



**European Research Council**

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# **Qualitative Evaluation of completed Projects funded by the European Research Council (2017)**

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## 1. Introduction

Since its creation in 2007, the European Research Council (ERC) has become one of the leading research funders worldwide. As part of its monitoring and evaluation strategy, the ERC performs regular qualitative assessments of the research outputs from completed ERC projects. These *ex-post* peer-review assessments complement other approaches based on the analysis of the bibliometric information related to the projects.

After the first two previous annual exercises (in 2015 and 2016), a new qualitative assessment was implemented during 2017. In this exercise, a random sample of 223 projects was evaluated from a pool of 470 ERC-funded completed projects. As in previous years, this *ex-post* peer-review evaluation was undertaken by independent, high-level international scientists, who were selected by the ERC Scientific Council. Experts who participated in the *ex-ante* selection of the projects for funding were excluded for this *ex-post* evaluation. Experts were grouped into evaluation panels aligned in their structure to those dealing with *ex-ante* evaluations. Each panel was composed of three to four experts; two to three of them with past experience as an ERC panel member, and one with no previous experience as ERC panel member, being neither an applicant in the last five years nor ever receiving an ERC grant.

The reviewers of the outcome from the completed ERC projects made their assessments following established guidelines. They addressed questions related to scientific impact, the introduction of new methodologies, interdisciplinarity, and societal and economic impact of each project. In addition, they were asked to provide an overall grade of projects according to the following scale: 'scientific breakthrough' (grade A), 'major scientific advance' (B), 'incremental scientific contribution' (C) and 'no appreciable scientific contribution' (D).

This report presents the outcome of the 2017 qualitative evaluation of completed ERC projects.

## 2. Methodology

### 2.1. Project selection and sample

In this qualitative evaluation of completed projects, a representative sample of projects was evaluated. This sample was randomly selected from a pool of 456 projects that ended between 1 July 2014 and 30 June 2015, together with 14 projects from panels that did not participate in the 2016 exercise<sup>1</sup>. In total, this initial selection pool was composed of 470 projects. Each project was allocated to a panel according to "ERC Science Behind the Projects" initiative<sup>2</sup> "best match".

A random selection of this pool of projects was done, respecting the ratio within each panel between the number of Starting Grants (StG) and Advanced Grant (AdG) projects. There was thus no selection according to the quality of the project. In total, a sample of 223 randomly chosen completed ERC projects was evaluated in the exercise of 2017.

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<sup>1</sup> In the 2016 exercise the LS4, LS7, LS9, PE8 and SH5 panels did not participate in the evaluation as the number of projects allocated to them was less than five.

<sup>2</sup> [https://erc.europa.eu/sites/default/files/publication/files/ERC\\_Science\\_behind\\_the\\_projects\\_FP7-2007-2013.pdf](https://erc.europa.eu/sites/default/files/publication/files/ERC_Science_behind_the_projects_FP7-2007-2013.pdf).

## 2.2. Expert evaluators

In this evaluation, the ERC was assisted by independent high-level scientists selected by the Scientific Council. The evaluation was organised in 25 panels, each composed of three experts<sup>3</sup>: two experts with previous or current participation as ERC panel members or panel chairs, and one expert without any prior participation as ERC panels members, being neither an applicant in the last five years nor a recipient of an ERC grant. Scientists who participated in the panels that selected the funded projects were excluded from this *ex-post* evaluation. A procedure to detect conflicts of interest and protect the confidentiality of the exercise was established. 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 76 panel members and 65 remote reviewers participated in the evaluation.

## 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 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 for each project an overall grade 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 2017 exercise for all the evaluated projects and split by call type (AdG and StG) are shown in Figure 1.

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<sup>3</sup> It was decided as a very exceptional case to allow panel LS7 to have 4 panel members as the scientific areas of the LS7 projects were very difficult to be covered by only 3 panel members.

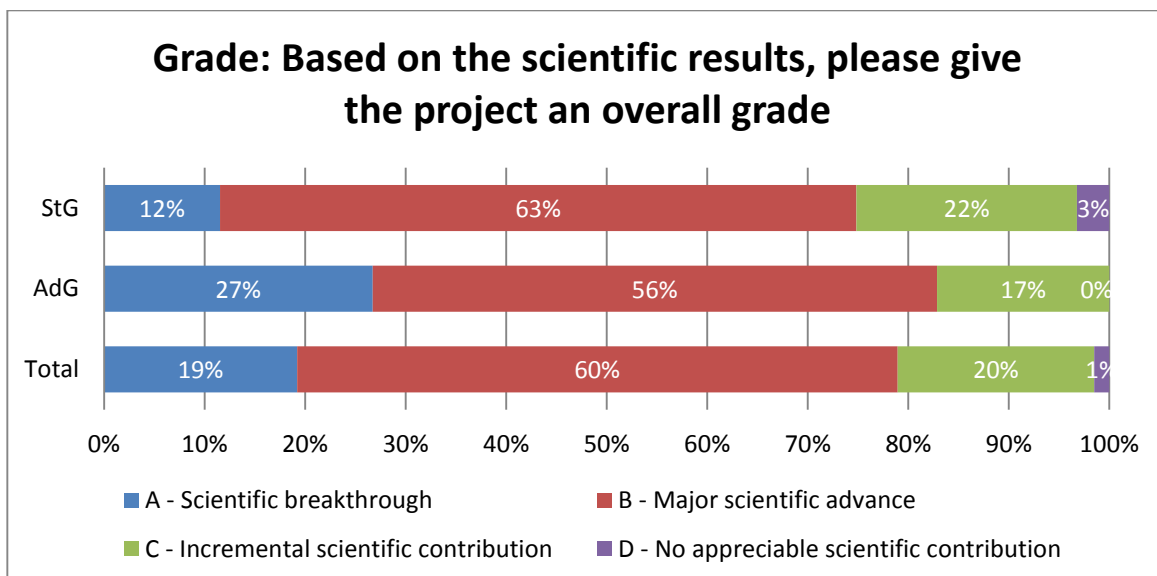


Figure 1. Overall grade: total and by grant type

The evaluators concluded that 19% of the projects led to a scientific breakthrough (A) and 60% of them to a major scientific advance (B). Therefore, taken together, 79% of projects were assessed as having produced a major scientific advance or a scientific breakthrough. 21% of projects were considered as having incremental (C) or no appreciable scientific contribution (D). These numbers can be considered remarkable, as projects were selected randomly and not based on their performance.

When doing the analysis by call type, the results suggest that AdG projects achieved in general better results than StG: for example the percentage of projects scored as A is much higher for AdG than for StG, and the percentage of projects with incremental or no appreciable scientific contribution is lower in AdG than in StG.

A comparison between the results of the exercises of 2015, 2016 and 2017 is presented in Figure 2. The proportion of projects classified as A is higher in 2016 than in 2015 and 2017. When comparing projects classified as A and B together, results are slightly better in 2017 (79%), but still rather consistent with previous studies (71% and 73% for 2015 and 2016 respectively).

