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Preparing Today for a Sustainable Future

Robert Peoples

ACS Green Chemistry Institute®

Business leaders and their academic trainers must embrace the concept of sustainability to prepare future leaders with the understanding and tools necessary to make key decisions based on more than “just the numbers.” The economic competitiveness of this country and the survival of our species require a deeper understanding of nature if we are to meet the demands of an expanding population and their expectation for improved quality of life. Competition for finite raw materials and resources will continue to expand despite the momentary speed bumps of the current economic slowdown. A model for enhanced decision making is presented that is based in the simple notion of effective communications. A personal example of strategic decision making translates into lessons learned.

Keywords: *sustainability; career; education; communication; decision making*

I am a PhD physical organic chemist with 28 years of experience building bridges between and among science, technology, and the business world. I can offer some advice on how to get things done and outline important steps along the way. For more than a decade I have focused my attention on the “environmental” side of the equation—not in a traditional role (e.g., compliance manager, regulatory guru, pollution prevention officer), but rather as a scientist looking at a future of increasing raw material prices and at the importance of recovering valuable feedstocks before they are sent to landfills.

Why is this story important to management education? The answer is that future well-being and quality of life for billions of people will be affected by the decisions made by managers and business leaders. The

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bottom line must be broader in scope than just “the numbers.” Economic analyses must incorporate the cost of natural capital for sustainable strategic advantage and survival.

Nature, as in business, is a complex system of interdependent processes. This interconnectedness offers both an opportunity for competitive advantage to those who can see the bigger picture and threats to those who do not. China is growing at a 10% annual rate starting with a base population of 1.3 billion people today. It is forecast that China will build 40 billion square meters of new space in the next 25 years. Do you have any idea how much space that really is? I do not. So I asked myself, what is the largest building under one roof? What I found is that it is the Pentagon at 6.5 million square feet. That means China will be building the equivalent of 67,077 Pentagons in the next 25 years. Think of the implications for raw material demands to not only build the structures, but also to outfit them with floors, walls, ceilings, roofs, plumbing, wiring, lighting, fenestration, heating, air conditioning, furniture, bathrooms, decorations, and so on. Add to this unprecedented growth in demand for raw materials the fact that India will be building at almost the same rate. In the United States we will remodel 150 billion square feet of existing space and build another 150 billion square feet of new space in the next 20 years.

Who will supply all these products and materials necessary to support this growth? More important, where will the basic raw materials come from to make these products?

Although the picture may look bleak, there is reason for hope. That hope is carried on the wings of a new understanding of a concept called sustainability. The best working definition of sustainability I have found was that developed by the Brundtland Commission back in 1983, which defines sustainability as,

Meeting the needs of today without compromising the ability of future generations to meet their needs.

Enabling the Future

Although simple in concept, it is quite another matter to reduce the concept of sustainability to practice. Real impact (reducing our integrated environmental footprint) will require the development of key metrics against which to measure progress. So, how do we “reduce it to practice?” I believe we have some good ideas based on what has been successful in recent years. Here are four key enablers:

1. Build the business cases that show an acceptable return on investment.
2. Use the marketplace to drive change via standards and regulations.
3. Build a critical mass of practitioners and advocates so it becomes embodied in our culture.
4. Communicate, communicate, communicate.

Several examples come to mind where significant progress has been made by adhering to one or more of these four key enablers:

- United States Green Building Council (USGBC) LEED initiative in the building sector (*Leadership in Energy and Environmental Design*)—www.usgbc.org
- National Science Foundation International (NSF) 140-2007 Sustainable Carpet Standard—www.nsf.org/carpet
- Carpet America Recovery Effort (CARE) in the carpet sector—www.carpetrecovery.org
- Electronic Product Environmental Assessment Tool (EPEAT) in the electronics sector—www.epeat.net
- Energy Star in the consumer products sector—www.epa.gov
- ACS Green Chemistry Institute—www.acs.org/greenchemistry

There is ample documentation in the published literature on the success and progress for all these initiatives, thus I will not attempt to outline each in detail. However, several initiatives in particular are worthy of some elaboration.

