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Crowd Innovation: Hype or Help?

PLATFORMS › CONTESTS › CONFLICT MANAGEMENT
OPEN STRATEGY › SOCIAL INNOVATION › NASA INTERVIEW

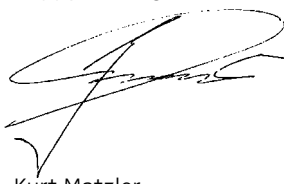FROM ACADEMIC RESEARCH TO PRACTICAL USE

Editorial

Knowledge and wisdom are unevenly distributed in society. ''No matter who you are, most of the smartest people work for someone else'' observed Bill Joy, co-founder of Sun Microsystems back in the 1990s – a law that many companies still seem to live by. But, ''never mind'', some clever managers thought, and invented crowdsourcing to fish for knowledge in a global pool of talents. Successful crowd projects range from finding gold mines to developing smart watches to establishing Wikipedia. Many companies also work with crowds for design, aesthetic or creativity challenges. But is crowdsourcing really a silver bullet? Is it a cure for all ills? Or is it a fading hype?

In this issue we take stock of years of research into crowdsourcing to discuss its merits as well as its limits. We explore different types of crowdsourcing – from microtasking to collaborative innovation. We discuss success factors in different contexts, for problems from product innovation to social innovation and strategy. We investigate why consumers are willing to share their expertise, often for free, as well as factors that may upset a crowd and cause participants to act against a company. Further, we learn from NASA's extensive crowdsourcing experience in amazing innovation challenges and how the Swiss soft drink company Rivella worked with a crowd to create new flavors.

We conclude that crowdsourcing can indeed be a powerful tool, if applied skillfully to the right problems. We invite you to dive into this exciting world of idea generation, problem solving and collaborative innovation and get a feeling for circumstances that lead to successful crowd engagement outcomes. May this issue be an inspiration for your work as innovators, product/ brand managers, and strategists.

Happy reading!

Kurt Matzler

Innsbruck, January 2020
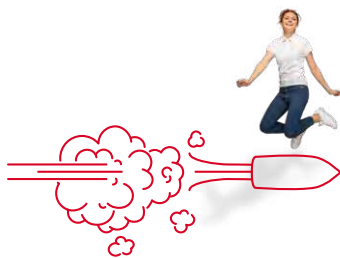
Crowd Innovation: Hype or Help?

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Kurt Matzler

All kinds of organizations have tapped into crowds to find individuals who can help them solve problems and develop innovations. Crowdsourcing makes it possible to attract a highly diverse audience that approaches innovation challenges from new angles. To develop groundbreaking innovations, companies are after exceptional ideas – and those are more likely to be found in large crowds rather than small internal groups. Furthermore, participants in crowd projects select the challenges they are really interested in themselves, due to which their motivation and engagement levels tend to be high. In collaborative crowdsourcing projects, new and better ideas can emerge when crowds share information freely, build on other ideas and are able to accumulate and recombine different concepts.

Despite these advantages there are risks: costs and effort might be underestimated, or organizations might fail to control their crowds. And the crowd can sometimes also be wrong. Managers need to carefully analyze which solutions they seek and whether their problems can be solved through crowdsourcing. Not all innovation needs are suitable for open innovation, but crowdsourcing can have remarkable success if applied wisely to the right challenges.

How to Manage Crowdsourcing Platforms Effectively

Ivo Blohm, Shkodran Zogaj, Ulrich Bretschneider and Jan Marco Leimeister

Crowdsourced tasks are very diverse – and so are platform types. They fall into four categories, each demanding different governance mechanisms. The main goal of microtasking crowdsourcing platforms is the scalable and time-efficient batch processing of highly repetitive tasks. Crowdsourcing platforms for information pooling aggregate contributions such as votes, opinions, assessments and forecasts through approaches such as averaging, summation, or visualization. Broadcast search platforms collect contributions to solve tasks in order to gain alternative insights and solutions from people outside the organization, and are particularly suited for solving challenging technical, analytical, scientific, or creative problems. Open collaboration platforms invite contributors to team up to jointly solve complex problems in cases where solutions require the integration of distributed knowledge and the skills of many contributors. Companies establishing crowdsourcing platforms of any type should continuously monitor and adjust their governance mechanisms. Quality and quantity of contributions, project runtime, or the effort for conducting the crowdsourcing project may be good starting points.

Strategies for Leveraging Crowds

Linus Dahlander and Henning Piezunka

How to Prevent Crowdsourcing Disasters and Leverage Positive Side Effects of Open Innovation

Johann Füller, Katja Hutter and Niclas Kröger

Crowds can be very effective, but that is not always the case. To actually render the usage of crowds effective, several factors need to be aligned: crowd composition, the right question at the right time, and the right analytic method applied to the responses. Specific skills are mandatory to tap into the creativity of a crowd, harness it effectively and transform it into offers that markets value.

The ''DBAS'' framework is recommended to successfully implement a crowd project. It consists of four stages, and in each phase some key questions need to be addressed. Each decision along the DBAS pathway matters and how you navigate each stage can either reinforce or undermine decisions made at the other stages. The right degree of innovativeness, listening to contributors and informing participants openly about the fate of rejected ideas are key success factors that require special attention. To continually improve the odds of success, crowdsourcing should best be treated as a continual iterative churn.

The gains from crowdsourcing can be high, but so can the risks. Contests may become a nightmare for the sponsoring organization if the innovators do not behave as planned. When contest managers act in undesirable ways from a participant's perspective, community members might bash, shame or ridicule a company. To prevent ''firestorms'' – negative, often highly emotional posts in social media that are eagerly taken over by traditional media – project sponsors need to ensure fairness throughout the contest. The value of the price and the procedures for selecting winners must be fair and transparent – and companies need to stick to predefined rules. Organizations that succeed in keeping their community motivated might not only benefit from new ideas, but also from additional positive effects. Devoting time, skills and personal engagement to developing new ideas for a company favors intense relationships, and participants often become passionate brand followers. By communicating openly about their approach of open innovation, companies can also foster their innovative image.

Open Strategy: The Inclusion of Crowds in Making Strategies

Christian Stadler, Julia Hautz and Stephan Friedrich von den Eichen

While innovation contests have become very popular, the inclusion of crowds in the strategy process is less common. Some recent implementations are blogging, wikis, jams, ideation contests and community platforms or prediction markets. The most common goal of using crowds in strategy is to generate novel and unconventional ideas concerning a company's strategic direction. Also, increasing internal participation and including employees on a larger scale can improve the implementation of a strategy. Other organizations state that by including a broader set of stakeholders, they can make the strategy formation process more transparent and comprehensible to the general public or their customers, which makes them able to increase external acceptance. On the other hand, the inclusion of larger audiences increases complexity, and involving employees makes it more difficult for managers to remain in control. Projects need to be well-conceived, well-planned and well-funded. Organizations need to remain flexible, learn from experiences and be ready to adjust tools and activities whenever necessary.

Motivating Crowds to Do Good: How to Build Crowdsourcing Platforms for Social Innovation

Thomas Kohler and Henry Chesbrough

Social innovations, just as any other form of innovation, can benefit from crowd engagement. However, the enthusiasm for crowdsourcing social innovation has so far run ahead of its effects. Many platforms are stillborn and struggle with turning their promising projects into sustaining platforms. As opposed to commercial crowd innovation projects, additional obstacles need to be handled here. Social innovation tends to be more complex and typically involves an entire eco-system with complementary partners. In addition, funding is usually more difficult as the impact of doing good on a communal level is hard to assess and therefore difficult to explain to investors or sponsors. To make social innovation successful, the innovation platform design needs to tackle these additional challenges. The governance and coordination of social innovation projects need to be designed thoughtfully. Organizations need to be prepared for several loops and some experimentation to balance value generation with the right structure and the right mix of participants, consumers and other platform partners.

Crowdsourcing at NASA: About the Work Behind Having Others Do the Work

Interview with Ryon Stewart, Challenge Coordinator at NASA's Center of Excellence for Collaborative Innovation (CoECI)

NASA's record of innovations is truly awesome. Every child knows about the first man on the moon and the space shuttle program, or marvels at images of outer space transmitted from NASA missions. It is less well-known that even the world-class engineers of NASA tap into the wisdom of crowds to solve their problems and devise groundbreaking solutions. In our interview, Ryon Stewart explains that innovation is less about a genius having a light-bulb idea while sitting at a desk and more about finding solutions that already exist – somehow, somewhere. Learn how NASA uses the power of crowds, why NASA's workforce still won´t run out of work, and how even the bison at Yellowstone National Park contributed to problem-solving.

Case Study "Crowdsourcing@Rivella": In Search of New Flavors

Silvan Brauen

The development of new beverage concepts in close cooperation with consumers via crowdsourcing was a great success for Rivella AG overall, but the approach did not remain without certain difficulties and challenges. For example, when reviewing the more than 800 ideas, the Rivella innovation team observed that a very small group of users had put certain ideas in the foreground.

It is therefore advisable to take a closer look at outcomes and not just blindly trust a crowd. Another challenge of the crowdsourcing approach was the considerably increased management effort for the in-house innovation teams. Practice also showed that platform users in crowdsourcing projects are often attracted by ideas with a certain degree of originality and novelty. While finding truly new ideas is one of the main reasons for involving external crowds in the first place, Rivella noted that aspects such as feasibility, profitability and the strategic sense of an idea rather tend to remain on the sidelines in a typical process.

Not all innovation problems are suitable for open innovation, but crowdsourcing can have remarkable success if applied wisely to the right challenges.

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Crowd Innovation: The Philosopher's Stone, a Silver Bullet, or Pandora's Box?

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Unconventional thinkers wanted ✕ Solutions to some of the most challenging problems have always come from people that are neither specialists nor experts in the focal field. These people have used unorthodox reasoning and relevant knowledge previously not applied to a given problem. Box 1 describes two such examples, one dating back to the 18th century, and one from current times. An advantage of our digital age is that these innovators, problem solvers, and gifted inventors can be reached and motivated to contribute their ideas and knowledge to the most challenging problems via well-organized crowdsourcing. This term was coined in 2005 by the editors of Wired Magazine, who used it to describe how organizations can take advantage of the networked world to "tap the talent of the crowd". Crowdsourcing as a term was soon after adopted by bloggers, in the popular press, the business community, and in academia. Not only did

it become popular, it was regarded in many industry circles as the philosopher's stone of innovation. But does crowdsourcing live up to expectations? Or is working with the crowd like opening Pandora's box? It´s time to take a closer look at how crowdsourcing works and what it can actually accomplish.

Crowdsourcing can take different forms ✕ All kinds of organizations, both public and private, have tapped into the "wisdom of the crowd" to find help in solving problems and developing innovations. According to eYeka, one of the largest crowdsourcing and co-creation platforms, 85% of the 2014 Best Global Brands have used crowdsourcing, of which the quest for innovative ideas was the most frequent application (59%), followed by marketing and communication ideas (34%) and design solutions (7%). Crowdsourcing has become so popular among companies that specialized crowdsourcing platforms and services have emerged to serve the demand. InnoCentive is probably the best known of these. It considers itself "the global pioneer in crowdsourced innovation", with a community of approximately 400,000 problem solvers from over 190 countries. More than 2,000 contests have been held and more than USD $20,000,000 has been paid out in prizes so far. Kaggle is another example. Owned by Alphabet Inc., Kaggle is an online community with more than 1 million data scientists and machine learning engineers. Kaggle runs competitions in diverse fields and disciplines, from news analytics to predict stock price performance, algorithms to understand customer loyalty, predicting customer revenues, or prices for real estate. Other areas are clinical research, health care, basic biology, criminology, and search technology. There are different forms of crowdsourcing, of which the most popular for innovation are described below.

Crowdsourcing then and now
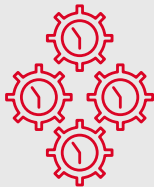
Back in the 18th century

In October 1707, four ships of a British fleet struck the rocks of the Isles of Scilly and sank. Between 1,400 and 2,000 men lost their lives. The sailing masters had miscalculated the longitude. The Scilly naval disaster led the British parliament to offer a series of rewards for anyone who could find an accurate way to determine longitude: ''...nothing is so much wanted and desired at sea, as the discovery of the longitude, for the safety and quickness of voyages, the preservation of ships, and the lives of men...'' according to the Longitude Act, 1714. For centuries, determining longitude at sea was a tough challenge for ocean navigators, and one of the toughest challenges for science as well. Even brilliant minds like Giovanni Medico Cassini or Isaac Newton could not find the answer. It was an English carpenter and self-educated clockmaker, John Harrison, who claimed the reward for determining longitude with his marine chronometer.

Fast forward to 2014

Exploration of the solar system poses a significant risk of radiation exposure both to humans and to hardware. Predicting Solar Particle Events that emit energy particles is of prime importance. Lacking an available method to predict onset, intensity, or duration of a Solar Particle Event, in 2014 NASA made an open call to invite people from all over the world to submit ideas for a solution. Over 500 problem solvers from 53 countries submitted solutions. The $30,000 reward went to Bruce Cragin, a retired radio frequency engineer from New Hampshire, who had an undergraduate degree in heliophysics. ''And it happens that when you take the math from extracting signal from noise and apply it to a heliophysics problem you get a really good prediction and this ended up being like an eight-hour prediction capability'', explains Steve Rader, from NASA Johnson Space Center.

https://www.nasa.gov/content/data-driven-forecasting-of-solar-events-challenge-0/
https://www.nasa.gov/johnson/HWHAP/crowdsourcing

> **Contests** ✕ Contests are the most common way to tap into the creativity and expertise of large crowds in the context of innovation. A company offers cash prizes to those who solve a challenging problem or submit a winning creative solution. The challenge is broadcast as widely as possible and it is open for a fixed period. Some of the toughest scientific and technological challenges have been solved through contests. Contests are also used for topics like developing new product designs, algorithms, or commercials. For instance, Swarovski organized gemstone design competitions, Netflix created a prize for collaborative filtering algorithms, and Frito-Lay launched its successful ''Crash the Super Bowl'' contest. A contest is particularly suitable when the problem is complex or novel, and when it is not obvious who might have the best solution or idea.

> **Crowd collaboration projects** ✕ Crowd collaboration projects, by contrast, do not seek the best individual solution for a problem, but try to tap into collective wisdom to aggregate knowledge and ideas into a coherent and value-creating whole. Wikipedia is probably the best-known example. Another is OpenIDEO. It was launched by the design and consulting firm IDEO as an ''open innovation platform where people from all corners of the world collaboratively tackle some of the toughest global issues through launching challenges, programs, and other tailored experiences''. Based on ''design thinking'', the IDEO community shares ideas, collaboratively refines them, and tries to solve problems like ''How might mobile technology help improve access to healthcare?''. Some companies have begun to involve large internal and external crowds

in strategy-making. IBM, for instance, invited its 150,000 employees plus externals like business partners, customers, or university researchers into its strategy process, attracting more than 46,000 ideas. The US Navy used a crowdsourcing platform in the form of a massive online war game to update its strategic plan.

⟩ **Crowd complementors** ⤬ Crowd complementors are a third common form of crowdsourcing. With this approach, a product or platform owner invites the crowd to develop innovative solutions that create value through complementary innovations. In contrast to the other two forms, it does not seek the solution to a defined and specific problem, but new applications for many different problems. Amazon for example, allows the crowd to develop and publish skills for its virtual assistant Alexa. Using the Alexa Skills Kit, by the end of 2018 almost 60,000 skills were developed by the crowd. In 2019 Amazon went further by allowing every user to develop skills with templates and to publish them.

