From Ho-Ping: Food for Everyone

By Medard Gabel

Introduction: Design Science

Design science is a new paradigm for viewing our world. Simply put, design science can be seen both as a process of recognizing, defining, and solving problems, and of formulating a goal and the systematic path of reaching that goal. It is not a new specialized discipline, but rather an integration of all disciplines. Its practice is not a further winnowing of the secrets of the universe, such as the frontiers of physics or biology, but an integrative discipline wherein the findings of all sciences and humanities are brought to bear to solve humanity's problems.

One way of viewing the purpose of design science is that it, like traditional science, tries to discover more about the universe through the formulation and testing of various hypotheses. In design science, the researcher may wish to find the answer to a question such as "can current resources and know-how meet the regenerative food needs of the world by 1985 (or 1990, etc.)?" or, more specifically, "can current methods of food storage eliminate enough spoiled food to feed those who are now hungry?" or, more specifically yet, "will this fiberglass and bamboo grain bin keep out bugs, rodents, and moisture?" Design science is vitally interested in all these levels of the problem—from the recognition of symptoms to a solution's reduction to practice. If the evidence—the answer to the question—indicates a positive position, the design scientist can pursue this new option of humanity and reduce it to a practice; he or she can also communicate the information to those who can evaluate this new evidence and offer feedback. If the response is negative, then the design scientist examines the situation to see what he/she can do to change this condition through the development of new artifacts or organizations structures ("Artifacts" are physical structures rather than political ones; a telephone, windmill, or airplane rather than propaganda or a law.) As in the previous example, perhaps one artifact would be new structures for storing food in developing countries where losses are heaviest and food needs the highest.

Design science sees the environment and the human condition as being ever improvable through the application of new information and understanding. It takes the demonstrable point of view that it is possible to continually do more with less; to increase a given amount of work done by energy, or functions performed by a given amount of materials, with less energy and less materials. There is no magic in this; it is merely the substitution of new information and organization for existing energy and materials. The new breakthrough that was uncovered in physics that made the transistor possible did much more with less than its predecessor, the vacuum tube. The vacuum tube, in turn, could do not only more, but new things that its

predecessor, the crystal, could not do. Continuing more with less leads eventually to new functions as well as more functions that can be performed by a given artifact. The latest electronic advances in large-scale integration now do so much more with so much less than the original transistors that they are making possible desk-top computers whose equivalents twenty years ago would have taken up a whole room.

The design science approach involves understanding the critical interrelated nature of our problems, their global scope; the inability of present, locally focused planning methods to deal effectively with these problems; and new systematic alternative approaches for recognizing, resolving, and preventing our present and anticipated problems through the development of artifacts.

> [The primary emphasis] in design science is committed to new forms rather than political reform; that is, to possible inanimate artifact development versus negative propaganda, legal and other restraints. It does not try to stop other people but tries to start itself. The strategy is to make that which is socially objectionable obsolete by developing superior inanimate means of solving economic and other problems. One way of looking at all problems is that they are physical. What is challenging us—creating our problem—is physical. To solve a problem something is needed that is not present. What is needed can always be translated into something physical, an artifact. The design scientist asks the question, "What artifacts do I develop in the environment that will solve the problem?" The procedure is to identity the problem and then the artifacts.[1]

The idea is not to ignore politics but to develop the artifacts that will make it obsolete. New artifacts create a demand for institutional changes by opening up productive opportunities unrealizable without such change.[2] Instead of seeking to have a law passed outlawing the use of inefficient energy consumers, design science seeks instead to develop an artifact that performs the same function (or more functions) as the inefficient design but uses fewer resources and less energy. This is in no way intended to mean or imply that the design scientist would be opposed to sensible, considerate legislative efforts (there are a number of "social design" strategies later in this book), but merely that the priority is on the development of new physical artifacts and alternatives that the decision-makers as yet do not have.

A design scientist, like many research scientists, does not wait to be hired by a patron or employer to do their bidding, but rather takes the personal initiative to solve problems that his/her experience has taught are important to solve for the betterment of humanity. Unlike "pure" science, which sometimes claims to be value-free, design science is value-laden. Design is the development or structuring of environments in preferred directions. Our preferred

directions, “where we want to go,” are determined by our values. Our future, the part we have control over in the present, is determined by the values we have today.

One of the underlying tenets of design science is that we are all in “this” together; “this” being the Earth, humanity, and our innumerable problems. Problems are all interconnected just as is our ecology. Problems are parts; design science seeks to deal with wholes, with systems. The method of design science is one of always starting with the whole and working toward the particular. In the specific effort documented in this book, food energy is dealt with within the context of the energy flows of the universe; the unique food problems of humanity on board Spaceship Earth are dealt with within the context of 100% of humanity, its total history, cultural inheritance, and needs of the whole planet. A major objective of the World Game workshops is to formulate design science strategies for eliminating human privations and to identify artifacts that could be developed that would lead to this state.

From Ho-Ping: Food for Everyone, pg. 10-11

[1]Fuller, R.B., Correspondence, 1974.

[2]Crosson, P., “Institutional Obstacle to Expansion of World Food Production,” Science, Vol. 188, 5-9-75, p. 519.