How Crowdsourcing Impacts Innovation Portfolio Management

The Internet has had a profound influence on innovation practices. Crowd sourcing has tipped the innovation balance from the domination of large corporations towards smaller entities and access to these innovation sources has become an important part of innovation strategy. Customer crowd sourcing, such as MyStarbucksIdea, has opened new avenues of identifying customer needs and trends. Another highly powerful way of applying crowd sourcing is in the identification of technology solutions to fulfil needs, whether they are customer or corporate. Needs driven innovation and Open Innovation are at the convergence of these two crowd sourcing methods.

Background: From Research to Search

Firstly, this article provides a background and sets the innovation scene, illustrated by some of the beliefs related to open innovation, and explains how open innovation inserts into innovation portfolio planning and value creation in general.

The need driven innovation model

Secondly, the article introduces and discusses the "need driven innovation model", providing a vision of an alternative approach to sourcing possible solutions to fulfil client and industry needs. By placing the innovation cursor within the needs, rather than the solutions, is particularly effective and Open Innovation at this boundary accelerates innovation cycles, opens the solution horizon far beyond industry boundaries and detects and connects to the unobvious. A number of innovation examples will be cited to illustrate how need-driven innovation engenders new opportunities and business models.

Key capabilities needed for open innovation

Thirdly, the article presents a number of key capabilities needed for open innovation with a perspective on identifying and realising latent customer needs. These key capabilities make up a virtuous circle where each item feeds from the precedent.

1. Define a balanced need portfolio (priority, budget, resources, objective….)
2. Transform the needs into well-crafted challenges
3. Diffuse the challenges (internally or externally) to gather quality solutions
4. Assure the clear execution of the solutions by absorbing and integrating into the portfolio action plan
5. Continually monitor to detect opportunities, threats, signals of change and trends… these are used to keep the dynamic of the portfolio needs (item 1)

These key capabilities will be elaborated upon further inside the article.

Case study: how Kraft integrated Open Innovation Crowd Sourcing

NineSigma has been active in Open Innovation crowd sourcing since 2000 and has run over one thousand highly diverse projects in food and drinks industry, ranging from melt proof chocolate packaging to microbial contamination detection.

The article will present a case study that shows how Kraft has integrated Open Innovation Crowd Sourcing in a very effective way to solve their challenge for an innovative packaging solution to prevent chocolate from melting. This example will show how preliminary work on identifying "the right things to do" can result in "doing things right", to accelerate identifying and acquiring the solution.

Future trends

The article continues with a review of the future of Open Innovation in the consumer goods industry. The food and drink industry and more specifically fast moving consumer goods (FMCG) companies, like Procter and Gamble and Unilever, have been early adopters of open innovation practices. Their vision and deliberate outreach to the global open innovation community goes far beyond sourcing new technology, but embraces the search for new product ideas and opportunities, innovative packaging and materials and processes.

We see that in those companies where Open Innovation is embedded into the company strategy that there is a deliberate overlap in their use of crowd sourcing in the ideation process and technology identification and acquisition.

Lessons learned from over 12 years of Open Innovation project management

The article concludes with an overview of lessons learned by NineSigma from over 12 years of Open Innovation project management. These 5 lessons involve:

- ***Create*** *an environment that nurtures, encourages and rewards open innovation*
- ***Define*** *clear challenges and process ownership*
- ***Decide*** *about the span of control, both internally and externally*
- ***Establish*** *realistic time-lines and budgets*.
- ***Plan*** *your resource allocation*.

We believe that there are three trends related to the future of Open Innovation and that can apply transversally across many industries: *Collaborative Sustainability - Value Chain Open Innovation - Innovation Portals:*

BACKGROUND: FROM RESEARCH TO SEARCH

The innovation landscape and the way companies grow and innovate have been radically changed in the past decades and is still in continual flux. As shown by Henry Chesbrough, the share of R&D investments and intellectual property ownership has shifted from big organizations to small (Chesbrough, 2011).

In 1981, 70% of all R&D spend was by big corporations with over 25,000 employees and 30% by smaller companies. Today the situation has inversed, with 70% sent by companies with less than 25,000 employees and, even more remarkable, more than 20% of all R&D spend is from companies with less than 1,000 employees. Innovation for big corporations is slowly but irreversibly evolving from Research and Development to "Search and Development".