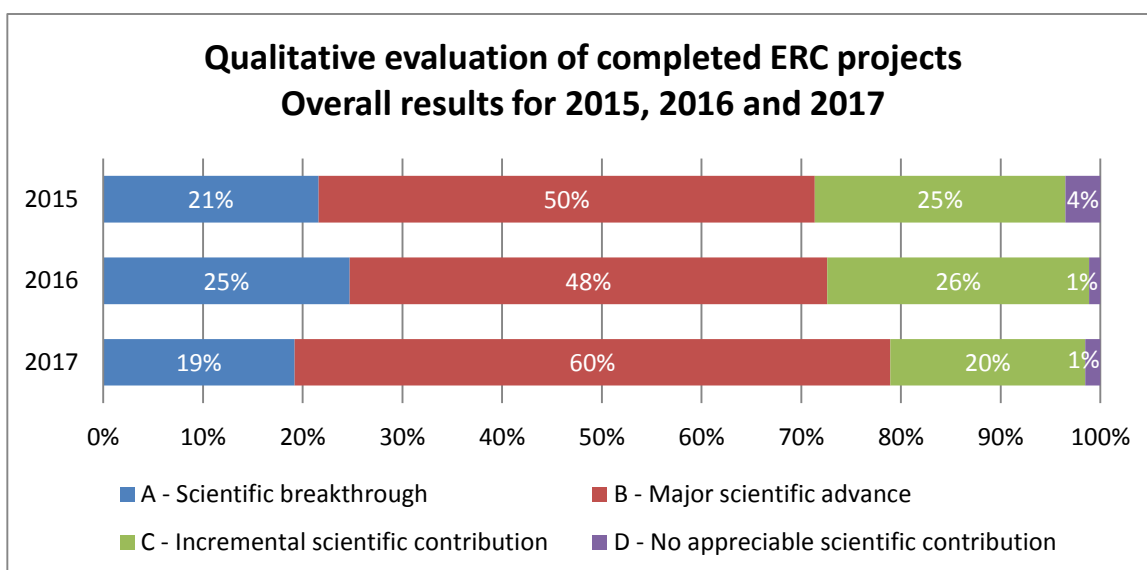


Figure 2. Overall results of the 2015, 2016 and 2017 exercises

### 3.2. Specific assessment criteria

In addition to the overall grade, the panels assessed the projects by answering the following nine questions with specific scale criteria. The categories of this scale are "To an exceptional extent", "Significantly", "Moderately", "Slightly" and "Not at all" for all the questions except for question six (Q6) where the categories "Strongly agree", "Agree", "Neutral", "Disagree" and "Strongly disagree" were used. For questions four, five and seven (Q4, Q5 and Q7) the option "Not applicable" was also included. The texts of the nine questions are the following:

- 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 influenced 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 distribution of the answers to the first question (Figure 3) is very much in line with the distribution of the overall grades assigned to the projects (Figure 1): 80% of projects resulted in new important scientific advances of knowledge to an exceptional or significant extent. Q2 shows that around 65% of projects opened a promising new research agenda for a particular field or a possible paradigm shift (Figure 4).

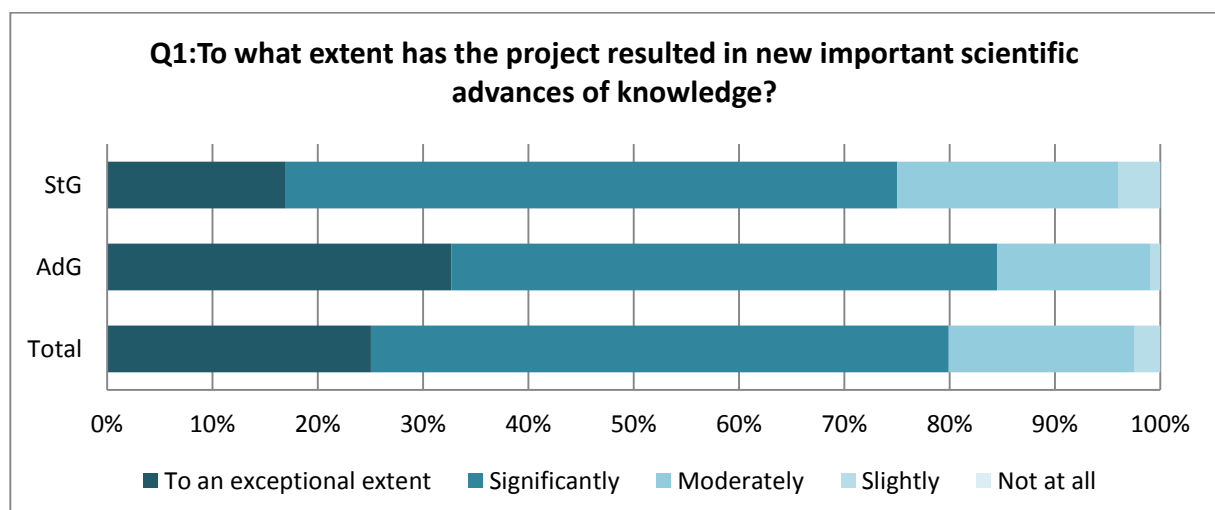


Figure 3. Results on new important scientific advances of knowledge

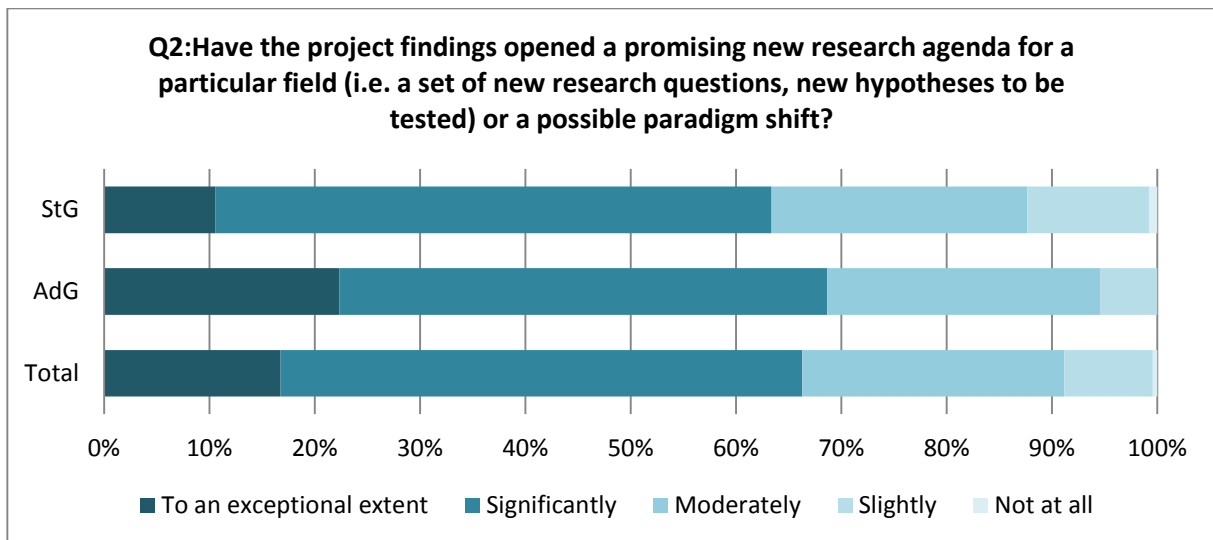


Figure 4. Results on promising new research agendas

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 to an exceptional or significant extent (Figure 5).

