A Renaissance in Ph.D Engineering Education
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Outline

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4. Undergraduate Impact
5. NSF Funding
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State of Affairs

- **7000 Engineering Ph.D.s** (1997)
- **7300 Engineering Ph.D.s** in (2005)
- 42% to US. Citizens, Permanent Residents
- 30% of Ph.Ds into Academia
- Curriculum driven by Industry/Academe Needs or-------- Curriculum driven by Research Infrastructure Growth?
Warning Signs

- China applications to Ph.D. (60% down 2003)
- Europe provides more Eng Ph.D.s (2003)
- Asia provides more Eng Ph.D.s (2003)

- US PhDs
  - Ready for Classroom?
  - Ready for Industry?

- M.S graduates (1993) earn more than Ph.D graduates (after 5 years). Has the “marketplace spoken?”
Renaissance of PhD Education

Which Path would you take?

PhD

Industry

B.S. ENG
Business Model for PhD Education

• Eng School “ranking” (and resulting prosperity) driven by graduate reputation
  > reputation (40%)
  > research dollars (25%)

• Ph.D. Students (Key to Labor Productivity -20K plus tuition)
  > External and Internal Assistantships
  > 50-500 Supported across Colleges
  > Benchmark with Medicine, Law, Business

• Who is the Client? (Choose one)
  a) Industry employers
  b) Academic employers
  c) Supply-side funding sources
Impact on Undergrad Program

• Today’s PhD is tomorrow’s Faculty

• 2000 new faculty each year

• Preparation as Mentors, Teachers and Innovators?

• Benchmark with Law, Medicine and Business
1) 7300 Eng PhDs
2) 5034 (NSF Eng) Grad Students (2006)
3) 89.7 mil (tuition and stipends)
4) $89.7 \times 1.57 = 141$ mil
5) 25% of NSF Eng Budget
6) 1000 “NSF PhDs” annually
7) 15% of Eng PhDs via NSF
Renaissance in Ph.D Education

- Ph.D. education is a “by-product” of research business (both employer and advisor)

- Need breadth and depth

- 70% to Industry – where is “value-added”? 
Desired Attributes of an Engineering PhD

- the ability to understand and be understood by those in other disciplines and other cultures
- world-class knowledge in a relevant specialty
- ability to develop work-class knowledge in related areas
- understanding of how specialized knowledge aligns with the larger context of knowing and understanding
- awareness of all effects of globalization and technology--and the price they exact on society
- leadership, as reflected in breadth of knowledge and ability to articulate ideas; confidence, poise, and focus
- ability to define and solve problems
- ability to deal with predicaments as well as problems
- ability to be both a thinker and a strategist
Next Steps

- Spring 2007 – AdComm Feedback
- Summer 2007 – Fact finding
  - Interviews with recent PhDs, industry and academic leaders
- Early Fall 2007 - Workshop
- Late Fall 2007
  - Program for next generation of Ph.D.