ISM 50 - Business Information Systems

Lecture 2

Instructor: Prof. Ram Akella
UC Santa Cruz
January 7, 2010
Student talks
Reminder: Business Analysis Paper Preferences Due today!

As a group, turn in 3 things:
1. List of your proposed group members.
2. List of companies you would like to study.

If you don’t have someone in mind to work with, turn in the above 3 things as an individual.

One of companies on list must be:
Another Reminder...

- Assignment 1 is due Tuesday.
  - Resume, and
  - Cover Letter.

- See class webpage for detailed instructions.

- Read:
  - Chapter 2 - Section I of O’Brien (reader pp 69-77)
  - Cash Flow Handout on class webpage
Review: Business Analysis Paper

- Go to class web page and click on business paper in the announcements for detailed guidelines.

- Paper Should Have:
  - Industry Profile
  - Company Profile
  - Information Technology
  - Leadership
  - Market and Financial Performance
  - Trajectory
Where are we, and how did we get here?

- Let’s survey the history of IT over the past few decades!

The History of IT from 1960-2000
The author (Nolan) breaks down history into 3 eras
- Data Processing Era
- Micro Era
- Network Era

A logical division, but not universal
- Messerschmitt divides into 4 phases
  - Centralized, Time shared, de-centralized, networked
The Data Processing Era (1960-1980)

- By 1960 economy dominated by large, multi-divisional, hierarchical businesses
  - Corporate Office
  - Divisional operating units in different markets
  - Example: GE
    - Corporate office in Connecticut
    - Lighting in Cleveland
    - Locomotives in Erie
    - ...

- Within each division many “functional departments”
  - Accounting, Finance, Engineering, etc.
The Data Processing (DP) Era (1960-1980)

- Needed to keep track of massive amounts of data for
  - Payroll
  - Payments to customers and suppliers,
  - etc.
The Data Processing (DP) Era (1960-1980)

- Meanwhile computers were developed for scientific and defense purposes
The Data Processing (DP) Era (1960-1980)

- These large companies purchased mainframe computers
  - to manage the data processing.
  - They were slow, enormous, and expensive, by today’s standards.
  - But, they did make it possible to process the enormous volume of data, and transactions in a huge corporation.
DP Era (1960-1980)

- Commercial computing evolved...
- 1954 -- IBM 650 dominates commercial market
  - Leased for $3,250 per month (over $22,000 per month in today's dollars!)
IBM 360
1964 - IBM 360,

- Interoperable peripheral and computer family
- *Great improvement over previous generation*
- A massive development effort by IBM
- Ensured IBM's dominance in the 60s and 70s
Data Processing Era (1960-1980)

- “You never got fired for buying IBM.”
- Average market share of 68% in the 70s.

Meanwhile
- Digital introduces the mini-computer (1960s)
- UNIX operating system developed (1969)
- Bob Metcalfe invents Ethernet (1973)
DP Era (1960-1980)

- Technology Evolution
  - First - Stand Alone Mainframes
  - Next - Dumb terminals attached to mainframe
  - ("Time-Shared" Phase in Messerschmitt’s terminology)
The information resource manager was known as the Data Processing (DP) manager.

- Charged with supporting the business
- Not with changing how the business was run
DP Era (1960-1980)

- **IS evolved from supporting lower functions to higher level functions**
  - **Low:** Inventory, Purchasing, Scheduling
  - **Medium:** Productions Operations Management
  - **High:** Corporate wide planning
DP Era (1960-1980) -- Annual Budgeting

- Budgeting was an important function made easier by computers

**Accounting of**
- Revenues, Expenditures, Assets, Liabilities
- Generate Profit and Loss Statement

**Before computers**
- Was difficult to do once a year

**After computers,**
- Could “close the books” more often
- Could break down profits and losses to each level of the corporate hierarchy
Capital Budgeting

- Analyze return and risk of expenditures intended to generate revenue over multiple accounting periods
  - Examples: New building, or factory
- Before computer
  - Calculations could become complicated
- After computer
  - Very easy
- Consequence: Every level of the organization could be held accountable for their ROI
Budgeting

Better budgeting and resulting accountability lead to consistent earnings growth.

Source: *A Nation Transformed by Information*, Oxford University Press, 2000
Build up to Micro Era

- 1974 - Xerox PARC develops first computer with a mouse. They don't commercialize it!
- 1974 - Altair PC for hobbyists
- 1975 - Bill Gates and Paul Allen Found Microsoft
Build up to the Micro Era

- 1977 - Apple introduces a successful microcomputer

- **1981 - IBM introduces its PC!**
  - Intel develops CPU
  - Microsoft develops operating system

- IBM PCs were rapidly adopted by the commercial market.

- PCs **threatened** the DP manager
  - Easier to manage one central mainframe than a PC on every employees desktop!
  - Data not Centralized.
    - The numbers on my PC are right, the ones on your PC are wrong!
  - Security Risks.

- DP managers put restrictions on PCs
- Users defied them!

