



European Research Council

Established by the European Commission

Qualitative Evaluation of Completed Projects funded by the European Research Council (2016)

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Table of Contents

1. Introduction.....	3
2. Evaluation results.....	3
2.1. Overall grade.....	3
2.2. Specific assessment criteria	5
2.3. Analysis of the results.....	9
3. Conclusion	13

1. Introduction

The European Research Council (ERC) was established to fund bottom-up research projects aimed at generating outputs of very high scientific value. Over the past two years, the ERC has carried out qualitative assessments of completed projects to assess whether this objective has been achieved. With this initiative, the ERC complements its regular analysis of the bibliometric impact of the scientific publications generated by the projects. After a successful pilot exercise, executed in 2015, a new qualitative evaluation of the frontier nature of ERC-funded research was launched as part of the ERC Work Programme 2016¹.

In the 2016 exercise, a random sample of 155 projects was evaluated from a pool of 237 ERC-funded projects that ended before 30 June 2014, excluding those evaluated in the pilot exercise of 2015. A minimum of two years is left between the completion of the projects and their assessment. As in the exercise of 2015, this ex-post peer-review evaluation was undertaken by independent, high-level scientists who were selected by the ERC Scientific Council. These experts were assigned to evaluation panels with a structure similar to those dealing with ex-ante evaluations. Each panel was composed of three experts, two with past experience as an ERC panel member, and one with no previous experience on an ERC panel or past experience as applicant or grantee.

The evaluators were asked to mark projects with one of the following four grades: 'scientific breakthrough', 'major scientific advance', 'incremental scientific contribution' and 'no appreciable scientific contribution'. In addition, they were asked to address a series of questions related to scientific impact, new methods, interdisciplinarity, and societal and economic impact for each project.

2. Evaluation results

The main output of the qualitative assessment of completed projects is a 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 high-risk/high-gain component.

This section contains the overall results of the exercise: Section 2.1 presents the overall assessment of projects, section 2.2 the answers to the questionnaire provided by the evaluators and section 2.3 an analysis of the results.

2.1. Overall grade

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

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

¹ https://erc.europa.eu/sites/default/files/document/file/ERC_Work_Programme_2016.pdf

The overall results and the grades split by call type (Advanced Grant (AdG) and Starting Grant (StG)) are shown in Fig. 1 and Table 1.

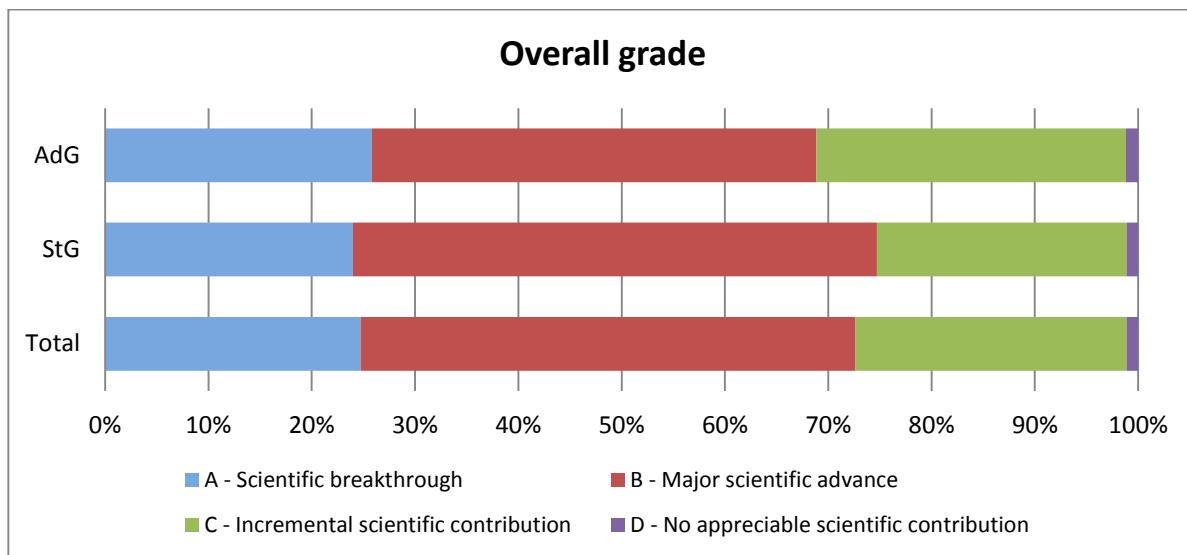


Figure 1. Overall grade: total and by grant type

Call type	A - Scientific breakthrough	B - Major scientific advance	C - Incremental scientific contribution	D - No appreciable scientific contribution
AdG	26%	43%	30%	1%
StG	24%	51%	24%	1%
Total	25%	48%	26%	1%

Table 1. Overall grade: total and by grant type

As shown in Table 1, overall 25% of the projects were considered as having led to a scientific breakthrough (A). An additional 48% of the projects were categorised as having led to a major scientific advance (B). Taken together, 73% of the evaluated projects were assessed as having produced a major scientific advance or a scientific breakthrough. Around a quarter of the projects were given the lower grades C or D.

The analysis by call type (StG and AdG) leads to similar figures for projects graded as A (see Fig. 1 and Table 1). The proportion of StG projects graded as A or B (75%) is higher than that of AdG projects (69%).

In Figure 2, a comparison between the overall results of the exercises of 2015² and 2016 is presented. The proportion of projects classified as A in 2016 is slightly higher than in 2015. In this context, the percentage of projects classified as A or B is very similar (71% and 73% of projects in 2015 and 2016, respectively).

