The Work System Method
Introduction, Motivation and Definitions

MBA 8125
Information Technology Management
Definition

• **Work**
  • the application of human and technical resources to produce products and services for internal and/or external customers.
Work System

• *Work System* - a system in which human participants and/or machines perform work using information, technology, and other resources to produce products and/or services for internal or external customers.
  
  • Typical business organizations contain work systems that procure materials from suppliers, produce products, deliver products to customers, find customers, create financial reports, hire employees, coordinate work across departments, and perform many other functions.

  • Every work system can be viewed as a subsystem of a larger work system, the boundaries of a work system are treated as a carefully considered decision by the work system modeler.

  • In general, the relevant work system for a particular analysis is the smallest work system that exhibits or possesses the problem, issue, or opportunity that prompted the analysis.
## Examples of Work Systems
(from papers by MBA students at Georgia State Univ.)

<table>
<thead>
<tr>
<th>Calculating rates for insurance renewals</th>
<th>Managing software development projects</th>
<th>Acquiring clients at a professional service firm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receiving materials at a large warehouse</td>
<td>Approving real estate loan applications</td>
<td>Planning and dispatching trucking services</td>
</tr>
<tr>
<td>Performing pre-employment background checks</td>
<td>Performing financial planning for wealthy individuals</td>
<td>Scheduling and tracking health service appointments</td>
</tr>
<tr>
<td>Operating an engineering call center</td>
<td>Purchasing advertising services</td>
<td>Determining salary increases</td>
</tr>
<tr>
<td>Collecting and reporting sales data for a wholesaler</td>
<td>Planning for outages in key real time information systems</td>
<td>Invoicing for construction work</td>
</tr>
</tbody>
</table>
Example work Systems

Work system #1: How a bank approves commercial loans.
Work system #2: How a software vendor tries to find and qualify sales prospects.
Work system #3: How Zoo Atlanta defines its membership recruitment process.
Work system #4: How a major bank authenticates callers to be bona fide customers before connecting to a call center.

Example: Work System for Clinical Data Warehouse, XYZ Healthcare
“The general premise behind the process model is that during the extraction, transformation and loading of the source data in the operational data store to the data warehouse, any transaction that fails anywhere, the entire load cycle is aborted and appropriate personnel is notified about the outage. Until the offending process is rectified and dealt with, the entire cycle is kept on hold.”

Comment: A highly Technical works system in a healthcare IT services unit and an example of a name/scope of the WS that is tied to the technology BUT where the WS description is a bona fide WS problem.
A Limiting Paradigm…

- Viewing Systems as IT-based tools that are used by users.
Work systems are NOT Information Systems

Figure 4.1: Different types of overlap between work systems and related information systems
Work System Framework
Basics of Work System Method

• System and Problem
  – Define work system based on problem
  – Summarize “as is” using work system snapshot

• Analysis and Possibilities
  – Drill down using work system elements and alignment within the work system

• Recommendation and Justification
  – Summarize “to be” using work system snapshot
  – Drill down to understand impact of changes
  – 10 questions related to recommendation and justification
Customers

- The people who receive, use, or benefit directly from products and services that a work system produces.
  - In most cases they can experience or perceive the quality of those products and services.
  - Customers include external customers and internal customers.
    - External customers receive and use the economic products and/or services that a firm produces. Firms exist to produce those products and services.
    - Internal customers are employees or contractors who receive and use a work system’s products and/or services while performing work in other parts of the same firm’s value chain.
Products and Services

• the combination of physical things, information, and services that the work system produces for its various customers.

• products and services may take various forms, including physical products, information products, services, intangibles such as enjoyment and peace of mind, and social products such as arrangements and agreements.
Intermediate Products and Services

- *intermediate products and services* --used by other activities within the work system.

- not considered to the products and services of the work system unless they are received and used by the customers of the work system for some purpose outside of the work system.

- E.g., assume that a loan approval process produces a formal evaluation of a loan.

  - The approval is considered to be among the products and services of the work system if it goes to a work system customer for some purpose outside of the work system.

  - If the approval process is only used to make a decision in a subsequent activity and then discarded; it is an intermediate process.
Participants

- **People who perform the work**
  - The role of work system participant is more important than the more limited role of technology user, whether or not particular participants happen to be technology users.

- Customers are participants in many work systems.
  - Minimal involvement-- such as when their request launches a production process that they are not involved in.
  - Vs quite involved (e.g., selecting furnishings for a room with the help of a designer or sales person, learning in a classroom with the help of a teacher, and helping a doctor perform a medical examination).

