6. Information System Acquisition

IT1106

Level I - Semester 1

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6. Information System Acquisition

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6.1 IS Acquisition Process

System Acquisition: The process used to obtain the information system resources needed to provide the services necessary to meet a specific set of needs.

Fundamental Strategies for System Acquisition: Buy off-the-shelf software or build a custom application based on the needs which may be very broad & encompass many users, or very narrow in scope, affecting just a single user.

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IS Acquisition Process

- Buying off-the-shelf software is less risky & leads to quicker deployment; however, maintenance & support costs may become expensive with this approach, & the software may not be an exact match to the needs & work processes of the organization.

- Building custom software can provide a better match to the current work processes & provide a potential competitive advantage; however, software development can be extremely costly, & it can take months or even years to develop custom software.

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Basic Approaches for System Acquisition

Strategy	Pros	Cons
Buy off-the-shelf software	+ A software solution can be acquired and deployed relatively quickly. + An organization can "test drive" software before acquiring it.	– Unmodified, the software may not be a good match to an organization's needs. – Maintenance and support costs can become excessive.
Build custom application	+ Customized software is more likely to be a good match to an organization's needs. + A custom application provides the potential to achieve competitive advantage.	– The cost to build a system can be quite high compared to the cost of purchasing of off-the-shelf software. – Customizing software can mean it will be months or even years before the software solution is ready to deploy.
Choose a software service provider	+ Users do not need to purchase and install additional hardware or software. + The service provider handles necessary hardware and software maintenance and upgrades.	– Complex pricing arrangements and hidden costs may reduce expected cost savings. – Performance issues may cause wide variations in performance over time.

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A Comparison of the Two Approaches

Factor	Develop (Make)	Off-the-Shelf (Buy)
Cost	The cost to build the system can be difficult to estimate accurately and is frequently higher than off-the-shelf	The full cost to implement an off-the-shelf solution is also difficult to estimate accurately but is likely to be less than a custom software solution
Needs	Custom software is more likely to satisfy your needs	Might not get exactly what you need
Process improvement	Tend to automate existing business processes even if they are poor	Adoption of a package may simplify or streamline a poor existing business process
Quality	Quality can vary depending on the program-ming team	Can assess the quality before buying
Speed	Can take years to develop	Can acquire it right now
Staffing and support	Requires in-house skilled resources to build and support a custom-built solution	Requires paying the vendor for support
Competitive advantage	Can develop a competitive advantage with good software	Other organizations can have the same software and same advantage

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Activity

Write down complete answers to the following questions in a forum.

- Provide two examples of opportunities or problems that are likely to trigger the need for an information system project.

- Would you expect to see more funds allocated to system development or to buying existing software and using software service providers? Why? Discuss.

- Discuss the pros and cons of buying versus building software.

- Distinguish between proprietary software and off-the-shelf software.

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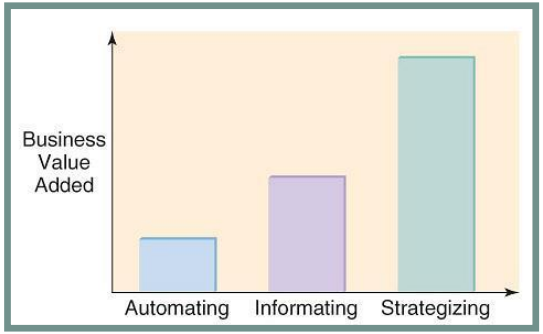
6.2 Valuing Information Systems Acquisition

Information systems can be used in three ways to add value to an organization:

1. Automating – Doing things faster, cheaper, & more accurately with more consistency



2. Informating - Doing things better
   - Learn about & improve processes
   - Support organizational learning

3. Strategizing – Doing things smarter
   - Gain or sustain a competitive advantage over rivals
   - Turning benefits of automating & informating into strategic advantage

Source: IS Today (valacich & schneider)

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6.2.1 How Information Systems Enable Organizational Processes

Five Types of Organizational Strategies

1. Overall Low Cost Leadership Strategy
   - Offer best prices in the industry or product/service category
2. Focused Low-Cost Strategy
   - Offer best prices in the industry or product/service category
3. Broad Differentiation Strategy
   - Offer better products/services than competitors
4. Focused Differentiation Strategy
   - Offer better products/services than competitors
5. Best Cost Provider Strategy
   - Provide products of reasonably good quality at competitive prices

Source: IS Today (valacich & schneider)

