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InnoCentive.com (A)

"Collaboration is one of the most important issues on our plate," said Dwayne Spradlin, CEO of InnoCentive.com (IC), a so-called innovation marketplace founded in 2000 that connected "Seeker" firms posing scientific problems ("Challenges") with external "Solvers" who submitted solutions. Seekers that accepted solutions rewarded the Solvers with cash prizes in exchange for the associated intellectual property (IP) rights. IC had thrived in the marketplace by creating a process for helping to resolve seemingly intractable scientific and technical problems in a context that assured *anonymity*. Solvers worked on problems independently of one another and of Seekers, who likewise were unaware of other Seekers and Solver identities until prizes were awarded.

In late May 2008, when the results of a survey of Seekers and Solvers had come up during lunch with IC Chief Technical Officer David Ritter and Vice President of Client Services Lisa Reinhold, Spradlin had observed that "some of these responses about collaboration confirm what we've already learned from Solvers, particularly from our Ideation Challenge. This does seem like a natural move on our part." The Ideation Challenge had involved soliciting from Solvers ideas about how to create communication and teamwork within IC's Solver community. The survey had also indicated an interest among Solvers in seeing the domain expanded to include problems in the nonprofit realm.

"Well," interjected Ritter, "our new platform can certainly accommodate collaboration if we want that to happen." Ritter had spearheaded an effort to overhaul IC's web site to make it more "Facebook-like," as he described it. "We can set up team rooms and provide a variety of tools for group work, Web 2.0-style community functionality, discussion groups, and improved informational and joint-authoring tools, and with all this, our Solvers could easily work together and collaborate."

"We've absolutely got the technological wherewithal for Solvers to collaborate," Reinhold concurred, "but do we *really* know what collaboration involves? It seems to me that we're potentially introducing a big change in how we do business. There are thorny issues about IP transfer, prize awarding, confidentiality, and more. Transitioning to a collaborative innovation model would require a significant change in mind-set in how all of us—Seekers, Solvers, and IC—work together ourselves right now."

"I agree," Spradlin concluded. "I propose we each think about how we might introduce collaboration into our current approach and meet next week to discuss the issues thoroughly."

Professor Karim R. Lakhani wrote the original version of this case, "Scientific Problem Solving through Broadcast Search: InnoCentive.com," HBS No. 608-142, which is being replaced by this version by the same author. HBS cases are developed solely as the basis for class discussion. Cases are not intended to serve as endorsements, sources of primary data, or illustrations of effective or ineffective management. Special thanks to Barbara Feinberg for her assistance in developing the case.

Company Background

In late 2003, a large multinational consumer products company was looking for a polymer with a unique set of characteristics. Despite significant efforts, its own R&D labs had been unable to come up with a solution. Yet there was a solution—indeed, there were 21 potential solutions, five of which were ultimately accepted by the firm. Moreover, the five solutions were independently provided by outside experts who included an aerospace physicist, a small agribusiness owner, a transdermal drug delivery specialist, and an industrial scientist. Surprisingly, none of these experts worked for the firm, nobody in the firm knew about them, and none was in the scientific field traditionally associated with the problem.

The foregoing problem had been submitted by its multinational owner for a "broadcast search" from IC's web site, which presented problems from firms' R&D labs to many diverse Solvers (i.e., experts representing multiple scientific and professional domains), who were rewarded for finding solutions. (See **Exhibit 1** for an historically important use of a broadcast search in scientific problem solving.)

IC was spun off from Eli Lilly and Company's new business model incubator, e.Lilly, in 2000. Then-vice president of e.Lilly R&D, Alph Bingham, spearheaded the push and was subsequently named chairman of Waltham, Massachusetts-based IC. Bingham had long recognized that firms tended to address science problems using a limited number of scientists in a single knowledge domain, leading to a so-called local-search phenomenon. That is, the tendency was to identify, define, and grapple with problems using local expertise, experience, knowledge, and tools that had proven effective to the in-house group in the past. When a local search was unsuccessful, problems simply were not solved or lay dormant. Even when this search approach did "work," the problems were often resolved with a suboptimal solution due to the limited space from which the solution was sought. Other possible alternative approaches were ignored—or simply not perceived. These "inside" problems, Bingham believed, might well be solved by connecting diverse "outside" scientists to them. A company that could make such connections could, moreover, increase not only the likelihood of a problem being solved but also the productivity of problem solving itself through massive parallel processing of both hypothesis generation and execution. InnoCentive, as first conceived, viewed itself as a kind of "eBay of Innovation."

By the end of 2007, the more than 600 problems, or Challenges, posted by more than 80 clients on IC's web-based marketplace had attracted more than 135,000 Solvers from some 175 countries (half in China, India, and Russia). (See **Exhibit 2** for a client list.) IC's pool of Solvers, 40% of whom held PhDs, represented diverse fields and included private-sector participants, academics, students, consultants, and retirees. IC did not prescreen Solvers; *anyone* in the world could go to the IC web site and register as a potential Solver. Problems were grouped into six Challenge domains: life sciences, chemistry, physical science, engineering/design, math/computer science, and business/ entrepreneurship. Between 2001 and 2007, Seekers had awarded, for the just over 33% of the Challenges deemed solved, more than 200 prizes (worth about $2.6 million) to people in 30 countries. (See **Exhibit 3** for Solver and Seeker trends.) IC's 30-person staff accomplished all of this.

Although InnoCentive originally operated on a subscription model, it now charged Seekers a $15,000 "posting fee" regardless of Challenge type. For this, Seekers received help in creating their problem definition, their Challenge statement and support during the solution evaluation process. InnoCentive also received a commission on prizes for those Challenges where awards were given.

