

# The Importance of Information Systems Management

## Chapter 1

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## Introduction

- Information Technology (IT) – computers and telecommunications – is having the kind of revolutionary, restructuring impact that has been expected and promised for years
- Rapid advances in speed and capacity + pervasiveness of Internet, wireless, portable devices etc. = making major changes in the way we live and work

## Major Trends of IS

- Governance of IT
  - ◆ A collaborative effort from IS executives and all other members of Senior Management
- Role of IS
  - ◆ Shifting from application delivery to system integration and infrastructure development
- Outsourcing – Total / Selective
  - ◆ Developing and managing contracts and relationships

## Management of IS

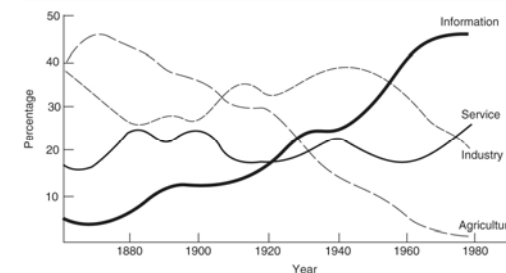
- Historically, managing IT has been the job of ‘Technical Managers’
- Now, increasingly becoming an important part of the responsibilities of:
  - ◆ Senior executives
  - ◆ Line managers
  - ◆ Employees at all levels of an organization

**Technology** is configured into **systems** that help manage **information** to improve **organizational performance**.

## A Little History (USA)

- U.S. passed from the industrial era to the information era as early as 1957
- The number of U.S. employees whose jobs were primarily to handle information surpassed the number of industrial workers

FIGURE 1-1 Percentage Aggregation of the U.S. Work Force



Source: Marc U. Porat, *The Information Economy* (Washington, D.C.: Office of Telecommunications Policy, U.S. Department of Commerce, 1977).

## A Little History (USA)

- In the late '50s / '60s: IT to support “information work” → largely non-existent (except telephone)
  - ◆ Information work mostly done in general offices without much support from technology
- 1970s: It all ‘started’ with many of the foundations of IT today invented and costs starting to fall
  - ◆ Typewriters, fax, ‘smaller’ computers
- 1980s: Number of US information workers surpassed the number in all other sectors (>50%)

## A Little History of IT

- Initially used to perform existing information work more quickly and efficiently
- Then used to manage work better
- Now well into the 3<sup>rd</sup> stage of technology assimilation
  - ◆ IT makes pervasive changes in the structure and operation of:
    - ◆ Work
    - ◆ Business practices
    - ◆ Organizations
    - ◆ Industries
    - ◆ The ‘Global Economy’

## The Organizational Environment

- The way IT is used depends on the environment surrounding the organization that uses it
- Simultaneously, technological advances affect the way IT is used
- Two aspects of the organizational environment:
  - ◆ The External Organizational Environment
  - ◆ The Internal Organizational Environment

## The External Organizational Environment

- IT allows information to move faster, thus increasing the speed at which events take place and the pace at which individuals and organizations respond to events.
- Major changes in our global marketplace
  - ◆ The Internet Economy
  - ◆ Global Marketplace
  - ◆ Business Ecosystems
  - ◆ Decapitalization
  - ◆ Faster Business Cycles
  - ◆ Accountability and Transparency
  - ◆ Rising Societal Risks of IT



## The External Organizational Environment: The Internet Economy

- From APARTNET to today's Internet
  - ◆ WWW has evolved from a graphical layer of the Internet to a cyberspace for business
    - ◆ B2C, e.g. Amazon.com
    - ◆ B2B, e.g. eBay
- Dot-com crash
  - ◆ Pure Internet economy vs. the hybrid model
    - ◆ Bricks and clicks

## The External Organizational Environment: Global Marketplace

- Mergers cross the national boundaries
  - ◆ The entire world has become the marketplace
- Internet enables companies to work globally
  - ◆ Even small firms have global reach
  - ◆ Local backlash
    - ◆ Global environment vs. local tastes

## **The External Organizational Environment: Business Ecosystems**

- An ecosystem is a web of relationships surrounding one or a few companies
  - ◆ They appear to follow biological rules
  - ◆ Various players in one's business ecosystem
    - ◆ Banks, advertising agencies, suppliers, distributors, retailers, competitors etc.