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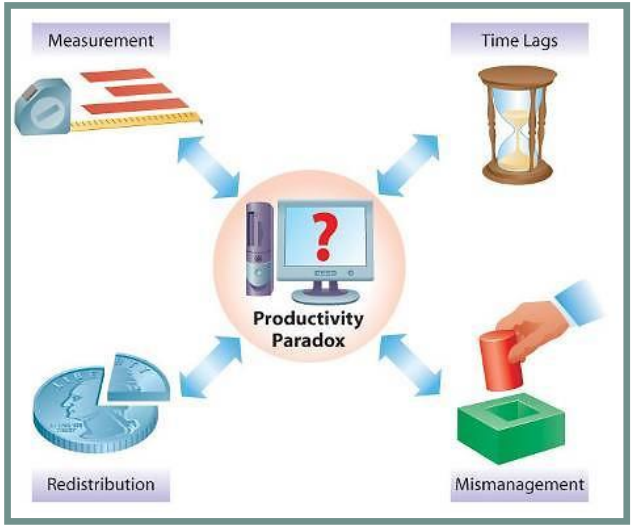
6.2.2 Making A Business Case for Information Systems

- Want systems that match organizational strategy
  - Business process management – improved business function
- Identification of IS benefits
  - Automating, Informating, and Strategic benefits
- Identification of Costs
- Identification of Productivity Gains
  - Productivity Paradox – Unintended consequences
    - Web surfing, junk mail, games
    - Difficult to measure & quantify
      - Effectiveness vs. Efficiency



Source: IS Today (Valacich & schneider)

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6.2.3 Productivity Paradox of Information Systems

- Difficult to measure and quantify
  - May measure wrong thing
  - Effectiveness vs. Efficiency
- Time Lags
  - Benefits do not always occur at the same time as implementation
  - Some IT implementations require people to gain experience
  - System must be integrated with existing systems
- Redistribution
  - IS may redistribute the pieces of the pie rather than grow
  - Increases in market share come at the expense of the competitors' market share
- Mismanagement - Bad business model not overcome by good IS
  - IS implementation as temporary fix
  - Creation of unanticipated bottlenecks

Source: IS Today (valacich & schneider)

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6.2.4 Investment Evaluation (Multi-criteria Analysis & Cost-benefit Analysis)

Investment Analysis / Evaluation is the process of evaluating an investment in each attribute of investments.
It involves evaluating its attributes.

- Cost-Benefit Analysis
  - Deciding, Quantitatively, Whether to Go Ahead

- Multi-criteria Analysis
  - A complementary approach to cost-benefit analysis (CBA).

Source: https://efinancemanagement.com/investment-decisions/how-to-evaluate-investments-and-their-attributes

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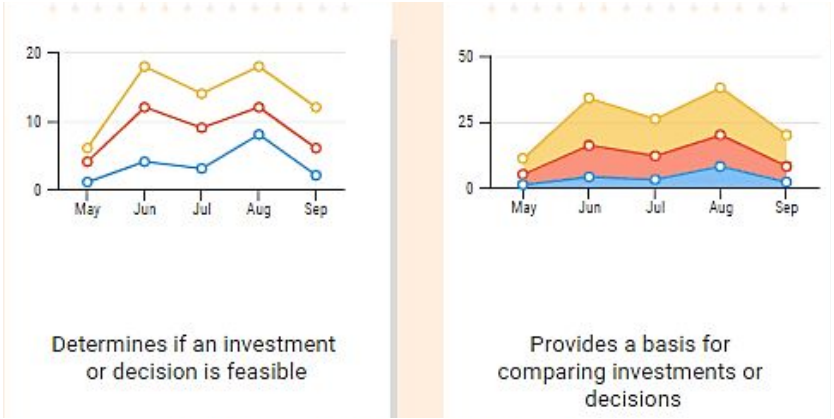
Cost-Benefit Analysis

Cost Benefit Analysis: A systematic approach to quantify the costs & benefits of a decision or a project.

- A systematic measurement way to calculate the cost to manufacture the product or produce the service & then compare it with the cost of the benefits to be obtained.

Basically, Cost Benefit Analysis calculates;

- Profit to be gained from the alternative
- Costs to be spent to build up the alternative
- Time Value of costs, incomes, and profits



Source: https://www.projectcubicle.com/cost-benefit-analysis/

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Cost-Benefit Analysis

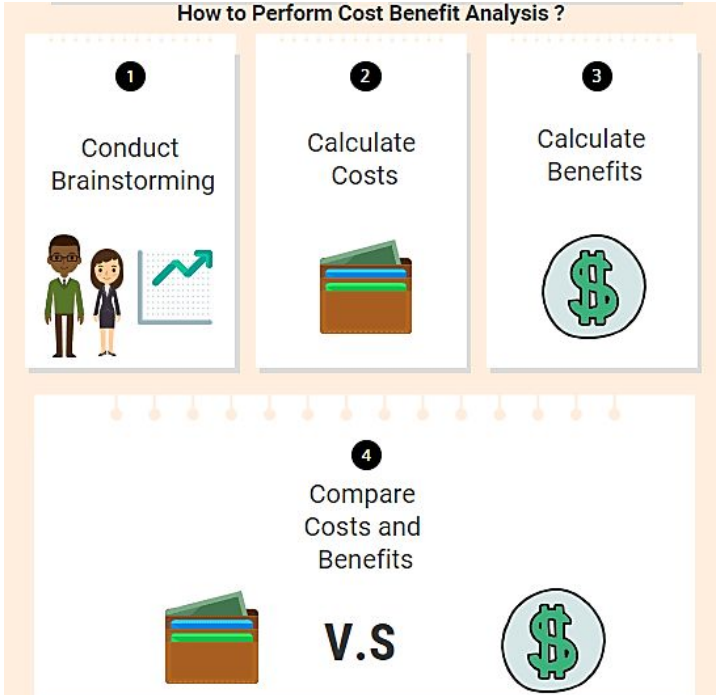
Performing a Cost Benefit Analysis:

