Technology Oriented Competitive Intelligence – A Primer

Bruce Mason

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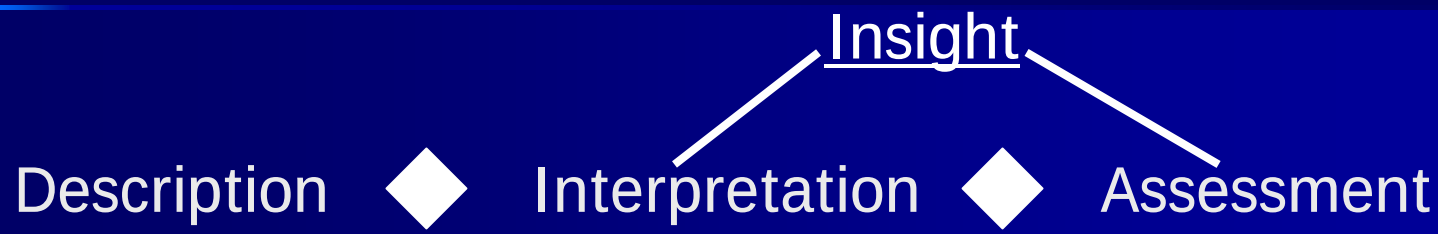
CI is a value process of creating insight



A Competitor's:

- Market Strategy
- Value Chain
- Assumptions, etc.

Consequences for:

- The Competition
- Other Rivals
- Marketplace
- Dynamics, etc.

Implications for the firm:

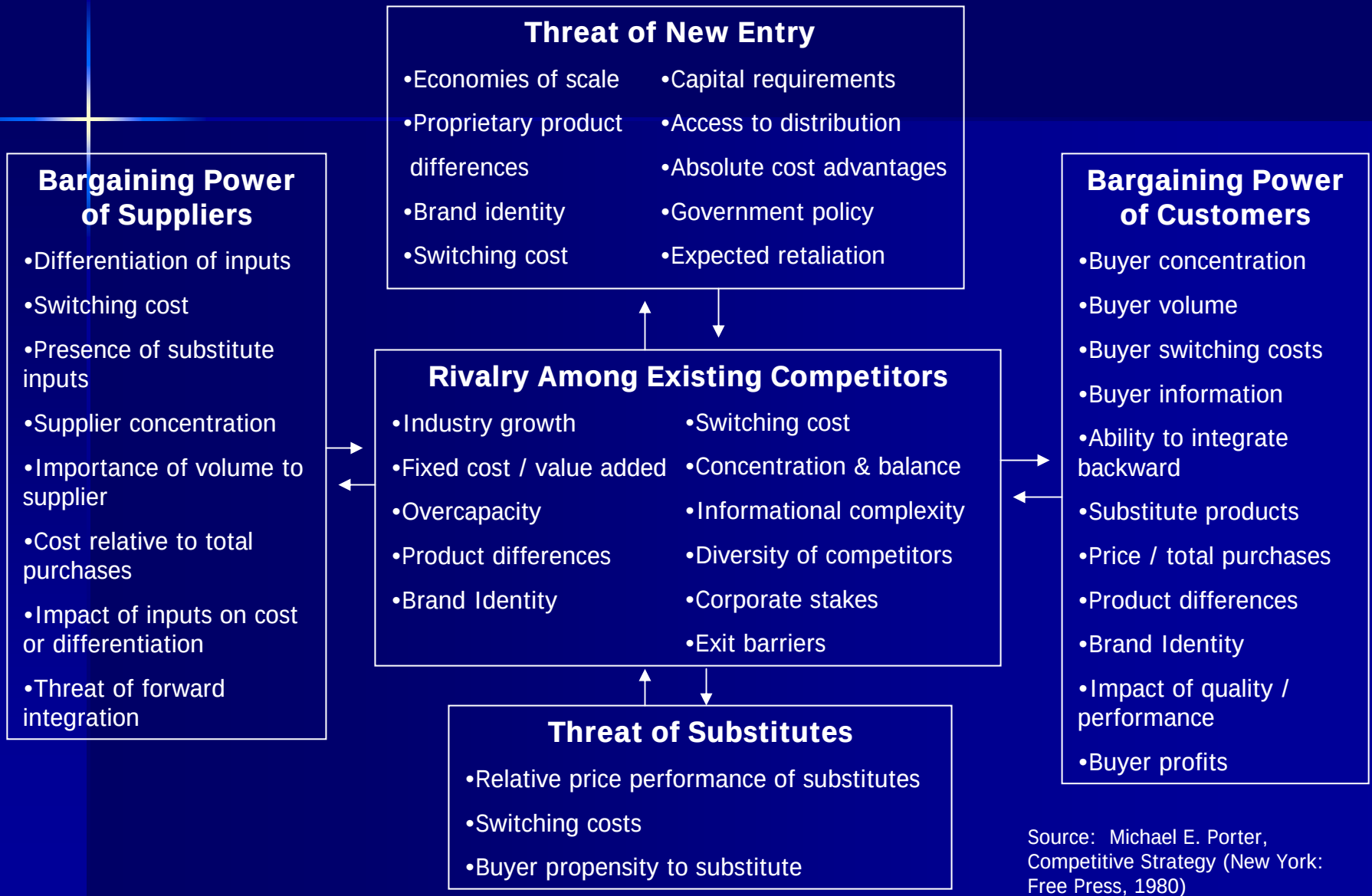
- Strategy
- Organization
- Decisions, etc.