Broadcast Search

In early 2007, the government- and oil industry-funded Ocean Spill Recovery Institute (OSRI), based in Cordova, Alaska, posted three Challenges on InnoCentive.com, all related to the recovery of oil and reduction of environmental damage associated with the Exxon Valdez oil spill. The first OSRI Challenge sought a method for separating oil from water, which had been frozen to a viscous mass on oil recovery barges. The first solution, which earned a $20,000 reward in October 2007, was submitted by a Solver whose principal scientific focus was nanotechnology. Having no background in the oil industry, the Solver proposed deploying an existing tool common in the concrete industry that used vibration to keep cement in liquid form during mass cement pours. The Solver reasoned that attaching the tool to a long pole and inserting it into the oil recovery barges would keep the oil from freezing into a viscous state and enable it to be easily pumped from the barge.

The critical starting point for an IC Challenge was defining the problem that needed solving. The Seeker, working with IC's scientific operations staff, had to articulate its concern in ways that would enable external Solvers from diverse scientific fields to imagine it. For example, creating a traditional requirements document would not capture the type of problem description required for this wide audience. The Challenge was then posted on IC's web site, together with information about the cash prize to be awarded and deadline for submission. (See **Exhibit 4** for a sample Challenge statement.) IC then broadcasted the problem to its existing Solver base via e-mail (see **Figure A**).

Figure A InnoCentive.com Model for Broadcast Search

Source: Created by casewriter.

Two broad categories of Challenges with IP implications were broadcast: a Reduction to Practice (RTP) (e.g., "An enzyme stabilizer at high pH is required.") or a "Paper/Theory" (e.g., "Can you formulate a simple, stable, and safe injectable suspension placebo that has no pharmacological and biological activity?"). For RTP problems, Solvers provided either original research data in the form of actual chemical or biological agents or detailed experimental results; for theoretical Challenges, Solvers offered "paper" submissions accompanied by a research proposal.

IC had recently added two other Challenge types. Ideation involved brainstorming Challenges that required only brief submissions and guaranteed that at least one Solver would win the posted cash reward. There was no transfer of IP: the Solver granted the Seeker a nonexclusive license to use any submission regardless of whether it was selected as the winner. Seekers used Electronic Request for Proposal (eRFP) Challenges to post product and service requirements and invite Solvers to bid on the most cost-effective approach to a solution. Solvers negotiated price and contract terms directly with the Seeker and then submitted solutions.

IC Solvers in all cases worked independently, interacting only with an IC program manager. Anonymity was sacrosanct. Solvers working on a particular Challenge were unaware not only of who

else was working on it, but also of how many solutions had been submitted and the nature of those submissions. Nor did Solvers know which Seekers they were working for, or Seekers which Solvers were working on their Challenges.

IC's scientific operations staff screened proffered solutions to ensure that they met problem requirements and forwarded those that did to the appropriate Seekers. Scientists within the originating R&D laboratory assessed the submissions and informed IC if any met their criteria. The decision to award prize money to the best solution rested with the Seeker who might award a single prize, multiple prizes, partial prizes, or none at all.

Safeguarding Intellectual Property (IP)

IP rights were carefully protected. The initial broadcast of a Challenge included only an abstract of its definition. Solvers interested in details and requirements first had to accept a "Solver Agreement" that described the reward, the time allowed for submitting, and the review period for judging solutions as well as confidentiality and IP transfer clauses for accepted solutions.

Solvers who submitted solutions thus granted Seekers a *temporary license* to perform the requisite evaluation. A Solver whose solution was accepted received the preannounced reward and *transferred all IP rights to the Seeker.* Solvers who were employees of other companies were asked, before the transfer took place, to provide a signed employee waiver. Seekers relinquished any rights to use in any future work the information provided in the submission of a solution that was not accepted. This policy was enforced by contracts between IC and Seeker firms that afforded the former the right to initiate audits. IC had transferred IP from more than 60 countries and its success rate exceeded 99%.

Why Does This Work?

Within the oil spill response industry, there are a limited number of people available to work on these problems. If this Challenge were solvable by the people within the industry, it would have been solved earlier. I'm fascinated to see that our winning solution uses related technology found in the concrete industry. We would never have found this through our regular RFP process. The InnoCentive Marketplace allows us to step outside the box and look at more creative solutions.

—Scott Pegau, OSRI[1]

I think I'm like a lot of people who like to solve problems. We make a living at it. My job is solving problems. I love the satisfaction of having solved problems.

—John Davis, a $20,000 winner of the first OSRI Challenge[2]

The broadcast-search problem-solving approach was distinguished from traditional methods of scientific problem solving in three ways. First, the pool of potential participant-Solvers was quite broad, including many people from different backgrounds, countries, personal and professional situations, and experiences. A problem deemed intractable by a Seeker was thus exposed to a host of people with a wide range of expertise not feasibly corralled or even imagined by the firm.

Second, Seekers shifted their perspective from that of "having" a problem to that of *evaluating solutions to it*. To generate solutions for evaluation, Seekers had to articulate their problems precisely, a nontrivial task in which IC's role was pivotal. But it was this definition task that set the stage for multiple, heterogeneous Solver minds to be focused on a Challenge.

[1] InnoCentive.com press release , November 7, 2007.

[2] Company documents.

Finally, the process of articulating a problem yielded criteria by which to judge proposed solutions. Only solutions that met the criteria were eligible to be rewarded.

More than 200 Solvers typically expressed formal interest in working on any given Challenge. On average, submissions were received from 10 Solvers. Seekers were, in effect, presented with results from 10 parallel experiments in problem solving.

Given such benefits to Seekers, what was in it for Solvers? Clearly, monetary rewards played a role, but so did "intrinsic motivation," the challenge of solving puzzles and personal satisfaction that derived from tackling and devising solutions to difficult problems. Ultimately, broadcast search aimed to leverage from the problem-solving process both the distribution of knowledge *and* varied motivations to participate. (See **Exhibit 5** for two Solver profiles.)