In the past, innovation was highly concentrated in research institutions and universities where large powerful corporations could cherry pick. Today, with financial pressure, the emergence of venture capital and the internet, the dynamics of innovation have changed and a highly competitive environment has grown where access has become perhaps equally important as ownership.

So in what way does Open Innovation differ from traditional technology sourcing ? Prof. Frank Piller director of MIT's mass customization centre and RWTH Aachen and thought leader in Open Innovation, defines Open Innovation as "The formal discipline and practice of leveraging the discoveries of non-obvious others as input for the innovation process through formal and informal relationships" (Piller, 2011).

The challenge is to develop the skills and capabilities that action the leverage and catalyse the integration the knowledge and solutions from new and existing ecosystems that are beyond the current networks of trusted suppliers and partners. Connecting to and working with the open global innovation community requires for large corporations to understand their own value chains and how Open Innovation ecosystems can insert and contribute. Winning in open innovation often requires that a big company becomes the partner of choice for small organizations.

"The formal discipline and practice of leveraging the discoveries of non-obvious others as input for the innovation process through formal and informal relationships" (Piller, 2011)."

To further illustrate the importance of Open Innovation within the corporate value chain, Gansky, author of "The Mesh", coined the shift "from ownership to access" (Gansky, 2010). Companies are moving away from the pure ownership paradigm and are having to learn how to connect the dots, combining their assets with those owned by (external) partners. These assets can be intellectual property but also production processes and other capabilities.

Another example is Ben Kaufmann's Quirky, where they are challenging big company models with agile models that tap into crowds by using an internet driven platform for ideation, concept development, product development, product design and sales and distribution, essentially the complete value chain. Ben Kaufmann started Quirky after learning first hand that the minimal

upfront cost for a single product company is $200,000 with a 90% chance of failure. He realized that there are thousands of people that have great product ideas every day but not the ambition, money or opportunity to start a one product company. By building a platform where he invites "ideators" to submit concept product ideas online, he created a funnel of more than 200 concepts per week.

To be eligible for Quirky, the ideas must retail for less than $150 and should not require integrated software to keep it manageable. His community of over 100,000 members is growing at 20% per month and involves, in addition to 'ideators', also "influencers" who vote on ideas and contribute to the further development of the ideas. Using a specially developed algorithm he pays 30% of the revenue back to the "ideators" and 'influencers", the amount being relative to their impact and contribution. His company currently launches one new product idea per day. The future of innovation is all about speed, like Ben's inspiring company shows. Accelerating innovation, leveraging assets from "unobvious others" and benefiting from the power of crowd sourcing and sharing.

KEY CAPABILITIES IN OPEN INNOVATION

Combining Insights and Benefits with Need Driven Innovation

Open Innovation is frequently perceived as a substitute for lack of vision or strategy. When adopting Open Innovation, companies often expect to be supplied with an unending list of ideas or needs. Open Innovation should not and cannot be expected to replace needs identification or corporate strategy, but should be viewed as an integral part of it. The model shown below from Frank Piller (Dialego, 2012) simply captures the two basic ingredients for any corporate strategy (Figure 1):

- Increasing effectiveness: Doing the right things
- Increasing efficiency: Doing things right.

Open innovation is mostly related to efficiency, doing things right, accelerating the innovation cycle and identifying solutions of what companies need to fulfil customer need. Understanding what is required by the market and customers (needs) is related to doing the right things.

Doing the right things

In a letter to the Amazon shareholders in 2009, Jeffrey Bezos allowed a peek into his thinking about growing the company. Although most companies would probably see it as common sense and best practice to take the key capabilities of their current organization as a starting point for growth and innovation

strategies, he challenged that view. He stated that "…working backwards from customer needs often demands that we acquire new competencies and exercise new muscles, never mind how uncomfortable and awkward-feeling those first steps might be...." (Bezos, 2009).

"Like Apple's Steve Jobs, J. Bezos argues that you need to develop a deep understanding and intuition of the benefits that customers want and only asking them will not help."

I have left out the preamble where he shows that he is thinking far beyond the 'you need to listen to what the customer wants' paradigm. It is doubtful if Bezos had not had this vision for the development of Amazon, that the company would be as successful as it is today, or still be in business. Like Apple's Steve Jobs, J. Bezos argues that you need to develop a deep understanding and intuition of the benefits that customers want and only asking them will not help. One of the key challenges for companies is related to this need information part. Many companies lack the vision and entrepreneurship needed for growth and unfortunately this is a key ingredient in successful adoption of open innovation.

