

American Society for Engineering Education
(ASEE)

Frederick E. Terman Award

Presentation 2006

Dr. Vijay Madisetti

Professor

Electrical & Computer Engineering

<http://www.ece.gatech.edu/~vkm>

October 2006



Overview

- Acknowledgements & Thanks
- On Writing Textbooks
- Changing Nature of Graduate Education
- Conclusions

*The American Society For Engineering Education
Electrical Engineering Division
Presents the
Hewlett-Packard Company Sponsored*



For the Year 2006

to

Professor Vijay Madisetti

outstanding young electrical engineering educator in recognition of his contributions to the profession

David Workeley
President, ASEE

John V. Zito

Chairman and CEO
Hewlett-Packard Company



Thanks

- Privilege & Honor to Receive the Award
- I am grateful to ---
 - ASEE Terman Award Selection Committee
 - HP
 - My nominator, Dr. Andy Peterson, and students/colleagues who wrote letters of support
 - My colleagues & students at Georgia Tech.
 - Colleagues at other universities and industry
 - My family; wife, son, parents and brother for their support.

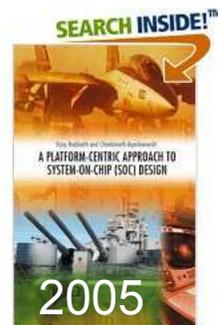
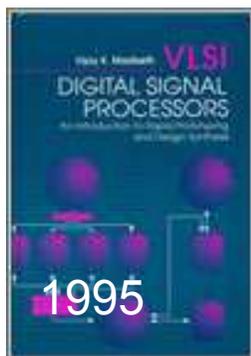
On Writing Textbooks

- Lifelong interest in textbooks – nature & nurture. I am a third-generation teacher.
- My father, Dr. Anant Ramlu Madiseti, wrote several books in Mining Engineering in the 1980s/90s (at Indian Institute of Technology, Kharagpur) – My parents were influential in instilling the value of the teaching profession.
- Colleagues at Georgia Tech & UC Berkeley were influential in showing me the power of a good textbook.
- *Differences between writing a textbook & writing a research paper.*

Research Paper vs. Textbook

- **Paper**
- Focus on original (and differentiated) research → researcher-centric
- Usually biased
- Goal – High impact for a shorter period of time
- Audience – Specialized group
- Presentation made by researchers and co-authors

- **Textbook**
- Focus on the knowledge base in a field → usually area-centric
- Usually unbiased
- Goal: Good impact over a longer period of time (filtering of ideas to select the ones with “staying power”)
- Audience – Larger group of engineers
- University or short course setting - presentations made by others (who are not authors of the book)