## **The External Organizational Environment: Decapitalization**

- Tangible items, such as capital, equipment and buildings were the tenets of power in the industrial age
- Today, we see power of 'intangibles' such as ideas and knowledge
  - ◆ Managing talent is now as important as managing finance

## **The External Organizational Environment: Faster Business Cycle**

- Faster tempo of business
  - ◆ Less time to market
  - ◆ Shorter product life cycle

## **The External Organizational Environment: Accountability and Transparency**

- Rise and fall of dot-coms probably should have been expected
  - ◆ Many business plans could not make money
- Debacle in Telco and business shenanigans have shaken investor confidence
  - ◆ Call for greater transparency of corporate operations and greater accountability of corporate officers
  - ◆ IT will play a significant role in implementing the ensuing regulations and fostering transparency

## **The External Organizational Environment: Rising Societal Risks of IT**

- IT has negatively affected millions of people
  - ◆ Network shutdowns
  - ◆ Computer viruses
  - ◆ Identity theft
  - ◆ Email scams
  - ◆ Movement of white collar jobs offshore
- Led to increasing calls for Government regulation and for vendors and corporations to take action

## **The Internal Organizational Environment**

- The work environment is also changing, and the art of managing people is undergoing significant shifts
  - ◆ From Supply-Push to Demand-Pull
  - ◆ Self-Service
  - ◆ Real-Time Working
  - ◆ Team-Based Working
  - ◆ Anytime, Anyplace Information Work
  - ◆ Outsourcing and Strategic Alliances
  - ◆ Demise of Hierarchy



## **The Internal Organizational Environment: From Supply-Push to Demand-Pull**

- Supply-Push
  - ◆ Companies did their best to figure out what customers wanted
  - ◆ Organized to build a supply of products or services and then 'push' them out to end customers on stores shelves, in catalogs etc.
- Demand-Pull
  - ◆ Allows much closer and 'one-to-one' contact between customer and seller
  - ◆ Offer customers the components of a product/service then the customer creates their own version by 'pulling' what they want

## **The Internal Organizational Environment: Self-Service**

- ATM is the early example
- 1990s saw an increase in systems that let consumers access corporate computer systems to:
  - ◆ Learn about products
  - ◆ Purchase products
  - ◆ Inquire about orders
  - ◆ Communicate and 'do business' with the firm
- FedEx's parcel tracking system via Internet

## **The Internal Organizational Environment: Real-Time Working**

- Sales people have up-to-the-minute information about customers
  - ◆ e.g. Knowing the current inventory and cash levels – not as they were a week or a month ago
- Being able to reach someone when you need them
  - ◆ Instant messaging (e.g. ICQ, MSN, Skype)

## **The Internal Organizational Environment: Team-Based Working**

- Working together on projects
- Task-oriented teams
  - ◆ Each member has a unique contribution to the overall results.
- Groupware
  - ◆ Provides IT support for meeting, collaborative work, and communication among far-flung team members.

## **The Internal Organizational Environment: Anytime, Anyplace Information Work**

- Information workers are increasingly mobile, so computers are needed not just for accessing information, but also communicating with others

## **The Internal Organizational Environment: Outsourcing and Strategic Alliances**

- To become more competitive, organizations are examining types of work that should be done internally or externally by others
  - ◆ Ranges from a simple contract for services to a long-term strategic alliance
  - ◆ The thinking is: We should focus on what we do best and outsource the other functions to people who specialize in them

## **The Internal Organizational Environment: The Demise of Hierarchy**

- Traditional hierarchical structure groups, several people performing the same type of work, overseen by a supervisor
  - ◆ No longer the most appropriate in factories or offices
- Hierarchical structures cannot cope with rapid change
  - ◆ Communications up and down the chain of command takes too much time for today's environment
- IT enables team-based organizational structures by facilitating rapid and far-flung communication

## **Goals of the New Work Environment**

- The following overarching goals for thriving in the new work environment:
  - ◆ Leverage Knowledge Globally
  - ◆ Organize for Complexity
  - ◆ Work Electronically
  - ◆ Handle Continuous and Discontinuous Change



## **Goals of the New Work Environment**

- Leverage Knowledge Globally
  - ◆ Tap tacit knowledge by fostering sharing and supporting sharing through technology
  - ◆ Happens through organizational pull (people needing help) rather than organizational push which overloads people with information

## **Goals of the New Work Environment**

- Organize for Complexity
  - ◆ The world is so interconnected
  - ◆ Issues are often systemic
  - ◆ Choices are endless

## Goals of the New Work Environment

- Work Electronically
  - ◆ Taking advantage of the Internet and networks in general is the 3<sup>rd</sup> major goal of enterprises today
    - ◆ Requires different organizing principles, management tenets, compensation schemes, structure etc.
    - ◆ Changes how organizations interact with others including customers
  - ◆ The microchip moved power within companies. Bandwidth moves power all the way to consumers
  - ◆ Will increase exponentially as bandwidth capability increases and costs decrease

## Goals of the New Work Environment

- Handle Continuous and Discontinuous Change
  - ◆ Fits and starts

## The Technology Environment

- The technology environment enables advances in organizational performance.
- Two have a symbiotic relationship: IT and organizational improvements coevolves.
- IT evolution can be described using the four traditional areas:
  - ◆ Hardware Trends
  - ◆ Software Trends
  - ◆ Data Trends
  - ◆ Communication Trends



## The Technology Environment: Hardware Trends

- 1950s –60s: Batch processing (Mainframe)
- Mid 1970s: Departmental Minicomputers
- 1980s: Advent of PCs
- Client-Server computing
  - ◆ "Client" machine user interfaces with "Server" on the network holding the data and applications
- Current: hand-held devices, wireless etc.



