

# Virtual R&D

## Open for Business

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Life Sciences

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“Someone outside your organization knows how to  
answer your specific question [...] better than you do.”

A.G. Lafley, CEO of Procter & Gamble

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## “There’s gold in them thar hills” ...but we can’t find it

The former CEO of Goldcorp, Rob McEwen, was concerned about the performance of his company’s Red Lake mine in Ontario Canada. Extraction costs were high and whilst the company was convinced that lucrative deposits of gold existed within the mine, its own geologists were unable to identify their exact location. McEwen decided to turn to the wisdom of the crowd—a daring and unconventional approach. In March 2000, the firm made all of its geological data available to external parties and launched an innovation challenge to find the gold deposits. The competition was backed by a prize fund of \$575,000.

The data was poured over by more than 1,400 external “prospectors” from different fields and professions including geologists, consultants, graduate students, computer programmers and even retired military officers.

The winning effort was a collaboration between two groups in Australia who used 3D mapping tools and graphic modelling techniques to build a 3D visualisation of the mine and its deposits. They had never previously set foot on the mine but were able to identify over 110 gold sites (50% of which were new to the company) and shaved 2–3 years off the exploration time. The value of the gold identified exceeded \$3bn, a sizeable return on the \$575,000 cost of the prize.

This fascinating tale, which is covered by Tapscott and Williams in *Wikinomics*<sup>1</sup>, illustrates the clear benefits that can result when companies consider the potential of outside ideas and the power of collaborative problem-solving.

*“Perhaps the most lasting legacy of the Goldcorp Challenge is the validation of an ingenious approach to exploration in what remains a conservative and highly secretive industry. [...] [McEwen] saw things differently. He realized the uniquely qualified minds to make new discoveries were probably outside the boundaries of his organization, and by sharing some intellectual property he could harness the power of collective genius and capability.”*

*Wikinomics* (2008)

## Opening up for business

The concept of open innovation has its roots in the industrial revolution and rose to prominence through the work of Henry Chesbrough<sup>2</sup> in 2003 (see sidebar).

Research conducted by Chesbrough and Sabine Brunswicker for the Fraunhofer Institute in 2013 identified that, on average, 78% of firms with turnovers in excess of \$250m in the US and EU, have turned to this more virtual form of R&D as a means to address seemingly intractable problems.<sup>3</sup>

Life sciences companies already routinely work on assets outside the company, access externally derived innovation and outsource elements of the R&D process. Figure 1 illustrates a selected range of collaborative mechanisms that already exist. Open, or virtual, R&D is a current reality but could pharmaceutical companies embrace it more completely and execute it differently to deliver more substantial benefits?

### Open Innovation

*“Open Innovation...assumes...firms can and should use external as well as internal ideas and internal and external paths to market.”*

In the conventional R&D process, a corporate R&D lab is embedded in a vertically integrated commercialisation structure with a strong funnel, channelling in-house ideas to the market. The open innovation approach makes the walls of this funnel permeable, either bringing outside ideas in or spinning out innovations that no longer fit the company’s strategy to the external market.

*Open Innovation* (2003)

Dr Lee Babiss, CEO of X-Rx Inc. and a board director of Moderna Therapeutics, notes that Big Pharma is increasingly switching early R&D spend away from in-house efforts and focusing instead on external sources of new drug candidates. He comments “pharmaceutical discovery is dead.”

Professor Jackie Hunter (CEO, Stratified Medical and a specialist in open innovation in healthcare and life science R&D) believes that ingrained attitudes in Big Pharma hinder its potential to drive value from some types of virtual R&D. These include being too restrictive when making deals with external partners; sharing reward and failure equitably and being short-term in outlook, particularly in corporate environments where there is constant change. She notes that for many pharmaceutical companies “the loss of control can be uncomfortable...but it is necessary.”

Nonetheless, the nature of the pharmaceutical sector presents some specific challenges to companies seeking to implement virtual R&D approaches. Dr Michelle Browner, Scientific Strategy Lead at Verily (previously Head of Platform Innovation and Partnership Management at J&J’s Innovation Center in Boston), notes that science sourced externally can be difficult to replicate once it has transitioned in house. Dr Frank Armstrong, a member of Charles River Associates’ Scientific Advisory Council, highlights the problems that can arise in relation to regulatory accountabilities in an extended, virtual R&D environment: “in the virtual model, the executives of the sponsoring company need to recognise that they are responsible for all of the company’s activities relating to compliance and quality even if they are conducted externally by a partner company.”

