Topic # 5

Identifying and Selecting Systems Development Projects
Learning Objectives:

1. Project identification and selection process.

2. SWOT analysis

3. Corporate Strategic Planning: mission statement, objective statements, and competitive strategies
Project Identification and Selection: a part of Systems Development Life Cycle (SDLC)
Need for a permanent improvement of CIS

Main reasons:

1. the cost of CIS (design development, outsourcing, implementation, maintenance, etc.) has risen steadily and approaches 40% of total expenses in some organizations;

2. many CIS cannot handle applications that cross organizational boundaries, various technical platforms, etc.;

3. many CIS often do not address the critical business functions/problems as a whole nor support strategic business applications;

4. data redundancy is often out of control, and users may have little confidence in the quality of data;

5. CIS systems' maintenance costs are out of control as old, poorly planned systems must constantly be revised;

6. application backlogs (or, D&D delays) often extend three years or more, and frustrated end users are forced to create (or purchase) their own systems, often creating redundant databases and incompatible systems in the process.
Example: a need for a permanent improvement of CIS: CIS must address (help with) critical business functions
Predictive Analytics as critical business function for Businesses: Algorithms and specialized information systems (CIS) as foundation for successful BA (2016-2018)

• **Project Identification and Selection stage consists of**
  1. **Step # 1:** identifying potential development projects
  2. **Step # 2:** classifying and ranking projects (based on various types of analysis)
  3. **Step # 3:** selecting projects for development

• **Step # 1: Identifying potential development projects.**
  
  This process can be performed by:

  1. **Top IT manager**
     *) greater strategic focus, largest project size, longest project duration
  2. **Steering Committee**
     *) cross-functional focus, formal cost-benefit analysis, larger and riskier projects
  3. **User Department**
     *) narrow, non-strategic focus, faster development, fewer users, management layers, and business functions
  4. **Development Group**
     *) “integration with existing system” focus, fewer development delays, more detailed project analysis
Information Systems Development Projects may come from Both Top-Down and Bottom-Up Initiatives

Sources of Potential Projects

- Top Down
  - Top Management
  - Steering Committee

- Bottom Up
  - User Departments
  - Development Group

Project Identification and Selection

Evaluate, Prioritize, and Schedule Projects

Project Initiation and Planning

Schedule of Projects
1. ...
2. ...
3. ...

The question is How to select best projects? How to prioritize projects? What are selection criteria? What are good (reliable) selection criteria?
Step # 2: Classifying and Ranking IS Development Projects.

Possible Evaluation Criteria:

1. Value Chain Analysis (for example, based on SWOT analysis)
   *) which activities/CIS features add value and costs when developing SW, CIS, products and/or services

2. Strategic Planning (for example, based on Corporate 10-year Strategic Plan)
   *) Does project help the organization achieve its strategic objectives and long-term goals

3. Potential Benefits (for example, based on Cost/Benefits Analysis)
   *) extra money, extra customers, extra quality, etc.

4. Resource Availability (for example, manpower, knowledge by workers)
   *) amount and types of resources

5. Project Size/Duration  *) number of individuals and the length of time

6. Technical Difficult /Risks  *) technical difficulty (equipment, hardware, software, access to the Internet, recourse constrains)

CIS SAD project: $ 2.0M, 1 year long, 5 person, ITBA (all 4 types of analytics, …)
Methods for Selecting Projects

- In every organization, there are always more projects than available time and resources to implement them.

- Very important to follow a repeatable and complete process for selecting SW/IT projects, to get the right mix (portfolio) for the organization.

- Business case – a document, developed by SME (subject matter experts), and composed of a set of project characteristics (costs, benefits, risk, etc.) that aid organization decision makers in deciding what projects to work on.

Four key issues needing answers for all SW, CIS, technology-related projects:
1. Business Value (SWOT Analysis – this class)
2. Cost/Benefits analysis (next class)
3. Risk Management (CIS491/591 class)
4. Technology/knowledge/personnel needed
SWOT Analysis
SWOT Analysis technique

- **SWOT analysis** -- an often used tool to select CIS or CIS developer:
  - **Strengths**
  - **Weaknesses**
  - **Opportunities**
  - **Threats**

- An information gathering technique to evaluate external influences against internal capabilities

- **Selection Tools: Qualitative Models**
  - Subject Matter Expert (SME) judgments (based on SME’s knowledge + expertise)
  - “Sacred Cow” (pressure from upper mngt) (upper Mngt. wants this project to get done)
  - Mandates

