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“There is not economy of scale in research. In research its economy of ideas”

Mix the wisdom of internal and external networks and you might just come up with brilliant and unexpected solutions to apparently intractable problems. Julian Birkinshaw and Stuart Crainer report on how Roche Diagnostics is exploring an experimental approach to harvesting bright Ideas.

When it comes to innovation the stakes don't come much higher than in the pharmaceutical industry. Innovative solutions for serious medical problems come with an enormous price tag. The Swiss company Roche spent 8.8 billion Swiss francs on R&D in 2008 alone - nearly 20 per cent of its sales. But, there is also a prize: drugs and diagnostics which help people live longer, healthier lives.

“There is not economy of scale in research. In research its economy of ideas,” former Roche CEO Franz Humerand current chairman of the board of directors observed. Maximising the bang per R&D buck lies at the heart of Roche's business. Given the size of the organisation - with 80,000 employees, Roche operates in 150 countries and has R&D operations in Europe, North America and Asia-Pacific, as well as numerous strategic alliances in a network of partnerships around the world - and the issues it is dealing with, this is always a contentious area both internally and externally. Roche, like other R&D intensive companies, has to balance organisation with freedom, diversity with direction, budgeting with brilliance.

One of those at the forefront of exploring this demanding balance is Tod Bedilion, the California-based director of technology management at the Chief Technology Office of Roche Diagnostics. This part of Roche is a world leader in in vitro diagnostics. This includes products used to test blood and tissues to obtain information for early detection, diagnosis, prevention and treatment monitoring of diseases.

The research is highly specialised and complex. The diagnostics research is separated into five largely separate business areas - Applied Science, Molecular Diagnostics, Diabetes Care, Professional Diagnostics and Tissue Diagnostics. Each has a complex product portfolio with customer and technology which can overlap. “Roche is a vast ecosystem,” says Tod Bedilion, himself a scientist with a Ph.D In molecular biology and over a decade of experience in commercial research.

The Power of Networks

In April 2008, a cross-functional team of Roche managers was put together to take a fresh look at the company's innovation processes. Were there smarter ways of working that would help Roche to utilise its knowledge base more effectively? The team consisted of members from the US, Switzerland and Germany, and represented several functional areas: there were scientists, a quality control manager, an attorney, an IT specialist, and a product portfolio manager. The mix was most definitely the thing.

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hypothesis was that small R&D teams could gain immensely from coordinating their efforts or being able to reach out to their colleagues across the other business areas and, at the same time, reaching beyond the traditional channels in business development and licensing for third parties, to the external world,” says Bedilion.

The team knew this was hardly ground breaking. Tools such as Facebook, Wikis and so on suggest there is huge business potential in relatively modest tools that allow people to collaborate more efficiently and transparently. The originality for Roche, and for many other organisations faced with similar issues, lies in actually bringing networks to life and leveraging their potential.

To get a sense of where the biggest opportunities might lie, the team sent out a survey to the R&D staff across Roche Diagnostics. 255 people responded. “The basic story emerging from this survey,” Bedilion observed, “was that people could see enormous potential in Increased collaboration, but they didn’t know how to do it”. The number of hierarchical levels, a lack of resources, and pressure to deliver were all mentioned as major obstacles. “The survey suggested that collaboration was latent, all ready to be harvested, if we could figure out how to do it in the right way,” says Bedilion.

“The over-riding hypothesis was that by putting more eyes on the problem, by creating virtual networks, we would be able to solve problems quickly and more efficiently,” says Tod Bedilion. “The organising principle was that they had to be real problems, things we were actually working with right now and would have value if they were solved.” With a faith in the power of networks, a multi-disciplinary dream team and a range of real troublesome problems, the next step was to identify a suitable means of experimentation.

The Challenges

A guiding principle for the team was “you cannot fully understand something until you try to change it.” In other words, to find out why collaborative innovation was so difficult, they needed to design an experiment to change the nature of collaboration.

They quickly hit on an important idea: why not challenge two different networks of scientists to tackle the same problem? If one group makes much better progress than the other, then it should be possible to isolate the factors that made the difference. After kicking around a number of possible designs, they gravitated towards a simple compare and contrast - between an Internal R&D community (i.e. employees of Roche Diagnostics), and an external network of scientists.

For the-focused project, the team challenged their colleagues within R&D to offer up a set of real, current problems that needed work. Six challenges were identified from across the Business Areas and touching on a variety of problems from mechanical engineering to biochemistry.

The team broadcast the six challenges across the Roche R&D network in June. By November, they had contacted over 2,400 members of the R&D community. 419 people logged onto the online system and read the challenges in detail. 40 proposals emerged. Many of these proposals lacked detail, but there was one real gem: a novel solution to efficient power management in a portable instrument. It was actually solved by a scientist, at a different site in a different function, so he hadn’t made the connection before to the team working on the power management challenge. “It was a beautiful example of linking people across an organisation who have allied interests, are working in the same field; they’re trying to solve the same problem, and these people simply didn’t know to ask each other. And the problem may have been solved that simply. We’re exploring that now,” says Bedilion.

Going Out

The second part of the experiment was to take one of the challenges to the outside world. Because of the cost involved, the team chose one of the six

*Since this article was written, the size of InnoCentive's solver network has increased to over 380,000.

InnoCentive had a success rate of 80% in 2016.

