The Position of the Engineer in Society and the Responsibility of Technical Education

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Beginning with the social image of the engineer today the fundamental differences of social and technical problems are outlined. In accordance with this the emancipation of the engineer not only as a professional but also as a member of a political community is demanded.

I

IN RECENT years, engineers have come to enjoy a much higher sense of self esteem. Although still subject to the German tradition of nose thumbing technology and applied sciences, the engineer is secure in the knowledge that prosperity as we know it—victory or defeat in the world markets, economic muscle, whether derived with swords or plowshares—was largely due to engineers. The clarity of this picture fades, however, with the growing shadow of doubt, ambivalence and criticism concerning technological progress, if not technology itself. In the wake of this critique, engineers tend to react by separating into two groups. Either they close ranks to rally to their defence by stonewalling critical debate entirely, or they withdraw to the more neutral position of simply doing what they are trained and paid to do.

These reactions don't imply, however, that the last word has already been spoken. As times change, more and more engineers are facing a growing public concern for 'ethical responsibility'. It would certainly be unfair to suggest that managers and other professional groups are unaware of ethics. The problem is, that within the hierarchical gristmill of institutions and corporations, the individual is subject to such intense pressures that his own sense of personal responsibility tends to get blurred. An individual can only assume responsibility for the given field of his endeavour, in which he has the power and authority to act. The fact that 'someone else' must always assume the ultimate responsibility for decisions of larger magnitude, means that the influence of the individual is effectively diminished, while his course of action more routinized.

To take the problem of social and ethical responsibility seriously—which means more than simply venting our frustrations at the expense of the engineer—educators and technical institutions must ask themselves some very new questions.

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II

Traditional perspectives, at least within German culture, have always pointed to a dichotomy between the formulation of objective goals and the process of their rational implementation. Consequently, within the structure of this traditional dichotomy, engineers and technical people have always been assigned the 'exclusive' responsibility of dealing with the practical realization and implementation of functional questions, whereas the nature of function and purpose itself, i.e. the more important questions, were always left to the 'nobler' fields, such as the humanities and social sciences. This dichotomy takes on critical mass when linked to staunch social hierarchies, in which, historically seen, the 'wise and cultured' ruling classes, with their swollen retinue of philosophers, priests, sociologists, etc., were destined to set the historic objectives, while the lower classes were predestined to implement them. The resulting entrenchment of technology within the fabric of our social structures is directly responsible for the backlash that gave rise to the anti-technological stance of the humanistic tradition.

This picture, however, has changed with the times, and now reflects the efforts of democratic societies to overcome these dichotomies by allowing the public to participate in the political process.

This has also led to a closer synchronization of both processes. Suffice it to say, that the developmental stages of the great cultural epochs were accompanied by 'technical' revolutions, and that the last stage of the industrial revolution was clearly characterized by the close and mutual cooperation in social, cultural and technical areas. This particular context represents the problem zone at the heart of this discussion, the implications of which have yet to find adequate expression in public debate.

The historical problem

Man is marked by two fundamental weaknesses which he must overcome to ensure his survival:

1. His physical limitations: unlike other animals equipped with organs and senses specifically evolved to cope with their environments, man must compensate by developing instruments and the sciences that developed through their use.
2. Unlike other community-building species, he has no inborn or instinctual rules with which to govern his collective life and ensure his ultimate survival as a species. Thus, he must compensate for this by developing a social culture, and particularly, a set of collective values and norms. He also has to consider the question of 'meaning' in relation to the individual and community, and develop this science. Both problem areas must be dealt with distinctly—and yet, the one cannot be solved without the other. Only in a relatively stable social context, can physical survival and well being be assured. Without its successful organization, the material basis for this social context would disappear.

Many engineers tend to have a mechanized view of human history. For them, man is a 'tool-making animal': the homo faber—to be judged and classified exclusively by his ability to make instruments. Thus, he sees culture and community as 'instruments' of another sort, or irrational platforms for the development of technology. Among other educated sectors in society, however, a different view has evolved: that of a society unencumbered by technology, and where, consequently, technology is seen and judged by its negative aspects.

III

For the field of technical education, this initial problem should have the following consequences:

1. The mutual interdependence of these fundamental problem zones must be made clear to the engineer. Above all, the question as to which rational criteria are relevant, or indeed, appropriate to these areas, must be thoroughly re-examined.

   We have become accustomed to the fact that rationalism, defined by the laws of natural and industrial science, is the only, and binding definition for the whole of society. Problems that do not fit this scheme, or cannot be solved by it, are rejected as being irrational. They are equated as a question of taste, ascribed to the lack of rational criteria for the hierarchical decision-making process, or simply chalked up as the gibberish of public consensus.

