

IESE White Paper 06001
The Times They Are a Changin'

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Motivation

We live in radically networked times, and those networks are changing the nature of engineers, engineering, and engineering education. This short white paper presents an actionable worldview useful for guiding the creation of the new IESE department.

A Worldview

The whitepaper briefly presents the worldview in newsletter form, presenting only the most salient points. A longer version is presented in a Powerpoint presentation of the same name.

Time of concern. The College has gone through a wrenching reorganization and a traumatic Dean search. The IESE department is still a work in progress. Fear of failing is in the air, and older IE faculty are sitting on their hands.

Brief history lesson. Modern era of engineering school started under Vannevar Bush (MIT EE Prof) and the report *The Endless Frontier*. Floodgates of money changed big science and engineering. Curriculum, P&T, and institutions adjusted to these monies.

Everything cool in the Cold War. Big and centralized was better. Economies of scale dominate other effects. Hierarchies dominate organizational thought, and universities followed suit.

UIUC paradigm follows the Cold War. UIUC were leaders in engineering science in research and curriculum. Sought greater share of Federal moneys and encouraged rugged individualism among faculty. Paradigms are not truth. Paradigms are paradigms. Still stuck on this formula born of WW2 and Cold War.

3 missed revolutions. Corporations moved on and we've had three revolutions since Cold War, all of which have been missed by universities: (1) quality revolution, (2) entrepreneurial revolution, and (3) IT revolution.

Technology, transaction costs, and network effects. Three things have changed our world: (1) transport and communication technology, (2) transaction costs, and

(3) network effects. The first makes the world a smaller place (e.g., Japanese auto makers invade US), the second reduces effective organizational size (downsizing & outsourcing), and the latter increases returns to large networks (software & telecom).

3 O's and a missing O. Everyone says the 3 Os are hot: Bio, Nano, Info. But first two are different than third. Bio and Nano are science push fields. Info is tech pull. Tech enables infrastructure, and users demand more tech. This leads to the missing O: Socio.

Qual-quant divide. Postmodern systems engineering demands better understanding of Homo sapiens as an engineering concern. Knowledge of humans is in philosophy, humanities, religion, and social sciences, not in engineering, but engineering needs knowledge of humans to design human-centered systems.

Socio as tech pull and humanities push. Cold-war view of humans was that humans were error in the loop. Now humans *are* the loop. As a result, engineers need to mine knowledge of the humanities and social sciences and put that knowledge in form actionable for engineering systems design.

A whole new mind in a new conceptual age. Daniel Pink's book talks of conceptual age, where 3 A's (abundance, Asia, and automation) reduce value of simply creating more stuff. New age demands design, story, symphony, empathy, play, and meaning. Good engineers a dime a dozen in Bangalore and Shanghai. Need to create category creators, not category enhancers.

Mind the gap. UIUC has been living on WW2 paradigm and have missed 3 revolutions. There is a large gap between where we should be (in IESE and the College) and where we are.

What to do? Don't need another plan. Do need to understand where we are, have conversations about the world, and then logically design future given where the world is going.

A principled approach. Goes beyond politics of big and small, respects the past, wary of the false choice, anticipates the future, organizes for efficiency and diversity, and penetrates the paradox of university strategy.

Requires courage. Julian Rotter investigated psychological theory of locus of control. Do we have courage to be internally driven? Or will we follow misguided efforts of the "leaders?"

Discussion of this worldview in contrast with the current UIUC worldview should generate some interesting discussion, thought, and action.