

# **Leveraging Academic Entrepreneurs - Commercializing Scientific Discovery**

An International Comparison of Technology Transfer

**May 24, 2004  
Brown University**

**“Research in natural sciences is always the secure foundation for technical progress, and a country’s industry will never be able to gain and sustain a leading position if the country is not at the same time a leader in scientific progress.” Werner von Siemens**



## Background

Whether we like it or not, the world is changing rapidly.

**“Ninety percent of the scientists and engineers that have ever lived in the history of mankind are alive today.”**

**D. B. Merrifield**

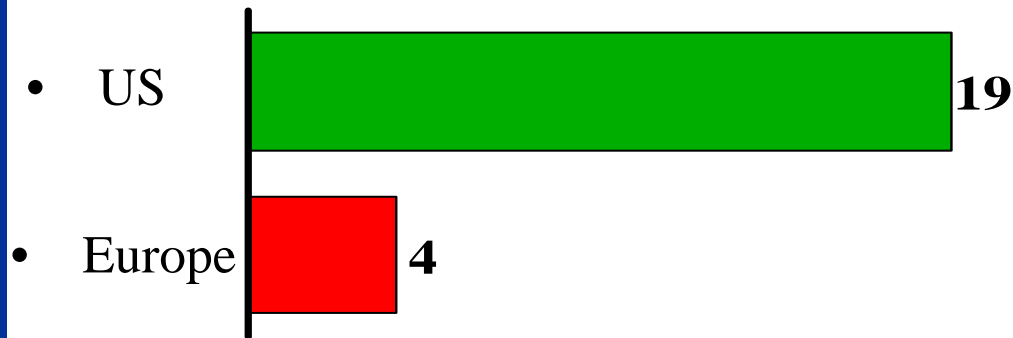
- MIT Spinoff Companies
  - 1065 in MA
  - >4000 worldwide
  - \$237 Billion 1997 revenues
  - equals the 27th largest economy of the world
- Semiconductors (e.g. Fairchild)
- Integrated Circuits (Intel)
- Biotechnology (Genentech)
- Internet (Akamai)

## **Economic Strength Requires Startups Because Large Companies do not Pioneer Radical Innovations**

- 70% of net new jobs in the US come from 4% of the firms “gazelles”
- Large companies create new jobs outside their home nation
- Small companies that are not globally competitive create low paying jobs
- Government policy – retain “old” jobs vs create “new” jobs