Architecture of a Graduate Textbook

Framework of Reference

Current Work in the Area

Models & Metrics

Analysis & Synthesis

Case Studies &
Projects

Labs & Exercises

Instructor Support

16-week
Semester
Timeline



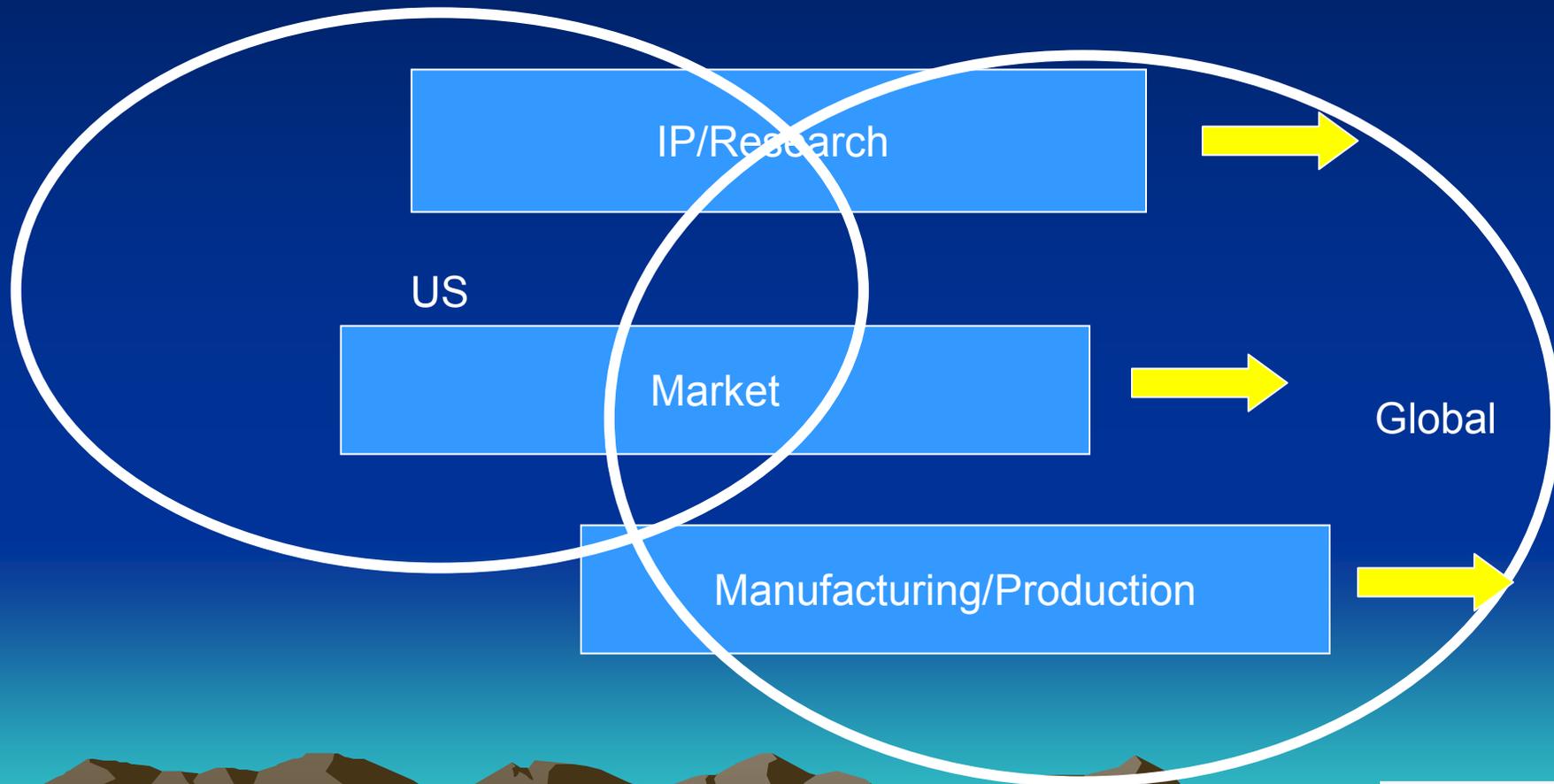
Changing Nature of Graduate Engineering Education



Internationalization of Research

- Everybody talks about globalization and “world is flat” – it is a loaded term
 - Late 90s/early 2000s – US Corporations (Design/Research/Market – US, Production & Manufacturing/Support – Global)
 - 2005-2015 – US Corporations (Design/Research/Market – **Global/US**), Production & Manufacturing/Support – Global)
- US Universities may have to be global in physical presence to be relevant to the needs of IBM, HP, GE, Motorola, Citibank, etc. etc. !
- **Georgia Tech has established campuses in Europe (France), Asia (China) and is exploring initiatives in Singapore and India in the near-time horizon.**

Globalization Pull for US Corporations



University Research Linked to Economic Development (As envisioned by Prof. Terman several decades ago)

- 1990s/Early 2000s – Some technology licensing to large corporations
- Early 2000s-2010 – Spinoffs from University Research in partnership with University, State & Industry by Faculty & Students
- Intellectual property, job growth, and market-relevance are creating new priorities for the research agenda in several engineering areas.
- Patents, startups, and licensing deals are likely to be discussed within university halls as often as theses, papers, and open source tools.
- Are we prepared for this challenge – The university as the hub & creator of new industries and products/services ?

“Integrated Systems” Approach

- Most of the challenging problems as defined by recent NAE reports are large-scale – Weather/Climate, Health, Security, Transportation, Food, Financial markets
- Engineering research and teaching, on the other hand, has become more specialized to sub-fields and sub-specialization
- Increased need to provide a “systems approach” to education and research with focus on analysis and modeling, simulation, advanced optimization, and systems integration.
- **At Georgia Tech, we are proposing a new MS/PhD program in Integrated Systems Engineering, whose working group includes 50 faculty from various fields of engineering, management, business, and computing.**

Engineering as a Service

- Focus moving from products to “services”.
- 60-80% of our graduates join services industries – financial, construction, software, education, transportation, government.
- No clear definition of the field “Services Engineering” – few models, few metrics, few R&D labs or Universities have a formal handle on the issue of “services”, and how to make sense of it in the notion of a “balance sheet/ P&L table” on a growing area, which eventually could be the mainstay of US economy
- Introduction of the “Services Supply Chain™”.
- New education and training → possibly leading to the MS Degree as being the minimum needed for the new class of Services Engineer.

Summary



Summary

- Engineering education and research is changing in four main ways – internationalization, linkage to economic development, systems approach, and the “services” focus. (Changes are best done at the graduate level, in my opinion).
- Exciting opportunity for us to use these challenges to redefine our field, and attract the best students and researchers to our area !
- Thank you again for this honor today !