Step One: Brainstorm Costs and Benefits

Step Two: Assign a Monetary Value to the Costs

Step Three: Assign a Monetary Value to the Benefits

Step Four: Compare Costs and Benefits



Source: https://www.projectcubicle.com/cost-benefit-analysis/

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Cost-Benefit Analysis

Scenarios Utilizing Cost Benefit Analysis

Cost Benefit Analysis offers unique and valuable insight when:

- Developing benchmarks for comparing projects
- Deciding whether to pursue a proposed project
- Evaluating new hires
- Weighing investment opportunities
- Measuring social benefits
- Appraising the desirability of suggested policies
- Assessing change initiatives
- Quantifying effects on stakeholders and participants

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Source: https://www.smartsheet.com/expert-guide-cost-benefit-analysis)

Multi-Criteria Analysis

Multi-Criteria Analysis: A two-stage decision procedure.

- Stage 01: identifies a set of goals or objectives and then seeks to identify the trade-offs between those objectives for different policies or for different ways of achieving a given policy.

- Stage 02: seeks to identify the “best” policy by attaching weights (scores) to the various objectives.

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Source: https://www.floodmanagement.info/what-is-multi-criteria-analysis-mca/

Multi-Criteria Analysis

Weighted Multi-criteria Analysis: Method used for deciding between alternative IS investments or alternatives of the same system.

Criteria	Weight	Alternative A		Alternative B		Alternative C	
		Rating	Score	Rating	Score	Rating	Score
Requirements							
Real-time data entry	18	5	90	5	90	5	90
Automatic reorder	18	1	18	5	90	5	90
Real-time data query	14	1	14	5	70	5	70
	50		122		250		250
Constraints							
Developer costs	15	4	60	5	75	3	45
Hardware costs	15	4	60	4	60	3	45
Operating costs	15	5	75	1	15	5	75
Ease of training	5	5	25	3	15	3	15
	50		220		165		180
Total	100		342		415		430

Source: IS Today (valacich & schneider)

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6.2.5 Identifying and Implementing Innovations

Successful Innovation is Difficult

- Innovation is often fleeting
  - Advantages gained are often short lived
- Innovation is often risky
  - Superior products may not win race
- Innovation choices are often difficult
  - Cannot foresee the future

The Innovator's Dilemma

- New technologies, products, or services that eventually surpass dominant technologies
- Undermine effective management practices
- Solution– Disruptive growth engine - Helps organizations respond to disruptive innovations more effectively

1. Start early
2. Educate organization
3. Build a team of expert innovators
4. Executive leadership

Source: IS Today (valacich & schneider)

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Organizational Requirements for Innovation

- Process requirements
  - The organization has to be willing to do whatever it takes to implement the change.
- Resource requirements
  - The need to have the human capital necessary for successful deployment of the system
- Risk tolerance requirements
  - The organizational members must have appropriate tolerance of risk and uncertainty.

Source: IS Today (valacich & schneider)

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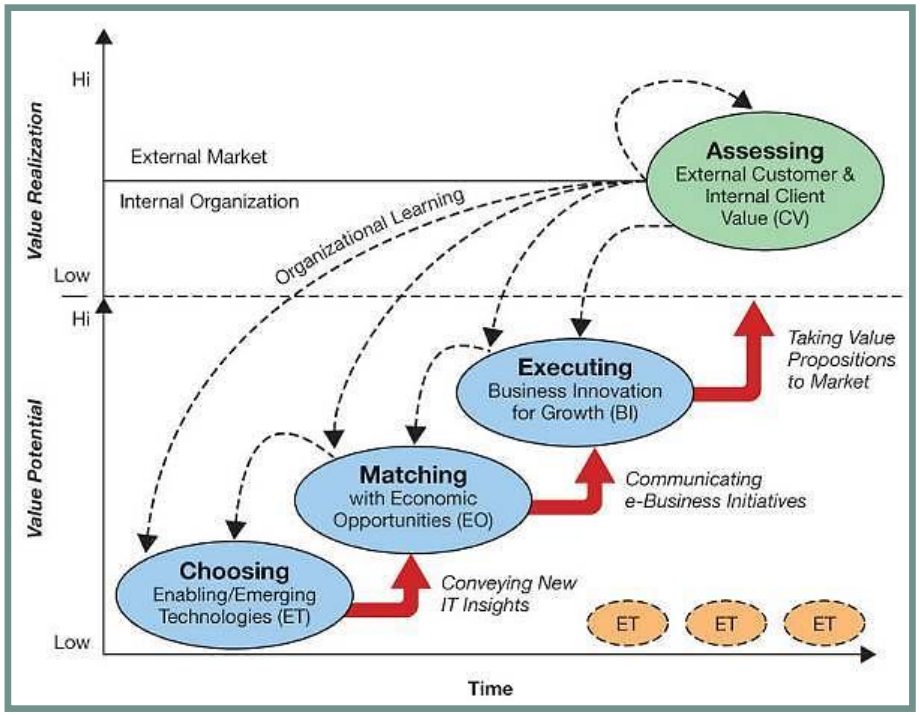
E-Business Innovation Cycle

