A Novel Approach for Open Innovation Platforms: Multistep Dynamic Expert Sourcing

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Abstract: Open Innovation platforms (and especially problem solving platforms) have received increasing attention over the last few years. Although much hope was initially put into them, it gradually faded away and changed in some form of mistrust, because of a number of drawbacks (relatively low number of *solvers*, confidentiality issues, intellectual property management problems, disappointing solutions, etc.). We propose a novel approach, Multistep Dynamic Expert Sourcing (MDES), developed and implemented by the French company PRESANS. This approach solves most of the existing drawbacks and leverages all the potential of online Open Innovation.

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Introduction

Resources in the traditional ecosystem of a company appear to be insufficient for many industrial or business *needs*. Open Innovation is the paradigm according to which companies need to use external ideas, knowledge & technologies to advance their business[i]. In particular, Open Innovation allows accelerating innovation by using most relevant external expertise and maximizes cross-fertilization between industries and between disciplines.

In the context of Open Innovation, there is an increasing need of intermediaries to facilitate the connection between companies and external resources. Various types of intermediaries exist. (i) *Traditional intermediaries*, such as Technology Transfer Offices, clusters, boundary agents[ii] etc., are not web-based[1] and have been around for decades. (ii) More recently, various types of *web-based intermediaries* appeared: crowdsourcing[iii] platforms (e.g. problem solving platforms such as Ninesigma or Innocentive), technology brokers (such as yet2.com) etc.

A first common feature between crowdsourcing platforms is that all of them are registration-based: you need to register on the platform to be part of the system and participate as a problem *solver*, which leads to various serious issues. The second common feature is a "black box" solving process: interactions between the input (a problem) and the output (a solution) are reduced to their minimum, which leads to poor quality of solving.

In the following, we present a novel approach for Open Innovation platforms: Multistep Dynamic Expert Sourcing (MDES). This approach, developed and implemented by the French company PRESANS, avoids most of registration-based crowdsourcing platforms' drawbacks.

The first section is an overview of the main issues with traditional registration-based crowdsourcing platforms. The second section presents the novel approach and its benefits.

[1] Web-based: rely on technologies of the World Wide Web.

Where Open Innovation Crowdsourcing Platforms Fail

The way Open Innovation *crowdsourcing platforms work is rather simple, at least in principle: they help companies to match a problem or a need to an existing solution or to somebody able to solve the problem. Underlying requirements are (i) a large pool of problems, (ii) a large pool of solvers*[2] *and (iii) a good matching algorithm or process. In addition, the lubricant for all that to work is trust, which here means careful management of confidentiality and intellectual property. However, behind this simple idea, a lot of theoretical and practical difficulties have emerged from a decade of experimentations.*

Registration Yields a Weak Number of *Solvers*

As an intermediary, how can you constantly find new and interested *solvers* around the world (i.e. people ready to propose solutions to technological problems)? You need efficient incentives to attract them on your platform, to make them subscribe, to engage them in solving problems and to release intellectual property (IP). Registration has a direct negative impact on the number of *solvers*, although it may be, in principle, a nice way to select supposedly motivated *solvers*.

Few experts register on crowdsourcing platforms: how many experts go and register on crowdsourcing platforms? 10,000? 100,000? Most famous platforms hardly reach 300,000 *solvers*, which is far less than the tens of millions of experts in the world. In addition, figures claimed by many companies are unclear: how can the claims of newcomers be checked? How many subscribers really want to engage in problem solving? These systems lead to a misleading competition to get the "biggest" pool of *solvers*, disregarding truth[3] and quality[4].

The large majority of registered *solvers* does not participate: self-registration is not the right paradigm to address global expertise. Many studies show that only 1% of subscribers are active on such platforms. The largest existing Open Innovation communities have only a few thousands of active users[iv].

***Solvers* are not experts:** crowdsourcing means that anybody can be a *solver*. This is a fashionable and demagogic argument to attract a large quantity of random *solvers* on a platform (the large number of subscribers being an argument to attract client companies and supposedly launch the platform). But among registered *solvers*, not all of them are experts. Some platforms actually use this as an advantage and claim that what matters is the solutions or the ideas brought by the *solvers*, and not their background. This is true to some extend (user-driven innovation etc.), but idealistic for highly critical problems (as seen on most platforms) requiring a strong expertise.

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[2] *Solver*: person or organization who has registered on the intermediary website and who wish to try to provide solutions.

[3] Some claims of recent Open Innovation platforms can be easily refuted by the use of online website statistics analyzers, showing that there can be a factor up to 30 between the reality and the claims.

[4] The same remark applies for the pool of problems (especially regarding their formulation).