- Users wanted the convenience of word processing, CAD, etc...
- Vendors marketed direct to the users instead of the DP managers.
- Example: Spreadsheets
Spreadsheet Example

- **VisiCalc (1979)**
  - First Spreadsheet
  - For Apple II computer

- **Lotus 1-2-3 (1983)**
  - Mimicked VisiCalc
  - For IBM PC

- **Excel (1985)**
  - Microsoft
  - Surpassed Lotus when Windows took off.

- Management realized the importance of bringing order to the chaos
  - Coined the term Chief Information Officer (CIO) in the 80s
Beginning of Internet

- 1969 - ARPANET linked scientists
- 1977 - TCP/IP used to link networks to ARPANET
- 1984 - the term Internet comes into use
- 1985 - NSF takes over management of Internet Backbone
- 1990 - WWW (Tim Berners-Lee at CERN)
- 1991 - HTML
- 1993 - Mosaic Browser (Marc Andreesen and Eric Bina)
The Network Era (1995 - ?)

- After chaos of Micro Era, organizations converged on Client Server networked architectures
  - Client PC allowed user to have direct access to her own computer
  - Server housed organizational data
- Because of Success of Internet technologies...
  - UNIX, HTML, TCP/IP
- ... IT managers used these technologies for internal networks - “intranets”
The Network Era (1995 - ?) - Internet Phenomenon

- Internet built on open standards
  - Different than control-oriented development philosophy
  - Benefits: Scalable, Extensible, ...

- Lots of vendors selling interoperable equipment
  - More decisions to make than the DP manager of the 1960s!

- Many companies started and flourished.
Cisco

- 1984 Founded by Leonard Bosack and Sandra Lerner (Stanford IT Staff)
- Developed a Router
  - A device to forward data packets from one network to another

- By 1998, Cisco had a market value of $100 billion!
Netscape

- Founded by Marc Andreessen and Jim Clark
- Browser based on Original Mosaic
- IPO in 1995
  - First day went from $28 -> $75!
  - The company's revenues doubled every quarter in 1995!
- Excitement triggered the dot-com boom.
  - Hundreds of companies started, most didn't survive...
The network era

- The network era permitted new ways of doing business
  - Employees could check on their benefits with a web browser
  - Customers could “self-serve” themselves
    - In 1998, 70% of Cisco’s $800 million of service revenue was provided over Internet, by allowing customers to access their intranet.
  - Wal-Mart used point of sale data to drive supplier replenishment (CRP)
The network era

- Amazon sold books with minimal inventories.
- Levi Strauss used geo-demographic database to match supply and demand in each store
- ...and many more examples!
Information Resource Management

- **Strategic realization**
  - *Information* is the resource to be managed not just *data*.
  - Need to get information into the hands of workers, so workers can be more productive.
Result: Organizational Performance Improvement

<table>
<thead>
<tr>
<th>Market Value Rank</th>
<th>1978</th>
<th>1986</th>
<th>1997</th>
<th>Company Name</th>
<th>Sales per Employee</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>3</td>
<td>1</td>
<td></td>
<td>General Electric</td>
<td>$49,012 $98,081 $320,797</td>
</tr>
<tr>
<td>16</td>
<td>16</td>
<td>2</td>
<td></td>
<td>Coca-Cola</td>
<td>120,164 309,259 639,593</td>
</tr>
<tr>
<td>NA</td>
<td>577</td>
<td>3</td>
<td></td>
<td>Microsoft</td>
<td>NA 171,304 510,885</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>4</td>
<td></td>
<td>Exxon</td>
<td>464,112 685,176 1,503,490</td>
</tr>
<tr>
<td>17</td>
<td>9</td>
<td>5</td>
<td></td>
<td>Merck</td>
<td>69,040 134,492 439,348</td>
</tr>
<tr>
<td>273</td>
<td>216</td>
<td>6</td>
<td></td>
<td>Intel</td>
<td>36,690 69,506 393,564</td>
</tr>
<tr>
<td>27</td>
<td>8</td>
<td>7</td>
<td></td>
<td>Philip Morris</td>
<td>82,814 186,315 369,171</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>8</td>
<td></td>
<td>IBM</td>
<td>64,747 127,011 291,348</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>9</td>
<td></td>
<td>AT&amp;T</td>
<td>50,969 169,391 401,557</td>
</tr>
<tr>
<td>54</td>
<td>39</td>
<td>10</td>
<td></td>
<td>Pfizer</td>
<td>58,038 111,900 254,146</td>
</tr>
<tr>
<td>11</td>
<td>18</td>
<td>11</td>
<td></td>
<td>Procter &amp; Gamble</td>
<td>147,267 208,635 337,396</td>
</tr>
<tr>
<td>53</td>
<td>26</td>
<td>12</td>
<td></td>
<td>Bristol-Myers Squibb</td>
<td>75,167 138,564 311,586</td>
</tr>
<tr>
<td>467</td>
<td>17</td>
<td>13</td>
<td></td>
<td>Wal-Mart Stores</td>
<td>51,146 84,461 142,979</td>
</tr>
<tr>
<td>25</td>
<td>30</td>
<td>14</td>
<td></td>
<td>Johnson &amp; Johnson</td>
<td>52,199 90,829 250,044</td>
</tr>
<tr>
<td>70</td>
<td>41</td>
<td>15</td>
<td></td>
<td>American Int'l Group</td>
<td>11,026 315,842 762,217</td>
</tr>
</tbody>
</table>

Source: Standard & Poor’s Compustat. Market value ranks and SPE reflect calendar year-end values.
The Network Era (1995 - ?) - Internet Phenomenon

- For IT manager -- Enormous challenge to manage networks of thousands of computers!
The Network Era (1995 - ?) - Internet Phenomenon

- “The Technology leader of Tomorrow must be a business leader with all of the management skills of any other senior executive...

