Lecture 9:
INCUMBENT FAILURE AND NEW FIRMS

3/7/00

Lecture

- Why do incumbent firms fail
  - Architectural innovation
  - Disruptive Technology
- Assignment
  - You will be asked "why can't company X do what you are dong" Need to justify the inability for incumbent firms to compete
  - What is your long term strategy
    - Start in incubator markets?
    - Create new markets?

Innovator's dilemma

IPPD 3/7/00 Incumbent failure

- Many "great" companies that are well run, fail when faced with a new technology
  - DEC, Prime, Sears
  - IBM
  - Disk drive companies
- Large companies have a hard time implementing technologies
  - Desk top computers
  - Disk drives
  - New stepper technologies
  - CS-II
  - Boeing/Airbus on determinate assembly & generic fixtures

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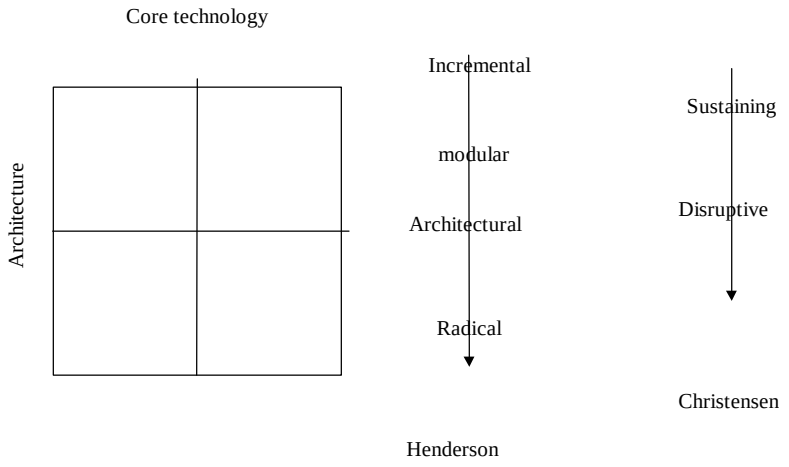
Types of innovation

IPPD 3/7/00 Incumbent failure



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Types

- Incremental
  - Minor changes
  - Reinforces existing capability
- Modular
  - Able to slot in new tech.
- Architectural
  - Have to change the interactions
- Radical
  - Opens new markets
  - Redefines new markets
  - Large org. can't compete

Disruptive Technologies

- Two types of innovation
  - incremental
    - sustaining changes
    - within a single "value network"
    - continual improvements along a single performance
  - disruptive
    - new technologies
    - tend to incubate in other market segments
    - change the performance criteria

Questions

- What are the major differences between the two approaches?
- Are they conflicting?
- Are they compatible?

Effects in architecture

- Companies are unable to adopt to new technologies because they can't get them integrated into their existing architecture
- Channels
  - Who talks to who when
- Filter
  - What are the key issues, what information is important
- Strategies
  - How to solve problems
  - How to respond

Examples of architectural changes

- Photolithography
  - Contact
  - Proximity
  - Scanner
  - Stepper
- Determinate assembly
- Common architecture across aircraft lines
- Change in door frame

DFM problem

- The innovation can be including manufacturing issues in design
- Many companies solve the problem by putting manufacturing on the teams but
- Don't create new filters
- Don't create new strategies
- Keep doing the same work and have the same problems.

Four principles of Disruptive technologies

- Companies depend on current customers for resources
  - can't go outside the current customer base because of the need to continually grow
- Small markets don't solve the growth needs of large companies
- Markets that don't exist can't be analyzed
- Technology supply may exceed market demand

Sustaining technology with incremental improvement

- Performance improvement of one metric
- Rate of technology improvement exceeds the customer needs
- Inflexible in other performance metrics (size etc)