We reveal six key drivers for delivering lasting success in open innovation and virtual R&D approaches through an examination of the experiences of leading companies including, Goldcorp, Google, Procter & Gamble, LEGO, General Mills and Siemens.

Figure 1: Virtual R&D in Life Sciences

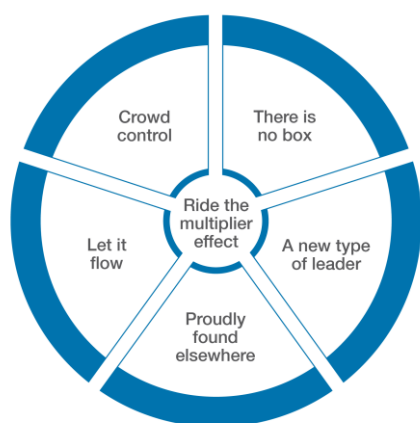
**The Virtualisation of Pharma R&D**

There are many examples of pre-competitive data sharing consortia such as the Centre for Therapeutic Target Validation (CTTV), the Innovative Medicines Initiative (IMI) and the Biomarkers Consortium. In February 2016, Seven Bridges made more than a petabyte of cancer data available in the cloud for any researcher to use. Examples of competition-based biomedical data projects include the US National Cancer Institute project on new genetic variants in breast cancer and the DREAM challenges programme, a crowdsourcing open science programme focused on algorithm development in systems biology.

Cancer Research UK, through Play to Cure™: Genes in Space; BioGames from UCLA; and EteRNA from Carnegie Mellon and Stanford apply game formats to crowdsourcing and community-based research knowledge advancement. InnoCentive, a crowdsourcing hub, provides the means through which many pharmaceutical companies seek input to key technical challenges for cash rewards. Academic social networks such as ResearchGate, Academia.edu and Mendeley, add to the pool of mechanisms that can enable R&D to function in a more virtual way.

Source: CRA Research

Figure 2: Six key drivers of success in virtualizing R&D



## 1. Ride the Multiplier Effect

*“No matter who you are, most of the smartest people work for someone else.” Sun Microsystems co-founder Bill Joy, 1990 (Joy’s Law)*

Procter & Gamble has been a front-runner in open innovation. Disappointed with the outputs of internal R&D efforts, the company decided to rethink its approach to innovating.<sup>4</sup>

The company’s innovation model was misaligned with a landscape where important innovation was “...increasingly conducted by small and mid-sized entrepreneurial companies.”<sup>5</sup> The then newly appointed CEO, A.G. Lafley, set out to transform the innovation process and the innovation culture itself. Many of the company’s best innovations came from connecting ideas across internal businesses and the firm believed significant potential existed in looking to external connections. The company’s revised innovation model, Connect + Develop (C+D), wholeheartedly embraced open innovation. Launched in 2000, it uses open and closed networks to find solutions to carefully defined customer needs. P&G also made extensive use of open innovation platforms such as NineSigma, InnoCentive and YourEncore. The company equally considers ideas whether they are generated by a customer, consultant or in-house research scientist.

The results have been impressive. Innovation success rates have doubled and a number of the company’s blockbuster products have been sourced externally (e.g. Olay Regenerist, Oral-B Pulsonic toothbrush).

P&G realised that the new model enabled the company to leverage a vastly bigger community of R&D staff through a virtual model than it could ever sustain internally. From an internal R&D staff of 7,500, P&G was able to access the innovative power of 1.5 million individuals working in areas relevant to P&G’s goals.<sup>6</sup>

For many companies there is broad acceptance that good ideas can come from anywhere. Open innovation is at the core of Google’s culture and is enshrined in the company’s nine principles of Open Innovation: “Default to open.”<sup>7</sup> The company released the Application Program Interface (API) and code for many of its tools such as Android and leverages a network of external developers to contribute and develop its products. It forms research collaborations with a large number of companies and will frequently acquire a company to gain access to external ideas, innovations and the people behind them.

