

# A New Model for Academic Entrepreneurship: Successes and Lessons

**Harold J. Raveché, President**  
Stevens Institute of Technology



National Cheng Kung University

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## **Contact Information:**

Email: [hraise@stevens.edu](mailto:hraise@stevens.edu)

Phone: (201) 401-4207

An aerial photograph of the Stevens Institute of Technology campus. The campus is situated on a peninsula overlooking the Hudson River. In the background, the dense skyline of New York City is visible across the water. The foreground shows various campus buildings, including a prominent tall, modern tower, a large green sports field, and several parking lots filled with cars. The text "Greetings and Best Wishes from Stevens Institute of Technology" is overlaid in blue on the upper portion of the image.

# Greetings and Best Wishes from Stevens Institute of Technology

# Outline

- Model of Traditional Research University
- Global Competition
- Defining Innovation
- The Academic Entrepreneurship Model of IP Commercialization
- Successes
- Lessons Learned
- Conclusion

### Research Enterprise

- Research Funding
- Single Investigators
- Research Centers
- Patents -- IP
- Technology Transfer of IP

### Teaching Enterprise

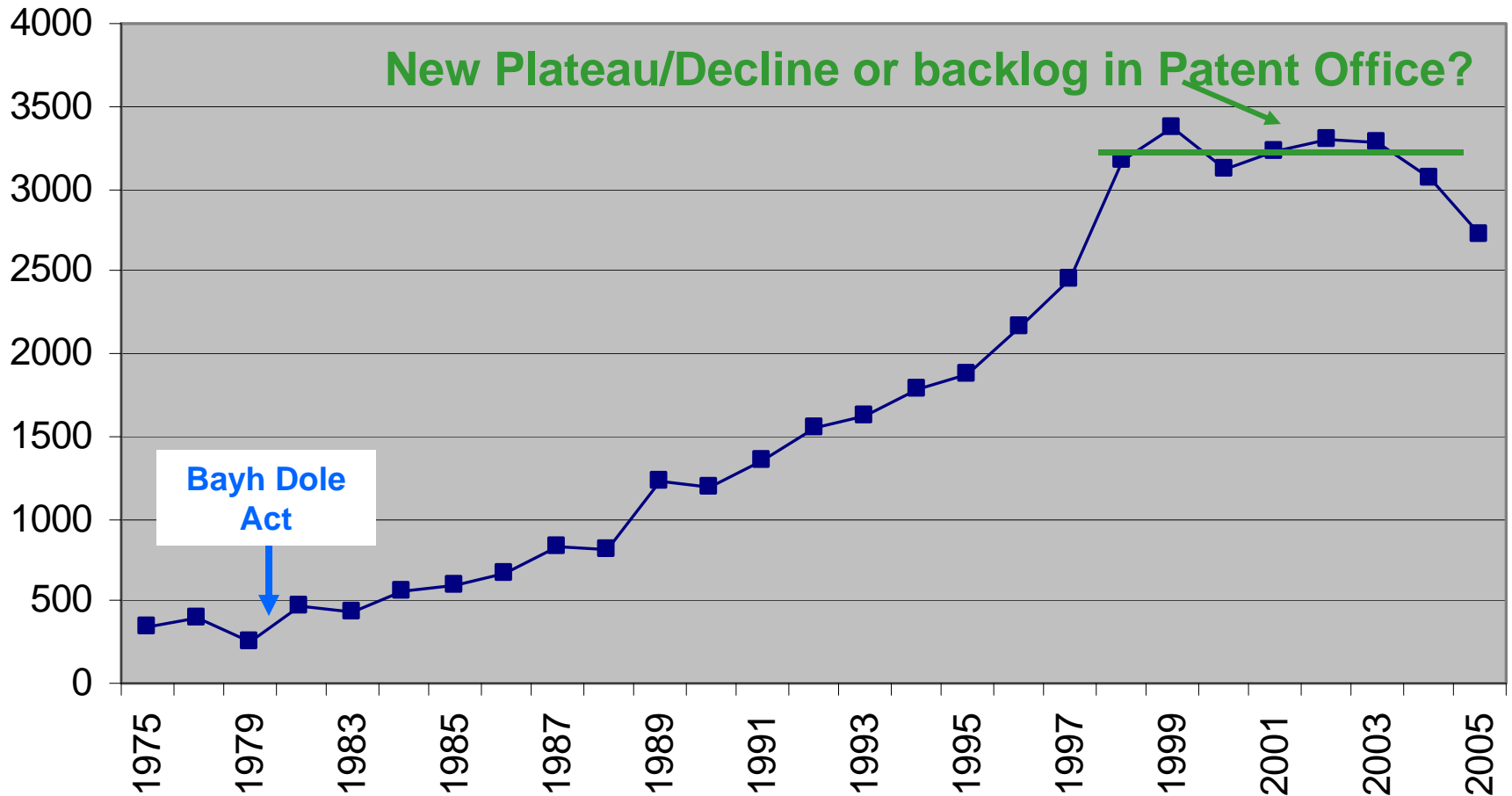
- Growing number of undergraduate, graduate, professional and web-based programs

