

# Grants4Targets: an open innovation initiative to foster drug discovery collaborations

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Collaborations between academic institutions and the pharmaceutical industry are increasingly being pursued in the hope that these relationships could help to tackle the challenge of improving research and development (R&D) productivity in industry (How to improve R&D productivity: the pharmaceutical industry's grand challenge. *Nature Rev. Drug. Discov.* 9, 203–214 (2010))<sup>1</sup>, as well as enable academic institutions to better exploit the translational potential of their research. Although there are a growing number of examples of industry collaborating closely with a major academic partner, approaches that exploit the expertise of a larger scientific community, using the internet as a platform, have been more limited. Such an open-innovation model is known as crowd sourcing<sup>2</sup> and has successfully been used in other sectors for decades. However, crowd-sourcing

initiatives in drug discovery are still in their infancy, and whether they have a substantial impact has yet to be proven<sup>3</sup>. Nevertheless, an initial evaluation of the impact of InnoCentive, the first open innovation initiative in drug discovery, introduced by Eli Lilly in 2001, was promising<sup>4</sup>.

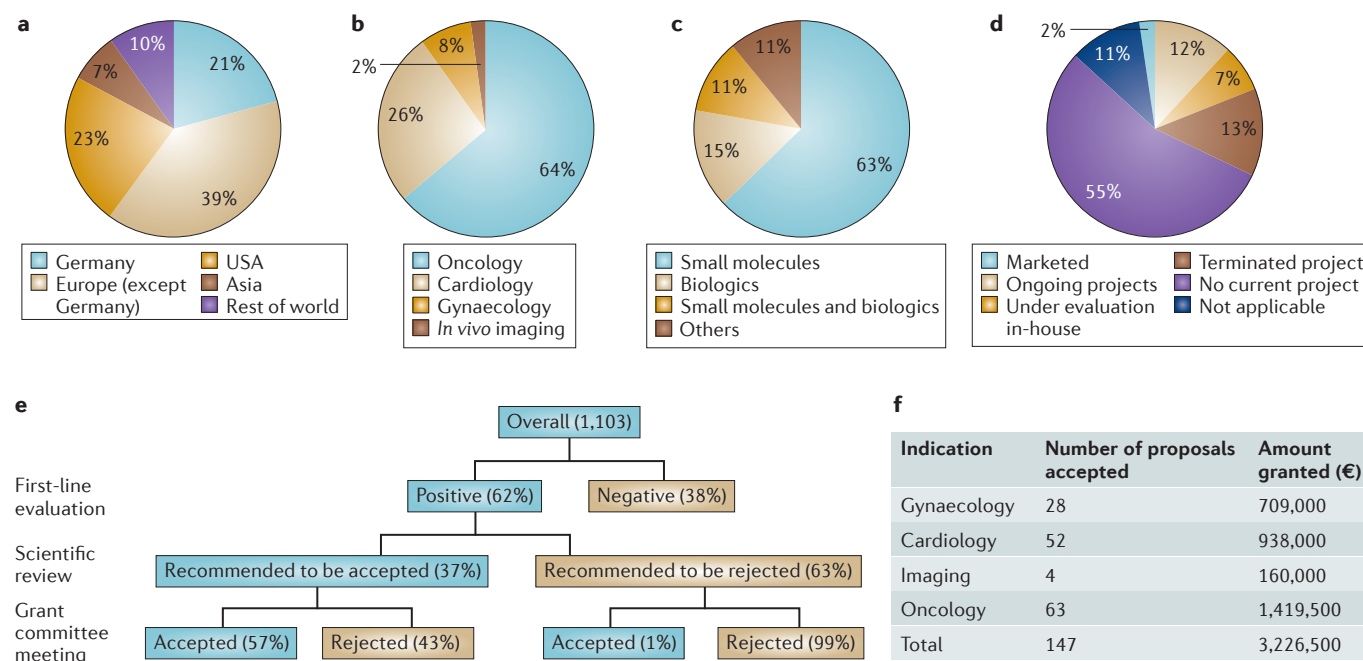
Five years ago, Bayer HealthCare launched a novel crowd-sourcing initiative called Grants4Targets (G4T). With this initiative we aimed to combine expertise from academic researchers and researchers in the pharmaceutical industry to identify and validate novel drug targets and biomarkers. Here, we provide an update on our experiences with this programme, results generated and successes achieved, as well as feedback from both the grant receivers and our in-house scientists acting as reviewers and caretakers.

