

Management Sciences Group Thrives at PPG Industries



PPG's headquarters shine in Pittsburgh.

PPG Industries, Inc. is a global supplier of glass products, chemical products and related services. Founded in 1883 as Pittsburgh Plate Glass Company, the name was changed in 1968 to recognize the diverse markets and products offered by the corporation. PPG's products generally fit into one of four major product areas: glass products, fiberglass, coatings and chemicals.

Organizationally, PPG is structured as several strategic business units (SBU), each focused on a specific product type and market segment. The SBUs are each led by a vice president or general manager, and have independent responsibility for reaching financial goals and achieving business strategy targets.

Operations Research at PPG

The Management Sciences Group was formally organized at PPG in the mid-1970s, but the practice of operations research goes back before that. An internal primer on operations research methods was written in 1973, and included examples of projects from the late 1960s. PPG's interest in O.R. was probably influenced by the use of O.R. in the steel industry; the float glass manufacturing process is operationally similar to the continuous casting process in steelmaking. In fact, Management Sciences was initially part of the IT organization that supported the glassmaking businesses. In 1990, Management Sciences became part of the corporate IT organization and was given full rein to conduct projects across all PPG businesses.

The original vision for the Management Sciences Group continues: to help PPG personnel make better, faster decisions that translate into bottom-line

All About the Roundtable

results. Over the years, this vision has translated into a variety of different types of projects and O.R. applications. Today, Management Sciences concentrates on three specific application areas:

Traditional operations research: Most of the early work in the group focused on improving PPG's manufacturing and logistics operations, and the group continues to support operations with simulation and optimization models. An example of a recent project is the development of a simulation model for a glassmaking plant that could be used as a test bed for a new process control algorithm. The process control software was embedded in the simulation in such a way that it "thought" it was running the plant rather than the simulation. Through the use of the simulation test bed, the process control software was thoroughly tested before it was ever installed to run actual equipment, and the project manager estimated that total project time was reduced by six months. As PPG's businesses step up to the challenge of meeting the rapidly increasing demand for our products in Asian markets, global supply chain optimization models have also become an important O.R. application area for Management Sciences.

Manufacturing planning and scheduling: Management Sciences has always been part of the IT organization, and most of the members of the group have come from a background in industrial engineering. As a result, Management Sciences became the natural IT skill center for manufacturing planning and scheduling applications. The group first developed and began marketing a relatively simple PC-based scheduling application to PPG's plants more than 20 years ago. That scheduling application, called CPS, has now gone through three major updates, has become the centerpiece of a suite of add-on applications, and is still widely used in PPG plants. PPG is now implementing standard enterprise management software based on Oracle, so Management Sciences has begun working with the plants to prepare them for migrating to more sophisticated commercial scheduling applications. To help support this effort, Management Sciences was paired with PPG's internal Oracle Consulting Group three years ago to form a new IT organization called Enterprise Engineering Services.

Business process improvement: Business process improvement is the newest application area for Management Sciences. PPG's corporate quality organization has a long and successful history teaching and applying improvement methods such as lean enterprise and Six Sigma across the corporation. When they adapted the lean and Six Sigma methods to business process improvement, representatives from Management Sciences participated in some of the first training classes and then partnered with the corporate quality organization to provide consulting for some of the early projects. The success of these projects has led to Management Sciences becoming known as a reliable and highly capable source for business process improvement consulting, and this work has grown to about one-third of the group's total workload over the past three years.

The Management Sciences Business Model

PPG Global IT is structured on a shared services model. Each SBU has an IT manager, who reports both to the head of the SBU and to the CIO. The IT managers have a small staff of business analysts reporting to them, but depend on the corporate IT depart-

INFORMS has two types of members: individual and institutional. The latter (usually a company) joins by joining the INFORMS Roundtable and appointing as its representative the person in overall charge of O.R.

The Roundtable has been very active since its founding in 1982, with three meetings each year and much communication in between. It, its member institutions and its member representatives take a strong interest in how INFORMS serves the needs of practitioners, and have undertaken many initiatives and provided many services toward this end. These involve, for example, public awareness of O.R., both of the annual INFORMS conferences, continuing professional education, one of the prizes and various committees.

In addition, the Roundtable has an advisory responsibility to INFORMS. One bylaw states that it "... shall regularly share with INFORMS leadership its views, its suggested initiatives and its implementation plans on the important problems and opportunities facing operations research and the management sciences as a profession and on the ways in which INFORMS can deal proactively with those problems and opportunities ...". By tradition, it meets with the newly elected INFORMS president-elect each spring to discuss practice-related topics of interest to him or her, and with the entire INFORMS Board each fall to discuss topics of mutual concern.

The Roundtable membership comprises about 50 organizations. Further information is available at <http://roundtable.informs.org>.

This series of articles aims to share with the INFORMS membership at large some information and insights into how O.R. is carried on in practice today.

ments for resources and personnel to complete any projects. Internal chargebacks, using a defined hourly rate, are used for accounting and budgeting the time spent by the corporate resources.

As part of IT, Management Sciences operates by the same basic business model. The group has two key annual performance measures. The first is the benefit to cost ratio for the group; that is, the ratio of business benefits realized through Management Sciences projects to the total costs of the group. While this number is often difficult to quantify, we typically see a ratio based on confirmed benefits between 4:1 and 6:1 at the end of the year. The second key metric is the difference between the "revenue" received from the internal project chargebacks and the actual costs of the group. The goal is to keep this difference as close to zero as possible, which demonstrates the willingness of the businesses to continue funding O.R. projects.