**Spheres rarely overlap making it difficult to establish a learning environment which sustains innovation.**

Challenge: Bring the spheres together through a new model

# US Patents and Revenue from Traditional Model

Number of Patents granted to US Universities per year\*



Licensing Revenue, 1992-2004: \$283 Million → \$1,385 Million\*\*

\*Source: United States Patent and Trademark Office

\*\*Source: Association of University Technology Managers

# Global Competition

## Patents granted per 100,000 residents Year 2006

Japan	99.51
Korea	182.81**
Taiwan	50.01
USA	30.07
Singapore	9.19
Malaysia	1.22

\* Source: JPO, KIPO, USPTO, TIPO, MyIPO and IPOS

\*\*Change in Patent Application Processing

Manufacturing as a percentage of GDP, 2006***	
Malaysia	29.8
Singapore	27.6
Korea	24.7
Taiwan	21.4
Japan	21.0
USA	12.6

\*\*\* Source: Economist.com Country Briefings, Economic Structure

**Message: Create in-country talent pool**

## Economic Activity

## Level of Education

Sustaining transformational inventions and business growth

The role of the innovation in research and development

### Jobs and Wealth

Inventing new products and services

PhD's with experience in Academic Entrepreneurship

### Innovation Economy

Improving existing products and services

Master and Bachelor degrees

### Jobs

Manufacturing of existing products

Associate – 2 year – and Bachelor degrees talent base

### Knowledge Economy

# Innovation

“The design, invention, development and/or implementation of new or altered products, services, processes, systems, organizational structures, or business models for the purpose of creating new value for customers and financial returns for the university, the region and the nation.”

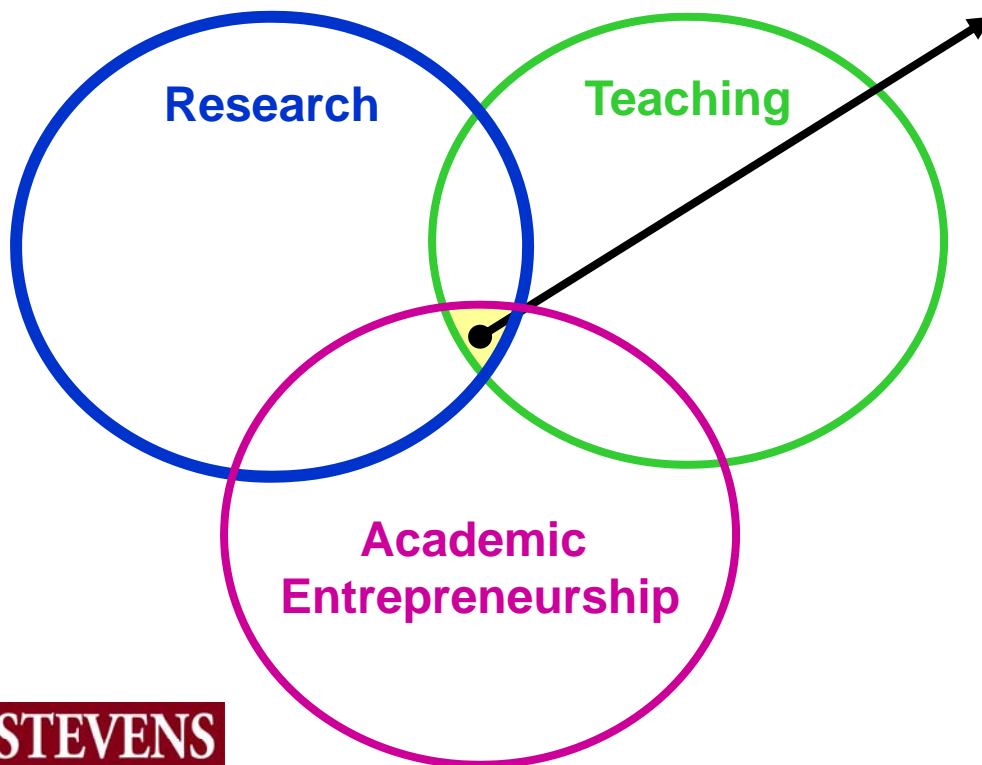
- Modified from “The Executive Summary of Measuring Innovation And Its Impact on the Economy.” US Department of Commerce. January 2008



# Academic Entrepreneurship

## ➤ Definition

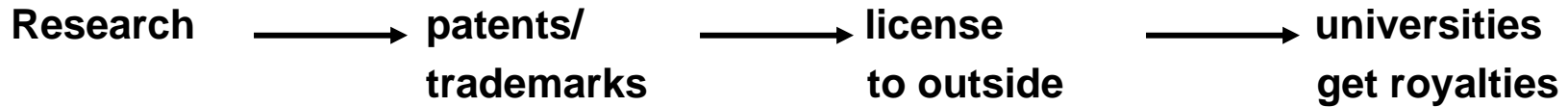
Academic Entrepreneurship (Æpreneurship) is the mindset of the faculty and students to pursue research that transforms its domain and to realize the benefits of their research for business, industry and government through the creation of shared value.