Introducing Collaboration?

IC's approach intended not only to connect Seekers with Solvers but to increase the "productivity" of problem solving. Implied were both faster solutions, as measured in "turn-around time," and potentially "richer" solutions that suggested approaches that were previously not considered by Seeker scientists. The nature of the marketplace IC had established and categories of Challenges offered contributed significantly to the latter. Could more be done? Was the "anonymous" individual Solver approach the only one possible? Some Solvers didn't think so. "I am envisioning," one wrote in an e-mail, "a nationwide or even worldwide network of problem-solving teams. I already know people all over the country as well as in Europe, Asia, Central America, and the Middle East who would be very interested in joining the effort." Even some Seekers wondered whether the "right" solution might be arrived at faster through collaboration. Several Seekers that noted that they currently "had no insight into the process [of solving]" suggested that a team-based approach might enable them to "provide information, improve quality, and secure IP" as solving unfolded.

The power of collaboration was not lost on Spradlin, Ritter, and Reinhold, who were well acquainted with the success of distributed collaboration in fields as diverse as open-source software (e.g., the Linux operating system) and content (e.g., the online encyclopedia Wikipedia). Ritter, who had extensive experience managing software development projects and had been a partner in a major strategy consulting firm advising software clients, was well aware of how open-source projects had permanently changed the software industry, and he put the case for collaboration thus: "Collaboration makes sense if you prize diversity (as we do!). We know the importance of having more 'eyeballs' involved. We know that collaboration increases the possibilities of finding and making use of complementary skills. And we know, from our own Solvers, that there's pent-up demand for greater Solver interaction."

The Ideation Challenge

It was evident, given the e-mails and other communications with IC program managers, that this pent-up demand had become a groundswell of interest in greater "interoperability" among Solvers. In response to this demand, IC posted in February 2008 its own Ideation Challenge on collaboration (see **Exhibit 6**). The abstract read: "The Seeker wishes to identify ideas regarding how the community of InnoCentive Solvers should be able to express their identities, communicate, interact, and collaborate through the InnoCentive web site and/or through other web-based communities."

Four of the 68 Solvers who responded were selected as winners and awarded a total of $5,000. The recommendations ranged from suggestions for modifying the web site to facilitating exchanges

among Solvers to ideas for how people could work together. (See **Exhibit 7** for excerpts from these solutions.)

The Meeting

Several days after their lunch, Spradlin, Reinhold, and Ritter met to focus on collaboration issues. Each had considered potential risks and benefits, and all were agreed that collaboration was an idea, an ideal, in fact, whose definition was often in the eye of the beholder and whose implications were often unpredictable. They needed to be clear on what it meant for them and, hence, for InnoCentive.com and its clients.

Ritter, armed with slides, opened the discussion.

"Here's how I see collaboration working. Our Solvers are currently provided individual 'project rooms' in which they can ask questions [of IC] about the Challenge they're working on and to post their solutions. The idea would be to create 'team project rooms' with the kinds of group-work tools I sketched out to you the other day at lunch: digital white boards, wikis, Voice over IP, shared file space, group/virtual meeting capabilities, and the like. Groups could choose the kind of arrangements that suited them and collaborate across disciplines and geographies—anywhere, anytime, so to speak.

"Let me also go through our new 'profiling system.' It includes a lot of the Solvers' suggestions. Solvers can basically find each other; we've got search expertise, chat rooms, a community discussion board, the ability for individuals to create their own personal journals. Participants can create groups for any purpose using the Yahoo Group model. And Solvers can even post their own 'Challenges' and award points to each other. It's a lot more engaging than what we had before.

"I see all of this as a big step forward in our ability to take on more and perhaps different kinds of Challenges in which collaboration would be a huge benefit. We're really empowering our Solvers, and they have, in fact, been asking for this capability. With it, a Solver can find others to work with on a Challenge, communicate with them to establish interest, negotiate terms, then actually do the work, and, if they're successful, divvy up the prize and IP. In other words, we publish guidelines and then let the group formalize them as they see fit."

"You know, as I listen to you talk I'm hearing that Solvers will be taking on other 'duties,'" Reinhold observed. "The idea of 'establishing a mission' and 'assembling a team' implies a kind of *managerial* role that Solvers haven't had to address when they've worked individually. Would this take more time and, hence, affect the deadlines that our clients establish for problem solving? With more people involved in the solving process, would more prize money have to be allocated? How does all this work?"

"It's not just prize money and time," interjected Spradlin, "it's IP. And a potential nightmare of international laws if we have to reconcile on a single problem the IP rights of many creators and the transfer to the Seeker."

"Another thing I'm concerned about," Spradlin continued, "is our role. Do we end up focusing on the solving process, something we've not had to consider so far? What *is* IC's *job* in a collaboratively organized solving process? Solvers are *passionate* about their work. You say that all the time, Lisa. They feel their involvement personally. What happens when a group of individuals feel that way? Would we be called upon to intervene if there are disputes? What else would we have to do or not do?"

"It seems to me we're looking at this in all-or-nothing terms," Reinhold reflected. "David assures us that our technology supports both individual and group approaches. We should be figuring out how to determine which works best, given specific problems. I'm excited that we could have a more varied range of Challenges. At the same time, I don't want to jeopardize the Seeker base we've worked so hard to establish. So, we shouldn't be thinking either/or, we should be considering when/best! Is what determines the 'best' approach the nature of the problem? Not only what it is, but how it can, or could, be divvied up among various people?"

"And we already help in problem definition," Spradlin pointed out. "That's an essential role we already fulfill. It's one that can be increasingly important if we expand into nonprofit work, where collaboration is the norm."