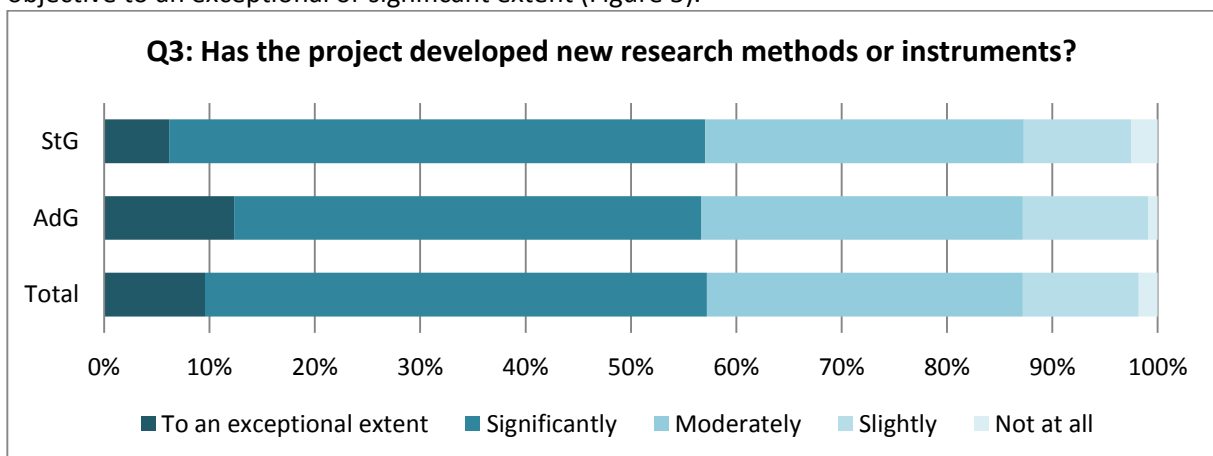
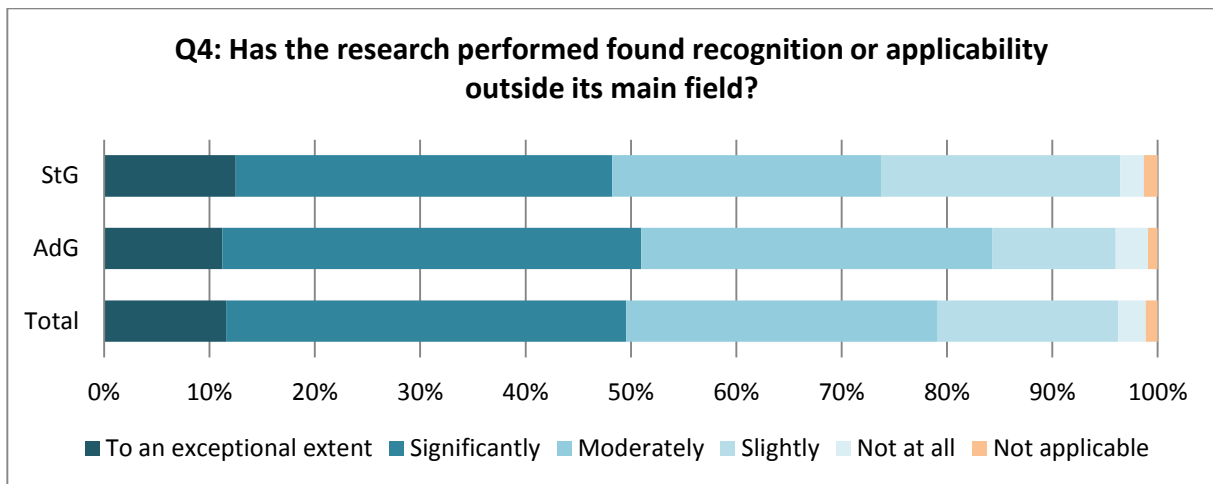
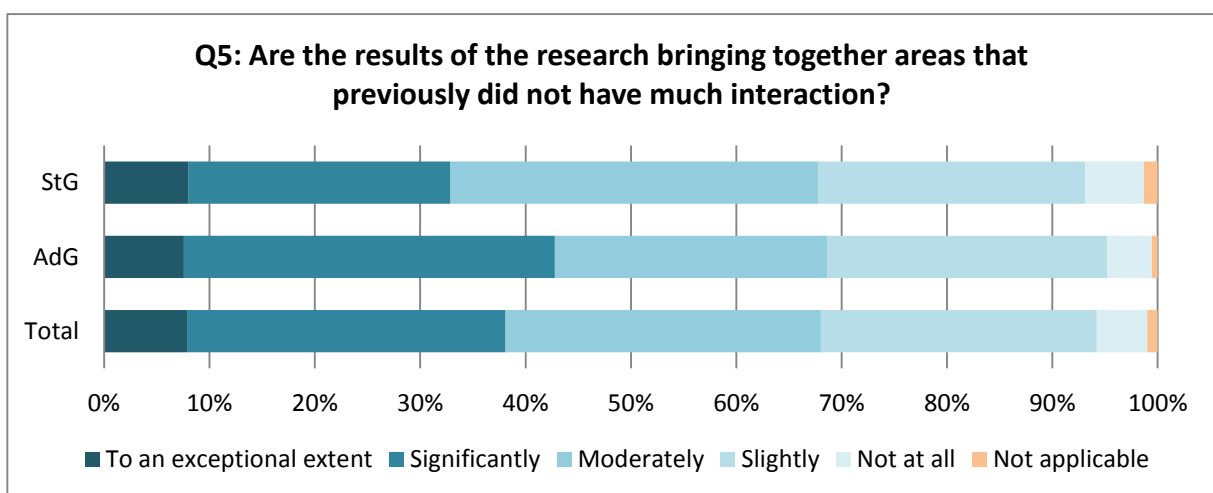


Figure 5. Results on new research methods and instruments

With regard to interdisciplinary, the assessment shows that for a large fraction of 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 80% and 70% of projects were at least moderately interdisciplinary and around 50% and 40% shared this feature to a significant or exceptional extent, respectively.



*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. Taking into account the long-term perspective provided by an assessment performed around seven years after granting, the evaluators considered that only 10% 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).