FIGURE 1 ⟩ Forms of crowdsourcing for innovation

	Crowd contest	Crowd collaboration	Crowd complementors
Description	The sponsor (organization broadcasts a problem and offers a prize for the contributor of the best solution	A large community works together to jointly achieve something that individuals could hardly do	The crowd develops a wide variety of solutions that enhance the value of a product or a platform
Best use	⟩ Challenging technical, analytical, and scientific problems ⟩ Development of new designs ⟩ Creative or aesthetic challenges	⟩ Tasks that can be modularized and have standardized routines ⟩ Accumulation and recombining ideas of a large crowd	⟩ New solutions for open platforms ⟩ New solutions to augment value of the core product
Principle	**Diversity**: use of many different approaches, ideas, or perspectives to solve a problem	**Collective intelligence**: cross-fertilization, aggregating decentralized knowledge, tapping into the wisdom of the crowd ("With enough eyeballs all bugs are shallow")	**Differentiation**: Create a large diversity of innovative solutions for product or platform users
Examples	NASA tournament lab, idea contests on InnoCentive	Wikipedia, OpenIDEO, IBM Innovation Jam	Smartphone operating systems and apps, Amazon Alexa skills; Lego ideas platform

adapted from Boudreau & Lakhani, 2013

Why crowdsourcing works ╳ What makes crowds attractive as innovation partners? And why are strangers and anonymous experts often the ones who come up with the most original or simplest solutions? Research has identified four basic explanations.

> **Marginality** ╳ Marginality refers to the distance between the solver's field of technical expertise and the focal field of the problem. Karim Lakhani, professor at the Harvard Business School and one of the foremost experts in crowdsourcing, has spent years conducting and studying hundreds of crowdsourcing projects. In the case of the crowdsourcing platform InnoCentive, he found that topical distance was positively related to higher rates of winning solutions. Technical and social marginality can be a source of different perspectives, and heuristics and can play an important role in explaining individual success in problem-solving. Experts, industry specialists and professionals tend to generate many good ideas, but with little variation. Due to specific education, formal training, work experience, and regular practical application, experts accumulate knowledge in their specific domain. They develop routines to solve frequently encountered problems and converge on conventional cognitive frameworks. Crowdsourcing, on the other hand, attracts a diverse audience and a variety of nontraditional problem solvers.

> **The Bell Curve** ╳ Karim Lakhani's second observation regarding the Bell Curve of ideas is simple but compelling. Innovative ideas tend to be normally distributed. There will be a few ''low quality'' ideas, many average ideas, a few good ones, and with luck, one or two that are exceptional. To develop groundbreaking innovations, companies seek those exceptional ideas or, statistically speaking, outliers. Outliers are extremely rare in small samples, however. When it comes to innovation, whether strategic, technological, or new products, we care about ''extreme values'',

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To develop groundbreaking innovations, companies seek exceptional ideas or, statistically speaking, outliers.

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and to get those we need large samples. The Austrian crystal producer Swarovski, for instance, invited more than 1,700 participants to submit over 3,000 pieces of jewelry during a jewelry design competition. Among the participants were both professional designers and amateurs or hobbyists. Submitted designs were evaluated by all users, with the top designs generating more than 4,400 evaluations. Statistical analysis revealed the bell-curve pattern depicted in Figure 2: Designs by professionals, on average, received the highest ratings, their variance on quality was the lowest. Non-professionals submitted low average quality, but with high variance. And the designs evaluated exceptionally highly – representing the ''extreme values'' – came from the non-professionals!

> **Cross-fertilization** ╳ In collaborative crowdsourcing projects, new and better ideas emerge when crowds share information freely, when they can build on other ideas, when they can accumulate and recombine ideas. Many software solutions for crowdsourcing allow participants to post ideas, view other ideas, discuss them, and rate them. With its I-Prize, Cisco gave innovative thinkers, entrepreneurs, students, and inventors worldwide access to an expanded portfolio of collaboration solutions with the idea of breaking down communication barriers and helping participants to share ideas and collaborate effectively. For instance, a social video community allowed participants to record, edit, and share videos, and to comment, rate, and tag content of interest. Further, a speech-to-text translation facilitated video search and viewing. A search platform helped contest participants locate experts and connect with them. An online meeting platform for audio and web conferencing was also provided. The evaluation took place in an idea market where contest participants could buy and sell ideas with a ''virtual currency''. This allowed participants (and Cisco) to establish the value of an idea.

> **Self-selection and intrinsic motivation** ╳ Problem-solving in most organizations follows a conventional path: select people, assign roles and responsibilities, incentivize with salary and bonus, and hope that skills and competencies will solve the problem. Crowdsourcing is different. People select themselves into problems based on their interests and competence; they are intrinsically motivated by the task, and in contests hundreds or thousands of people compete to win a prize. In contrast to the conventional approach, organizations pay only for the solution and not for the ideas that aren't used.

FIGURE 2 > The power of diversity – Crowd versus experts

Number of ideas

Crowd:
low average quality,
but high variation
and higher likelihood of
„extreme values"

Experts:
on average high
quality, but low
variation

Outliers:
breakthrough ideas,
unconventional
solutions

Quality of an idea
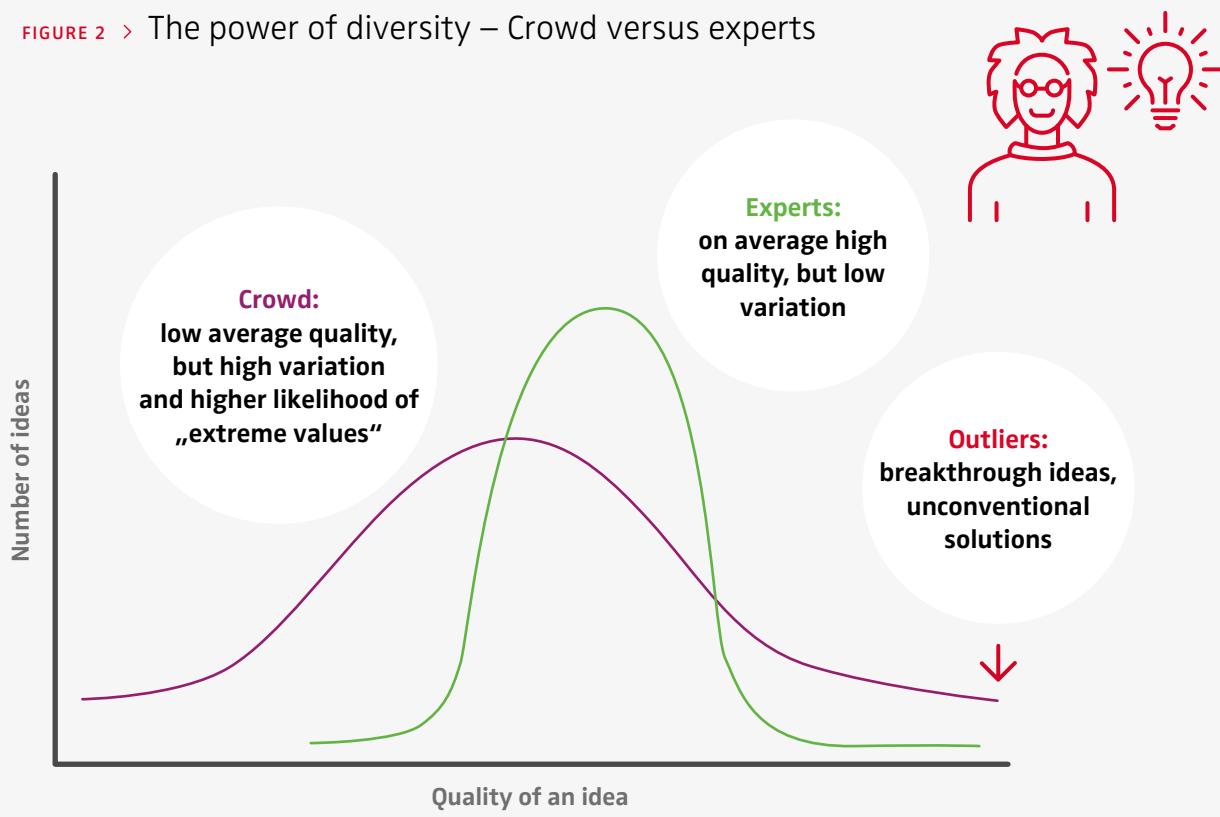
adapted from MacCormack, Murray & Wagner, 2013

How crowdsourcing can be a success ✕ The articles in this issue all discuss critical factors that make crowdsourcing successful. Ivo Blohm and colleagues (pp. 18) explore the topic of different platform types and discuss efficient governance principles for each. Linus Dahlander and Henning Piezunka (pp. 24) look at critical success factors of innovation contests and present ideas to motivate crowds to deliver the right kinds of contributions. Johann Füller and coauthors (pp. 30) explain conditions under which innovation contests are likely to fail and how companies can keep a crowd motivated. Julia Hautz and coauthors (pp. 36) investigate the special case of crowdsourcing for corporate strategy and demonstrate the utility of involving internal and external crowds in that effort. Another special application is presented by Thomas Kohler and Henry Chesbrough (pp. 42). They demonstrate how crowdsourcing can be applied for social benefit. In an interview, Ryon Stewart (pp. 48) shares what NASA has learned from almost 400 crowd-sourced projects, some of them highly unusual. Finally, Silvan Brauen presents a case study of how Swiss beverage manufacturer Rivella applied crowdsourcing (pp. 54). He does not overlook the problems encountered, which leads us to our next topic.

The dark side of crowdsourcing ✕ A multitude of success stories show how outsiders can solve challenges and how crowds can outperform specialists. But not all projects are successful. When things turn out to be more complicated than envisioned, companies may feel they have opened a Pandora´s Box that they should have left closed. Below is what can go wrong or turn out differently than planned, and what to do about potential pitfalls.

> **Don't underestimate the cost** ✕ It sounds compelling. Frame the problem, set a prize, broadcast the challenge, and wait. But successful crowdsourcing needs preparation and management. The effort needed to select the winning idea alone can be enormous, as the process must be fair and effective. With its Innovation Jam, IBM learned that most ideas submitted were not new, and many were completely impractical or irrelevant. When 40,000+ ideas are submitted, identifying good ideas can be like finding a needle in a haystack. Managers spent weeks sifting through Gigabytes of Jam conversations. Cisco received over 1,200 distinct ideas from more than 2,500 participants in 104 countries in its $250,000 I-Prize competition for ideas that could

FIGURE 3 > Why crowdsourcing can be powerful

Marginality of problem solvers	The Bell-Curve	Cross-fertilization	Intrinsic Motivation
↓	↓	↓	↓
Individuals not affiliated with the problem field approach the problem with different perspectives and heuristics	Individuals with diverse backgrounds generate a large number of ideas with large variation	Individuals with different backgrounds contribute different knowledge; they accumulate and combine their ideas	Individuals self-select themselves into crowd-sourcing projects based on their interests and skills
↓	↓	↓	↓
Problems that cannot be solved with con-ventional methods are more likely solved by unconventional thinkers	„Big ideas'' are statisti-cal outliers: The more ideas and the greater the variation, the more likely they are to surface	New solutions emerge in a combinatorial feed-back process: the more that is known, the more new combinations of solutions are possbile	A large number of highly motivated individuals compete and collaborate to develop the best solution

generate new businesses. Analyzing the entries and select-ing a winner took six people working full-time for three months. To avoid ''expert biaswf Cisco's inhouse evaluators and handle the quantity, comments and votes from idea contributors were also considered. Cisco then assigned a mentor to the 40 semifinalists to help them refine their ideas, eliminate weaknesses, and develop a business plan. In the next round, 10 ideas were selected, and contributors were invited to present their ideas.

> **Don't blindly follow the crowd** ⨯ To handle the massive amount of ideas and suggestions, many companies let par-ticipants and consumers rate the ideas. However, research has shown that user ratings are not good predictors of idea quality. Reto Hofstetter and his team studied idea contests on Atizo, a major European crowdsourcing platform. The results showed no correlation between consumers' votes in the contest and the market success of the eventual prod-ucts as rated by managers. Other studies confirmed that in crowdsourcing contests, consumers tend to propose ideas high in novelty and originality but low in feasibility.
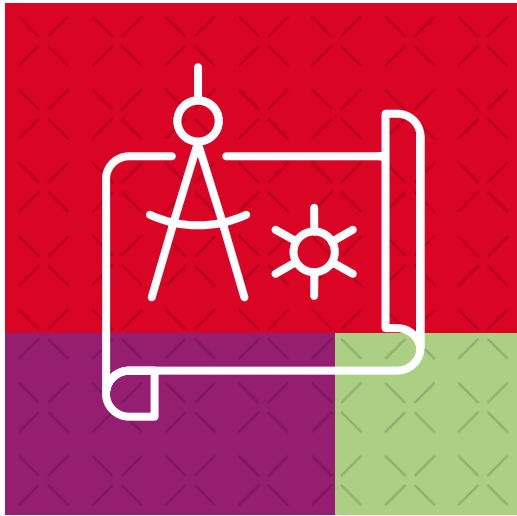
> **Take a closer look at the crowd's voting behavior.** ✕ Another finding of Hofstetter's study was that social ties on crowdsourcing platforms can dramatically skew results as happened at Rivella (see article on pp. 56). In their study of more than 30,000 ideas submitted in 87 crowdsourcing projects, the researchers found that participants tend to reciprocate in a *quid pro quo* – if you vote for my idea, I will vote for yours.

> **When the crowd goes mad** ✕ An otherwise smoothly running contest can take a wrong turn. Some participants might even 'hijack' the contest. Instead of offering sincere suggestions, participants may seize the chance to ridicule a company, an effect investigated by Peter C. Verhoef and his colleagues. In the box on page 32 in this issue there are descriptions of incidents with notebook brand Moleskine and the German detergent brand Pril; but the list of companies that are seriously challenged by their crowds is still growing. So, be aware that crowds can be difficult to control, especially if a company has outstanding customer issues that haven't been dealt with, or if the terms of the contest aren't fair.

> **Not invented here.** ✕ Finally, don't forget that one of the major challenges in crowdsourcing comes after the solution has been found. It is the ''not invented here'' syndrome, a strong internal corporate bias against ideas from the outside. If crowdsourced ideas are not accepted internally, they will not be implemented. Crowdsourcing is a cultural change and a change in the role of R&D people who have vested interests in the company direction with respect to their own roles and inventions. Concerted listening to employees can anticipate and avert potential resistance and bring them on board.

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Crowdsourcing is not the answer to every innovation requirement.
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Crowdsourcing – a silver bullet if you know how to shoot and what to aim at ✕ Crowdsourcing can be a powerful tool. It can dramatically enhance a company's innovativeness. Nevertheless, it is not the philosopher´s stone of innovation. And even if things go wrong and produce distress instead of groundbreaking innovation, it isn´t Pandora´s Box either. Crowdsourcing is simply not the answer to every innovation requirement. Managers must analyze carefully what kinds of solutions they seek and whether their problems can be solved with crowdsourcing. They need to consider the cost and the potential downsides when evaluating its benefits. If the balance of advantages and downsides points to the wrong side, there remains a range of traditional approaches to pursue. Applied wisely to the right challenges, crowd-sourcing might indeed be a silver bullet. ✕

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FURTHER READING

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How to Manage Crowdsourcing Platforms Effectively

Ivo Blohm, Shkodran Zogaj, Ulrich Bretschneider
and Jan Marco Leimeister

Not all crowdsourcing challenges are created equal ×
New information technologies have allowed companies to
tap into the creative potential, distributed work patterns,
and expansive knowledge of huge online crowds. In various
business fields, crowds can solve certain problems faster,
better, and cheaper than companies are able to do in house.
Today, according to a trend report published by the platform
provider eYeka in 2015, 84 % of the world's top companies –
including SAP, Dell, Google, General Electric, Fiat, LEGO, and
Procter & Gamble – have started to build their own crowd-
sourcing platforms. The crowd-sourced tasks, however, are
highly diverse, as are crowdsourcing platforms. For instance,
the Fiat Mio platform, where contributors collaborated to
develop a new concept car, is completely different from the
GE Ecomagination Challenge, where contributors compete
against each other. In the case of Fiat Mio, contributions
were small and reflected by sharing, commenting, editing, or
integrating ideas for further developing the car in a collabora-
tive fashion. In contrast, GE's Ecomagination Challenge does
not require substantial collaboration among contributors. It
facilitates an innovation contest in which each contribution
reflects an independent and exhaustive solution to a specific
crowdsourced task. Of course, the different nature of the
tasks demands different governance mechanisms. While
collaboration is an important issue for Fiat Mio, mechanisms
that permit the control and evaluation of a high number of
alternative contributions will be a key challenge for GE.