## Status and process

Since May 2009, researchers from all over the world can apply online via the G4T webpage for a grant supporting a research project for up to 12 months in research areas that are of strategic interest to Bayer HealthCare. Key information regarding focus areas, conditions, criteria and so on are provided on the webpage. The background of the initiative, process and initial results have been reported previously in 2011 (REF. 5). Briefly, after receipt of the application, a rapid first-line evaluation is performed, and applications meeting the general criteria progress to scientific review. Final decisions are made by a grant committee. The whole review process mirrors that of a scientific journal and so uses slightly adapted software (ScholarOne Manuscripts™ by Thomson Reuters Inc., UK). The response time is less than 2 months after the biannual submission deadlines (that is, March 31 and August 31). There are two types of one-year grant: support grants (€5,000–10,000) and focus grants (€10,000–125,000), and intellectual property always remains with the applicant. Afterwards, promising projects might be pursued by separate collaboration agreements.

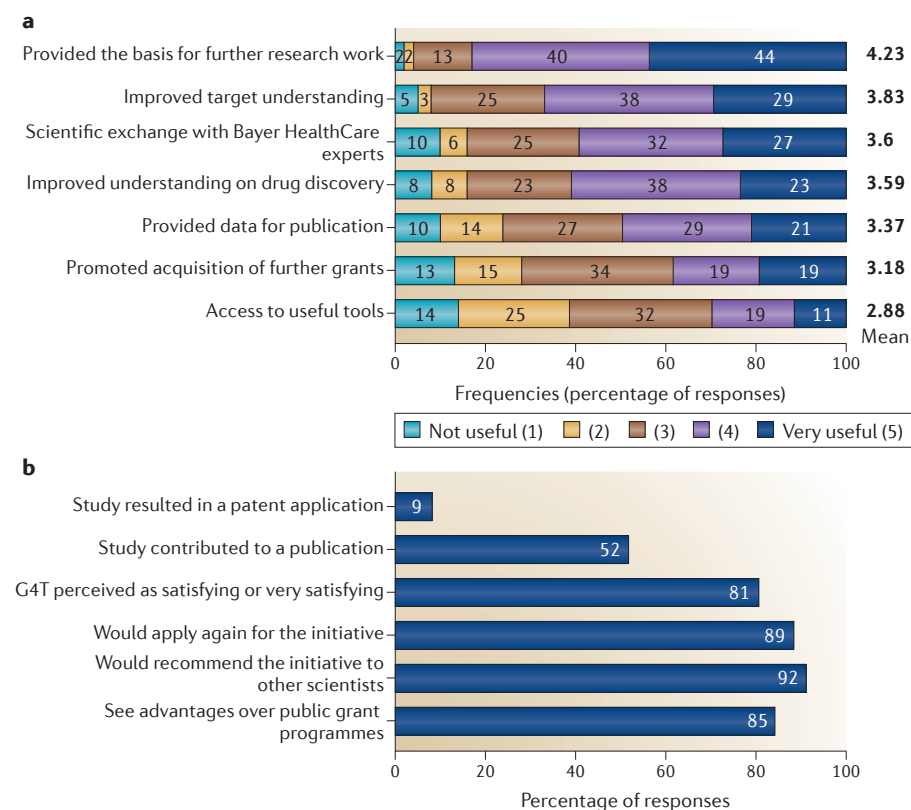
## Results

The initiative has received global recognition, indicated by increasing numbers of website clicks (about 2,000 per month since 2013) and 1,103 applications in 11 calls from all



**Figure 1 | Results of 11 rounds of G4T applications.** Summary statistics for the applications received ( $n = 1,103$ ) are shown. All data are given in percentages. **a** | National distribution. **b** | Applications per indication area. **c** | Target approach. **d** | Novelty of the proposed targets as defined as targets

that have not been addressed by us previously for a particular therapeutic area or indication ( $n = 683$ ; after first-line evaluation). **e** | Decision tree of the Grants4Targets (G4T) application process. **f** | Allocation of grants for biomarkers and targets to indication areas.



**Figure 2 | Value of G4T for grant receivers.** **a** | 65 of the 71 surveyed receivers indicated that the Grants4Targets (G4T) award and the interaction with Bayer HealthCare scientists have been useful for them from different aspects. Mean scores for ratings on a scale from 1 (not useful) to 5 (very useful) are shown. **b** | The graph depicts percentages of grant receivers indicating that the G4T grant resulted in or contributed to patents and publications, that they are satisfied or very satisfied with the programme, would apply again with another project, would recommend the initiative to fellow scientists and see advantages over other public funding programmes.

