TIM 50 - Business Information Systems

Lecture 2

Instructor: Ram Akella
UC Santa Cruz
January 17, 2017
Announcements

• Business paper preferences due Thursday (1/19)

• Assignment 1 posted and due Tuesday (1/24)
  - On OTIS case

• Read ch 3 of Laudon and Laudon for Thursday
Selected Chapters from: D. Messerschmitt, *Understanding Networked Applications*

Case Studies

+ [Harvard Business Publishing]

= Reading Material 1
Reading Material 2

Selected Chapters from:
Laudon & Laudon, Essentials of MIS, 11th edition
Business Analysis Paper Preferences
Due THURSDAY 1/19!

- We want you to try to form your own groups.
  - However, we may modify the groups to balance skills and experience

- As a group, turn in (paper):
  - Names of proposed group members with emails
  - List of companies you would like to study

- Use the form we provide on the class webpage!
Business Analysis Paper Preferences
Due THURSDAY 1/19!

At least two of your preferred companies must be from this list:
- Emirates (airline),
- CVS Caremark,
- eBay,
- Carrefour (Supermarket Chain),
- Charles Schwab,
- Inditex (Clothing retailer),
- Netflix,
- Toyota,
- Amazon

With your preferences in mind, we will make the final company assignments to the groups.
To help us create balanced groups...
...you will self identify your best skills from:

W: Writing
A: Accounting and finance
C: Computers and technology
S: Business strategy
L: Literature Search
Business Paper Preferences

Example:

- Bob Smith  smith@yahoo.com  A, L
- Jane Do  do@hotmail.com  C, W
- Chris Tomas  chris@gmail.com  S, W

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?

- Interrelated components
  - Input
  - Processing
  - Output

Input  
\[\text{SYSTEM}\]  
Output
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).
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).

Information systems provide

- information (feedback) on the operations of the system
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: An area of specialization within an enterprise
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
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

Example: Channel Selection Process within Marketing function
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...

- Billing
- Financial Aid
- Health Insurance
- Housing
- Dinning
- Rec center
- Class Reg.
Similarly, at small companies

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

Capital Equipment Purchase Business Process

Manager

Director

Finance

Accounting

IT Dept
Business and Firm Hierarchies

- Hierarchy with authority is concentrated at top
- Goal: Achieve Coordination
- Typical Breakdown:
  - Senior management
  - Middle management
    - Knowledge workers
  - Operational management
    - Data workers
    - Production or service workers
- Each group has different needs for information
Components of a Business

Levels in a Firm

- Senior Management
- Middle Management
  - Scientists and knowledge workers
- Operational Management
  - Production and service workers
  - Data workers

Figure 2-3
Components of a Business

The Business Environment

- Global environment factors
  - Technology and science
  - Economy
  - Politics
  - International change

- Immediate environment factors
  - Customers
  - Suppliers
  - Competitors
  - Regulations
  - Stockholders
The Role of Information Systems in a Business

- Firms invest in information systems in order to:
  - Achieve operational excellence.
  - Develop new products and services.
  - Attain customer intimacy and service.
  - Improve decision making.
  - Promote competitive advantage.
  - Ensure survival.
Systems For Different Levels of Management

- **Transaction processing systems:**
  - Keep track of basic activities and transactions
  - (e.g., sales, credit decisions, flow of materials in a factory)
- **Management information systems and decision-support systems:**
  - Assist monitoring, controlling, decision making, and administrative activities
- **Executive support systems:**
  - Help address strategic issues and long-term trends, both in firm and in external environment
Types of Business Information Systems

• **Transaction processing systems:**
  • Serve operational managers.
  • Answer routine questions
    • E.g., Is the widget in stock? Was Bob paid?
  • Monitor status of internal operations and firm’s relationship with external environment.
    • E.g. Is the gizmo in production? Did we get paid?
  • Feed information to higher level info. systems.
A TPS for payroll processing captures employee payment transaction data (such as a timecard). System outputs include online and hard copy reports for management and employee paychecks.
Management information systems:

- Assist middle managers with reports on firm’s performance.
- Summarize and report on basic operations using data from TPS.
- Provide weekly, monthly, annual results, but may enable drilling down into daily or hourly data.
- Typically not very flexible systems with little analytic capability (in contrast to higher level systems).
How MIS Obtain Their Data from TPS

![Diagram showing the flow of data from Transaction Processing Systems (TPS) to Management Information Systems (MIS) and then to managers.]

Figure 2-6
This report, showing summarized annual sales data, was produced by the MIS in Figure 2-9.

### Consolidated Consumer Products Corporation Sales by Product and Sales Region: 2008

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Decision Support System Example:
Voyage-Estimating Decision Support System

This DSS operates on a powerful PC. It is used daily by managers who must develop bids on shipping contracts.

