

## Interview with Bruce Kirk

### Director, Corporate Innovation Effectiveness Corning Incorporated



Bruce is responsible for the advancement of Innovation Effectiveness throughout Corning. His responsibilities include innovation process development and deployment, employee education and training, global benchmarking, and next generation process development. Bruce has been leading Corning's Revitalize Innovation Globally (RIG) initiative since 2005.

Bruce's career has spanned several Corning divisions including Medical Products, Science Products, Photonic Technologies, and Science and Technology. He has held leadership positions in sales, marketing and business management. Bruce can be reached at [kirkbd@corning.com](mailto:kirkbd@corning.com)

Interview conducted by Doug Berger, INNOVATE [doug@innovate1st.com](mailto:doug@innovate1st.com)

Doug: Corning has been a technology leader for more than 150 years. How is that legacy embedded in the fundamental mindset of people?

Bruce: First, I think it is important to tell you what Corning is - we are a technology company that grows through new product and process innovation. Our core expertise is focused on specialty glass and ceramic materials, optical physics and process engineering. We convert our materials and process competencies into keystone components, which bring critical value to the difficult systems needs of our customers. This has been the case throughout our history.

Corning's longevity is due largely to our ability to diversify across several different business segments, and balance the continued growth of current products with the development of new ones. Every business recognizes that at some point in time its key product lines are going to mature, decline, and eventually go away, at least in their current form. New technologies and/or new markets are going to be required to replace them. Businesses have to innovate to survive. A recent statement by our chairman gives insight into our innovative culture. "We've been around for 157 years; our mission is another 150 years of innovation and independence." This culture of innovation drives everyone in the company.

Originally, Corning made the glass lenses for railroad lanterns. Those being made at that time cracked when they were hot and were impacted by rain or snow. We started making them out of a new glass composition that resisted breakage. From there, we went on to make the glass envelopes for Edison's light bulbs. Lighting was a strong business for Corning for a long period of time. There was a lot of innovation in the manufacturing process, moving from hand blowing one at a time to a machine that we

invented which made at least 1,000 per minute. This enabled the broad commercialization of light bulbs.

TV was big coming out of World War II. We moved into black-and-white from our glass used for cathode ray tubes for radar, and then into color television. Again, key process innovations kept the cost of the material low enough so that the masses could afford the finished TV product. That business is now being replaced largely by LCDs for TVs and computers. We have been able to stay on the technology curve in the display business with many different technologies along the way. Each step change required considerable investment.

Optical fiber technology was another big one for us and took a long time to develop. So, there's an underlying culture of the importance of identifying new and breakthrough ideas and products, coupling them with a winning process, and getting them to market.

Doug: Corning is known for investing in new technologies with a long time horizon until reaching commercial scale.

Bruce: We use the term patient capital when referring to investment in an innovation which is leading edge or significantly new. We understand that there is going to be considerable incubation time. It generally takes us anywhere from 7 to 15+ years to get the significant ones to market at scale. There can be several hundreds of millions of dollars invested by that point.

When discussing time horizons of this length, it is important to realize two things: 1) We are talking about end-to-end innovation, meaning that we start with a significant materials and/or process invention, convert that into a keystone component and then build the business. The time frame to go from invention to operating business is not so unusual. It is the patience required to stick with this innovation model that is distinguishing. 2) We are talking about what we call new/new: new technologies and new markets. We are not talking about technology or product extensions that can be developed or implemented in 1 – 5 years. We do a lot of that to grow the existing businesses. New/New requires significant technology and market understanding, as well as long-term product adoption cycles.

Many companies that we benchmark and interact with look to get payback within a short period of time, often around two years. The concept of working on something for 7 to 15+ years is foreign to them. Others consider Corning to be one of the most innovative business-to-business companies, and one of the key differences that distinguishes Corning is our time horizon.

Finally, it is clear that there is intermediate ground between the near term extensions and the long term new/new. We refer to the intermediate ground as adjacency space. It is here that we seek new markets for existing technology and manufacturing assets. The time frame for realizing these opportunities may be 3 – 7 years. A current example is the application of our flat glass capability for screens and touch panels for the handheld, portable consumer electronics device market in the form of our new, ultra-tough Gorilla™ Glass.

Circling back to our culture, every month or so our CEO routinely visits the research facility. He doesn't come just to talk with the chief technology officer, although he certainly incorporates that dialogue into his visit. He also, however, goes out and talks with people in the labs in order to get an understanding of what's going on and how the different technologies are progressing. A key part of our culture is the strong belief in,

understanding of, and engagement from top management in the technologies that we develop.

Doug: Does Corning have a formal innovation framework?

Bruce: We loosely define innovation as converting ideas into dollars. It's not enough to just come up with some great new idea. Getting that idea to market in a commercially profitable venture is what's involved in our innovation process. It attempts to take you from building technical and market knowledge, through testing for feasibility, then trying to prove practicality, ultimately into seeing whether it looks like a viable, profitable venture. We used to call our last stage 'commercialize' but we changed it to manage the lifecycle because, after you've invested massive amounts of money and launched things, you need to stay on top of them. We make sure that we are checking the pulse of the market, that we aren't missing things, and that we're in a position to make quick course corrections so that we don't lose out to a fast follower.