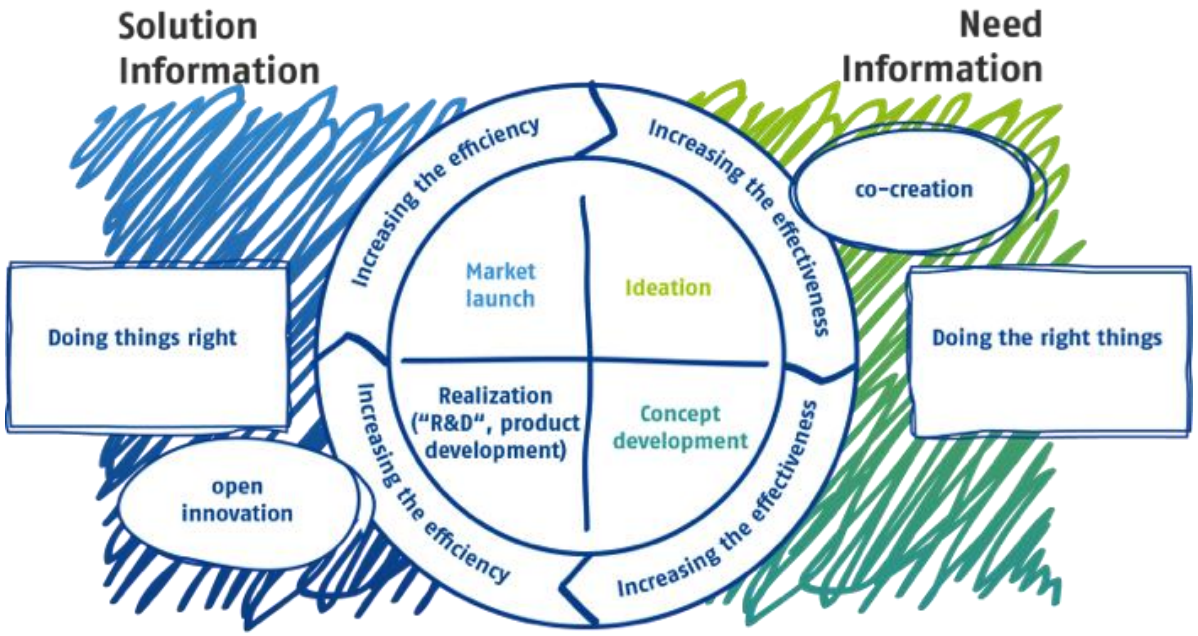


Figure 1: Two key types of information.
Source: Frank Piller & Dialego AG Aachen (Dialego, 2012)

Doing things right:
The Need Driven Innovation approach

Once companies understand their customer and market needs there are essentially only two ways to solve the identified "problems", whether these are needs, opportunities, signals of change or threats : internally or externally. The traditional way companies solve challenges is by taking an idea driven experimental approach. The R&D community works on platforms, generating a multitude of ideas and they usually devise experiments to test which ideas are best. Doing experiments is the way forward, fail often to succeed sooner. The issue with that approach is that all costs for experiments have to be absorbed internally while the process is sequential and can take hundreds or thousands of iterations.

Take, for example Edison and the light bulb where hundreds if not thousands of attempts were made before identifying the right filament. Edison argued that in fact he learned many ways of how not to solve the problem but companies can no longer afford to spend time and resources on this type of iterative experimental work, particularly when they can profit from parallel processing today as many innovations happen simultaneously across industries and across the world. To connect to these parallel worlds with solutions, companies must learn how to access this pool of innovate by clearly stating their challenges that they are trying to solve.

The foundation of successful Open Innovation is always 'needs driven' innovation. By taking this needs driven innovation approach companies have the opportunity to tap into unobvious solutions and ideas from adjacent technologies and discontinuous industries. When companies communicate problems to their trusted networks andadventure beyond to global networks, as provided by the likes of NineSigma, they actively tap into global cognitive surplus.

" The foundation of successful Open Innovation is always 'needs driven' innovation."

