Project Evaluation:
A Few Final Thoughts

"Civil engineers are problem solvers, but we need to broaden the scope of our services to include problem definition. Civil engineers must go beyond thinking in terms of project specific limits and scopes of work and become involved in system-wide, program-related decisions and policy-making to achieve long-term, sustainable solutions. We must be facilitators of collaboration among multiple agencies/owners and across jurisdictional boundaries. We must also take a leadership role in developing acceptable and sustainable methods of funding infrastructure development and asset management."

<div align="right">Kathy J. Caldwell, ASCE News, June 2009</div>

Societies and civilizations advance through projects that seek to make life safer, healthier, more prosperous or more secure. History abounds with tales of famous projects, from the pyramids of Egypt and Mexico, the temples of Greece and Cambodia, the aqueducts and roads of Rome and the Great Wall of China to the canals, railroads and telegraphs of the 19th century and the highways, telecommunication, dams, and water and wastewater systems of the 20th. Countries have been bankrupted by bad projects, secured by practical projects, and advanced by bold projects. Individual fortunes have been made or squandered on projects, as banks and financial markets have made it possible to direct vast sums of money toward massive undertakings anywhere in the world. Large projects entail large risks, and such projects will only be undertaken if those promoting the projects can convince investors or governments to fund them. Highly capable, charismatic individuals motivated many great projects, including the Suez Canal, the Brooklyn Bridge, and the Empire State Building. However, it has not always been possible to separate the true visionaries from the charlatans and the deluded, especially when it comes to large outlays of public funds.

Project evaluation could be viewed narrowly as a set of procedures and methodologies that can be used to determine whether or not a proposal should be approved. Indeed, there are well-defined methods for assessing financial aspects of a project, and private companies and investors use these methods routinely in determining whether or not to begin projects or to invest in them. Moreover, governments today mandate environmental and social impact assessment prior to the approval of any significant project, and they use intricate economic models to estimate the effect of public infrastructure investments.

However, taking such a narrow approach misses the most interesting and challenging aspects of projects and programs, namely coming up with ideas for what could become a successful project. Someone has to come up with the proposals that will be subjected to careful scrutiny by banks, government agencies, and the public. Such proposals could emerge from a careful consideration of what society needs, they could reflect insight into opportunities offered by new technologies, or they could simply be pipe dreams that appeal to public emotions but that have little chance of success.

Much of the challenge and excitement in project evaluation deals with the earliest stages of a project, in clarifying the needs of society, in anticipating technological opportunities, and pulling together ideas or objectives for a possible project or program. Figuring out what the problem really is, defining the problem in a way that invites diverse solutions, and responding to the problems effectively and creatively can be extremely rewarding, both in terms of the success of whatever is done and in terms of the intellectual satisfaction of those involved in the process. In these early stages of project evaluation, breadth of thinking, curiosity, imagination, intuition and flexibility are more important than analytical capabilities or methodological excellence. This is when the story of a project begins to emerge.

Every project has a story, and every story has several components. What are the context and the history of the project? What are the needs that are addressed by the project? How will the proposed project meet those needs? What other approaches are available and why is the proposed approach the best approach? How much will it cost and who will pay for it? What are the broader impacts on society? What is the proper role for government? Why should the public support the project? How will negative externalities be mitigated? Projects will have financial, economic, social,

environmental and aesthetic impacts, any or all of which could be important in telling the story, in evaluating whether or not to proceed or how best to proceed, and in going from preliminary thoughts toward final design.

> *"The need is to subordinate economic to aesthetic goals – to sacrifice efficiency, including the efficiency of organizations, to beauty. Nor must there be any nonsense about beauty paying in the long run. It need not pay. It is though the state that the society must assert the superior claims of aesthetic over economic goals and particularly of environment over cost.*
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> John Kenneth Galbraith, "Liberty, Happiness and the Economy",
> **The Atlantic Monthly**, Vol. 149, No. 5, June 1967, pp. 521-26

Good solutions seldom come straight from a textbook, nor do they come from the use of complex techniques of operations research that claim to find the optimal solution to a problem. Good solutions arise from a deep understanding of the nature of the problems or needs and a clear idea of what might be done. Experts who have developed a comprehensive conceptual framework for addressing system performance will often be able to contribute a great deal to the early stages of project evaluation, especially with regard to the kinds of technical approaches that are possible. Users, abutters, and members of the public will be able to contribute their understanding of needs, identify issues that are important, and – in the aggregate if not always individually – help in applying some common sense to the discussion. Brainstorming, systematic analysis, sensitivity analysis, and scenarios can all be useful in eliciting ideas and in determining what approaches might work best in dealing with a problem.

The gestation period for very large projects may be measured in decades, and gaining approval for a major project or program may require seemingly endless political wrangling and nearly impossible coordination among local, state, and federal officials. Projects and programs therefore will need champions who are willing and able to fight the bureaucratic, political and legal battles that must be waged. The most effective leaders will incorporate social and environmental elements into the initial design and be able to use the environmental impact assessment process as a means of enhancing projects and building public support for them.

Very few infrastructure projects relate to anything that is entirely new. Most proposed projects will be viewed as potential enhancements to an existing system that deals with transportation, water resources, energy, or some other societal need. Effective project evaluation therefore requires understanding of how such systems are created, how they evolve to meet changing social and economic conditions, and how they eventually give way to obsolescence or to new technologies. Different types of projects and different kinds of issues are encountered in each stage of system evolution. In early stages, there will be a struggle to determine how best to use new technologies, how to structure facilities or networks, and in general how to become more effective and more efficient. In later stages, there will be a need to adjust the size and structure of the systems to adjust to new technologies or new kinds of competition. At the end, the challenge may be to grow old gracefully and pass away.

In recent decades, changes in technology have made some of our infrastructure systems obsolete, changes in social norms have made other systems inadequate, and changes in scientific knowledge have revealed unacceptable results from the systems we have built and continue to use. As result, most infrastructure systems initiated long ago are proving to be unsustainable, because of financial, social or environmental problems. We have become ever more aware of the need to grapple with climate change, over-dependence upon fossil fuels, destruction of forests and wetlands, contamination of the oceans, congestion and pollution within our largest cities, and ensuring adequate food and clean water for the growing global population. To deal with these issues, we will need to manage our infrastructure systems more effectively, develop new technologies, and initiate projects that enhance the sustainability of our civilization. Sustainable projects and programs will be those that will have adequate financing for construction, maintenance, and operations, a fair distribution of costs and benefits to society, and the ability to continue indefinitely without significant depletion of resources or disruption of the environment. Engineers, planners, conservation groups, businesses, politicians, and the general public will have to work together to figure out how best to move toward more sustainable infrastructure for the 21st century and beyond.

Resource: Project Evaluation: Essays and Case Studies
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