Figure 2-8
• Executive support systems (ESS):
  
  • Serve senior managers.
  
  • Address strategic issues and long-term trends
    • E.g., what products should we make in five years?
  
  • nonroutine decision making
  
  • Provide generalized computing capacity that can be applied to changing array of problems
  
  • Draw summarized information from MIS, DSS, and data from external events
  
  • Typically use portal with Web interface to present content
This system pools data from diverse internal and external sources and makes them available to executives in an easy-to-use form.

Figure 2-9
Systems That Span the Enterprise

- Enterprise applications
  - Systems that span functional areas, focus on executing business processes across the firm, and include all levels of management.
    - Supply chain management systems
    - Customer relationship management systems
    - Enterprise Resource Planning Systems
    - Knowledge management systems
Enterprise applications automate processes that span multiple business functions and organizational levels and may extend outside the organization.

Figure 2-14
Supply Chain Management Systems

- Manage relationships with suppliers, purchasing firms, distributors, and logistics companies.
- Manage shared information about orders, production, inventory levels, and so on.
  - Goal is to move correct amount of product from source to point of consumption as quickly as possible and at lowest cost
- Type of interorganizational system:
  - Automating flow of information across organizational boundaries
Customer Relationship Management Systems

- Help manage relationship with customers.
- Coordinate business processes that deal with customers to optimize revenue and customer satisfaction, and increase sales.
- Combine sales, marketing, and service record data from multiple communication channels to provide unified view of customer, eliminate duplicate efforts.
- E.g., Saab CRM applications to achieve 360 degree view of customers resulted in greater follow-up rate on sales leads and increased customer satisfaction.
Enterprise Resource Planning Systems

- Integrate data from key business processes into single system.
- Speed communication of information throughout firm.
- Enable greater flexibility in responding to customer requests, greater accuracy in order fulfillment.
- Enable managers of large firms to assemble overall view of operations.
- Alcoa used ERP to eliminate redundancies and inefficiencies in its disparate systems.
Knowledge Management Systems

- Intangible knowledge assets
  - Knowledge about producing and delivering products
  - Source of value and advantage for firms
- Knowledge management systems:
  - Help capture, storage, distribute, and apply knowledge so that it can be leveraged for strategic benefit.
  - Include systems for:
    - Managing and distributing documents, graphics, other digital knowledge objects
    - Creating knowledge directories of employees with specialized expertise
    - Distributing knowledge
Business Benefits of Collaboration and Teamwork

• Large business firms: “command and control” organizations in which upper management created the strategy and middle management carried out their orders.
  • Today, businesses rely on collaborative culture.
  • Teams of employees responsible for creating and building
Evaluating and Selecting Collaboration Software Tools

• What are your firm’s collaboration challenges?
• What kinds of solutions are available?
• Analyze available products’ cost and benefits.
• Evaluate security risks.
• Consult users for implementation and training issues.
• Evaluate product vendors.
Collaboration technologies can be classified in terms of whether they support interactions at the same or different time or place, and whether these interactions are remote or colocated.

The Time/Space Collaboration Tool Matrix

**Figure 2-12**

- **Same time (synchronous)**
  - Face to face interactions
  - Decision rooms, single display groupware, shared table, wall displays, roomware, etc.

- **Different time (asynchronous)**
  - Continuous task
  - Team rooms, large public display, shift work groupware, project management, etc.

- **Same place (colocated)**
  - Remote interactions
  - Video conferencing, instant messaging, charts/MUDs/virtual worlds, shared screens, multi-user editors, etc.

- **Different place (remote)**
  - Communication + coordination
  - Email, bulletin boards, blogs, asynchronous conferencing, group calendars, workflow, version control, wikis, etc.
The Information Systems Department

- Programmers
- Systems analysts
  - Principle liaisons to rest of firm
- Information systems managers
  - Leaders of teams of programmers and analysts, project managers, physical facility managers, telecommunications managers, database specialists, managers of computer operations, and data entry staff
- Senior managers: CIO, CSO, CKO
- End users
- External specialists
Information Systems Services

Services provided by the information systems department include:

- Computing and telecommunications services
- Data management services
- Application software services
- Physical facilities management services
- IT management services
- IT standards services
- IT educational services
- IT research and development services
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 IBMs 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)
Data Processing Era (1960-1980)

- 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
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
Better budgeting and resulting accountability lead to consistent earnings growth.
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 employee's 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!
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

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Source: Standard & Poor’s Compustat. Market value ranks and SPE reflect calendar year-end values.
For IT manager -- Enormous challenge to manage networks of thousands of computers!
“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.”¹

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%!\textsuperscript{1}

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

\textsuperscript{1}Deloite and Touche
Components of a Business

Organizing a Business: Basic Business Functions

- Five basic business entities:
  - Suppliers
  - Customers
  - Employees
  - Invoices/payments
  - Products and services