over the world (FIG. 1a). We are receiving applications for all of our main strategic areas; the majority of proposals are for oncology (FIG. 1b). Most applications were for small-molecule targets (FIG. 1c). After we broadened the initiative, we also received increasing numbers of applications for projects relating to biomarkers. More than 50% of the targets proposed were new to us (FIG. 1d). Proposals sent to internal scientists for review were evaluated positively and recommended to be funded in 37% of the submissions, indicating the high quality of the ideas submitted (FIG. 1e). 147 proposals in all our strategic indication areas have been finally accepted — an overall success rate of 13%. A total of €3.2 million has been granted (FIG. 1f). For each grant, an internal caretaker was appointed to interact with the external partners. Caretakers support the grant receivers by giving advice from the perspective of a pharmaceutical company, by helping to perform certain experiments at our institution (for example, gene expression analyses) or by providing tools such as

compounds. The grants triggered or generated relevant input for 10 in-house drug discovery research projects. So far, they have led or contributed to 6 lead generation projects, 1 lead optimization project and 2 preclinical development projects. Moreover, one new indication for an existing compound was proposed, which we are currently investigating. The programme also helped to identify promising animal models and led to access to new academic partners who were engaged in additional collaborations.

### Survey

An online, anonymous survey of both external grant receivers ( $n=98$ ) and internal caretakers ( $n=52$ ) was conducted between 25 March and 11 April 2014. Participants could select between different options for answers but were also able to provide free comments. Both 'yes/no' and multiple choice questions were included, and for some questions a rating was requested on a scale from 1 to 5. The response rate was 72.4% ( $n=71$ )

and 50% ( $n=26$ ) for grant receivers and caretakers, respectively.

Grant receivers indicated that getting access to funding is the most common (93%) but not the only reason to apply. Indeed, making contact with Bayer HealthCare scientists (42%) and/or Bayer HealthCare (38%) was quite frequently chosen as a driver for the application. The satisfaction with the website was high (mean score of 4.2; maximum possible 5). 75% evaluated the interaction with Bayer HealthCare as satisfying or very satisfying (mean score of 3.99). 70% of the grant receivers had further interaction with Bayer HealthCare beyond what was necessary for the pure administration of the grant, mainly involving scientific exchange and discussions of results and experimental working plans (78%). In particular, discussions on the working plan, which happened in 42 cases, was perceived as helpful (95%). Almost all of the 71 surveyed receivers indicated a benefit from the grant initiative (91%), in particular with regard to providing the basis for further research (FIG. 2a). Grant receivers reported that their study rarely resulted in a patent but frequently contributed to a publication (FIG. 2b). Overall, 81% rated the G4T initiative as satisfying or very satisfying, 89% would apply again with another project, 92% would recommend the initiative to fellow scientists, and 85% of the receivers see advantages over public funding programmes (FIG. 2b). Verbal comments indicated that the initiative was seen as a very innovative approach. The low administrative hurdles and the fast and easy access to funds, together with the opportunity to get in contact with the industry in general and/or with the scientists at Bayer HealthCare were appreciated. A desire for even more intensive follow-up activities and constant interaction with Bayer HealthCare was expressed.

Caretakers indicated that they spend, on average, 5.3 working days in total to support a G4T project. 69% of the caretakers agreed with the receivers on a working plan, which is only requested for the more substantial grants (that is, focus grants). In these cases, 89% of the caretakers reported interactions with the grant receivers to discuss the working plans, which were usually perceived as helpful (88%) and that their recommendations were considered (81%). When caretakers evaluated how helpful the G4T project was for their own drug discovery activities, they scored in the intermediate range, with an average score of 2.88. However, the overall satisfaction of the caretakers was reflected by a mean score of 3.44, and the majority

(85%) would supervise another grant project. 92% of the participating caretakers would recommend or have already recommended external scientists to apply for the programme. Furthermore, 77% would encourage other colleagues to take over responsibility as a caretaker in the initiative or have already done so. Verbal comments indicated that caretakers see a great chance to create new ideas and to network through this initiative.

### Conclusion

The G4T initiative has been highly successful. As well as identification and validation of several new targets, which have already had direct impact on our portfolio, it led to the identification of promising animal models and access to new academic partners,

and also helped to increase our reputation within the scientific community. G4T is well accepted internally and externally, and we will continue with this programme. The G4T platform has also been broadened to [Grants4Leads](#) and [Grants4Apps](#), and an initiative to support the testing of compounds in novel indications is in preparation.

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### Competing interests statement

The authors declare [competing interests](#): see Web version for details.

### FURTHER INFORMATION

**Grants4Apps:** <https://www.grants4apps.com>

**Grants4Leads:** <https://www.grants4leads.com>

**Grants4Targets:** <https://www.grants4targets.com>

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