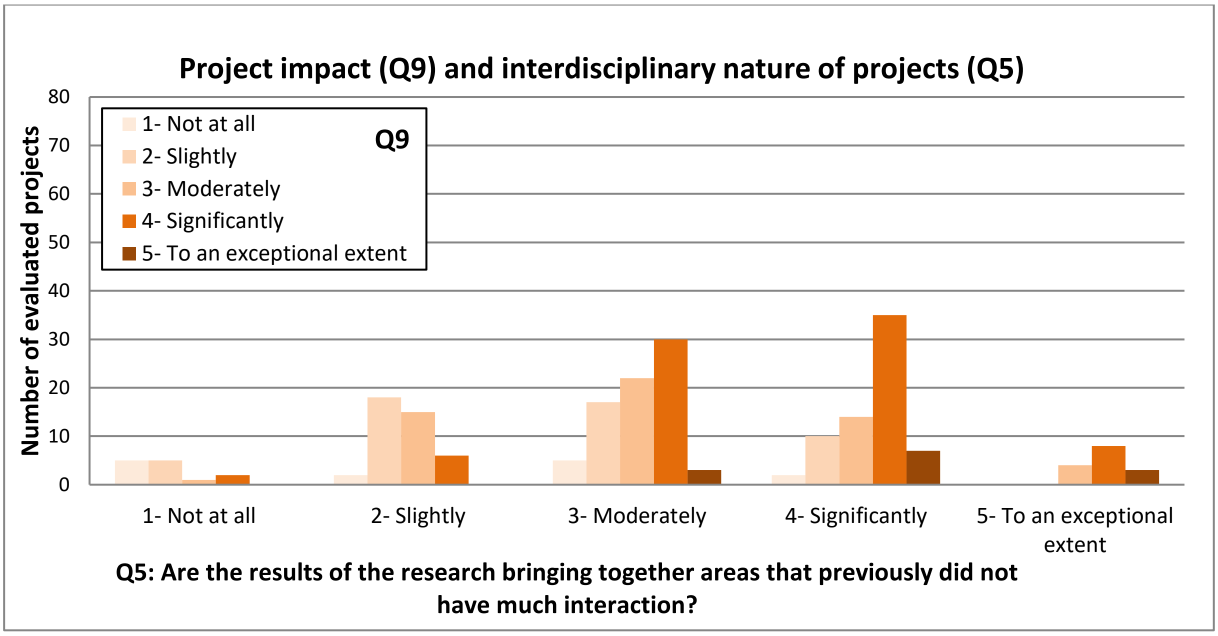

Figure 18. Histogram of answers to Q5 measuring whether projects brought together areas without much previous interaction, split by the future impact of projects

4. Conclusion

The ERC has completed the fifth exercise in the framework of the qualitative evaluation of completed projects. The evaluation concluded that 18% of the projects led to a “Scientific breakthrough” (A) and around 62% to a “Major scientific advance” (B). These results are very much in line with those of previous years. Around one fifth of the projects were assessed as C or D, indicating that they were not as successful as initially expected. As in previous years, the output of this evaluation shows that, on the one hand, the ERC is achieving its goal of financing research of high scientific impact, and on the other hand that the funding decisions are not exempt from risk.

The evaluation confirmed the strong interdisciplinary nature of the projects. Around 70% of the projects led to results that are applicable to areas of research outside the main focus of the project, and around 70% of them bring together research areas that previously did not have much interaction. Although not an ERC selection criterion, it was found that close to half of the projects has already had an impact on the economy, society and policy-making, and around two thirds of the projects are foreseen to do so in the medium to long term.

The results indicate that there is a positive correlation between the project’s overall grade and the degree of interdisciplinarity. On the one hand, projects that led to significant advances or to breakthroughs were assessed as being more interdisciplinary. On the other hand, projects that were categorised as having incremental or no appreciable scientific results have a lower degree of interdisciplinarity. A similar pattern is found between the overall grade and the impact of the project on the economy, society or policy-making: projects that received higher overall grades have already had greater economic and societal impact and it is more likely that they will continue to have these in the future.

The qualitative evaluation also concluded that less than 10% of the projects were considered not to have been high-risk/high-gain projects at the time of funding. A positive correlation was found between the high-risk/high-gain feature and the overall grade given to projects. These results support the ERC policy of funding high-risk/high-gain research.

The qualitative evaluation of completed projects carried out in 2019 confirms that the ERC is achieving its goals of funding high-risk/high-gain projects with a very significant scientific impact. Although it is too early to extrapolate these results to the entire pool of ERC projects, the results of the evaluation suggest that both of these components contributed to highly successful projects and the development of ground-breaking ideas in new and emerging fields.

After completing the 2019 exercise, approximately 50% of the ERC funding in FP7 has been assessed. It is, thus, still too early to provide significant statistics relative to performance broken down by field or scientific domain. It is expected that such breakdowns can be presented in the remaining two exercises for FP7, in 2020 and 2021, to obtain a more complete picture of the overall evaluation of the impact of ERC funding in FP7.