USING TECHNOLOGY SCOUTING TO STIMULATE INNOVATION: KEYS TO FOCUSING THE SEARCH

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Open Innovation as it is currently used refers to a variety of different tools by which a firm can leverage expertise and resources outside of its own organization in order to accelerate its innovative efforts: internal and external ventures, competitive intelligence, strategic and orphan spin-offs, corporate venturing and technology scouting. For over five decades some of the most innovative firms have developed mastery of these basic processes to support their growth strategies. Technology scouting is critical to all of these – frameworks for monitoring and assessing the external technology environment, to collect insights on what is possible and identify alternative sources. In the next few pages we will look more closely at technology scouting and explore some of the keys to making it an effective tool to promote innovation.

Technology Scouting

Technology Scouting is an organized effort by a company or government agency to look outside its own organization for information on technology developments and sources that can be used to support its product and business development efforts. It is based on a simple, but often overlooked, insight: *Innovation does not come from the discovery of technology but from being the first to learn about and use technology to meet customer needs.* Once you recognize that to innovate you don't have to invent everything yourself, or even develop everything yourself, it frees you to explore sources of technology, products and services developed by others. You can often discover that others have addressed their customers' needs with products or services you can adapt to meet the needs of your business and your customers.

Technology Scouting programs typically have three critical elements:

> Need: clarify how information on technology can support your innovative efforts.

> Source: identify one or more sources for insights on external technology.

> Deal: acquire or access required technologies externally when it makes sense to do so.

In this paper we will examine the first element in more detail.

Need: When is Scouting Called For? The most often cited reason for looking outside is that you know you need a technology that you lack – gap filling. While this can be important in speeding development and executing on an idea that you have for which you lack resources, it only taps the surface of when and where scouting can enhance innovation.

A broader perspective of scouting recognizes 6 different reasons why firms might scout:

Tactical uses:

- You have a gap to fill

- Problem solving – yours or your customers

Strategic uses:

- Problem solving – yours or your customers

- Anticipating substitution or introduction of new or disruptive technologies

- Sourcing strategy (one aspect of the Technology Strategy)

- Scenario planning that identifies future customer needs

- Find new applications for your technology – for spinout or adjacency targeting

Lets look at the first three to see how best to focus the search for information.

Gap filling

In many cases technology scouting programs are asked to use their resources to help identify a source for a technology that the organization knows it needs but is unable or unwilling to develop on its own. This inability to develop the required technology usually stems from one of these three Rs: *Resources*, *Risk*, or *Resistance*:

o *You don't have enough of or you lack the **resources** required.*

o *Your organization is unwilling to accept the **risk** of investing in a new technology or application of that technology until there is more information on the technology's robustness and the market need.*

o *You get **resistance** from organization controls requiring hard numbers for a market size and revenue streams when all you have is a concept, or from technical staff who say, "that's not invented here. I don't want to do it."*

These searches for known solutions are important, but they do not leverage the full power of scouting or represent its true value. Nor do they tend to promote innovation. They merely help to solve problems in the development of the current generation of products and services.

In fact, if a firm gets in the habit of defining its scouting needs solely in terms of technologies sought to fill gaps it is unlikely that it will uncover the innovative surprises that scouting programs can often deliver.

Problem Solving

Scouting works best and can lead to the greatest breakthroughs when the technology *is not* known – but the problem or the need *is*. The scouting assignment should be based on finding someone who has solved or is working on a particular problem. In a recent assignment we worked with an oil company who was looking for technologies to help in oil field management. Traditional searches for oil field management software revealed nothing they did not already know. When they redefined the scouting need in terms of the problem to be addressed – using noisy data from far-flung sites to manage high value operations in real time – their search eventually led to approaches used for different, but similar, problems in places such as the management of utility grids and semiconductor foundries.