   In contrast, the thesis presented here maintains that the transformation of this model will require more than just the combined input of the humanities and social sciences. Vital to this process is the forum for political and democratic debate itself. If a new and independent model for rationality is to be developed, then it must evolve from the process of democratic debate. This debate must necessarily concern itself with social relations/differentiation as its object, and convincing argumentation—as opposed to arbitrary conclusion—as its method. This type of debate cannot be dismissed as irrational, by virtue of the fact that it cannot be verified by scientific experiments, mathematical proofs, or social structures that can be demonstrated with the brevity of efficient appliances. Indeed, anyone who displays the willingness to participate in a debate concerning the nature of social existence, and moreover, who accepts the legitimacy of democratic institutions for public council, assumes—at least in principle—the intellectual validity of political argumentation. This insight is equally as relevant, if not indispensable, to the field of technical education, where technology, even in its utmost complexity, is by no means free from non-technical decisions.

   Given the choice, many engineers would probably opt to tame the beast of politics, or at least have it behave as rationally as technology. In so doing, however, they completely overlook the fact that they are depriving themselves of the means to examine such fundamental questions as the meaning of social justice—not to mention other questions central to the very organization of technology itself. For this reason an insight into the workings and differences of both fields is of critical importance.

2. The second consequence for the field of engineering and technical education must lie in the qualification to assume a participatory role in the process of political discussion. This presupposes, however, an adequate understanding of the role of the engineer, which is not, however, intrinsic to him. While technical and scientific activities are not hindered by the division of labor and expertise—quite the contrary, they depend upon it—the solution of social questions and political problems cannot be left to the experts. The process of social communication must be democratically structured. The same must also apply to sociologists and philosophers, as it is not their job to consider these questions as experts outside of the public domain.

   If the engineer is to play an active role in the process of social communication, it is not in the sense that he must steep himself in the disciplines of philosophy and social science. This would be ridiculous, and is expected of no one. His role is to bring his technical expertise into the forum of this democratic process.

The engineer must learn a twofold lesson:

1. He must learn to reject all forms of spurious authority and he must also learn to realize the extent to which non-technical decisions are anchored in technology—and thus, the formidable limits of his own expertise. Preconceptions must be stripped of their dogmatic omnipotence

in order to ensure the framework for the genuine development of political alternatives. In this context, competent experts are also needed for the critique of misleading and coercive demands of pseudo-experts.

2. He must learn, like any other citizen in a democratic society, that the ongoing debate about objectives and means, does not just break off in mid-air, or terminate in absurdity—although this may often seem to be the case. And even when a decision has been reached by means of public consensus, or mandate, he must, none the less, scrutinize the clarity of its argumentation and the ultimate legitimacy of represented interests.

The social structures required for the development of political objectives in a democratic society are endangered by the fact that the engineer is all but excluded from participating in them. As long as the engineer is only required to give his professional opinion as a technical representative, and not the technical competence of his personal opinion as a citizen and member of a democratic process, this condition will deteriorate. His role in society will only change when he learns to reject pseudo-authority, for a more democratic approach to the formation of political objectives in an industrialized world. The engineer is still, all too often, hidebound by the importance of his qualifications. He is an engineer as a bourgeois, only. He must learn to experience himself as a Citoyen—a citizen and a qualified participant in the forum of public debate. And he must realize that his qualifications in both of these areas will be subject to different roles, and that this will not compromise his integrity.

If the engineer is to free himself from the overwhelming onus of ethical imperative, as cited at the beginning of this discussion, then he must finally learn to grasp the fact that his competence and authority are limited by the narrow confines of his professional field. He must begin to act as a citizen entrusted with a larger democratic commitment to determine the political framework that alone is capable of endowing technology with a meaningful role in society.

IV

What does this mean in concrete terms, and how will it directly affect the curricula of engineering schools?

Once the problem areas have been pinpointed, the situation is not as bad as it seemed. After all, we are not talking about quantity in this case, but the quality of the courses required. The fundamental and theoretical structures of the natural and industrial science will continue to be taught as before, however they must be augmented by a deeper insight into the basic processes of social communication. It must be understood that we are not talking about opposing or contradictory structures that must be unified in order to find a common basis. We are talking about complementary structures that can only find a common interface through their mutual interaction.

It will be somewhat more of a challenge to reconstruct the interplay between technological development and social processes, however. A seminar focusing upon industrial science and the successive phases of industrialization might lend itself quite well towards these ends. It should deal with the collapse of the guild system and the medieval conception of the world, the development of modern industry and the new technologies made possible by it, and the repercussions of these new developments upon other processes, including their impact upon the nature of social and political debate.

How often, in the history of modern society, has the existence of two cultures led to the complete breakdown of social communication, understanding and downright hostility? This is yet another manifestation of the historical problem of social differentiation—and an indication of a structural misfiring within democratic society. There have been many proposals for mending this schism through the development of a common language, or common model for rationalism, for example. Here, I suggest that it would be far more appropriate not to patch over, or deny these differences, but rather to understand their indispensable complementarity, as it is in this complementarity that we shall learn to recognize the common interests for a synchronous solution to technical and social problems.