American Engineers Go Global?: Protecting the Technical Core, from Post-War to Present

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You are an engineer working for a multinational corporation that is expanding operations in South America and Southeast Asia. Their job is to evaluate the feasibility of the expansion, including finding suitable locations and planning operations. From the following list of competencies, pick the top 5 you think are most essential for completing this task:

- apply principles of effective leadership
- engage in continuous and life-long learning
- understand and apply ethical responsibility
- communicate effectively
- work effectively in the global engineering profession
- evaluate situations to make informed decisions
- synthesize engineering with business, societal, and environmental perspectives
- work effectively in diverse and multicultural environments
- recognize and manage change in one’s work context
- be creative and innovative
- work effectively on a team
- realize new ideas or innovations in an existing organization (intrapreneurial) or new organization (entrepreneurial)
- be personally adaptable in a changing environment
- work hard and commit fully to a task
- apply concepts and principles of sustainability (environmental, economic, social)
- Other: ___________________
# Historical Periods

<table>
<thead>
<tr>
<th>Period 0: Prelude</th>
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<tr>
<td><strong>When:</strong> 1910s to 1940s</td>
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<tr>
<td><strong>Context:</strong> Post-WWI / Interwar Years</td>
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<tr>
<td><strong>Notable Developments</strong></td>
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<td>First notable U.S. forays into international education</td>
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<th>Period 1: Diplomacy</th>
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<td><strong>Primary Motivations</strong></td>
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<td>Education (enhanced language and cultural training)</td>
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<td>Emerging business and government needs</td>
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<td>World peace and international understanding</td>
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<th>Period 2: Development</th>
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<th>Period 3: Competitiveness</th>
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<th>Period 4: Globalization</th>
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Historical Periods

Period 0: Prelude

- **When**: Post-WWII into 1960s
- **Context**: Concerns about spread of fascism and communism; rise of Cold War; emphasis on American “cultural and technical diplomacy”

Period 1: Diplomacy

- **Notable Developments**
  - More American engineers going abroad to support foreign aid initiatives, American business operations, and university contracts
  - Major general expansion of international education
  - Establishment of first international educational programs specifically for engineering students

Period 2: Development

Period 3: Competitiveness

Period 4: Globalization
### Historical Periods

<table>
<thead>
<tr>
<th>Period 0: Prelude</th>
<th>When: mid/late-1960s through 1970s</th>
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<td>Period 1: Diplomacy</td>
<td>Context: Policy changes, less overt emphasis on Communist threat, greater emphasis on bottom-up assistance to developing countries, actors like AID and the UN play important roles</td>
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<td>Period 2: Development</td>
<td>Notable Developments</td>
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<td>Period 3: Competitiveness</td>
<td>- MIT Inter-American Program; UCLA RITA Project</td>
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<td>Period 4: Globalization</td>
<td>- Shift in emphasis from technical assistance to technical cooperation, world development, international service, technology assessment, culture-bound technology</td>
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**Period 0:** Prelude

**Period 1:** Diplomacy

**Period 2:** Development

**Period 3:** Competitiveness

**Period 4:** Globalization

**When:** 1980s to mid-1990s

**Context:** Decline of the Cold War, growing concerns about American industrial/economic competitiveness, development discourses recede

**Notable Developments**

- Competitiveness more persuasive as a rationale for internationalizing engineering education
- Many new programs and initiatives focussed on Pacific Rim, especially Japan
- Select engineering schools such as UIUC develop expansive international profiles
# Historical Periods

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<th>Period</th>
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<td>Period 0: Prelude</td>
<td>When: Mid-1990s to Present</td>
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<td>Context: Globalization discourses emerge and partially displace competitiveness concerns</td>
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<td>Period 2: Development</td>
<td>Notable Developments</td>
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<td>Period 3: Competitiveness</td>
<td>- Calls for global engineering education intensify among stakeholders in industry and the academy</td>
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<td>- Many pioneering programs and initiatives launched and sustained (e.g. WPI, GE3)</td>
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<td>Period 4: Globalization</td>
<td>- Notable rise in number of global engineering programs and number of engineering students abroad</td>
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Internationalizing Engineering Education: Failing to Scale