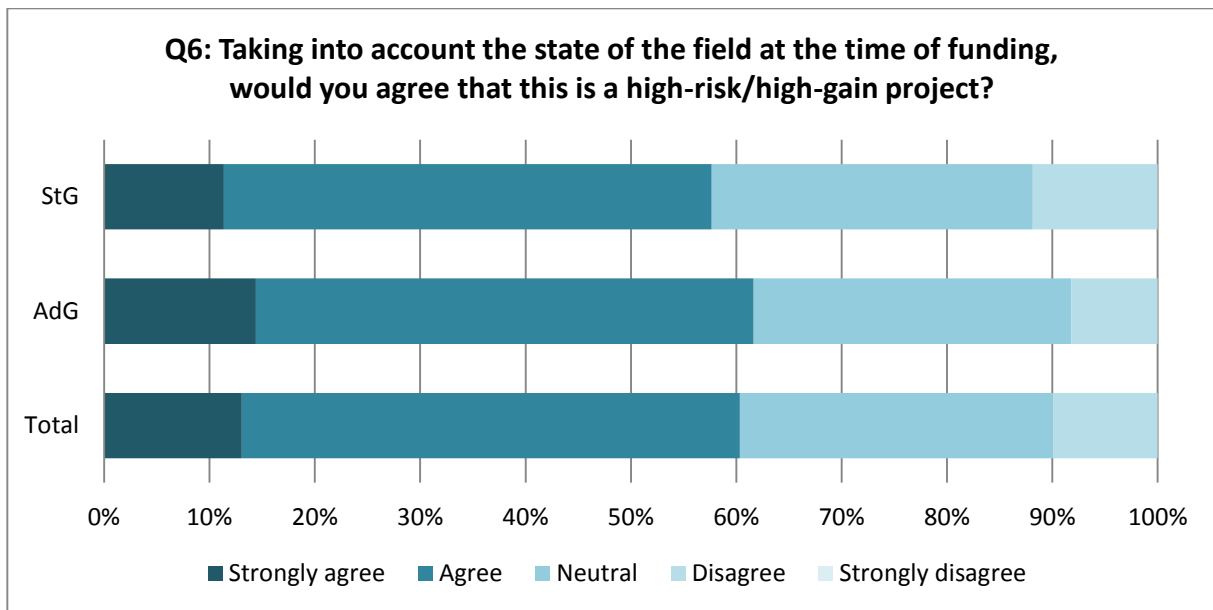


Figure 8. Results on the degree of high-risk/high-gain

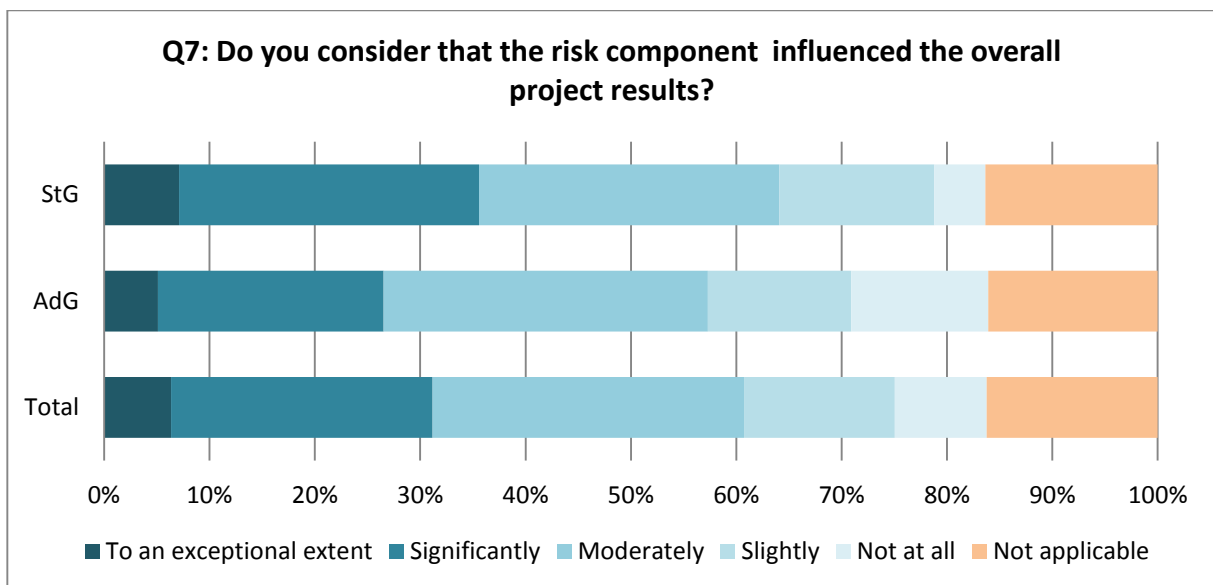


Figure 9. Results on the influence of the risk component

As regards impact (Figures 10 and 11), the data show that over 50% of the projects, the research performed has already at least moderate economic and societal impact (Q8), while over 70% of them are predicted to have this feature in the future (Q9).

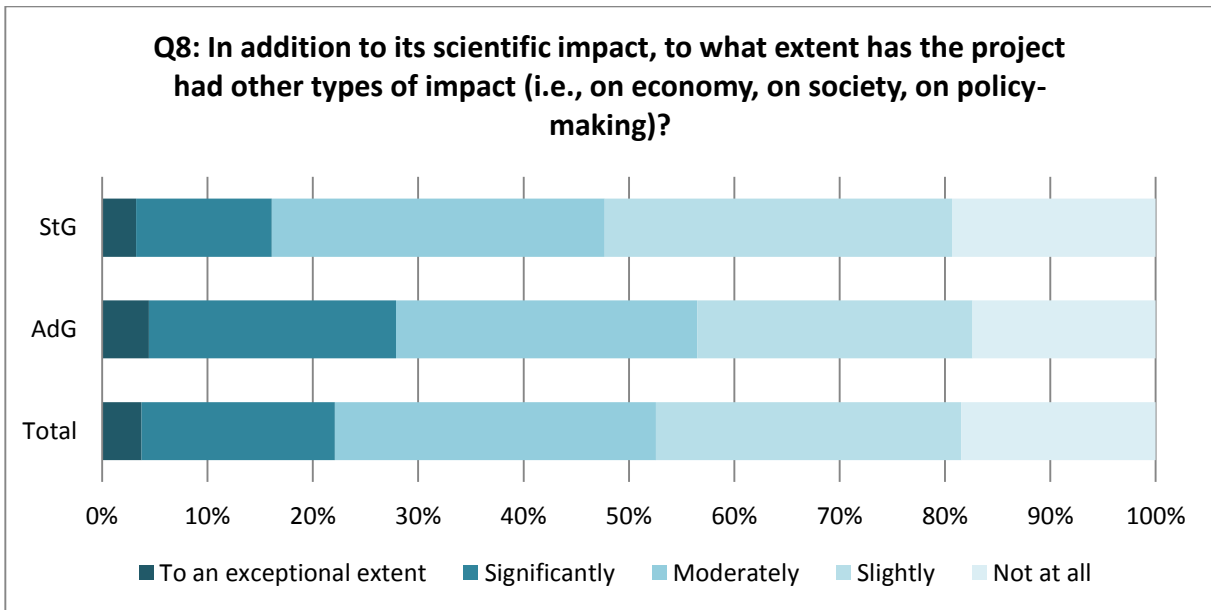


Figure 10. Results on current economic and societal impact

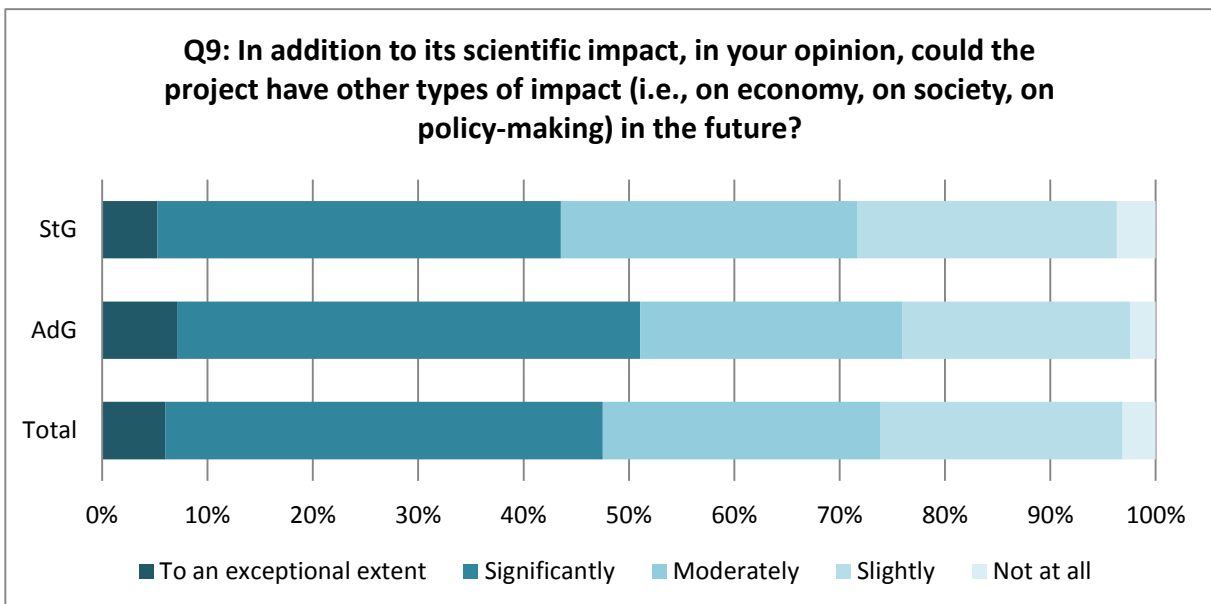


Figure 11. Results on future economic and societal impact

### 3.3. Analysis of the results

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 amongst the projects with an overall grade of A or B. The distribution of projects classified as A and B peak in the "To an exceptional extent" and "Significantly" categories, respectively.