- **Selection Tools: Quantitative Models** (based on financial considerations that can be calculated – next class + CIS491/591 classes)
  - Net Present Value (NPV)
  - Internal Rate of Return (IRR)
  - Return On Investment (ROI)
  - Payback Period (PP)
SWOT Analysis of a technology (an example)

**A SWOT ANALYSIS ON CLOUD COMPUTING**

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decreased Costs</td>
<td>Trust issues</td>
</tr>
<tr>
<td>Scalability and Flexibility</td>
<td>Loss in Control</td>
</tr>
<tr>
<td>Reduction Potential in Administration</td>
<td>Lock-in Effect</td>
</tr>
<tr>
<td>Effective Use</td>
<td>Reliability</td>
</tr>
<tr>
<td>Location Independence</td>
<td></td>
</tr>
<tr>
<td><strong>Opportunities</strong></td>
<td></td>
</tr>
<tr>
<td>Disruptive Technology</td>
<td>Competition</td>
</tr>
<tr>
<td>Green IT</td>
<td>Standards</td>
</tr>
<tr>
<td>Complexity</td>
<td>Regulation</td>
</tr>
<tr>
<td>Virtualization</td>
<td>Security</td>
</tr>
<tr>
<td>New Markets</td>
<td>Maturity</td>
</tr>
</tbody>
</table>

**Internal**
- **Strengths**
  1. Cost-effective
  2. Flexible and innovative
  3. Simplified cost and consumption model
  4. Faster provisioning of systems and application
  5. Secure infrastructure
  6. Compliant facilities
  7. Resilient in disaster recovery
  8. Maintenance Cost Reduction
  9. Convenient level of accessibility
  10. Better control of the resources
  11. Independence of time and location
  12. Energy saving
  13. Environmental protection
  14. Friendly utilization
  15. Expandability

- **Weakness**
  1. Post training required
  2. Development of applications
  3. Increased dependency
  4. High-speed Internet connection requirement
  5. Difficulty of integration with local software
  6. Data transfer bottlenecks
  7. Lack of physical control of data
  8. Lack of commitment to the high-quality of service and availability and availability guarantees
  9. Liability of providers to guarantee the location of the company's information

**External**
- **Opportunities**
  1. Pay for use licenses
  2. Good chance for SMEs because of making progress without upfront investments
  3. Invent scalable store
  4. Marketplace enhancement in terms of functionality, innovation & price
  5. Adaptive to future needs
  6. Standardized process
  7. Quick solution of the problem
  8. High tech work environment
  9. Offering modern information solutions according to the latest technology

- **Threats**
  1. Security concerns (data security)
  2. Lack of specific standard regulations (local, national & international)
  3. Difficulty from migration from one to another platform
  4. Hidden cost (backup, problem solving and recovery)
  5. Compatibility reduction
  6. Possibility of backlash from entrenched incumbents
# SWOT Analysis of a company (example: Microsoft)

## Microsoft SWOT analysis

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
</table>
| 1. Brand loyalty  
2. Brand reputation  
3. Easy to use software  
4. Strong distribution channels  
5. Robust financial performance  
6. Acquisition of Skype  | 1. Poor acquisitions and investments  
2. Dependence on hardware manufacturers  
3. Criticism over security flaws  
4. Mature PC markets  
5. Slow to innovate  |

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
</table>
| 1. Cloud based services  
2. Mobile advertising  
3. Mobile device industry  
4. Growth through acquisitions  | 1. Intense competition in software products  
2. Changing consumer needs and habits  
3. Open source projects  
4. Potential lawsuits  |


Microsoft SWOT Analysis

Strengths

1. **Brand loyalty.** Over the years, Microsoft has been the leading OS and software provider, which resulted in more than 50% market share for PC OS. Most of us grew up using its easy to use OS, and we are familiar with it and will keep using it. Few other brands are capable to compete with Microsoft for this reason. Even open source OS, which are completely free and well suited to use for common user, find it hard to attract users.

2. **Brand reputation.** According to interbrand, Microsoft's brand is the 5th most valuable brand in the world, valued at $97 billion. Forbes listed the corporate as the 7th most reputable business in the world. Brand reputation leads to higher sales and greater market share.

3. **Easy to use software.** Windows OS and Office software products are so popular not just because Microsoft has great monopolistic power, strong distribution channels and good brand reputation but also because its products are of great quality and really easy to use.

4. **Strong distribution channels.** The company works with all the major computer hardware producers such as Lenovo, Dell, Toshiba and Samsung and major computer retailers to make sure computers would be sold with already pre-installed Windows software. The company also invested in Dell and Nokia to tighten its relationships with these companies.