Toymaker LEGO is another leader in open innovation. Its LEGO Ideas platform taps into its fan community for suggestions for and feedback on new sets. Proposals which gain the most user support, are likely to be turned into official production sets. The company also used AFOLs (Adult Fans of LEGO) to co-develop the next generation of its Mindstorms product line, integrating these super users into the development team.<sup>8</sup> General Mills established G-WIN (General Mills Worldwide Innovation Network), aiming to “enhance and accelerate our innovation by teaming with world-class innovators” outside of the company.<sup>9</sup>

### ‘A wake-up call’ for P&G

“By 2000, it was clear to us that our invent-it-ourselves model was not capable of sustaining high levels of top-line growth. The explosion of new technologies was putting ever more pressure on our innovation budgets. Our R&D productivity had levelled off, and our innovation success rate – the percentage of new products that met financial objectives – had stagnated at about 35%. Squeezed by nimble competitors, flattening sales, lacklustre new launches, and a quarterly earnings miss, we lost more than half our market cap when our stock slid from \$118 to \$52 a share. Talk about a wake-up call.”

“Connect and Develop: Inside P&G”  
*Harvard Business Review* (2006)

### P&G Open Innovation Success

- By 2006, 35% of P&G products had elements that originated from outside (15% in 2000)
- 45% of initiatives have elements discovered externally
- R&D productivity increased by over 60%, with R&D spend as a percentage of sales declining

“Connect and Develop: Inside P&G”  
*Harvard Business Review* (2006)

Other companies have followed Goldcorp's example in establishing competition-based, open innovation initiatives. Netflix sought to address a specific problem in the open environment when it offered a \$1 million prize for an algorithm to improve its movie distribution process. GE and the open engineering community GrabCAD launched the 3D Printing Design Quest in 2013. This was a public competition to redesign a metal jet engine bracket, making it 30% lighter while preserving its integrity and mechanical properties. Participants from 56 countries submitted nearly 700 bracket designs to the Quest.<sup>10</sup>

The experiences of these companies show that success in virtual R&D is tightly linked to its placement at the centre of corporate strategy. Actavis (now Allergan) is one of a number of pharmaceutical companies that values innovation, but prefers to invest in research taking place outside of the company.<sup>11</sup>

*These companies and many others are enjoying the “multiplier” effect of virtual R&D.*

#### Actavis/Allergan on Virtual R&D

*“We love research and we have no issue with research [...] we just don't like to do it ourselves.”*

*“Innovation is [...] key. R&D is the lifeblood of what we do.”*

*Brent Saunders, CEO*

## 2. There is no box

*“People who think outside the box, often talk to people who play in a different box to get new ideas.” Clayton Christensen<sup>12</sup>*

The solution to a problem frequently can be found outside the walls of the company; often, the solution exists in a completely different industry or sector.

BMW adapted its iDrive system for controlling a car's on-board functions (climate, satellite navigation, drivetrain settings etc.) by borrowing from the gaming industry. The controller replicates many of the multiple gestures and functionality found on the typical games console controller. Nike Shox shoes were adapted from Formula One shock absorption systems and P&G leveraged software written for modelling underground water flows to simulate liquid flow in diapers.<sup>13</sup>

Many organisations tackle innovation challenges in partnership with companies in different sectors. For example, DuPont and Duracell (through Power Matters Alliance) are working on the Corian® Charging Surface which can be used to charge smartphones and tablets cordlessly.<sup>14</sup> Some of the greatest opportunities for pharmaceutical companies today lie at the intersection of medicine and advancing technologies that will enable new products and integrated healthcare approaches. Verily, Apple and IBM are already active in this space, opening up a rich pool of potential collaboration partners for pharma, but also introducing a competitive threat. There are signs that pharma is beginning to experiment outside its usual innovation partnerships. For example, Novartis is working with Google to develop next generation contact lenses. Elsewhere, drug companies are embracing new technologies in clinical trials. Biogen is monitoring the movement of multiple sclerosis patients in trials using fitness trackers and GlaxoSmithKline and AstraZeneca are using “smart” inhalers. The partnership between Novartis and Qualcomm is a major step forward in the use of mobile technology in the trial setting.<sup>15</sup> According to Professor Hunter, firms will need to invest in new types of in-house skills to make these approaches a success (sidebar).

*“If you want people to think out of the box, you need to get out of the box thinkers – they will not be traditional bench scientists.”*

*Professor Jackie Hunter*

Google proactively encourages an “outside the box” approach and pushes its staff to “think big – think 10x” when dealing with innovation challenges.<sup>16</sup> This has led the company, for example, to consider using helium balloons to deliver broadband reception to less accessible parts of the globe. Through Verily, Google will focus attention on life sciences and healthcare. One of its current projects involves disease-detecting nanoparticles which would travel through the blood and send signals to a sensor worn in a wristband.