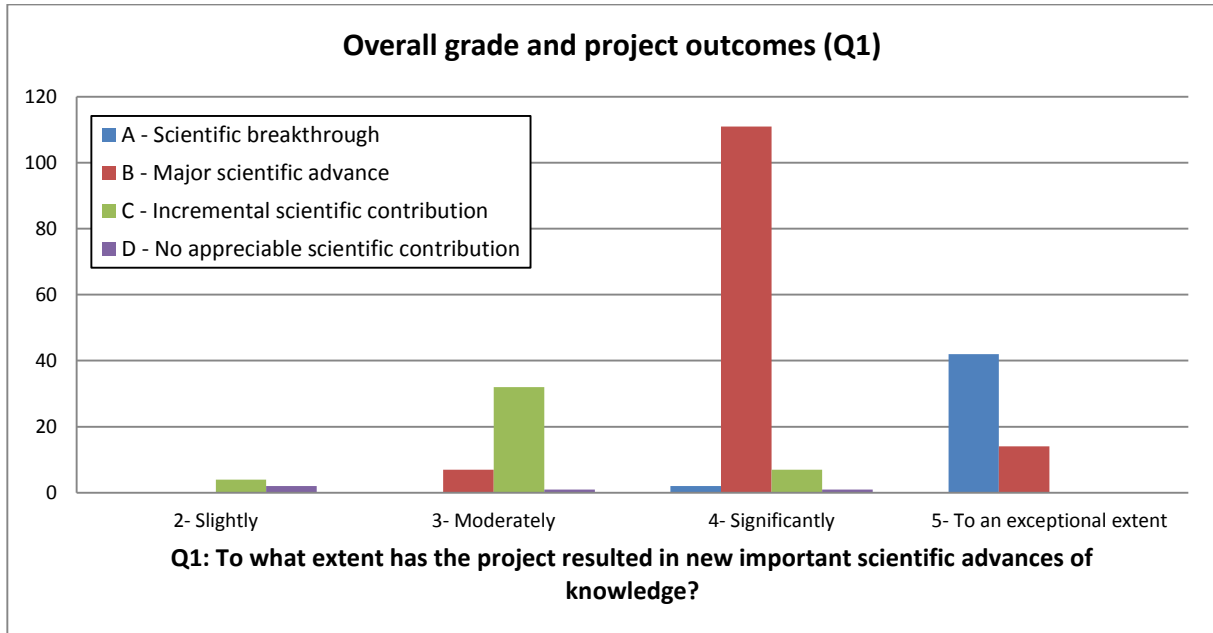


Figure 12. Histogramme of answers to Q1 measuring the results on new important scientific advances of knowledge, split by overall project grade

This is also the case for projects that have opened a promising new research agenda for a particular field (Figure 13).

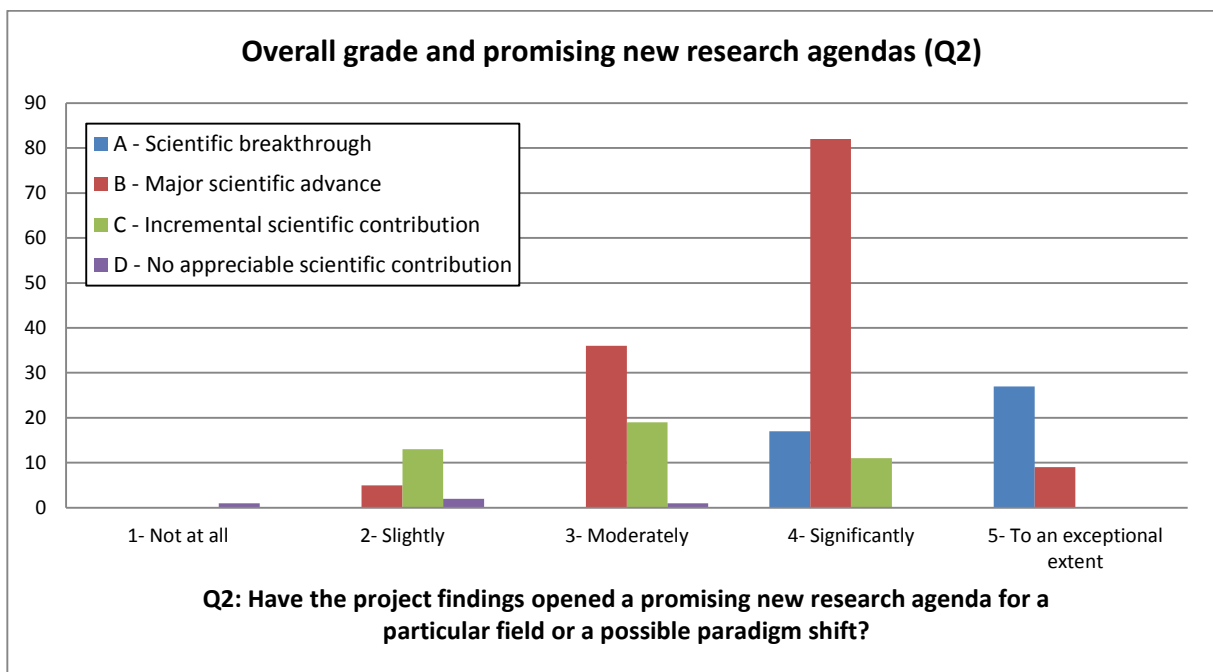


Figure 13. Histogramme of answers to Q2 measuring promising new research agendas opened by projects, split by overall project grade

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 their overall grade: the distribution of projects classified as A and B peak in the "Significantly" category and projects classified as C have a peak between the "Slightly" and "Moderately" categories. These data indicate that interdisciplinary projects are more likely to lead to significant scientific advances or breakthroughs.