5. **Robust financial performance.** Microsoft grew its revenues by 20% from 2008 to 2012 and holds more than $132 billion of cash and cash equivalents that can be used for acquisitions and substantial investments into R&D.

6. **Acquisition of Skype.** With nearly 300 million users, Skype is a significant boost to Microsoft's online presence and have a lot of potential in generating income from online advertising.

Weaknesses

1. **Poor acquisitions and investments.** Few of Microsoft’s acquisitions were successful and brought not just revenues and products but new skills and competencies to the company. Massive, LinkExchange, WebTV, Danger are just few examples of multimillion acquisitions made by Microsoft but soon shut down or divested.

2. **Dependence on hardware manufacturers.** Microsoft is a giant software corporation but it does not produce its own hardware and depends on computer hardware manufacturers to develop products that run Windows OS. If cheap and popular alternative OS would appear, hardware manufacturers may simply choose the alternative and Microsoft could do little to change the situation.

3. **Criticism over security flaws.** Windows OS, the main Microsoft product has been heavily criticized for being so weak against various viruses' attacks. Compared to other OS, Windows is the least protected against such attacks.

4. **Mature PC markets.** Only recently has Microsoft entered the mobile technology sector and still heavily depends on its OS and software sales for standalone and laptop computers. The market for these products has matured and Microsoft will find it harder to grow revenues in these sectors.

5. **Slow to innovate.** Microsoft has huge R&D resources and great potential to enter new markets with innovative products but constantly failed to do so. It had an opportunity to be the first player in online advertising but missed the opportunity. It’s entrance to mobile OS was too late, while Google and Apple captured the market share.

Opportunities

1. **Cloud based services.** Microsoft could expand its range of cloud services and software as the demand for cloud-based services is expanding.

2. **Mobile advertising.** Mobile advertising markets are expected to grow in double digits over the next few years and Microsoft has a great opportunity to tap into these markets with its mobile OS.

3. **Mobile device industry.** Smartphones and tablets markets will grow steadily over the next few years and Microsoft could exploit this opportunity by introducing more of its own tablets and a new company phone.

4. **Growth through acquisitions.** With a huge reserve of cash Microsoft could start acquiring new startups that would bring new technology, skills and competencies to the business.

Threats

1. **Intense competition in software products.** Microsoft is more than ever on the pressure to introduce successful OS both in PC and mobile markets as such competitors like Google and Apple have already established positions.

2. **Changing consumer needs and habits.** Customers shift from buying laptops and standalone PCs to
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Identifying and Selecting Systems Development Projects

In-classroom Exercise
Considering Alternative Projects:

- System analysts should consider at least two cases for each project:
  
  (1) which design strategies would *minimally satisfy objectives* and *not violate constraints*, and

  (2) which design strategies would *meet or exceed objectives with minimal violation of constraints*.

  There are *many possible design strategies* between these two extreme positions.

- Analysts should generate *three alternatives* because three alternatives can represent both ends and the middle of a continuum of potential solutions.

  Ex: Expensive                      Middle                      Cheap
      High Quality                   Average                     Low Quality
Selecting IS Development Projects: possible outcomes

- Perceived and Real Needs
- List of Potential and Ongoing Projects
- Existing and Available Resources
- Current Organizational Environment
- Evaluation Criteria

Decision Outcome
- Accept Project
- Reject Project
- Delay Project
- Refocus Project
- End-User Development
- Proof of Concept
Project Identification and Selection: deliverables and outcomes

- **The primary deliverable from this phase** is a schedule of specific CIS development projects, coming from both top-down and bottom-up sources, to move into the next SDLC phase – project initiation and planning.

- **Principle of Incremental Commitment**: A strategy in systems analysis and design in which the project is reviewed *AFTER EACH PHASE* and continuation of the project is re-justified in each of these reviews.

  *Ex.: National Science Foundation Project:*
  - **duration**: 3 years
  - **project revisions**: every 0.5 year
  - **project funding**: depends on results of a previous project year
Topic # 5

Strategic Planning
Corporate Strategic Planning

Corporate Strategic Planning:

The process of developing and refining models of the current and future enterprise as well as a transition strategy.

The ongoing process that defines/adjusts/improves mission, objectives, and strategies of an organization.

All development projects in a company, including CIS projects (acquisition, design & development, maintenance, etc.) should be in-line with Corporate Strategy.