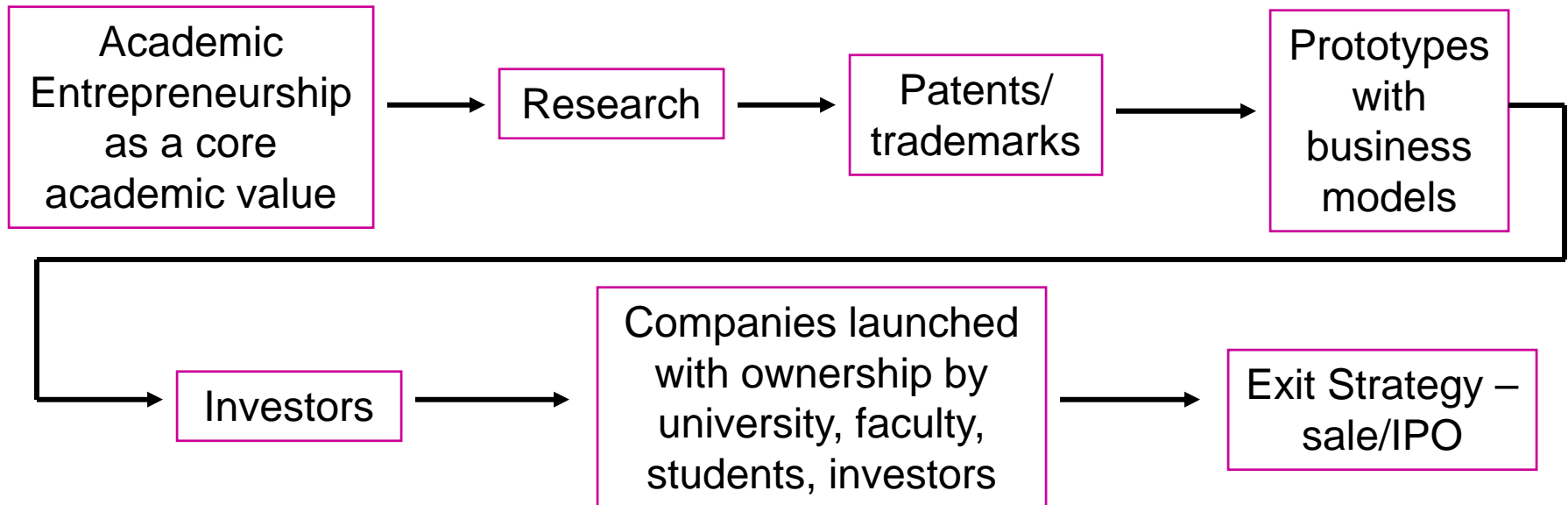
## The Effect of Æpreneurship

- The mindset for innovation is established among faculty and students
- Æpreneurship enables the research university to be a source of sustained innovation

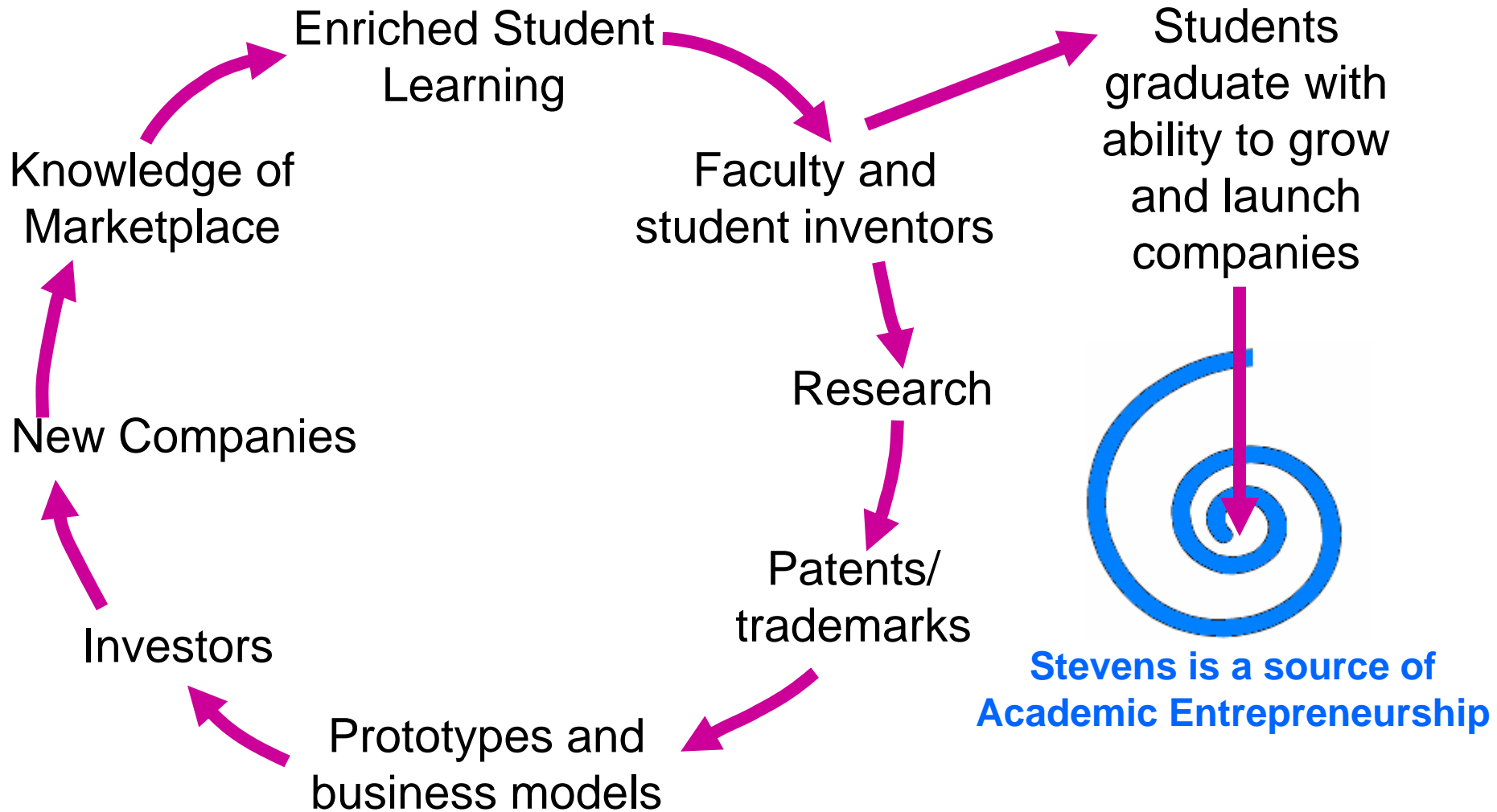
## Traditional Research University Model