## The Technology Environment: Software Trends

- In 1960s
  - ◆ Improve the productivity of in-house programmers
  - ◆ Modular and structured programming techniques
- In 1970s
  - ◆ Life cycle development methodologies and software engineering
  - ◆ Prototyping
  - ◆ Purchasing software became viable alternative to in-house development
  - ◆ OOA & OOP
- In 1980s
  - ◆ IS managers paying attention to applications other than transaction processing
  - ◆ DSS, report generation, database applications
  - ◆ End users develop their own systems

## The Technology Environment: Software Trends (cont')

- 1990s
  - ◆ Push for "open systems"
  - ◆ Enterprise Resource Planning (ERP) e.g. SAP, PeopleSoft
    - ◆ A fundamental organizational change
    - ◆ Defining a corporation's IT architecture
  - ◆ Like hardware, software is migrating to be network centric.
    - ◆ Web front ends to empower employees rather than replacing legacy systems
- Now
  - ◆ Moving to Web Services
    - ◆ Packages of code that each perform a specific function and have a URL
    - ◆ The network becomes the heart of the system, linking all Web Services

## The Technology Environment: Data Trends

- 1950s-1960s
  - ◆ File management
    - ◆ Organizing files to serve individual applications
  - ◆ Corporate databases
    - ◆ Serving several applications
    - ◆ Led to concept of establishing a data administration function
- 1970s
  - ◆ DBMS
    - ◆ Data dictionary/directory
      - Specification and format, information about relationships among systems, sources and uses of data etc.
    - ◆ First 20 years: managing data in a centralized environment
- Late '70s / '80s
  - ◆ RDBMS, 4GL and PCs:
  - ◆ Data distribution: employees directly access corporate data

## The Technology Environment: Data Trends (cont')

- 1990s
  - ◆ From data resources to information resources
    - ◆ Information management focuses on concepts
    - ◆ Contains a much richer universe of digitized media including voice, graphics, animation and photographs
  - ◆ New technologies
    - ◆ Data warehousing – Stores huge amounts of historical data from systems such as retailers Point-Of-Sale systems
    - ◆ Data mining – Extracting knowledge from large amounts of data
- Now
  - ◆ Web has broadened 'data' to 'content'
    - ◆ Text, graphics, animation, maps, photos, video etc.
  - ◆ Two major data issues are now facing CIOs:
    - ◆ Security – protecting data from those who should not see it
    - ◆ Privacy – safeguarding the personal data of employees, customers etc.

## The Technology Environment: Communication Trends

- Telecom opened up new uses of IS so it became an integral component of IS management
  - ◆ Communications-based information systems link organizations to their suppliers and customers
- Telecom has experienced enormous change and is now taking "center stage"
  - ◆ Early use: online and time-sharing systems
  - ◆ Then: interest in both public and private (intra-company) data networks blossomed
- Internet: Changed everything!
  - ◆ Today the Internet's protocol has become the worldwide standard for LANs and WANs
  - ◆ Will also soon be the standard for voice, TV etc.
- Explosion of wireless
  - ◆ 2G, IM, Wi-Fi, 3G
  - ◆ Doesn't just enable mobility: changes how people communicate, how they live and how they work

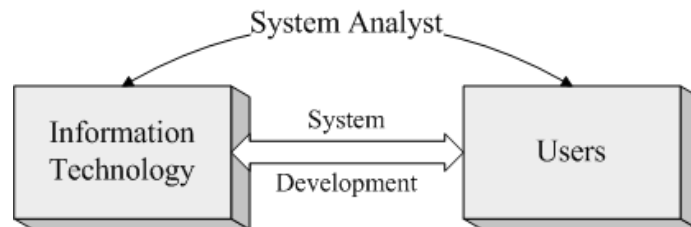
## The Mission of Information Systems

- Early days: "paperwork factories" to pay employees, bill customers, ship products etc.
  - ◆ Objectives of information systems defined by productivity measures
- MIS era: produced reports for "management by exception" for all levels of management
- Today: Improve the performance of people in organizations through the use of information technology
  - ◆ Improving organizational performance is accomplished by the people and groups that comprise the organization

The mission is to improve the performance of people in organizations through the use of information technology