*The ability to look outside one's own industry to other fields for innovation is fast becoming a crucial capability. It's not about your box and their box, successful innovators seek ideas everywhere and anywhere. There is no box.*

### 3. A new type of leader

*"Innovative people do not need to be told to do it [innovation], they need to be allowed to do it."*  
Udi Manber<sup>17</sup>

Embracing an open, virtual model is a break with the dominant, in-house invention driven R&D paradigm, which has been in place for decades at many pharmaceutical companies. Adopting an open, virtual model depends on a significant change in mind-set throughout the organisation, and this has to come from the top. In the words of Schmidt and Rosenberg, "The CEO needs to be the CIO (Chief Innovation Officer)."<sup>18</sup>

Early in its Connect + Develop journey, P&G identified the importance of a mandate from the CEO and senior leaders to not just talk about change, but to *live* it. The CEO, Lafley, was a visible and vocal supporter of the initiative. He made a number of public declarations and went on record to state that the company had a goal of acquiring up to 50% of its innovations from outside the organisation—a clear commitment to innovation management.<sup>19</sup>

Similarly, without the vision and drive of the CEO Rob McEwen, it is unlikely that the switch to open innovation at Goldcorp could have overcome organisational resistance. McEwen's background was in corporate finance, not mining, and Goldcorp staff were sceptical.

While crucial, public championing of open approaches by leadership is not enough. Leaders also have a responsibility to enable innovation to take place in the right way. Google's founders and CEO see it as their role to create the *environment and conditions* for innovation to flourish. At P&G, Lafley made sure that the C+D programme was backed up with senior management oversight and the resources to succeed. For Jim Whitehurst, President & CEO of Red Hat software, an open source software company, one of the crucial roles of a leader is to actively break down the barriers to collaboration that can impede virtual R&D (see sidebar).<sup>20</sup>

For senior managers this requires a shift from a classic "command and control" approach to one which focuses on *what* output is required rather than *how* the work should be done.

Professor Hunter agrees that strong leaders are key to getting companies to properly embrace virtual R&D. They are unlikely to fit the traditional pharma leadership model and are more likely to be mavericks who are also committed to the vision for the long term—a challenge in an industry where change is the norm. Company leaders must be the primary drivers (chief innovation officers), but they must also ensure that all layers of management buy into the vision and that middle management, in particular, are accountable for its execution.

*Success in Virtual R&D requires a new kind of leadership style and ethic.*

#### A different type of CEO

*"I've [...] learned that the skills required to lead a company that relies heavily on the principles of open innovation are vastly different from those needed to run a business based on the hierarchical structure of a conventional organization [...]. It takes time, effort and a good dose of humility – especially if you are the CEO – in order to build the culture."*

Jim Whitehurst, Red Hat Software  
President & CEO



## 4. Proudly found elsewhere

*“From Not Invented Here to Proudly Found Elsewhere.” P&G<sup>21</sup>*

Chesbrough and Brunswicker (2013) found that managing internal organisational change was the most significant challenge for companies participating in virtual, open approaches to innovation.<sup>22</sup> Lafley noted that for a “Connect and Develop” approach to succeed at P&G, the company culture would need to fundamentally shift from a mind-set which only valued innovations from **within** the organisation to one which took overt pride in accessing innovation generated **outside**.

When Siemens sought to introduce open innovation into its business, it too faced a considerable cultural challenge. The organisational pushback it faced (sidebar) is common in companies seeking to introduce open innovation approaches.<sup>23</sup>

Other common barriers include concerns that virtualisation inevitably leads to redundancies and a lack of clarity about the link between newer approaches and established career paths, as well as mechanisms for reward and recognition. The most significant blockage is almost always simple inertia: “we’ve always done it this way, so why change?”

Siemens addressed these concerns by adopting a number of crucial change management techniques. The initiative was driven from the top and resources were provided. The company piloted the concept by focusing on a set of current challenges and worked “openly” across Siemens to break down a silo-oriented way of working.