The Intelligence Process Helps to Answer Several Basic Strategic Questions:

- What is driving competition in my industry or industries I'm thinking of entering?
- What actions are competitors likely to take and what is the best way to respond?
- How will the industry evolve?
- How can my company be best positioned to compete in the long run?

Industry Analysis	→	Main View
Strategic Mapping	→	Intermediate View
Competitor Analysis	→	Micro View
Blind Spots	→	Nano View

Porter's Five Forces Analysis



Source: Michael E. Porter, Competitive Strategy (New York: Free Press, 1980)

Drug Industry (ROE=28%

Supplier Power

Low

Threat of Entry

Low

- Economies of scale
- Capital requirements for R&D and clinical trials
- Products differentiation channels
- Patent protection

Industry Competitiveness

Low

- High concentration
- Product differentiation
- Patent protection
- Steady demand growth
- No cyclical fluctuations of demand

Threat of Substitutes

Low

No Substitutes.

(Changing as managed care encourages generics.)

Buyer Power

Low

Physicians as buyer:

Not price sensitive

No bargaining power

(Changing with managed care.)

Airline Industry (ROE=-1%)

Supplier Power

High

- Strong labor unions
- Concentrated aircraft makers

Threat of Entry

High

- Entrants have cost advantages
- Low capital requirements
- Little product differentiation
- Deregulation of governmental barriers

Industry Competitiveness

High

- Many companies
- Little product differentiation
- Excess capacity
- High fixed/variable costs
- Cyclical fluctuations of demand