An interesting example of cognitive surplus is the acclaimed 3 billion hours per week people are playing games worldwide (McGonical, 2010). McGonical explains that the average young gamer today, in an economy with a strong on-line gaming culture, will have spent an average of 10,000 hours gaming by the age of 21. That is about the same amount of time an American child spends in school between 5th grade and high school graduation - assuming full attendance.

This abundance in "problem solving training", "collaborative playing" and cognitive surplus is witness of the emergence of an unparalleled resource. This resource has already been tapped by companies through e.g. the Netflix Challenge, solving their problem through a grand challenge approach (Piller & Ihl, 2009). This Grand Challenge approach mobilized 27,000 registrants competing for the $1 million price. Similar grand challenges, more directed to mobilizing professionals or business to business oriented crowds, are used by General Electric in e.g. the Healthymagination Challenge on breast cancer management (NineSigma, 2011).

The five key capabilities

For companies to effectively adopt a challenge or need driven approach, five key capabilities are needed in a virtuous circle of steps.

1. Define a balanced need portfolio (priority, budget, resources, objective….)
2. Transform the needs into well-crafted challenges

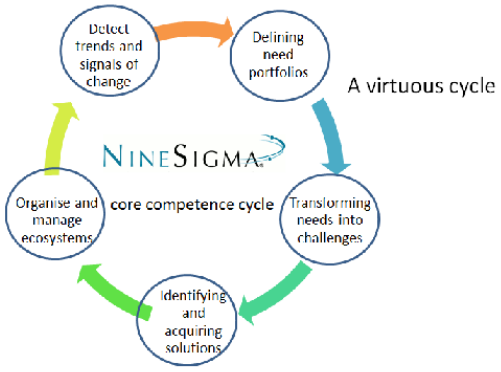
3. Diffuse the challenges (internally or externally) to gather quality solutions
4. Assure the clear execution of the solutions by absorbing and integrating into the portfolio action plan
5. Continually monitor to detect opportunities, threats, signals of change and trends… these are used to keep the dynamic of the portfolio needs (item 1)

Firstly, companies have to develop coherent, balanced need portfolios. To develop these need portfolios, or innovation shopping lists, it is useful to review and rethink their innovation project portfolio, or as defined earlier, the right things to do.

After the definition of the needs the company will have to translate these needs into challenges. Challenge crafting is a mix of art and science. Well-formulated challenges are easy to understand and inspiring. To classify challenges into a needs portfolio, the company requires to define what challenges can be broadcasted and shared with the outside network for identification of solutions, and which must stay internal.

In the next step, the identification and acquisition of solutions requires companies to define a process to efficiently review different solutions. From the search and identification of solutions, an ecosystem of players emerges from diverse technology solution domains and to effectively leverage these different ecosystems requires development and management capacity as well as internal absorptive capacity that can effectively integrate external solutions into the value chain.

Finally this virtuous circle is complete with an important but perhaps the most challenging capability related to detecting signals of change and trends and that induce new needs. This capability deals with managing the boundaries, i.e. answering which knowledge, capabilities and capacity do I need from a strategic perspective inside the company and which outside the company boundaries? Learning about changes requires to continuously monitor key areas as input for the (open) innovation strategy. Crowd sourcing is an excellent means to address this aspect of innovation portfolio management.



Communicating Your Challenges

Communicating challenges (needs) starts with analyzing good problems before you can develop good solutions. Starting every research and development project with a well-defined problem statement and sending that out (both internally and externally) in the form of well-defined technical briefs to relevant contacts and connections will help understand what the options are for accelerating the innovation cycle. It is interesting to observe how very few companies actually first do search before research.

Besides development of ecosystems and relevant contacts, another important consideration is whether sharing of sensitive information in the form of your challenge or problem is or is not an option or not. Arguably the most difficult part is related to accepting and integrating externally sourced knowledge and solutions.

"It is interesting to observe how very few companies actually first do search before research."

Often the R&D community feels disqualified, or as one R&D manager at a large chemical corporation stated: *'if we need Open Innovation then we have failed as R&D'*. This perspective is often referred to as the "Not Invented Here Syndrome" and is related to many cultural aspects.

Alan Taub, CTO of General Motors explained in a private conversation that for him the cultural shift was the most important objective related to the Open Innovation program. He explained that he wanted to realize 25% of the R&D budget invested with external partners and take out any threshold people in his organization to make sure that they use the best partners and not just the usual suspects, or "Not Invented There".