Doug: Within this innovation framework, what core competencies have you explicitly set out to develop?

Bruce: There are core technologies in approximately 7 key areas, such as materials and processes, biochemical sciences, optical physics and surface sciences. We also have capabilities in other areas, modeling and simulation, systems engineering and characterization sciences, for example, which work closely with those fundamental technologies. In order for another company to get to the level and depth of understanding that we have in our core competencies, they would be required to make a significant investment, and it would take many years. Hopefully over that time, we would continue to invest and stay ahead of them. We think, therefore, of these capabilities and our competency to integrate them into keystone components, as offering a sustainable advantage.

Doug: Are there non-technical competencies, as well, which give you this long range strategic advantage and would be very difficult to duplicate?

Bruce: We all know that the new product development game is not risk-free. There's an acceptance that not every project is going to work out. There's an understanding regarding the cost associated with developing new things. Given that cost escalates as we go through different stages of development, earlier cancellation of less promising projects is one of the objectives of our innovation process. There is the realization in Corning that this is part of the game - that we're going to make investments - that we're going to work on things which all of a sudden turn out to be not as promising as other things in our portfolio, and that we've got to stop work in one area and move on. We operate from the realization that not all projects will be a commercial success. Learning from those enables us to continually improve.

Coming out of the telecom downturn, we did a study and looked at our significant successful projects. We've articulated something that we call our innovation recipe - a diagram of past successes. It's an interesting diagram which combines a deep understanding of a specific technology with a solid understanding of an extremely difficult-to-solve customer problem.

Additionally, as I mentioned at the outset of this discussion, there is a keystone component in that recipe; a component without which the broader system won't work or won't work as effectively. The glass envelopes for light bulbs or the honeycomb substrate used inside an automobile catalytic converter are examples of keystone

components. Lastly, in LCD-based displays, the surface characteristics of our glass enable the printing of little displays on the back of the glass at reduced cost.

Doug: What other noteworthy elements are in your innovation framework?

Bruce: We know that our existing businesses have to stay focused on their current customers and markets. There's a growth component within them, but asking an existing business to identify and pursue the next big new business for Corning is not realistic. They're trying to extend and protect today's business.

One of the most important steps we've taken in going after new strategic growth has been to form a separate group within R&D called the Strategic Growth Organization. In a sense, it is a business division within our centralized research facility focused on identifying new businesses for Corning – technology-based businesses that we are not in today. It's made up of people who have significant market development and/or technical experience in new product and process development. We are developing promising individuals who have shown an interest in this area and a skill at being able to work effectively in the new/new area. People call it 'the fuzzy front-end' for a reason. There's a lot going on there that's very hard to articulate and understand.

Integral to Corning's Strategic Growth Organization is a relatively new program that we call The Magellan Process. It's a proactive, externally-focused way to identify fast-growing, very attractive markets, and to quickly assess whether we might be able to play by ourselves, or with a partner, in those markets. We do some initial screening via white papers. The most promising ones go into a four to six month in-depth assessment to determine whether Corning should further pursue them as innovation projects.

The Strategic Growth Organization has been in existence for about five years. Over the course of those five years, we've been identifying some promising opportunities. Given the current state of the economy, the question now is, "Do we continue to identify and develop new opportunities?" So far the answer has come back, "Yes." This again points to our patient capital mindset being one of our distinguishing competencies.

Additionally, we realize that there may be times when it would be best for us to find an alternative business model. Rather than try and do everything ourselves, which usually involves time and requires a lot of money, our mindset is to be open and either partner or find an alternative path to market.

Doug: Let's talk about these stages and how you stage your new/new kinds of investments.

Bruce: We have a stage-gate process and we use it in a flexible format. It's applicable to new markets/new technologies, existing markets/existing technologies, and combinations of existing technology/new market or existing market/new technology. It therefore, requires a skillful interpretation of the process based on the specifics of the project and the market conditions that the project faces. If we're in the existing/existing area where more is known, the work becomes more routine and perhaps, more repeatable. In the new/new area, by definition, much more is unknown so there's a more complete use of the activities and tools. The specific application of our process is based on the uniqueness of each project.

Doug: How has your own staged approach to innovation evolved?

Bruce: We routinely revisit and update our innovation process. We started back in the mid 1980s with a lot of ad hoc processes. Bob Cooper and Stage-Gate™ were just coming

onto the scene. We worked with Bob and ended up building a model customized for Corning. We studied from 50 to 100 of our successful projects to determine what was behind that success so that we could identify important activities and establish some guidelines for our model. When we launched the first version, we utilized a "hierarchical" rollout. We trained the management committee of the company first. Then we went to all of the division general managers and their staff, and then to the actual project teams so that everybody in the company, in a short period of time, was trained on the same innovation process.