Threat of Substitutes

Medium

- Autos for short distance travel

Buyer Power

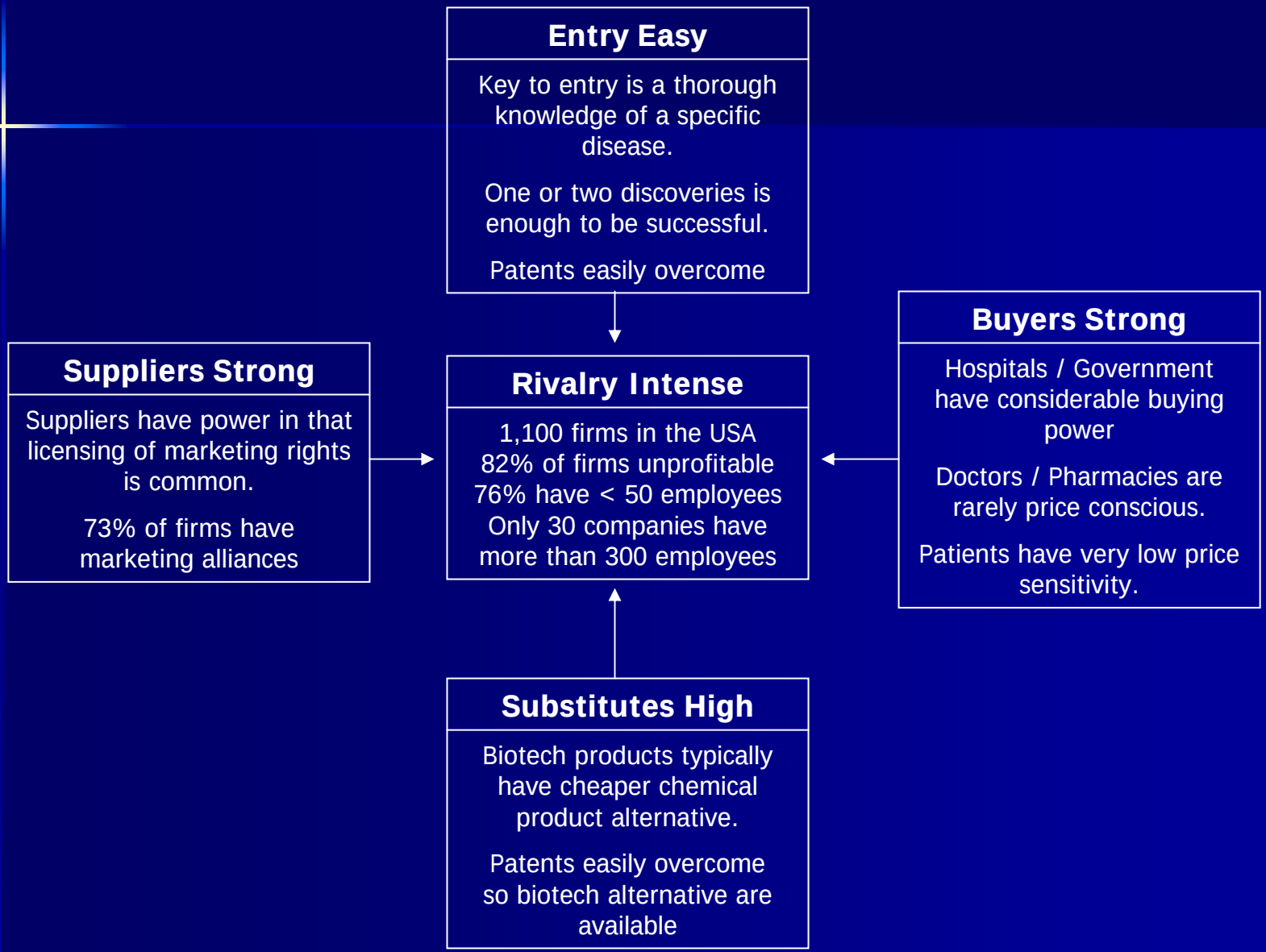
Medium/High

Buyers extremely price sensitive

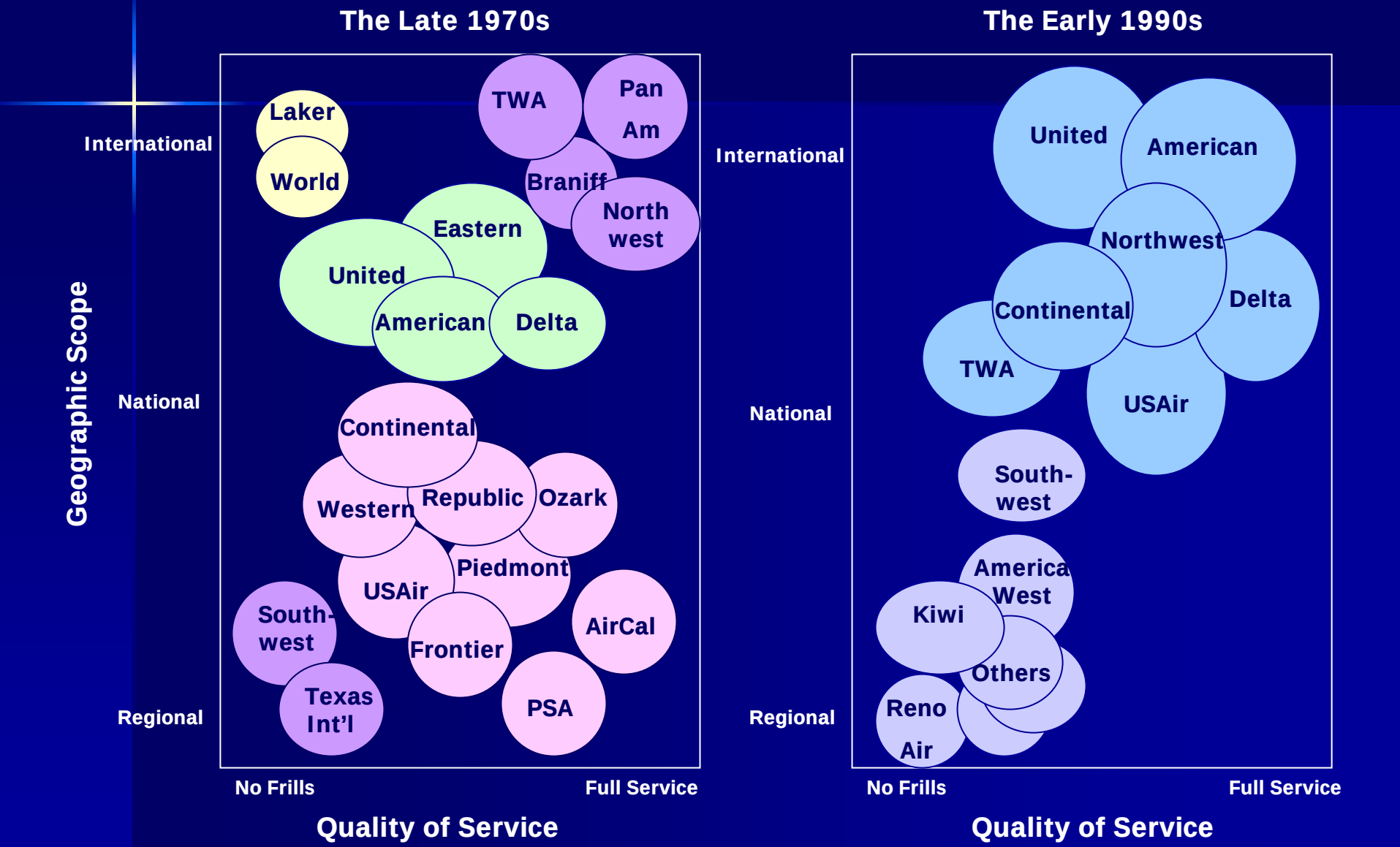
Good access to information

Low switching costs