## European start-ups are not fast growing and do not truly grow across borders yet

- Percentage of firms classified as fast growers

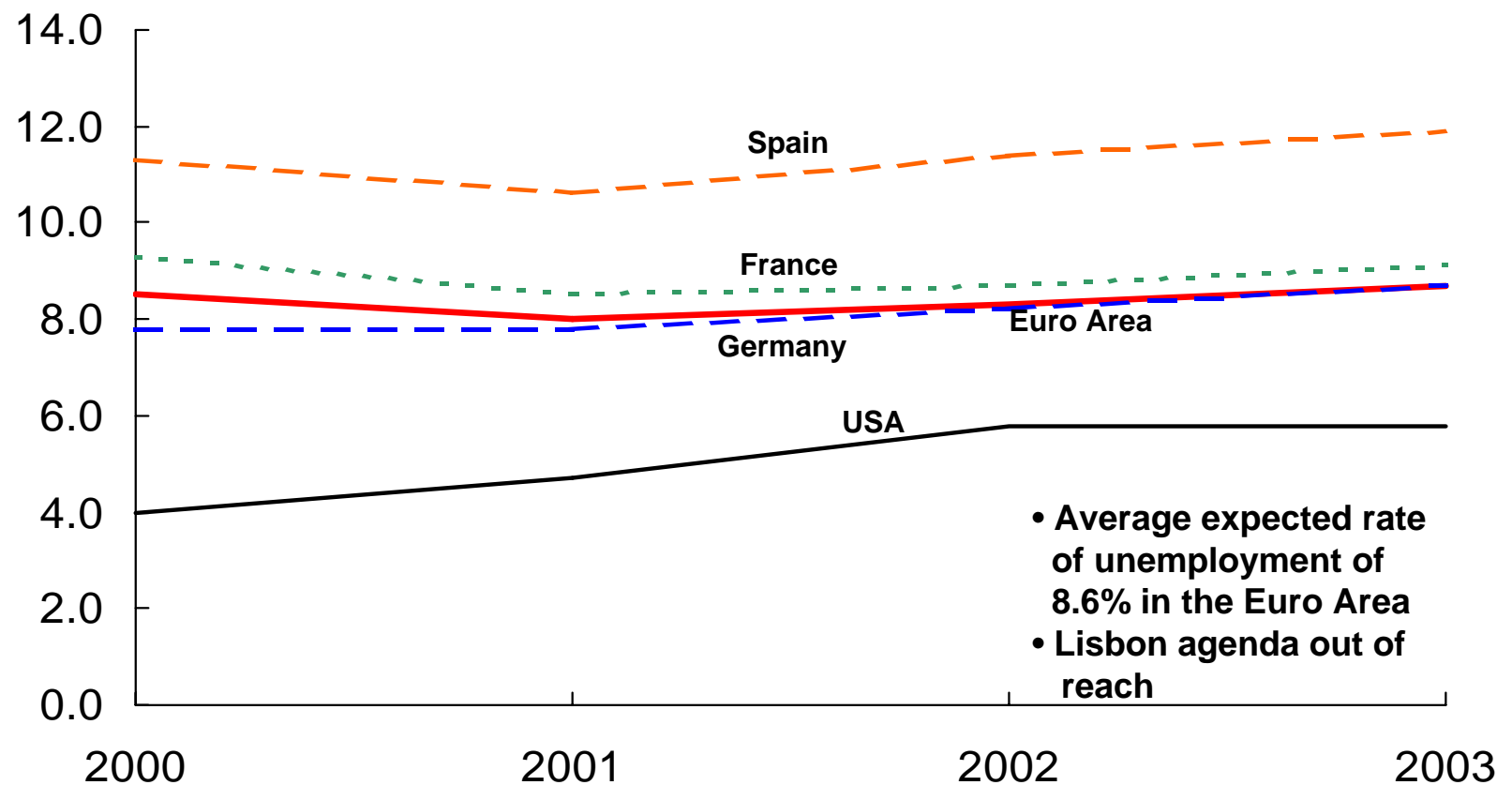


Fast growers:

Firms that double their turnover between reference periods as a percentage of all mid-sized companies

- **Less entrepreneurial dynamism in Europe:**
- Most European entrepreneurs are life-style entrepreneurs and survivors

## Unemployment in Europe / USA



Source: OECD Standardized Unemployment Rates. From a presentation by Bert Twaalfhoven to the EEC June 10, 2003

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## High Unemployment in Europe is Only Part of the Problem

- Average American works 1978 hours per year
- Average European works 1525 hours per year
- US has higher percentage of “unemployable”
- Fewer strikes and labor actions in the US
- Entrepreneurs (and passionate workers) never leave work!

## **Startup Companies Need**

1. Best and brightest willing to take risk
2. Willingness to share success
3. Willingness to work hard with passion
4. Availability of quality investors
5. Source of quality ideas
6. Academic collaboration with industry
7. Government policies that support business creation

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## Non-Entrepreneurial Firms Respond Poorly to Disruptive Ideas

“Radical Innovation never originates with the market leader.” J. Utterback

- Management uses experts in the “Old Technology”
- Experts in the Old Technology are the most threatened by something new
- Management uses committees, which have the wrong psychology
- Western Union
- Napoleon
- Thomas Edison Examples

“Great spirits have always encountered violent opposition from mediocre minds.” A. Einstein

## Europe and Japan have a Stigma for Failure

“The only people who never experience failure are those who are not pushing the envelop of what man is capable of doing.” J. Preston

- Culture is deeply engrained and difficult to change
- Best and brightest elect lower risk careers (large companies)
- Nietzsche
- Failure is often followed by great leaps forward
  - Post W W II Europe /Japan

## Europe and Japan have a Stigma for Success

- Perception that wealth is shifted in Europe
- Perception that wealth is created in the US
- New rich in Europe often hide their success
- Celebrating success is key to inspiring the best and brightest young people to entrepreneurship