Everybody had a little "flip-guide" that listed key activities for each stage, and a little checkbox in front of each activity. You literally did not go to a decision diamond until you had checked off all of those little boxes - evidence that you had done the work. One of the key differences came in the early '90s, when teams started telling us, "I don't have time to do all of this any more. I mean it's all listed there ... I can't say it's not important, but I don't have time to do it all anymore." The market conditions had changed. For example, automobile platforms went from approximately 5 -6 years, down to 4 years, and I believe that they are now less than 2 years. The customer or market expectations are now centered on a much shorter time horizon so we had to reinterpret the process. We came up with the concepts of flexibility and rigor - choose what is appropriate for you to do but do what you choose with rigor, and do it well. When you have a process that says, "Follow all of these steps" it's relatively easy to do. When you have a process that says, "Now you're going to have to exercise some judgment and interpret what you have the time to do and what's most appropriate to do," then it starts to become more difficult.

So, we've been building on that theme since the mid 1990s, and we really took it to the next level in 2004. We revisited the process and determined that we needed people who were more expert in the use of our innovation process and the tools; people who knew what to use, when to use it and what level of detail was appropriate for the particular project and the market conditions. We've been training people, now referred to as *Innovation Black Belts*, to be experts in the appropriate application of our innovation processes and related tools.

The last component that we haven't talked about yet, is our corporate governance processes. We set up two separate councils. One is our Corporate Technology Council and the other is our Growth and Strategy Council. The Corporate Technology Council is comprised of our chief technology officer, all of the senior vice-presidents from RD&E, and many of the research directors. Their role is to take a look at projects primarily in Stages 1 and 2. We have articulated a series of questions to act as screens for the projects that they review. These questions basically ask, "Is the market real? Can we win? Is it worth it?"

Our Growth and Strategy Council consists of the chief executive officer, the chief operating officer, the chief financial officer, the chief technology officer, and other key individuals. They look at the mid to late Stage 2 and Stage 3 projects and determine which ones the company is going to invest in and the pacing of that investment. The key ingredient is that our top leaders are personally involved and engaged in our innovation efforts.

Doug: As part of your innovation recipe, you talked about solving very demanding customer problems, and your time horizon, which is seven to ten years, or more. Implicit in this is that your customers are working seven years out, or more.

Bruce: It is important to recognize that the innovation recipe has two time horizons. The first is the near term 1 - 5 years, where we extend existing keystone components with the

evolving needs of our customers' applications. Technology roadmaps play a key role in determining the trajectory of those evolving applications and the related technology curves. The second time horizon is the longer term, greater than 5 years, where we are monitoring megatrends that will define new technologies and new product applications- typically for new businesses that we are not in today but are still closely associated with our technical competencies. Both time horizons are focused on inventing and commercializing high value, keystone components.

For the longer time horizon opportunities, we may be working more with thought leaders, industry leaders and academics in the early phases. As part of our Magellan Process, we'll bring in a group who are expert in a certain area. We'll spend a day or two just listening to them, asking them questions, and sharing things we think we could work on. In the very early stages, customers may not know or be able to articulate, what they are going to have a need for at some future point in time.

Doug: What are some new/new areas that you can mention?

Bruce: We are working on a technology called microreactors for chemical processing. Essentially, we are creating microstructures in glass that enable effective and efficient reactions. We are also developing a green laser. Red and blue lasers exist but green is needed to cover the full range of colors. Portable projection based on lasers is one of the applications being explored. Imagine a cell phone, for instance, that can project an image onto a wall. We've been working on the green laser for about five to seven years, and the microreactor has been around for at least five years. These technologies have the potential to be significant market opportunities.

Doug: Please comment on anything else regarding innovation about which you're personally passionate.

Bruce: Ours is a culture that is really embodied in people. To me, it's all about people. We can have the best stage-gate process in the world, but if we can't get the different functional groups to come together and work toward common objectives, we're not going to be successful. I believe one of Corning's key differentiators lies in the diversity of our employees and our willingness to listen to, and build on, the diverse thinking of other individuals and functional groups. This plays out, for example, when the research community gains acceptance of the marketing function and vice versa. The same holds true when manufacturing is engaged. It's the realization that when we bring those diverse functional views together, the resulting holistic view is usually better, or more optimized, than any one of the individual functional perspectives. At the end of the day, it's that interaction which allows us to be successful in getting some of these ideas to market. It's also the key differentiator for the future. The people at Corning really do appreciate the value that each one of the different functional perspectives brings to the total picture ... that's the powerful part.

In summary, we hear in our dialogues with other companies that our culture and our ability to invest significant amounts of money over long time horizons are both fairly unique. Also somewhat unique is the training of innovation process experts, our governance structure, the Magellan Process and our Strategic Growth organization. Lastly, the level of involvement from our senior leadership in our innovation process has been referred to as an important differentiator.