² https://erc.europa.eu/sites/default/files/qualitative_evaluation_of_completed_projects_funded_by_the_erc.pdf

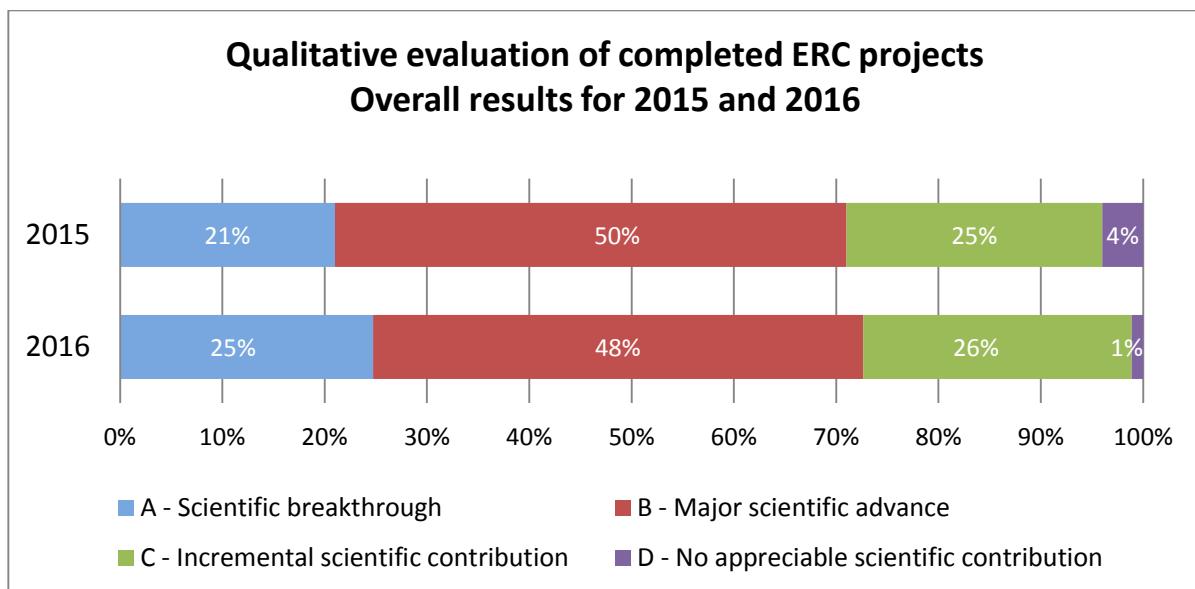


Figure 2. Overall results of the 2015 and 2016 exercises

2.2. Specific assessment criteria

In addition to the overall grade, the panels assessed the projects by answering the following nine questions with specific scale criteria (e.g., "To an exceptional extent", "Significantly", "Moderately", "Slightly" and "Not at all"):

- 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 for a particular field (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 had influence on the overall project results?
- Q8. In addition to its scientific impact, to what extent has the project had other types of impact (i.e., on economy, on society, on policy-making)?
- Q9. In addition to its scientific impact, in your opinion, could the project have other types of impact (i.e., on economy, on society, on policy-making) in the future?

These questions were designed to gauge the level of scientific contributions, methodological advances, high-risk/high-gain component, interdisciplinarity, as well as potential short- and long-term economic and societal impacts, and the answers provided had to be justified by the evaluators. The summary of the results for each question is presented in Figures 3 to 11.

The distributions of the answers to the first two questions (Figures 3 and 4) are very much in line with the distribution of the overall grades assigned to the projects (Figure 1).