- The key to success is the extent of IS use in timely and innovative ways.



Source: IS Today (valacich & schneider)

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E-Business Innovation Cycle

- Choosing Enabling/Emerging Technologies
  - Group/ process devoted to looking for emerging IT
- Matching Technologies to Opportunities
  - Most promising new technology matched with current economic opportunities
- Executing Business Innovation for Growth
  - Stage at which the change is actually implemented
- Assessing Value
  - Assess value created for customers and internal operations

Source: IS Today (valacich & schneider)

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Activity

Write down complete answers to the following questions.

- Discuss the advantages and limitations of Cost Benefit Analysis.
- Distinguish between Cost Benefit Analysis and Multi-Criteria Analysis.
- An example of modern disruptive innovation is the Internet. Briefly explain why internet has become a disruptive innovation and how does it affect for a successful innovation.

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6.3 IS Acquisition Options

System Acquisition: The process used to obtain the information system resources needed to provide the services necessary to meet a specific set of needs.

System Development: The process of defining, designing, testing, and implementing a software application or program in building an information systems to meet end-users' needs.

Buy off-the-shelf software: Buying existing software developed by a software manufacturer enables an organization to test drive and evaluate it before making a major commitment to purchase it and install it.

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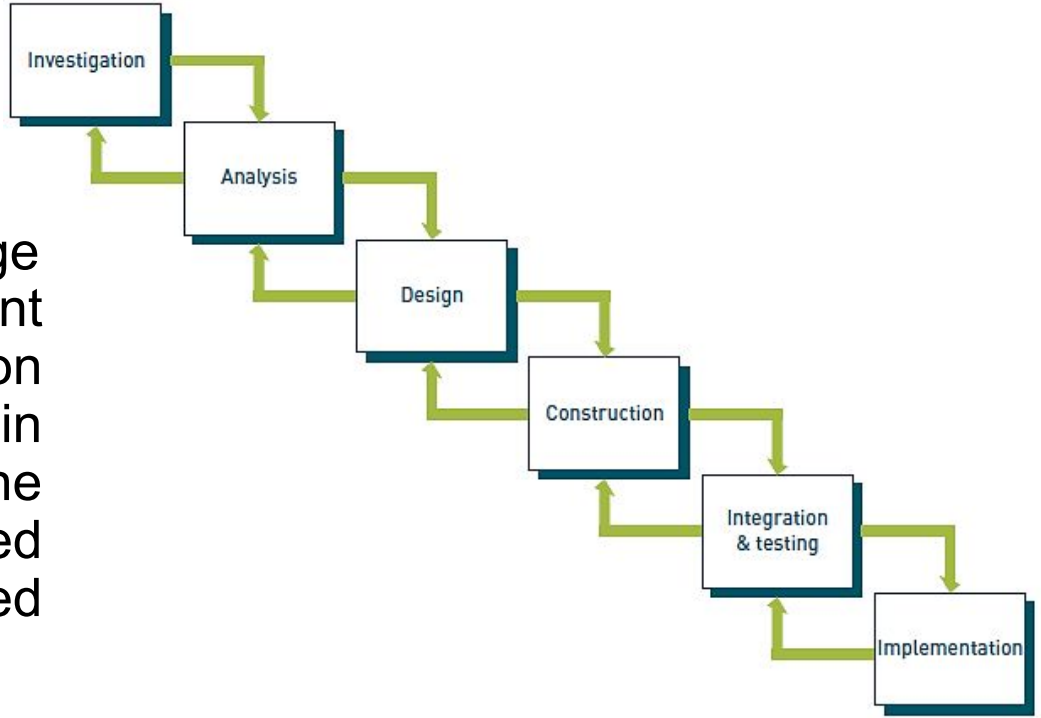
System Development Processes

Waterfall System Development Process

A sequential, multistage system development process in which work on the next stage cannot begin until the results of the current stage is reviewed and approved or modified as necessary.



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Waterfall System Development

- The development process moves from one phase to the next. At the end of each phase, a review is conducted to ensure that all tasks & deliverables associated with that phase were produced and to ensure that the project is on track and worth completing. As a result, the waterfall approach allows for a high degree of management control.