## The Stevens Entrepreneurship Model: Path to Sustained Innovation






# Stevens Entrepreneurship Model Value Proposition



August 30, 2007 – The Business Week article titled **“Who Needs the Ivies?”** cites the strong entrepreneurial environment at Stevens: **“Schools like MIT and Stanford don't graduate more founders than Stevens Institute of Technology or Arizona State University. Even the famed Indian Institute ...”**

## Successful Examples of Entrepreneurship

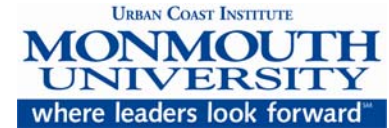
Company	Product	Disruptive Features	Status
	Removes heavy metals from water	Effective at small scales	Sold to Graver
	Medical Sterilization Equipment	Quick turn around sterilization, portable, safe for sensitive surgical instruments, no environmental disposal	Sold to Stryker
SPOC, Inc.	Diagnostic medical device – locates specific muscles causing pain	<b>Redefines</b> pain mgt – Prevents unnecessary treatments & surgeries.	Clinical trials; Institutional investments received; Kaiser Permanente trials; FDA approved
Attila Technologies LLC 	Intelligent multi network radio/router - dynamically connects to all accessible networks for high throughput, non-interrupted connectivity	<b>First</b> of a higher level class of communication systems - works in the space of channels not signals – a cognitive network.	WHCG field tests; interest in internet enabled car; private inv. Received; units purchased
InStream Media, LLC.	Unobtrusive stego based advertising s/w for digital media; Consumer interactive & initiated. Real time advertiser feedback.	<b>Creates</b> an advanced advertising paradigm for digital media – next generation product placement.	Negotiations with broadcast and cable TV; seeking additional investors; BIG INTERACTIVE, PTE, LTD. distributor
Predator Vision, LLC	Mid IR camera with images of ultrahigh optical resolution and hyperspectral imaging	<b>Operates in range of</b> 8-10 micrometers; penetrates optical barriers; highly sensitive chem/bio detection	Uncooled resolution of 3 Megapixels; negotiation with investors and manufacturers
Castle Point Scientific LLC	Ultra sensitive optical sensors for automated perimeter and border security	<b>Displaces</b> current sensors – 40% greater sensitivity and lower cost	Military tests of prototype outperformed industry standard; tests at US border by DHS