As an example of one of the actions he took was to provided Open Innovation training and made the use of Open Innovation tools like broadcasted challenges independent of R&D budgets and which were made part of his corporate budget.

FROM IDEA DRIVEN INNOVATION TO NEED DRIVEN INNOVATION

As discussed above, developing problems or needs obviously starts with quality insights ("doing the right things"). The innovation agenda or program of an organization is usually a good starting point to filter out challenges and identifying good open innovation candidates. Over the years we have developed an innovation diagnostic approach to qualify projects that are good open innovation candidates, including:

- What has already been done to solve the problem?
- What would be the value if the problem was solved?
- What type of solution is required?
- What is the priority of solving the problem?
- What is the budget for spending on outside solutions?
- What happens if the problem is not solved?

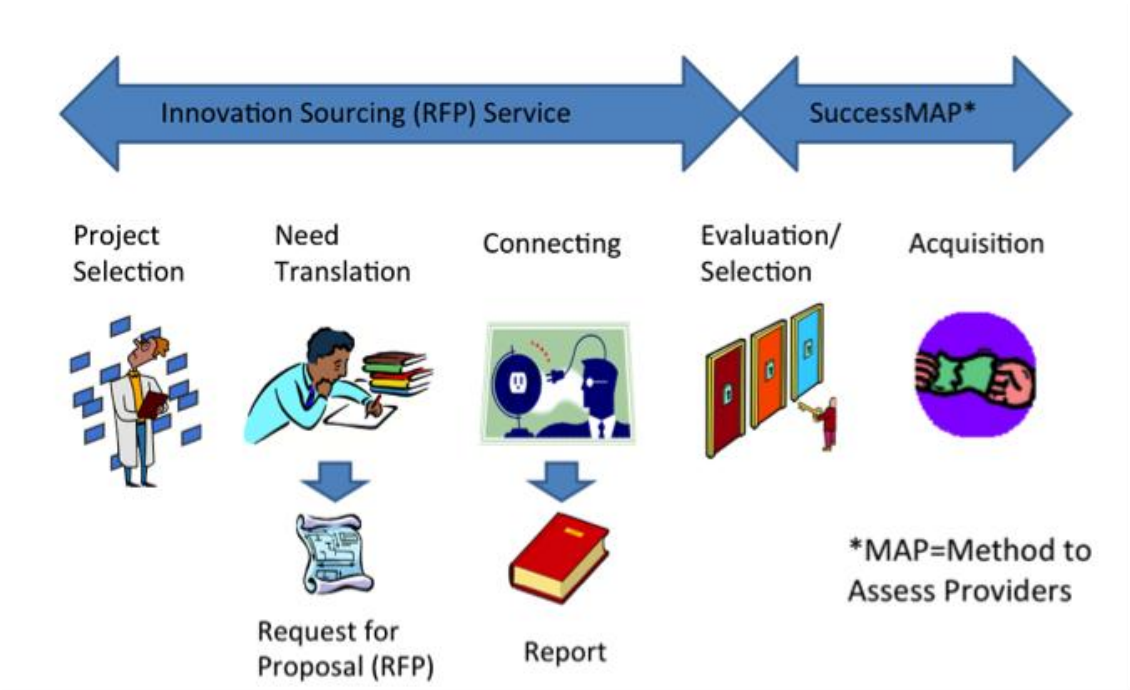
The more mature organizations have dedicated innovation or technology scouts that actively engage with the innovation community to identify needs and solutions. Best in class examples are from companies like Kraft who have developed long lists of qualified needs. These needs have a budget and a solid business case justifying the company's willingness to pay for to acquire solutions or for the development of a solution.

CASE STUDY: PACKAGING RELATED: MELT PROOF CHOCOLATE BARS FROM KRAFT

The problem that Kraft identified was initially assessed by the program management team at NineSigma as what we refer to as "holy grail": everyone in the industry is looking for this so called 'unobtanium'. Even the US military attempted to solve the problem of melting chocolate at higher temperatures.

Besides white "bloom" discoloration that appears on chocolate if it is exposed to direct sunlight or heat, the experience of trying to poke melted chocolate out of the wrapper is a known phenomenon for chocolate lovers alike. By NineSigma crafting the challenge in a precise but open way, it was possible to attract transversal interest from many industry domains.