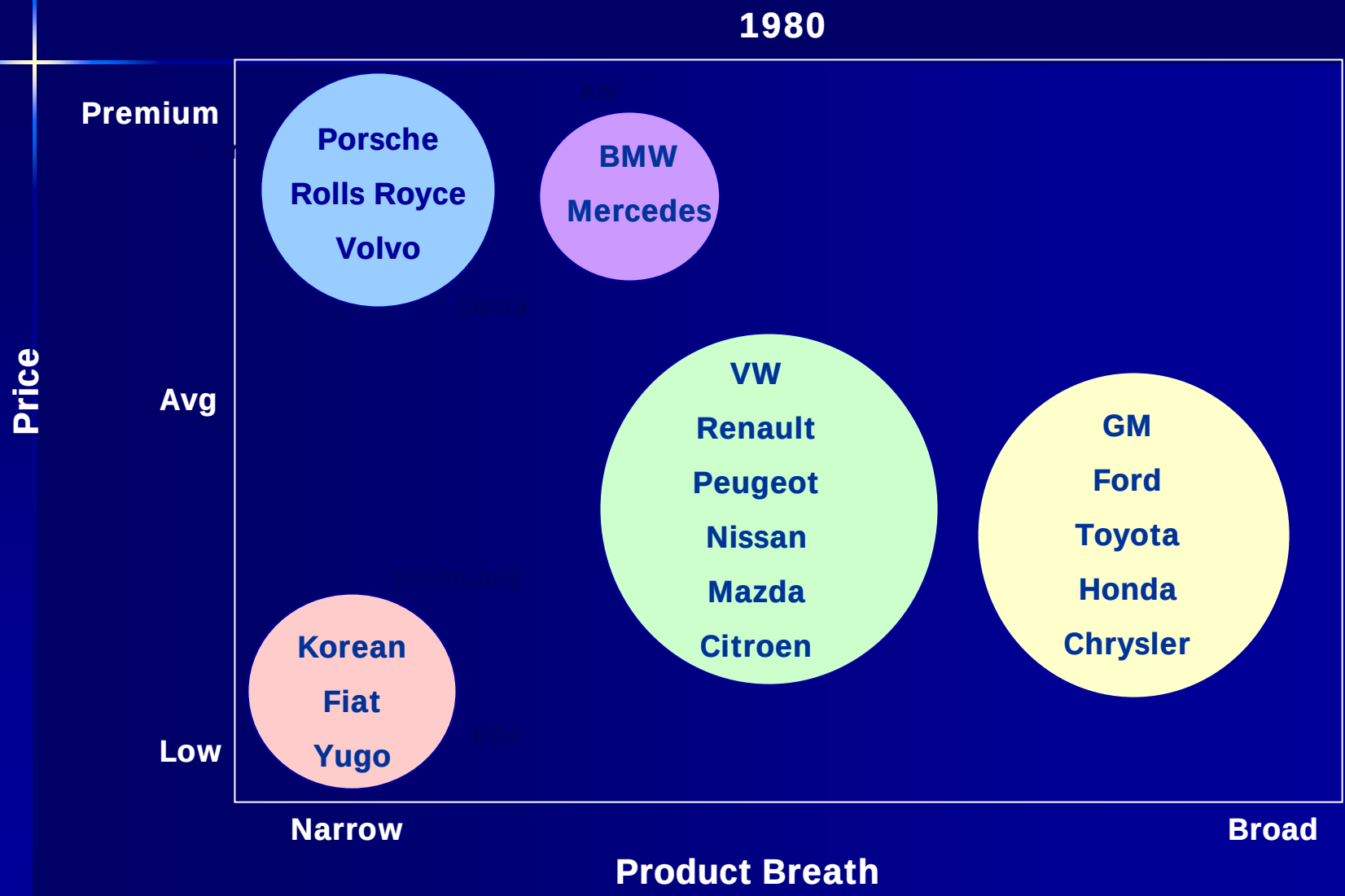
Five Forces in Biotechnology



Strategic Maps of the United States Airline Industry



Strategic Maps of the Auto Industry



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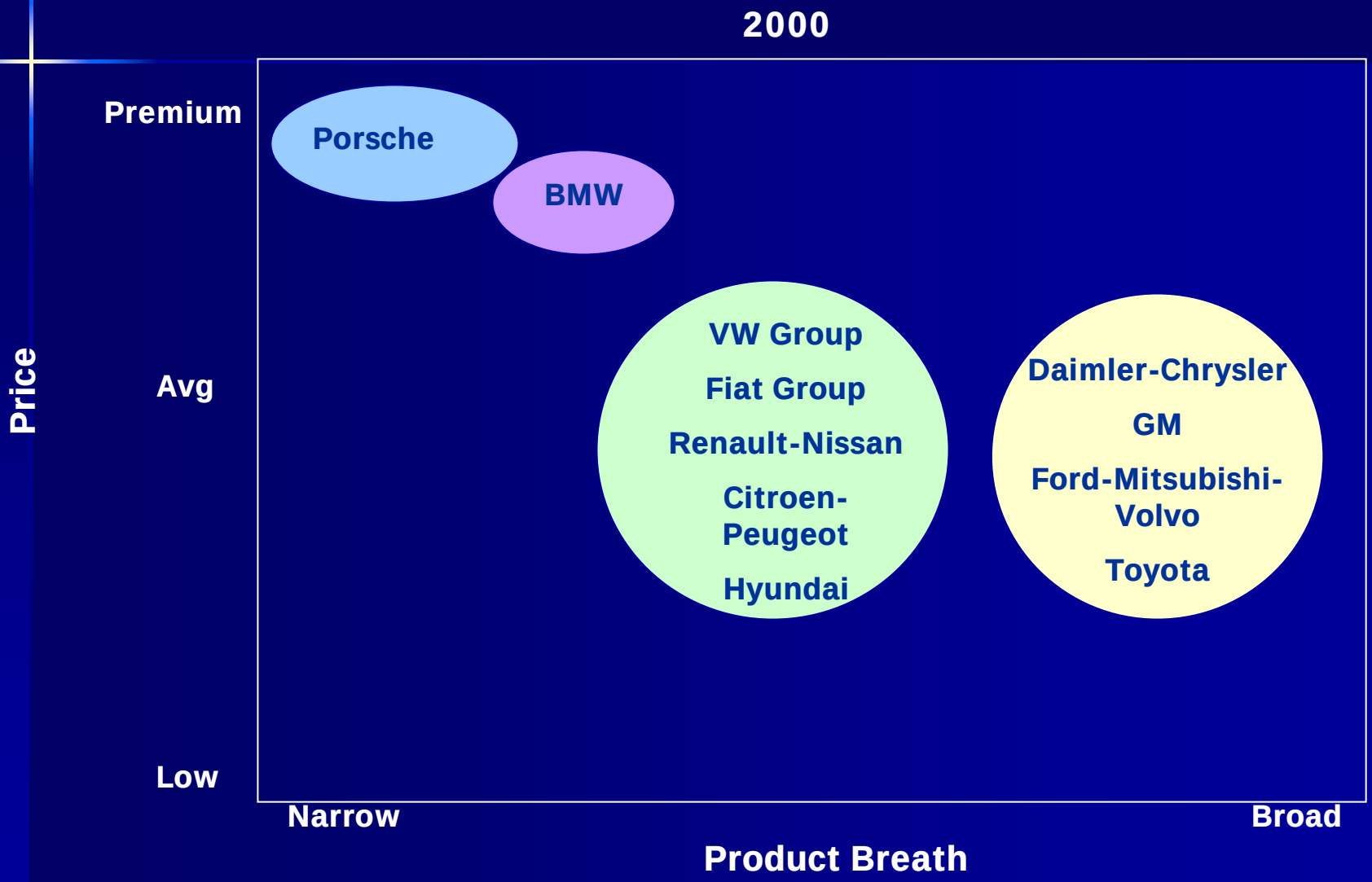