# SIT's Experience

## Department of Homeland Security National Center of Excellence



## For Port Security



### Research Areas

HF Radar

Resiliency

Vessel Tracking

Policy Assessment

Research and Education

Satellite-Based Surveillance

Maritime Domain Awareness

Recovery and Continuity of Operation

### COE Partners



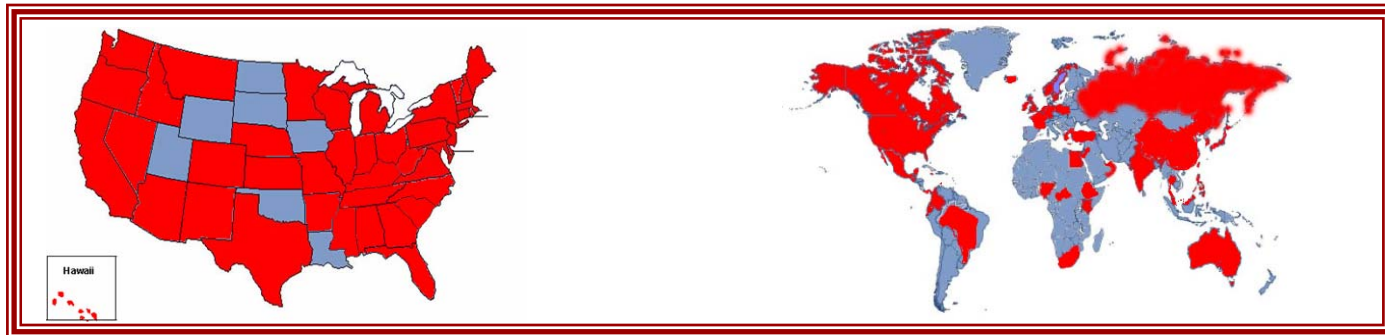
# SIT's Experience

## WebCampus.Stevens

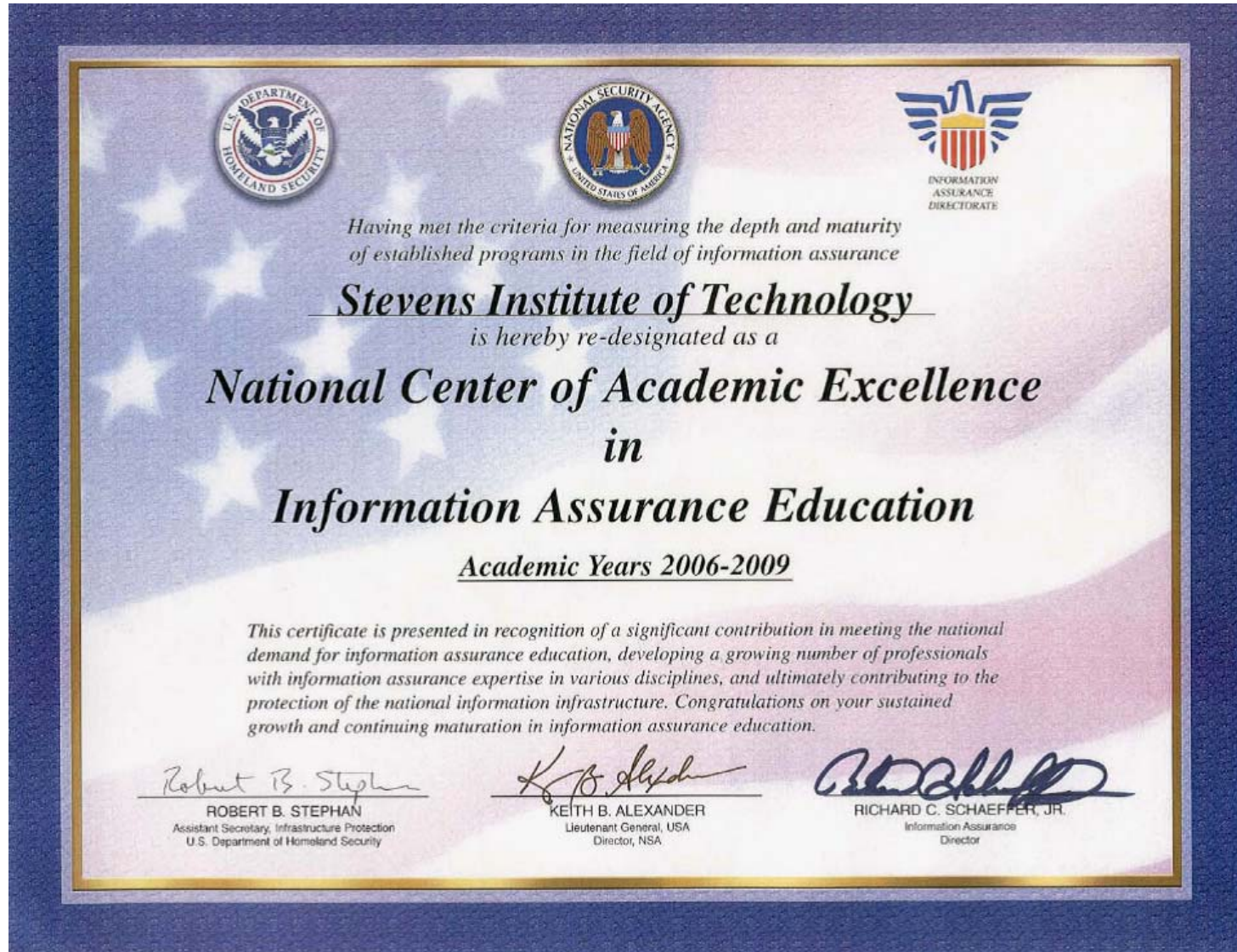
- Stevens Institute of Technology's **China** Program — management and technical degrees delivered in collaboration with top universities in China—has been named “**most outstanding online teaching and learning program**” by the Alfred P. Sloan Foundation in 2007
- December 2007: WebCampus.Stevens reached its **12,000<sup>th</sup> enrollment**
- U.S. Distance Learning Association's **21<sup>st</sup> Century Award for Best Practices** in Distance Learning for 2005
- Named **Best Institution-wide Online Teaching and Learning Programming** for 2003 – presented by the Alfred P. Sloan Foundation's Sloan Consortium