The figure describes the whole process in steps discussed below.



The challenge that we defined was "Kraft Foods seeks novel materials or approaches to packaging that can protect single serve chocolate bars from medium term exposure to warm ambient conditions. Products frequently experience multiple cycles of exposure to controlled and uncontrolled climates. The product may be shipped in controlled and uncontrolled conditions, sold by the retailer in an air-conditioned setting and consumed sometimes later having been carried on the person or in a handbag."

Although current technology can provide a solution to the problem, the resultant packaging was both cost prohibitive and excessively bulky." It is interesting to note that Kraft had a very clear vision of the need, the application, the technical and economic constraints that would be applied in the selection process: they had defined the "right thing" prior to the challenge.

A well-defined brief contains besides the challenge also criteria for a good solution, possible approaches and equally important, approaches not of interest.

The possible approaches where defined as:

- Novel insulating materials
- Phase change materials
- Thin film approaches that can store energy and repurpose it
- Active packaging technologies that are triggered by temperature or light
- Novel cooling or heat absorbing technologies

The approaches not of interest where defined as:

- Chocolate formula or recipe changes
- Chocolate processing modifications
- Battery or electrically powered devices
- Common insulating materials, such as:
- Foamed polymers
- Paper-based expanded structures
- Expanded polystyrene
- Solutions that cannot protect product through more than one cycle of heating and cooling

Once the challenge brief was defined and approved, a broadcast and instant network of around 10,000 contacts was built from challenge key word, by addressing academia, business and research institutes. The brief was directly sent to individual experts in the instant network to solicit their interest and whom we suspect that might have knowledge or contacts to solve this particular challenge.

Nevertheless, the reason for any organization or solution provider to respond is that there is a business opportunity to collaborate on a development contract, to licence out intellectual property or win a supplier agreement. The response to this particular challenge resulted in over 30 different proposals addressing the problem and proposing an innovative approach or solution were received from around the world.

The next phase, after processing the responses is the assessment and acquisition phase, screening the proposals and organizations that responded and selecting those with whom Kraft can start contract negotiations. The starting point is a technology map that summarises and classifies the different technologies proposed, providing an assessment of the maturity of the solution and solution provider.

The long list of 30+ proposals is reduced to 5 or 10 candidates. Additional questions and telephone interviews are organized with the top candidates and sometimes site visits and (on-site) demonstrations are scheduled, usually after signing a non-disclosure agreement. Finally for 1 or more candidates contract negotiations are started and the acquisition finalized.

The whole process, up until reporting out of the proposals, is strictly non confidential. The step after making a first selection of top candidates often involves the development of non-confidentiality agreements with these top candidates. This enables the searching company (in this case Kraft) to get more depth to the capabilities of the partner, background of the solution and proposed business model.

This business model can be acquisition of Intellectual Property, licence of the IP, a research contract or any business transaction that is mutually beneficial. Depending on the seeking company and solution provider, sometimes the approach to IP can be a difficult sticking point and in some cases can require mediation from our side.

One observation is that few global companies truly understand the dynamics of doing business with smaller businesses. The usual modus operandi is to use the standard "80 page contract" and consequent visit of 5 people to an overwhelmed "20 people SME". Moderation of this conversation and mediation to help each partner feel and behave as a trusted partner, is crucial in all cases.

Crowd sourcing was highly effective in the successful identification of quality solutions in this challenge. What contributed significantly to this success was the active solicitation of the instant network. It is interesting to note that up to 40% of solution providers came from referrals from the instant network.

CONCLUSIONS

Companies invest much effort and attention in testing and learning from this so called problem broadcasting approaches or crowd sourcing as exemplified by the Kraft example. In the end, crowdsourcing for technical problems also enables important change within a company. What is usually observed is that in the course of the project the clients not only learn a lot about potential partners but more importantly much about themselves and their own company.

This "learning about one selves" may be one of the largest benefits of networking with the world. However, open innovation is not an automatic success, but one that demands thorough preparation and planned implementation. From our experience of over 12 years of open innovation project management in many different contexts, we have observed a number of key success factors to profit from open innovation and crowdsourcing of technical problems.

Here are some of our most important conclusions.

- *Clearly defined problem and challenge ownership:* The most important factor, perhaps, is to have a problem or task that is suited to being crowd sourced : Start with the problem and challenge owner, determine the objective of your open innovation venture before hiring an intermediary as intermediaries differ, and not all are equally suited for the same kind of task.