### Encourage the right behaviours

*“Be valued for doing it and see the value in doing it.” Professor Jackie Hunter*

Companies must provide incentives for team members to participate in open innovation. As P&G found, a career progression and reward structure closely aligned with an innovation culture, indifferent to the source of innovation sends a strong signal that encourages participation (see sidebar).

To address concerns about potential job losses, P&G proactively promotes the C+D programme as an opportunity for individuals to evolve and gain new skills.<sup>24</sup>

P&G used business metrics as a tool to drive cultural change across the organisation and focused on the number of open innovation deals and the percentage of initiatives with an external component. Once leadership was convinced that the organisation had fully embraced the new way of thinking and working, the metrics were replaced with measures focussed on the **value** created by initiatives with external components, rather than their numbers.

### Fail well

*“I haven’t failed...I’ve just found 10,000 ways that do not work.” Thomas Edison*

Operating a virtual, networked approach to innovation often carries more risk than internally focused innovation efforts. There will always be failures, but leading companies recognise that a culture that penalises failure is toxic for innovation.

#### Siemens – opening the closed door

*Cultural pushback to open innovation:  
“We’re already doing it.”*

*The business is too complex to embrace open innovation input*

*Potential loss of IP and company secrets*

*Not invented here syndrome*

*“We’re too busy.”*

*“Wherever the solution comes from (inside or out), if the end product succeeds in the marketplace, the rewards for employees involved in its development are the same. [...]”*

*“Connect and Develop: Inside P&G”  
Harvard Business Review (2006)*

Google's Wave product, a next generation e-mail platform, was technologically innovative but a flop in the market (sidebar).<sup>25</sup> Other notable Google failures include Buzz, Gears and Panoramio. However, the company's approach to failure is to fail fast and "fail well," to value the efforts of the team involved and to take learnings that can be used in other initiatives. Google's social networking platform, Google Plus incorporates elements of other "failures" including Google Buzz, Wave, Orkut and OpenSocial. According to Gopi Kallayil, "at Google, failure is a badge of honour."<sup>26</sup> It is crucial that companies overtly derive positive benefit and learnings from failures resulting from open innovation approaches.

*"If things are not failing, you are not innovating enough."  
Elon Musk, 2014, CEO Tesla Motors<sup>27</sup>*

### Showcase the successes

Perhaps the most significant driver of cultural change is to demonstrate, through success stories, the potential of open, virtual approaches to deliver tangible benefits. When staff see positive outcomes for the company, their customers and their career development, they are much more likely to get on board. Siemens successfully used this approach when developing its open innovation programme.

Similarly, Procter & Gamble showcases successes internally and is proactive at conferences and events in evangelising about the concept of open innovation, with the CEO and other senior leaders at the forefront of these efforts.

*They may not have invented it, but the people who work in companies that are winning in virtual R&D take pride in bringing innovation that originated elsewhere into the company.*

## 5. Let it Flow

*"If only Siemens knew what Siemens knows."<sup>28</sup>*

Virtual R&D relies on the seamless, secure transfer of information and knowledge within and outside the organisation.

As part of its open innovation initiative, Siemens introduced information technology tools designed to enable collaboration and unlock knowledge **within** the company. The challenge was encapsulated in a common saying at the time, "Wenn Siemens nur wüßte was Siemens weiß" which translates as "If only Siemens knew what Siemens knows."

Siemens answer, TechnoWeb 2.0, was designed to support cross sector networking and included social networking functionality to allow networks and communities of interest to stay connected around topics / projects. The tool also allows staff to rapidly identify and connect with internal experts, bringing knowledge holders together. It has enjoyed strong uptake and has created over 1,300 dynamic networks (sidebar).<sup>29</sup>

### Not such a damaging Wave

*"They were right, Wave was a tremendous failure. It failed quickly: We did not pour good money after bad. It failed without anyone being stigmatized: No one on the Wave team lost their jobs, and in fact most of them were highly recruited within Google after the project shut down, precisely because they had worked on something that pushed the boundaries. And it failed after having created a lot of valuable technology: Pieces of the Wave platform migrated to Google+ and Gmail. As a failure, Wave failed well."*

*How Google Works (2015)*

### Enabling the Flow

*"The system solved real problems in a fast and effective manner, created sustainable and dynamic knowledge networks, and through its social media features represented a competitive advantage in the war for global talent."<sup>23</sup>*

*Michael Hess, CTO, Open Innovation, Siemens*



P&G created a secure IT platform to support internal and external connectivity through its Connect + Develop portal. The portal assists with the creation, transfer and utilisation of knowledge across organisational borders. Innovators submit their ideas directly to P&G for triage and due diligence by the business development team. The portal also enables P&G’s internal business leaders to access, share and track the progress of submissions.