KEYWORDS
**Crowdsourcing,
Platform Management,
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Companies establishing crowd-sourcing platforms should continuously monitor and adjust their governance mechanisms.

Different types of crowdsourcing platforms ✕ Crowd-sourcing platforms fall into four categories, distinguished by the diversity and aggregation of their contributions (see Figure 1). The main goal of microtasking crowdsourcing plat-forms is the scalable and time-efficient batch processing of highly repetitive tasks, e.g., categorizing data or writing and translating small chunks of text. Crowdsourcing platforms for information pooling aggregate contributions such as votes, opinions, assessments, and forecasts through approaches such as averaging, summation, or visualization. Broadcast search platforms collect contributions to solve a task to gain alternative insights and solutions from people outside the organization. They are particularly suited for solving chal-lenging technical, analytical, scientific, or creative problems. Frequently, broadcast search is applied to running different kinds of innovation, design, or data science contests. Finally, open collaboration platforms invite contributors to team up to jointly solve a complex problem where the solution requires the integration of distributed knowledge and the skills of many contributors. The individual contributions are aggregated such that one or more solutions to the under-lying problem can emerge. In practice, however, pure forms of these archetypes are rare. Frequently, crowdsourcing plat-forms combine several traits.

How to manage the different types successfully ✕ The management of these different types needs to reflect their varied goals and nature along several dimensions. Gover-nance involves structuring roles and responsibilities, formal and informal rules, standards and regulations, outcome con-trol measures, communication processes, or details of task allocation to achieve a crowdsourcer's goal. In a research project, we identified six distinct governance domains that encompass 21 distinct governance mechanisms for crowd-sourcing. We investigated a total of 19 platforms and for each platform type, we studied at least four typical platforms. The purpose of our study was to identify effective governance mechanisms for each type of platform. Figure 2 summarizes which types of governance mechanisms are effective for the different types.

> **Effective governance of microtasking platforms** ✕ Organizations that host a microtasking platform should consider governance mechanisms that are primarily geared towards assuring an adequate quality of contributions. In order to ensure the repeated and parallelized execution of tasks, modularization is key; to receive high quality

> »
> *The management of different platform types needs to reflect their varied goals and nature along several dimensions.*
> «

contributions, crowdsourcers should communicate contri-bution requirements. Such definitions provide contributors with a clear set of instructions to help them better under-stand the tasks and document the results of their work. For example, Clickworker provides templates for defining the characteristics of desired results.

> **Effective governance of information pooling plat-forms** ✕ Organizations intending to establish an infor-mation pooling platform should implement a governance structure that focuses on helping contributors submit high quality information. They should define contribution requirements and offer tutorials. For instance, BahnScout has clear guidelines: Contributors are expected to include a picture of the issue, a textual description, the precise location, select a predefined category, and mention poten-tial hazards. Typically, contributors voluntarily participate in this type of crowdsourcing and therefore most contributors are personally interested in the task or project. To get a realistic picture and avoid bias, organizations should focus on integrating diverse and independent contributions, e. g. by demographic-based task allocation. For this type of crowd work, non-financial incentive mechanisms such as reputation systems are most effective. Rankings or experi-ence levels are good tools to motivate contributors because they enable contributors to signal their standing within a platform's community. Similarly, socialization enables con-tributors to communicate and interact with peers and is often appreciated.

> **Effective governance of broadcast search platforms** ✕ Completely open approaches to broadcast search tend to create a lot of ''noise'', resulting in many low-quality contributions. In order to receive a manageable number of contributions without substantially reducing the chances of getting high quality, organizations should consider focusing their broadcast search on groups of contributors with proven abilities. For this type of platform, contribu-tion requirements again play a crucial role and should be defined carefully. They should ensure that results can be implemented in practice. For broadcast search, financial

FIGURE 1 > Different types of crowdsourcing platforms

Aggregation of Contributions	
Selective contributions the value is derived from individual contributions	**Integrative contributions** the value is derived from the entirety of all contributions

Diversity of contributions

Homogenous contributions
contributions have the same characteristics

Heterogeneous contributions
contributions differ in nature and quality

Microtasking

> Highly pre-determined and qualitatively identical contributions as result of simplistic tasks
> **Goal:** Scalable and time-efficient batch processing of tasks
> **Examples:** Facebook Translations; Amazon Mechanical Turk; GalaxyZoo; Clickworker

Information Pooling

> Additive aggregation of distributed information
> **Goal:** Integration of diverse opinions, assessments, predictions, or other information of contributors
> **Examples:** Mountain Dew Dub the Dew; Hollywood Stock Exchange; AT&T Mark the Spot; Google Maps

Broadcast Search

> Contributions reflect alternative solutions to the same problem of which the most promising ones are going to be selected
> **Goal:** Gaining alternative insights and solutions to problems from "outsiders"
> **Examples:** General Electric Ecomagination Challenge; Netflix; Prize; Applause; InnoCentive

Open Collaboration

> Contributions of limited individual value are aggregated to an entire whole by means of collaboration among contributors
> **Goal:** Creation of complex artifacts that require the integration of distributed knowledge and skills
> **Examples:** OpenIDEO; LEGO Ideas; IBM Apache Community; Wikipedia; Fiat Mio

Effective governance mechanisms for each type of platform

	Microtasking	Information Pooling	Broadcast Search	Open Collaboration
Task Definition				
Task Modularization				
Contribution Requirements				
Pretesting				
Task Allocation				
Skill-Based Allocation				
Demographic-Based-Allocation				
Performance-Based-Allocation				
Quality Assurance				
Manual Control				
Automated Control				
Peer Assessment				
Incentives				
Payment				
Prizes				
Reputation System				
Framing				
Feedback				
Socialization				
Qualification				
Peer Coaching				
Tutorials				
Onboarding				
Regulation				
Non-Disclosure Agreement				
Netiquette				
Authentication				

Effectiveness

Low ☐ ☐ ☐ ☐ ☐ High

incentives are particularly important. Usually the best contribution receives a significant prize while unsuccessful participants come away empty-handed. For example, the jovoto platform recognized that competing for such prizes is perceived as risky by many contributors. To ensure broad participation, jovoto usually offers multiple prizes such as rewards for runner-up contributions or progress prizes for best contribution at the halfway point of the contest. In some cases, payments for participating can also be considered. This is common when a group of contributors with specific skills are included within the broadcast search, e.g., design professionals, or for invitation-only projects with a limited number of participants.

> **Effective governance of open collaboration platforms** ✕ For open collaboration platforms, modularization of tasks that structure the collective effort of contributors alongside incentives that appeal to intrinsic motivations can be highly effective. The overarching goals of the task are often broad and complex and should be broken down into sub-goals, which can be framed in a project-like fashion. Frequently, contributors perceive the topic of an open collaboration platform as personally important and are willing to expend substantial effort in contributing to achieve the goals. Thus, organizations should define precise and inclusive objectives that appeal to many contributors. They should ensure that these objectives are clearly communicated on the platform. Due to the collective nature of open collaboration, peer assessment is an effective mechanism for quality assurance. Quality control can be achieved by letting participants validate the contributions of other contributors. Apart from peer assessment, open collaboration platforms should provide a variety of socialization mechanisms that enable contributors to immerse themselves in the community. Contributors need to be able to communicate, to exchange, and to discuss their ideas with their peers, and also to resolve disputes during collaboration. For this purpose, all the open collaboration platforms we investigated maintain communication forums that are used extensively. While these forums resemble a general communication infrastructure, open collaboration platforms should also contain sophisticated structures with which contributors can directly collaborate on their emerging contributions. Further, providing contributors with feedback is key to long-term success and to the development of the platform. Contributors consider feedback on the collective effort of the community as a genuine sign of appreciation.

Don´t expect too much too quickly ✕ Crowdsourcing can achieve astonishing results but getting a platform right is an ongoing project. The analysis in this article can help define the goal and the key design of the operating system of a crowdsourcing platform. Nevertheless, we recommend starting small. Effective governance is an experiential learning process, and appropriate mechanisms may not spring into being all at once. Organizations should consider pilot-testing their governance mechanisms with a series of smaller crowdsourcing projects in a noncritical environment. Also, they should think of restricting the crowd to create room for experimentation and learn how to improve governance without fear of negative consequences. Managers responsible for crowdsourcing platforms should recognize that they are the ''middlemen'' between the organization and the crowd. In order to avoid redundant time-consuming interactions, managers should invest in making their governance mechanisms scalable after having accomplished an effective proof of concept. Finally, companies establishing crowdsourcing platforms should continuously monitor and adjust their governance mechanisms. Quality and quantity of contributions, project runtime, or effort for conducting the crowdsourcing project may be good starting points.   ✕

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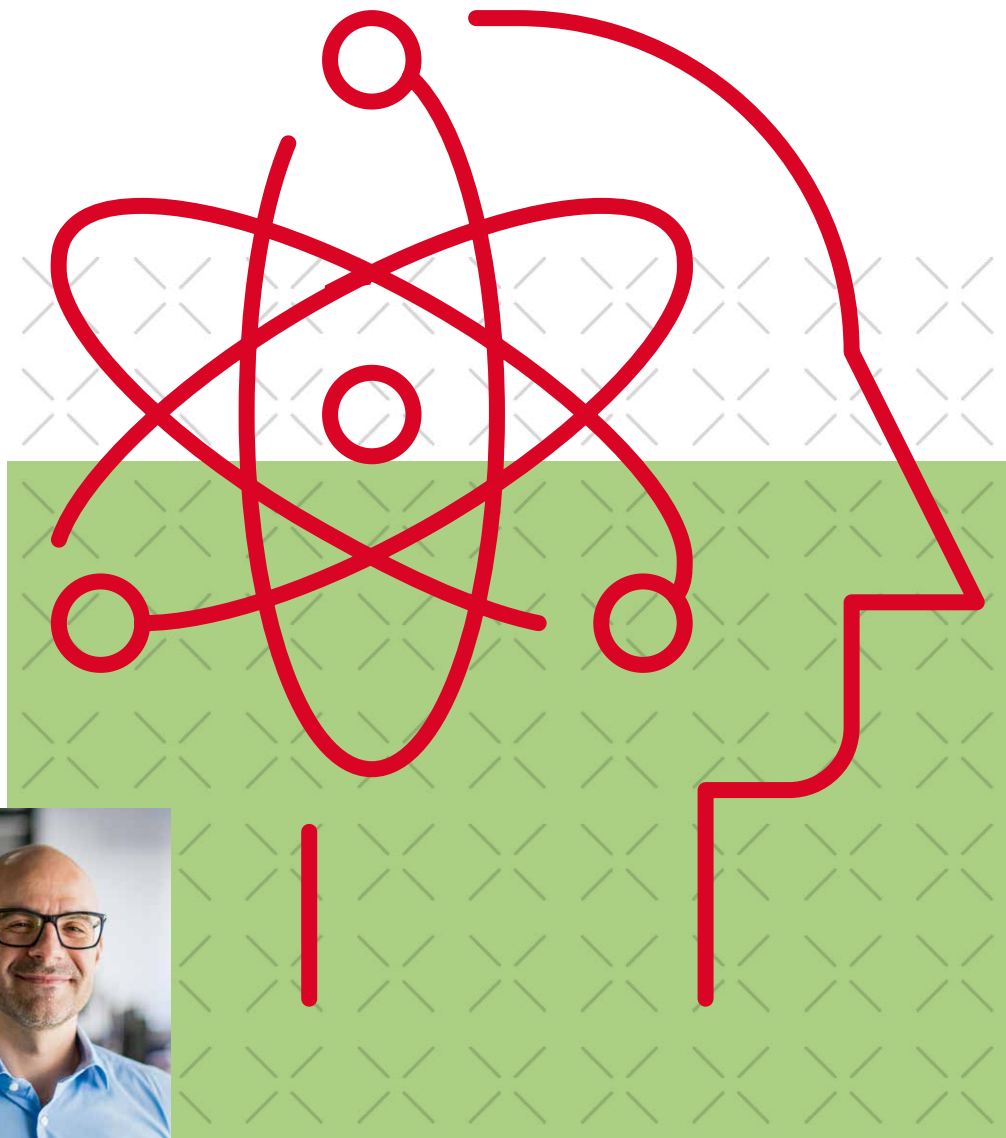
Specific skills are mandatory
to tap into the creativity
of crowds and effectively
harness its potential.

→

Strategies for Leveraging Crowds

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Crowds are not inherently wise ╳ It has been over a decade since it became popular to involve large groups of people beyond corporate boundaries in the creation of ideas for products or services. From technical problems to sports equipment, lifestyle products, or financial and public services, organizations increasingly sought to tap the knowledge of the crowd. The rapid growth of online platforms and the emergence of diverse online communities became an ideal resource from which to generate new product ideas or business solutions.

Crowdsourcing success stories abound, but so do stories of failure. Lego's use of a crowd-based innovation strategy played a crucial role in reviving the struggling toy manufacturer. Netflix likewise used crowdsourcing to improve the efficacy of its recommendation engine by 10%, attracting over 44,000 submissions. Starbucks launched MyStarbucksIdea.com in 2008, to get ideas from consumers; the company has so far received more than 100,000 submissions from consumers around the world. By contrast, the crowdsourcing platform Quirky went bankrupt in 2015 because it didn't adequately vet the market potential for ideas that were too quirky, financing too many bizarre products (Wi-Fi-enabled egg trays, anyone?) with no commercial appeal. Another tricky field is the public contest where an organization invites the public to suggest names, flavors or advertising ideas. The unpredictable dynamic of crowds can lead to "crowdsourcing fails" as in the Boaty McBoatface case that received global media coverage in 2016. The United Kingdom's Natural Environment Research Council (NERC) had invited the public to choose the name of its newest polar research vessel, never anticipating the awkward moniker that won the online poll.

Crowds are effective under the right set of conditions ╳ Obviously, crowds can be – but are not always – effective. Crowds, after all, are composed of human beings and can display the same unpredictable tendencies as the set of individuals that comprise them. To use crowds effectively requires the alignment of several factors. These are: crowd composition, the right question at the right time, and the right analytic method applied to the responses. Crowd-based creativity can be seen as a natural resource. It takes specific skills to acquire it, harness it effectively and sustainably, and transform it into offerings that markets value. Just as oil companies don't randomly drill holes and hope for the best, companies should not attempt crowdsourcing without deploying a solid framework from inception to completion. Based on a comprehensive review of the existing research, we devised a crowdsourcing framework for the successful involvement of crowds in the innovation process. It consists of four stages: Define, Broadcast, Attract and Select – the "DBAS" framework and in each face some key questions need to be addressed (see Figure 1).

Each decision along the DBAS pathway matters, and navigation of each stage can reinforce or undercut decisions made at the other stages. From the initial stage of task definition onwards, companies must coordinate steps through the maze of decisions that crowdsourcing entails.

For example, properly setting up the Broadcast stage demands that the problem first be well defined, to enable curation of optimal solutions a crowd is capable of supplying. Moving along the project pipeline, the Attract stage requires knowing what will motivate this crowd to become active and creative – information that should be collected at the previous Broadcast stage. And during the Select stage, the required resources will depend on the size and nature of the contribution pool cultivated at Broadcast and Attract.

