The Effective Use of Scenario Analysis to Support R&D

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Introduction

During the past five years, we have had the pleasure of working with several companies that came to GBN seeking help in applying scenario analysis techniques to their research and development (R&D) plans over the medium- to long-term (generally five- to 10-year timeframes). These engagements involved companies in a range of industries—computer hardware and software, telecommunications, power generation—as well as people in varied roles, from business development and marketing executives to pure researchers, engineers, and scientists. Based on our experience, we have identified a number of best practices that produce the most useful results. These include:

- Involve a diverse team of people and perspectives in the effort.
- Put a stake in the ground around what senior management or key decision-makers consider vital aspects of the company's strategic intent; if the company has a clear vision or sense of what it wants to be, then take it into account.
- Maintain openness about the uncertainty of customer needs and wants.
- Incorporate a strong technology road-mapping capability in order to make the pathway from big ideas to the creation of actual products and services clear.
- Establish a well-functioning connection between R&D, marketing, and manufacturing departments.
- Embed a continuous learning loop and focused scenario analysis at the market entry- point and beyond.

Using Scenario Analysis to Guide R&D Planning

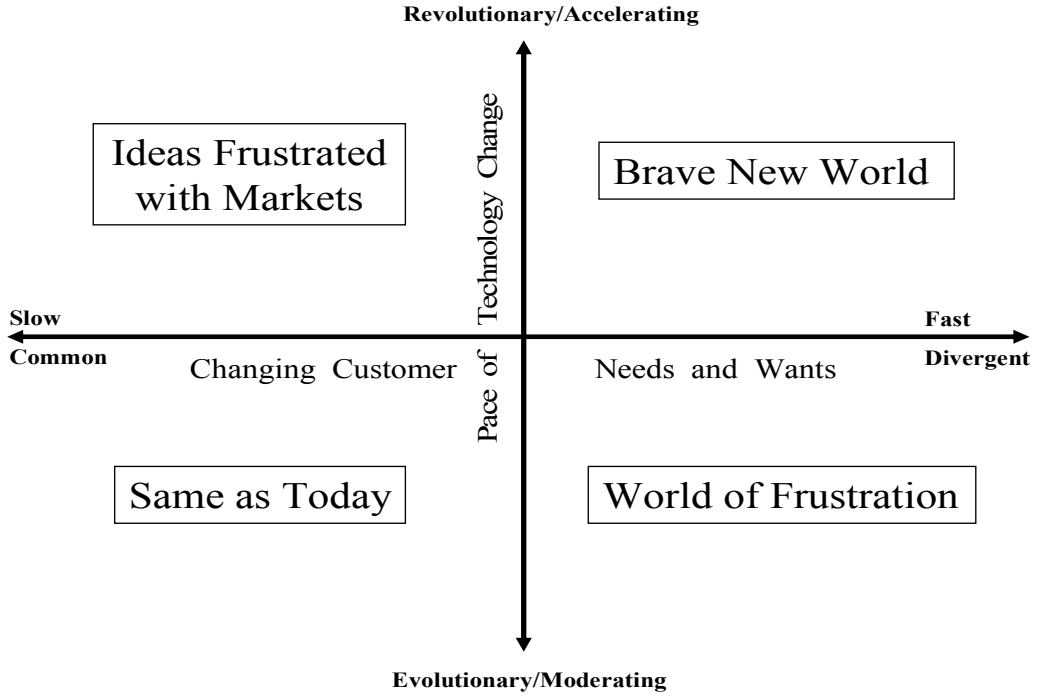
The purpose of R&D is to enhance the product and service offerings of a company. This may mean incremental or revolutionary improvements to current products or the introduction of completely new offerings. However, in a successful business, R&D is not solely the job of the technical people who sit in the laboratory, invent things, and throw them over the wall. Good R&D requires a connection to customer needs and desires and to how products and services might be priced, positioned, and sold relative to the competition. This is a complex process involving many people with different roles and priorities, which inevitably gives rise to communication challenges.

