Introduction to Operations Management
Introduction to Operations Management

1. Introductions
2. Housekeeping
   a. SloanSpace
   b. Course Introduction
   c. Professional Standards
3. Concepts & Nokia
4. Course Outline
5. Next Time
   a. Sega
   b. CPM
“Housekeeping” for Operations Management

1. Course Materials:
   Course packet

2. Grading
   Class participation: 30%
   First case write-up 20%
   Second case write-up 25%
   Third case write-up 25%

3. Professional Standards
   Academic Integrity--”Do your own work”
   Behavioral Integrity -- “Do unto others . . . “
Three Foundational Components of Operations Management

Product Development

Process Design & Management

Supply Chain
Product Development

- **Product Design**
  - **Voice of the Customer**
    *What is the role of product design in the demand and supply issues faced by Nokia and Ericsson?*
  - **Product/System Architecture**
    *Were problem chips integral or modular?*

- **Product Development**
  - **Project management & Cost**
  - **Design for Manufacturing**
    *How important was "Nokia quickly redesigned some of its chips so they could be produced elsewhere?"*

- **Technology Strategy**
  *Did product technology play a role in the differential performance of N & E?*
Process Design & Management

• Process Design: Options & Assessment
  - Queueing Analysis
  - Capacity Analysis
  How did Nokia assess capacity in the crunch? How did they change capacity?
  - Uncertainty Analysis
  How did each company prepare for difficult-to-anticipate events?

• Inventory Systems
  • Did N&E operate Just-in-Time, or did they hold big stores of chips waiting just in case?

• Production Control
  Was Nokia’s software the principal instrument of control?
  How did they monitor the situation?

  ERP/Software/Internet
  • Was Nokia’s software the principal instrument of communication?

• Operations Excellence
  - Continuous Improvement
  - Just-in-Time
  - Quality Management (SPC, 6σ)
Supply Chain

- **Strategic Supply Chain Design**
  - Make Vs. Buy
    - Did sourcing strategy play a role in the differential performance of N & E?
  - Supplier Selection, Sourcing
    - Single vs. Dual sourcing

- **Supply Chain Management**
  - End-to-end coordination
    - Do we see here examples of integrated enterprise?
  - Supplier Relations
    - hard-nosed, polite, hostile, collaborative?

- **Delayed Differentiation**
## Companies and Industries we will cover

<table>
<thead>
<tr>
<th>Product</th>
<th>Sega</th>
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<tbody>
<tr>
<td>Electronics &amp; SW</td>
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<tr>
<td>Process</td>
<td>Toyota</td>
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<tr>
<td>Autos:</td>
<td>Dell, Cisco, Quanta</td>
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<td>Bank of America</td>
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<td>Financial</td>
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<td>Burger King</td>
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<td>Food Processing</td>
<td>National Cranberry</td>
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<td>Air Transport</td>
<td>Alaska Air</td>
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<td>Health Care:</td>
<td>University Health</td>
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<tr>
<td>Software:</td>
<td>Sega, SAP (Vandelay), Oracle (Cisco)</td>
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<tr>
<td>Supply Chain</td>
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<tr>
<td>Electronics:</td>
<td>Nokia, HP</td>
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<td>Fashion Apparel</td>
<td>Sport Obermeyer</td>
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<td>Food Distribution</td>
<td>Barilla Pasta</td>
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<td>eSupply</td>
<td>Webvan</td>
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<td>2</td>
<td><strong>Product Dev</strong></td>
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<td>3</td>
<td>Operations</td>
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<td>Strategy</td>
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<td>Process</td>
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<td><strong>Technology</strong></td>
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<td>8</td>
<td>Process</td>
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<td>Analysis</td>
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<td>11</td>
<td>Process</td>
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<td><strong>Quality</strong></td>
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<td>15</td>
<td><strong>Supply</strong></td>
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<td>16</td>
<td><strong>Chain</strong></td>
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<td>18</td>
<td><strong>Wrap-Up</strong></td>
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Clockspeed:
The Dimension of Time on Operations Management
Study the Industry Fruitflies

**Evolution in the natural world:**

**FRUITFLIES**
evolve faster than

**MAMMALS**
evolve faster than

**REPTILES**

**THE KEY TOOL:**

Cross-SPECIES Benchmarking of Dynamic Forces

**Evolution in the industrial world:**

**INFOTAINMENT** is faster than

**MICROCHIPS** is faster than

**AUTOS** evolve faster than

**AIRCRAFT** evolve faster than

**MINERAL EXTRACTION**

**THE KEY TOOL:**

Cross-INDUSTRY Benchmarking of Dynamic Forces
INDUSTRY CLOCKSPEED IS A COMPOSITE: OF PRODUCT, PROCESS, AND ORGANIZATIONAL CLOCKSPEEDS