Matching algorithm and process fail to engage *solvers* into problem solving

To maximize the probability to solve a problem, a tradeoff has to be found between strong targeting of the *solvers* and large broadcast: even assuming a large base of *solvers*, it is merely impossible to guaranty their engagement into problem solving. To engage *solvers*, one needs to contact them (for example by email) to "advertize" the problem. Given a certain problem, who should be contacted? All the *solvers* in all the fields? *Solvers* whose online profile shows a certain "potential" for the problem? Common knowledge would assume that it is best to target *solvers* to most-efficiently engage them into the solving process. However, a paradox underlies Open Innovation platforms: the "graal" of these platforms is to maximize cross-fertilization (between industries and between scientific fields). Indeed, studies[iv] have shown that submitted problems are regularly tackled and solved by *solvers* outside of the"natural" field.. The initial problem broadcast to experts should therefore not be too targeted. However, recurring fuzzy broadcast of problems to *solvers* leads to decreasing interest as many irrelevant problems end up being sent to *solvers*. The tradeoff is uneasy and fails in most situations.

The *solver* has no guarantee that his solution will not be "stolen" by the client company. Since no trustable mechanism is proposed to incite the client company to reward a good solution (as they may use it for free if they do not look for the IP rights[5]), *solvers* are very reluctant to propose a valuable solution when they have one.

Confidentiality and intellectual property issues are poorly addressed

Confidentiality. This is *the* big issue on the client side. Companies using Open Innovation Platforms are mostly concerned by the confidentiality of the information they provide to the intermediary and to the rest of the world. Even if the name of the company remains anonymous, it may be easy for competitors to guess who is behind the problem, which is a serious issue. Putting a problem online and broadcasting it to *a priori* unknown *solvers* is too sensitive for many companies, and is a significant break for the use of Open Innovation platforms. Online Non-Disclosure Agreements proposed to *solvers* is not a satisfactory solution as anybody can sign them without real engagement or verification.

Intellectual property (IP) management is yet another extremely touchy aspect. Who owns the solution provided by a *solver* through the Internet platform of an intermediary? The client company, also called *seeker*, wants to own the IP to use the solution without any restriction and gain competitive advantages. As for the *solver*, he or she may fear to give up his or her IP rights, but has to do so if he or she wants to get paid.

In an ideal world, an Open Innovation platform would allow *solvers* to seamlessly transfer their solution IP to the *seeker*. In practice, such a feature does not work. Even with terms-of-use of the type *"As soon as any solution is submitted to xxx, its*

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[5] Some platforms even propose to their clients a free broadcast of their problems; in this case, the platform get paid by the client only if a "good" solution is found. This results in the publication of poorly formulated problems (and subsequently poor quality of solving), and makes it possible for seekers to use the platform as a "free brainstorming".

IP rights are also transferred to xxx". This cannot work on a generic basis, because, most of the time the *solver* does not own the IP from the start. Indeed, the solution may already be patented by others or worse, it may not be patented, and because the *solver* (say a researcher in the public sector) has an employer, the IP belongs to this employer. Such IP management leads to unsatisfied clients, unsatisfied research centers and unsatisfied *solvers*.

Overall, Open Innovation crowdsourcing platforms, although they are still a very promising concept, have failed to provide fully satisfying services. The main issues have been:

- To attract and to engage sufficient number of qualified experts in a sustainable way,
- To properly match *seeker* problems with potential experts,
- To incentivize clients to be fair and reward promising solutions,
- To properly protect confidentiality and intellectual property.

A disruptive approach: Multistep Dynamic Expert Sourcing (MDES)

The French startup PRESANS developed and implemented the Multistep Dynamic Expert Sourcing (MDES) approach. It relies on a combination between a state-of-the-art web-mining technology and a secured multistep problem solving process. In this approach, experts do not register, instead, the various digital tracks they leave on the web allow to detect and to invite them on-demand to tackle most challenging technological problems. MDES has strong advantages for the platform, for the experts and for the client companies.