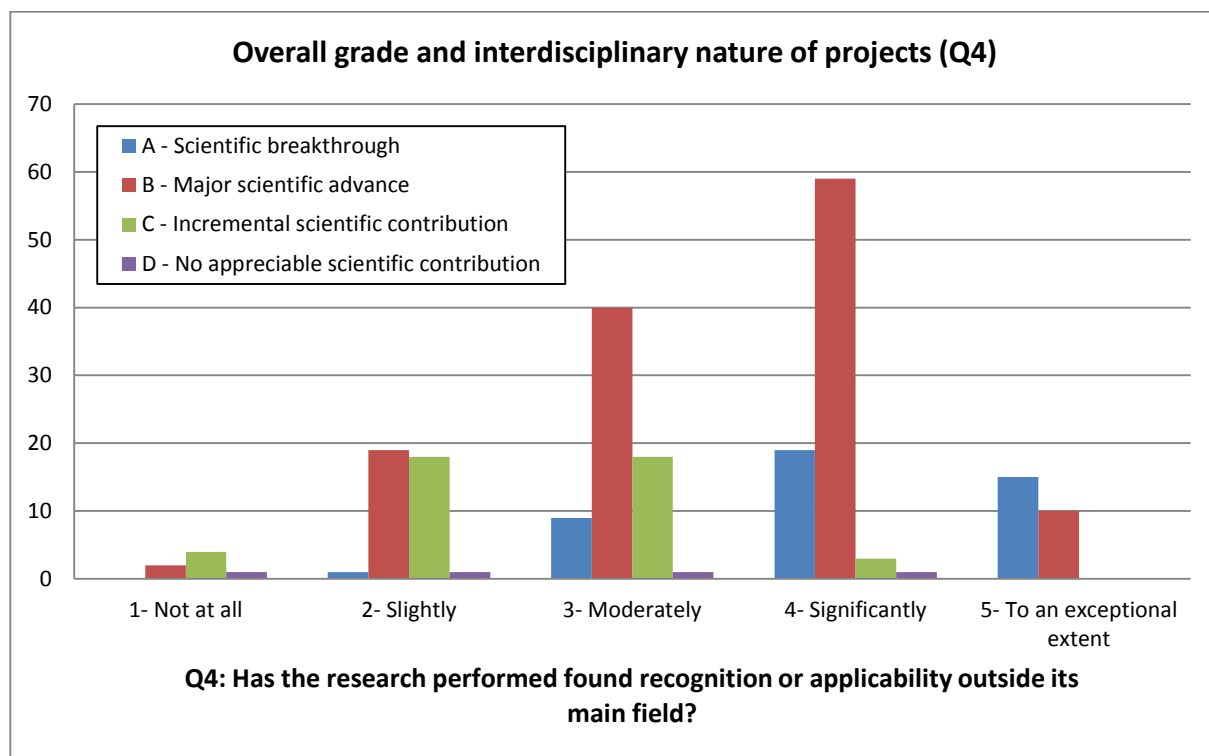


Figure 14. Histogramme of answers to Q4 measuring the recognition or applicability of the research of the project outside its main field, split by overall project grade

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 15). 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. One finds a similar pattern regarding projects with overall grade 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 got an overall grade of C (see Figure 15). These results sustain that in the *ex-ante* evaluation panels took a moderate amount of risk. A lack of projects with incremental (C) or no appreciable scientific contribution (D) in the categories of Q6 "Agree" or "Strongly Agree" could have indicated certain unwillingness of the *ex-ante* evaluation panels to take enough risk when making their funding recommendations.

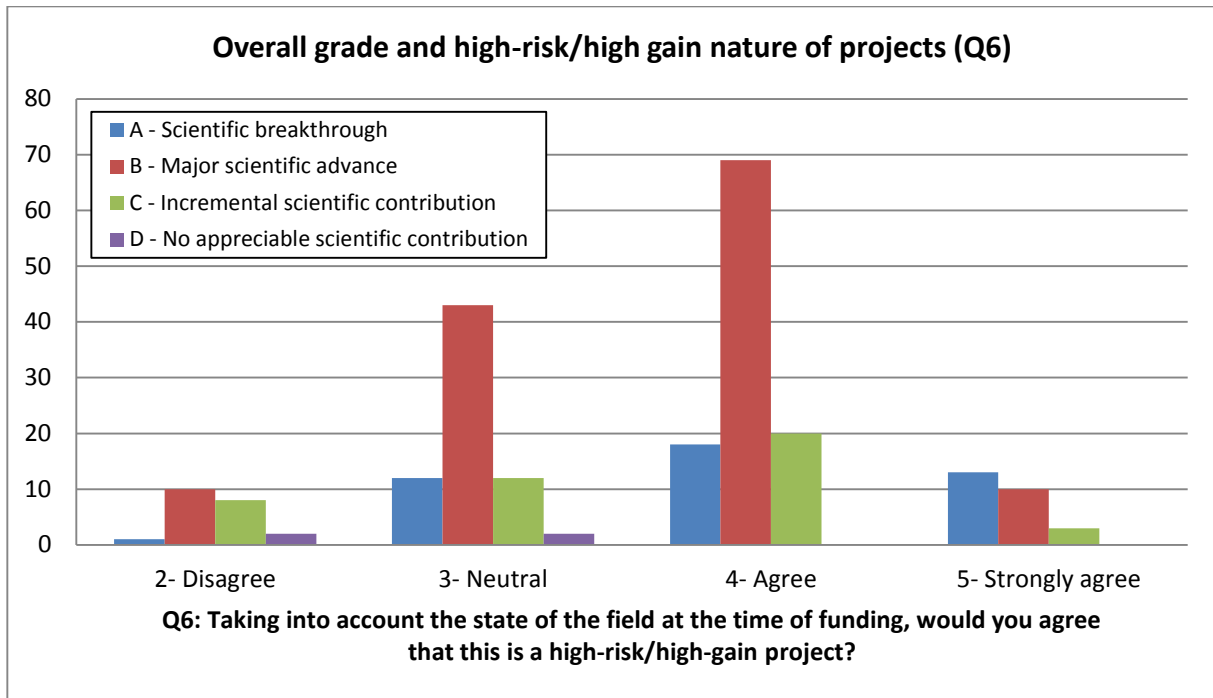


Figure 15. Histogramme of answers to Q6 measuring the high-risk/high-gain nature of the projects, split by overall project grade

The relationship between the projects' overall grade and their economic or societal impact currently (Q8) and in the future (Q9) was also analysed. The results show that, in both cases, there is a positive correlation between these two categories, being stronger when the question is asked about the future (see Figure 16): the distribution of projects classified as A and B peaks in the "Significantly" category, while projects classified as C in the "Slightly" category.