Mobile Phone INDUSTRY CLOCKSPEED

THE Mobile Phone product technology

THE Mobile Phone PRODUCTION PROCESS process technology

THE Mobile Phone MANUFACTURING COMPANY organization
Mobile Phone System CLOCKSPED is a mix of Transmission Standards, Software and Handsets

**TRANSMISSION STANDARD**
slow clockspeed

**SOFTWARE APPLICATIONS**
medium clockspeed

**OPERATING SYSTEM**
slow clockspeed

**SERVICES**
fast clockspeed

**HAND SET**
fast clockspeed

**ISSUE:** THE FIRMS THAT ARE FORCED TO RUN AT THE FASTEST CLOCKSPED ARE THE MOST LIKELY TO STAY AHEAD OF THE GAME.
Dynamics between New Projects and Core Capability Development: PROJECTS MUST MAKE MONEY AND BUILD CAPABILITIES

See Leonard-Barton, D. Wellsprings of Knowledge
ALL COMPETITIVE ADVANTAGE IS TEMPORARY

**Autos:**

**Computing:**

**World Dominion:**
*Greece* in 500 BC, *Rome* in 100AD, *G.B.* in 1800

**Sports:**
*Bruins* in 1971, *Celtics* in 1986, *Yankees* no end

*The faster the clockspeed, the shorter the reign*
ARCHITECTURES IN 3-D

INTEGRALITY VS. MODULARITY

*Integral product architectures* feature close coupling among the elements:
- Elements perform many functions
- Elements are in close spacial proximity
- Elements are tightly synchronized
- Ex: jet engine, airplane wing, microprocessor

*Modular product architectures* feature separation among the elements:
- Elements are interchangeable
- Elements are individually upgradeable
- Element interfaces are standardized
- System failures can be localized
- Ex: stereo system, desktop PC, bicycle
SUPPLY CHAIN ARCHITECTURE

Integral supply-chain architecture features close proximity among its elements
- Proximity metrics: Geographic, Organizational Cultural, Electronic
  - Example: Toyota city
  - Example: Ma Bell (AT&T in New Jersey)
  - Example: IBM mainframes & Hudson River Valley

Modular supply-chain architecture features multiple, interchangeable supplier and standard interfaces
- Example: Garment industry
- Example: PC industry
- Example: General Motors’ global sourcing
- Example: Telephones and telephone service
# DESIGNING ARCHITECTURES FOR PRODUCTS & VALUE CHAINS: THE NEED FOR ALIGNMENT

## Value Chain Architecture

(Geog., Organ., Cultural, Elec.)

<table>
<thead>
<tr>
<th>Integral</th>
<th>Modular</th>
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<tbody>
<tr>
<td>Product Architecture</td>
<td>Value Chain Architecture</td>
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<tr>
<td>Integral</td>
<td>Integral</td>
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<tr>
<td>Jet engines</td>
<td>Polaroid</td>
</tr>
<tr>
<td>Microprocessors</td>
<td>Nortel, Lucent</td>
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<td>Mercedes vehicles</td>
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<table>
<thead>
<tr>
<th>Modular</th>
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<tr>
<td>Automotive Supplier Parks</td>
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</table>
A 3-D CE decision model illustrating the imperative of concurrency.
**DESIGNING ARCHITECTURES FOR PRODUCTS & VALUE CHAINS: MODULARITY VS. OPENNESS**

**ARCHITECTURAL STRUCTURE**

<table>
<thead>
<tr>
<th>INTEGRAL</th>
<th>MODULAR</th>
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<tbody>
<tr>
<td>Pentium Chip Mercedez Vehicles SAP ERP</td>
<td>IBM Mainframes Microsoft Windows Chrysler Vehicles</td>
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**ARCHITECTURAL PROPRIETARINESS**

<table>
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<tr>
<th>CLOSED</th>
<th>OPEN</th>
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<tbody>
<tr>
<td>Linux</td>
<td>Palm Pilot software &amp; accessories Phones &amp; service Web-based ERP</td>
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</tbody>
</table>

**INFORMATION ARCHITECTURE MUST REFLECT BUSINESS MODEL**
All Conclusions are *Temporary*

Clockspeeds are increasing almost everywhere

3-D Concurrent Engineering must anticipate Industry and Value Chain Dynamics

3-D Concurrent Engineering is a key organizational competency

Study of Fruit Flies can help with crafting strategy