"But it's also how we're looking at the teamwork," added Reinhold. "We've been referring to groups, and teams, and collaboration. These are not the same things, I think, or they are organized differently, or *we* should ensure that they are organized differently. The idea of leaders establishing missions and essentially hiring people to work on them, etc., is not the same thing as a self-organized group comprising folks who are 'interested' in a problem. And that's different, too, from the development of something from scratch, like the open-source Linux model."

"Well, all this implies running experiments, doesn't it?" Ritter asked. "The trick would be to design these so we could evaluate, compare, and contrast what is most effective, the 'when/best' that Lisa suggested. Can we, should we, do that? Dwayne?"

Exhibit 1 Using Broadcast Search to Solve One of the Most Important Scientific and Technological Challenges of the 18th Century

Broadcast search, with the lure of prize money, is an old story, the most well-documented example being the challenge of "finding" longitude at sea (latitude had long been determined); failure to solve the problem of longitude had for centuries bedeviled sailors, sea captains, naval warriors, and pirates. Thus, in 1714, the British Parliament established a prize of up to 20,000 British pounds (£)—a huge amount of money for the time—for anyone who could find a solution. It also established a Board of Longitude to evaluate and select prizewinners; the board's principal advisor was Isaac Newton. The "broadcasting" of both the defined problem—it had to be a *practical* method of finding longitude at sea—and its reward was effective: some 150 solutions were submitted.

Newton, like others, was convinced that the solution would, and should, come from astronomy, where studies of planetary motions, for instance, had deep theoretical and empirical roots. As such, he rejected "alternative" proposals made to the panel, for example, those based on a view of the problem in terms of chronometry, the "keeping" of time as it happened.

In fact, the immediate solution was that of timekeeping, and it appeared from a decidedly nontraditional source: a carpenter and clock-maker from the wilds (of Yorkshire). Not only did this man, John Harrison, advocate the approach of chronometry (essentially clock-making), he produced a model that demonstrated its effectiveness. Using his skills in what we now call material science, he crafted an exquisite device that indeed "determined" longitude at sea, the product of years of work and then dogged insistence to the board that his ideas had merit. However, the defined problem was to make a *practical* device that determined longitude at sea. Could Harrison's elegantly hand-built marine chronometer be (economically) manufactured so that anyone could take advantage of it?

Interestingly, although it was eventually possible to mass-produce a modification of Harrison's chronometer, in the interim the astronomy camp also developed greatly improved star charts; the two "knowledge domains"—chronometry and astronomy—together, therefore, ultimately solved the defined problem.

Source: Created by casewriter.

Exhibit 2 List of Clients Using InnoCentive

InnoCentive has worked with over 80 clients, including:

Procter and Gamble

Eli Lilly & Company

Janssen

Solvay

Rockefeller Foundation

GlobalGiving

Corona

Neah Power

SunNight Solar

Oil Spill Recovery Institute

Asset India

Source: Company documents.

Exhibit 3 Key Facts on InnoCentive

Total Solvers	180,000+
Total Challenges Posted	930
Total Award Dollars Posted	$22,500,000
YOY Posting Growth	100%
Project Rooms per Challenge (average)	250-300
Project Rooms Resulting in Submissions	5-10%
Total Submissions to Date	15,875
Total Challenges Solved to Date	539
Total Award Dollars Awarded	$4,650,000
Solve Rate	45%
Countries Represented by Winning Solvers	40+
Countries Represented by Solvers	175+

Source: Company documents.

Exhibit 4 Sample Challenge Statement

Dual-Use Off-Grid Illumination Device
Award Amount: $20,000 USD
Posted: March 1, 2007
Deadline: April 30, 2007
Status: Open

Detailed Description & Requirements

Design of affordable dual purpose off-grid lighting device is desired. This requires only a written proposal and can be a total re-work or upgrade of the existing model.

In many parts of the world where family income is low, there is a need for lighting that is inexpensive to buy while incurring little or no operating costs. Towards that need, a lighting device for reading that uses an LED lightbulb and rechargeable battery was developed. The rechargeable batteries can be charged during daytime with a small solar panel (5″x1.25″) built onto one side of this task light. Thus, the operating cost of such a lighting device is essentially eliminated while imposing zero carbon footprint. This lighting device is classified as a task light with a small (12°–15°) angle of illumination. After initial roll-out of this task light, many users of this task lamp expressed a greater need for a dual purpose/mode lamp that can be used for reading as well as room lighting to enhance social cohesion at night. The goal is quite modest: the villagers would like to have a lamp that can illuminate a small (4 meters x 4 meters) room relatively evenly with light intensity comparable to that afforded by a conventional kerosene lantern.

The Seeker is interested in achieving this dual purpose lamp by adding additional feature to the existing lamp with a switch to turn on either mode when needed. For this Challenge, the **task** (reading) light illumination and **room** lighting are designated as mode 1 and mode 2 respectively. The Seeker would like to solicit a novel lighting device design that can be built upon the existing lighting structure and provide dual mode lighting if possible. For example, multiple (up to eight) LED lightbulbs can be added to the existing lamp design positioned in a certain way with additional means of diffusion to provide about 360 lumens illumination relatively evenly for a small room.

The Solvers should follow the **Design Constraints**:

1. Housing: the dimension of the housing for the lighting device is preferably to be fixed to that of the existing task light (picture shown below). If that is not possible, the critical dimensions may be enlarged by no greater than 20% and the weight for the complete device should be kept under one pound (454 grams).