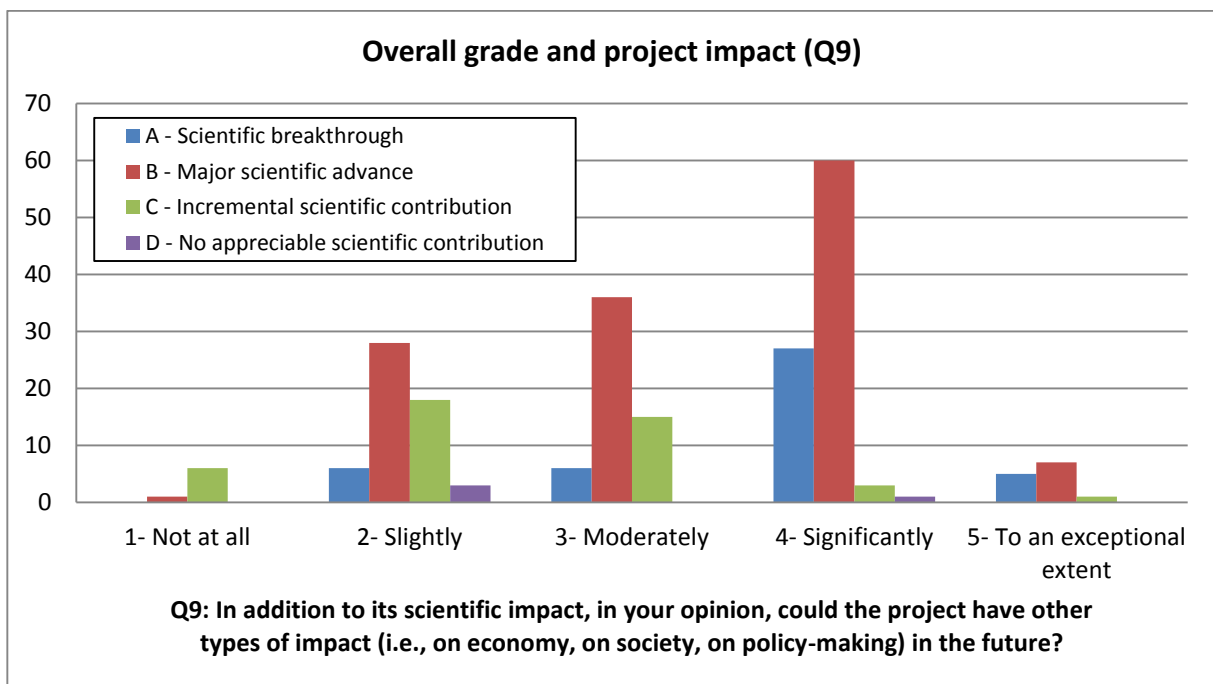


Figure 16. Histogramme of answers to Q9 measuring the economic or societal impact of the research of the project in the future, split by overall project grade

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") have been identified as being more high-risk/high-gain at the time of funding (see Figure 17).

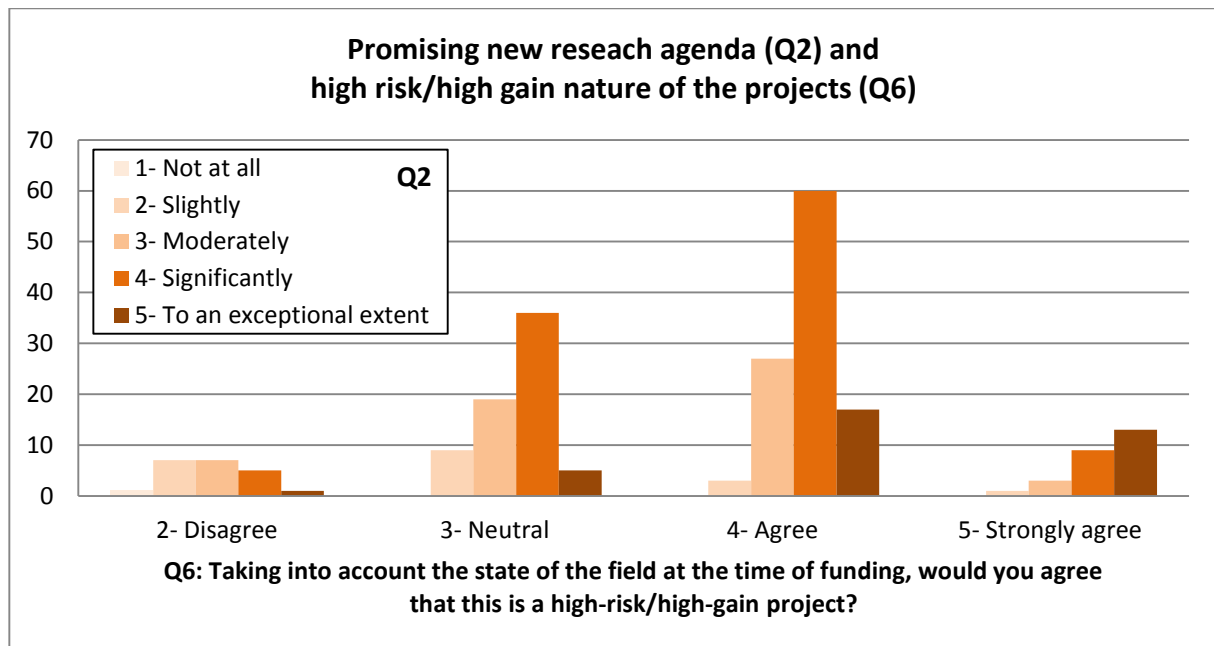


Figure 17. Histogramme of answers to Q6 measuring the high-risk/high-gain nature of the projects, split by promising new research agendas

There is also a significant dependence between the answers to Q3 and Q6, as more projects created new research methods or instruments (answers to Q3 "Significantly" or "To an exceptional extent") amongst those identified as high-risk/high-gain (answer to Q6 "Agree" or "Strongly Agree"). The picture that emerges is shown in Figure 18.

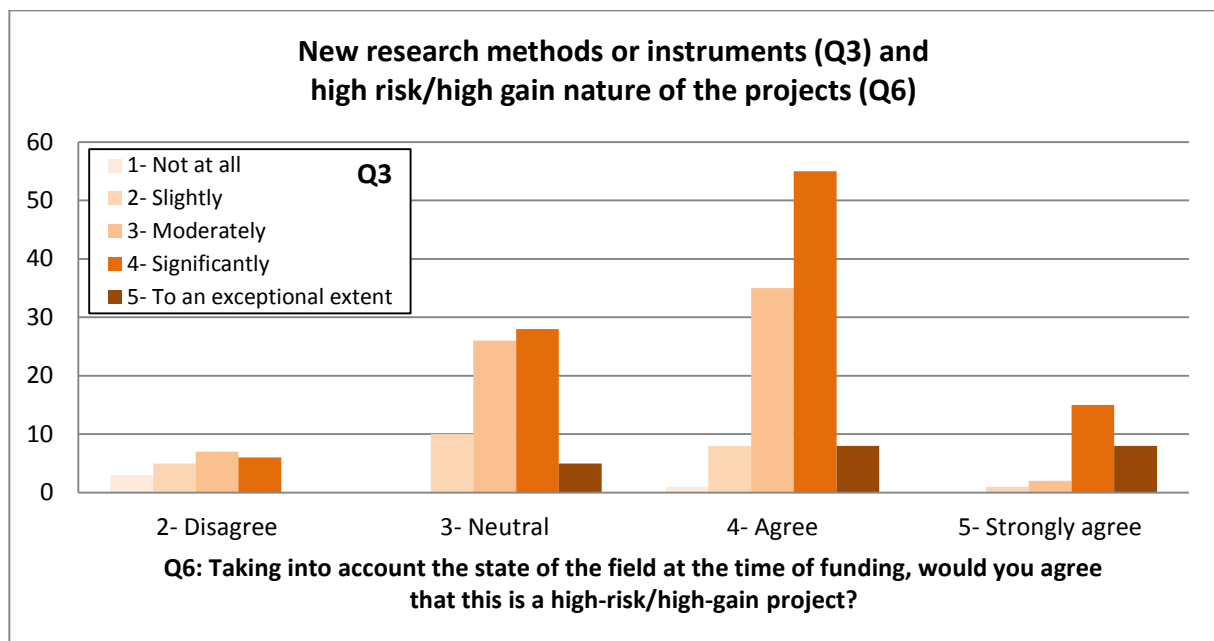


Figure 18: Histogramme of answers to Q6 measuring the high-risk/high-gain nature of the projects, split by new research methods and instruments

The relationship between the interdisciplinary nature of 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 both types of categories. This is shown in Figures 19 and 20, where the distribution of projects with potential future high impact (answers to Q9 "Significantly" or "To an exceptional extent") peaks around the "Significantly" category, while those with low impact (answers to Q9 "Not at all" or "Slightly") have a peak between the "Slightly" and "Moderately" categories.