Many leaders in the virtual R&D space have portals where ideas and solutions are only visible within the company. General Mills’ G-WIN portal is an example. However, LEGO Ideas is a “collaborative” portal where ideas are visible to everyone who visits the site. This enables LEGO to gauge the relative popularity of different submissions among its consumer network before committing resources to their development.

The pharmaceutical sector has a long history of leveraging technology to increase connectivity with its collaborators. There are many examples of pharmaceutical company innovation portals. Figure 3 shows AstraZeneca’s open innovation website. InnoCentive® which was spun out of Eli Lilly in 2005, today provides a vehicle for pharmaceutical companies and other sectors to solve problems through crowdsourcing. Pharma’s long history of outsourcing parts of R&D, particularly at the highly regulated end of the process, means that it has experience of the challenges involved in sharing data seamlessly and securely.

*These companies embrace the power of the internet to reach the widest possible sources of innovation and let it to flow into their businesses.*

## 6. Crowd control

*“..most companies don’t die from starvation, they die from indigestion.” Jørgen Vig Knudstorp, CEO, LEGO<sup>30</sup>*

### Focus

LEGO has ridden the open innovation wave and is today the world’s most valuable toy brand.<sup>31</sup> Between 2008 and 2010, the company’s profits grew faster than those of Apple. However, it hasn’t been an easy ride and the challenges presented provide a valuable lesson on the need to not only open the doors to innovation outside the company, but to actively **manage** the flood that can result.

Open innovation was one element in a broader programme of innovation initiatives wholeheartedly embraced by LEGO in 1999. Initially the programme increased sales but, by 2003, the company had a negative cash flow and debts of \$800m. There was, in the words of Niels Milan Pedersen (LEGO designer) “this feeling that LEGO wouldn’t exist in another year.”<sup>32</sup> Internal analyses revealed that the flood of innovation had resulted in a situation where 94% of LEGO sets at that time were unprofitable with only three ranges actually making money.

Figure 3: <http://openinnovation.astrazeneca.com/>

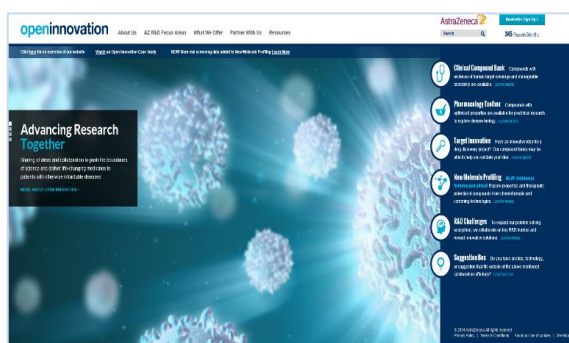
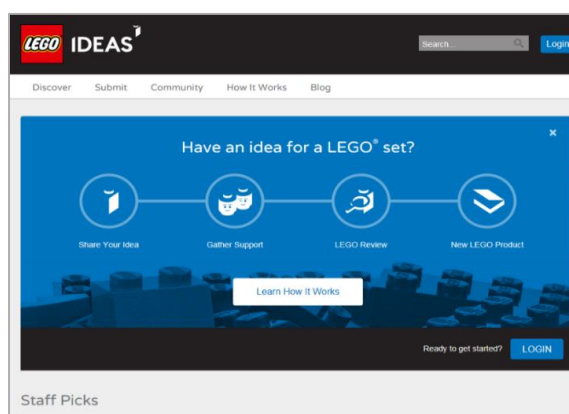


Figure 4: <https://ideas.lego.com>



LEGO's response was to revisit its strategic goals for innovation and to refocus the tactics that it would use to achieve them. Key among these was an **innovation guidance system** delivering mechanisms to harness and control innovation. A vital first step was to provide tighter focus for the submissions of its innovators. LEGO set "a fixed direction" but stayed "flexible in the execution," i.e. balancing guidance and control with creative space. Similarly, P&G defines up front its "needs and wants" based on consumer analysis, megatrend analysis and technology analysis and then leverages its network to identify relevant ideas. GE, another active participant in open innovation, provides detailed guidelines for each active challenge that it launches to the external community via its website (<http://www.ge.com/about-us/openinnovation>). The guidelines clearly articulate the need and the criteria used to judge entries.