Corporate Strategy components:

- Mission statement
- Objective statements
- Description of competitive strategy
Caterpillar: Corporate Strategy (Vision 2020)

ENTERPRISE STRATEGY
RENEWING OUR STRENGTHS...
...SHAPING OUR FUTURE

Best Team
- Safety
- Inclusion

Superior Results
- Earnings Per Share
- Operating Profit After Capital Charge
- Cash Flow

Global Leader
- Quality
- PINs
- Aftermarket Parts

VISION 2020
We aspire and develop the best talent.

STRATEGIC GOALS
- Superior Results
- Global Leader
- Best Team

OPERATING PRINCIPLES
- Supplier Collaboration
- Caterpillar Production System
- Unmatched Dealer Support
- Deep Expertise
- Accountable for Results
- Competitive Costs

OUR VALUES IN ACTION
- Integrity
- Excellence
- Teamwork
- Commitment

CUSTOMERS
We take pride in helping our customers succeed.

2011-2015 THE “BIG 8” IMPERATIVES
- Execute the Business Model... accelerate aftermarket parts and services growth
- Excel at Product Development... quality, emissions, growth markets and next generation products
- Simplify and attack cost structure
- Achieve profit and cash pull through
- Win in China... grow to leadership in India, ASEAN and CIS
- Achieve profitable global machine leadership... Excavation, Earthmoving and BCP
- Expand leadership in Mining and Quarry & Aggregates... new products and solutions
- Aggressively grow Power Systems... rail, power conversion, growth markets and alternative fuels

For additional information on the Enterprise Strategy, go to Cat @work > Values & Strategy > Enterprise Strategy

MAKING SUSTAINABLE PROGRESS POSSIBLE
Caterpillar: Corporate Strategy (Vision 2020)

VISION 2020
- We are recognized as the leader everywhere we do business
- Our products, services and solutions help our customers succeed
- Our distribution system is a competitive advantage
- Our supply chain is world class
- Our business model drives superior results
- Our people are talented and live Our Values in Action
- Our work today helps our customers create a more sustainable world
- Our financial performance consistently rewards our stockholders

OUR BUSINESS MODEL
We win by delivering valued, quality products, services and solutions to our customers that provide the lowest total owning and operating lifecycle costs. This value proposition, enabled by our unmatched customer support, creates the largest global field population, highest customer loyalty and attractive profitability through the business cycle.

OUR VALUES IN ACTION

INTEGRITY
The Power of Honesty
Integrity is our foundation. We:
• Deliver what we promise
• Are trustworthy
• Compete fairly
• Do not improperly influence others or let them improperly influence us
• Achieve excellence through the Caterpillar Production System, and 6 Sigma

EXCELLENCE
The Power of Quality
To achieve ambitious goals, we:
• Take pride in what we make and do
• Have an intense, acute focus on our customers
• Act with a sense of urgency

TEAMWORK
The Power of Working Together
To help each other succeed, we:
• Utilize the unique talents of our team
• Strengthen our team and improve results through inclusion
• Collaborate with employees, dealers, distributors and suppliers

COMMITMENT
The Power of Responsibility
To embrace our responsibilities, we:
• Are committed to Caterpillar’s success
• Protect the health and safety of others and ourselves
• Are personally accountable to meet our goals
• Create and capture value through sustainable solutions

Access the complete Code of Conduct at www.cat.com/Code-of-Conduct

CATERPILLAR
TODAY’S WORK. TOMORROW’S WORLD"
CIS projects authorized as a result of:
1. A market demand
2. An organizational need
3. A customer request
4. A technological advance
5. A legal requirement
Corporate Strategic Planning: Mission Statement

1. **Step # 1: Development of the Mission Statement.**

The *mission statement* of a company is a concise and precise statement about the main business of the organization.

*Below are some sample mission statements.*

**Courtyard by Marriott**  
*To provide economy and quality minded frequent business travelers with a premier, moderate-priced lodging facility which is consistently perceived as clean, comfortable, well maintained, and attractive, staffed by friendly, attentive and efficient people.*

**McDonald’s**  
*To offer the fast food prepared in the same high-quality manner world-wide, tasty and reasonably priced, delivered in a consistent, low-key decor and friendly atmosphere.*

After defining its mission, an organization can then define its objectives.
Step # 2: Development of Objective Statements.

It refers to “broad and timeless” goals for the organization. These goals can be expressed as a series of statements that are either qualitative or quantitative, but typically do not contain details that are likely to change substantially over time.

There are typically two types of objectives used: financial and strategic.