43 States

40 Countries

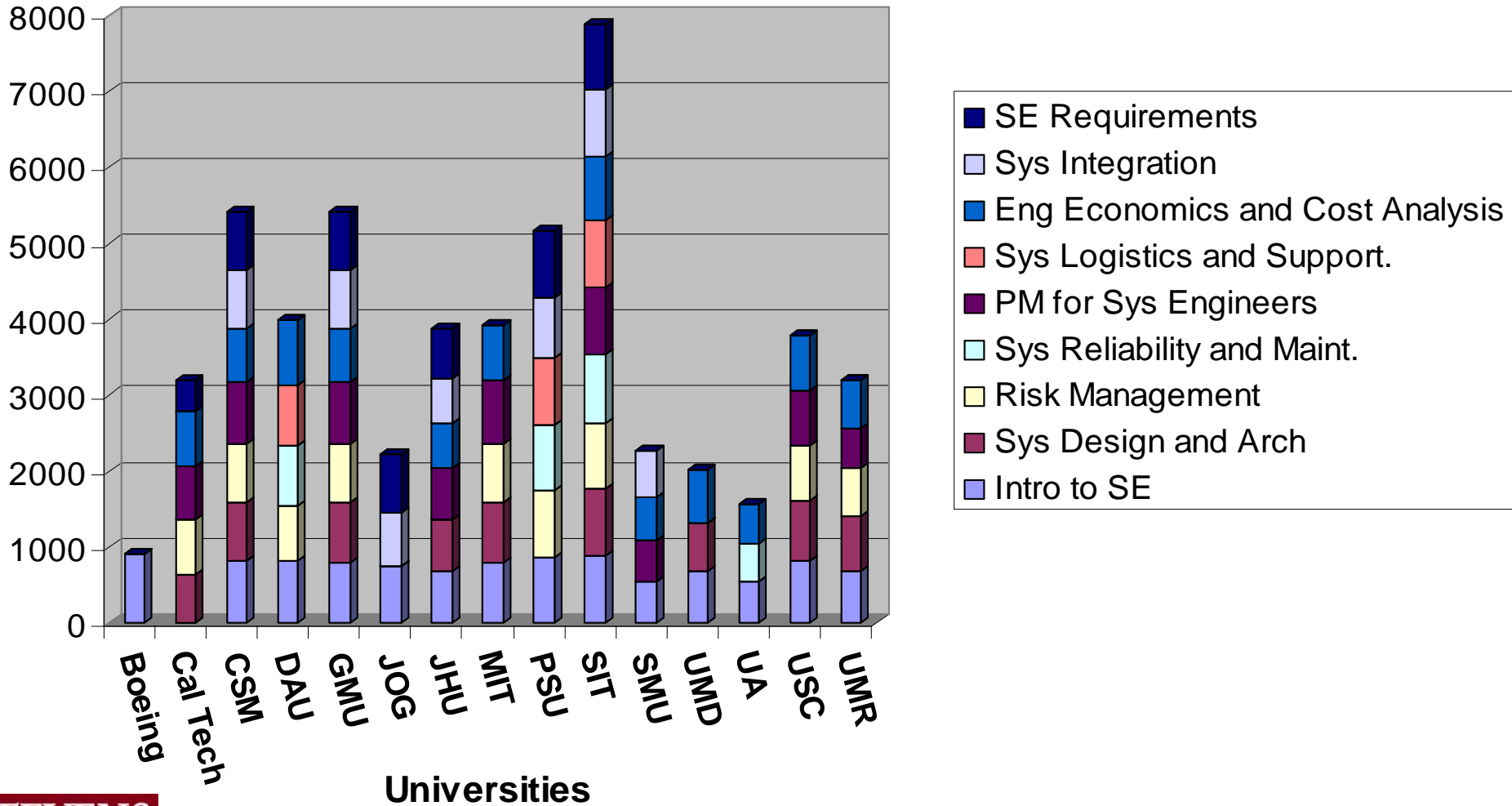


# SIT's Experience



# SIT's Experience

Comprehensive criteria for educating and implementing Systems Engineering at National Security Administration