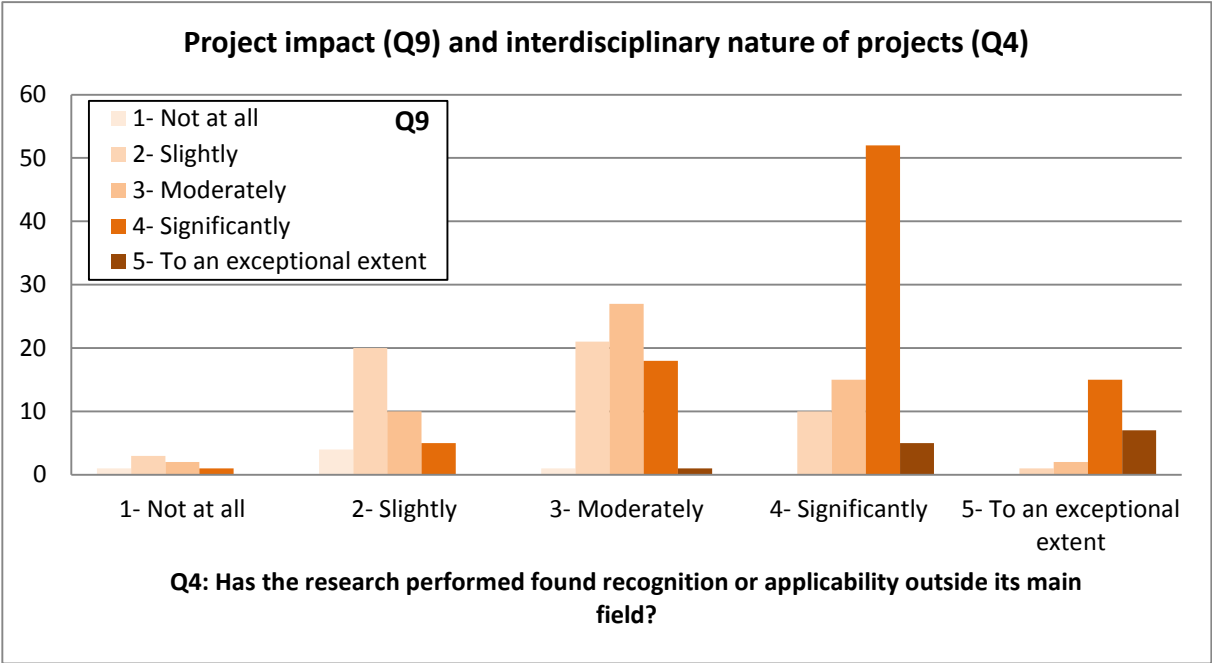


Figure 19. Histogramme of answers to Q4 measuring the recognition or applicability of the research of the project outside its main field, split by future impact of projects

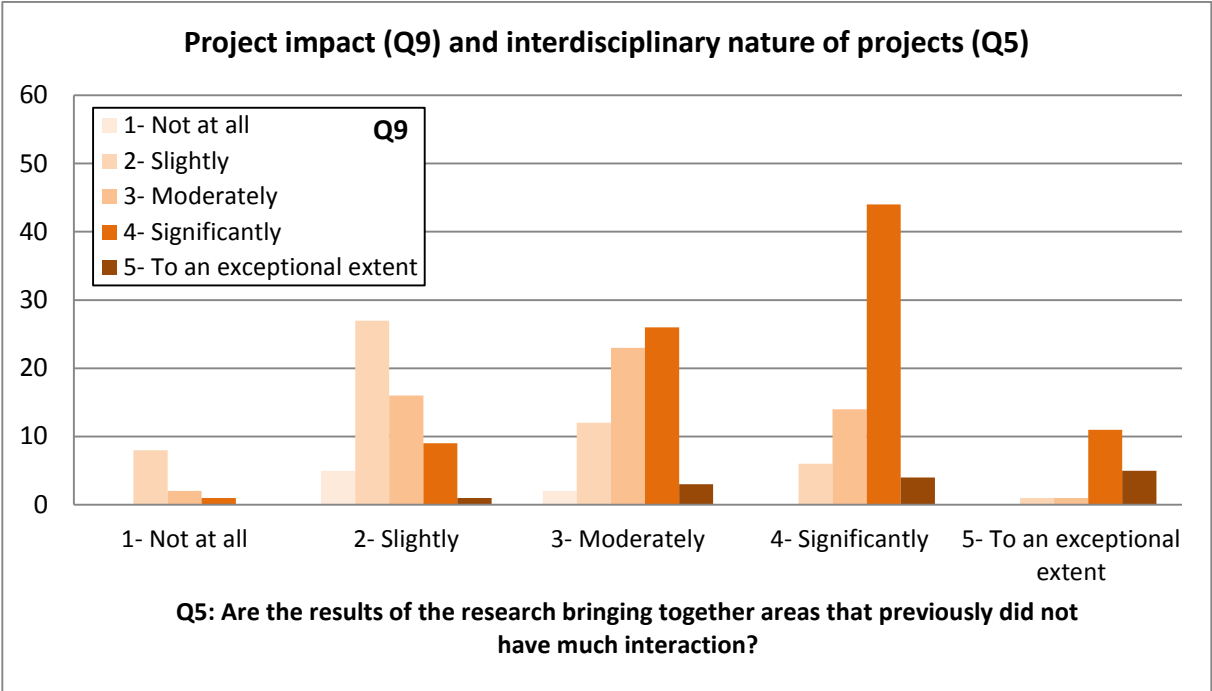


Figure 20. Histogramme of answers to Q5 measuring whether projects brought together areas with not much previous interaction, split by future impact of projects

## 4. Conclusion

The 2017 qualitative evaluation of completed ERC projects concluded that 19% of the assessed projects led to a scientific breakthrough (grade A) and 60% of the projects have led to a major scientific advance (B). These numbers can be considered remarkable, as projects were selected randomly and not based on their performance. Altogether, 79% were assessed as having produced a major scientific advance or a scientific breakthrough. These results are consistent with those obtained in 2015 and 2016, when 71% and 73% of projects respectively were considered as achieving scientific breakthroughs or major scientific advances. Less than a quarter of the projects were given the grades C or D. The small number of projects in these categories could have indicated a reluctance of *ex-ante* evaluation panels to take enough risk when making their funding recommendations.

The evaluation confirmed the strong interdisciplinary nature of the projects, also in accordance with the ERC's mission. Around 80% 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 are bringing together research areas that previously did not have much interaction. Regarding the impact on the economy, society and policy-making, it was found that close to half of the projects have already had impact on these areas, and around three quarters of them are foreseen to do have such impact on the medium and long term.

The results indicate that there is a positive correlation between the projects' overall grade and the degree of interdisciplinarity. Projects that led to significant advances or to breakthroughs have been assessed as being more interdisciplinary. On the other hand, the projects whose results have been categorised as incremental have a lower degree of interdisciplinarity. A similar pattern is found between the overall grade and the projects' impact on the economy, society or policy-making: projects with higher overall grades already have more economic and societal impact, and it is more likely that they will continue to have such impact in the future.

A strong positive correlation was found between the high-risk/high-gain feature and the overall grade of projects. The evaluation concluded that only 10% of the projects were not considered originally high-risk/high-gain. These results support the ERC policy of funding high-risk/high-gain research.

Overall, this *ex-post* peer review evaluation carried out in 2017 confirms the high quality of the research outcome from completed ERC projects. ERC Scientific Council plans to continue performing this type of assessment by independent experts during the coming years, aiming towards a sound evaluation of the performance of its funding schemes.