## Management Teams

- Value of Teams of Entrepreneurs
- Best and Brightest
  - 1s hire 1s, 2s hire 3s
- Complementary Skills

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## Passionate Behavior

- Distributed Ownership (US v Europe, Japan)
  - Southwest Airlines, Lotus Development
  - European and Japanese firms generally do not give meaningful stock options.
- Generators of Passion
  - Pass credit to subordinates
  - Share blame for mistakes
- Killers of Passion
  - Greed, lawyers, committees - 100% of nothing vs a small piece of a big pie. Schmidheiny quote

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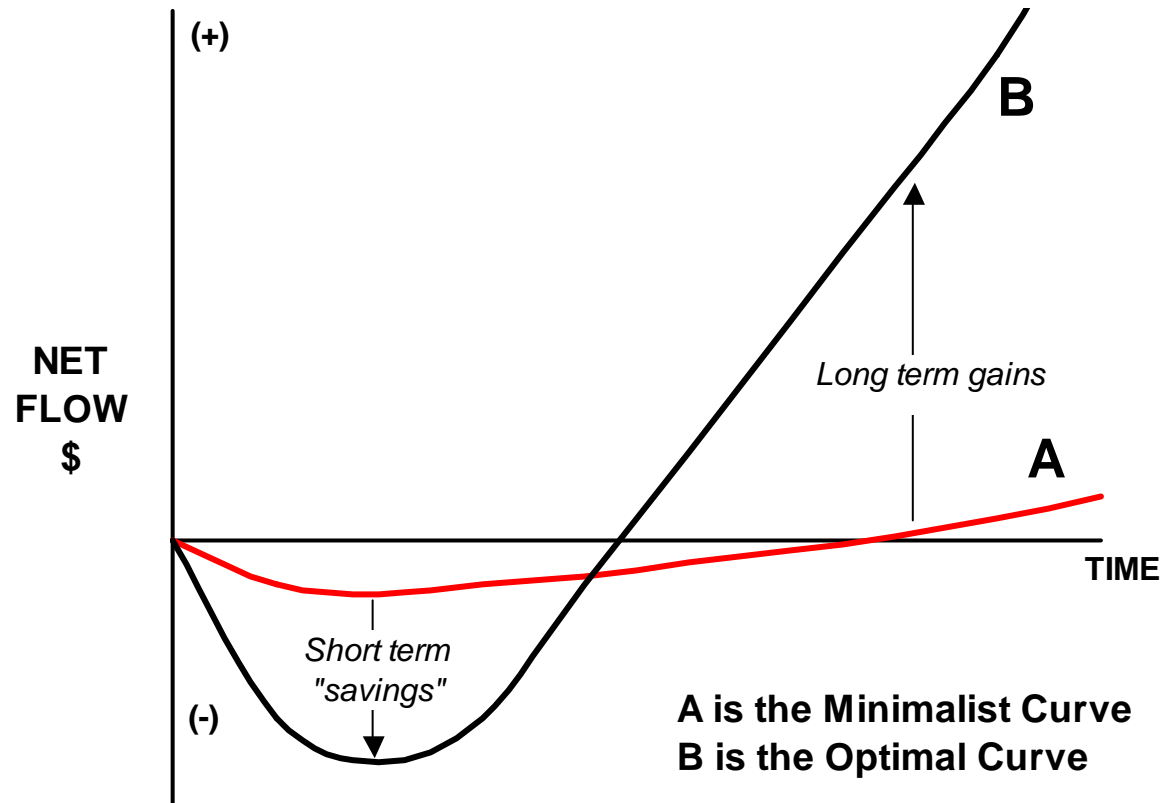
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## Investors

- Provide Leverage
  - Open Doors (Genentech)
  - Deep Pockets
  - Hands On
  - Sufficient Long Term Capital to be on the “B” Curve



## Financing Capital Equipment and New Technology



## Venture Investments in Europe and Japan are Very Different than in America

- Fewer “hands on” professional investors
- More friends and family and banks
- Unwillingness to wait 5+ years needed to break even
- Exa example

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## Sources of Great Ideas are Similar in Europe, Japan and the US