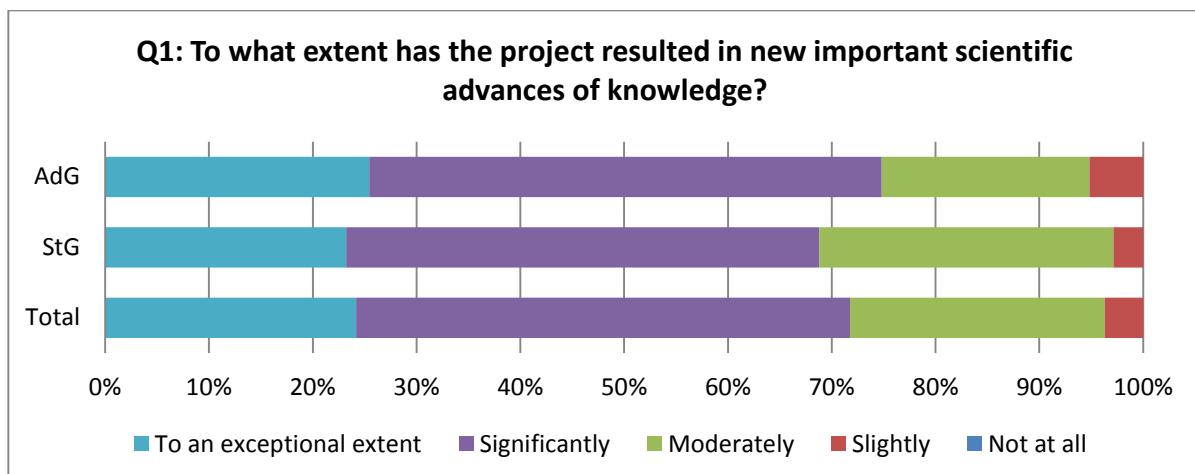


Figure 3. Results on new important scientific advances of knowledge

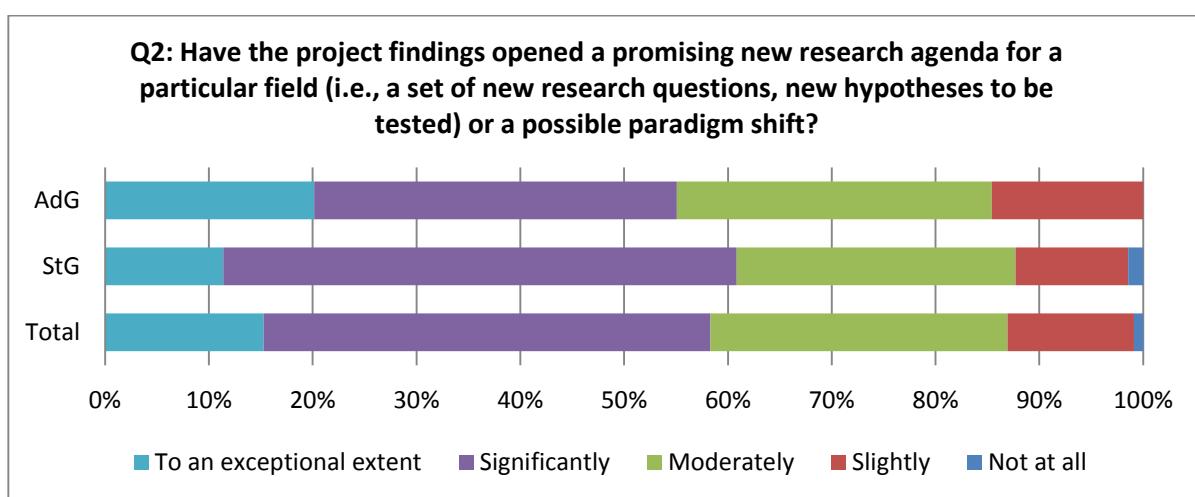


Figure 4. Results on promising new research agendas

Regarding Q3, it is remarkable that over 80% of the evaluated projects have at least "Moderately" developed new research methods or instruments, while over 50% of the projects have achieved this objective "Significantly" or "To an exceptional extent" (Fig. 5).

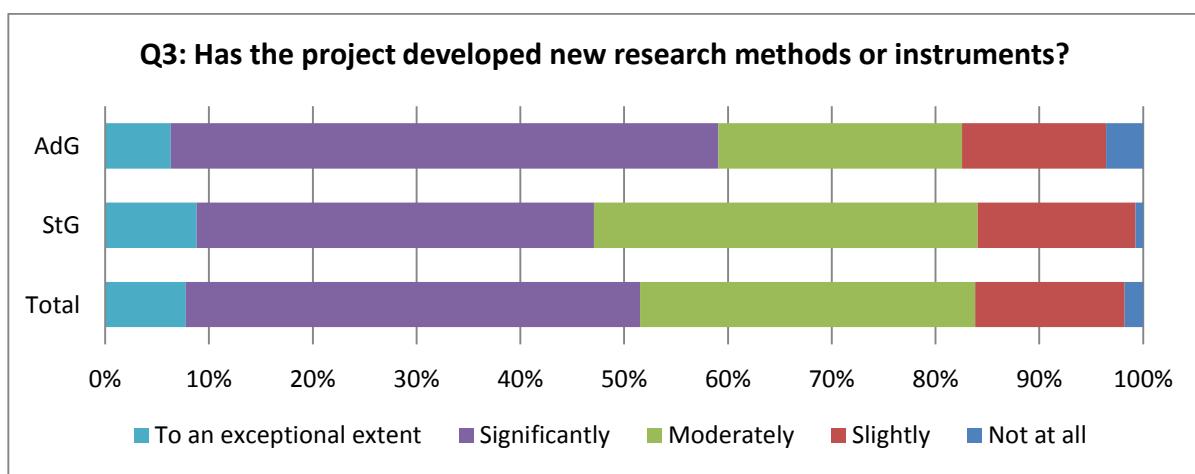


Figure 5. Results on new research methods and instruments

Regarding interdisciplinarity, the assessment shows that for a large fraction of the evaluated projects the research found recognition or applicability outside of the main field (Q4) or brought together areas that previously did not have much interaction (Q5). As shown in Figures 6 and 7, about 60% of the projects were at least "Moderately" interdisciplinary and about 30% shared this feature "Significantly" or "To an exceptional extent".