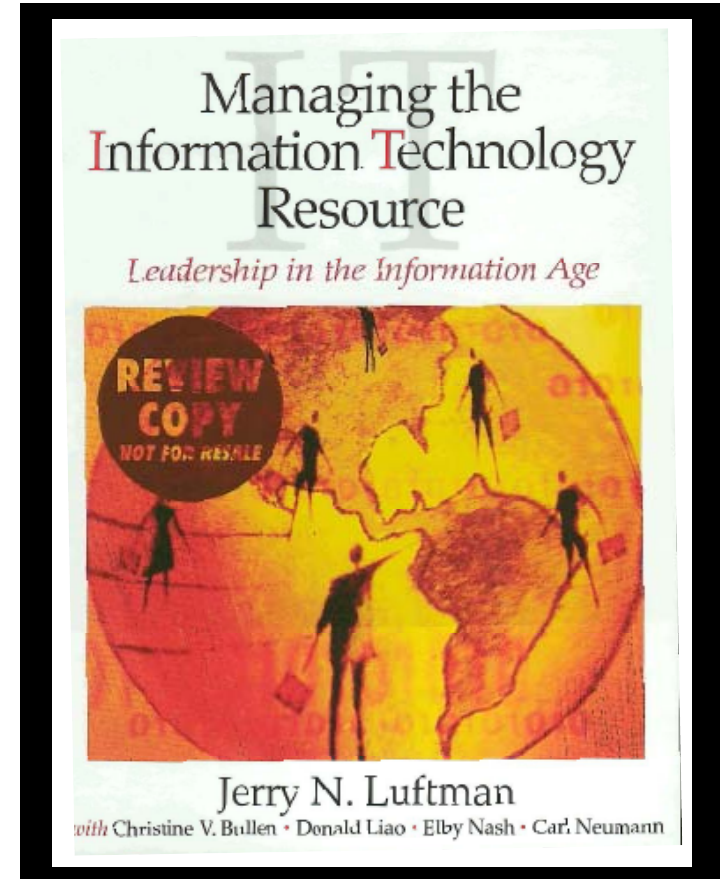
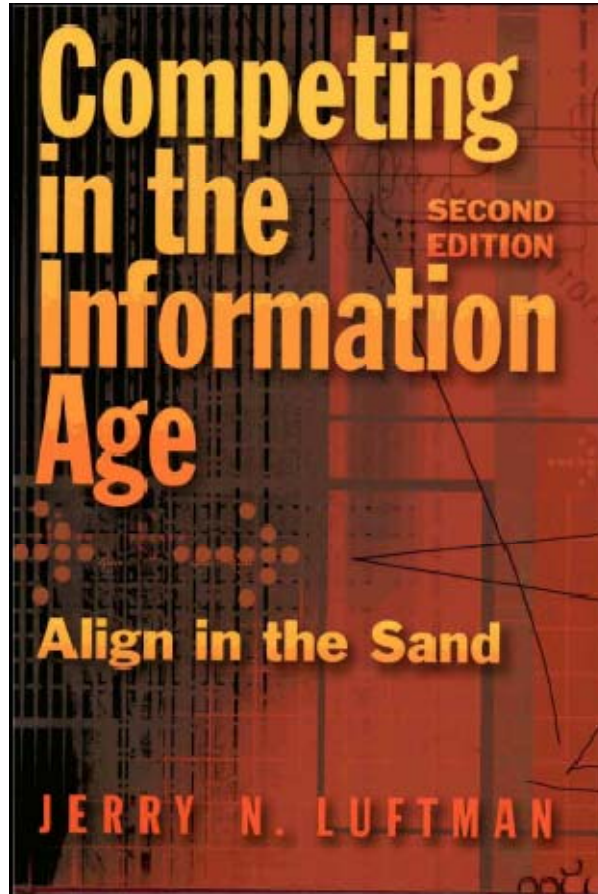