Four Corners Model

Motivation | Action

Drivers

- Goals
- Culture
- Executive Background
- Philosophy

Strategy

Management Assumptions

- What execs think of industry
- What execs think of themselves
- What execs think of competition

Capabilities

Porter & Rivkin, Adapted from Competitive Advantage, The Free Press, 1985

What is Unique About Science & Technology Intelligence?

- Liaison role between managers and scientists
- Focus on substitute products and technologies of competitors
- One or more steps removed from commercial products
- Limited resources and skills available to firm

Competitive Intelligence: A Guide for Your Journey to Best Practice Processes, APQC:2004

Technical Intelligence Needs

-Scientists/Engineers
Detailed Technical Data:

- Technical Objectives
- R&D Approaches
- Manufacturing methods
- R&D Progress
- Technical contacts/Researchers

-Technical Managers
Technical Funding Data:

- Program Funding Plans
- R&D vs. Acquisition strategy

-Senior Executives
Technical News:

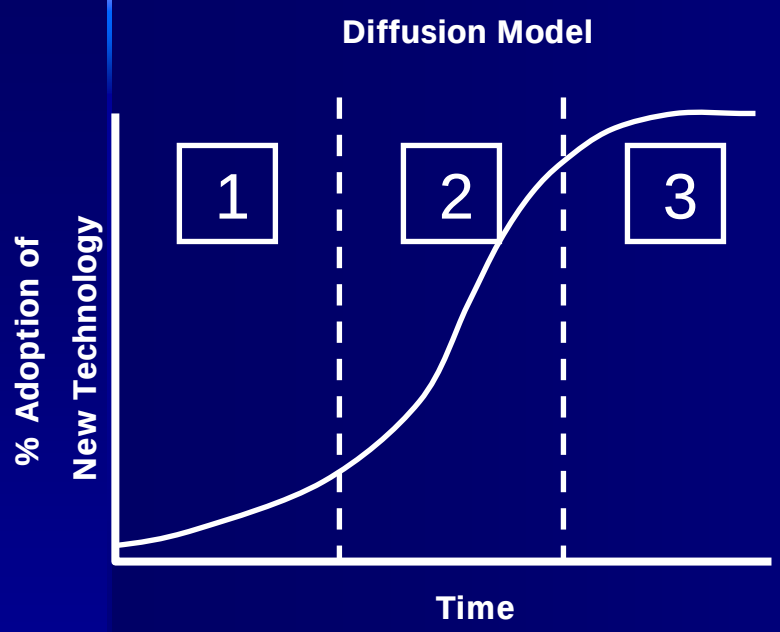
- Business Alliances
- New Products
- Technical Breakthroughs

The Four Models of STI Programs

Model	Managing Technological Substitution	Technology Portfolio Management	Commercialization	Crafting Strategic Direction
Description	Participation in an established technology while establishing a foothold in an emerging technology	Juggling multiple technological thrusts across time and stages of development	Create viable products with existing technologies	Provide just-in-time STI into the emergent strategy development process
STI Input Focus	Balancing exploitation and exploring substitution	Early warning of technological pipelines	Opportunities for exploration	Ongoing emergence of opportunities and threats
Outcome Focus	Protection	Acquisition	Leveraging existing technologies	Interfaces of protection, acquisition, and leverage
Indicator of Effectiveness	Ability of STI to foresee the direction and speed of technological substitution	Degree to which STI influences the structure of the R&D portfolio	Number of new businesses that are launched	Ability to predict & anticipate emerging technologies, products & events
Limitation of Model	1. High coordination costs of integrating two sets of STI 2. Politics of resource allocation process	1. Trade-offs involved in creating a balanced portfolio 2. Costs of developing a trust-based network	1. Entrepreneurial mindset 2. Traditional planning techniques do not apply when markets do not exist	1. STI professionals need strong anticipatory skills 2. Push back from managers

American Productivity & Quality Center (Houston: APQC, 2004)