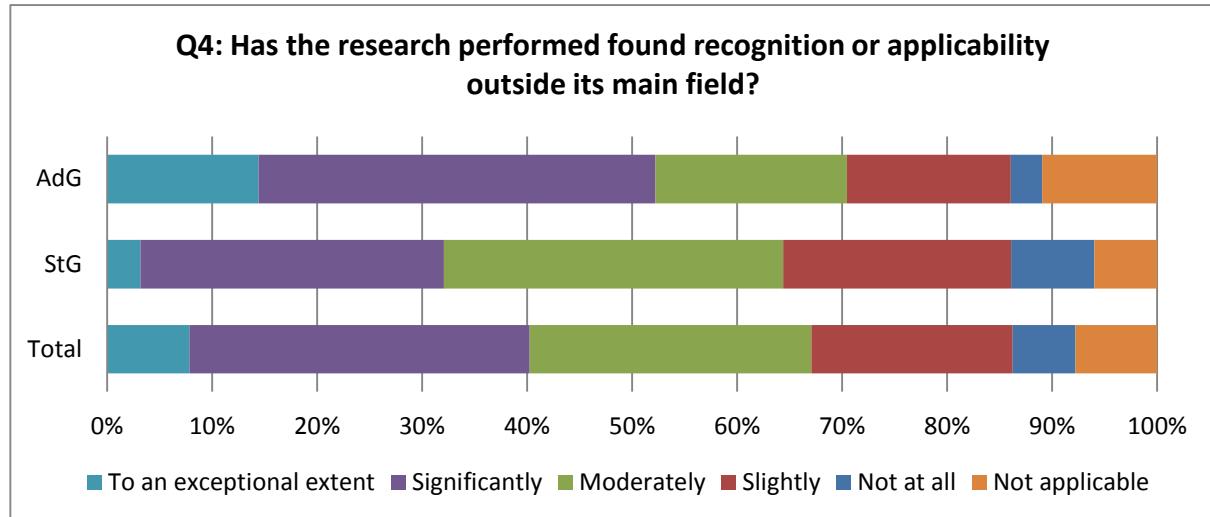


Figure 6. Results on recognition or applicability outside the main field

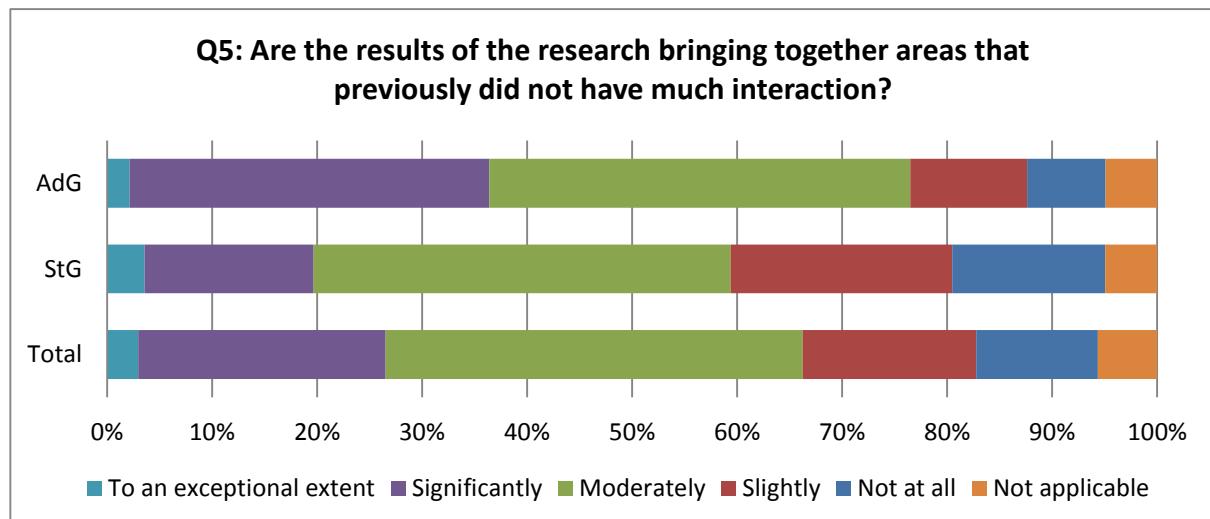


Figure 7. Results on bringing together areas with no previous interaction

Q6 addressed the degree of high-risk/high-gain of the research performed in the projects. High-risk/high-gain projects are a target of ERC ex-ante evaluations. Taking into account the long-term perspective provided by an assessment performed at least 7 years after granting, the evaluators considered that only 11% of the projects does not meet this feature (Figure 8).

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

**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?**

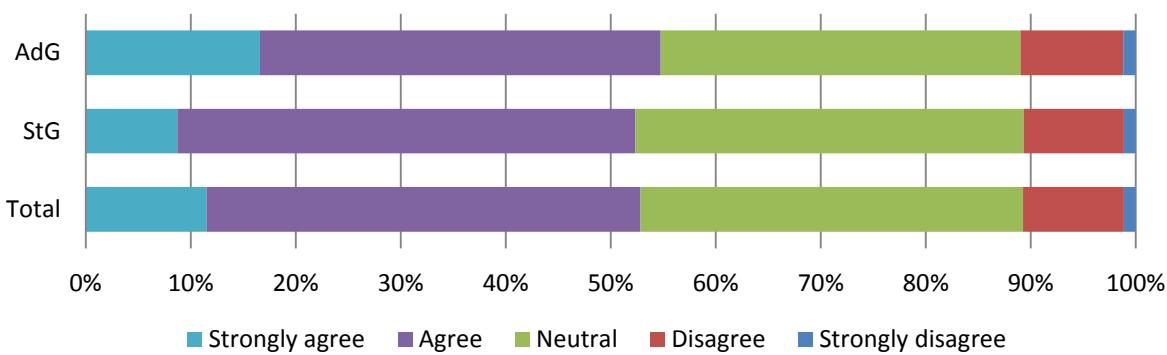


Figure 8. Results on the degree of high-risk/high-gain

**Q7: Do you consider that the risk component had influence on the
overall project results?**

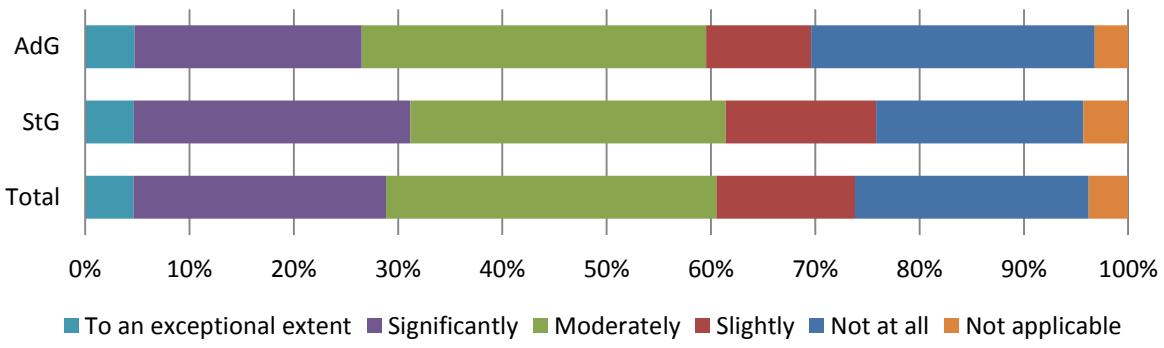


Figure 9. Results on the influence of the risk component

As regards impact (Figures 10 and 11), the data show that for more than 45% of the projects, the research performed has already had at least a moderate economic and societal impact (Q8), while over 60% of them are predicted to have this feature in the future (Q9).

**Q8: In addition to its scientific impact, to what extent has the project
had other types of impact (i.e., on economy, on society, on policy-
making)?**

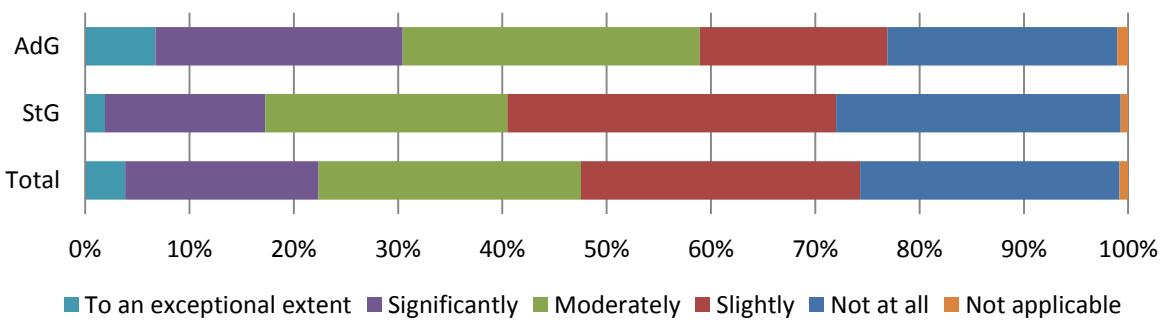


Figure 10. Results on current economic and societal impact

Q9: In addition to its scientific impact, in your opinion, could the project have other types of impact (i.e., on economy, on society, on policy-making) in the future?

