Requirements Determination

Creating a requirements definition and performing requirements analysis
Context of analysis

• Recall the Systems Development Life Cycle (SDLC):
  – Planning
  – Analysis
  – Design
  – Implementation

• Analysis:
  – requirements determination
  – functional modeling
  – structural modeling
  – behavioral modeling
The system proposal

• End product of analysis phase
• Refinement of system request
• Contains:
  – requirements definition (this lecture)
  – functional models (lecture 7)
  – structural models (lecture 6)
  – behavioral models (lecture 8)
  – revised feasibility analysis and workplan
What is a requirement?

- A statement of
  - what the system must do; or
  - what characteristic the system must have
- In analysis phase: predominantly business requirements
- In design phase: also system requirements
  - more technical, derived from decisions as to how the system will be implemented
Functional and nonfunctional

• Functional requirements: describe a process the system has to perform or information it needs to contain
  – Can be directly translated to functional, structural, behavioral models

• Nonfunctional requirements: behavioral properties
  – E.g. performance, usability
  – Influence decisions about architecture and user interface
Determining requirements

• If done only by IT analysts, may not address true business needs
• If done only by business experts, may not take advantage of new technology
  – Leads to automating existing inefficiencies
• Requirements analysis techniques help users find out what they truly want
  – Critical analysis of the as-is system
  – Develop a concept for the to-be system
Requirements analysis techniques

• Three types:
  – Business Process Automation (BPA)
  – Business Process Improvement (BPI)
  – Business Process Reengineering (BPR)
Business Process Automation

- BPA = *No changes in business processes, but better support for them with the new system*

- Activities:
  - Problem analysis
  - Root cause analysis
BPA

• Problem analysis
  – Ask users/managers to identify problems and how to solve them
    • Improves user’s efficiency
    • No/minor improvement in business value

• Root cause analysis
  – Prioritizing problems
  – Tracing symptoms to their root causes
Root Cause Analysis

- Identify symptoms
- Trace each back to its causes

See for a good book/roman: *The Goal* by E.M. Goldratt
Root cause analysis: example

Lightbulb burns out frequently

- Bulb burns out prematurely
  - Buy better bulbs
  - Fix bad fixture
  - Fix bad wirings
  - Control power surges

- Bulb burns out at end of rated life
  - Left on when not needed
    - Change procedure to have bulb turned off
    - Develop ways to automatically turn off bulb
  - Left on when needed
    - Find ways to simplify changing
    - Buy a bulb with a longer-rated life
    - Find other means to deliver light
    - Find other ways to achieve what light does
Business Process Improvement

• **BPI = evolutionary changes in business processes, and supporting them with the new system**

• Activities:
  – Duration analysis
  – Activity based costing
  – Formal & informal benchmarking
Duration analysis

• Calculate time needed for each process step
• Calculate time needed for overall process
• Compare the two and develop process integration or parallelization
Example of (in)efficiency

<table>
<thead>
<tr>
<th>Type of Business</th>
<th>Process</th>
<th>Flow Time</th>
<th>Theoretical F.T.</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life Insurance</td>
<td>New policy</td>
<td>72 hr.</td>
<td>7 min.</td>
<td>0.16%</td>
</tr>
<tr>
<td>Commercial Bank</td>
<td>Consumer loan</td>
<td>24 hr.</td>
<td>34 min.</td>
<td>2.36%</td>
</tr>
<tr>
<td>Hospital</td>
<td>Patient billing</td>
<td>10 days</td>
<td>3 hr.</td>
<td>3.75%</td>
</tr>
<tr>
<td>Auto Manufacture</td>
<td>financial closing</td>
<td>11 days</td>
<td>5 hr.</td>
<td>5.68%</td>
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</tbody>
</table>

Adapted from Blackburn, J.D. 1992
Activity-based costing

• Calculate cost of each process step
• Consider both direct and indirect costs
• Identify most costly steps and focus improvement efforts on them
Benchmarking

• The study of a competitor's product or business practices in order to improve the performance of one's own company