It is in managing such communication challenges that scenario analysis techniques can provide real value. A diverse team of people, drawn from across the organization and seeded with knowledgeable outsiders (maybe even customers), can open up the strategic conversation about the intent and direction of R&D spending. In other words, it is useful to bring together key stakeholders from marketing, customer relations, business development, and finance as well as R&D to ask a broader set of questions: What is our R&D spending trying to achieve? Over what timeframe? What will enhance our competitiveness? How will R&D help meet important aspects of the customer's total value proposition? These questions cannot be answered by the R&D department's technical staff alone. A well-managed scenario analysis provides a process through which diverse stakeholders can explore the uncertainties behind these questions in an open and learning-oriented way. Ultimately, it can generate exciting new insights, deepen the shared understanding of R&D decision-making, and build lasting, cross-organizational relationships.

A Common R&D Scenario Framework

To explain more about scenario analysis in R&D, it is useful to share a scenario framework that arose consistently in our R&D work. Of course, how these scenarios unfold—and their ultimate implications for R&D—varied widely depending on the company or industry.

In developing scenarios, it is useful to establish the framework by isolating two highly uncertain but very important variables that may drive change in the future. In our R&D work, we found two recurring variables: (1) the pace or direction of technology innovation, and (2) changes in customer needs or wants. In most cases, the scenario teams felt that the underlying technology or technologies they were working with could either accelerate or stagnate, be open to sudden breakthroughs, be shifted by wildcards, or be largely out of their control. Despite edicts to "know thy customer," the teams felt that customer demand could be fickle—outside factors such as competitive offerings, substitute products, economic conditions, and peer pressure often changed the shape of that demand. This realization typically led to variations of the scenario framework displayed below.



This framework was only a starting point for detailed and well-researched scenarios. Its strength lays in the truly divergent and challenging worlds that each quadrant suggests. Typically, the northeast quadrant produced a "Brave New World" scenario, where many big changes—and opportunities—challenged companies to keep up and innovate. The southwest quadrant, by contrast, tended to produce scenarios

with a “Same as Today” feeling; participants were either satisfied that their companies were well positioned or frustrated that a lot of good ideas would go undeveloped. Scenarios for the southeast and northwest quadrants at first seemed counterintuitive, and the teams found that making them “work” in the real world was both challenging and exciting. The southeast quadrant typically involved a “World of Frustration”—a world in which customer needs went unmet and a series of inadequate solutions were attempted and usually failed. In the northwest quadrant, the scenario was often a variation on “Ideas Frustrated with Markets.” Participants worried that new technologies would not match customer needs and wants and therefore would not find profitable markets. In many cases, the southeast and northwest quadrants introduced unexpected, but plausible, real-world contradictions into the conversation.

Elements of a Good Scenario Analysis

Whether scenarios are developed to guide R&D plans or to inform other strategic decisions, some basic steps should be followed. Once divergent, well-researched, and compelling scenarios are created, they should be used to test or “windtunnel” existing strategies—what the organization is actually doing or positioning itself to do in the areas of concern. Secondly, the scenarios should be used to create new strategic options. In order to do this, members of the stakeholder team should “live” in each scenario (i.e., assume it is true) and determine what strategies or actions might lead to success. Then the options for each scenario should be tested for robustness. Those that are robust should become high priority. Those that are not, but have great appeal if certain events unfold, should be looked at closely in two ways. First, are there low-cost and low-risk actions we can take that will allow the organization to quickly move to this option? Second, can we identify and scan for early indicators that give us a signal to move that option to the forefront? Making strategy development proactive rather than reactive and dynamic instead of static is among the most valuable dimensions of scenario analysis.

Getting the Most from R&D Scenarios

In our experience, a strong, well-facilitated team will create challenging and useful scenarios. The real differences lie in the level of participation, and in how the scenarios are ultimately used and shared within in the organization, as demonstrated by the following three examples.