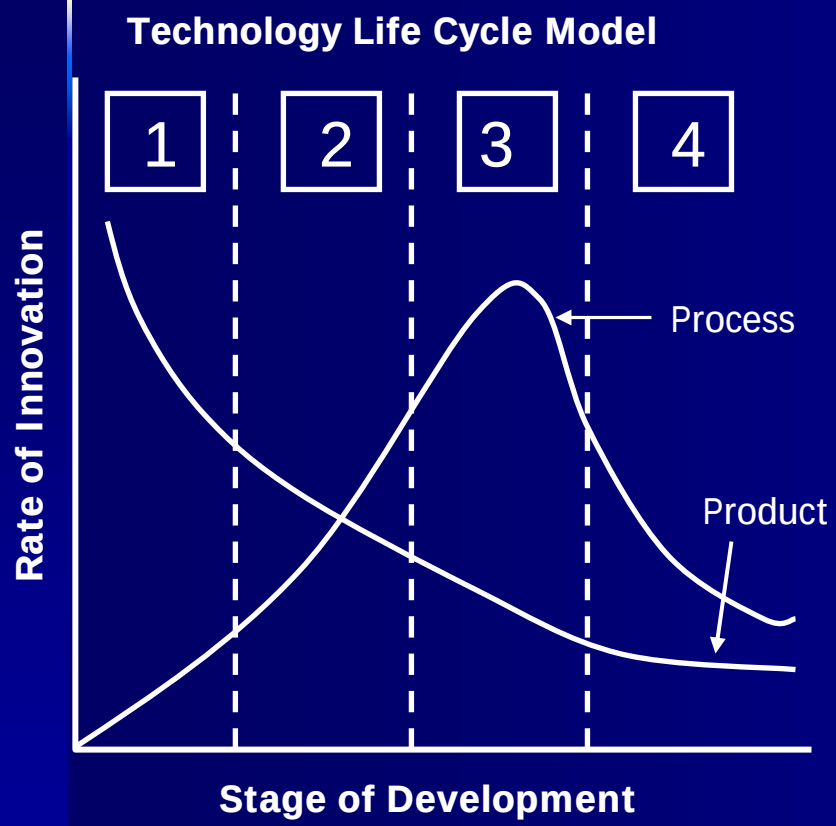
S-Curve (Technology Life Cycle) Analysis



1. Embryonic: The new technology has not been proven and so very few firms adopt it. As a result, the rate of learning about the new technology is slow, causing performance improvement to increase at a marginal rate.
2. Growth: Eventually, the performance of the new technology improves, inducing many more firms to substitute the old technology for the innovative new technology. The fast pace of adoption reinforces organizational learning about the new technology, resulting in further performance improvements.
3. Maturity: As the number of firms that have adopted the new technology exceeds those that have not, the speed of technological diffusion slows. Performance improvements approach natural limits; inducing a marginal decline in innovation around the new technology.

Source: Adapted from Kuznets, 1930

S-Curve (Technology Live Cycle) Analysis



1. Fluid: Consumer needs are not fully defined so the focus is on product innovation by very entrepreneurial and flexible firms.
2. Transition: Innovations begin to become standardized, resulting in the transition to a focus on process improvements by increasingly structured firms. Competition becomes premised on price and low costs.
3. Specific: The predominance of process over product innovation becomes rigidly entrenched. Firms become even more structured.
4. Mature: Product innovation ceases as the industry becomes commoditized.

Source: Adapted from Utterback and Abernathy, 1975

Forecasting Methods

- Technology Surveillance & Data Acquisitions Surveillance Methodologies (technology scouting)
  - Patent Analysis
  - Reverse Engineering
  - Trade Secrets
  - Source of Data & Information
- Extrapolation
- Judgmental Forecasting/Expert Opinion

Source: Richard Mignogna, Technology/Engineering Management, 2001

Patent Trend Analysis Applications

Application	Benefits
Technology Competition Analysis	
Compare company portfolios & strategies	Improved product management strategies and decisions
Characterize high-and low-growth Technologies for competitors	More focus on best long-term market gains
New Venture Evaluation	
Evaluate potential technology acquisitions	Better technology acquisitions
	Reduced investment risk
Analyze joint venture opportunities	Reduced planning uncertainty
Patent Portfolio Management	
Identify valuable patents, product areas or spin-offs	Improved returns from patents (license, sell, develop)
Identify potential technical customers	Early identification of potential new spin-off business
R&D Management	
Evaluate process/product plans	Improved R&D allocation (pick winners, avoid losers)
Define pacing technologies	Better inventive idea awareness
Product Area Surveillance	
Review new patent content & ownership	Early warning of potential breakthroughs, development shifts & new market entrants
Check for infringement	Better protection of intellectual property

B. Ashton & R.K. Sen, Technology Management, 1988

- When technology is a driver in a firm's competitive advantage, means to protect IP need to be considered

- Establishing a strategy on intellectual property makes sense for any product company that uses technology to secure a significant competitive advantage

A company's strategy with regard to patents & other ways to protect technology IP is determined by:

- The pace of technology developed in the industry
- The pace of market development in the industry

Industries with rapid technical changes & rapid market development

Information technology industries
computers
telecommunications
internetworking

- Time-to-market higher priority than protecting IP
- Product live cycles measured in weeks or months
- Delay in product introduction of a few months can be devastating

Industries with rapid technical changes but slower market development

Biotech
pharmaceutical
process instrumentation & control
electronics optics
signal processing data management technology

- Time to market slow due to mandated testing
- Niche markets which can be dominated by compelling technology

Industries with slow technological change but rapid market development

Energy
Environmental equipment & services

- Technology development influenced by price instability or governmental intervention
- Basic technologies are usually chemical or mechanical process or some sort of device
- Incremental improvements

Continuum of Resources Sustainability

Level of Resource Sustainability

Low
(Easy to Imitate)