- *Create a good open innovation environment*: You need a dedicated team to make open innovation a success. This starts by installing a central project competence for your open innovation initiative. Successful companies appoint an internal OI champion who is passionate, outwardly focused and capable to coordinate different crowdsourcing projects. Equally important, however, is to educate other team members and employees about the objectives, principles and expected outcomes of the open innovation project so that they understand what is expected from them.

- *Decide about the span of control*. Open innovation is about opening up to seek beyond the periphery of your firm. But you can decide about the control you want to keep during the knowledge transfer process and the exploitation of the results by selecting an appropriate process and intermediary. For example: will potential solution providers learn who you are and see your name and company logo on the challenge? We know that challenges that reveal the challenge owner's identity receive significantly more and better proposals. But revealing who you are also may inform your competitors. Knowing about and weighing up these trade-offs is crucial for open innovation success.

We believe that food and drink companies, as are FMCG companies, maybe somewhat further developed when it comes to consumer and market insights compared to other industries. This maturity in their needs identification, definition and stratification should make it easier for them to define their needs portfolios. Kraft is an example of a company that is well developed in this aspect as can been seen at their Innovate with Kraft Foods innovation portal (Kraft, 2012). But Kraft is perhaps an exception as most companies have neither the needs portfolio developed, nor the capability to translate these in challenges or the internal organization to acquire, manage and develop the partner ecosystems.

The biggest challenge for companies to become successful in using open innovation lies interestingly enough on the inside of the organization as it requires resources, development of new skills and capabilities as well as a different mind-set.

FUTURE TRENDS

The food and drink industry and more specifically fast moving consumer goods (FMCG) companies like Procter and Gamble and Unilever have been early adopters of open innovation practices. Their vision and deliberate outreach to the global open innovation community goes far beyond sourcing new technology, but embraces the search for new product ideas and opportunities, innovative packaging and materials and processes. We see in those companies where Open Innovation has integrated into the company strategy that there is a certain overlap in their use of crowd sourcing in the ideation process and technology identification and acquisition.

Three trends related to the future of Open Innovation have been identified.

Collaborative Sustainability

Currently more than 50% of food and drink projects and a significant number of FMCG challenges run by NineSigma have a component involving sustainability. This is a cross industry phenomenon, but what is particularly remarkable is the change in the approach. Large corporate clients are willing to join forces to solve industry challenges like e.g. changing the current oil based feedstock of packaging material to a sustainable bio-based polymer feedstock. None of the individual companies is big enough to solve this challenge in isolation. Consolidating demand and needs in this example enables a viable business case for the development of a new feedstock.

Value Chain Open Innovation

Companies are struggling with absorbing technologies due to increasing technology complexity, integration challenges, resource allocation and availability and the increasing gap between research and development. Open Innovation sourced solutions are often perceived as not sufficiently mature for companies to merit evaluation and integrate.

As we have already witnessed in the high tech industry, we see that companies, covering many industrial domains such as food and drink, FMCGs, automobile and healthcare, are also requiring their existing supply base to absorb innovations into their pipeline or can even require partners to have significant design and prototype capabilities that can develop the concept to a more mature stage, giving rise to a dichotomy of innovation producers and innovation integrators.

Innovation Portals

Over the last years more and more companies are launching their own innovation portals, all with different objectives, collaboration models, target audiences, varying from consumer to business networks. None of the companies seem to get value out of these portals. It is expected that a consolidation phase (aggregation of portals) in combination with a focussed, one-stop-shop platform, involving more IT support and a process driven model, will lead to mature and cost effective way to expand networks and create value. Let us keep in mind the prediction of J. Bezos and how that has made Amazon such a successful company.

By Rick Wielens

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Rick Wielens, CEO, NineSigma Europe. Rick Wielens joined NineSigma in 2010 and is responsible for NineSigma Europe. Previously, Rick worked with his own company in open innovation and expert services mainly in the High Tech area in the Netherlands and Germany. Rick brings international experience working in Germany for SAP and in the Netherlands for Royal Philips Electronics in various roles and industries. Rick holds a M.Sc. in Transport Planning and Management from the Westminster University in London and a BA in Traffic Engineering from the University of Applied Science in Tilburg.