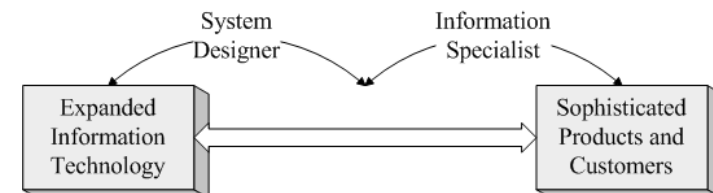
## A Simple Model

- In the early days of Information Systems, the 'translation' between IT and users was performed almost entirely by systems analysts



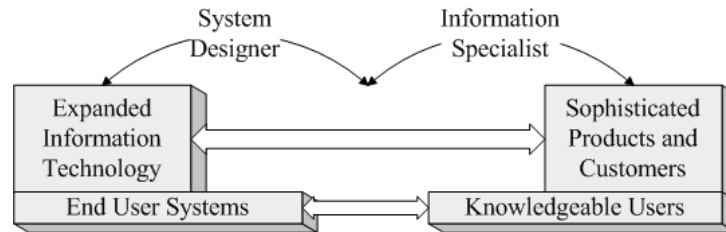
## Systems Professionals Bridging the Technology Gap

- Over the last 50 years technology has become increasingly complex and powerful
  - ◆ Users have become increasingly sophisticated
  - ◆ Information systems are now viewed as "products" and users have become "customers"
- More specialization is required of systems professionals to bridge this wider gap



## Users Bridging the Technology Gap

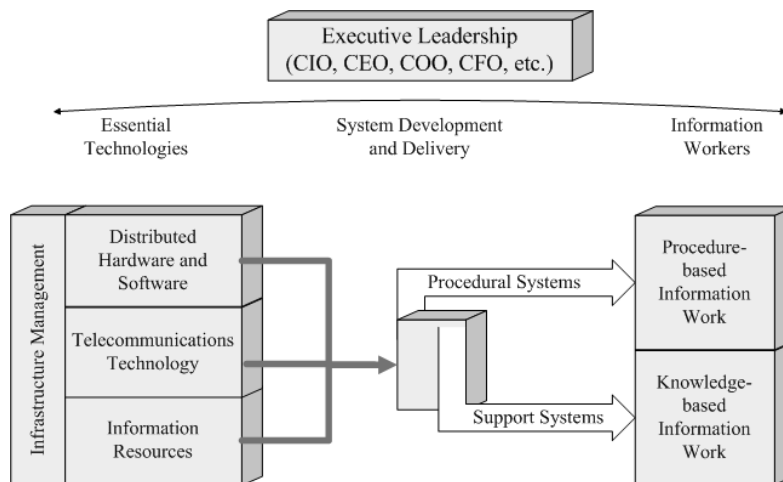
- Technology becomes user-friendly and many applications are handled by non-IT staff.
- Transaction systems, however, are still developed by professional developers



## A Better Model

- Expanding the simple model gives us more guidance into managerial principles and tasks
- We suggest a model with four principal elements:
  - ◆ A set of technologies that represent the IT infrastructure installed and managed by the IS department
  - ◆ A set of users who need to use IT to improve their job performance
  - ◆ A delivery mechanism for developing, delivering and installing applications
  - ◆ Executive leadership to manage the entire process of applying the technology to achieve organizational objectives and goals

## A Better Model



## The Technologies

- Several forces contribute to the increased importance and complexity of IT:
  - ◆ Growth in capacity and reduction in cost & size
  - ◆ Merging of previously separate technologies of computers, telephones/telecom/cable TV, office equipment and consumer electronics
  - ◆ Ability to store and handle multiple forms of data

## The Users

- A dichotomy of information worker
  - ◆ Procedure-based activities
    - ◆ High volume of transactions; well-structured procedures; output measure defined; focus on process and efficiency; handling of data...
    - ◆ e.g. "Pay employees"
  - ◆ Knowledge-based activities
    - ◆ Low volume of transactions; ill-structured procedures; output measure less defined; focus on problems, goals and effectiveness; handling of concepts...
    - ◆ e.g. "improve sales in the Asian Market"

## System Development and Delivery

- Bridging the gap between technology and users
- Systems for procedure-based activities differ from systems for knowledge-based information work
- Infrastructure management
  - ◆ Hardware and software
  - ◆ Telecommunications
  - ◆ Information resources

## IS Management

- Chief Information Officer (CIO)
  - ◆ Must be high enough in the enterprise to influence organizational goals
  - ◆ Must have enough credibility to lead the harnessing of technology to pursue those goals
- CIOs must work with all the other CxOs
  - ◆ IT has become too important to be left to one individual
- Executive team must work together to govern IT and leverage IT well