Your project pulled my team together.

MIT Practice School at Corning, Inc., Fall 2012

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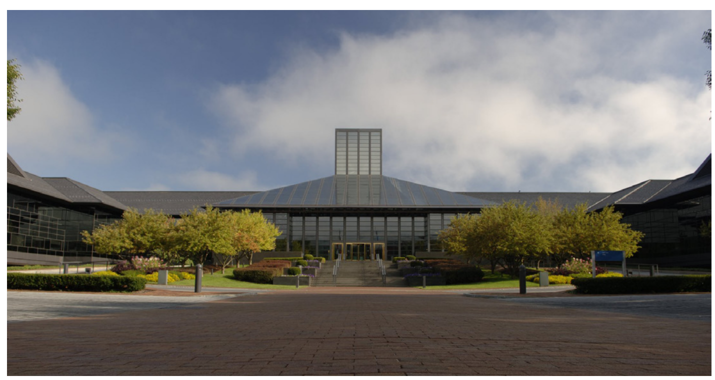
As we entered out second session here, one of the questions Corning wanted to address was this: How can we maximize the value of having eight Chemical Engineering graduate students conduct six projects over two months? And this, in turn, raised the question, how is value even quantified for our program?

The Corning group spends some bonding time at Niagara Falls.

While the impact we have is always immediate due to the nature of our one-month projects, the translation of our impact into value may require some time. Yes, when the stars align, it is indeed possible for a one-month project to realize an immediate financial reward for the host company, one that is relatively easy and always fun to capture. More often than not though, the impact a team creates may not provide tangible value to the company until long after the students are gone. An example of this scenario is when our projects 'jolt' the host company's thinking, resulting in a powerful re-commitment to or re-direction of their work. Because of this time-delay, the connection between our impact and the associated value generated for the company becomes difficult to quantify. For these projects, we work with the host company to capture the verbatim feedback from their personnel, thereby enabling a more comprehensive assessment of our longer-term value. One such project fell into this category when the students brought together a range of personnel, both within the group and between different business units, to support their efforts. The act of doing this helped one of the champions of the project re-energize her team. As she shared with me at the end of the program, "Your project pulled my team together." Difficult to quantify, important to capture.

To help answer the question posed at the beginning of this article while keeping the above concepts around value in mind, Corning did an interesting experiment that ended up benefitting all involved. As is the case for other companies, Corning has a technology pipeline that starts at the front end with a large diameter of ideas and ends at the back end with a small diameter of commercialized products. The narrowing of the pipeline is driven by a highly structured process designed to maximize ROI for R&D's efforts, a critical need in light of the rapid rise in costs as a project moves from one end to the other. Such a rapid increase in costs necessitates a corresponding shift in skill requirements for the engineer, from being comfortable in the ambiguity and failure characteristic of the front end to being driven by the need for certainty and success characteristic of the back end.

During our inaugural Fall '11 session, Corning created projects for us in the middle of this pipeline. For our Fall '12 session, in true Design-of-Experiment thinking, Corning created a new mix of projects by targeting the two ends of the pipeline. Our first set of projects focused on commercial or near-commercial products (Gorilla Glass, Optical Fibers, Ceramic Dies) and so provided the students opportunities to experience quick-hit, tangible-value results. One project team identified the root-cause of a certain manufacturing problem and was thus in the enviable position of seeing their recommended solution successfully implemented while we were still there.



Corning Inc.'s headquarters building in Corning, NY.

The second set of projects focused on longer-range opportunities involving Corning's efforts to apply their technology and expertise to develop new markets (Biosensing, Gas Separations, Polymer Processing). These projects provided the students with all the ambiguity they needed to truly experience via practice what it takes to confront an open field, determine for themselves which direction to head in, and then make positive progress in that direction. They checked things out, tried things out, found failures, found successes. They brought results home for Corning, making a positive difference in the long-term trajectory of each project. This was a great experience for each team on how to tackle the open-ended problem statement characteristic of a research envi-

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ronment, an experience that they would only rarely (if at all) see in a university setting.

Corning is currently assessing the results of these experiments, and the conclusions they draw will be used to identify how best to align our program with their technology pipeline for the upcoming Fall '13 session.

An additional experience of note from this session occurred with the first set of projects in which the students were provided with an opportunity to practice the art of problem solving, a trademark of the global engineering community. Corning has developed their own approach to problem solving, building on the industry tools of, for example, Six Sigma and Kepner-Tregoe, while incorporating their own in-house tool based on the Strong Inference model popularized by John R. Platt (*Science* 16 October 1964: Vol. 146 no. 3642 pp. 347-353). In a nutshell, this model embraces the creation of a range of hypotheses as possible causes of a given problem, and then further embraces a logically structured approach towards knocking each one of these hypotheses down. The one that's left standing is most likely the sought-after cause. This was an invaluable opportunity, one not available in the classroom, for the students to practice the use of real world approaches to solving real world problems. In future sessions, we look forward to strengthening the alignment of our program with Corning's approach to problem solving. ◊