Operations management is heavily dependent upon strong and effective information systems. Analytical models are used to address decisions, and data drives these models.

It reflects the greatest growth in business investment in the past decade. Nearly 40% of the capital investments by businesses is related to information technology (IT).

Information systems have gone through several phases of development. In early phases, the main emphasis was on improving the efficiency of transaction processing, and today they are highly sophisticated systems to help managers make decisions.

They are a critical part of the “New Economy.”
**From Old Economy**

- Resource-based
- Stable comparative advantage
- Resource extraction, manufacturing fundamental to wealth creation
- Investment in physical capital key to competitiveness
- Safety nets
- Monopolistic, low value-added infrastructure
- Protection
- Discrete domestic and international markets
- Multinational firms
- Quantity: economies of scale
- Hierarchical
- Subsidies to slow change

**To New Economy**

- Ideas-based
- Dynamic
- Knowledge increases importance of service sector in wealth creation
- Investment in human capital key to competitiveness
- Trampolines
- Competitive, high value-added infrastructure
- Openness
- Interdependence of domestic and international markets
- Global firms/strategic partnering
- Quality: economies of scope
- Total quality, strategic alliances, partnerships
- Encouragement to adapt

**SOURCE:** Building a More Innovative Economy, Industry Canada

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**TYPES OF INFORMATION SYSTEMS**

**P Transaction Processing Systems (TPS)**
- Pure data processing
  - Goal is to reduce processing cost and increase accuracy
  - Example: payroll, general ledger, billing, etc.
- Sometimes referred to as Electron Data Processing (EDP)

**P Management Information Systems (MIS)**
- First efforts to give managers digitally based information for decision making
  - Predefined aggregations and reporting capability
  - Lacked flexibility
  - Examples: accounting summaries, delinquent accounts, production flows, sales statistics, etc.
  - Recently, some attempts have been made to increase flexibility (e.g., can design own report form)
Decision Support Systems:
- Extensively integrated systems with flexible data processing and support from decision models
  - Becoming common in larger companies
    - SAP is a very comprehensive system used by many firms
- Concepts are being applied to smaller firms
- Also has been given other names (e.g., Executive Support Systems, and Management Support System, Process Oriented Information Systems)
**Davis’s Information and Haeckel’s Hierarchy**

- **Data**
- **Processing**
- **Information**
- **Intelligence**
- **Knowledge**
- **Wisdom**

**DATA ORIENTED vs. MODEL ORIENTED**

- **File Drawer System**
- **Data Analysis System**
- **Analysis Info. System**
- **Accounting Models**
- **Representation System**
- **Optimization Models**
- **Suggestion Models**

- **Data Retrieval**
- **Data Analysis**
- **Simulation**
- **Suggestion**

**Data Oriented**

**Model Oriented**
### FRAMEWORK FOR INFORMATION SYSTEMS

<table>
<thead>
<tr>
<th>Type of Decision</th>
<th>Operation Control</th>
<th>Management Control</th>
<th>Strategic Planning</th>
<th>Support Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structured</td>
<td>Temperature or Light Control</td>
<td>Selecting Pesticide Program</td>
<td>Choosing Product Mix</td>
<td>Clerical or Mngt. Sci. Models</td>
</tr>
<tr>
<td>Semi-Structured</td>
<td>Restructure Business Debt</td>
<td>Set Production Goals</td>
<td>Expanding the Business</td>
<td>Decision Support Systems</td>
</tr>
<tr>
<td>Un-Structured</td>
<td>Hiring Business Employees</td>
<td>Delegation of Business Duties</td>
<td>Forming Business Alliances</td>
<td>Human Intuition</td>
</tr>
</tbody>
</table>

**SOURCE:** Adapted from Morton

### COMPONENTS OF A MODERN DECISION SUPPORT SYSTEM

```
TRANSACTION DATA

Finance     Production     Marketing     Personnel     Research
Other Internal Data

Data

External Data

User Interface

Decision Maker

Model

Other

SOURCE: Sprague and Watson (House, Ed.)
```

**Strategic Models**
**Tactical Models**
**Operational Models**
**Model Building Blocks and Subroutines**
MODEL DESIGN APPROACH

User Input → Matrix Generator → Data Base

“Black Box” → Report Writer

(Information)

VALUE OF INFORMATION

“In general, the value of information is the value of the change in decision behavior caused by the information, less the cost of the information”

-- G. Davis & M. Olson (1985)
### TIME TO DEVELOP A COMPUTER MODEL
(Income Tax Management Model)

<table>
<thead>
<tr>
<th>Activity</th>
<th>% of Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning and Design</td>
<td>10</td>
</tr>
<tr>
<td>Programming and Testing</td>
<td>17</td>
</tr>
<tr>
<td>Writing the User’s Manual</td>
<td>51</td>
</tr>
<tr>
<td>Control Structure for User Interface</td>
<td>19</td>
</tr>
<tr>
<td>Project Administration</td>
<td>3</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

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### (Information)

#### THE LOGIC OF STRATEGY SELECTION

- **Expected Benefit**
- **Cost**

Subjective Probability of Being Correct: 0.0 to 1.0

- Simple Analysis
- Complex Analysis