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Leadership and Stewardship in Microeconomic Decision-Making

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The homeland security enterprise needs engineers who develop their careers in order to lead and assume responsibility for resilience as a design parameter. The "Guiding Principles" developed by the American Society of Civil Engineers (ASCE) for the nation's infrastructure advocate that design professionals "exercise sound leadership, management, and stewardship in decision-making processes." Doing so requires a project-design executive whose career development has been shaped by the type of thinking postulated by the ASCE.

In July 2009, Mitchell D. Erickson of the Department of Homeland Security's Science and Technology Division wrote an excellent paper for a Columbia University workshop that begins to analyze the tactical framework needed to move infrastructure resilience from theory to reality. The paper does a commendable job of quantifying and analyzing the roadmap for resilient infrastructure.

In a February 2010 DomPrep survey, there was general agreement among readers that resilience is an outcome of system design. There also was a sense that engineers must be better integrated into public safety affairs. Erickson's paper discusses not only the designer's role but also the interdisciplinary nature of the new design mandate to achieve resilience.

Focusing Greater Attention on the Forgotten Factor

However, Erickson's paper – like many other papers and books on the subject – originates from a macroeconomic point of view rather than from a microeconomic examination. In the United States, decisions about infrastructure projects usually are made in private and/or public boardrooms and generally are not focused on resilience.

Somewhat paradoxically, though, engineers more or less act as an owner's "agent" in the planning and design of infrastructure. This implies that the fee paid by the owner includes not only pure design services but also professional decision-making advice and guidance on other matters. Owners themselves, though, are not necessarily interested in changing the design status quo and often, therefore, view design fees as part of the fixed overhead required to get the project done.

Engineers and architects have key roles to play both in consulting the client on innovations and in producing plans and specifications. For some design professionals, however, the rough and tumble of selling infrastructure innovations is not an appealing chore.

The Maryland U and West Point Examples

In the late 1980s, University of Maryland Medical System CEO Morton Rapoport set out to rebuild the decayed infrastructure of his institution. One of his more important objectives was to modernize the systems involved – but he also recognized that, to attract patients to downtown Baltimore, a large urban medical center had to behave and "feel" somewhat like a secure shopping mall. He set achievement of that objective as his vision of what the future medical system would look like, and for 20 years the planners and design professionals involved in the project strived to bring that vision to reality.

There were many boardroom debates, of course – over money and priorities, for example, and the best timing for the use of scarce capital – but at the end of the day each individual component of the $500 million project contributed to achievement of the vision. Even with executives who intuitively understood the value of life-cycle thinking, however, it was a long and difficult struggle to gain approval for each change that moved the vision closer to reality while at the same time: (a) carefully integrating existing systems; (b) surgically removing outdated equipment; and (c) replacing other systems with new technology.

Not every executive is inclined to follow Rapoport's example, but if a designer works in close cooperation with the owner the goal of resilience can be achieved, to at least some degree, by advocating for it *during* the process. The resilience will be built-in, therefore, through the microeconomic decisions that are made in the thousands of projects that are projected to be built – at a total cost of almost $1 trillion – to expand, maintain, and improve the nation's infrastructure over the next five years. These cost/benefit decisions are made by owners every day with the help of designers, sometimes as bystanders and sometimes as active participants in the process.

To that end, Lieutenant Colonel Steve Hart of the U.S. Military Academy's Civil and Mechanical Engineering Department developed not only a course of study but also the first, in 2010, of what is intended to be an annual symposium for his students (and those from other universities) to explore Critical Infrastructure Resilience and Protection. One of the principal lessons learned from his efforts this past year is that there are very few engineering departments currently focused on the resilience of Critical Infrastructure.

That may change in the not-too-distant future, though, thanks in large part to Colonel Hart's efforts. Fortunately, there is a growing awareness that: (1) The roadmap to achieving resilience is paved with many microeconomic decisions; and (2) Both education and career development are critical to the long-term process of building resilience – primarily by following the ASCE Guidelines mentioned earlier.

For additional information
A Bridge to Prosperity: Resilient Infrastructure Makes a Resilient Nation; Presented at Aging Infrastructure Workshop July 21-23, 2009

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