- A strong trend -- toward self-service work systems whose customers perform much of the important work (e.g., paying bills online, using an ATM, or doing research on the internet about a possible car purchase).
Information

- Includes codified and non-codified information used and created as participants perform their work.
  - **Codified** information is the pre-defined information used in tracking packages, entering orders, and performing repetitive financial transactions.
    - In each case, each data item must be defined precisely, and the information is usually processed using explicit rules.
  - **Uncodified** information includes computerized or handwritten documents, verbal agreements, and formal or informal conversations. Information may or may not be computerized.
  - Knowledge can be viewed as a special case of information.
    - Explicit knowledge is recorded in documents, images, rules, and other forms.
    - Tacit knowledge exists in people’s heads and is not explicit.
Technologies

- Tools that help people work more efficiently or that perform automated work steps autonomously.

  - Some technologies, such as search engines, cell phones, spreadsheet software, and automobiles, are general-purpose because they can be applied in a wide range of business situations.

  - Other technologies are tailored to specific situations.

    - Examples include a spreadsheet model for calculating mortgage interest and a software package for designing kitchens.
Infrastructure

- Human, informational, and technical resources that the work system relies on but are outside the work system and are shared resources with other work systems.

- Human infrastructure - people and organizations that supply services shared by different work systems.
  - For example, training organizations, internal consultants, and human resources departments are typically considered part of the human infrastructure that may be relevant to a work system.

- Information infrastructure -- information shared across various work systems, such as mutually accessible databases and other enterprise-wide information.

- Technical infrastructure includes the Internet, corporate computer networks, database management software, and other technologies shared by multiple work systems and often hidden or invisible to work system participants.

  - e.g., Enterprise software such as ERP suites is technical infrastructure that is shared across multiple work systems. A specific program or module in an ERP suite can be viewed as technology within a work system.
Environment

- The organizational, cultural, competitive, technical, and regulatory environment within which the work system operates.

- Factors in the environment affect work system performance even though the work system does not rely on them directly in order to operate.

- The organization’s general norms of behavior are part of the culture in the environment that surrounds the work system, whereas…

- Behavioral norms and expectations about specific activities within the work system are considered characteristics of processes and activities within the work system.
Strategies

- The guiding rationale and high-level choices within which a work system, organization, or firm is designed and operates.

- Strategies at the department and enterprise level may help in explaining why the work system operates as it does and whether it is operating properly.

- A work system’s strategy (its guiding rationale and high-level choices) should be aligned with the strategy of the organization and firm that it serves.

  - E.g., a work system designed to produce the highest quality products might not fit in an organization operating under a cost minimization strategy.
Metrics

• *Measures of performance* (including)
  • instantaneous measures (e.g., the current inventory, the cash balance last Monday at midnight, the number of amount of data stored in our database last Tuesday at midnight) or
  • measures of occurrences or phenomena during a time period in the past (e.g., total sales last week or total hiring last year).

• *The value of a metric* is a number describing how well a work system or part of a work system is currently operating or operated in the past. Here are some examples:
# Metric examples

<table>
<thead>
<tr>
<th>Metric</th>
<th>Current value</th>
<th>Realistic desired value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total output</td>
<td>50 units per week</td>
<td>60 units per week</td>
</tr>
<tr>
<td>Average time to resolve customer questions</td>
<td>4 hours</td>
<td>2.5 hours</td>
</tr>
<tr>
<td>Cost per invoice handled</td>
<td>$5.35</td>
<td>$2.00</td>
</tr>
<tr>
<td>Rework rate</td>
<td>10%</td>
<td>3%</td>
</tr>
<tr>
<td>Error rate in calculations</td>
<td>3%</td>
<td>0%</td>
</tr>
<tr>
<td>Customer satisfaction</td>
<td>6.2 out of 7.0 on a monthly survey</td>
<td>6.7 out of 7.0 on a monthly survey</td>
</tr>
<tr>
<td>Uptime of equipment</td>
<td>99.5 %</td>
<td>99.8%</td>
</tr>
</tbody>
</table>
Level of Abstraction & Analysis

- **Organizational Analysis levels** (include):
  - the entire enterprise,
  - a department within an enterprise,
  - a work system within a department within an enterprise,
  - a subsystem of the work system.

The person doing the analysis should decide on the right organizational level for the analysis that needs to be done.

- **The level of detail** differs across the roles and across different situations.
  - In all cases, the analysis and design of a system should include typical steps of identifying the problem and system, performing an analysis, and producing a justified recommendation.
  - People in different roles should use the framework and related ideas at different levels of depth.
A Starting point:

The Work System Snapshot

- *a highly summarized but balanced view of a work system that a business professional can produce quickly or can understand quickly when it is presented.*
- uses six central elements to summarize what a system is and what it produces. At this summary level distinctions between technology and technical infrastructure are unimportant.