- However, a major problem with the approach is that users do not interact with the solution until the integration and testing phase. This can lead to a mismatch between system capabilities, users' expectations, organizational needs.

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System Investigation

The initial phase in the development of a new or modified business information system whose purpose is to gain a clear understanding of the specifics of the problem to solve or the opportunity to address.

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System Investigation

The steps of the investigation phase:

1. Review system investigation request
2. Identify and recruit team leader and team members
3. Develop budget and schedule for investigation
4. Perform investigation
5. Perform preliminary feasibility analysis
6. Prepare draft of investigation report
7. Review results of investigation with steering team.

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System Analysis

The overall emphasis of the system analysis is on gathering data on the existing system, determining the requirements for the new system, considering alternatives within identified constraints, and investigating the feasibility of alternative solutions.

- The primary outcome of system analysis is a prioritized list of system requirements and a recommendation of how to proceed with the project.

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System Analysis

The steps in the system analysis phase:

1. Identify and recruit team leader and team members
2. Develop budget and schedule for system analysis activities
3. Study existing system
4. Develop prioritized set of requirements
5. Identify and evaluate alternative solutions
6. Perform feasibility analysis
7. Prepare draft of system analysis report
8. Review results of system analysis with steering team

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System Design

System design creates a complete set of technical specifications that can be used to construct the information system.

- The primary result of the design phase is a technical design that details;
  - system outputs, inputs, controls, and user interfaces;
  - specifies hardware, software, databases, telecommunications, personnel, and procedures;
  - shows how these components are interrelated.

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System Design

The steps in the system design phase:

1. Identify and recruit team leader and team members.
2. Develop schedule and budget for system design activities.
3. Design user interface.
4. Design system security and controls.
5. Design disaster recovery plan.
6. Design database.
7. Perform feasibility analysis.
8. Prepare draft of system design report.
9. Review results of system design with steering team.

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System Development

The system development phase follows the completion of the system design phase when the project steering team approves of proceeding with the project. System development converts the system design into an operational system by coding and testing software programs, creating and loading data into databases, and performing initial program testing.

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System Development

The steps in the system development phase:

1. Code software components
2. Create and load data
3. Perform unit testing

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Integration and Testing

Several types of testing must be conducted before a new or modified information system is ready to be put into production.

These tests are outlined in the testing phases:

1. Integration testing
2. System testing
3. Volume testing
4. User acceptance testing

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Tests Conducted on an Information System

Form of Test	What Is Tested	Purpose of Test	Who Does It
Unit	Test individual units of the system.	Verify that each unit performs as designed.	Software developers
Integration	Test all of the individual units of the information system linked together.	Uncover any defects between individual components of the information system.	Software developers or independent software testers, using black box testing measures
System	Test the complete, integrated system (hardware, software, databases, people, and procedures).	Validate that the information system meets all specified requirements.	Independent test team, separate from the software development team
Volume	Evaluate the performance of the information system under realistic and varying work volume and operating conditions.	Determine the work load at which system performance begins to degrade and identify and eliminate any issues that prevent the system from performing at the required service level.	System development team and members of the operations organization
User acceptance	Test the complete, integrated system (hardware, software, databases, people, and procedures).	Verify the information system can complete required tasks in a real-world operating environment and do this according to the system design specifications.	Trained users of the system

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Implementation

The steps in the system development phase:

1. User preparation
2. Site preparation
3. Installation
4. Cutover

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Implementation

- User preparation: The process of readying managers, decision makers, employees, other users, and stakeholders to accept and use the new system.
- Site preparation: Preparation of the location of a new system.
- Installation: The process of physically placing the computer equipment on the site and making it operational.
- Cutover: The process of switching from an old information system to a replacement system.

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System Operation and Maintenance

The steps in the system operation and maintenance phase:

1. Operation
2. Maintenance
3. Disposal

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System Operation and Maintenance

- System operation: Involves the use of a new or modified system under all kinds of operating conditions.
- System maintenance: A stage of system development that involves changing and enhancing the system to make it more useful in achieving user and organizational goals.
- System disposal: A stage of system development that involves those activities that ensure the orderly dissolution of the system, including disposing of all equipment in an environmentally friendly manner, closing out contracts, and safely migrating information from the system to another system or archiving it in accordance with applicable records management policies.

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Advantages & Disadvantages of Waterfall System Development Process

Advantages	Disadvantages
Formal review at the end of each phase allows maximum management control.	Users get a system that meets the needs as understood by the developers; however, this might not be what the users really needed.
This approach requires creation of considerable system documentation so that system requirements can be traced back to stated business needs.	Often, user needs go unstated or are miscommunicated or misunderstood.
Approach produces many intermediate products that can be reviewed to measure progress toward developing the system.	Users can't easily review intermediate products and evaluate whether a particular product (e.g., a data-flow diagram) will lead to a system that meets their business requirements.