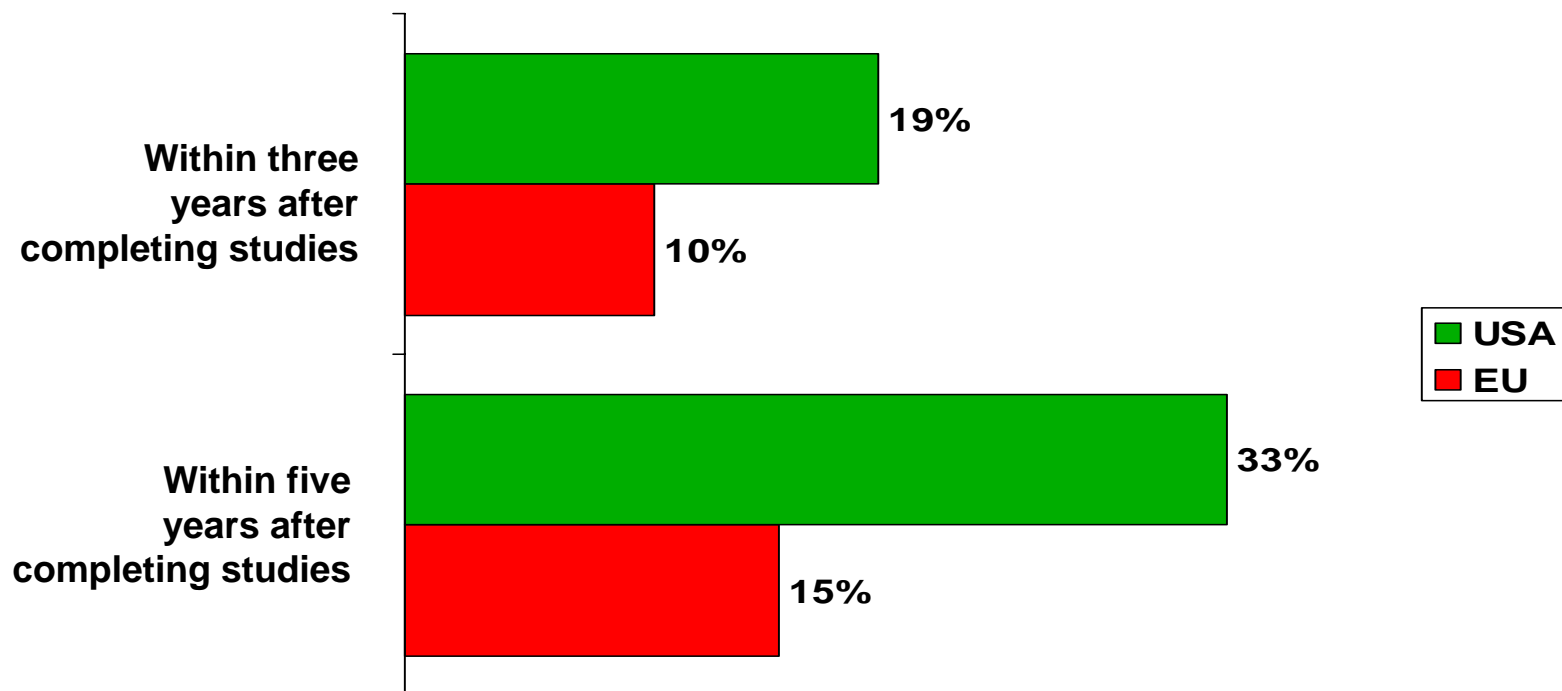
- Cambridge, Oxford, ETH Zurich, St. Gallen, Helsinki University of Technology, Leuven, Ghent, Vlerick, Delft, Erasmus, Max Plank, Heidelberg, Aachen, Leiden, Munich, Berlin, Ecole Polytechnique, ...
- Brown, MIT, Stanford, Harvard, California, Texas, Rice, Houston, Georgia Tech, Wisconsin, Florida...
- European universities do not have clear ownership on inventions
- European universities do not take equity in lieu of royalties
- Simple business to business negotiations – no lawyers entrepreneurial negotiators on both sides

## However There are Big Differences in Academic Attitudes

- Ivory tower attitude - connections to industry are demeaning and reduce credibility
- European Universities lag the US in teaching entrepreneurship
- Peer pressure to avoid commercial activities is worst for young faculty (young faculty are most valuable for startups)
- There are few role models (Prof. Edgerton)
- The mission is to publish - at MIT the mission is to make a difference
- Stephanopolous quote: "Creating life v Painting a picture..."