FIGURE 1 > The four stages of the DBAS crowdsourcing framework

Define
↓

Know what you are looking for: Type of task and specifity of problem
> Is it a problem or a solution you are seeking?
> How specific do you want your call-out to the crowd to be?
> Do you want to make one lump request, or is it better to break it up into constituent parts?

Broadcast
↓

Ensure that your crowdsourcing communication reaches the right people: Select appropriate channels
> Do you want to use your own platform or that of an intermediary?
> Do you want to convene a large crowd or a small one?
> How selective should you be in soliciting crowd contributions?

Attract
↓

Provide the proper motivation and define the type of incentive and mode of allocation
> Should incentives be monetary?
> Should there be many winners, or few?
> Who owns the finished product?

Select
↓

Define evaluation criteria and procedures: Choosing winners
> Should you use judgment calls or a metric score to evaluate entries?
> Should the crowd be involved in judging their peers' work?
> How many rounds of judging should there be?

↓ **Creative and workable ideas**

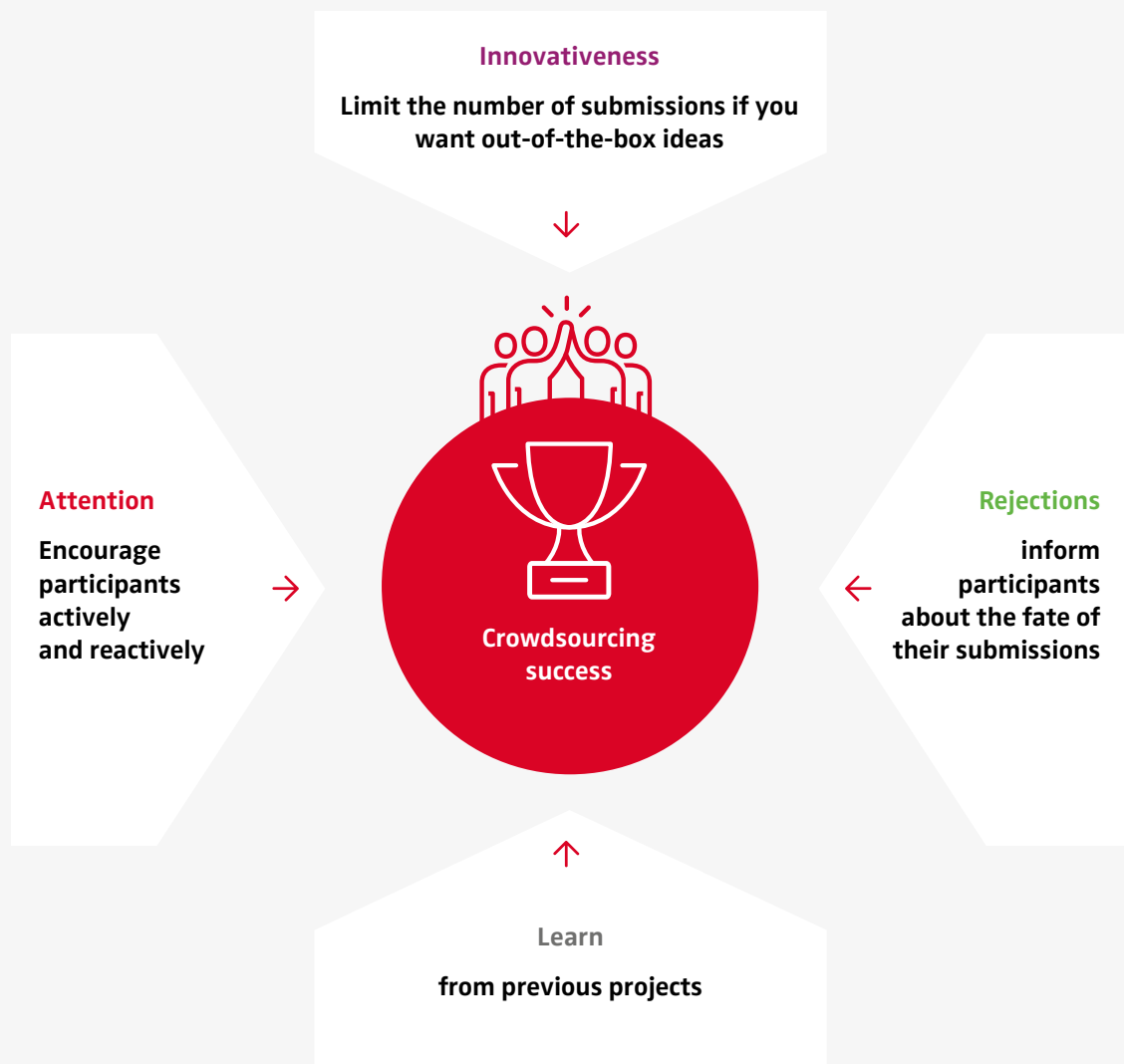← **Experience to improve the next crowdsourcing project**

Critical success factors for crowdsourcing projects ✕
To analyze success and failure of virtual engagement tools and crowdsourcing projects, we collaborated with a private company to create a massive dataset in, that allowed us to study over 100,000 suggestions submitted to nearly 1,000 organizations. From this analysis we developed a set of guidelines. Below we describe critical factors that require special attention when implementing the DBAS framework.

> **Assessing the Level of Innovativeness** ✕ Not all crowdsourcing campaigns require innovative and novel contributions even though crowdsourcing is associated with creativity and innovation. It can be enough to take the pulse of a customer community or ask customers to choose between a small number of familiar options. If a company seeks a high level of innovation from the crowd, it should design and broadcast the project to constrain the number

FIGURE 2 > Critical success factors for crowdsourcing projects

Innovativeness

Limit the number of submissions if you want out-of-the-box ideas

↓

Attention

Encourage participants actively and reactively

→

Crowdsourcing success

←

Rejections

inform participants about the fate of their submissions

↑

Learn

from previous projects

»

Companies should be selective
*about who they invite to participate.*

«

of submissions within a manageable range. When crowd-sourcing campaigns trigger a flood of responses, the more unusual ones are likely to be ignored. When crowdsourcing evaluators feel overwhelmed by the volume of submissions, they tend to prefer recognizable, eminently practical ideas and ignore novel, groundbreaking suggestions.

> **Paying Attention to Activity** ✕ Across all our data, the amount of attention crowdsourcing campaigners give to their contributors determines the success of their initiatives. The correlation is salient both for reactive attention, e.g. feedback to contributors, and for proactive attention, e.g. priming the flow of contributions with ideas submitted by the organizations themselves. Organizations that respond publicly to submitted suggestions (reactive attention) receive significantly more suggestions from external contributors than those that do not. Campaigns received significantly more contributions and higher quality ideas when organizers were consistently generous with both varieties of attention throughout the process. But those cases were few in our dataset, and especially for the slow-starting campaigns attention giving tended to start too late.

> **Dealing with Rejection** ✕ In our studies, contributors who received information about idea rejection were far more likely to participate in future crowdsourcing campaigns managed by the same organization. Launching a successful crowdsourcing campaign means arousing many hopes that are destined to be disappointed. Over 90 percent of ideas from the crowd will not be used. Most companies failed to notify contributors about the fate of their submissions. When organizers took the time to respond in language that stylistically resembled the contributor's own communications, the likelihood of future engagement was even higher. We concluded that far from pushing people away, rejections bonded recipients even more tightly to the host organization.

How to manage crowdsourcing projects successfully ✕ Based on these findings a few concrete recommendations can improve the success of crowd-based innovation projects.

> **Select your crowd carefully** ✕ Companies should be selective about who they invite to participate. If they seek truly novel solutions, it makes sense to build a few hurdles into the process to deter less committed contributors, thereby limiting the number of submissions and increasing the chance that groundbreaking ideas get enough attention.

> **Give to get: Share your own ideas** ✕ Instead of waiting for ideas to be submitted, successful organizations foster engagement by posting ideas themselves and inviting people to discuss them. This proactive attention gives external contributors examples of the direction an organization wants to pursue; it also engenders trust by sharing internal information. Further, it empowers external contributors to evaluate the organizations' own ideas and thus stimulates knowledge sharing, increasing potential motivation. Proactivity is a key to spurring submissions at the beginning to jumpstart the flow of ideas; this is especially the case for less lively and popular campaigns.

> **Show you care: Respond publicly to submissions** ✕ First-time participants have no way to know whether the organization will notice their ideas. Feedback validates external contributors and motivates further contributions. It also indicates what types of suggestions the organization values, and helps the crowd understand what is appropriate. Newcomers especially value this form of reactive attention. If they learn through the program's responses that the organization cares, participants become motivated to make full use of their fresh perspectives and share their ideas more openly.
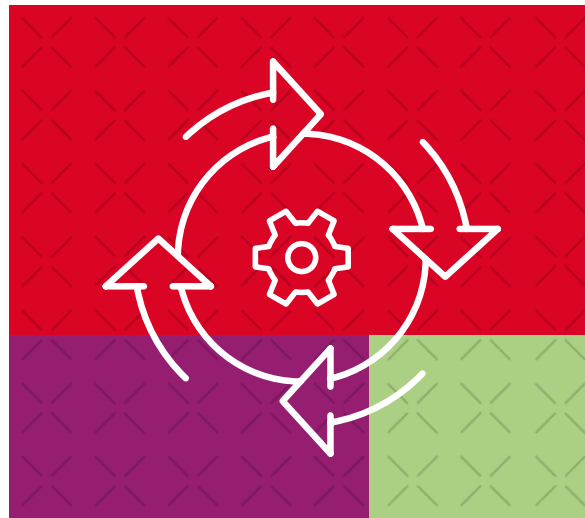
> **Improve your practices vis-à-vis rejections** ✕ Based on our findings, participants whose suggestions could not be implemented should not be neglected. In the interest of maintaining participation over the long run, it pays to inform participants about the fate of their submissions. This means it is important to design crowdsourcing initiatives to protect the resource with more value than any single innovative idea – the loyalty of crowd-project participants.

To continually improve the odds of success, crowdsourcing should be treated as an iterative process, like the rapid innovation practices for which Silicon Valley tech firms are famous. All crowd projects are different, but each one provides a possibility to learn what works and what doesn´t. The DBAS framework is therefore best thought of as a cycle; each misstep or victory contains lessons for the current campaign, and for all campaigns to come.   ✕

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To continually improve the odds of success, crowdsourcing should be treated as an iterative process.

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How to Prevent Crowdsourcing Disasters and Leverage Positive Side Effects of Open Innovation

Johann Füller, Katja Hutter and Niclas Kröger
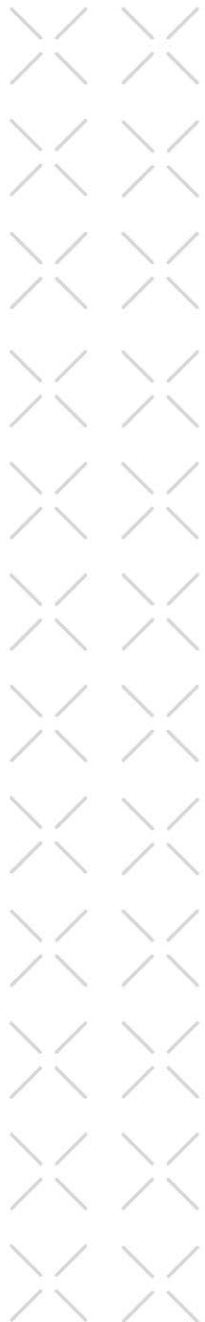
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High rewards at high stakes ✕ More knowledge, better understanding of needs, fresh ideas, solutions to unsolved problems – these are the traditional benefits organizations seek from crowdsourcing. Not all companies, however, are aware that while the gains can be high, the risks can also be substantial. Prior research suggests that about half of all crowdsourcing campaigns fail. Crowdsourcing contests may turn out to be a nightmare for the sponsoring organization when participants do not behave as envisioned. Some contests are hijacked, and participants start to bash, shame or ridicule a company instead of being cooperative and supportive. Often such "firestorms" – negative, highly emotional posts in social media – arise when management acts in undesirable ways from participant perspectives (see Box 1 for examples). On the other hand, there is more to gain from the practice than innovative ideas. Positive side benefits from crowdsourcing can involve increased brand awareness, well-established customer relationships, or an innovative brand image. The difference between disaster and victory depends on how well a company succeeds in handling its crowd.

To prevent "firestorms," project sponsors need to insure fairness throughout their contests.
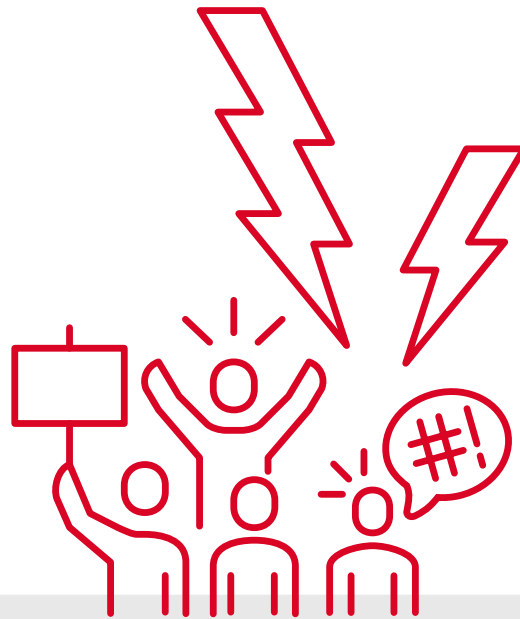
BOX 1

Beware of ''firestorms'': Innovation Contest (Near-) Fails

The notebook brand **Moleskine** caused a wave of indignation when asking designers – a significant part in their online community – to submit ''free'' designs and subrogate IP rights for a new blog logo. Outraged freelancers voiced their anger, feeling that their livelihoods were threatened. Some used their design skills to submit deformed Moleskine logos. Hundreds of community members expressed disagreement with the incentive scheme in more than 500 comments on the brand's Facebook fan page and on Twitter. Thousands of customers openly declared their intent to boycott Moleskine.

In the case of **Pril**, participants felt betrayed when Henkel, a German detergent manufacturer, changed the rules for the winner selection process. Henkel had launched a web platform asking for label designs for detergent bottles. The design ''Chicken Flavored Pril,'' which was the community's favorite submission, ultimately was not approved by the company. Instead, Henkel chose a design with lower community ratings. Participants felt overruled and engaged in active resistance, voicing and sharing their dissatisfaction on the Pril Facebook page and across the web. Henkel had to face a lasting PR debacle, including reports outside the community on German television and in major German online newspapers.

An example of conflict management that avoided the escalation of a firestorm is that of **SPAR**, one of Austria's leading retail chains, that set up a community platform to generate new shopping bag designs. A jury selected the winning design, which was intended to be produced in a run of one million bags. Resistance emerged, as a minority of participants did not agree with the jury's decision; the contest had been promoted as design-focused, but the winning bag relied on word-play and had no graphical elements. Participants could not understand the jury's decision and felt their work was disrespected. Immediate and appropriate conflict management applied by the community moderator eventually pacified the contested atmosphere. The unanticipated reactions prompted SPAR to revise its decision to print and distribute the winning bag. Instead, the company implemented the second and third-ranked designs, which had been accepted by the community.

