Information system development process
Learning of Objects

• Describe full actions of system for information system development.
• Name and explain processes which the system should fulfill.
• Describe system basic processes.
• Explain distinction between incremental and iterated system development and consider, why system development process should be both incremental and iterated.
Learning of Objects

• Identify various types of customers of information systems.
• Consider dominant roles and duties of participants of system in development process.
• Explain important categories of system engineering.
• Prepare the economic analysis.
View

• Lecture represents the simplified version of Development process of an information system.

• Process happen four types - Initiation, Development, the Construction and Transition.

• Each phase includes some iterations. Each iteration adds possibility or improvement to system.
View


- Process as system generic description, should adapt always according to circumstances defined for the project.
View

- There are two main groups of participants of systems analysis - customers and developers.

- At analytics system engineering should consider interests of various types of customers.
• System analysts are responsible first of all that understood, modelled, and transferred necessary conditions for new system. Successful system analysts possess interpersonal and communicative abilities.
View

- System builders are responsible
- For a technical system design. They should guarantee that the system is developed for satisfaction of necessary conditions.
• Managers supervises development process and provide measurement and testing control.

• The business case for the offered developmental operation includes research of realizability of the project - merge technical, a resource, organizational, the schedule, and economic perspectives.
Programming processes

- Process will be organized in four phases,
- Nine basic principles and
- Iterations within a phase.
Process phases

1. Idea: a business case
2. Development: Defines architecture of system
3. Construction: Creates system
4. The interface: Unites system with an external environment
Basic processes

1. Business simulation: repeatedly assumes repeated designing of the device
2. Necessary conditions: Defines user requirements
3. Designers: Develop system
4. The developer: Writes software
5. Testing: Tests system
Allocation of Resources

- Inception: 10%
- Elaboration: 30%
- Construction: 50%
- Transition: 10%

- Internal Release
- First External Release
- Final Release

- TIME

- RESOURCE

- 10%
- 20%
- 5%

- 65%
Development of iterated and Incremental system

• Iterative development allows to divide system into parts, with possibility the subsequent modification.
  
    That refines a product
  
• Revising of any part of the project or implementation, allows to rectify errors or omissions.
  
• Incremental development organizes process as the pipeline assembly.
  
  It refines a product as all is fulfilled stage by stage.
Time boxing

- Time boxing lards a phase of development or a cycle in a restricted time interval
- (Time frame).
Participants of Systems analysis and Designing

- Customers
- Analysts
- Developers
- Programmers
- Experts
# Participants of Systems analysis and Designing

<table>
<thead>
<tr>
<th>PHASE</th>
<th>PARTICIPANTS</th>
<th>PRINCIPAL ARTIFACTS</th>
<th>DECISIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Inception (Make the Business Case)</td>
<td>USERS ANALYSTS</td>
<td>Project vision document</td>
<td>What is the proposed system going to do for each of its major users?</td>
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<td>Critical use cases</td>
<td>Is it technically and organizationally feasible?</td>
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<td></td>
<td></td>
<td>Initial business case</td>
<td>What risks could affect its feasibility?</td>
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<td></td>
<td></td>
<td>Preliminary system architecture</td>
<td>Are the estimated benefits worth the expected costs?</td>
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<tr>
<td></td>
<td></td>
<td>Risk analysis</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Project plan</td>
<td></td>
</tr>
<tr>
<td>2. Elaboration (Define the System Architecture)</td>
<td>USERS ANALYSTS DESIGNERS programmers</td>
<td>System architecture specification (includes hardware characteristics and system software characteristics)</td>
<td>Are the use cases, system architecture, and project plans stable enough?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Initial Implementation of critical use cases</td>
<td>Are the risks under sufficient control to commit to developing the entire project?</td>
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<tr>
<td></td>
<td></td>
<td>Reliable project schedule and cost analysis</td>
<td>Is the construction phase plan adequate?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Refined project plan</td>
<td>Is the project still economically feasible?</td>
</tr>
</tbody>
</table>
## Participants of Systems analysis and Designing

<table>
<thead>
<tr>
<th>3. Construction (Construct the System)</th>
<th>DESIGNERS PROGRAMMERS QUALITY ASSURANCE analysts users</th>
<th>Intermediate builds of system at each iteration</th>
<th>Documented and tested version of the completed system with users’ and operations manuals</th>
<th>Do the software units work and meet the specified requirements? Is it still technically, operationally, and economically feasible? Is the documentation for the completed system accurate and adequate? Is the system ready for delivery to the users? Are the stakeholders ready to take delivery of the system?</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Transition (Integrate the System with the Using Organization)</td>
<td>USERS analysts designers quality assurance</td>
<td>Report of completed acceptance tests</td>
<td>Operational system Postimplementation evaluation report</td>
<td>Do the acceptance tests show satisfactory compliance with all the stated performance targets? Has the system passed all the user acceptance tests? Has the accepted system been smoothly integrated with the operations of the organization? Is the system still meeting the specified performance targets?</td>
</tr>
</tbody>
</table>
Types of Customers

• The system owner: the Principal making decisions on quality of system
• Responsible customer: the manager of middle tier responsible for business processes which supports system
• Practical customer: the manager who interacts directly with the system input equipment and an output
• Beta testing: the character who has no direct contact to the automated system,
Duties of Customers

1. Deciding to incorporate the automated system into their way of doing business
2. Relating the need for the system and its functions to the goals, policies, and objectives of the organization
3. Knowing and understanding the business functions supported by the information processing system
4. Serving as a reliable information source
5. Establishing priorities and resolving conflicts among system objectives and among users’ requirements
6. Reviewing, understanding, and approving the system development documents which define users’ objectives and requirements
7. Reviewing the system at milestones and making abort or continue decisions
8. Allocating the necessary resources to the system development process
9. Deciding among alternatives, making trade-offs, and evaluating relative costs and benefits
10. Providing support for desired change and continuing pressure for change
Duties of Customers