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Activity

Write down complete answers to the following questions.

- Identify and state the purpose of each of the six phases of the waterfall system development process.

- What is the purpose of studying the existing system during the analysis phase?

- Once a project has successfully made it through the system investigation phase, should it ever be cancelled? Why or why not? Discuss.

- The waterfall approach allows for a high degree of management control, but it does not allow for user interaction with the system until the integration and testing phase, when the system is nearly complete. True or False? Explain your answer.

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Agile Development

Agile development: An iterative system development process that develops the system in "sprint“ increments lasting from two weeks to two months.

- Scrum: An agile development framework that emphasizes a team based approach in order to keep the development effort focused and moving quickly.
- Scrum master: The person who coordinates all the scrum activities of a team.
- EXtreme Programming (XP): A form of agile software development that promotes incremental development of a system using short development cycles to improve productivity and to accommodate new customer requirements.

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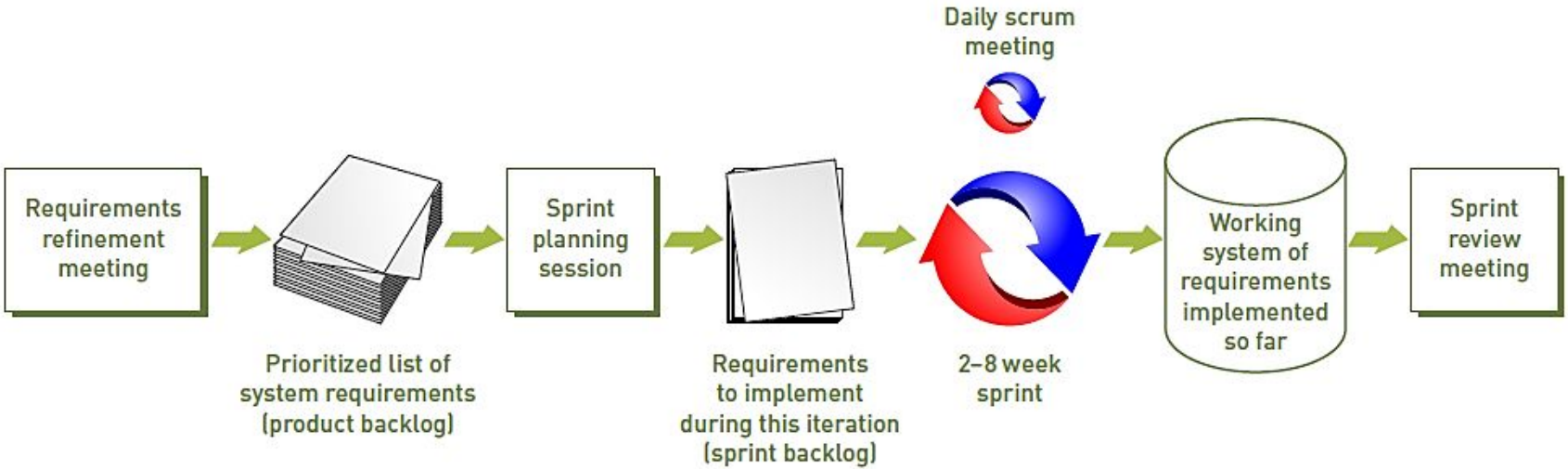
The Scrum Agile Software Development Process



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Advantages and Disadvantages of Agile Development

Advantages	Disadvantages
For appropriate projects, this approach puts an application into production sooner than any other approach.	It is an intense process that can burn out system developers and other project participants.
Documentation is produced as a by-product of completing project tasks.	This approach requires system analysts and users to be skilled in agile system development tools and agile techniques.
Agile forces teamwork and lots of interaction between users and stakeholders.	Agile requires a larger percentage of stakeholders' and users' time than other approaches.

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Comparison of Approaches to System Development

Characteristic	Software Development Approach	
	Agile	Waterfall
Description	An iterative process that develops the system in sprint increments lasting 2–8 weeks; each increment focuses on implementing the highest priority requirements that can be completed in the allotted time	A sequential multistage process where work on the next stage cannot begin until the results of the previous stage are reviewed and approved or modified as necessary
Basic assumption	System requirements cannot be fully defined at start of project	All critical system requirements must be fully defined before any coding begins
How requirements and design are defined	Users interacting with system analysts and working software	Users interacting with system analysts and system documentation and/or models
Associated processes	Scrum	Structured system analysis and design

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Activity

Write down complete answers to the following questions.

- As part of the team's initial project kickoff meeting, you have been asked to briefly summarize the differences between the waterfall and agile software development process. What would be your answer?

- There is likely to be some confusion over the role of project manager, scrum master, and product owner.
  - What is the difference between the roles and responsibilities of a scrum master, project manager and product owner?

- Which agile development framework uses a team-based approach in order to keep the development effort focused and moving quickly. Explain your answer.