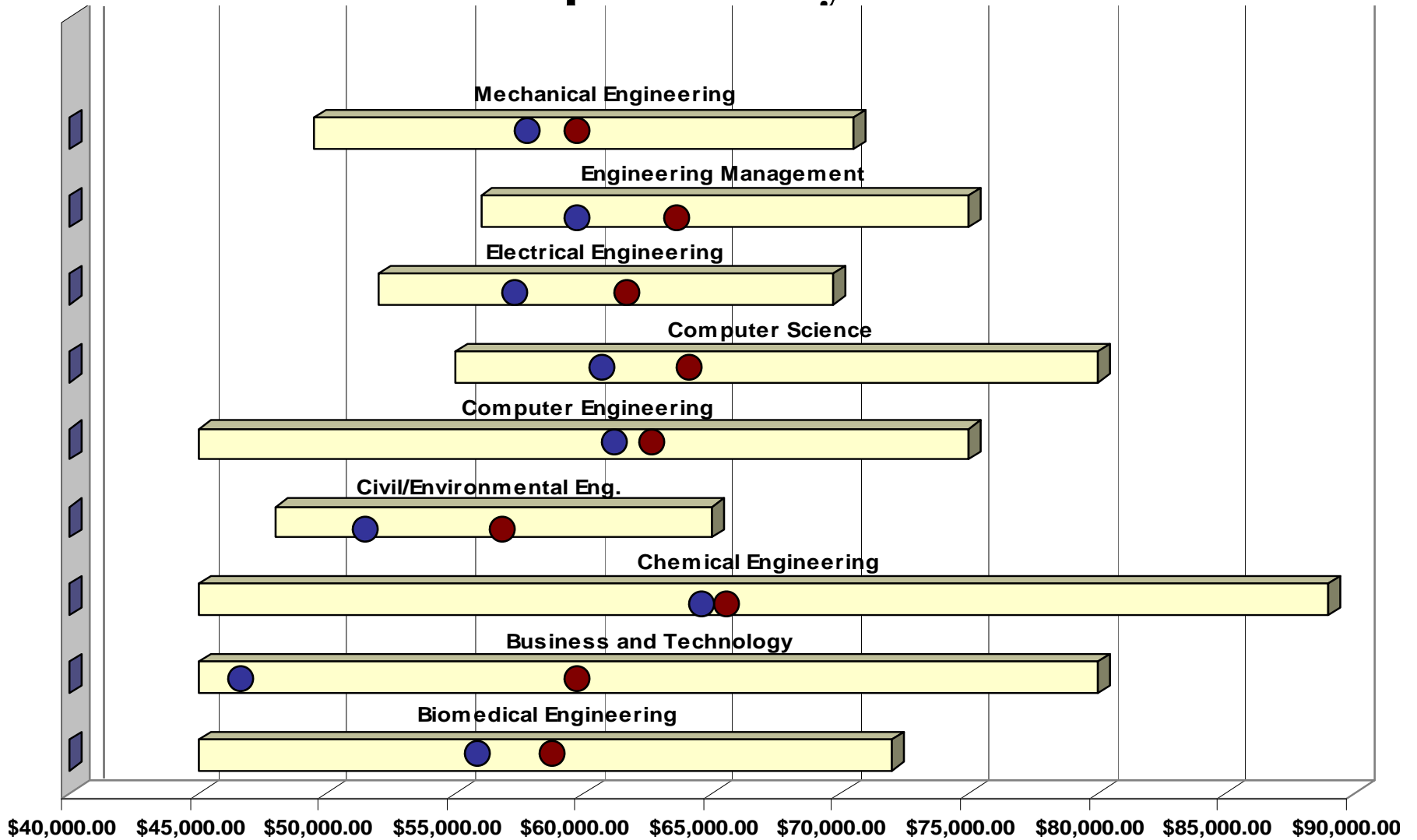


# SIT's Experience

## Graduate Resource Books



# Undergraduate Class of 2008 – Accepted Salary Offers



● Stevens Average      ● National Average

# Lessons Learned

## 1. Nurturing attributes among the faculty and students

Desire to create new things

Courage to take a risk

Perseverance

Incentives and Rewards

## 2. Active commitment of the University Leadership

The leadership must make entrepreneurship a mandate along with teaching and research, championing a model that suits NCKU

Be Generous in sharing value with inventors

Provide infrastructure

# Lessons Learned

## 3. Sources of Capital – advantages/disadvantages

University

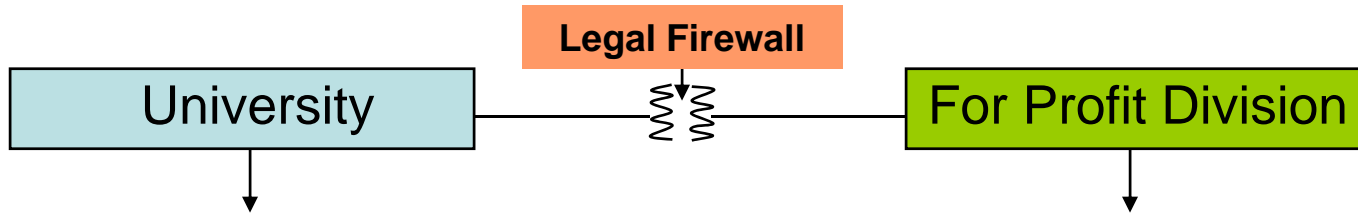
Venture capital

High net worth individuals

Corporate

## 4. Infrastructure

# Infrastructure



- Funding for faculty and student research
- Policies and practices to implement and sustain Entrepreneurship – incentives, rewards and recognition for faculty and students
- Networking to attract external collaborators and partners

- Licenses IP to startups jointly owned by the university, inventors and investors
- Supports prototype development
- Develops business plans
- Attracts investors (seed and follow on rounds)
- Investment decisions must be made by business persons to business standards
- Hires CEO's
- Develops exit strategy

# Conclusion



- Transition to academic entrepreneurship is difficult but rewarding for the university, faculty, students and Taiwan
- Success will be realized through
  - Leadership and commitment of the university leaders
  - Active engagement of key faculty, who will inspire other faculty and students

**Pursue this Goal with Passion and Perseverance!**

**Thank you**



**Dr. Harold J. Raveché is the sixth President of Stevens Institute of Technology, a private university founded in 1870 in Hoboken, NJ. The founders of Stevens, who pioneered steam transportation in the U.S. and who were early advocates for U.S. Patent Law in 1790, are said to be America's First Family of Inventors.**

**Dr. Raveché pioneered the unique Technogenesis® learning environment (SIT Model), wherein students, faculty and external partners join in creating shared value from the intellectual property developed by launching new companies. Many companies have been formed with investors and some have been sold to larger corporations.**

**Dr. Raveché has promoted multi-disciplinary research centers to meet the needs of government agencies, and business and industry. These include: Maritime Systems Laboratory, Wireless Network Security Laboratory, Center for Environmental Systems, Joint Center for Pharmaceutical Research, CyberSecurity Center, and the Design and Manufacturing Institute. New initiatives launched in alternate energy sources and biomedical technologies. The graduate programs in Systems Engineering and Information Systems, among the largest in the world, extend beyond U.S. to Latin America, Europe, Asia and India.**

**Dr. Raveché championed WebCampus.Stevens in 2000, which has reached 12,000 enrollments with student in all continents. It was named the best online graduate program in the U.S. by the Sloan Foundation in 2003 and by the U.S. Distance Learning Association in 2005. In 2007, the SIT program in China received the distinction of “most outstanding online teaching and learning program” by the Alfred P. Sloan Foundation.**

**He holds a PhD from the University of California, San Diego in Physical Chemistry, lectures widely on the role of universities in promoting entrepreneurship and economic competitiveness. He serves on corporate boards and is a global advisor on technological innovation.**