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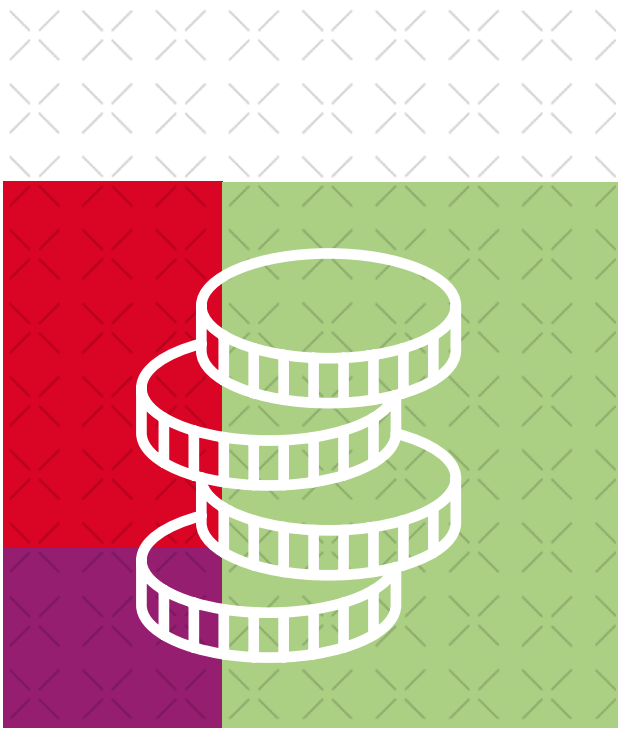
Even if personal interest plays a key role, incentives are part of the game.

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Understanding participants' expectations helps avert negative distortions ✕ In online contests consumers, designers, lead users, students, software developers, or other experts donate time to contribute know-how, often for free, and may reveal their own intellectual property (IP) to companies. To avoid negative turns in online competitions, it is important to understand why people engage. Organizations need to pay close attention to what participants expect to gain. They can be persuaded to share creative ideas, offer candid opinions of products, and spend valuable time only if their expectations are to be met. Besides intrinsic interest in a project, which is a precondition for participation, there are other crucial aspects that require careful planning.
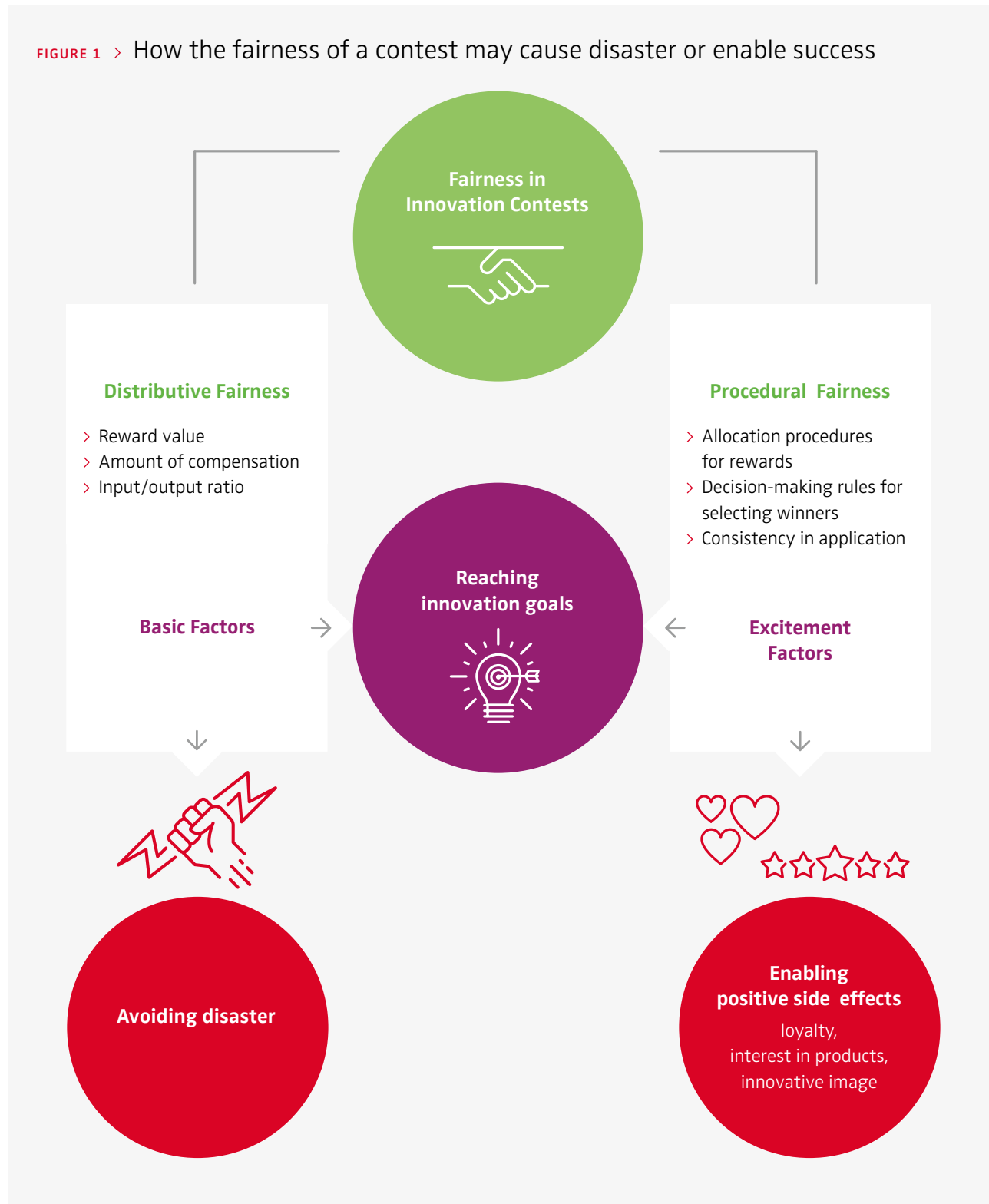
› **Offered incentives** ✕ Even if personal interest plays a key role, incentives are part of the game. Participants may be attracted by what a company offers in return for engagement besides monetary incentives like cash prizes, financial compensation, financial participation in product success, special offers and giveaways. Non-monetary incentives such as industry experts' feedback, a warm thank-you, an appointment at the company to further elaborate an idea, or an official naming as co-developer are additional motivators. Similarly, recognition from the organization's leadership throughout the selection process, and the prestige of associating with a well-known company are further motivators. Overall, crowdsourcing participants
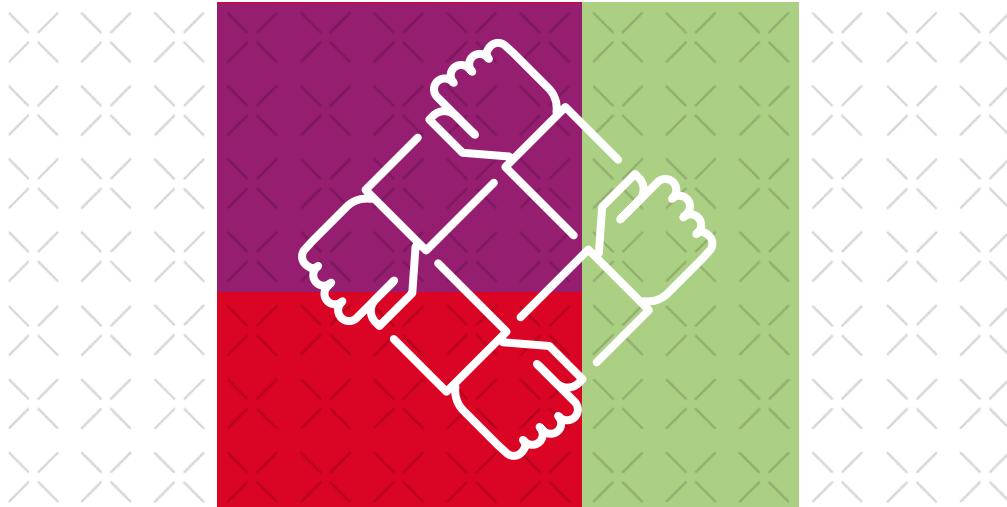
are heterogeneous not only in their expectations but also in their skills and contributions. Expectations may differ depending on the innovation task and stages of the process. Some users may be more interested in generating new ideas and solutions, while others prefer the evaluation and selection of product concepts. The incentives offered should suit these different desires and types of challenges.

› **Fairness** ✕ Community members must feel fairly treated and learn to trust the contest provider. Figure 1 shows how fairness can be insured and signaled to participants and how it affects the outcome of a contest. Distributive fairness refers to the offered prizes: the amount of money and the number of prizes that can be earned. Whether the prizes are considered fair depends on what participants are expected to contribute, for instance, fair terms and conditions regarding the transfer of intellectual property rights. Procedural fairness refers to a transparent and consistent process, how winners are selected, as well as the quality of day-to-day interactions. While distributive fairness is a basic requirement for avoiding negative behavioral outcomes, procedural fairness serves as an engagement factor that engenders positive behavioral outcomes.

The contests of Moleskine and Pril (see Box 1) are two well-known examples that ended up in a publicity disaster because they violated participants' sense of fairness.

FIGURE 1 › How the fairness of a contest may cause disaster or enable success

Fairness in Innovation Contests

Distributive Fairness
› Reward value
› Amount of compensation
› Input/output ratio

Basic Factors →

Reaching innovation goals

Procedural Fairness
› Allocation procedures for rewards
› Decision-making rules for selecting winners
› Consistency in application

← **Excitement Factors**

Avoiding disaster

Enabling positive side effects
loyalty,
interest in products,
innovative image

Moleskine's incentive scheme for its target group of freelancers was poorly thought out. Their choice to award only the winner with a cash prize while requiring the transfer of IP rights from all participants regardless of whether they won or not was perceived as an insult and an unfair practice. In the case of Pril, it was the change of the rules in the selection of the winning design that inspired outrage, as participants felt cheated.

> **Community Management** ⨯ Related to some of the intrinsic rewards mentioned above, active community management is another important factor in providing value for participants. Throughout its duration, a contest requires attention, monitoring, and responsiveness to community requests. Innovation platforms must encourage intensive interaction to establish relationships and encourage community formation. It is critical to maintain direct, honest feedback in order to encourage involvement and promptly recognize contributions. This feedback helps participants to continuously learn about the topic and to satisfy their intrinsic drive for personal advancement; it also helps the community to devise more tailored ideas and solutions. Moderators should be on hand to answer emerging questions on the topic and the challenge requests. Conflict management also requires prompt intervention, since an unfriendly climate within the community or disruptive behavior from individuals damages the community spirit and deters participation. The Spar shopping bag contest provides an example of a social media disaster that was avoided successfully with transparent communication and timely, appropriate conflict management (see Box 1). The design, usability, and participant mix of an online platform output are other factors that affect community coherence. Given the foregoing, it can be beneficial to partner with intermediaries like platform providers for professional community management services.

Crowdsourcing benefits beyond innovation ⨯ Organizations that run innovation contests fairly, with a lively, motivated community may benefit from additional positive effects, as well. According to our studies, the close interaction of contest participants with a company increases brand loyalty and responsiveness to new products. This is partly a function of exposure and regular contact: devoting time, skills and personal engagement to help a company develop new ideas fosters identification; participants may become passionate about the brand or product. Consumers engaged in crowdsourcing create a relationship to "their" new product even before it physically exists. The positive effects can extend to a broader public through an influencer effect. Studies have found a link between a company's engagement in value co-creation activities and its perceived innovativeness in general. Broadcasting the innovation approach enhances a company's image as an innovator. ⨯

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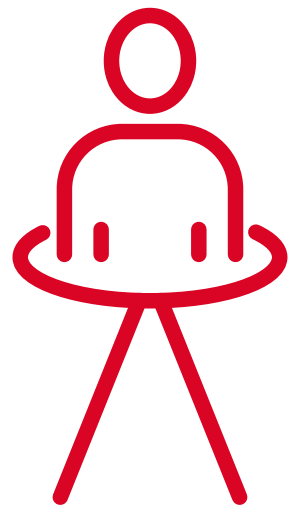
Open Strategy: The Inclusion of Crowds in Making Strategies

Christian Stadler, Julia Hautz and Stephan Friedrich von den Eichen

More participation everywhere ✕ Technological innovations of the 21st century have enabled a major trend: participation. Social media and real-time communication technologies have created the basis for broad interaction of diverse people from all over the world. Consumers not only consume, but co-communicate, comment, and co-develop eagerly. Citizens no longer wait for governments to shape their environments but start their own petitions and initiatives. Organizations have begun to use this trend to advantage by harnessing the power of crowds. While innovation contests or joint brand communication have become popular, the inclusion of crowds in the strategy process is less common. Examples of Open Strategy show that companies have begun to apply a variety of practices to engage a broad spectrum of actors. Some recent implementations include blogging, wikis, jams, ideation contests, and community platforms or prediction markets. This multitude of practices reflects the range of potential methods of inclusion.

Why companies open their strategy-making to crowds ✕ Organizations have different objectives for including a wider range of participants in strategy development. According to our research, the most common goal is to generate novel and unconventional ideas for a company's strategic direction. In some cases, managers believe that people not connected to the company, with mindsets free from a dominant corporate culture can increase the likelihood of finding groundbreaking

KEYWORDS
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Crowdsourcing, Partizipation**

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Inviting employees to participate
on a larger scale can improve
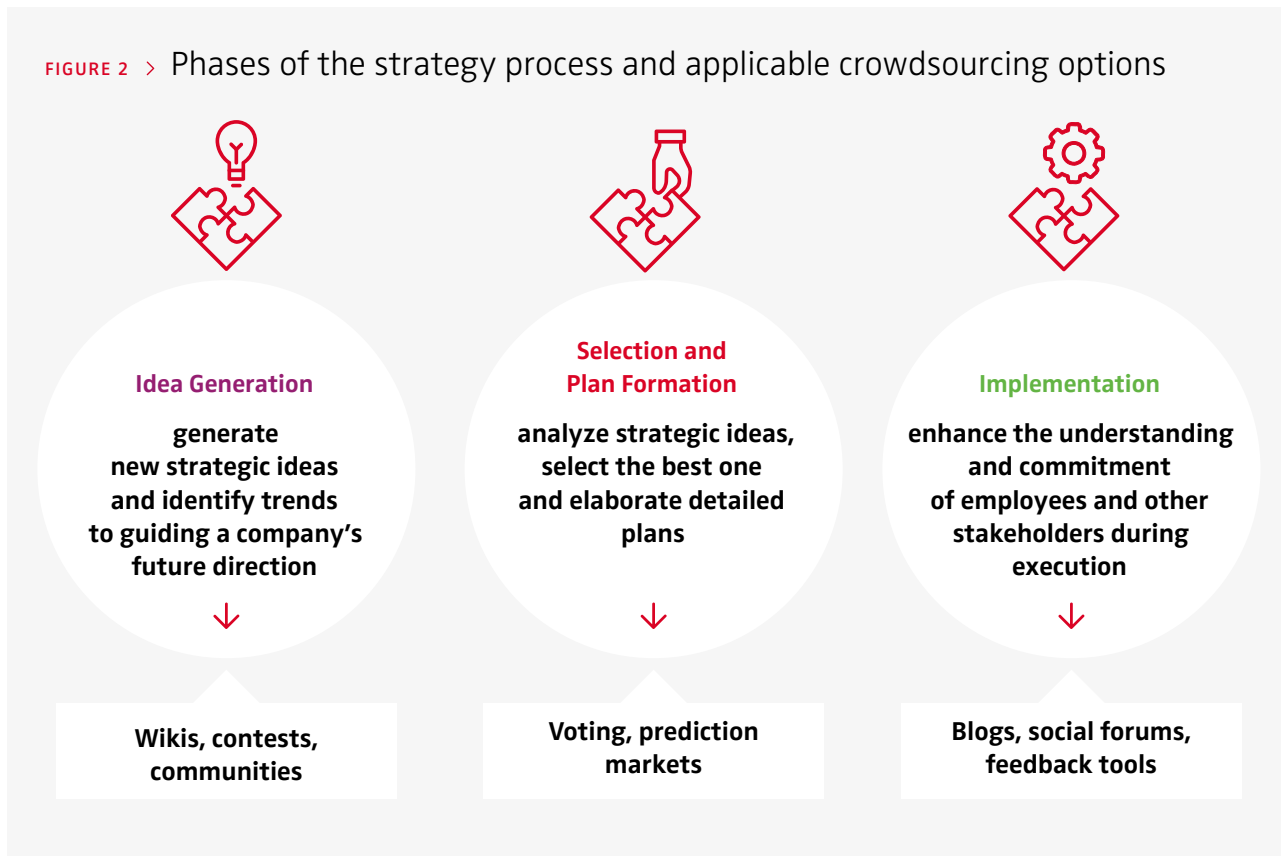the implementation of a strategy.

technical or social solutions. Other companies want to pool knowledge and tap into the wisdom of crowds to improve decision-making within an existing strategy. They aim to gain access to collective intelligence because under certain conditions, large groups can be more effective at problem-solving than individual experts. An approach commonly used when improved implementation is the objective, is to increase internal participation by inviting a broader scope of employees to share in decision-making. Many strategic initiatives fail because implementors do not ''own'' the strategy. Improved

buy-in, shared understanding, stronger commitment, and a more effective implementation can be achieved when those who must implement a strategy are involved in the process of developing it. For these reasons, it has been found effective to include internal implementers in a crowd project. In other cases, organizations claim that including a broader set of stakeholders increases external acceptance because it makes the strategy formation process more transparent and comprehensible to the general public.