Similarly, Baxter met a need for hospital pharmacies to better manage prescriptions by creating a computer driven drug dispenser, adapting a sophisticated computer driven Kirin Beer dispenser to the hospital environment.[1] They did not go out scouting for drug dispensers; they scouted for industries and companies that were addressing similar problems. This first of its kind product (the ATC 212) led to a major new business with sales of almost half a billion in just a few years.

Both of these examples highlight an important feature of need definition that can drive innovation: define your search target in terms of needs, not solutions (i.e., technologies) and use generic terms rather than the concepts and terminology particular to your business. Every industry develops its own jargon and terms to describe the what, why, and how of their technology base. When you use generic terms it is easier to make connections to the solutions others have found for the problem you share but describe differently.

Anticipate Disruptive Technologies

One of the most common requests a Technology Scouting function receives is to identify the next 'disruptive technology.' This is a valid request, but too often firms fail because they do not focus properly. They start by scouting all the new technologies on the horizon and then attempt to assess each in terms of its potential for causing disruption in their business. This sounds good and appears logical, but it rarely works. There are too many organizations where new technology is being developed or applied: government labs, universities, private research firms, entrepreneurial companies, and, of course, large corporations. The geographic location of such efforts is also expanding dramatically as technology development goes global. The field of 'new technologies' is just too broad to search effectively without having a more tightly defined focus.

Then how should you answer the question of where the next disruptions will occur? Before answering that lets step back and define disruptive technology and explore the forces behind disruptions.

Disruptive technology is a phrase that Clay Christensen introduced to describe cases where a new technology comes into a marketplace at the same time there is a total change in the way in which the business model works.[2] The result is you have different criteria for buying, different criteria for supporting and sometimes different ways of making and distributing products and services. It is often very difficult for the major company who is working with and listening to those current customers to recognize that a shift is taking place. As a result another company that's not a major player, often in a niche market, introduces an innovative new technology because the big player and the big customers are blind to the future. The business model changes but the complacent market leader is caught by surprise and the small entrepreneurial or fleet of foot company rises.

On the surface it often appears that the technology leads to the shifting business model and changed fortunes of current players. Hence the task of finding those technologies that will "change our world." However, if you look at most of the documented examples of disruptive technologies, it is not the technology that caused the disruption. The disruption was caused by the dominant firm's failure to recognize that the *basis* of the business model was changing. They failed to recognize that the needs that drove *the use* of its technology were changing.

In a recent article my colleague Ralph Katz and I argue that the key to anticipating disruptive technologies is to focus on identifying shifts in the *drivers* for those technologies.[3] We point out that you only get technology substitution when two conditions are met. First, there is an unmet need in the dominant driver. The dominant driver is that performance characteristic or combination of characteristics that the marketplace most wants improved. Second, the current technology is unable to satisfy the improvements that are required by the marketplace. *You do not get a new technology just because it's new; you get it because it can do something important that the old technology cannot do.*

There are three basic situations which lead to substitution.

The first is the obvious one. You are using a technology to provide ever greater value to your customer but it reaches its limit; it has matured and further changes are impossible. In the early days of the semiconductor revolution computer firms knew users wanted greater memory storage and the old technology (magnetic core) was simply unable to meet the customer demands. Integrated circuit memory was introduced allowing memory density and speed to increase past the point that cores were able to achieve. In this case, everyone knew what the market wanted, and recognized that the current technology could not achieve it. The result was substitution.

Such substitutions usually do not cause disruption in the firms using the technology in their products because their business model stays the same: computer users still want greater memory. It can, however, cause disruptions in the firms who supply the old technology. The

producers of core memory who identified themselves as supplier of cores instead of suppliers of memory, and who failed to recognize the shift to integrated circuits were soon out of the memory business.

If you are the user of the technology there is a role for scouting to find a technology that will extend your ability to satisfy customer needs. If you are the supplier of the technology there is a role for scouting to find other applications where your technology is still relevant or to identify ways to acquire the new technology capability needed.

The second situation is probably the most difficult to anticipate, and the basis for most disruptive technology case histories. In this case the old technology still has the ability to improve the current dominant driver, but the current dominant driver has reached a point where customers do not value further improvements – this is the leverage limit.