Disruptive technology

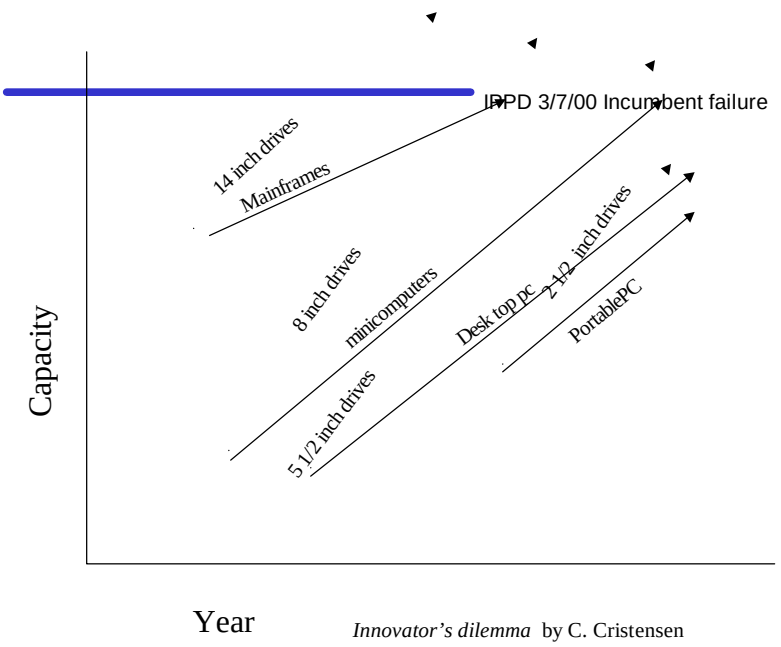
- Compete on new performance criteria
- Sacrifice performance on current market drivers
- Developed in small, entrepreneurial settings
  - Typically bootlegged in existing companies
  - Able to come up the learning curve
- Create a new market for the technology
- Existing companies put $ where the highest ROI is
- When faced with new technology, can't come up the learning curve.

Examples

- Disk Drives
  - Continual increase in drive capacity
  - Smaller drives
  - Continual changes in the lead players
- Back Hoes
  - shift from cable driven to hydraulic

Steps in Disruptive technology

- Sustaining technology performs well and is being improved in response to customer demands
- Disruptive technology is developed but does not meet performance requirements
- Alternative markets are found/created where the performance/cost point fits new technology
- Disruptive technology matures to a state where the original markets can be entered and compete on a new performance criteria (i.e. size)



Innovator's dilemma by C. Cristensen

Steel Technology

IPPD 3/7/00 Incumbent failure

- Integrated mills
  - Produce from raw ore
  - Use blast furnaces - large optimal capacity (sizes the whole system)
  - High quality
- Mini-mills
  - Produce from scrap
  - Use electric arc furnaces - smaller optimal capacity
  - Low quality commodity parts

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Two processes

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O2, limestone, coke and iron ore	
Blast furnace	
Bessemer converters -> open hearth -> basic O2 furnaces	scrap metal
ingots -> continuos casting	Electric arc
Cool	2” long strips
Store	4-5 rollers
Re heat	
Rolled through 10-12 rollers	

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Steel production

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• Cont. casting	• CSP
• Huge capacity • Higher costs • Produce steel (limited by scale of blast furnace) • Upgrade can be stages (easier) • Higher quality	• limited capacity • Lower costs • Use scrap steel (use electric arc furnaces) • Requires fundamental changes • Quality?

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Justification

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- New technology implemented when new capacity added.
- Chances that new technology will be put in competitors site is minimal
- Their cost benefit was from other sources (labor, fuel, scrap metal)
- Looked at the technology and rejected it
- ??? They are being forced to upgrade their system to make it competitive.

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Discussion questions

- Is the mini-mill a disruptive technology?
- Is the mini-mill an architectural change
- It seems obvious that they should implement it. Why can't USS steel make the decision to do the investment.
- What would you do?

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Next lecture: Prototyping

- Pisano, G. (1996). BMW: The 7-Series Project (A), Harvard Business School, 9-692-083: January 19.
- MacCormack, A. (1996) Team New Zealand (A). Harvard Business School, 9-697-040
- Clark, K. B. and T. Fujimoto (1991). Chapter 7: Manufacturing Capability: A Hidden Source of Advantage.