FIGURE 1 › Why companies open their strategy-making

Collecting ideas for a new strategic direction

Identification and validation of trend

Recognize, evaluate and (if necessary dismiss) growth areas

Open Strategy

Foster inclusion and collaboration of different stakeholders

Improve an existing strategy

Support the implementation of strategic decisions

Increase transparency and understanding to gain external support

› Phases of the strategy process and applicable crowdsourcing options

Idea Generation

**generate
new strategic ideas
and identify trends
to guiding a company's
future direction**

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**Wikis, contests,
communities**

**Selection and
Plan Formation**

**analyze strategic ideas,
select the best one
and elaborate detailed
plans**

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**Voting, prediction
markets**

Implementation

**enhance the understanding
and commitment
of employees and other
stakeholders during
execution**

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**Blogs, social forums,
feedback tools**

Different forms of inclusion ✕ The choice of inclusion practices applied depends not only on the objectives and on the phases of the strategy process to be opened, but also on who will be involved. Figure 2 shows the different phases of the strategy process, and which crowdsourcing tools could be useful. Based on their decisions about phases and options, companies can select the stakeholders to involve and how broad the base of participants should be. They must decide whether to keep crowdsourcing within corporate boundaries using employees only or seek external talent and skills. For open strategy work, internal audiences are more relevant than for other crowd applications, since outsiders may have little insight into strategy, whereas employees have a vested interest.

› **Wikis, contests and communities** ✕ Many companies open the idea generation phase of the strategy process to both external and internal inclusion. The New Zealand organization responsible for sustainable land use in the country, Land Care Research, collected ideas via a crowd-sourcing initiative integrated into an online contest platform. Wikimedia, the non-profit umbrella organization behind Wikipedia, launched a special wiki dedicated to the organization's future strategy and invited everybody interested to contribute. Over 1,000 individuals made nearly 900 proposals for the company's future direction, then categorized, rationalized, and elaborated on them. This open'' strategy process resulted in a coherent strategic plan detailing a set of beliefs and priorities. The industrial manufacturer Siemens also enabled its employees to participate in strategy formation and idea generation by providing ideas and suggestions in an online crowdsourcing initiative via a community platform. Internal community platforms not only allow a large number of individuals to submit ideas, but their additional community functionality also enables participants to discuss and comment on them. They are tools to provide insights, to communicate, interact, and build social relationships, fostering a shared sense of community and increased collective commitment to support implementation.

› **Voting, evaluation mechanisms and prediction markets** ✕ Organizations may embed voting and evaluation mechanisms into their idea crowdsourcing platforms to facilitate the evaluation and selection of strategic ideas. Other companies establish prediction markets, which typically foster the inclusion of internal actors only. As an example, the software developer Rite-Solutions launched a tool for decision support that allowed employees to invest in a virtual idea market. Ideas with a given level of support are selected for implementation. Prediction platforms allow organizations to use market mechanisms to efficiently aggregate their employees' individual predictions and forecasts. They can be used for decisions on strategic moves, pricing, competitors, sales markets, and new product introductions. Compared to traditional methods like surveys, these prediction markets can provide greater accuracy in less time with a lower number of required participants. In addition to traditional prediction markets, social technology-based prediction platforms also enable gathering qualitative comments from participants, who can explain and share additional insights on their decisions.

› **Blogs, social forums and feedback tools** ✕ In order to make the strategy process more transparent and to increase understanding and commitment, many organizations use a corporate blog or an open social forum, where employees can discuss specific topics or comment on ideas or projects. Buffer, a social media management software company lives up to its value of ''default to transparency'' through a transparency dashboard. Additionally, management discusses strategic moves on corporate blogs and allows their external community to submit comments and

suggestions. Other online feedback tools collect feedback on the organization's strategic direction from internal volunteers. Unilever, for instance, set up and integrated a social collaboration tool to livestream and digitally open the company's two-day Change Leader Conference, where 400 senior managers met face-to-face to share and discuss strategy. The project required heavy resource investment to create and curate content during the event, but it made a positive impression of openness and transparency, helping employees feel involved. It was well received, and employees felt that the technology provided real time information and considered it a major step in democratizing the company. In terms of external inclusion, GitLab, an open source software initiative, relies on a Google Doc entailing a draft strategic plan, which allows participants to constantly review strategic ideas.

Opening up strategy work: No gains without risk ✕ Openness of strategy developments has benefits, but increased inclusiveness can also incur additional costs or inefficiencies.

› **Beware of unintended consequences** ✕ The crowd involved may come up with controversial ideas or solutions, leading to unpredictable issues; employees might take sides in debates and identify with those controversial issues. A badly managed project can cause disputes that persist over time or lead to polarized, incompatible groups. Processes and sentiments must be monitored constantly to take timely action when members become alienated rather than join in creating shared understanding, buy-in, and improved implementation.

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Contributions should not disappear into a black hole or have restricted visibility. Any contribution needs to be recognized and rewarded.

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› **Acknowledge value contributions** ╳ The success of a crowdsourcing strategy depends upon the willingness of individuals to share and contribute knowledge. To make an open strategy a success, companies must regard engagement with contributors as a long-term reciprocal relationship and ensure that expectations are met. Open, transparent and proactive communication, clearly stated objectives, as well as terms and conditions of the initative are essential to avoid frustration and disappointment. Participants should be informed of the status and value of their contributions at every stage of the process. Contributions should not disappear into a black hole or have restricted visibility. Any contribution needs to be recognized and rewarded, e.g. through praising contributors in company-wide communication channels, meetings with top management, repeat assignments to projects, career advancements, or future joint projects with external participants.

› **Make sure that targeted crowds have the required skills and time for participation** ╳ A reliance on social technologies for inclusive practices also requires that individuals involved have the skills necessary to participate. Users might be more familiar with crowdsourcing platforms from their private lives than with the use of specialized voting systems or prediction markets. The use of well-known technologies might therefore decrease the risks of implementing complex tools or the additional costs of participant training. However, for selection and evaluation processes, and especially for prediction markets, organizations will need to rely on specialized technologies. Further, just providing technology won´t be enough. Managers must create a suitable process to encourage and guide employees in their participation.

The potential gains from crowdsourcing strategy can be significant, but benefits are accompanied by risks. The inclusion of larger audiences increases complexity, and involving employees makes it more difficult for managers to maintain control. Projects must be well-conceived, well-planned and well-funded. Nevertheless, organizations need to remain flexible, learn from experience and be ready to adjust tools and activities when necessary. ╳

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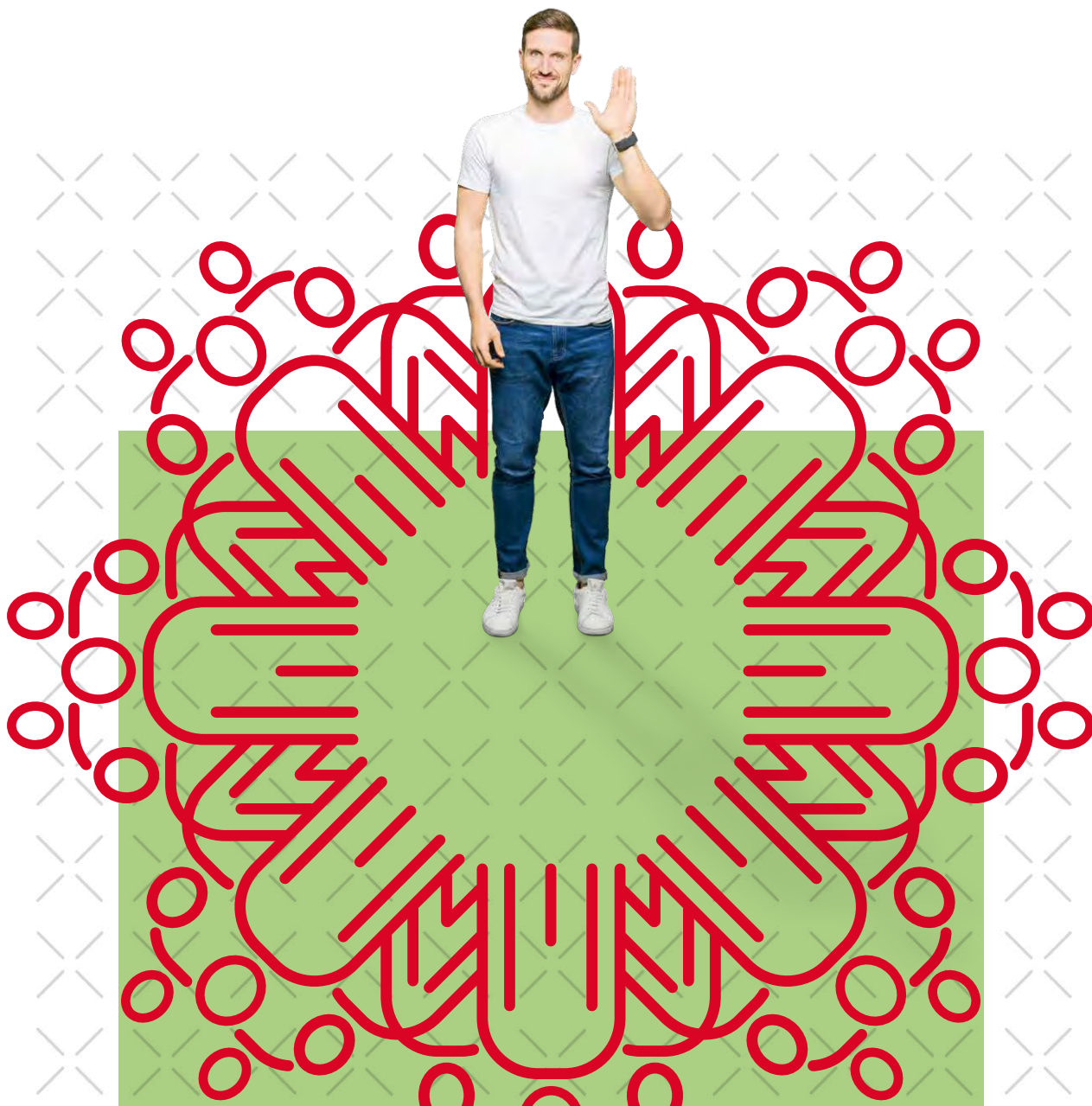
Social innovation projects
tend to be more complex than
commercial crowd projects.

Motivating Crowds to Do Good: How to Build Crowdsourcing Platforms for Social Innovation

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Crowds and Social Innovation ✕ In commercial settings, crowd sourcing is now a widely accepted innovation tool. Many success stories demonstrate that crowds can spark ideas or solve commercial challenges. But what about the social space? Can crowds be motivated to find novel ideas and solutions for social causes or community-related projects? Governments, non-profits, and companies are challenged by a multitude of pressing problems. Why not involve whole communities to develop desperately needed solutions? Social innovation – novel social solutions that provide value to society rather than to individuals or single organizations – could indeed be a relevant approach to the messy, interdependent, and complex issues our society faces. Already, platforms such as OpenIDEO or Neighborland invite anyone in the world to collaboratively solve social issues through crowdsourcing challenges (see Box 1). However, the enthusiasm for crowdsourcing social innovation has so far run ahead of its effects. The issue has not been a lack of promising projects, but one of sustainability and scale. Many platforms are stillborn, and initiatives struggle to turn their promising projects into sustaining platforms. Based on the study of several platforms and our experiences with a community-related crowd project we ourselves launched (see Box 2), we present a step-by-step framework for building crowdsourcing platforms for social innovation.

BOX 1

Platforms facilitating social engagement

Neighborland is a US-centered public engagement platform designed to empower people to shape the development of their neighborhoods. Its mission is to improve the way city agencies, local organizations, universities, and real estate developers collaborate with communities. The platform enables co-working of local ventures with stakeholders in an accessible, participatory, and equitable way in order to deliver more efficient and responsive services. In cities all over the US, including San Francisco, Atlanta, Los Angeles, and Oakland, over 3 million people to date have participated on Neighborland.

OpenIDEO is a world-wide operating online platform where people develop ideas and design new products for social good. The diverse community of over 40,000 members from more than 200 countries tackles significant global challenges like food waste, garbage avoidance, agricultural innovation, or refugee education, from ideation to implementation.

InnoCentive`s clientele is mainly commercial, but it has also been used successfully for social projects with a technical focus. For instance, the Rockefeller Foundation has successfully supported social innovation challenges through InnoCentive. This cooperation allows non-profit organizations to tap InnoCentive's global network of more than 175,000 minds in science, engineering, technology, and business to solve the problems of the world's poorest and most vulnerable populations.

The social arena is different in some respects ✕ Social innovation, just like any other form of innovation, can benefit from crowd engagement because it is able to tap the innovative power of its own prospective beneficiaries by turning them into co-creators. Further, it facilitates the engagement of other external groups that could be valuable problem solvers.

Compared with commercial crowd innovation projects, social innovations present some unique obstacles. A principal barrier is that projects tend to be more complex. Typically, they involve an entire ecosystem comprised of complementary partners, where the interests of stakeholders are not necessarily aligned. Governance and coordination of social innovation projects is critical and needs to be thoughtfully balanced. In addition, social innovation tends to be targeted

at environments with limited financial resources, making it difficult to design appropriate project management solutions. Further, it is harder to assess the material impact of doing good on a communal level. Therefore, attracting investors or sponsors is a challenge. To improve chances of success, social innovation platform designs need to consider these additional factors.

Crowdsourcing platform design to create social innovation ✕ Figure 1 outlines the critical steps in designing a platform for crowd innovation. While the steps themselves are relevant in any crowd innovation projects, we focus our analysis on challenges in a social context. To make the dicussion more concrete we refer to our own experience with the social platform ''Travel2Change'' (T2C) (see Box 2).