## Entrepreneurship is not considered a priority for life in Europe by many students

Student interest in becoming an entrepreneur



Source: Ministry of Economical Affairs/Netherlands. From a presentation by Bert Twaalfhoven to the EEC June 10, 2003

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## **FLEXIBILITY: MULTIMEDIA INTERNET EXAMPLE**

<b>MARKET</b>	<b>US</b>	<b>JAPAN</b>
Catalog Shopping	\$80B	\$8B
Home Shopping	2B	0.1B
Video Rental	16B	2B
Cable TV	23.5B	0.5B
Info. Services	35B	5B
No of PCs	70M	10M
% of PCs Networked	50%	10%

Source: Dr. Yukawa at Mitsubishi, 1993 data



## **RULES IN JAPAN: BARRIERS TO ADOPTION OF INNOVATIVE TECHNOLOGIES**

1. MINISTRY OF HEALTH
  - No Drug Sales Outside Drug Store
  - Doctor Must be Face-To-Face with Patient to Make Diagnosis and to Charge for Service
2. MINISTRY OF TRANSPORT
  - No Ticket Sales Outside Travel Office
3. MINISTRY OF EDUCATION
  - No Credit for Learning Outside Class
4. MINISTRY OF FINANCE
  - No Banking Outside Banks and Bank Hours
5. CORPORATE LAW DOES NOT RECOGNIZE:
  - Teleconferenced Board Meetings
  - Working at Home (Insurance & Labor Standards)

Source: Dr. Yukawa at Mitsubishi

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## LOCATION OF THE COMPANY

### (Regional “Cluster” Advantages - Michael Porter)

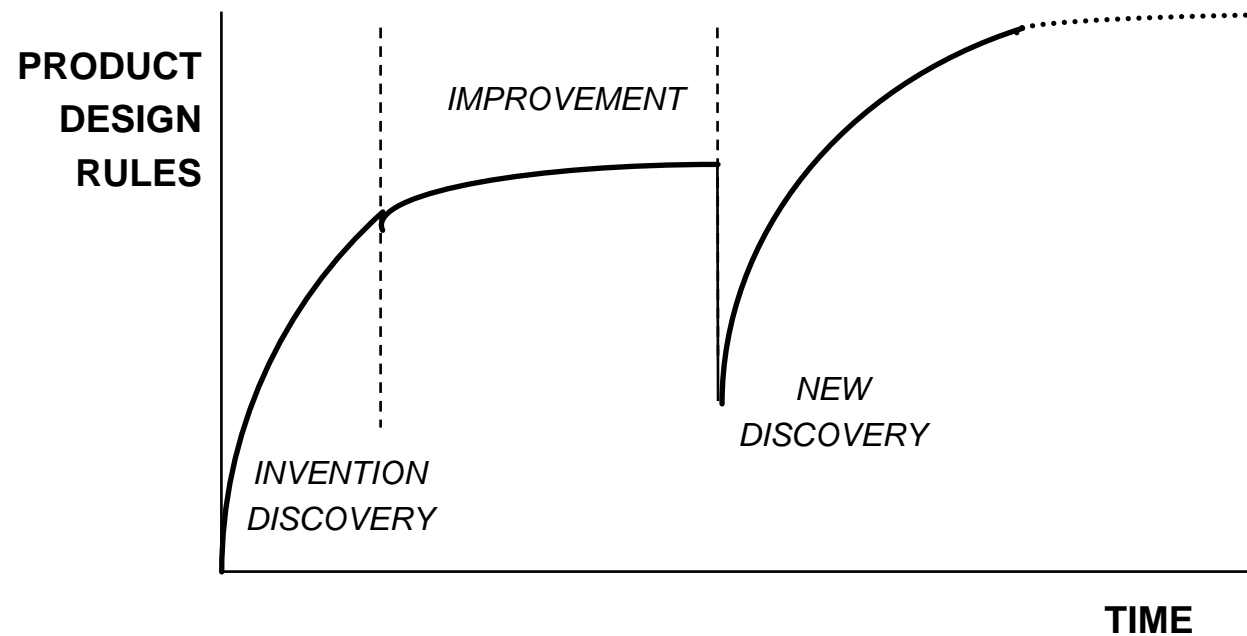
- Near Fiercest Competitor and/or Most Demanding Customer
- Clusters of Complementary Companies Provide Advantage:
  - Dutch Flowers
  - Route 128/Silicon Valley
  - Japanese Consumer Electronics
  - Singapore Hard Disk Drives
- Barriers to Foreign Competition Spoil the Advantage of Clusters:
  - Pushes Most Demanding Customers to Leave  
Sony, Toshiba, Toyota...are moving outside Japan