1) Financial objectives target outcomes that relate to improving the company’s financial performance. Two examples are: (1) increasing earnings growth by 10 to 15 percent per year, and (2) boosting return on equity investment from 15 to 20 percent.

2) Strategic objectives target outcomes that will result in greater competitiveness and a stronger long–term market position. Three examples are: (1) overtaking rivals on quality or customer service, (2) attaining lower overall costs than rivals, and (3) achieving technological superiority over rivals.

Once a company has defined its mission and objectives, a competitive strategy can be formulated.
Corporate Strategic Planning

Step # 3: Identification of a Competitive Strategy.
This is the method by which an organization attempts to achieve its mission and objectives.

Main types:
- Low-cost producer (products, services, etc.)
- Highest-quality possible (products, services, etc.)
- Product or service differentiation
- Innovative product or service
- etc.

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-Cost Producer</td>
<td>This strategy reflects competing in an industry on the basis of product or service cost to the consumer. For example, in the automobile industry, the South Korean-produced Hyundai is a product line that competes on the basis of low cost.</td>
</tr>
<tr>
<td>Product Differentiation</td>
<td>This competitive strategy reflects capitalizing on a key product criterion requested by the market (for example, high quality, style, performance, roominess). In the automobile industry, many manufacturers are trying to differentiate their products on the basis of quality (e.g., “At Ford, quality is job one.”).</td>
</tr>
<tr>
<td>Product Focus or Niche</td>
<td>This strategy is similar to both the low-cost and differentiation strategies but with a much narrower market focus. For example, a niche market in the automobile industry is the convertible sports car market. Within this market, some manufacturers may employ a low-cost strategy and others may employ a differentiation strategy based on performance or style.</td>
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</tbody>
</table>
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Strategic planning

In-classroom Exercise
Topic # 5

Identifying and Selecting Systems Development Projects

Additional Information
Information Systems Planning Matrices

**Information Systems Planning**

- Information systems in general represent automated or non-automated systems used to transform data into useful information to support business processes –
  a) *business functions* such as business planning, product development, marketing, sales, production operations, etc.
  b) *data entities* such as customer, product, vendor, order, invoice, etc.
  c) *particular information systems* such as payroll processing, accounts payable, accounts receivable, etc.

- After creating detailed lists of business functions, data entities, and particular information systems, a series of matrices can be developed to cross reference various elements of the organization such as
  1. *Function-To-Data-Entity*
  2. *Unit-to-Function*
  3. *Process-to-Information System*
  4. *Location-to-Function*
  5. *Location-to-Unit*
  6. *Function-to-Objective*
  7. *Function-to-Data Entity, etc.*
**Example of business matrix**
In the following matrices, data entities are abbreviated as: CU=Customer, PR=Product, VEN=Vendor, RM=Raw Material, OR=Order, WC=Work Center, EQ=Equipment, EMP=Employee, INV=Invoice, and WO=Work Order.

<table>
<thead>
<tr>
<th>Data Entities</th>
<th>Information System–to–Data Entity Matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C</td>
</tr>
<tr>
<td>Information System</td>
<td></td>
</tr>
<tr>
<td>Payroll Processing</td>
<td></td>
</tr>
<tr>
<td>Accounts Payable</td>
<td></td>
</tr>
<tr>
<td>Accounts Receivable</td>
<td>X</td>
</tr>
<tr>
<td>Inventory Management</td>
<td></td>
</tr>
<tr>
<td>CAD</td>
<td></td>
</tr>
<tr>
<td>CAM</td>
<td>X</td>
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### Information Systems Planning Matrices

**Example of a business matrix:**

In the following matrices, data entities are abbreviated as: CU=Customer, PR=Product, VEN=Vendor, RM=Raw Material, OR=Order, WC=Work Center, EQ=Equipment, EMP=Employee, INV=Invoice, and WO=Work Order.

#### Function–to–Data Entity Matrix

| Data Entities | CU | P | R | V | E | N | M | O | R | W | C | E | Q | E | M | P | I | N | V | W | O |
| **Functions** |    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Circuit       | X  | X | X | X | X | X | X | X | X | X |
| Manufacturing |    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Circuit Design| X  | X | X | X | X | X | X | X | X |   |
| Order         | X  | X | X | X |   |   |   | X | X |   |
| Fulfillment   |    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Distribution  | X  | X | X | X |   |   |   |   |   |   |
| Accounts       | X  | X | X | X |   |   |   |   |   |   |
| Receivables   |    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Accounts       | X  | X | X |   |   |   |   |   |   |   |
| Payable       |    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |