Design as API between Technology and Humanity
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To some of my friends who learned of the gift of Morningside Foundation for the MIT Morningside Academy of Design, the announcement felt like a change of direction from the Foundation's roots of supporting education, science, medicine and public health to the support of the arts. For them, as for most people, design is in the realm of the arts where beauty is to find expression. Design therefore equals esthetics. I'd like to make it clear that this gift is not about the arts.

Historically, the Morningside Foundation has used its philanthropy to highlight important but under-appreciated, not only under-served, areas that deserve more support for society's greater good. In 2014, long before the world saw a global pandemic, the Foundation's gift to the Harvard T.H. Chan School of Public Health highlighted the need to support public health. Last year, the Foundation made a gift to the UMass Chan Medical School to highlight the need for philanthropic support to be directed to our state universities. This intentionality is a hallmark of the work of the Morningside Foundation. It is also why the Foundation does not operate in a response mode in spite of its sympathy with many noble causes worthy of support and many dire human conditions
in need of support.

In keeping with this character of intentionality, this gift to MIT is meant to highlight the field of design. What then do we mean by design? I can find no wiser words to answer this question than those of Herbert A. Simon, the polymath who won both the Turing Award in Computer Science in 1975 and the Nobel Prize in Economics in 1978. To do anything other than quoting him and expect greater clarity would be a fool's errand; so let me simply read an excerpt from Simon's book *The Sciences of the Artificial*, first published in 1969 by the MIT Press.

"Historically and traditionally, it has been the task of science disciplines to teach about natural things: how they are and how they work. It has been the task of engineering schools to teach about artificial things: how to make artifacts that have desired properties and how to design.

Engineers are not the only professional designers. Everyone designs who devises courses of action aimed at changing existing situations into preferred ones. The intellectual activity that produces material artifacts is no different fundamentally from the one that prescribes remedies for a sick patient or the one that devises a new sales plan for a company or a social welfare policy for a state. Design, so construed, is the core of all professional training; it is the principal mark that distinguishes the professions from the sciences. Schools of engineering, as well as schools of architecture, business, education, law, and medicine, are all centrally concerned with the process of design."

I don't think anyone can offer a clearer, a more forceful or a more concise statement on the universality of design. Everyone who devises courses of action to change a situation from one state to a more desirable one is engaged in design. Simon then went on to talk about elements of

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design such as constraints, variables, utility functions, etc, in order to give structure to the practice of design, hence his term "the sciences of the artificial." Even though he is much better known for his many other intellectual contributions, Simon is truly a seminal figure in the field of design. It is in this Simonian sense of design that the Morningside Academy was conceived.

Simon then went on to talk about the place of design education in universities.

"In view of the key role of design in professional activity, it is ironic that in this century the natural sciences almost drove the sciences of the artificial from professional school curricula, a development that peaked about two or three decades after the Second World War. Engineering schools gradually became schools of physics and mathematics; medical schools became schools of biological science; business schools became schools of finite mathematics. The use of adjectives like "applied" concealed, but did not change, the fact. It simply meant that in the professional schools those topics were selected from mathematics and the natural sciences for emphasis which were thought to be most nearly relevant to professional practice. It did not mean that design continued to be taught, as distinguished from analysis."

Looking back into mid-twentieth century, it is perhaps not surprising that this shift away from design occurred in universities. Simon described design education at that time as "intellectually soft, intuitive, informal, and cook-booky" whereas "academic respectability calls for subject matter that is intellectually tough, analytic, formalizable, and teachable." This shift away from design was the consequence of necessary efforts gone too far. By this, I mean the efforts in the early twentieth century to anchor professional practice on hard science. The Flexner Report of 1910 which called for medical education in US and Canada to be anchored on physical and life science was a prime example of those efforts. The inaugural address of MIT's President Karl Taylor Compton in 1930 likewise called for engineering education to be anchored on fundamental science.

Times have changed since Simon's writing. Sufficient developments have taken place in recent years to make design both formalizable and teachable. Design as a field has gained currency in both educational and professional circles. The term design thinking has been popularized by a sizable body of literature and reduction to practice. While this term has taken on somewhat different meanings for different people, I see no need to rein in such variations in understanding. Insistence on uniformity will inevitably lead to tyranny of orthodoxy, sterilization of ideas and eventually weakening of the field. Suffice it to say that in spite of such variations on the theme, there is a sufficient body of concepts and practices that make for a common ground. I like to comment on a couple of these common precepts in design in so far as they are pertinent to the mission of higher education.

Simon reminded us that professional education is about making things, or making things happen. Education includes inculcation of a maker disposition in the learner and giving them tools to succeed. Today, education cannot merely mean the transmission of knowledge from the teacher and a passive reception of that transmission by the learner. The hallmark of an educated person is not the abundance of facts he retains and recalls; it is what he can do with what he has learned. Learning must therefore lead to doing, and it is in doing that further learning takes place. If this reminds you of John Dewey, I quite agree. In advocating for design, Simon has gone beyond

Dewey from doing to making. Still, Herbert Simon and John Dewey are fellow travelers on the same journey. Indeed, they both hail from a particular period of the University of Chicago even though their tenure there did not overlap.