The CIO has gone from being a corporate god in the 1980s to the chief blame taker in the 1990s when IT initiatives often have failed to deliver their promised productivity gains.”

1Sifonis and Goldberg, “Changing Role of the CIO,” Information Week, March 24 1997
The Network Era (1995 - ?) - Internet Phenomenon

- In 1996 the CIO turnover rate was 17.7%!

Take Away: Managing IT in the Network Era is difficult, but if you do it right the rewards can be huge!

1Deloitte and Touche
Some Terminology from Messerschmitt
Definitions

- **An application**
  - a software program that provides direct and specific value to a user or organization

- **A networked application**
  - distributes programs across 2 or more computers which collaborate in realizing an application.
Definitions

- **Information Technology**
  - the suite of technologies that manage the storage, communication, and manipulation of information.

- **Infrastructure**
  - part of the information technology shared by many applications
    - Hardware - computers and the network
    - Software - operating system, middleware
Definitions

Middleware

software falling between the operating system and the application.
History of Computing

- **Centralized**
  - A few big mainframes to automate business functions such as payroll and accounting

- **Time-Shared**
  - Terminals added so many could access main frame

- **Decentralized**
  - PCs on every desk

- **Networked**
  - Applications could be geographically distributed
Definitions

Legacy Applications

- Applications implemented in the technology of yesterday.
Preview for Tuesday
What is a Business?

An organization that provides a product and/or a service that satisfies a need for which people are willing to pay money.

Makes money if revenues exceed costs.
Why Does a Company Need to Make a Profit?

- An obligation to owners/shareholders
  - Owners and shareholders have invested money and time. They expect to see something in return.

- Survival requires continued investments
  - new product development.
  - facilities and equipment.
  - acquiring other companies.
  - Invest in employees (training and salary increases)

- Stakeholders want to see performance before investing in a company’s future.
Recall: What is a System?

System Definition: A group of interrelated components working toward the attainment of a common goal by accepting inputs and producing outputs in an organized transformation process

- Input
- Processing
- Output
- Feedback
- Control
Business as a system

A business is an organizational system where economic resources (input) are transformed by various organizational processes (processing) into goods and services (output).
A Business is a System

Helps to remember and to tie together:

• Some business basics while remembering the importance of making a profit.
• The understanding of business functions.
• The appreciation for the importance of business processes.
A business is an organizational system where economic resources (input) are transformed by various organizational processes (processing) into goods and services (output).

Information systems provide information (feedback) on the operations of the system to management for the direction and maintenance of the system as it exchanges inputs and outputs within its environment.
Important Things to Understand

Two terms:

1) business functions
2) business processes

Will be frequently used throughout this course.

It would be a good idea to make absolutely sure that you know what they are.
Business Functions

**Function:** A group of people with related skills (specialized) seems to be a good starting point in understanding functions but this is a fairly loose definition.
Business Functions

- Examples
  - Design
  - Engineering
  - Sales
  - Finance
  - Marketing
  - Etc…
What prompts the creation and justification of business functions?

- Specialization
- Size
- Efficiency
- More cost effective
Business Processes

What is a business process?

- A designed *succession of actions* to the accomplish of some result in a business.

Example

- Order Fulfillment
A Business Process

Business Functions

- Customer
  - Order
  - Take Order
  - Enter Order
  - Credit Check
  - Check Stock
    - Print Packing list
    - Find Goods
    - Ship
    - Print Invoice
  - Tell Mfg. to make order

- Sales
  - Enter Order

- Finance
  - Enter Order

- Inventory Control
  - Credit Check

- Warehousing
Cross Functional Process

- A business process that crosses over multiple functions
- Are all business processes cross functional?
A business process within a function

Example: Channel Selection Process within Marketing function

- New Product idea
- Conduct Focus Group Studies
- Find sales by channel Data for similar products
- Mine Demographic data
- Combine information Make decision
Processes tend to be more simple at smaller organizations

Enrollment Process at a small, fictitious university…

- Fee Processing
- Financial Aid
- Housing
- Dinning
- Recreation Membership
- Health Insurance
- Class Registration
Processes tend to be more simple at smaller organizations

Enrollment Process at UCSC...
Similarly, at small companies

Example: Capital Equipment Purchase Business Process...
Big company

Capital Equipment Purchase Business Process

- Director
  - manager
  - finance
  - accounting
  - IT Dept
So where do Information Systems Fit into this Story??

- Coordinates flow of information between functional departments carrying out a business process.
  - Increase Speed
  - Reduce Errors
- May reduce number of steps in a business process.
- May even allow new processes that would not have been feasible before...