The USGBC LEED program and NSF 140 are consensus-based voluntary initiatives that reached critical mass and thus are making a difference. I believe one of the key elements driving explosive growth at the USGBC was the documentation of economic benefits associated with certification against the LEED standard. Initially certification was limited to government buildings. Private sector businesses were reluctant to invest in more expensive options to meet LEED requirements due to a lack of proven value (e.g., shareholder value or return on investment). Today it is well-documented that building lease rates are higher, operating and maintenance costs are lower, worker productivity is up, insurance rates are lower, and resale value is higher for LEED certified buildings. That's why today there are more than 9,000 buildings in the queue for LEED certification.

NSF 140 is the first ANSI (American National Standards Institute) approved, multiattribute green product standard. After several years of negotiations with a balanced group of stakeholders, the final version of this standard was introduced into the commercial carpet market in November 2007. Built on a platform that is modeled after the LEED concept of

categories and credits, NSF 140 allows companies to certify carpet products against five key categories, which include,

1. *Environmental health and safety*: Examines the chemical composition of the final product and the chemistry used in the manufacture of that product (including releases/emissions to land, water, and air).
2. *Energy and energy efficiency*: Recognizes progress in reducing the energy use per unit of production and the use of renewable energy.
3. *Materials*: Provides incentives for the incorporation of recycled content (postindustrial and postconsumer) and/or biobased materials.
4. *Manufacturing*: Examines the environmental management systems and publically available environmental performance along with ISO (International Standards Organization) certification.
5. *End of life*: Specifically requires a pathway for recovery and recycle/reuse of the product at the end of its useful life thus avoiding landfill disposal. It treats materials as a valuable feedstock for future use. This category is particularly important because the vast majority of our products today are derived from petroleum.

NSF 140 standard development process has become a model for a number of other industries going forward. The good news is there is communication and collaboration across industry sectors to drive some degree of consistency and commonality of language and definitions. Common language helps remove ambiguity and reduce green washing in the marketplace.

In addition to the programs outlined above, there are two additional key programs I have been deeply involved in. They are CARE and the ACS Green Chemistry Institute. I leave it to the reader to explore the Web sites referenced above to learn more about these powerful organizations. The CARE organization is driving the creation of a new industry in the United States—carpet reclamation—focused on reclaiming existing carpet for recycling when replaced with new carpet. The mission of the latter program is to “catalyze and enable the implementation of green chemistry and engineering principles across the entire global chemical enterprise.” A very ambitious mission indeed!

Ambiguity Model—How to Avoid Delays

Over the years, I have developed an Ambiguity Diagram to explain why the decision-making process gets bogged down; it is illustrated below. This diagram can also explain why decisions about investment in sustainability can get bogged down in organizations. In essence, a request for investment is made to management. Invariably, there is a lack of information or some

Figure 1
Ambiguity Diagram



unanswered questions. This situation results in ambiguity, which means a lack of understanding (increased risk), resulting in confusion. A lack of complete understanding of the risks leads to a lack of commitment. When you do not have a commitment there can be no decisions made, meaning there is no action taken, resulting in no progress on the project. Quite often, in this case, the project manager is asked to go back and “study” the problem or run additional analyses. This cyclic “rework” activity results in a significant loss of time, frustration, and often a missed opportunity. A good way to avoid such a situation is to enroll decision makers early in the process and seek their input and guidance. It’s also important to conduct an anticipation exercise with independent eyes, looking for ambiguity and information gaps. Conducting this exercise will greatly improve the odds of a successful proposal. Finally, it is critical to have the expertise reside in-house, with strong advocates in positions of authority.

When project leaders are able to stand in front of their management and have the answer to every question, that is impressive. It shows thorough preparation and comprehensive analysis, thus raising confidence. It is amazing how often people will respond by saying, “Gee, that’s a good

question; I'll have to get back to you on that," or "I hadn't thought of that." Both are killer responses guaranteeing no decision at this meeting.