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challenges: to find a means of better measuring the quality and amount of a clinical specimen as it is passed through one of Roche's automated chemistry analyzers. This problem had, in one form or another, been wrestled with for many years involving researchers throughout Roche and its external partners.

To manage the process of inviting outsiders into Roche's R&D process, the team decided to work with InnoCentive, based in Waltham, Massachusetts. Founded in 2001, InnoCentive claims to be the world's "first open Innovation marketplace". It is a global web community which enables scientists, engineers, professionals and entrepreneurs to come up with solutions to problems posed by organisations including Procter & Gamble, Eli Lilly and Solvay. InnoCentive has around 160,000 what it calls "solvers" in its network (*please see note on left side for recent figures*). Anyone can be a solver and they provide their ideas anonymously. You simply go to the network, sign up and agree to the terms and conditions. You may be a 20-year Ph.D chemist, a graduate student, or a scientifically trained housewife. "The idea is to increase the number of shots on goal. You never know where a solution is going to come from," says Bedillion.

InnoCentive boasts an average success rate of 40 per cent and, as Bedillion puts it, is "very sensitive to the mechanisms for handling intellectual property. This would not have been doable without a very thoughtful approach to how you handle any kind of intellectual property that emerges. We worked with InnoCentive to refine the proposal". A \$20,000 award was included if a solution was produced.

The challenge was posted on the InnoCentive network and had almost 1,000 readers in two months. The result was 113 proposals from around the world. Their quantity and quality took Bedillion and his team by surprise. "The proposals were incredible," he says. "In contrast to the internal network, rather than being one or two lines, many were multiple pages. Some people had done experiments. There were diagrams. There were drawings that filled an entire notebook. We would have been delighted if we could have got much of the work out of our own research organisation."

The pay-off was apparent. As Tod Bedillion noted: "I couldn't put ten people in a room and have a brainstorming session or a seminar for two days for the same cost with all the travel involved. And I would have got a few hundred sticky notes rather than an entire notebook with 113 separate detailed proposals."

And, most important of all, there was a result. Basically, in 60 days, Roche was able to solve a problem that it and its partner have been tinkering with and optimizing for the last 15 years. The solutions provided actually mirrored the entire history of Roche's R&D programme. All of the solutions Roche had tried came in.

Incredibly, more than one solver hit upon the same novel solution. At the time of writing, Roche is analysing each of them. No formal technology transfer has yet been agreed.

Making Sense of the Results

What to make of the findings? At first glance, you might expect the internal R&D community to provide better-quality answers - they have the necessary technical expertise, and the same overriding interest in Roche's wellbeing. But it was not so. For the most part, internal responses to the challenges were disappointing. Many were one-liners; a handful extended to a paragraph or two. Despite the fact that they got a solution to one of the problems, the Roche team didn't see the interactive discussion and exchange of ideas that they had anticipated. The members of the InnoCentive network, on the other hand, were motivated, and seemingly as knowledgeable. Observes Bedillion: "Clearly, the financial incentive played its part here, but we think there is more going on - people also seem to get intrinsic value out of sharing their expertise through this community".

So what is the learning within Roche? “We still think there’s a huge amount of value in internal web-based forums. We simply don’t know how to do it,” admits Tod Bedilion. He and his colleagues are working together to understand the dynamics of the system, incentive structures, as well as the kinds and scope of the problems that should be posed and how questions should be asked.

This does not suggest that employees are less innovative, but simply that this channel to their creativity is not yet fully understood and is difficult to utilise.

Insights from Roche Diagnostics

Work on the question

One of the hardest problems in designing the experiment was figuring out exactly what question to ask. When you’re asking for help solving a problem, how much detail do you have to give? The quality of answers is usually related to the quality of the questions. Says Tod Bedilion: “We had the full spectrum on the team: people who basically said we have to put it down in a few sentences and others who were adamant that we had to provide enough detail and structure so that someone who wasn’t familiar with the space, could actually get in there and turn things over. The latter approach is what we largely followed.”

Back openness with knowledge

Roche formed an expert team for each of the six challenges to look at any solutions submitted. The teams were made up of people who were currently working on the project and people who were new to the organisation. This combination turned out to be critical. “It was often a really emotional heated debate as these challenges came in. One experienced expert was strongly opposed to the winning solution. It wasn’t his solution. So we saw in a microcosm what plays out across organisations every day.”

Open innovation; open learning

While the design of the experiment was carefully structured, there was still plenty of scope for learning on the job. For the Roche team, a key lesson was in marketing. None were marketers so first they had to learn how to sell, promote and launch a new interface. Initially they thought it was a question of extracting everyone’s email address in the organisation, sending them an email describing the problem or the opportunity, and inviting them to click on the website. Modest returns resulted - a few hundred people clicked on the link. The email was then simplified and some were sponsored or sent out by the heads of R&D. A poster was published and hung up on the walls of all the business areas. The final version of the poster offered a modest incentive - an Apple iPod Touch.

Everyone likes an experiment

Tod Bedilion, a scientist by training, constantly thinks in terms of experiments. This, he argues, is an important factor and a differentiator in how people view open innovation activities.

“We set it up as an experiment, as an actually compare and contrast, with a designed input and measurable output. Because of this I think we saw a positive response from everybody that we presented to. That was profound: it was quantitatively different than the response to the average presentation, which is more around opinion, and sometimes around data, but rarely around an experiment. It was very powerful in explaining there’s a whole range of problem solving that we simply don’t have any experience of. We can’t comment until we try it.”

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