- Engineering majors represented just over 1% of all American students studying abroad for credit in the mid and late 1950s.
- In the 1960s, engineering students 1-2% of all students abroad.
- 1968-1969: 464 engineering students among more than 25,000 total American students abroad.
- From 1980s to early 2000s, engineers as proportion of students abroad gradually rises from 1.3% to 2.9%.
- 2002-2003: ~5,000 engineering students among 175,000 abroad.
- Perennial barriers: Rigid, overloaded curricula; lack of student foreign language expertise; high quality of education in the U.S.; persistent lack of institutional and faculty support.
Questions and Methods

Research Questions
- What attributes or competencies have been ascribed to international or global engineers? What dis/continuities can we detect over time?
- How have specific attributes or competencies been discursively linked to specific identity markers and/or national agendas?

Theory
- “Archaic Professional Frameworks” (Buch), Identity Theories?

Methods
- Extensive archival research and systematic analysis of the literature

Themes
- Protecting the Technical Core; Foreign Language Proficiency; Social and Cultural Knowledge and Competencies
Protecting the Technical Core
The Limits of the Technical Core
“The U.S. nationals going abroad for technical cooperation services should be acquainted with the traditions and culture of the host country, understand the characteristics of the people and the organization of the government, know economic and social conditions there, and have an open mind concerning the ways in which development can be accelerated. Few technicians and administrators going abroad have been fortified with enough knowledge concerning their host country.”

- National Planning Association, 1955
“The task of assisting these new nations is far more complex than is generally realized. It is not merely a question of sending persons with excellent technical training out to do the job. ‘The job’ requires a great deal more than technical know-how – it also involves training, adapting and inspiring. It requires, not only a knowledge of psychology and anthropology, but also an intuitive ability to appreciate the folkways and mores of persons having a totally different outlook on life, and daily habits quite different from our own.”

- Myer Cohen, United Nations, 1961
"I do not mean to belittle the need for technical competence – but I want to emphasize the indispensability of psychological and cultural understanding, along with technical competence, and the significance of the personality structure of individuals being sent into what for them are novel situations. Rigid personalities who want to make the world over in their own images, and who have little tolerance for ‘foreign’ ways of doing things, cannot be very helpful in international development assistance regardless of the other normal technical competence they may possess.”

- Myer Cohen, United Nations, 1961
“[I]t is important that training and education programs for developing country engineers be tailored to their special needs to the extent possible, and that the students and trainees emerge with more than a highly specialized, narrowly focused engineering perspective.”

- Bill Long, AID, 1975
From Either/Or to Both/And: Integrating the Curriculum
“What seems lacking [...] is the perception that international activities for U.S. universities and engineering schools are essential to the future of U.S. industry; often these programs are perceived solely as development assistance to other countries or ‘cultural’ activities without full appreciation of their potential economic benefits for U.S. industry and trade. Japan and W. Germany do not make this mistake.”

- Carol Ganz, NSF, 1983
“It becomes more difficult everyday to try to out-run the rest of the world in technical innovation and development, and the basis for selling technical capability in the future has some serious long-term flaws. If the U.S. is to continue to be a world leader and provide the kind of economy its citizens have known in the past, it is most important for our technically trained professionals to not only have technical awareness but an ability to deal in the international scene.”

- Howard Wakeland, UIUC, 1987
“[E]ngineering is now practiced in a global holistic business context, and engineers must design under constraints that reflect that context. In the future, understanding other languages, and communicating with other people from marketing and finance will be just as fundamental to the practice of engineering as physics and calculus.”

- William Wulf, NAE, 2004
Integrative Visions
vs.
Institutional Realities
“Most faculty and administrators of professional technical and technological schools with whom we spoke argued that the task of coping with peculiar foreign cultures were not proper problems for their students. [...] The engineer’s function, they said, was to design and to build things, not to worry about the larger culture in which this construction was embedded. [...] The implication of this argument [is] that there is no purpose in a technical professional either studying about or in a foreign land.”

- Goodwin and Nacht, Abroad and Beyond, 1988
“Robin Willner, an IBM vice president, recently explained her firm's stress on ‘service science’ to a Capitol Hill audience. Basically, IBM wants engineers who are ‘well-rounded,’ with business acumen as well as math and science skills. The company has been telling engineering schools: ‘You can't send us people who don't know how the world works.’”

- Reported in ASEE Connections, October 27, 2009