The daily activities of the Management Sciences staff are essentially the same as those of a small consulting firm. We recognize the need to market our capabilities within the corporation, and spend time promoting the group through personal contacts, presentations, seminars and participation in SBU meetings. Once a prospective project has been identified, we will work with the business to ensure we understand the business need or opportunity that the project is intended to address. We then prepare a proposal, which can vary from a one-page memo to a formal proposal document depending on the extent of the project. While some of our projects involve only Management Sciences and are managed from within the group, an increasing number of projects are a collaborative effort involving people from across the corporation on the project team. In these cases, the business usually provides the project manager who coordinates the efforts of the team.

Partnerships with others, both inside and outside the corporation, are very important to us. The IT managers with each SBU are vital contacts for us. Most of them have come to see Management Sciences as a key resource in delivering strategic IT results to their businesses, while in turn they have become our ‘marketing agents’ in the businesses. The successful partnership with the corporate quality group on business process improvement was described earlier. We have taken advantage of the vibrant academic environment in Pittsburgh, with external partnerships that include Carnegie Mellon University, the University of Pittsburgh and Penn State.

Principles for a Successful O.R. Practice

Developing and sustaining an internal O.R. practice in a large corporation is a challenging task that requires a high level of persistence and adaptability. Business strategies, problem types and available technologies all change, but we have found a few key principles that have become the foundation of success:

Use appropriate technology: Most of the models and decision support systems we have created eventually end up being used and maintained by people in the business units. For each project, we are careful to match the technology to the comfort level of those who will ultimately be using our systems to make decisions. PPG’s professional staff and executives are quite comfortable with standard office productivity software, so many of the models and decision support systems we have developed are PC-based. When possible, we use standard spreadsheet and database interfaces for data entry and reporting results. In some cases where the ultimate solution to the business need requires advanced technology, we will look for an intermediate step that allows the business to realize some of the benefits while staying within their technology comfort zone. We will then work with them to determine when they are ready to move from the intermediate step to the more advanced technologies. We have learned by hard experience that a project never succeeds when you push your customer beyond his or her technology comfort zone, no matter how good the technology may be.

Focus on business value: The performance metric described earlier, business benefits to cost ratio, was put in place at the request of the Management Sciences Group. Even though the benefits are sometimes difficult to quantify, the metric helps us keep the need for business value in focus. In the same way, we have learned to begin discussing a prospective project with a customer by ensuring that we accurately understand the business need or opportunity the project is intended to address. We then write the expected business value into the project proposal and, later, into the project charter document used for larger projects. On individual projects, keeping the focus on the business value helps us choose the right technology and also properly evaluate scope or design changes suggested later. For the group as a whole, the ability to articulate how we’ve made a difference for PPG has helped secure the steady support of the IT and business leadership.

Cultivate strong IT relationships: IT owns the data that goes into our models, and more often than not, owns the production systems that turn the recommendations of our decision support systems into reality. In turn, we make IT systems stronger and more valuable to the businesses. It really is

a family relationship, and sometimes those relationships are the most challenging. In the past, aggressive marketing that failed to take IT concerns into account led to misunderstandings and a lack of cooperation. Once the misunderstandings were recognized, we were able to reach out, clarify our role and vision and build the partnerships with the IT managers described earlier.

Develop a marketing plan for O.R.: At PPG, most of the models and decision support systems we have developed aren’t intended for regular daily use, and those that are used regularly are located in the manufacturing plants rather than at the executive leadership level. We’ve learned that we need to get a reminder of who we are and what we do in front of the executive leadership teams in the businesses at least once every six months. Therefore, we create a deliberate marketing plan each year, incorporating annual budget reviews, quarterly or semi-annual presentations to the business IT managers, training opportunities and executive presentations. Recently, we have also been able to produce actual marketing materials such as brochures to leave with executives and key users.

Foundation of a Successful O.R. Practice

I would like to conclude with a few personal observations. I joined PPG almost 10 years ago to lead the Management Sciences Group. The size of the group has varied from five to eight people, with a total of 15 people who have been part of the Management Sciences team at one point or another during that time. It is these people who have been the real foundation for the success of O.R. at PPG.

With a relatively small staff, I expect them to be able to take on projects in any of our application areas and succeed. I ask them to be technically innovative, while at the same time being sensitive to the business needs and technical comfort zone of our customers. I ask them to move seamlessly from being the project lead on one project to being part of a very large team on the next project – usually at the same time, since they will be working on three to four projects simultaneously. Finally, I ask them to be salespeople for the group, willing to give a presentation to a vice president one day and then provide a seminar for plant schedulers the next. Without exception, they have stepped up to and met the challenge. My contribution to the success of O.R. at PPG has been in finding and recruiting high-caliber people; they, in turn, have built a reputation for good, business-focused project work. In fact, we had considered changing the name of the group when INFORMS began to emphasize “operations research,” and decided not to because of the strong brand recognition with “Management Sciences” inside PPG.

Management Sciences alumni are in high demand in the PPG business units, and most of the 15 people I have supervised are still with PPG in a variety of different roles. I sometimes joke that this is also part of our marketing campaign. Aside from joking, though, this may be one of the most important contributions of Management Sciences to PPG – sending people into the businesses that appreciate and encourage the use of O.R. to build a prosperous future for the corporation and themselves. **ORMS**

Kevin F. Kandt is the director of the Management Sciences Group at PPG Industries, Inc.