1. Assuring the technical quality of the products and procedures of systems analysis (as described in Part II)
2. Determining (with the aid of other participants in the process) the implications — technical, economic, psychological, and organizational — of decisions about the scope and kind of automation
3. Facilitating communication and understanding among the other participants in the process
4. Providing effectively organized information to support user decisions leading to the development of the best computer information system for the organization
5. Acting as an advocate or ombudsman for the users, especially during design and acceptance testing, to ensure that users’ requirements stated in the system specifications are satisfied in the later stages of system development
6. Acting as a conscience for the development effort
Duties of Developers

1. Reviewing the requirements specification to verify its completeness and consistency
2. Notifying users and analysts of any deficiencies found in the requirements specification
3. Assuring the technical quality of the products and procedures of system design
4. Facilitating communication and understanding among the participants in design
5. Defining design alternatives and selecting the best
6. Assuring that the design can comply with the performance standards of the requirements specification as well as those of the system acceptance tests
7. Coordinating the design with decisions about the hardware and system software environment
8. Determining the implications of their designs for system performance and construction
9. Assuring that the system as designed is still technically, economically, and operationally feasible
Duties of programmers

1. Notifying designers of any deficiencies found in the design
2. Assessing the realizability of a design in differing hardware or software environments
3. Evaluating the flexibility and reusability of the software components
4. Predicting system performance
Duties of experts

1. Establishing standards and policies for quality assurance throughout the system development process
2. Monitoring compliance with software quality standards
3. Obtaining measurements of the quality of the software and of the performance of the development teams
4. Conducting independent tests of the completed software
System change

- Information system change often represents the considerable organizational change.

- Analysts should understand interests of each type of a customer and work with customers directly.

- The plan should include adequate wishes of each customer.
Realizability of System

- Development phases:
  - The analysis of the offered decision, estimation of that of expediency of carrying out of research and development, estimation of technological potential for system implementation, an estimation of probability of finishing of system before end.
  - The analysis of a realizability stages:
- Restrictions on system - what conditions should be satisfied for implementation of system,
Realizability of system

• For realizability research ask itself these questions:
• What advantages of yours the system, what consumer qualities are in your system for satisfaction of a customer?
• How the system functional will be achievable?
• What technologies, methods algorithms etc. provide a new functional to your system?
• Economic justification of your system - the
Realizability categories

- The technical: whether your system can be produced at usage of the modern technologies?
- Resource: whether it is enough at you resources for development and manufacture of your system?
- The organizational: whether it is enough at you organizational resources for system manufacture?
- The economic: whether really the system has investment attractiveness?
The economic Analysis of a realizability

It is necessary to produce the analysis:

• Costs: to produce the all-round economic analysis of the offered decision.

• Reset of investments: to time reset of investments.

• The income: to settle an invoice profitableness from system implementation.
Present Value Formula

\[ PV = FV / (1 + i)^n \]

where

- \( PV \) is the present value of a cost or benefit for time period \( n \).
- \( FV \) is the future value of a cost or benefit in time period \( n \).
- \( i \) is the interest rate for discounting future costs or benefits.
- \( 1 / (1 + i)^n \) is the discount factor, dependent only on \( i \) and \( n \).
The economic Analysis of a realizability

<table>
<thead>
<tr>
<th>Economic Feasibility Analysis</th>
<th>Public University Registration System</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Row</strong></td>
<td><strong>Years</strong></td>
</tr>
<tr>
<td><strong>Benefits</strong></td>
<td></td>
</tr>
<tr>
<td>2 Net Economic Benefit</td>
<td></td>
</tr>
<tr>
<td>3 Discount Factor (at 8%)</td>
<td></td>
</tr>
<tr>
<td>4 PV of Benefits</td>
<td></td>
</tr>
<tr>
<td>5 NPV of all Benefits</td>
<td></td>
</tr>
<tr>
<td><strong>Costs</strong></td>
<td></td>
</tr>
<tr>
<td>6 One Time Costs</td>
<td>(462,000)</td>
</tr>
<tr>
<td>7 Recurring Costs</td>
<td>(132,000)</td>
</tr>
<tr>
<td>8 Discount Factor (at 8%)</td>
<td>1.000</td>
</tr>
<tr>
<td>9 PV of Costs</td>
<td>(462,000)</td>
</tr>
<tr>
<td>10 NPV of all Costs</td>
<td>(462,000)</td>
</tr>
<tr>
<td>11 Overall NPV</td>
<td></td>
</tr>
<tr>
<td><strong>Break-Even Analysis</strong></td>
<td></td>
</tr>
<tr>
<td>12 Yearly NPV Cash Flow</td>
<td>(462,000)</td>
</tr>
<tr>
<td>13 Overall NPV Cash Flow</td>
<td>$ (462,000)</td>
</tr>
<tr>
<td>14 Interest Rate</td>
<td>0.08</td>
</tr>
<tr>
<td>15 Project breakeven occurs between years 3 and 4</td>
<td></td>
</tr>
<tr>
<td>16 Breakeven ratio = (($93,920-$88,994)/$93,920) =1.049</td>
<td></td>
</tr>
<tr>
<td>17 Breakeven will occur at 4.05 years</td>
<td></td>
</tr>
<tr>
<td>18 Overall ROI = Overall NPV/NPV of all Costs</td>
<td>0.0900</td>
</tr>
</tbody>
</table>
The inference

• The advanced practice in system development

• Uses process which is iterated and incremental, such as Rational Process.

• Principal participants of process: customers, system analysts, system builders, programmers and experts.