2. LED lightbulbs each will provide 60 lumens of illumination with small and wide angle of illumination suitable for two different modes of illumination.

    a. Angle of illumination: 15 degrees; 6 LED lightbulbs for mode 1 (task lighting) illumination. This part should be kept intact. The Solvers are advised to focus on mode 2 illumination while accommodating the existing design for task lighting—mode 1 illumination.

    b. Angle of illumination: ≤ 150 degrees; up to 8 LED lightbulbs may be used in the design to meet the requirements of mode 2 (room lighting) illumination.

3. Diffuser mechanism: The use of diffuser or reflector in the diffuser/reflector assembly is the key of the proposed design. The diffuser mechanism should fit within the housing as specified in the Design Constraint #1 shown above.

Any proposal should address the following **Technical Requirements**:

1. Performance: the lamp, when made according to the proposed design, and hung from the ceiling, should be expected to provide the light:
    a. Cone angle of illumination: 110 ± 10°.
    b. Variation in light intensity < 20 % from all angles.
    c. Minimum (preferably < 10 %) loss in intensity due to use of diffuser.
2. Manufacturability: Should be relatively simple in design to render the lighting device inexpensive to be built.
3. Durability:
    a. The device should be rugged enough for long term use.
    b. The device, being transportable, should be expected to be rugged enough to survive occasional drop from a height of 4 feet.
    c. Should be sealed and water resistant (not waterproof) to survive the exposure to rainfall for a short (≤ 30 minutes) time.
4. Costs: Not to add more than $1.00 USD/lighting device.
5. Constraints: Should comply with the **Design Constraints** listed in the detailed description.

We are aware of the following approaches that will deviate significantly from the **Technical Requirements** and **Design Constraints**:

1. Utilization of existing LED light with standard light socket: This is too costly and does not fit the existing lamp housing.
2. A design that rearranges the reflector assembly and/or LED lightbulb position with a mechanical switch to accommodate two modes of illumination: Moving parts from this design may result in premature failure in this mechanical switch mechanism.

However, any novel method which can be expected to meet the **Technical Requirements** and has not already been identified by the Seeker would be welcome.

The Seeker client is not looking for a literature review. The proposed method should offer the Seeker client "freedom to practice." There should be no patent art preventing the use of specific material for their commercial application.

Project Criteria

Design of affordable dual purpose, interior, self-contained, off-grid lighting device is desired. This requires only a written proposal and can be a total re-work or upgrade of the existing model.

The proposal, which will be evaluated by the Seeker on a theoretical basis, should include the following:

1. Identification and Detailed Description of the proposed lamp lighting device design that should include:
    a. Detailed drawings of the lighting device proposed.
    b. Identification and Specification of the materials/parts used when applicable.
    c. Estimated/Expected performance (Technical Requirement #1) of the device.
    d. Estimated/Expected durability (Technical Requirement #3) of the device.
2. Rationale as to why the Solver believes that the proposed method will work. This rationale should address each of the **Technical Requirements** described in the Detailed Description and should be supported with relevant examples and literature citations. Concrete support for the **Technical Requirement** #1 is essential.

Source: Company documents.

Exhibit 5 InnoCentive Solver Profiles

The following are statements written by two top InnoCentive Solvers, explaining why they participated in solving Challenges.

Dr. Sekhar Konjeti

I do not remember exactly when I joined the InnoCentive community but I remember that I was skeptical about the concept of InnoCentive. I was concerned that I might lose intellectual property rights if I disclosed my ideas for a problem that was not chosen for the winning solution.

Despite this I decided to try it and submitted a solution for a theoretical problem in 2003, Biological Targets for Inflammation. This problem required me to identify five new biological targets for the discovery and development of pharmaceuticals to treat inflammation. The proposed targets needed to be the ones to which no FDA-approved drug is known. A scientific literature search yielded a few targets which I proposed in my solution. However, because I was so skeptical about the system, instead of proposing five targets, I wrote only three targets thinking that it was a waste of my time. To my surprise, two of the targets I proposed were selected for the award.

Over the next three years I did not see many Challenges that interested me. I submitted 2 or 3 solutions without much enthusiasm. I usually selected the Challenges that required only written solutions and did not require me to do actual experiments to validate the solution.

My curiosity in drug discovery led me to actively participate in another Challenge in 2006 even though I knew nothing about Duchenne Muscular Dystrophy (DMD). After reading the strategies and descriptions of the treatments in the Challenge, I immediately knew the solution but confirmed it by conducting a literature survey.

I was concerned that it was not a drug that is approved by FDA or in clinical trials, it was an over the counter supplement, Resveratrol (it has been disclosed in the DMDetank web site). I was not sure whether the Seeker would accept a supplement in the proposal but I thought if it works, it can be easily administered without much hassle or FDA approval. I couldn't believe it when my proposal was selected and the Seeker started testing the drug on mice. It gives me pleasure to know that the recent scientific literature has confirmed further the usefulness of Resveratrol. This is one of my favorite solutions due to its implications for possible future treatment for those that suffer from DMD and have to take lots of pills daily. This will reduce the number of pills an individual has to take if proven effective in animal/human testing.

2007 was an exciting year for me with three winning solutions and recognition as one of the Top Solvers by InnoCentive. It is exciting to see the different problems facing the industry in one place. Several of the problems the drug discovery industry is facing seem simple, but after looking at the description one will realize how big the problem is.

Many of the industrial problems are never seen or heard outside of the industry. InnoCentive is helping the drug discovery industry by grouping scientists/researchers with various backgrounds and posting problems from various disciplines so that registered users can see the description of the Challenge in one place. This is something I really like about InnoCentive. I encourage everyone to read each Challenge posted even if it doesn't fall into your area of expertise and to search on the Internet to get some information on the problem which will help in thinking about the solution in a novel way.