> **Defining the value unit** ✕ The best way to begin leveraging crowdsourcing for social impact is to focus on the purpose of the platform. The purpose is the expected value or innovation and needs to be clearly communicated. In the case of T2C, we started with the creation of whole trip packages that would positively impact local communities. While T2C did generate ideas through innovation challenges, the ideas for the trips remained vague, were not ready for implementation, and were not sufficiently grounded in local problems. Thereafter, T2C simplified the value unit and shifted it to less time-consuming individual projects and single experiences with a social purpose. Based on this history, we concluded it is better to start with simpler value units. Complexity can be increased once there are well-functioning interactions with proven platform actors.
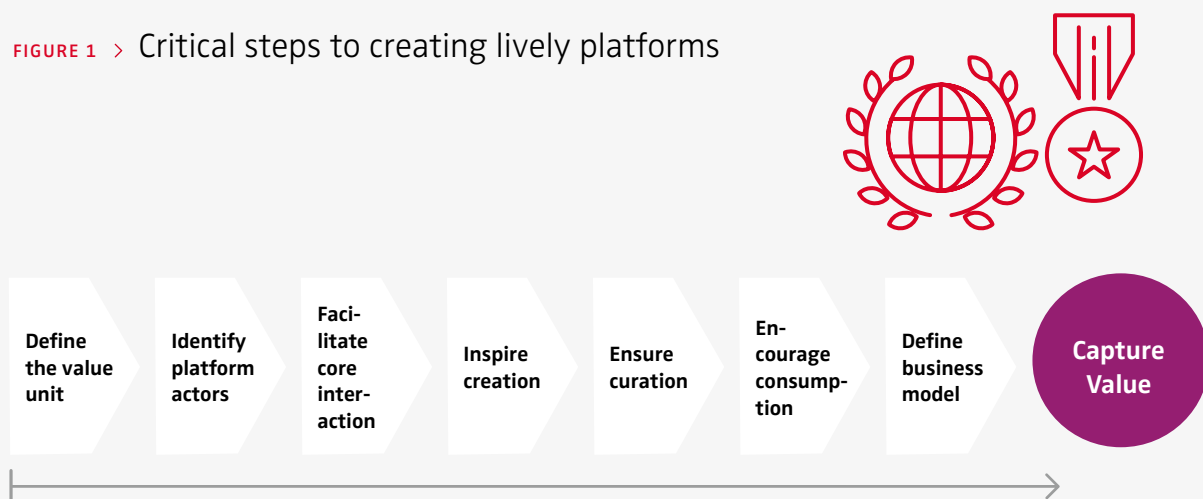
> **Identifying platform actors and inspiring continued creation** ✕ Crowdsourcing platforms are multi-sided, bringing together two or more platform actors. The platform provider is an organization that builds the infrastructure, offers the tools, and defines the rules that facilitate interactions among creators and between creators and consumers. For platforms to thrive, a critical mass of consumers and creators must be active. The T2C platform

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Compared with commercial crowd innovation projects, social innovations present some unique obstacles.
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succeeded in attracting some innovator-travelers at the beginning. The winners received free trips or a project budget in exchange. To keep participants engaged and attract enough overall participation, it became necessary to continually improve the platform experience itself, along with rewards and recognition for creators. Further, we had to proactively invite local organizations to participate and develop concrete travel products that could be bought and consumed.

> **Facilitating the core interaction and ensuring curation** ✕ The core interaction is the mechanism that drives joint value creation by all platform partners. This needed further development at the early stage. T2C had to relaunch the whole website to ensure that curation was seamless and supported direct booking. The newly designed platform allowed detailed elaboration of travel experiences to make them more interesting and attractive for consumers; the

FIGURE 1 > Critical steps to creating lively platforms

Define the value unit → Identify platform actors → Facilitate core inter-action → Inspire creation → Ensure curation → Encourage consumption → Define business model → **Capture Value**

Social innovation in tourism: The Travel2Change (T2C) project

T2C is a non-profit organization that leverages crowdsourcing with the purpose of connecting travelers with local communities. T2C launched in 2011 to build a collaborative community interested in developing travel experiences that benefit local communities. The regional focus of the platform is Hawaii. To become and remain vital, the crowd innovation concept had to be adjusted and changed several times. We investigated the management and evolution of this platform in an action research project over the past years to learn more about the challenges that social crowd innovation platforms face.

What are you interested in?
Discover something nice

YOGA   SNORKEL   HIKE

How it works
Travel2Change connects travelers with the local community
to create a positive impact.

Hosts list activity
Nonprofits or local tour operators invite you for fun and impactful activities.

Travelers join activity
Experience Travel2Change activities that are fun and create a positive impact.

Create a positive impact
Travelers and hosts come together to make a difference.

https://travel2change.org/

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By facilitating bottom-up, decentralized processes involving many actors with different capabilities and interests, social crowd innovation can be a valuable tool to tackle at least some of the social issues the world faces.

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actual booking of the experience allowed travel partners to capture value. The new marketplace website removed friction from the interaction by means of better tools for creators and more complete information (like contact details) for consumers. An improved user experience in the creation, booking, and consumption processes provided a better match to user expectations of quality.

⟩ **Building a business model and encouraging consumption** ✕ A valid business model ensures the continuation and positive societal impact of the platform. Typically, some revenue must be generated even in non-profit contexts. T2C needed to generate income to facilitate a greater number of quality interactions to create projects for social benefit travel. The original T2C website failed to generate a revenue stream. With the new website, T2C moved from an integrator platform model to a two-sided platform where creators and consumers interact directly. Such platforms typically charge transaction fees or commissions on one or both sides. In the travel industry, however, paid activities for a social cause compete with traditional travel experiences that tend to provide stronger economic incentives to distribution partners. In the T2C case, these incentives affected access to the market segment. Getting a piece of the pie was further difficult, because tour operators listing on T2C were reluctant to let lower-priced or free T2C activities cannibalize their higher value traditional tourist activities. To increase reach, T2C therefore encouraged activity providers to discount pricing for volunteer participants. However, on the other side of the platform, T2C was not able to charge hosts for the difference because not enough extra value was created for them. Hence, T2C now seeks to attract to the platform additional partners, like corporations that involve their employees or customers in T2C activities. As well, it is increasing control of transactions, to create more opportunities for revenue generation and value capture.

Don´t give up too early and keep learning ✕ Crowdsourcing platforms offer an intriguing approach to enhancing social innovation activities through interaction with external innovators. However, implementing social crowd projects can be more complex than primarily commercial ones, and is certainly no less challenging. Our research on the evolution of T2C reveals some hazards of social benefit projects. Social innovators should be prepared for several learning loops of experimentation to balance value generation with the right structure and the right mix of participants, consumers and other platform partners. For organizations willing to face these challenges, crowd innovation can be rewarding. By facilitating bottom-up, decentralized processes involving many actors with different capabilities and interests, social crowd innovation can be a valuable tool to tackle at least some of the social issues the world faces. ✕

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← **RYON STEWART**

ABOUT RYON STEWART

Ryon Stewart serves as Challenge Coordinator at NASA's Center of Excellence for Collaborative Innovation (CoECI). He is responsible for fostering the use of open innovation tools at NASA and other parts of the Federal Government and coordinates crowdsourcing projects for multiple agencies. Ryon has an Aeronautics and Astronautics Engineering degree from the University of Washington and has worked at NASA's Johnson Space Center since 2008. His early responsibilities at NASA gave him hands-on experience with operations facilities, engineering GN&C (guidance, navigation & control), and engineering robotics. Later, he worked full time in ISS Flight Operations as a flight controller. In this role, he supported over 2200 hours of real time execution supporting activities from visiting vehicle dockings, undockings, reboosts, and other precision operations. He also worked as an instructor teaching flight controllers, instructors, and astronauts about the ISS motion control system and soft skills required for the job.

ABOUT NASA'S CENTER OF EXCELLENCE FOR COLLABORATIVE INNOVATION (CoECI)

The CoECI was established by NASA in 2011 at the request of the White House Office of Science and Technology Policy (OSTP). CoECI guides NASA and other Agency teams on all aspects of implementing crowd-challenge-based initiatives, from problem definition, to incentive design, to post-submission evaluation of solutions. This service allows other agencies to experiment with new methods in a quick turnaround, before formalizing their own capabilities. Since its inception, research into the use of crowdsourcing has been central to NASA's efforts. All CoECI challenges are managed under the umbrella of the NASA Tournament Lab (NTL), which recently expanded its capabilities beyond software and algorithm development. The NTL now offers a variety of open innovation platforms that engage the crowdsourcing community in challenges to create the most innovative, efficient and optimal solutions for specific, real-world challenges faced by NASA.

THE INTERVIEWER
Professor Kurt Matzler conducted the interview in November 2019.

Crowdsourcing at NASA: About the Work Behind Having Others Do the Work

Interview with Ryon Stewart, Challenge Coordinator at NASA's Center of Excellence for Collaborative Innovation (CoECI) explains how NASA benefits from crowd projects.

NASA's record of innovations is truly awesome. Every child knows about the first man on the moon and the space shuttle program, or marvels at images of outer space transmitted from NASA missions. It is less well known that even the world class engineers of NASA tap into the wisdom of crowds to solve their problems and invent groundbreaking solutions. In our interview, Ryon Stewart explains that innovation is less about a genius sitting at a desk and having a light-bulb idea, and more about finding solutions that already exist – somehow, somewhere. Learn how NASA uses crowd-power, why NASA's workforce still won´t run out of work, and how even the bison at Yellowstone National Park contributed to problem solving.

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Kurt Matzler ✕ *NASA is known to have an extraordinarily skilled and talented workforce. How did you get the idea that anybody would be able to solve problems better than you can on your own?*

Ryon Stewart ✕ The idea was born back in 2009. In this year, the Human Health and Performance Director of NASA, Jeff Davis, had been at an executive training course at the Harvard Business School and learned about this method from Karim Lakhani, who is very well known in the crowdsourcing world. Karim basically inspired Jeff to utilize a crowdsourcing route. His organization had to handle a pretty drastic funding cut, and so he understood that crowdsourcing might be a means to help his R&D portfolio with less money than before.

And the early projects turned out to be successful?

Yes, they ran some pilots using the InnoCentive platform, and found that it was quite successful. Around the same time, the Human Exploration and Operations Chief Technologist at NASA Headquarters started doing similar pilots on the software and algorithm side, using Topcoder. These concurrent pilots were both having successes and so we went on.

You now work for the CoECI at NASA. So, you have a whole unit for crowd projects?

Right. At about the time of our first projects, the Obama administration was looking to take advantage of all the skills

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*In 80% of our challenges we see cost savings
of on average 41%.*

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within the country and get the most for the taxpayer. They requested that NASA establish a center of excellence to help NASA and other government agencies take advantage of crowdsourcing. So, in 2011 the CoECI was officially started and we're still here and helping lots of people and government agencies take advantage of crowdsourcing.

I assume, by now you have an impressive list of successful projects?

We operate the NASA Tournament Lab with its contracts and mechanisms. We have done close to 400 challenges so far. This number includes internal and external projects of NASA and other federal agencies. So far, we have had about 25,000 unique submitters for idea solutions who made it the whole way to the finish line. In terms of registered participants, the number is around 200,000 for all the different things that we've done so far. And we've awarded prizes of about $6.5 million since 2009, with a lot of that coming from other federal agencies.

What would you consider your most successful project so far?

This is a tough question. We have a lot of interesting and very successful ones. Clearly, the challenge that got the biggest reach was the ''Space Poop Challenge''. It was looking at trying to improve the methods for human waste management for long duration space activities. Space walks had never been longer than about seven hours and seven hours of waste management can be handled ok. The challenge was looking for a period of 144 hours. We got some interesting responses that helped continued development for future space suits. Obviously, people think of this subject as funny and the project went viral and got covered by basically every major US news media outlet.

And apart from publicity, are there any other projects that stand out?

Some projects on our internal crowdsourcing platform NASA@WORK helped us save a lot of money. NASA@WORK reaches out to the NASA crowd itself. We have had lots of situations where folks came to us with a problem they were ready to fund with a few million dollars and multiple years of development. And then, when they posted it on NASA@WORK, it turned out that someone at the same or in another NASA center already had the answer, at least partially. That has happened many, many times. As an example, someone at Johnson Space Center was looking for a way to better measure urine in microgravity. He was about to spend I think $1.3 million and three to five years of development and posted the problem. It turned out that somebody only a few hundred yards away at the same NASA center already had a prototype that had been developed for a different reason. He was able to respond on the NASA@WORK platform, and what they already had could be used. We have lots of situations where NASA@WORK broke through silos. This was really great, because wherever you work there are silos, sometimes even between team members.

How do you measure crowdsourcing success?

One thing we do is ask the challenge owners before the challenge what they think the project would cost, using traditional methods. Then, after the project, we have a closeout interview as well, where we ask them for the level of advancement: ''Was the solution advanced not at all, incrementally, significantly or was the problem actually solved?'' Anything from incremental advancement to solved is considered successful and we've seen a 94% success rate, which is huge. Approximately a third of our challenges reach incremental advancement, another third are significant advancement and one third is classified solved, which is crazy.

Do you collect metrics apart from success rates?

We also capture savings compared to traditional methods in a similar way. In 80% of our challenges we see cost savings of on average 41%. Utilizing us instead of doing what they would have done is actually like a negative cost for managers. In fact, we've saved about $32 million so far for NASA by utilizing the NASA Tournament Lab. You see, we capture interesting metrics and we have to utilize those to continuously sell crowdsourcing to everyone at NASA.

Wow. That´s impressive. Are you also able to implement all solutions?

Ninety-four percent of our solutions were implemented or planned to be implemented. This is another metric we look at. We have learned over the years how important this is, as a lot of folks don't have a good plan for implementing their solutions. We work really hard with the challenge owners to

make sure they have the clout and authority to get it done afterwards. That's very important, because if you're given a novel solution but don't do anything with it, then what was the point? Then it becomes extra-curricular, which is the stigma that crowdsourcing had lots of times anyways.

Do you run crowdsourcing projects yourself or do you collaborate with partners?

We collaborate with partners for pretty much everything we do. Even for our internal platform, there's a vendor who owns the site and helps us update the platform and figure out problems. We collaborate with platforms like InnoCentive, Topcoder, Kaggle, Luminary Labs, HeroX. Right now, we have ten vendors; they all have different skills, and often self-select depending on what they know best. Once a vendor is selected, they do most of the work and this is a really good selling-point for the problem owners. The vendors help frame the problem, develop the contest and help execute it.
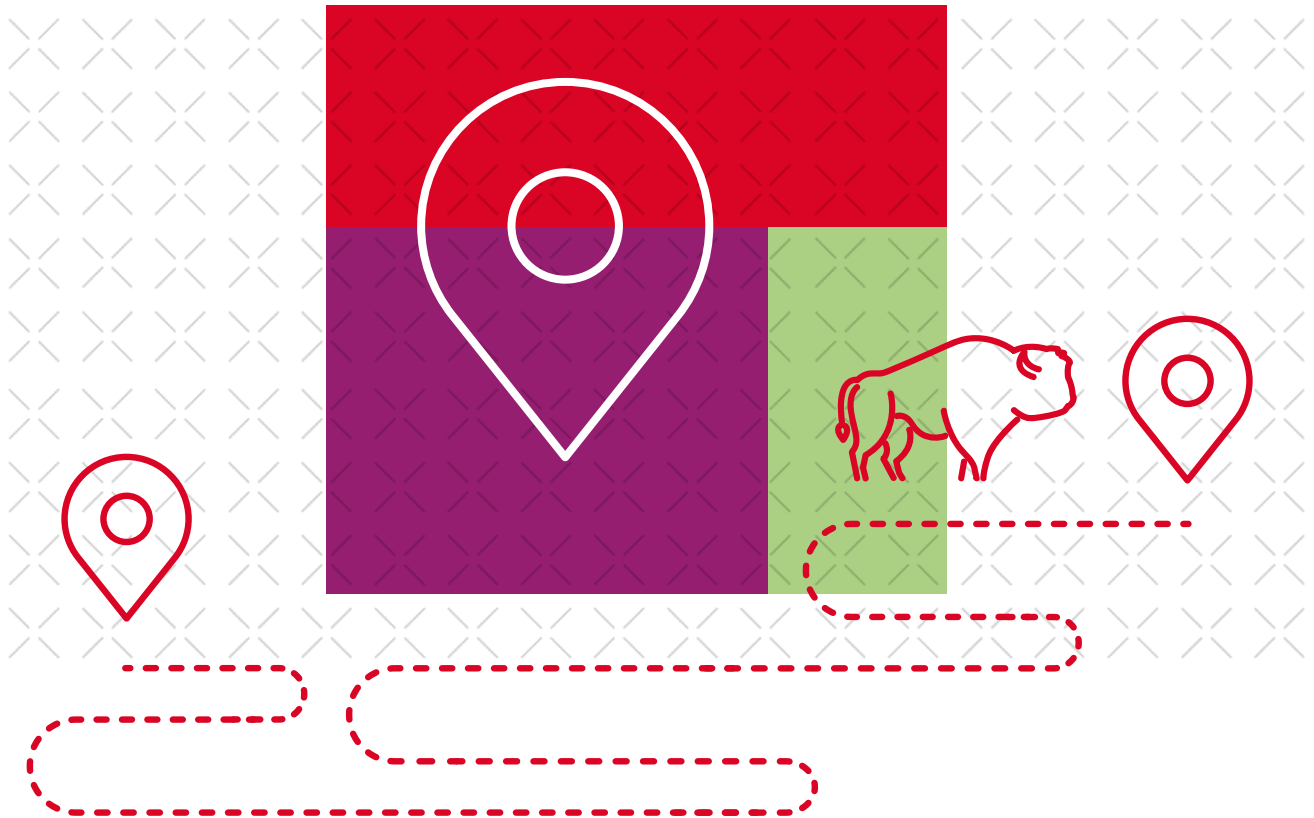
Who selects and evaluates the ideas and solutions? Do you delegate this to the vendors as well?