Advice for University Students, Faculty, and Administrators

Scenario: I am a new (90 days on my first job) PhD chemist asked to run a pilot plant operation (300-gallon reactor) to make 600 pounds of a new molecule for a prospective client. The lead pilot plant operator asks me the following question, "How would you like to pump this stuff?" My response, "What do you mean, Al?" His reply, "Do you want to pump this with a gear pump or a centrifugal pump?" I had absolutely no idea because they did not teach this in graduate school. I made a strategic decision and admitted to Al that I had no idea what the difference was between a gear and a centrifugal pump. He gave me a strange look and explained the difference. At this point I still had no idea what the right answer was, so I said to him, "Al, based on your experience what would you recommend?" What a career-defining moment. Al told me I had to use a centrifugal pump because the solids would plug the check valves in a gear pump. I instantly understood and it all made perfect sense. We made two runs in the pilot plant where I dutifully tracked data and wrote the report, delivering 600 pounds of excellent quality material, on time and budget to the customer. However, it struck me the pilot plant operators were the ones who made these runs a success based on their knowledge and experience of process technology. I was an observer, but got the credit. On my first promotion I invited these key, behind-the-scenes players to my celebration party and thanked them for my success and credited them with my promotion. No one had ever done this before, and the pilot plant operators continued to support me as I moved up in the organization.

Lessons Learned

(Please Note: The lessons below, which are based on the above scenario, are intended for students, faculty, and/or academic administrators—although some may also be helpful to general managers—and can be used with respect to initiating/advancing sustainability in academic—and non-academic—organizations.)

Lesson one: Recognize the experience of others around you and use it to enable your own success.

Lesson two: Acknowledge those who help you and you will build a valuable life-long network of supporters you can count on. (If you fail in this regard, your reputation will not grow to precede you.)

Lesson three: Seek out those key people in every organization who have the reputation of being sound thinkers and decision makers and who are respected by their peers. Take them out to lunch and be a sponge (i.e., absorb everything they have to say).

Lesson four: Stop the prescriptive approach. Let people explore and define their own path forward. Do provide counsel and guidance, but allow flexibility. Nothing is more antithetical at an institution of higher learning than to have an administrator say, "You can't do that."

Lesson five: Make classes as relevant to the real world as possible. Business schools have been great at the case study approach. Case studies should be augmented with speakers from the business world, keeping in mind that although it may be nice to have the senior vice president present, there is tremendous working knowledge in the rank and file.

Lesson six: What you learn as a basic set of skills at the university is important. What is more important is developing confidence in your own ability to define an opportunity or problem, outline a course of action, and execute. Unless you want a routine job doing the same, boring repetitive thing day after day, you will likely find yourself in a dynamic environment. The challenges you will be asked to tackle are not necessarily defined, and that will represent exciting opportunities for advancement and growth.

Lesson seven: Mine the interface between disciplines. It is amazing how often solutions implemented in other areas are directly applicable, with the proper tuning, to meet your needs.

Lesson eight: Business leaders of technically based corporations need an understanding of science and technology to make sound decisions. We cannot rely exclusively on traditional business expertise (e.g., taught in traditional business schools) to make decisions in institutions that rely on science and technology to create products and services. Learn what you need to know about your industry, and surround yourself with experts.

Lesson nine: The world is experiencing a "sustainability tsunami." Students today get this and it is being driven on a global basis at the grassroots level. It is essential that students be trained in this rapidly evolving field. More and more companies value the insights and understanding that come from the tools of life cycle analysis, biomimetic design (using nature as a model), green chemistry and engineering, and the idea of reverse supply chain logistics. This field is an intellectual specialty service for the United States going forward—the next-generation knowledge worker.

The French poet Paul Valéry once said, “The trouble with our times is that the future is not what it used to be.” I prefer the idea that we choose to make our own future based on how we look at the challenges we face and the course of action we choose to take. In my work to help build the CARE organization, which was a team effort, CARE reached a major milestone in 2007, the diversion of one billion cumulative pounds of old carpet from landfills. My motto at CARE was, “Success is perseverance for one more minute.” Good advice for future leaders.