David H. Tracy

I'm relatively new to InnoCentive, with two awards under my belt. Someone told me about InnoCentive back in 2004. I checked it out, was definitely intrigued by the concept and quickly joined as a Solver. Both the challenge of attacking novel real problems and the prospect of actually getting paid for doing so were highly attractive. I regularly checked out the Challenges posted, but for several years I didn't take the plunge and submit a solution. Why not? Partly it was the subject matter—I'm a physicist, and most of the early problems needed a chemistry or biochemistry background. Also, I was pretty busy with my "day jobs," technical consulting and local volunteer work. But there was another factor—I wasn't sure if the InnoCentive approach was right for me.

Would it be a good use of my time and um, talents? Would it be difficult to craft and submit solutions without actually talking to the Seekers? And what were the odds—could I really compete against 140,000 Solvers worldwide.

Finally, in 2007, a flood of problems appeared on InnoCentive that I felt I could get my teeth into. The number of disciplines represented continues to grow rapidly. It also became apparent, in looking at the specifics of these problems, that the InnoCentive model had some interesting advantages for Solvers.

Much has been written in the blogosphere about the benefits of "open innovation" for companies and organizations in need of fresh ideas and solutions to R&D problems, but relatively little about the upsides and downsides for scientists and engineers—the Solvers in InnoCentive's parlance. To me, it gradually became apparent that InnoCentive offered opportunities and stimulating Challenges that were almost entirely incremental to my conventional means of drumming up business.

Typically, the InnoCentive Challenges I found attractive were, well, business-as-usual. My ideas for solving them, and the resulting IP, were almost always brand new and didn't come out of some finite reservoir of professional secrets or insights that I felt I needed to hoard and protect.

Coming up with Solutions is gratifying, even if sometimes agonizing. But ironing out the details, writing them down and submitting them can be actual work! Would it be worth the time and energy?

In my previous full-time work life in R&D, as well as in my consulting work, I have been used to dealing face to face with "customers." Working out a "solution" to their "problem" is then the result of a two-way discussion, in which everyone's needs, expectations and capabilities gradually become clear. If there is a mismatch between needs and capabilities, it usually becomes clear at an early stage, before a lot of time has been invested. If a solution is eventually found, it is generally the result of a give-and take process, rather than a unilateral response to a problem specification.

With the double-blind submission process which is necessary to the InnoCentive model, it appeared to me that things would be very different. Submitting a Solution is somewhat analogous to submitting a competitive Grant Application, in which the persons ultimately evaluating the applications are unknown to the applicants, and their mind-sets and the criteria they use to pick a winner can be only partially understood. This puts a premium on clearly explaining the proposed Solution, so that misunderstanding can be avoided.

InnoCentive scientists clearly play a major role in crafting the Challenge specifications, which results in a consistent degree of clarity about the essential Solution Requirements. This filtering role however, is bound to make the thinking of the anonymous Seekers behind the Challenge a little more inscrutable. In most cases, there are details of the problem specification or parameters that legitimately need clarification. I have found that addressing thoughtful and relevant questions to the InnoCentive science team can sometimes elicit answers from the Seekers which really help me to

understand their needs better and which give useful clues on how best to explain the solution in their terms.

But what of the odds? I'm a good enough mathematician (barely) to know better than to play the lottery. Not every Challenge results in an acceptable solution (aside from the new Ideation Challenges, which have a guaranteed award) and some exciting Challenges apparently attract many Solvers. If I thought that a given Challenge would attract, say, 100 strong solutions—solutions likely to be roughly as wonderful as mine—then I might choose not to invest the time needed to create and submit a solution with just a 1% probability of winning.

However, these odds are largely unknowable in advance, so what is a poor prospective Solver to do? I decided to perform the experiment—try few submissions and see what happens. So, over the last year I started on eight or ten Challenges, of which I actually submitted Solutions for half a dozen. I put varying amounts of effort into them (as little as a day in one case!). The result so far has been 2 awards out of the 6 submissions. And the ones that won weren't even necessarily my favorites—the competition seems to be pretty fierce. A statistician will tell you that these are small numbers from which to draw any strong conclusions, but I for one am highly encouraged. I'm not quitting my "day jobs" just yet, but I think a Phase II experiment is definitely in order.

If you've been sitting on the fence, you may want to do your own little study—just be sure to submit enough solutions to make it a fair test!

Source: Company documents.

Exhibit 6 Ideation Challenge Statement

Challenge Name: *Defining community and collaboration for InnoCentive Solvers*
Award Amount: $5,000
Posting Period: 1 month
Evaluation Period: 15 days

Abstract: *(viewable by general public)*

The Seeker wishes to identify ideas regarding how the community of InnoCentive Solvers should be able to express their identities, communicate, interact, and collaborate through the InnoCentive web site and/or through other web-based communities.

Summary:

The Seeker wishes to identify ideas regarding how the community of InnoCentive Solvers should be able to express their identities, communicate, interact, and collaborate through the InnoCentive web site and/or through other web-based communities.

You do not need to be an expert in internet community development to work on this Challenge. What matters most is your creativity and common sense as a professional, individual and a member of the InnoCentive Solver community.

This Challenge has the following distinct features:

1. The Seeker guarantees a total award amount of $5,000, split among four different Solvers. A first award of $3,000 will be paid for the best submission. An additional $1,000 will be awarded for the second best submission. Two third-place awards of $500 each will also be given. This means that for you to win an award, your submission does not necessarily need to be perfect—it just needs to be better than others. You are welcome to submit multiple submissions, but each individual Solver is eligible to receive only one of the four awards.