*"While crowdsourcing ideas can be valuable it can also deliver lots of junk and overwhelm resources."*

Professor Jackie Hunter

Dr Browner stressed the need to draw clear limits around the space that is opened up to external collaboration and input, and to ensure that there is evident commercial value in what is pursued. Chris Thoen at P&G also identified the danger of ignoring existing internal assets or competences when turning the corporate focus to external sources of innovation; his advice is to make sure you don't already have it – "you don't want to pay for something you already know."<sup>33</sup>

*"You still have to manage it – it's just a different management challenge."*

Dr Lee Babiss

### Manage the links

LEGO also learned the hard way that "if you are going to crowdsource, you need crowd control."<sup>34</sup> LEGO created new roles to manage open, crowd-based activities (see sidebar) both internally and outside, among the broader community of innovators.<sup>35</sup>

P&G has a global network of technology entrepreneurs located in 11 C+D hubs. Their role is to scout for and internally champion innovation found outside the firm. They also maintain the ongoing relationship with the external innovator on behalf of P&G, helping them to understand the status of their asset and its progress within the company.<sup>36</sup>

As part of its GameChanger programme, Shell has an autonomous open innovation team which supports external innovators from initial idea through to proof of concept. Similarly, LEGO's innovation "pilots / stewards" are experienced managers who set direction for initiatives, source innovators and navigate projects to a successful, profitable outcome for the company. They bring focus and discipline to ensure that the company delivers value from its open innovation initiatives.

It is challenging to manage virtual innovation in pharma for a myriad of reasons but, as the quote from Frank Armstrong indicated, it *must* be managed, at the very least, to ensure compliance. Dr Babiss found that while virtual approaches can speed up decision making by reducing unnecessary layers of bureaucracy, they can create communications problems and make it hard to employ "group think." In the virtual environment, trust is crucial.

### Crowdsourcing requires crowd control

When LEGO developed its next generation Mindstorms set, it turned to innovators outside the company and co-created a new concept with a selected group of four expert users (the Mindstorms User Panel (MUP)). As the project advanced, LEGO involved a broader user base (over 100 additional super users - the Mindstorm Community Partners) who were involved in prototyping and concept testing. This larger, open community inundated LEGO with ideas and adaptations and were often not keen to take "no" for an answer. This led to considerable tensions in the co-creation process and LEGO had to develop new ways to manage its virtual R&D community. As Søren Lund, manager of the LEGO Mindstorms project stated; "You can't fire them, because you haven't hired them." The company quickly realised that crowdsourcing required crowd control and to achieve this, LEGO used the MUPs in a new role as community organisers.

David Robertson at FT Innovate

Crowd control requires new skills, including the ability to network (internally and externally) and to successfully manage relationships. Staff taking part in virtual initiatives will need a mix of curiosity, holistic vision, adaptability, entrepreneurship and the ability to operate in a changing uncertain world.

### **Make it a positive experience**

The shift to virtual R&D in any sector, places an even higher premium on the already sought after status of “preferred partner.” Building relationships based on win/win principles is key. Big companies need to be aware that the motivations of their external partners may differ from their own but that they nonetheless need to be properly reflected in the construct of any partnership. According to Chris Thoen, P&G works hard to ensure that there is always a feeling that the “opportunities for the partner are essentially amplified by working with P&G.”<sup>37</sup> Equally important, as Dr Browner notes, is the need to work at maintaining relationships once the collaboration is over. Relationships are enhanced through the “experience of partnering” and P&G invests heavily in processes and approaches to ensure that its interactions with partners are fast, streamlined and positive.

*Leaders in virtual R&D and open innovation have created new roles and processes to optimise the quality and flow of innovation into the company from external communities.*

### **Virtual R&D in the pharmaceutical sector – worth the pain**

The learnings set out in this paper suggest that pharmaceutical companies must embrace the concept of virtual R&D whole-heartedly and address all six of the identified success factors to fully deliver the potential benefits. That can mean a fundamentally new corporate ethos and strategy and far-reaching changes to styles of leadership, core processes, people and skills. The lesson from leaders in other sectors is, although virtual R&D can be a challenge to execute, the benefits are worth the pain.

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