

## Alph Bingham, Problem Definition

Beth Noveck and our colleagues at the government lab have asked me a series of questions to help you articulate a clear challenge and produce results.

The first of these is what are the most common errors made when innovators moved to define the problem they are working on.

Well, the first error may be more common than you'd like to believe it is, that is they don't do it. Somehow the need is perceived by many in the organization, those charged with coming up with innovations or solutions to the problem. They have a general understanding of what the target is and what they're trying to accomplish but, nobody has bothered to put the challenge or the problem into language. Make it specific, make it explicit, and so effort continues on and on for a while without seemingly much progress. The reason for that was the lack of definition to begin with. We actually had one case early on innocentine experience in which we were brought in to help a company formulate the challenge to be posted on Innocentine. When we finish the exercise they said we don't know if we need to go any further, now that the challenge has been so well defined we think we actually know how to solve it already. Now the second way in which innovators

make an error when they're defining the problems is do they have they asked themselves why the problem is not already solved. If this is a real need and it's a generally accepted need then somewhere at the heart of it there lies a reason for why this problem hasn't been solved already. Many times getting to the core of the problem is the ability to answer that question: Why don't we already have a cure for cancer whatever the challenge might be and it's the deconstruction process that then will lead you to a key specific articulable challenge statement.

The second question I have is this one: What are the key signs or leading indicators that your problem definition is somehow off?

It's wrong; it's incomplete; it's imprecise, etc. Well the first thing I would say is that an indication that the challenge statement or the problem statement has not been adequately defined is that it lacks clear criteria for success. It doesn't spell out what an appropriate answer is going to look like or an appropriate solution is going to look like. This is a key step in getting a well-formulated challenge.

The second reason is that it may not tell the potential solver something that they don't already know. For example as important as this might be I consider the challenge cure cancer to be somewhat useless and the reason being that everybody knows we would like a cure for cancer. It doesn't add anything to my understanding of the problem, to have it specifically written down. Even if we can go through and define all what all the criteria for success are. In the former question we talked about well why is the problem not solved and that's an important part of identifying some element that is probably news to somebody who's not well steeped in that particular discipline. This is what enables solvers from outside the area in which the problem is framed to make a contribution to it. If for example it was some type of non covalent bonding that we felt that if we we could resolve that phenomenon going on in a biological system and it would enable us to make progress on our cures for cancer. Posting that could be news to a material scientist who might spend a lot of their time thinking about non-covalent bonding between different materials. And so the addition

of a very detailed description of the problem. An explanation of why, provides the solver with additional information they'll benefit from. The absence of that is usually a sign that something is incomplete and that the challenge will not produce the results that you're hoping for.

My third question is this one: What are the key signs leading indicators that your problem definition is a good one?

Sort of the opposite of the prior question. Well as part of the InnoCentive process of bringing our clients through and understanding of how to craft a good challenge statement. We use the acronym LASSO, that's to help us remember what the key elements are of a well-formulated challenge. The first is that it has Limited scope, that we have taken the step I've talked about earlier, of addressing a very large problem by narrowing it down to a more readily definable smaller problem.

The second is Actionable and of course by making it more specific we make it more actionable. Within the context and the writing of the challenge itself it should make very clear what would render that actionable if the seeker recipient is going to need specific details about how to acquire materials or devices or instruments, all of that should be requested, put in the criteria for success that helps make it actionable the first letter S stands for Specific, some ways it's these aren't completely orthogonal and within the limited scope that adds to the notion of specificity. But the criteria need to be specific and spell things out in adequate detail. The third stands for Supported and within the organization a challenge that's posted should be supported, in other words the organization actually cares whether this challenge is solved or not, they care whether or not the solutions that have been submitted are valued enough that they can be go through a fairly comprehensive evaluation process in an assessment to determine whether or not they will produce a solution of the problem. So support by the organization is an important criteria and finally the O stands for Own. There needs to be an owner. Somebody. needs to be on point for this information as it comes in from the solver community as submissions are evaluated and take ownership for communicating back to the solvers any additional information that they need to focus on in order to solve the problem and at the same time let them know that if they did not meet the criteria which criteria they clearly did not meet. Finally I would say that a key criteria noting denoting a well author challenge is the language in which the authoring occurs, now the language can be very technical and it can be very precise but at the same time it should try to remove itself from the jargon of a given field. Most of the challenges that InnoCentive and it's 1800 challenge history have had solved to the very great satisfaction of the seeker, are solved by somebody that resides outside the field. In some ways that's not surprising because if they resided inside the field they probably already been consulted and it is well known what the barriers to solving that problem are within the field. Now that's not to say that it's a bunch of literature majors that are solving the chemistry problems, but it is to say that there seems to be a diaspora around the individual the very specific discipline in which the problem is framed and those that appear to be uniquely qualified to solve it, and to bring new kinds of thinking to the problem. And in order to enable that, the language in which the problem is described needs to be specific, while not jargony.

And my final question is this one: What is your process to curate the central question assuming that every problem has multiple questions associated with it?

Well we borrow a page from the experience of two-year-olds. Every parent has had this experience in which a two-year-old is hanging on their leg and ask them a question is immediately followed by why; why is the sky blue? And then you try to explain something about the refraction of light two-year-old ask; why? You try to explain something about the wavelength, differences and colors associated with wavelengths and the two-year-old just keeps asking why, why, why? We find that after about five why's we're getting to the nub of the problem and that is you know obviously not done it is pedestrian away is that two-year-old hang on your on your leg but keeping that thought in line that there are probably five layers to be dug through, to get to the core of the problem is one of the ways in which we, we work to get these problems very clearly articulated. Now the second thing I want to say is it depends on what you mean by problem. I would say that were a. big problem has many, many small questions or challenges associated with it it's not necessarily true that one is central. What it might mean is that you should take that big problem break it into many subproblems, each of which is more specific, more actionable meets the criteria we talked about earlier. and multiplicity of those should be distributed. Perhaps some of them aren't even appropriate for crowdsourcing and they should be shared with the university lab or, worked on internally or, done in another way. We refer to this process of taking a big problem, breaking it into small problems and then making deliberate choices about the innovation methodology by which each of those subproblems assault. We refer to this is challenged driven innovation, in fact i think it would be google, even organizations that kept all of the work internally, for them to first take the large problem, break it into the smaller subproblems, articulate each as a clear actionable challenge, and then even if all of that work is distributed internally to work on it, this is what we refer to as challenge driven innovation.

So to summarize let me say first, do it. Articulate the challenge, a well formulated challenge is one that is half solved. Second ask why it hasn't been done yet. Get to the nub of the problem itself, what will help us move forward. Third, articulate very clear criteria for. success Fourth, tell solvers something they don't already know. Enable them to engage, using information and knowledge that they already possess. Fifth, LASSO that problem. Make it with limited scope, make it actionable, make it specific, have it supported by the organization and owned by a champion. Sixth, while the language can be complex and very specific, make sure it's not jargony. Don't try to narrow the solutions to the field in which the problem already exists. And seventh, break big problems down into smaller units.