



The Social Captivity of Engineering

By Jon A. Schmidt, P.E., SECB

My title this month comes from a 1991 paper by Steven L. Goldman, the Andrew W. Mellon Distinguished Professor of the Humanities at Lehigh University. It appeared in a volume entitled *Critical Perspectives in Nonacademic Science and Engineering*, edited by Paul Durbin and published by Lehigh University Press.

Goldman argued that engineering is captive to society in two ways – intellectually, because its theory has been subordinated to science; and socially, because its practice has been limited in terms of what problems engineers are allowed to address and what solutions are considered acceptable. These two captivities are not separate, but interdependent – the first anchors the second, which in turn reinforces the legitimacy of the first. I have discussed the first type previously in this space (“Engineering Knowledge,” November 2007; “The Principle of Insufficient Reason,” May 2008), and now I would like to explore the second.

Goldman’s thesis was that technology and innovation are generally dominated by market-driven value judgments, rather than technical knowledge. He noted that even when clients are engineers by training, the decisions that they make inevitably reflect the agendas and priorities of the organizations that they serve – not necessarily the capabilities and limitations of the engineers that they hire. As a result, engineering tends to be *instrumental* in nature; it is utilized by non-engineers as a convenient means of achieving their own objectives, which may be quite arbitrary. In other words, the willfulness of engineering (“Engineering as Willing,” March 2010) is both enabled and constrained by the willfulness of the institutions that appropriate it.

This has significant ethical implications. Carl Mitcham, Professor of Liberal Arts and International Studies at the Colorado School of Mines, has argued that engineering is “philosophically inadequate” because it does not have an integral ideal that is “good in itself” and well-embedded in its curriculum and practice. Physicians pursue health and lawyers seek justice, but engineers solve whatever design problems are presented to them and leave the use (or misuse) of the resulting technology up to others. Although we are explicitly charged with holding paramount the safety and welfare of the public, we are not especially qualified to determine exactly what satisfies that obligation.

David E. Goldberg, the Jerry S. Dobrovlny Distinguished Professor in Entrepreneurial Engineering at the University of Illinois, has responded to this assessment. His view is that Mitcham is improperly differentiating occupations that are ethically simple vs. ethically complex, based on whether serving the client’s interests will align naturally and consistently with serving the interests of society as a whole. In this sense, engineering is clearly ethically complex, because it can be utilized for malevolent purposes; and even when this is not the case, the uncertainties involved are such that good intentions can still lead to unfortunate consequences.

Furthermore, the reality of social captivity calls into question the claim to autonomy that is crucial to engineers’ status as professionals. As I have written before (“What Is a Profession?” November 2008), the authority of structural engineers is somewhat limited by our need for someone to retain us before we can undertake specific projects. We rarely have the opportunity to influence the process that leads a current or potential client to decide that a certain facility is necessary or desirable, and a variety of limitations are imposed on our designs by others as a result of aesthetic, functional, or other – often non-technical – considerations.

One way that some structural engineers are addressing this situation is by leading the design team, rather than always being a subconsultant. BIM may even provide an opportunity to make this the norm, rather than the exception. Specialization is another route to gaining more control over one’s practice. By narrowing the scope of services to a particular niche, structural engineers can exert greater influence over that portion of the work, as well as others that are related to it.

Despite such adjustments, it is highly unlikely that engineering will escape its social captivity anytime soon, if ever. Even so, there may be much that our captors – especially political and commercial decision-makers – can learn from the systematic and remarkably effective way in which engineers intentionally translate the conflicting needs and desires of various stakeholders into feasible – and usually successful – solutions.■

Your Turn

How has the social captivity of engineering, as described here, been evident in your own experience? Do you perceive the lack of an integral ideal to be a deficiency of engineering as a profession? Please submit your responses and see what others have had to say by clicking on the “Your Turn” button at www.STRUCTUREmag.org.

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Join the Conversation

The SEI Engineering Philosophy Committee will meet on Wednesday, May 12, from 3:30 to 5:30 PM at the Structures Congress in Orlando, Florida. For more information, please contact the author.

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