## Locating in a Cluster Provides Multiple Advantages

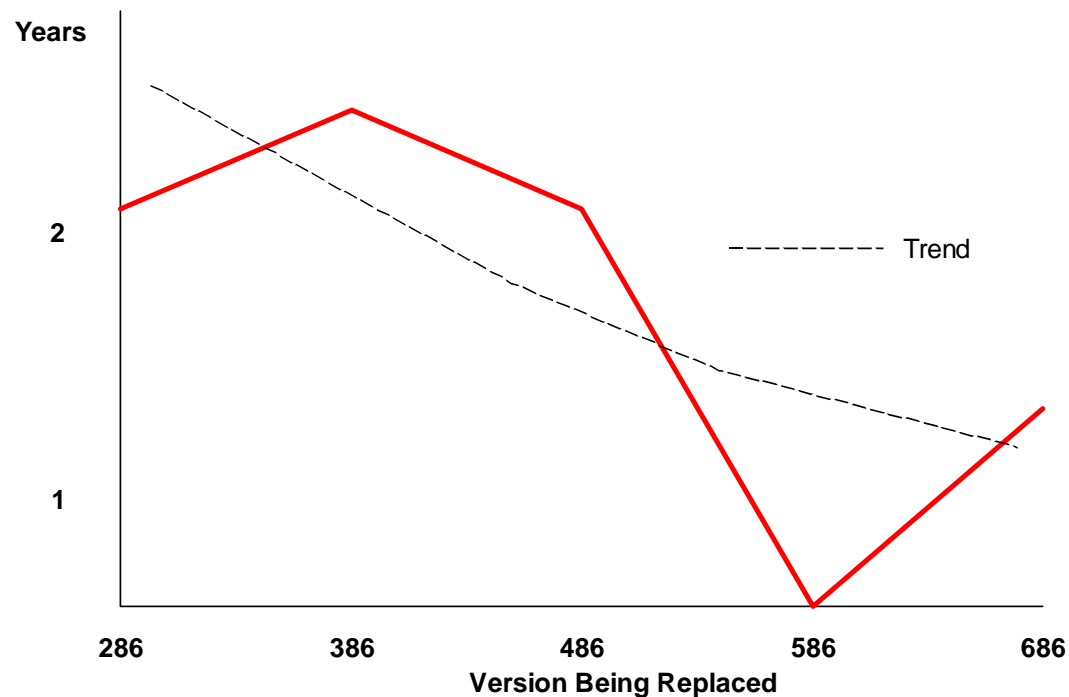
(Michael Porter)

- Higher skilled labor
- More competitive vendors
- Greater access to customers
- Greater access to investment money
- Greater opportunity to obtain liquidity for investments
- Early insight into industry trends

# INNOVATION CYCLES



## INTEL: NUMBER OF YEARS FROM VOLUME PRODUCTION TO ANNOUNCEMENT OF NEXT VERSION



Data Source: Professor James Utterback, MIT

# Large Company Strategies

- Monitor emerging trends in core fields
  - Use outside experts (e.g. academics)
- Acquisitions
  - After risk reduction
  - Prior to major valuation run-up
- Examine synergies
  - Internal markets for companies products
  - Complimentary distribution channels

## Large Company Strategies (cont.)

- Entrepreneurs do things you cannot do
  - Singer example
- Speed to market
- Retain passionate behavior
- Make a few “B” curve decisions rather than many “A” curve decisions
- Look for formations of synergistic clusters