It is high time that we rethink the use of problem sets as the work horse of undergraduate education. Questions in problem sets, to be graded by teaching assistants, tend to be questions with unique answers. They train students to solve questions posed by others. Problem sets represent an intellectual activity carried out within a bounded space. In contrast, design education is intended to conduct the student from a bounded space into an unbounded space where he learns to explore and create. It is a necessary preparation for the students to enter into the real world which is a very unbounded space.

One prominent feature of design thinking that has evolved beyond Simon's conception is the human centricity of design, hence human-centered design. I cannot emphasize enough the importance of bringing humanity back into education including technical and professional education. For too long, academia has thrived on objectivization, turning the animate into the inanimate. But humans are "messy." They conform to invariant laws of nature in some ways and are highly variable in other ways. By reducing human behavior to a set of variables relatable to each other by logical operations, we have arbitrarily created the categories of the rational and the irrational. Being human is both. To ignore the variable and the "irrational" just so that human behavior can be neatly described by mathematical operations is a distortion of humanity at best and a dehumanization at worst. Any solution that we design for human problems inevitably depends on the premise of how we describe humanity.

Design represents an alternative approach. Design does not begin with abstraction of humanity, but with observation of humanity. Design thinking is not only accepting but respectful of human messiness. It acknowledges both the inner space and the outer space of human existence and strives to satisfy both even if this may never be fully possible. Design takes into consideration not only objects, but also experiences, human impulses, processes, relationships and more. It is a grounding that protects against solutions that satisfy the designers' assumptions but are irrelevant to the recipients. Whether it is an entrepreneur creating a new widget for the market or a political leader devising a policy for a population, open-minded observation of humanity tethers design to humanity as it is.

This is particularly pertinent as we now live in a world overflowing with powerful technologies whose impact on people has yet to be fully fathomed. The need for dialogue between technology and humanity has never been greater. Missing all too often, however, is an interoperable language between the two. Herein is a critical role that design can play. Design is the API between technology and humanity. Design affords a process and a methodology by which technology is translated into human relevance.

Simon also alluded to the pursuit of academic respectability as one cause for the decline of design in his times. Consider academic publications which are the currency for climbing the academic ladder. An ethnographic study will never be viewed as favorably as a publication full of mathematical equations and models. What is sacrificed in the abstraction of mathematical modeling is humanity, yes, in all its messiness. It may not be immediately evident, but the

metrics by which we evaluate academic achievements will cascade down to impact on how a university can fulfill its obligations to society at large.

This brings me to the place of the humanities in a professional curriculum such as engineering. The most common practice if not the universal one is to require every student to take a certain number of courses from the humanities departments. When I was an undergraduate studying engineering, I remember these humanities requirements as nothing but a nuisance. I took two courses in Jewish history which I loved, but they were merely informational. I took a course in symbolic logic. By virtue of its being offered by the philosophy department, that course checked the box. None of the courses I took to fulfill the humanities requirements did anything to develop my humanity. It took me many years to realize that it is not about taking courses in the humanities departments; it is about developing the humanity of the students. One of the powers of design education is to do just that.

If I may quote Herbert Simon again:

"The proper study of mankind has been said to be man. But I have argued that people — or at least their intellectual component — may be relatively simple, that most of the complexity of their behavior may be drawn from their environment, from their search for good designs. If I have made my case, then we can conclude that, in large part, the proper study of mankind is the study of design, not only as the professional component of a technical education but as a core discipline for every liberally educated person."

It is in keeping with this thought that the MIT MAD is designed to be cross-cutting across the whole Institute. It is not a single department, it is not a silo. The Academy is designed to be open and porous to the whole MIT community. My hope is that every student, undergraduate and graduate, in the course of their education at MIT, would end up being exposed to design, and that such an exposure would awaken and enrich their humanity. In so doing, they will find purpose to go along with their technological prowess and their creative energy.

What we learn in design education here at the Academy will be shared freely with other universities. In future summers, the Academy will run programs in design education for school teachers so that school children can be exposed to the concepts of design at an early age. Given MIT's openness to experimentation and its leadership position in academia, I cannot think of a better home for this initiative.

I am heartened by the enthusiasm with which the MIT community has embraced the Morningside Academy. I am grateful to my very dear friend Bob Millard who first brought up the idea of this gift to me. I am grateful to President Rafael Reif, Hashim Sarkis, John Ochsendorf, Maria Yang and many other faculty members who helped to shape the Academy and turn it into reality.

With confidence, I know many young lives will be touched by the Morningside Academy. With great anticipation, I look forward to seeing the works of students who will go forth from here, with mind and hand, to be of service to humanity.