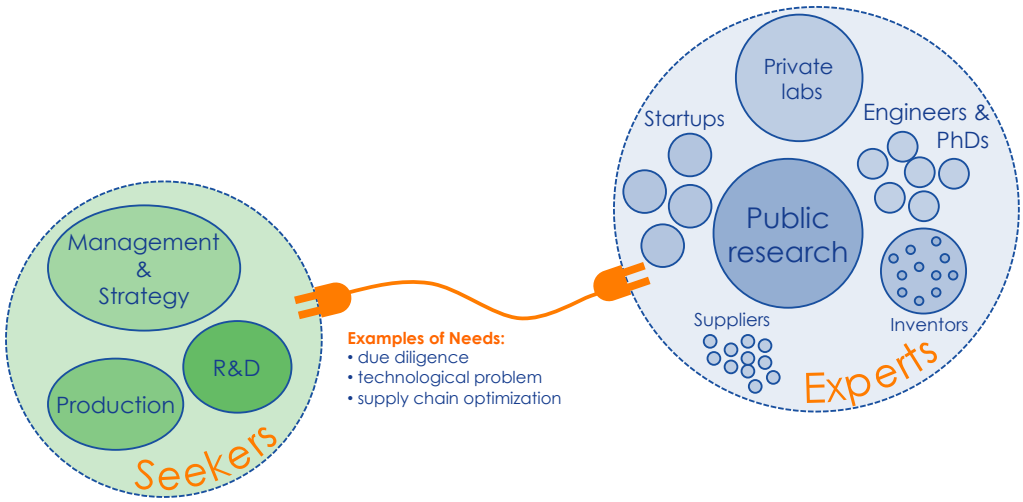

Figure 1: the MDES approach brings value to *seekers* by connecting their *needs* to worldwide scientific knowledge & intelligence. *Seekers* can be any department in a company with *needs* (a *need* is a "pain" that can be addressed by scientific or technological expertise).

As illustrated in Figure 1, the MDES approach seeks to bring value to *seekers* by connecting their *needs* to worldwide scientific knowledge & intelligence. The MDES philosophy holds on 3 points:

1. Expert Sourcing
2. Dynamic (or On-Demand)
3. Multistep

Points (1) and (2) are covered in the next subsection and point (3) in the following. Main advantages are listed at the end of the present section.

Expert Sourcing and Dynamic aspect

Expert sourcing rather than crowdsourcing: to solve highly critical and technological problems, a company needs experts, not random *solvers*. This is why MDES relies on highly skilled experts rather than *solvers*.

Dynamic (or On-Demand) rather than subscription-based: as previously explained, most Open Innovation intermediaries or network of experts rely on registration-based platforms: potential experts have to know about the platform and to register. This is not the right paradigm to address global expertise.

Instead, we propose to build a worldwide automatic network of Experts that can be solicited on-demand and that allows automatic profiling of experts. In addition, this paradigm enhances confidentiality, since the visibility of the problems can be restricted to preselected experts (and not to any registered *solver*).

Millions of experts exist in the world; most of them leave tracks on the web through scientific literature, patents, research center corporate websites, blogs, forums etc. Based on Information Retrieval[6] and Machine Learning[7], PRESANS developed an Expert Search Engine (see Figure 2) allowing to discover and engage these expert in an automated manner:

- The Expert Search Engine build a fully structured map of expertise from unstructured data such as research center websites, scientific literature etc. (steps 1 and 3).
- The textual description of the *seeker*'s technological *need* is fed into the Expert Search Engine that, in return, suggest an exhaustive list of most relevant experts in the world (step 3).
- The Smart-Broadcast software then automatically contacts and invites a number of the most relevant experts, using automatically generated personalized emails.
- Interested experts can then join the Multistep Problem Solving Process.

Note that the complex algorithm of the Expert Search Engine is designed to improve automatic matching while maximizing cross-fertilization[8].

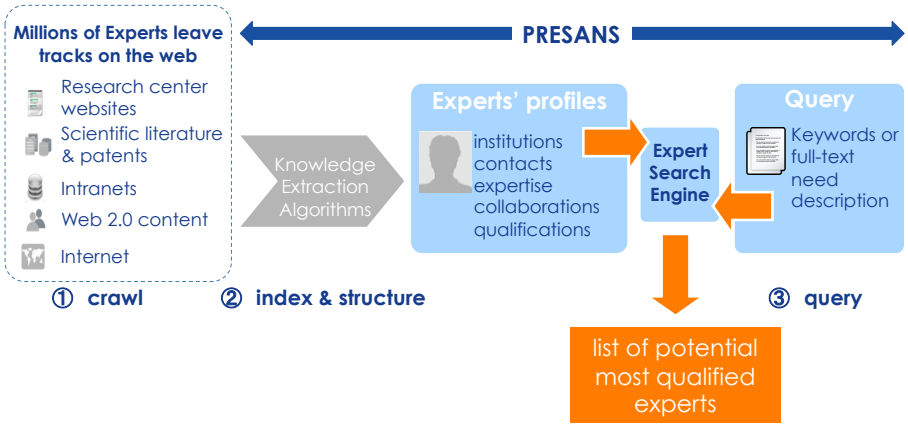

Figure 2: (1) The Expert Search Engine technology crawls tens of millions of scientific sources (scientific literature, patents, research center websites etc.). (2) The engine indexes and structure the information into expert profiles. (3) Sending a query (keywords or full-text description) from the search bar returns a list of potential most qualified experts.

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[6] Information Retrieval (IR) is the science of searching for documents, for information within documents, and for metadata about documents, as well as that of searching relational databases and the World Wide Web [http://en.wikipedia.org/wiki/Information_retrieval].