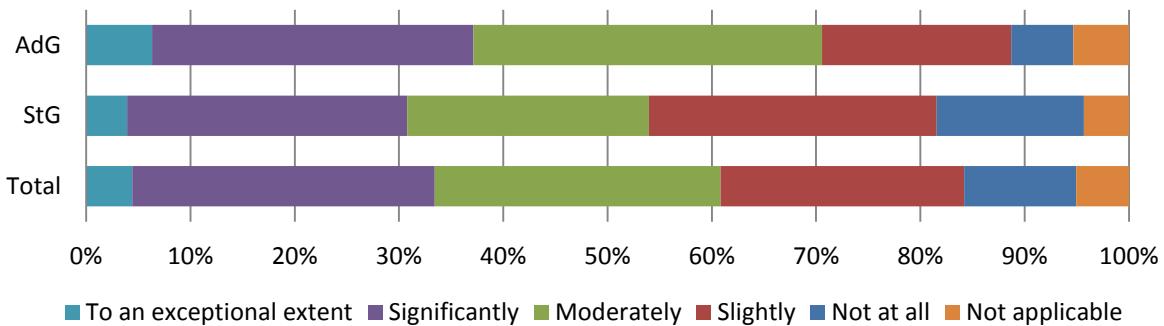


Figure 11. Results on future economic and societal impact

2.3. Analysis of the results

The relationship between Q1 and Q2, and the overall score was analysed. As seen in Figure 12, a large majority of the projects that generated new important scientific advances were among the projects with an overall grade of A or B. The distribution of projects classified as A and B peak on the "Significantly" and "To an exceptional extent" categories, respectively. This is also the case for projects that have opened a promising new research agenda for a particular field (Figure 13).

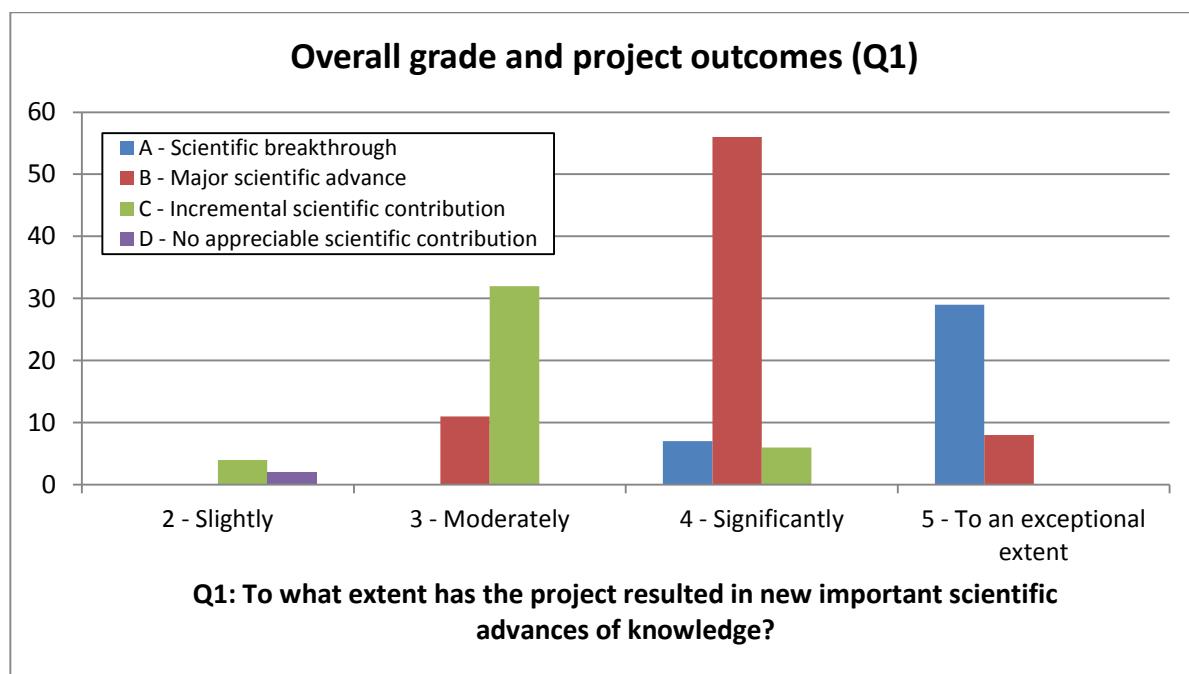


Figure 12. Histogram of answers to Q1 measuring the results on new important scientific advances of knowledge