The vendors help select ideas by evaluating them against the defined requirements. Therefore, you have to make sure that your requirements are clear enough to pick different solutions. For an algorithm challenge, it's mostly easy. You're almost always just picking the highest score. But for ideation or creative-type challenges, it's more difficult. Our contracts specify that vendors filter the ideas. We've had challenges with hundreds of responses from the general public, with each response up to 30 pages talking about something in space, and many nowhere near what we want. Even in a curated crowd, many responses are not good. The vendors are reading all the papers and identify which meet the requirements. Then they deliver those to our NASA teams and problem owners only have to read through those to pick a winner.

How do you motivate contributors to participate in your challenges?

For a lot of the challenges, that's really up to the vendors. They understand their crowd and it's their job to maintain and curate that crowd and keep people interested. That's part of what we pay them to do. They'll know how much money it takes to get the right kind of answers. If you offer too much money, the crowd might think the problem is too hard and their solution won´t be good enough. If you offer too little, then people might think it's not worth their time.

What are typical problems that can arise during a project and how can they be solved?

Probably the biggest problems emerge when the challenge-owning team is not ready to take the solution. For instance, if the solution is a software application and they haven't,

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People often are afraid of the idea of outsourcing work, but really there's still lots of work to do even if you're handed a solution.

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ahead of time, coordinated the implementation with their IT. If people haven't done all of the leg-work, you get a problem. The people in-house need to be able to integrate the new ideas into their platform and their architecture. People often are afraid of the idea of outsourcing work, but really there's still lots of work to do even if you're handed a solution.

Are there any problems with intellectual property issues? Don´t you fear giving away secrets that people would use for their own purpose?

Together with the vendors we define what IP (intellectual property) we want to give the solvers as part of the challenge. Usually, the more IP you're willing to give, the better the solutions will be, especially for hard problems. If respondents are pretty much inventing something new, they might back out part way through and say,'' I don't want to win this prize. I'm going to go start my own company.'' So you have to be careful on how much IP you're willing to give. Generally, because we're the government, we give a government use license where they'll continue to give us, in perpetuity usually, the ability to use whatever that thing is, but we still allow them to go start a business on the side, if they want. For private industry it will probably be a little more complicated.

Data might be too sensitive to be shared. How do you handle this challenge?

For a data science type problem, you can change the labelling of some data or share only part of your dataset, to make it unclear. For instance, if we're doing a challenge on astronaut health, we can't share health data. So we make sure that we have just columns of numbers or we scale data differently. There are lots of things you can do to prevent people from interpreting exactly what it was originally.

Do you always reveal that it´s NASA that seeks a solution or does it sometimes make sense not to disclose who the sponsor is?

Obfuscating a problem can be very good in some cases. If we reframe the problem to disguise who we are or what the problem is, it gets hard for folks to know what's really going on. A few years back, the CIA actually ran a challenge without listing themselves as the CIA. The challenge was to utilize only social media posts to track particular bison in Yellowstone National Park. But in fact they wanted to use their algorithm to help track Russian actors in Crimea, and were finally able to do so. They didn't post it as that to avoid attracting bad actors submitting bad responses that might change the outcome. Getting people help you find bison in Yellowstone National Park is the same concept and really harmless. The vendors are very good at helping folks like me reframe and restructure those problems so that we need not worry about leaking too much intellectual property or sensitive data.

You mentioned several times that you actively sell the idea of crowdsourcing within NASA? Is it difficult to convince people to play along?

We do have the ''not invented here'' syndrome or people who think that their problem is unique. It's a culture shift and a lot of folks believe that we at NASA know our stuff better than anybody else. We have to explain to people that just because you're a chemist in a chemistry lab, a chemistry problem might not be the best thing for you to solve if you want a breakthrough solution. It might be, but if you put a problem out there, people will come with new things that you have never thought about. So we do a lot of work convincing them with roadshows where we present the general successes based on the metrics we collect. We also tell them

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The vendors are very good at helping folks like me reframe and restructure those problems so that we need not worry about leaking too much intellectual property or sensitive data.

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all our case studies. A few years ago, for instance, a group was looking to improve the ability to send and receive large files in e-mail through to the International Space Station from Mission Control. So they really had to improve the networking protocol in space, like sending the internet to space more than before. It was a problem that seemed unsolvable for some of them. They got an answer using an external platform and were blown away that it worked. It's now implemented and still being used on the Space Station today. So, we definitely try to shape the culture to help understand that crowdsourcing is good for NASA.

Are the engineers and scientists worried that they might get redundant because of crowdsourcing?

We show them that crowdsourcing is not taking away jobs: Maybe a design is coming from someone outside, but you're the one who has to integrate that design, you're the one who can build off of that design. Often, a design or an idea isn't your end goal – it's just changing where you start. Even not getting good solutions can validate that NASA was doing the right thing, because not even the rest of the world could think of anything better.

For which problems does crowdsourcing provide the greatest benefits to NASA?

Contests work well when the combination of skills or even the technological approach are not obvious. Often, trying something and not getting the solution can be due to inherent biases that you are unaware of. So, reaching out to a large crowd through experts can help re-frame the problem such that those inherent biases disappear. You can get many diverse skills and backgrounds. And maybe they end up being

smarter than your technical domain. The right combination of skills and backgrounds will be out there. They will shoot new perspectives at you and you might get big and really good solutions. If the problem is very well-defined, you know for sure that only a certain kind of work could get it done, then contests might not be the right route.

Finally, based on your experience with many crowdsourcing projects, which advice would you give an organization that is planning to start with crowdsourcing?

If a company wants to start their own crowdsourcing projects or start a Center of Excellence, they have to be flexible and patient. You have to be able to understand different kinds of problems and handle a lot of rejection, because crowdsourcing will be new. It's not traditional and often scary, like we were just talking about. At least to start off with, you should take advantage of other platforms and their crowds. Definitely capture metrics for basically everything you do. Think about metrics that are important to your stakeholders and to your potential challenge owners and use them to explain to people why crowdsourcing is good. But then also find interesting stories that can go along with those numbers. Really good case studies are a great way to convince.

Thanks so much for sharing your crowdsourcing insights and success stories with us. We sure hope to read about further extraordinary projects in the media soon. And with the help of the crowd, I am sure, you will send humans to Mars not too long from now. ✕

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Case Study "Crowdsourcing@Rivella": In Search of New Flavors

Silvan Brauen

Red, Blue, Green and Yellow ╳ In 2012, the leading Swiss beverage company Rivella faced a strategic question of innovation management. At that time, the company generated the largest share of its sales with the popular two flavors "Rivella Red" (original) and "Rivella Blue" (low-calorie). The company introduced "Rivella Green" in 1999. Its green tea flavor was a successful aromatic supplement to the classic line. But the "Rivella Yellow" variety was withdrawn from the market only five years after launch despite its highly innovative concept. It was introduced in 2008, using an original soy serum produced with a highly complex technical process. After this setback in 2012, the company asked itself whether and how it wanted to tackle future innovation projects.

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BOX 1

Key facts about Rivella AG

> Family business, founded in 1952 by Dr. Robert Barth
> Largest Swiss producer of soft drinks and number 2 in the Swiss soft drinks market
> Brands: Rivella, Michel, Passaia, URS, FOCUSWATER, eau&moi
> Top Swiss power brand with a national awareness level of over 95%
> 2012: Start of a crowdsourcing project to develop new Rivella flavors
> Crowdsourcing platform: ATIZO 360°: 800 submissions, 20 taste finalists
> 2014: Successful launch of 2 new crowd-based varieties

The development of new beverage concepts via crowdsourcing was great but companies should not blindly trust crowds.

←

Innovation yes – but how? ✕ Several internal stakeholders had urged the company to postpone product innovations and focus exclusively on established offerings for the time being, but company management decided to reengage with new methods of innovation management. One requirement for the new process was to involve consumers more intensively in the research and development of new concepts, that is to strive for consumer-centric innovation rather than use a strictly technology-driven approach. After evaluating different methods and procedures, the team responsible for innovation decided to try the crowdsourcing platform ATIZO 360°, provided by an open innovation consulting firm. This approach enabled Rivella to search and evaluate ideas from consumers in the spirit of open innovation.

New varieties through crowdsourcing ✕ The innovation process covered a period of almost two years. From idea generation to naming and launching, consumers – including many loyal Rivella fans – were involved at several steps of the process. First, over 800 different ideas for new Rivella varieties were collected via the digital crowdsourcing platform. After a rough pre-selection by the innovation team, the most promising ideas were selected in a workshop with consumers and internal decision-makers. These were developed into around 30 detailed idea profiles. After a further round of prioritization, 20 idea profiles were prepared for presentation on the crowdsourcing platform where users evaluated them in detail. Finally, concrete beverage recipes were developed for the 10 best-rated ideas. The concrete product concepts and product samples were then tested using classic quantitative market research methods (concept and product tests) in several Swiss cities until the two winning flavors, Rivella Peach and Rivella Rhubarb, were ultimately chosen and launched in the Swiss market in spring 2014.

The fact that the two new varieties were co-developed by consumers was prominently communicated during launch. In the end, the two new varieties contributed to a significant increase in household penetration of the Rivella brand and to successful business results in 2014 and 2015. In recent years, new flavors such as Rivella Mango and Rivella Elderflower have replaced the earlier range extensions and other new flavors based on the crowdsourcing innovation philosophy are in the innovation pipeline.

> *Aspects such as feasibility, profitability, and the strategic sense of an idea are sidelined in a typical process.*

Crowdsourcing works, but … ✕ The development of new beverage concepts in close cooperation with consumers via crowdsourcing can be deemed a success for Rivella AG overall, but the approach was not without difficulties and challenges. For example, when reviewing the more than 800 ideas, the Rivella innovation team observed that a small group of users had managed to push certain ideas. A central part of ATIZO 360°'s crowdsourcing system is a process by which consumers can both like and comment on the ideas they receive, as well as respond to posts on social media such as Facebook and Twitter. These comments and likes have an impact on which ideas are considered promising and pursued by the company's internal innovation teams. This is what Rivella learned in its crowd project:

> **Social dynamics can skew results** ✕ Reto Hofstetter, professor of marketing at the University of Lucerne, uses the term ''social bias'' to describe the problem that many participants reciprocate positive comments or likes with each other, regardless of whether they actually like others' ideas. For 14 months, his team examined 87 crowdsourcing projects on the ATIZO 360° platform. The study also showed that users who were connected as ''friends'' liked each other's ideas more often than they did those they had no connection with. The evaluations of many crowdsourcing users therefore often reflect generic social media behavior rather than indicate the actual quality of the ideas or real preferences. On closer inspection, the likes and dislikes of users turned out to be rather unreliable indicators of the actual quality of ideas.

> **The moderation and communication effort can be considerable** ✕ Another challenge of the crowdsourcing approach is the increased management effort for in-house innovation teams. The demanding and complex moderation and coordination role of an innovation project goes beyond the various internal stakeholders, and includes external consumers, with their attendant ideas, questions and needs. The higher the number and complexity of submitted ideas, the more the administrative burden of viewing, sorting, prioritizing, and condensing all these ideas can escalate.

> **Creativity dominates feasibility considerations** ✕ Experience also shows that platform users in crowdsourcing projects are often attracted by ideas with a certain degree of originality and novelty. While finding really "new" ideas is a main reason for involving external crowds, aspects such as feasibility, profitability, and the strategic sense of an idea are sidelined in a typical process. With their limited perspective, most users don't know whether an idea that sounds exciting can be effectively implemented or economically and strategically meaningful for the company.

Critical questions should be part of the exercise ✕ These examples of challenges in crowdsourcing innovation projects show that it is advisable to take a closer look and not blindly trust "the crowd". One of the basic skills of a good innovation manager is to analyze why an idea finds approval or disapproval from users. The challenges described above do not mean that crowdsourcing isn't a useful tool for innovation management. Rather, it shows that new solutions and procedures are needed to avoid or minimize issues like social bias. For example, it may make sense to work more closely with a carefully curated crowd, where the individual members have relevant expert knowledge. It might be better for companies to work more intensively on an innovation project with a smaller number of the "right" people than to invite many randomly selected people to submit ideas and vote on them. This would not only significantly reduce the risk of social bias, but also result in a lower coordination effort. And finally, the chances of finding ideas that are both highly original and creative, as well as ones that are economically feasible, and strategically relevant would increase substantially.   ✕

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One of the basic skills of a good innovation manager is to analyze why an idea finds approval or disapproval from users.

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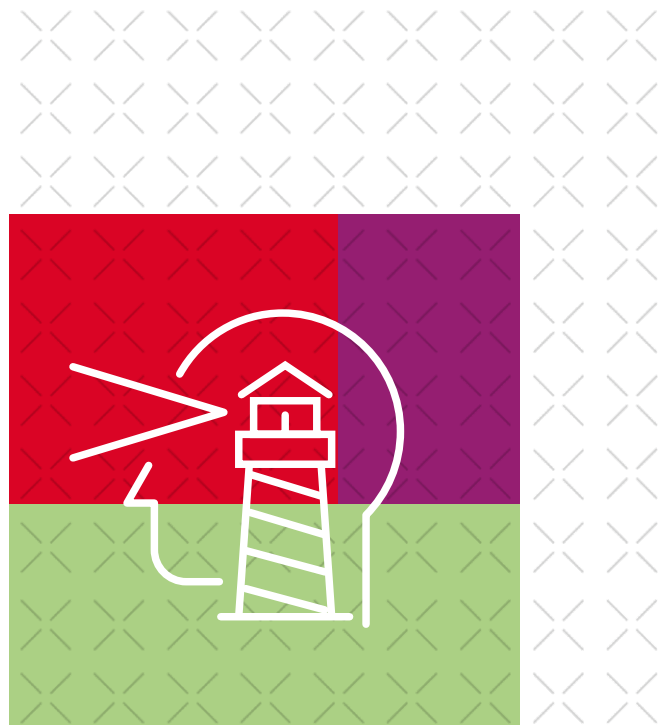
Editors

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