In our article, we describe the battle between 5¼ inch and 3½ inch floppy drives. When 3½ inch drives were developed the dominant driver was storage density. Makers of 5¼ inch drives were not threatened by the new, smaller 3½ inch drives because they knew their storage density would always be greater. What they did not recognize is that the need behind the driver was the ability to move as large a file as possible. When the capacity of the smaller drive reached 1.44 MB, larger than any file a customer had, the need was still there, but further improvements were not important. It had a large enough capacity to satisfy customer requirements.

Looking at the long list of needs that customers had, the next most important need after capacity (speed and reliability having already reached their limits) was durability and size. These were the very the features that 3½ inch drives provided that the 5¼ inch drives could not. The result is that the drivers changed, the old technology was not adequate to meet them, and a new technology emerged as the industry standard.

The point is that 3½ inch drive technology did not cause a disruption: it did not create a need for itself. It was positioned so that when the old needs (for capacity) were fully satisfied it was able to take advantage of the new drivers – size and durability.

The last basis for technology substitution and possible disruption occurs when new needs and drivers enter the picture. Twenty-five years ago, no home computer user had a need for security; laptops were not part of their world. Today the situation has changed and security is an important driver. When the context in which your customer uses your product or service changes, their needs and related drivers often change as well. If the old technology cannot make the required improvements demanded by the new driver it then sets the stage for technical substitution.

The implications for scouting are significant. If you are trying to figure out what's going to disrupt you, don't start by looking for technologies. Focus first on what's happening to the needs.

If the needs remain constant, and there's significant growth left in your technology, there's probably not going to be substitution and you don't need to spend time scouting for possible substitutes. If the needs are constant, and your technology is maturing, you need scouting to find the next replacement technology. More importantly, listen to your customers and understand what drives their purchase and use behavior and be alert to subtle shifts that indicate new drivers may emerge. Focus not just on what they ask for, the *Voice* of the Customer, but also attempt to understand the *Mind* of the Customer. Look at how they use your product. Look at the problems that they have. Look at the environment in which they are operating and try to anticipate what the next drivers will be when the current drivers are satisfied. Then go and find analogues in other industries that have addressed these problems and borrow or adapt that technology in ways that will allow you to meet your emerging customer needs.

Conclusions

Successful scouting starts with the right definition of the need. The easiest is to scout for technologies you lack you know you need. However, to promote innovation, scouting must go beyond gap filling; it must seek new technologies that provide novel approaches to the problems you face and anticipate shifts in needs that will generate demands for new technologies. Think in terms of the problem to be solved, not the technology you think will solve the problem. Define the problem in generic terms to make it easier to identify potential solutions and technological approaches used in other industries. If you're concerned about missing disruptive technologies, look at changes in customer needs that drive the demand for new technologies.

Focus is critical for effective scouting – but focus on the right things: the problems and needs that your technology intends to address.

About the Author *Jay Paap is President of Paap Associates and serves on the faculty of the Executive Program at The Sloan School (MIT), is a Fellow of The Strategy of Competitive Intelligence Professionals, and a PDMA Certified New Product Development Professional. He received his Ph.D. from MIT's Sloan School of Management with concentrations in technology management and organization design. His article,* "Anticipating Disruptive Innovation," *won the Maurice Holland Award as the best article published in Research Technology Management. Jay has almost five decades of experience in helping firms with technology scouting, corporate venturing, and other approaches to open innovations.*

1 Steve Kaufman, "Scouting for New Technologies," Presentation to Nihon University Conference on Technology Transfer, 26 June, 2003, Tokyo, Japan.

2 *Clay* Christensen, <u>The Innovator's Solution</u>, Cambridge: Harvard Business School Press, 2003.

3 Jay Paap and Ralph Katz, *"Anticipating Disruptive Innovation,"* Research Technology Management 47, No.5, September 2004.