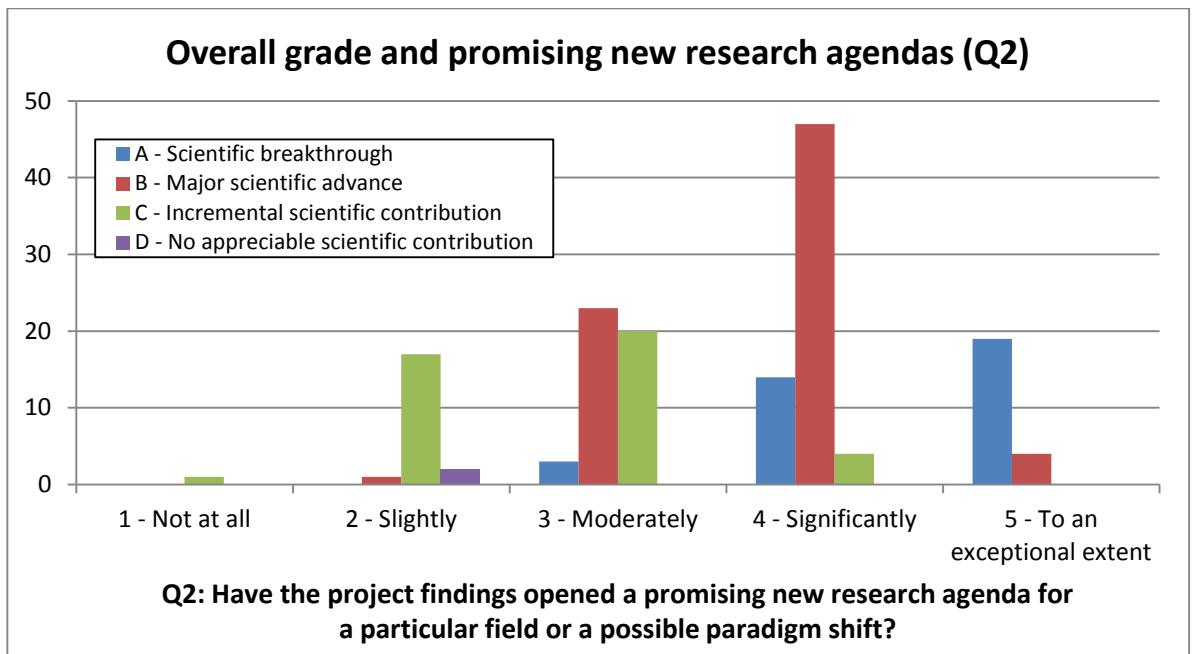


Figure 13. Histogram of answers to Q2 measuring finding new promising research agendas

It was also investigated whether the 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 14, there is a positive correlation between the projects whose research found recognition or applicability outside their main fields (Q4) and the overall grade of the project: the distribution of projects classified as A peak on the "Significantly" category, project classified as B peaks between the "Moderately" and "Significantly" categories, and projects classified as C have a peak on the "Slightly" category. These data indicate that interdisciplinary projects are more likely to lead to significant advances or breakthroughs.

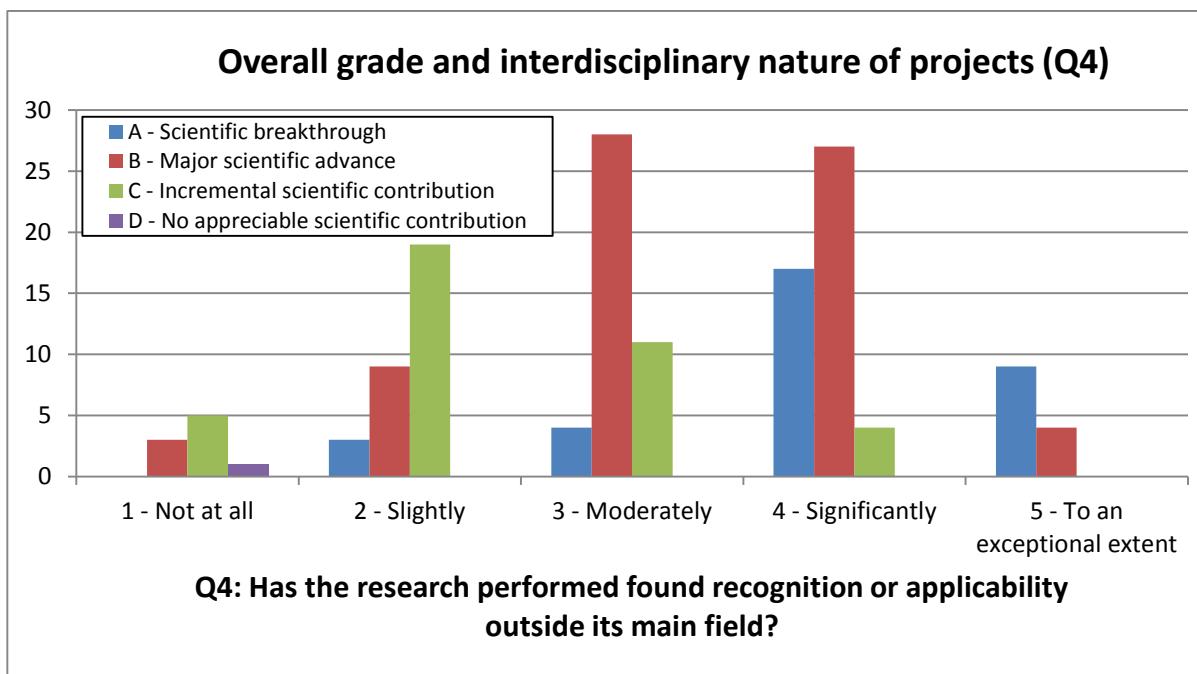


Figure 14. Histogram of answers to Q4 measuring the recognition or applicability of the research of the project outside its main field, split by overall project grade

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 (Fig. 15). The vast 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. The analysis of the relation between the overall grade and Q7, that measures the influence of the risk component in the overall project result, shows that for 30% of projects that did not achieve significant results (i.e., projects graded as C or D) the risk component influences the project results to a "Significant" or "Exceptional extent". These numbers suggest that ex-ante evaluation panels took some risk when making their funding recommendations and, therefore, the project selection was consistent with the policy established by the ERC of funding high-risk/high-gain projects.