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Buying Off-the-Shelf Software

- Buying existing software developed by a software manufacturer enables an organization to test drive and evaluate it before making a major commitment to purchase it and install it.
- The effort required to modify the software package, as well as existing software, must be taken into account as a major factor in selecting the final vendor and software.
- Once purchased, the existing software can be installed with minimal disruption, so that user requirements can be quickly met & the organization can obtain the benefits from the system.

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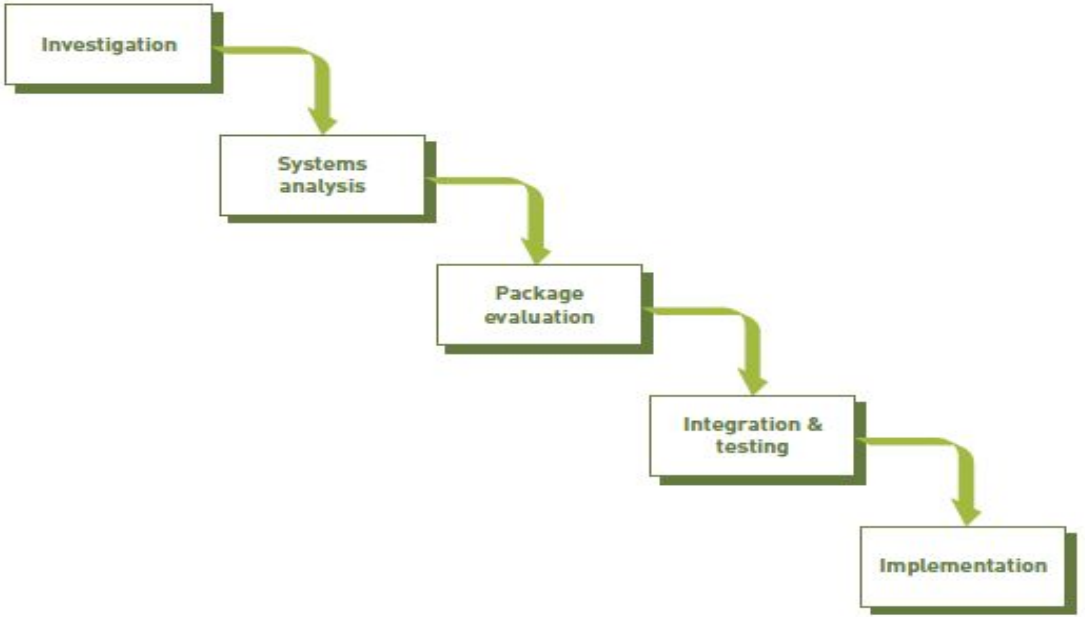
Software Package Implementation Process

Software package implementation eliminates several of the phases of the waterfall approach.



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Investigation & System Analysis

- One question that must be answered during System Analysis phase *is* :
  - Which approach is the best solution for the system?
    (buying off-the-shelf software or build a custom application)
    The decision is often called ‘make-or-buy’ decision.

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Package Evaluation Phase

Purchasing an off-the-shelf software requires that, an organization to go through several steps to ensure it purchases the software that best meets its needs. These steps are a part of the Package Evaluation phase which comes after the System Analysis phase.

1. Identify potential solutions.
2. Select top contenders.
3. Research top contenders.
4. Perform final evaluation of leading solutions.
5. Make selection.
6. Finalize contract.

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Integration and Testing

Testing must be conducted before the software package is ready to be put into the workspace, if the software package has been modified to meet the needs of the organization or the software package must integrate with the existing information systems.

1. Integration testing
2. System testing
3. Volume testing
4. User Acceptance testing

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Implementation

Key Implementation Tasks:

- Use data-flow diagrams to map current business processes and requirements to the software, and identify any gaps that must be filled by changing current processes or by modifying the software.
- Install the software and configure all of its capabilities and options to meet the project requirements.
- Customize any aspects of the solution needed for the organization.
- Integrate existing software with the new software.
- Train end users.
- Test the software to ensure that it meets all processes and requirements.
- Convert historical data from the old software so that it can be used by the new software.
- Roll out the new software to users in a live work environment.
- Provide for ongoing end-user support and training.

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6.4 Sourcing Methods

An increasingly popular approach to manage the IS and IT functions of an organization is to adopt a sourcing method.

- In-Sourcing
- Outsourcing and Offshoring
- Co-Sourcing

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6.4.1 In-Sourcing

In-sourcing: the organization performs an activity internally, thereby using internal resources and governance. i.e. the activity is governed and performed by internal resources.

Dimension	Description
Degree of Integration	Only internal resources except staff augmentation driven by the need to increase staff capacity
Duration	Short-term, long-term
Allocation of Control	Full governance by the organization, residual rights are owned by the organization

Source: Björn Johansson, Mirella Muhic, “Examining Sourcing Strategies in Information Systems Development in the Financial Sector”-semanticscholar.org(https://pdfs.semanticscholar.org/e1fa/0950cf47126a6ba6057983bfca18419a28f9.pdf)

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6.4.2 Outsourcing

Outsourcing: A long-term business arrangement in which a company contracts for services with an outside organization that has expertise in providing a specific function.