[7] Machine Learning is a scientific discipline that is concerned with the design and development of algorithms that allow computers to evolve behaviors based on empirical data, such as from sensor data or databases [http://en.wikipedia.org/wiki/Machine_learning].

[8] It supposes that the problem is well-formulated, which requires a smart methodology.

Multistep Problem Solving Process

Multistep rather than black box: the multistep approach allows to engage experts and to satisfy *seekers*, in a safe, secured and trustable environment. It ensures better performance for problem solving, less frustration among *solvers* and less disappointment among *seekers*.

Online problem solving is often thought of as a "black-box process": the *seeker* gives the input, waits a few months and finally opens the box to discover the set of submitted solutions. This process implemented by nearly all Open Innovation platforms has various drawbacks, the main ones being:

- motivation decrease and risk-averse behavior of *solvers*,
- inefficiency to reach quality and relevant solutions,
- limited incentives for *seekers* to be fair and pay for all valuable solutions.

We propose instead a three-step "gray-box" process for online problem solving. Based on our experience, we believe that this innovative process has a high potential to leverage expertise and intelligence through problem solving.

The three-step process serves to filter experts in order to select the 2 to 5 most relevant ones out of the initial automatically generated list. Each step is a gate where experts that have accepted the invitation to solve a problem are asked to provide additional information.

1. **Abstract** (typical length: half page)

In the first step, experts submit a short abstract in which they present their understanding of the problem, their approach and an outline of their solution. This submission is made through a web-based interface with mandatory fields, making it easy for experts to be exhaustive and for the reviewers to select promising propositions.

Experts are then preselected by the *seeker* on the basis of their abstract.

2. **Extended summary** (typical length: 3 pages)

In the second step, each preselected expert is asked to submit an extended summary presenting the approach, the main lines of the solution, its main advantages and proofs of relevancy. This more detailed submission provides a good overlook of the solution without giving the keys to master it.

At this point, the *seeker* chooses 2 to 5 submissions to be developed extensively against financial compensation.

3. **Full solutions** (typical length: 10 - 50 pages)

In the third step, the remaining 2 to 5 experts write the complete solution as they would on a traditional problem solving platform. The 2 to 5 experts all get paid for their full-length solution and the best one gets an extra financial reward.

Main advantages of Multistep Dynamic Expert Sourcing

Implementing the MDES approach with the right technological and methodological assets (i.e. a powerful Expert Search Engine and a relevant methodology to enhance problem formulation) presents strong advantages for experts, *seekers* and Open Innovation intermediaries (problem solving platforms).

1. For the experts
    - Get relevant problems without having to register
    - Ensure the protection of their intellectual property
    - Avoid irrelevant work and frustration
    - Get the guaranty to be paid for their work
2. For the *seekers* (the client companies)
    - Have a better control of confidentiality
    - Get potential access to tens of millions of worldwide experts
    - Engage more and better experts
    - Get better solutions
3. For the intermediaries (the platforms)
    - Decrease cost structures
    - Increase scalability
    - Build a reputation of quality & trust
    - Improve the solving rate and the solution quality.

Conclusion

In the first section, the main drawbacks of traditional problem solving platform were presented. These drawbacks are (i) the difficulty to attract and engage sufficient number of qualified experts, (ii) the difficulty to efficiently match *seeker* problems with potential experts, (iii) the difficulty to give the *seeker* convincing incentives to reward all promising solutions and (iv) the difficulty to manage confidentiality and to ensure a reliable transfer of intellectual property.

In the second section, we presented the disruptive approach that we have developed and implemented. The Multistep Dynamic Expert Sourcing approach relies on both an innovative Expert Search Engine technology and a three-step process for the actual problem solving phase. The Expert Search Engine ensures a relevant matching between experts and problems and avoids the necessity to get experts to register on a platform. The multistep process reduces the risks of losing time, money and intellectual property for all the parties.

We believe that this innovative and disruptive approach has a high potential to leverage expertise and intelligence through problem solving, and that it can contribute significantly to the success of online Open Innovation.

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Biographies

Albert Meige is the founder and President of PRESANS, a new generation of Open Innovation intermediary, connecting business needs to scientific expertise. Albert Meige holds double PhD degree in Physics. He has managed and carried out research in physics, computer science and innovation management in various institutions such as the Ecole Polytechnique for seven years.

Boris Golden holds a M.Sc. in Theoretical Computer Science from the Ecole Normale Supérieure and a M.Sc in Management from the Ecole Polytechnique. He is currently finishing his PhD in Systems Architecture, working on new methods to design & manage innovative industrial systems and complex organizations. He has also worked for 2 years in Management Consulting.