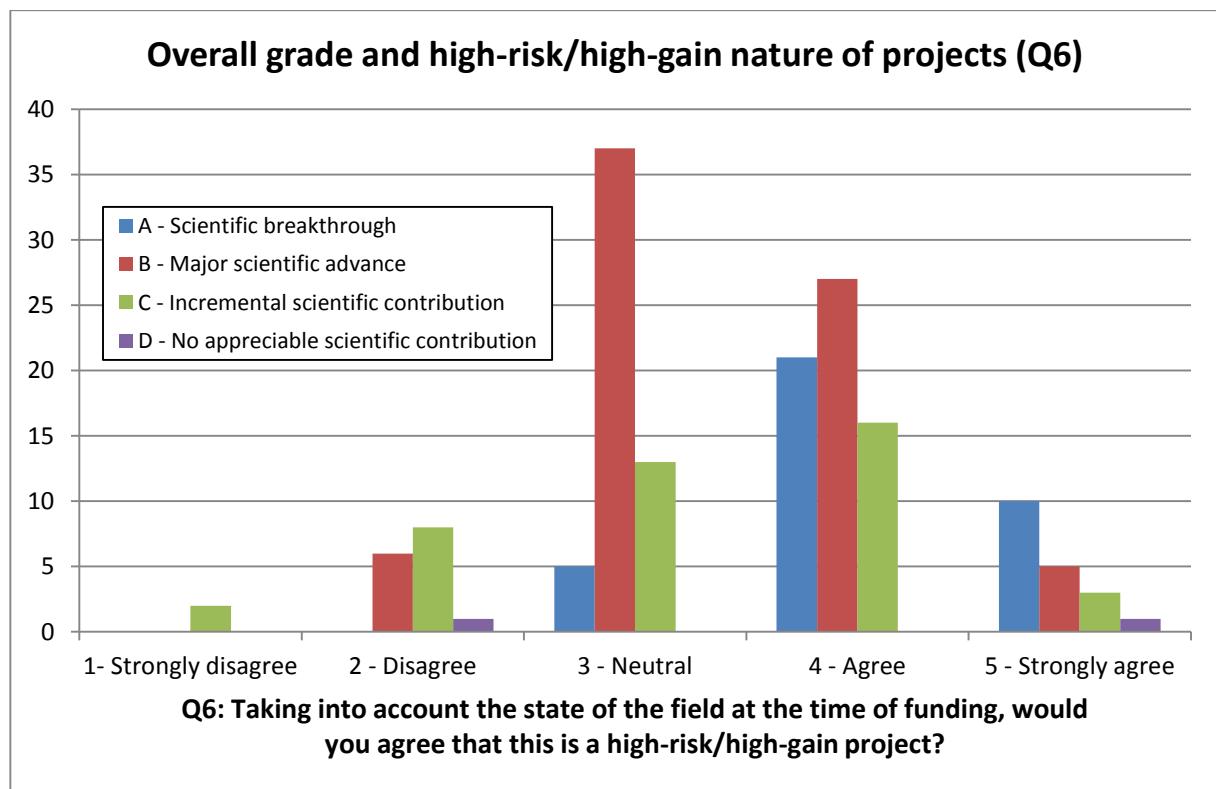


Figure 15. Histogram of answers to Q6 measuring the high-risk/high-gain nature of the projects, split by overall project grade

The relationship between the high-risk/high-gain nature of the project and its degree of interdisciplinarity was also analysed. It turns out that there is a statistically significant correlation between projects classified as high-risk/high-gain and those evaluated as being interdisciplinary. This can be seen in Figure 16, where most of the projects considered high-risk/high-gain (answer to Q6 "Agree" or "Strongly agree") were identified as having a high degree of interdisciplinarity (answer to Q4 "To an exceptional extent" or "Significantly") in contrast to those having low interdisciplinarity (answer to Q4 "Not at all" or "Slightly").

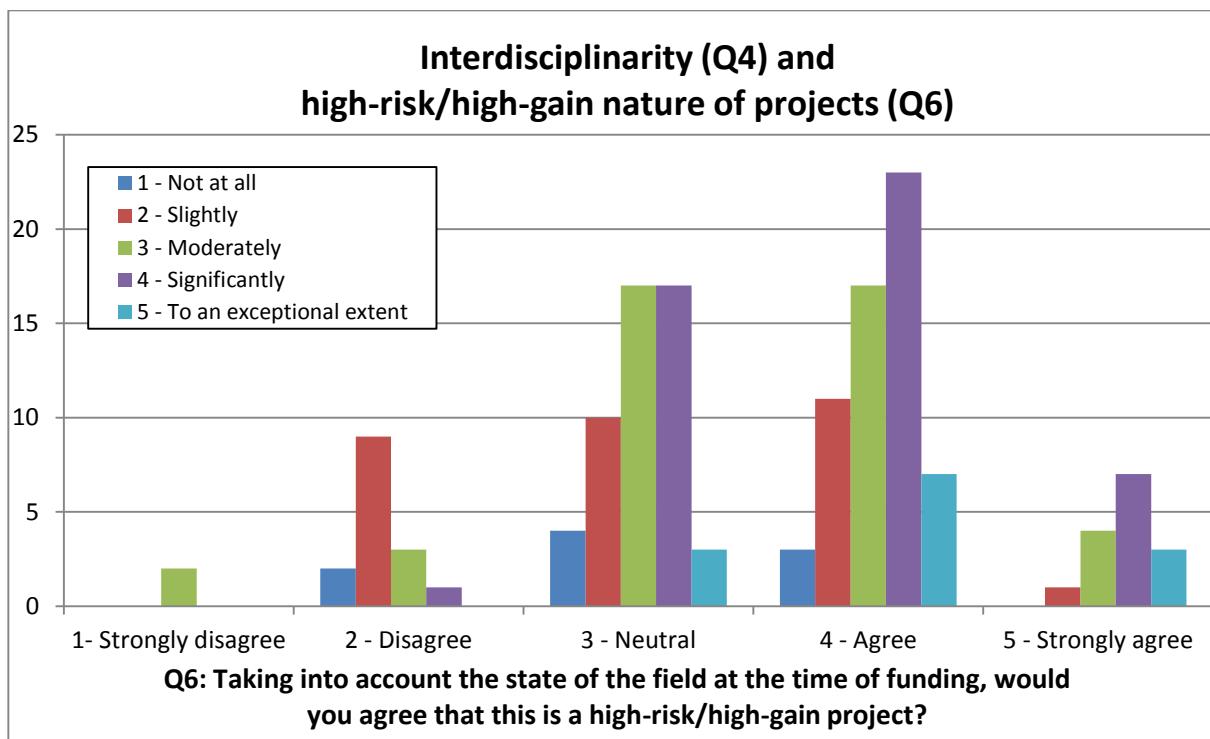


Figure 16. Histogram of answers to Q6 measuring the high-risk/high-gain nature of the projects, split by the interdisciplinary nature of projects (Q4)

The relationship between the overall grade assigned to the project and the economic or societal impact of the project currently (Q8) and in the future (Q9) was also analysed. The data show that, in both cases, there is a positive correlation between these two categories and the overall grade, with the correlation being stronger when the question is asked about the future. This is shown in Figure 17, where the distribution of projects classified as A or B peaks around the "Significantly" category, while those classified as C have a peak on the "Slightly" category.