<table>
<thead>
<tr>
<th>Work system snapshot for a loan approval system for loans to new clients</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Customers</strong></td>
</tr>
<tr>
<td>• Loan applicant</td>
</tr>
<tr>
<td>• Loan officer</td>
</tr>
<tr>
<td>• Bank’s Risk Management Department and top management</td>
</tr>
<tr>
<td>• Federal Deposit Insurance Corporation (FDIC) (a secondary customer)</td>
</tr>
<tr>
<td>• Loan officers identify businesses that might need a commercial loan.</td>
</tr>
<tr>
<td>• Loan officer and client discuss the client’s financing needs and discuss possible terms of the proposed loan.</td>
</tr>
<tr>
<td>• Loan officer helps client compile a loan application including financial history and projections.</td>
</tr>
<tr>
<td>• Loan officer and senior credit officer meet to verify that the loan application has no glaring flaws.</td>
</tr>
<tr>
<td>• Credit analyst prepares a “loan write-up” summarizing the applicant’s financial history, providing projections explaining sources of funds for loan payments, and discussing market conditions and applicant’s reputation. Each loan is ranked for riskiness based on history and projections. Real estate loans all require an appraisal by a licensed appraiser. (This task is outsourced to an appraisal company.)</td>
</tr>
<tr>
<td>• Loan officer presents the loan write-up to a senior credit officer or loan committee.</td>
</tr>
<tr>
<td>• Senior credit officers approve or deny loans of less than $400,000; a loan committee or executive loan committee approves larger loans.</td>
</tr>
<tr>
<td>• Loan officers may appeal a loan denial or an approval with extremely stringent loan covenants. Depending on the size of the loan, the appeal may go to a committee of senior credit officers, or to a loan committee other than the one that made the original decision.</td>
</tr>
<tr>
<td>• Loan officer informs loan applicant of the decision.</td>
</tr>
<tr>
<td>• Loan administration clerk produces loan documents for an approved loan that the client accepts.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Participants</th>
<th>Information</th>
<th>Technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Loan officer</td>
<td>• Applicant’s financial statement for last three years</td>
<td>• Spreadsheet for consolidating information</td>
</tr>
<tr>
<td>• Loan applicant</td>
<td>• Applicant’s financial and market projections</td>
<td>• Loan evaluation model</td>
</tr>
<tr>
<td>• Credit analyst</td>
<td>• Loan application</td>
<td>• MS Word template</td>
</tr>
<tr>
<td>• Senior credit officer</td>
<td>• Loan write-up</td>
<td>• Internet</td>
</tr>
<tr>
<td>• Loan committee and executive loan committee</td>
<td>• Explanation of decision</td>
<td>• Telephones</td>
</tr>
<tr>
<td>• Loan administration clerk</td>
<td>• Loan documents</td>
<td></td>
</tr>
</tbody>
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Premises of the Work System Method

• **The goal:** Improving business performance.

• **Assumption:** Business performance is generated by operation of sociotechnical work systems.

• **Improvement process:** Changing work systems, not just creating, installing, or using information systems or IT.

• **Links to more formal ISA&D techniques (UML, SOA, etc.)**
  – Decompose work systems into smaller work systems:
  – some of which are sociotechnical
  – some of which are autonomous computerized agents.
Q: Should Business Professionals Analyze Systems for Themselves?

• Can they be trusted?
• Do they have the appropriate skill and knowledge?
• IF NOT: How is it possible for them to do their work and manage organizations?
• IF NOT: How is it possible for them to participate in the development of information systems?
• What system should be analyzed?
Typical Systems Analysis Methods are created for IT Professionals

- Mostly about documentation, not really about analysis
- Emphasis on precision and completeness
- Complex, opaque terminology
- Emphasis on use of tools, not on business performance
Work System Method:
a kind of Systems Analysis for Everyone Else

• Aha! Business professionals need to focus on work systems, not just IS or IT.
Positioning of Work System Approach

Enterprise level:
- Organizational architecture
- Localized rules and routines
- IT-reliant work systems in organizations
- Technical infrastructure

Localized rules and routines

Predominance of design and social science

Links that ignore IT-reliant work systems within organizations

Predominance of engineering and computer science

Links that emphasize IT-reliant work systems within organizations

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Chapter 1

Systems a mess: Seven Common Temptations

• **Temptation #1:** Viewing technology as the system.
• **Temptation #2:** Assuming technology is a magic bullet.
• **Temptation #3:** Abdicating responsibility for systems.
• **Temptation #4:** Avoiding performance measurement
• **Temptation #5:** Accepting superficial analysis.
• **Temptation #6:** Accepting one-dimensional thinking.
• **Temptation #7:** Assuming desired changes will implement themselves