In one of our most successful cases in the telecommunications industry, a joint team from business development and R&D initially requested the scenarios. This team worked together throughout the process and, at a key point, introduced and “windtunneled” a technology roadmap through the scenarios. The conversation exploded with insights and ideas. Team members were able to pinpoint specific technical advances that would support high value-added or competitive product features specific to each scenario. The path to commercializing products was also made clearer and more concrete. Importantly, the team enjoyed clear support and direction from senior management. Management told the team that there were no “failures,” and that if a chosen path did not succeed in meeting its objectives there was still an opportunity to capture the learning for future efforts. The five-year timeframe for evaluating results allowed them to be patient, and the scenarios provided the context for deeper, more focused analysis.

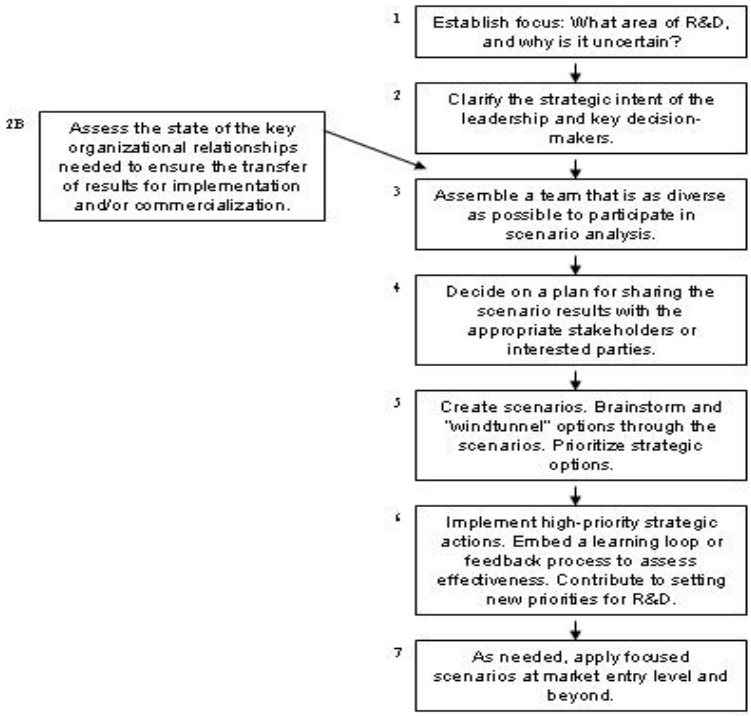
Years after we concluded the project, focused scenarios were being used to consider pathways to market entry.

In a moderately successful effort, a company involved in heavy manufacturing succeeded not so much in radically shifting the direction of its R&D spending, but in getting a wide range of parties involved. As a result, the ultimate decisions were well understood and supported across the organization, and relationships were built internationally across several groups. Finally, the team isolated some key uncertainties for longer-term scanning and monitoring that could portend a change in direction. The project could have been much more valuable if there had been deeper research on and openness toward changing customer needs and wants. Integrating more customer perspectives would also have added more content in the strategic option development stage of the project.

Our least successful effort involved a consortium of companies, and featured a general confusion and lack of cohesion around the strategic intent of the key stakeholders. These companies were mostly involved in computers and information technology and fit in different places along the value chains of those industries. In this situation, R&D results had to be shared with multiple and sometimes competing firms. Competitive concerns kept many participants from being explicit about their true strategic interests and made it impossible to test existing or potential strategies within the context of the scenarios. Eventually this handicapped the lead organization's ability to articulate viable options and share the results. However, the project did have a powerful impact in terms of using the scenario development process as a tool for sharing perspectives across a very diverse group. Many participants expressed appreciation at the opportunity to see how an issue or problem might be seen very differently by companies at different points in the industry value chain.

Based on these and similar projects, we recommend following the process map in order to ensure that scenario analysis is successfully applied to R&D planning:

Process Map for Applying Scenario Analysis to R&D Planning



Conclusion

Scenario analysis can enhance and guide R&D efforts by engaging a broader range of stakeholders, leveraging their experience and knowledge to create divergent and challenging future worlds that illuminate risks and opportunities, and creating a context for evaluating existing and potential strategies in an uncertain world. Ultimately, scenario analysis can enrich an organization's ongoing strategic conversation about the purpose and increasing importance of forward-looking research, development, and innovation.

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