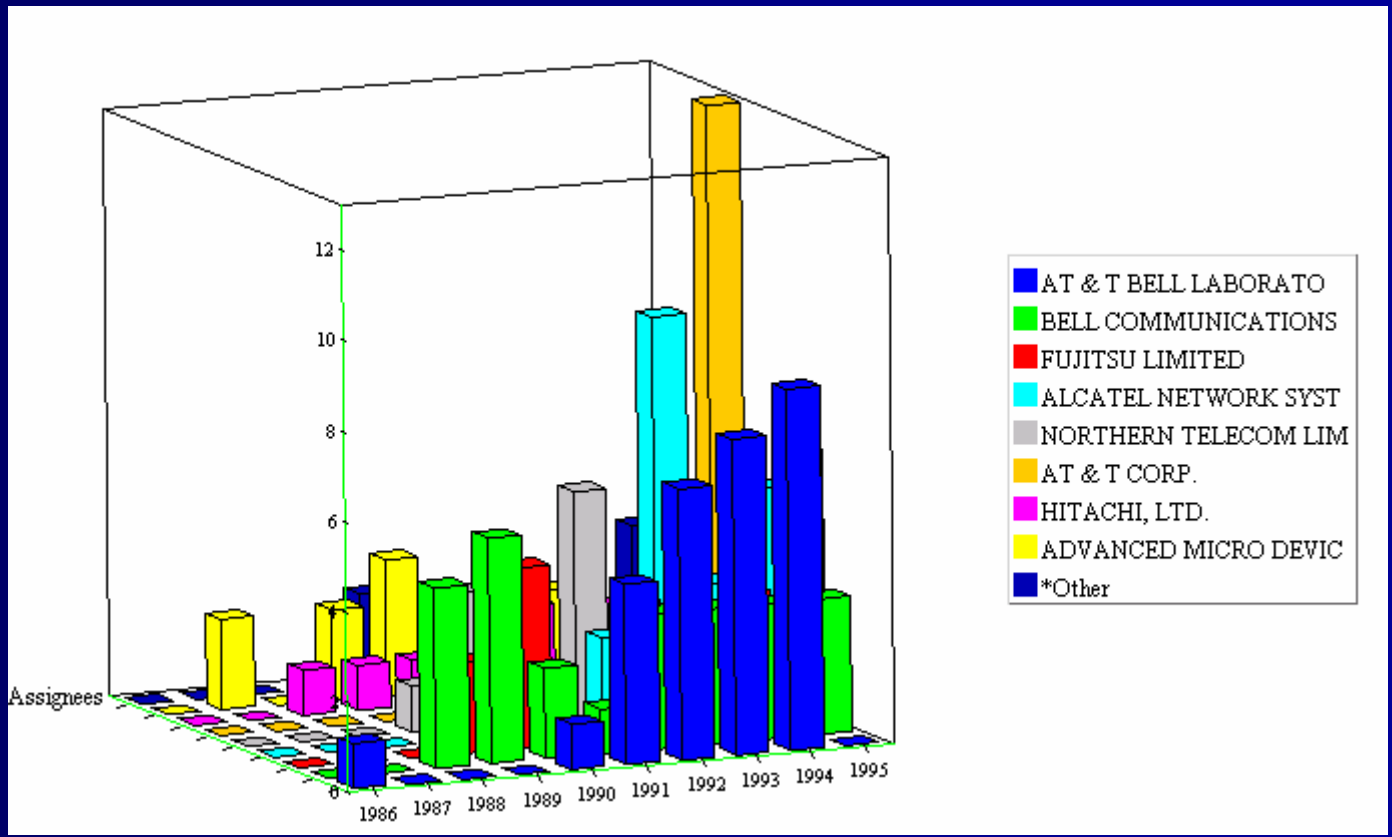
Slow-Cycle Resources
- Strongly shielded
- Patents, brand name
- Gillette:
  Sensor razor

Standard-Cycle Resources
- Standardized mass production
- Economies of scale Complicated processes
- Chrysler: Mini-van

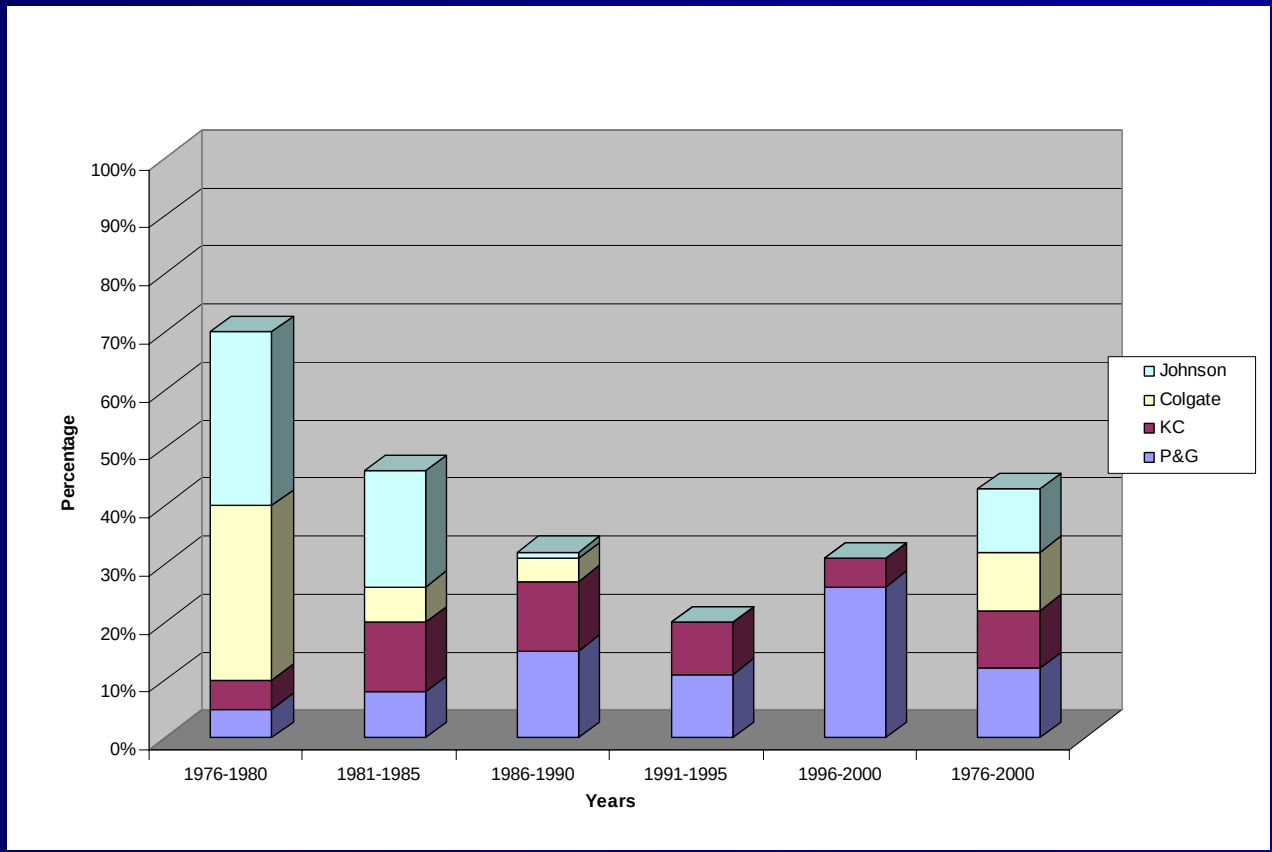
Fast-Cycle Resources
- Easily duplicated
- Idea driven
- Sony: Walkman