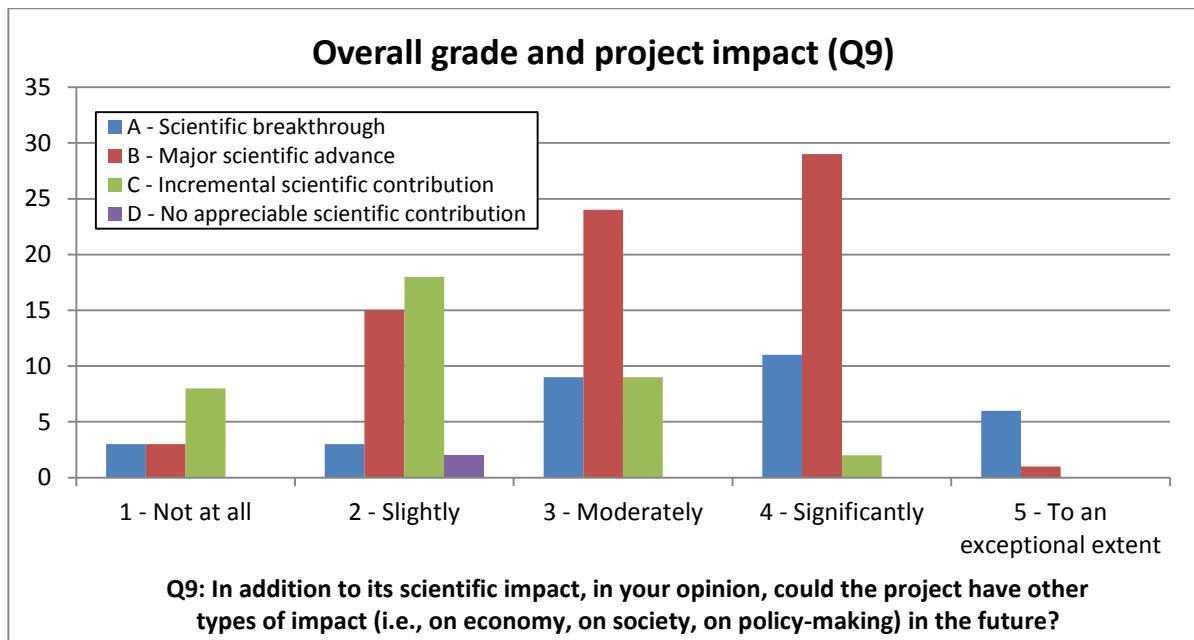


Figure 17. Histogram of answers to Q9 measuring the economic or societal impact of the research in the future, split by overall project grade

3. Conclusion

The 2016 qualitative evaluation of the frontier nature of ERC-funded research is a continuation of the similar exercise carried out in 2015. It complements the findings of the bibliometric analysis of the scientific publications generated by the projects. In this year's exercise, 25% of the projects were evaluated as having led to a scientific breakthrough, 48% to a major scientific advance, 27% of projects were evaluated as incremental or with no appreciable scientific contribution. Taken together, 73% of the evaluated projects were assessed as being in the top two categories, a remarkable result, considering that the selection of projects was entirely random. This is in line with the results obtained in 2015, where 71% of the evaluated projects were classified as having led to a major scientific advance or a scientific breakthrough.

The ERC aims to fund high-risk/high-gain research, and the evaluation panels confirm that in their view only 11% of the assessed projects were not considered as high-risk/high-gain given the state of the art at the moment of their funding. The results also indicate a significant statistical relationship between those projects seen by the evaluation panels as high-risk/high-gain and the overall grade: those projects which are considered to be high-risk/high-gain have a higher probability of producing breakthrough results. Nevertheless, funding risky projects increases the chance that a fraction of them do not achieve their goals, and indeed for 30% of projects that did not achieve significant results (i.e., projects graded as C or D), the risk component had influenced the overall project results to a significant or exceptional extent.

The evaluation revealed interdisciplinarity was frequently present among the projects, also in accordance with the ERC's mission. In both exercises, over 80% of the projects led to results that are applicable, to some extent, to areas of research other than the main focus of the project, or have brought together research areas that previously did not have much interaction. The results further indicate that there is a positive correlation between the overall grade assigned to the project and the degree of interdisciplinarity. Projects that have led to major scientific advances or breakthroughs were assessed as being more interdisciplinary. On the other hand, projects categorised as incremental had a lower degree of interdisciplinarity.

Although the potential impact of the proposed research on the economy, society or policy-making is not taken into account at the time of selection for funding, it was found that nearly half of the projects have already had at least a moderate impact on these spheres and more than three quarters of them are predicted to do so, to some extent, in the medium- and long-term. A pattern similar to that for interdisciplinary projects is found when the overall grades are compared to the economic and societal impact: those projects scoring with higher overall grades are already having more economic and societal impact, and it is more likely that they will continue doing so in the medium- and long-term.

The qualitative evaluation of completed projects carried out in 2016 confirms that the ERC is achieving its goals of funding both high-risk/high-gain projects and interdisciplinary frontier research. Although it is too early to extrapolate these results to the entire pool of ERC projects, they suggest that, two years after the end of the projects, both of these components have contributed to highly successful projects and ground-breaking ideas in new and emerging fields. Committed to evaluate the programme it is charged with, the ERC Scientific Council will continue to request that the ERCEA assesses finished projects by independent, high-level scientists on an annual basis.