2. You are not required to transfer exclusive intellectual property rights to the Seeker. Rather, by submitting your proposal, you grant the Seeker a royalty-free, non-exclusive license to practice your idea submitted for this Challenge. *Please note that InnoCentive may choose to use ideas from submissions that are not selected for an award. At InnoCentive's discretion, and with the Solver's permission, the Seeker may give public "honorable mention" for these contributions.*

Detailed Description & Requirements: *(viewable by Solvers who signed user agreement for your Challenge)*

Founded in 2001, InnoCentive is connecting industrial companies, academic institutions, and non-profit organizations with a global network of more than 135,000 of the world's brightest minds on the world's first Open Innovation Marketplace. InnoCentive believes that by exploring the power of open innovation and bringing together creative minds, it will deliver breakthrough solutions that touch every human life and change the way governments, business and whole societies operate.

Central to InnoCentive's success are its Solvers: a community of 135,000 highly qualified and creative individuals and contract organizations. Solvers visit the InnoCentive web site to find and solve Challenges placed by global organizations in a variety of industries including marketing, pharmaceuticals, energy, and consumer products.

InnoCentive wants to grow this community to include millions of the world's brightest minds. Moreover, InnoCentive wants all Solvers to feel a sense of belonging to the same, exciting and unique community.

To achieve this ambitious goal, the Seeker is looking for answers to two groups of questions.

First, how can InnoCentive create an online community with unique characteristics that would make it distinctly attractive to the Solvers? What features, beyond standard blogs and wikis, could make www.InnoCentive.com a daily destination for the Solvers, or even their home page on the Internet? What topics do Solvers want to read about, and talk about with other Solvers?

The Seeker is thus soliciting creative ideas on how InnoCentive Solvers could:

- Express their identity within the Solver community and have their status as a Solver visible and recognized on www.InnoCentive.com and other web communities;
- Be recognized for their solutions, and their contributions to the community;
- Find news and other information relevant to specific Challenges, professional and individual interests, and career growth;

Second, how can InnoCentive enable Solvers to work on Challenges together, sharing resources, awards, and recognition? How can such collaboration be achieved while providing sufficient protection of confidential information belonging to both Seekers and Solvers? What community and collaboration features would make working on Challenges easier, more enjoyable, and more productive?

The Seeker is thus interested in additional creative ideas on how InnoCentive Solvers could:

- Connect, communicate and develop relationships with other Solvers;
- Contribute content and ideas of interest to other Solvers;
- Form groups with other Solvers for collaborative work on Challenges;
- Share ideas developed on www.InnoCentive.com with other web destinations relevant to Solvers;

To be selected for an award, your submissions should be novel and specific to the needs of the InnoCentive Solvers. Generic solutions that would be applicable to any web community are less likely to be successful.

Project Criteria: *(viewable by Solvers who signed user agreement for your Challenge)*

Your proposal should include the following information:

- A clear description of your proposed solution
- Diagrams/flowcharts that illustrate your proposed solution, if necessary
- Any supporting literature, when available

Please, try to limit the length of your proposal to less than *two* pages.

After the deadline, the Seeker will evaluate all received submissions and determine the best proposals for the awards **at his sole discretion**. The Seeker will not provide the Solvers with evaluations of their submitted proposals.

The Seeker guarantees a total award amount of $5,000, split among four different Solvers. A first award of $3,000 will be paid for the best submission. An additional $1,000 will be awarded for the second best submission. Two third-place awards of $500 each will also be given. This means that for you to win an award, your submission does not necessarily need to be perfect—it just needs to be better than others. You are welcome to submit multiple submissions, but each individual Solver is eligible to receive only one of the four awards.

You are not required to transfer exclusive intellectual property rights to the Seeker. Rather, by submitting your proposal, you grant the Seeker a royalty-free, non-exclusive license to practice your idea submitted for this Challenge. *Please note that InnoCentive may choose to use ideas from submissions that are not selected for an award. At InnoCentive's discretion, and with the Solver's permission, we may give public "honorable mention" for these contributions.*

Source: Company documents.

Exhibit 7 Excerpts from Solver Submissions on IC's Ideation Challenge on Collaboration

Solver 1—Website Changes

"The InnoCentive site should provide links to sites of interest for a particular group of Solvers. It would be difficult to set up such a list automatically. Each Solver should be able to create his own mash up of RSS feeds, URLs, and other Web 2.0 widgets and to organize his personal InnoCentive page (My InnoCentive). A Solver should also be able to post a link that he thinks might be useful to other Solvers that share the same interests and skills with him to the Community (or Communities) he is member of.

The Solvers should be able to subscribe to the e-mail newsletter that would summarize at given frequency (daily, weekly, monthly) the information of interest to them based on the keywords supplied when defining the profile, for example. The same information should also be available through an RSS feed."

Solver 2—Website Changes

"In order to allow Solvers to more easily navigate the InnoCentive site and further develop a sense of community, it is proposed that Solvers be allowed to construct personalized homepages as their own entry point into the InnoCentive site (which can be viewable by all Solvers if chosen).

- Assuming formal and informal collaborations become features of the InnoCentive experience, a personal InnoCentive Solver homepage could include the following features (the particular features could be selected by the Solver):
    - Personal & CV information: Photograph, contact details, career and educational background, areas of specific and general expertise, list of papers, etc
    - Current collaborators & collaboration names—with links to CRs (private to Solver)
    - Current InnoCentive group memberships
    - Current Challenges open
    - Challenges won & entered
    - Recent requests for help (see above) and responses
    - Recent provision of help
    - Ratings for provision of help, collaboration efforts and generosity in sharing rewards with those who have provided help
    - Recent updates to collaboration pages (private to Solver)
    - New requests for help (in areas of interest to the Solver)
    - New Challenges (in areas of interest to the Solver)
    - New job/contract listings (in areas of interest to the Solver—posted by Seekers, perhaps)
    - Recommendations for colleagues
    - Recommendations from colleagues

  - Search for a Solver by expertise, stats/rankings, location, etc
  - Leave an instant message for a fellow Solver (via simple text based message exchange service)
  - View and respond to received messages
  - Invite a Solver to join a collaboration
  - Invite a Solver to join a group (common professional or academic interest)