California Management Review, 1992

3D Bar Chart (Patent count vs. Assignee vs. Publication Date)



Four leading companies' share in the total number of diaper patents, measure in a percentage (1976-2000)



Source: US Patent and Trademark Office

MICHELIN LETS THE AIR OUT OF FUTURE TIRE INNOVATION

Michelin announces two fitments for its revolutionary non-pneumatic Tweel™

DETROIT, M.I. (January 9, 2005) – Today at the North American International Auto Show (NAIAS) Michelin showcased a potential future for mobility, an integrated tire and wheel combination missing one ingredient that is vital for traditional tire performance...air. The company unveiled the first real-world fitments for its revolutionary "Tweel" – which operates entirely without air. View the photo gallery.

"Major revolutions in mobility may come along only once in a hundred years," said Terry Gettys, president of Michelin Americas Research and Development Center in Greenville, S.C. "But a new century has dawned and Tweel has proven its potential to transform mobility. Tweel enables us to reach levels of performance that quite simply aren't possible with today's conventional pneumatic technology."

Source: www.michelinman.com

New Recyclables Market Emerging: Plastic Railroad Ties

	Wood	Plastics	Concrete
Cost $	35	70	45-55
Weight lbs	200	200	800
Lifespan yrs	<30	50+	<50
Mktshare %	99	<1	<1
Environment	-	+	+
Installation	+	+	-

Source: WSJ 10/19/2004

ExxonMobil's new process squeeze oil from old fields

- Emphasis on new technologies to tap large oil/gas deposits previously too costly to develop
- Oil sands development in Canada
- Importing liquefied gas from Qatar
- Enhanced techniques for injecting water or gas into reservoirs to extract oil
- Partnership with two Japanese companies to develop stronger steel to reduce costs of Arctic pipelines by 10% ($2 bil)
- Conversion of oil tanker to floating production system
- Drilling offshore wells from onshore – cheaper than offshore platforms

Not looking for projects or fields in places where political unrest can disrupt production – major shift from rest or oil industry

Oil & gas output from unconventional projects accounted for 20% of production in 2003 – expected to double by 2010.

Source: Bloomberg News/AJC 01/16/2005

How Drug Giant Keeps a Monopoly on 60-Year-Old Pill

The secrets of Horse Urine

Lessons for Biotech Industry

- 1942 Wyeth sole supplier of Premarin
- Patents expired in 1968 & 1972
- 1986 FDA publishes its list of key ingredients in Premarin
- 1988 FDA notifies Barr it had almost completed requirements for generics Premarin
- 1990? Wyeth complains generic applicants' test not stringent enough to show generics processed by body the same way as Premarin
- 1991 FDA agrees & required blood tests instead of urine test
- 1995 Barr files another application
- 1997 Rejected again by FDA as Wyeth argues that previously unknown ingredients has a role in drug's effectiveness
- 1997 FDA announces that no generic for Premarin will be approved until the substance is adequately characterized

WSJ/09/09/2004

Lessons Learned

1. The impact of government/regulatory agencies must always be considered in competitive intelligence analysis
2. Government can change the rules of the game in the middle of the game (as the FDA did in redefining “equivalency” for Premarin)
3. Patent expirations won’t make it easier for generic companies to copy biotech drugs with enormously complex molecules related to the body’s own proteins (eg., Epogen (anemia) and Remicade (rheumatoid-arthritis)

WSJ/09/09/2004

Conclusions

Technology oriented competitive intelligence

- Begins with an understanding of the forces that impact your industry
- Focuses on rivals, the threat of emerging technologies & the threat of substitute products
- Anticipates future actions/trends of competitors, customers, suppliers, government

Conclusions

To be effective, technology oriented competitive intelligence must

- Rely on analytical tools that indicate possible future actions based on research, corporate culture, perceived and realistic capabilities, world view, leadership profiles
- Include an early warning system
- Be allowed to rise to its natural strategic level