Dimension	Description
Degree of Integration	External resources
Duration	Long-term
Allocation of Control	Full governance by the supplier, residual rights are owned by the supplier during the delivery process

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Outsourcing

Main reasons behind a decision to outsourcing:

- Save Money—Achieve Greater Return on Investment (ROI)
- Focus on Core Competencies
- Achieve Flexible Staffing Levels
- Gain Access to Global Resources
- Decrease Time to Market

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Top 10 Reasons Companies Outsource	Top 10 Factors in Vendor Selection
1. Reduce and control operating costs	1. Commitment to quality
2. Improve company focus	2. Price
3. Gain access to world-class capabilities	3. References/reputation
4. Free internal resources for other purposes	4. Flexible contract terms
5. Necessary resources are not available internally	5. Scope of resources
6. Accelerate reengineering benefits	6. Additional value-added capability
7. Function is difficult to manage internally or is out of control	7. Cultural match
8. Make capital funds available	8. Existing relationship
9. Share risks	9. Location
10. Cash infusion	10. Other
Top 10 Factors for Successful Outsourcing	**Top 10 IT Areas Being Outsourced**
1. Understand company goals and objectives	1. Maintenance and repair
2. A strategic vision and plan	2. Training
3. Select the right vendor	3. Applications development
4. Ongoing management of the relationships	4. Consulting and reengineering
5. A properly structured contract	5. Mainframe data centers
6. Open communication with affected individuals/groups	6. Client/server services and administration
7. Senior executive support and involvement	7. Network administration
8. Careful attention to personnel issues	8. Desktop services
9. Near-term financial justification	9. End-user support
10. Use of outside expertise	10. Total IT outsourcing

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6.4.3 Offshoring

Offshore outsourcing: An outsourcing arrangement in which the organization providing the service is located in a country different from the firm obtaining the services.

- Offshoring can be defined as a relocation of an organization's business processes to a lower-cost location, usually overseas. (Offshoring can be considered in the context of either production offshoring or services offshoring.)

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6.4.4 Co-Sourcing

Co-sourcing combines the advantages of outsourcing and insourcing as it provides access to external expertise without having to completely give up internal control over processes. (Gross, 2006)

- Co-sourcing is advisable for processes that an organization does not want to completely allocate to an external provider. It reviews the main characteristics, benefits and pitfalls of the type of co-outsourcing, along with some case evidence showing how some organizations had approached it.

Source: https://www.kbmanage.com/concept/co-sourcing

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Activity – Discuss in a Forum

- What benefits might your organization gain from outsourcing basic functions? Identify at least three major organizational challenges associated with transitioning those functions to an outsourcing firm. Discuss and explain your answer with an example.

- What is outsourcing? How is it different from offshoring?

- Identify and distinguish the difference between in-sourcing vs. outsourcing and on-shoring vs. offshoring.

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Match

Organizations can obtain software using one of two basic approaches: buy or build.

1. _____ software is less risky and leads to quicker deployment; however, maintenance and support costs may become expensive.

2. _____ software can provide a better match to the current work processes of the organization and may provide a potential competitive advantage; however, software development can be extremely costly, and it can take months or even years to complete.

- a. Custom
- b. analysis
- c. Off-the-shelf

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Match

3. The overall emphasis of the _____ phase is on gathering data on the existing system, determining the requirements of the new system, considering alternatives within identified constraints, and investigating the feasibility of alternative solutions.

- a. Custom
- b. analysis
- c. Off-the-shelf

Match

4. A preliminary evaluation of software packages and vendors begins during the _____ phase when the two or three strongest contenders are identified.

5. The primary tool for assessing the software marketplace to determine whether existing packages can meet the organization's needs is the _____.

- a. Request for information
- b. gain a clear understanding of the specifics of the problem to solve or the opportunity to address
- c. system analysis
- d. system construction

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Match

6. The _____ phase converts the system design into an operational system by coding and testing software programs, creating and loading data into databases, and performing initial program testing.

7. The purpose of the system investigation phase is to _____.

- a. Request for information
- b. gain a clear understanding of the specifics of the problem to solve or the opportunity to address
- c. system analysis
- d. system construction

Quiz

Agile development is an iterative system development process that develops a system in “sprint” increments lasting from two weeks to two months.

1. In the scrum framework, the _____ is a person who represents the project stakeholders and is responsible for communicating and aligning project priorities between stakeholders and the development team.

- a. project manager
- b. scrum master
- c. product owner
- d. project sponsor
- e. developer

2. _____ is the practice of blending the tasks performed by the development and IT operations groups to enable faster and more reliable software releases.

- a. Scrum
- b. Extreme programming
- c. JAD
- d. DevOps

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