- A Solver could use their own InnoCentive homepage as a communication tool to connect with the InnoCentive Solver (and Seeker community in some applications)
- With such features the InnoCentive Solver network would become an interactive community. Old colleagues could reconnect and enjoy working on new Challenges as part of a collaboration
- To further develop the community aspect of the Solver network, Solvers could be allowed to create common interest groups (e.g., professional interest groups, scientific disciplines, etc) and within those groups jointly create and review papers/articles and discuss problems of interest to that specific field of knowledge
- Professional, Industry & Government organizations could perhaps access these InnoCentive groups for survey purposes or seek feedback on various industry-wide issues (perhaps with InnoCentive, and even participants, obtaining a fee for providing access)
- Access to groups of Solvers with specific technical expertise could be granted for a fee (e.g., 100 surgeons provide practical feedback on a surgical tool, views of 100 physicists on nuclear energy). There may be examples where this could become a community service (for example, young doctor in Africa seeking advice from a forum of specialists on a particular case)
- Younger Solvers could seek the mentoring of older, more experienced Solvers
- Allow Seekers to advertise positions (permanent or consulting) on the InnoCentive site and perhaps contact Solvers directly (though message facility) based on observed performance/rankings/recommendations"

Solver 3—Teamwork recommendations:

". . . we need to change the way people solve problems, dividing Challenges in two types: competitive (what we have today) and cooperative. For cooperative Challenges (the new default type), the ideas below need to be implemented:

a) Each Solver signed to a project (after agree on all agreements), can make 3 actions: submit a proposal, change an existing proposal and vote on a proposal.

b) Creating a proposal is now made using a Wiki (and not uploading a document).

c) If a Solver X believes Solver Y (creator of the original solution) has a good solution but needs improvement to work perfectly, he can submit a change on solution of Solver Y, using the Wiki.

   i. If Solver Y accepts the change, the changes will be incorporated to the original solution and only one version will be visible to other participants. Solvers X and Y will earn

money if the solution is awarded. Solver Y, as the creator, will earn more money, but another Solver will receive money based on the timing they have made changes and other factors (like size of the change, relevance, etc).

ii. If Solver Y does not accept the change, there will be two versions: the original version of Solver Y and the modified version of Solver X. If the modified solution is awarded, Solver X now earns more than Solver Y. This is because Solver Y (that wrote the original solution) didn't believe in the changes made by Solver X. This will make Solvers consider a lot any suggestion. Also, it will decrease the number of solutions and make it easier to choose a winner. In this scenario, if the solution chosen is the solution Y, Solver X doesn't earn money.

d) A Solver can vote in only one solution. It can be his solution (if he has one), a solution that he has made changes to (if he has made some) or in any solution presented in the project room. The number of votes will make a solution increase the chance to win.

i. If you vote in an awarded solution, you will earn money. The amount will depend on the timing and other factors. To vote at the end of the timeline can make you win just a very small amount of money. To vote at the beginning can make you earn more money.

ii. To modify a solution is more valuable than just vote, i.e., you will earn more money if you modify a solution awarded after an "accept" from the creator.

e) The main benefit achieved with limited voting (one for each Solver) is:

i. To facilitate screening of the solutions (the buyer, for example, can choose to analyze just the top 20 solutions). Remember: if the site becomes very popular, we can have more than 1,000 solutions. Screening is a must.

ii. To make a person think a lot before vote in a solution. Everyone wants to win; the Solver will read and vote in the best solution in his/her opinion."

Solver 4—Teamwork recommendations:

"The call for collaboration could have two forms. In the first case, the Solver might need help for a particular part of the Challenge, while feeling perfectly comfortable to work on his own on the rest of the tasks of the Challenge. He would then call for the collaboration on this particular part of the Challenge, and would propose to share a given percentage of the award (in the case the proposed solution wins one, of course) with another Solver that would provide the solution for the missing part. The Solver interested in providing this part of solutions could offer his services, perhaps negotiate the percentage of the award he would be entitled to, and if an agreement is reached, the two Solvers would form an official Solvers Team that would be submitting the solution under the terms agreed upon. The terms of the agreement would be deposited at the InnoCentive site. The first Solver would communicate to the second Solver only the details of his solution that the second Solver needs in order to elaborate his part of the solution, but would not have to communicate all the details of his solution. He would be the main author of the solution, although the participation of the second Solver would also be recognized, but only as the provider of that part of the solution. This type of collaboration could be seen as a kind of subcontracting.

"In the second case, the Solvers might want to join their forces on an equal basis. Once again, one of the Solvers working on the Challenge would broadcast the call for collaboration, specifying he is seeking collaboration on an equal basis. This form of collaboration would be appropriate when Solvers don't need help for a particular part of the solution but are not perfectly at ease on their own.

In this case it might be sensible to collaborate on the solution—working together may more than double the chances of obtaining the award, so one is better off with half of the award then with no award at all. The agreement would be deposited at the InnoCentive site. The Solvers forming the Team would commit to exchange all the information about the solution, and all of them would be considered as the authors of the solution.

"Once the Solvers have formed the Team to work on the Challenge, they would not be allowed to submit individual solutions for that Challenge. A Solver would also not be allowed to take part in more than one Team. However, two or more Teams could merge together to form one single Team, but only if all the members of all the Teams agree. The Solvers Team would live the time of the Challenge it is working on. Naturally, the Solvers that have worked successfully together on one Challenge would likely reform the Solvers Team when working on the next Challenge in the same field.

"The Solvers having collaborated on the Challenge on the same Team would be able to rank each other in terms of collaboration and professional skills. These rankings would help build trust among Solvers seeking collaboration."

Source: Company documents.