• Informal benchmarking
  – play the role of a customer of the competitor

• Formal benchmarking:
  – Establish formal relationship with other organizations, usually in different industries
Business Process Reengineering

• **BPR = fundamental change in the business processes, and supporting them with the new system**

• Activities:
  – Outcome analysis
  – Technology analysis
  – Activity elimination
Outcome analysis

• What does the customer really want?
  – As a car lease company, do we offer cars or mobility?
• Consider what the organization *could* do for the customer
Technology analysis

• Analysts and managers list important and interesting technologies
• The group identifies how each might be applied to the business
• Example: a car manufacturer published its production schedule on an Internet-like network linked to its suppliers
Activity elimination

• Identify what would happen if each organizational activity were eliminated
• Use “force-fit” to test all possibilities
• **Example: hotel reservation**
  – step 1: client calls & asks for rooms available
  – step 2: enter client’s data in the hotel’s pc
• Eliminate steps by using a suitable web site
Comparing BPA, BPI and BPR

<table>
<thead>
<tr>
<th></th>
<th>BPA</th>
<th>BPI</th>
<th>BPR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential Business Value</td>
<td>Low-Moderate</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Project Cost</td>
<td>Low</td>
<td>Low-Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Breadth of Analysis</td>
<td>Narrow</td>
<td>Narrow-Moderate</td>
<td>Very Broad</td>
</tr>
<tr>
<td>Risk</td>
<td>Low-Moderate</td>
<td>Low-Moderate</td>
<td>Very High</td>
</tr>
</tbody>
</table>
Requirements gathering

- Interviews
- Joint Application Design (JAD)
- Questionnaires
- Document Analysis
Interviews

- Selecting interviewees
- Designing questions
- Conducting the interview
- Follow-up
Selecting interviewees

• Together with project sponsor:
  – make a list of people from different levels in the organization
  – clearly state the purpose of each interview
  – make a logical schedule: start with interviewing a senior manager to obtain strategic info, end with users to obtain the details
Designing questions

Four types of questions

– closed-ended, e.g. “How many telephone orders are received per day?”

– open-ended, e.g. “What do you think about the current system?”

– Yes/No, e.g. “Do you ...?” Compare with: “Why do you ...?”

– probing, e.g. “Can you explain that in more detail?”
How can order processing be improved?
How can we reduce the number of times that customers return items they have ordered?
How can we reduce the number of wrong product shippings?

**High level:** very general

**Medium level:** moderately specific

**Low level:** very specific
Conducting the interview

• create the right atmosphere
• record everything
• separate facts from opinions
• summarize key points
• watch body language
Follow-up

- Prepare asap the interview report
- Ask feed-back

<table>
<thead>
<tr>
<th>INTERVIEW REPORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview notes approved by: __________</td>
</tr>
<tr>
<td>Person interviewed  ________________</td>
</tr>
<tr>
<td>Interviewer  ________________</td>
</tr>
<tr>
<td>Date  ________________</td>
</tr>
<tr>
<td>Primary Purpose:  ________________</td>
</tr>
<tr>
<td>Summary of Interview:  ________________</td>
</tr>
<tr>
<td>Open Items:  ________________</td>
</tr>
<tr>
<td>Detailed Notes:  ________________</td>
</tr>
</tbody>
</table>
Joint Application Design (JAD)

• A structured process for information gathering
• Depending on project size: a group of 5 – 10 or 10 – 20 representing a broad mix of organizational levels in a specially prepared separate room
• A facilitator
• A scribe
JAD Meeting Room
The JAD session

• Preparation:
  – of participants, by making the session’s goals clear
  – of questions, similar to an interview

• Use a formal agenda and ground rules:
  – respectful, only 1 person talks at once, etc.

• Facilitator:
  – stick to agenda
  – help group with jargon/analysis techniques
  – record input of the group (flip chart, whiteboard or computer display)
Managing problems in JAD sessions

• Noncontributors & dominant persons
• True conflict vs. ‘violent agreement’
• Side discussions (especially in larger groups!)
• Agenda merry-go-round
Questionnaire

• Selecting participants
  – Use a representative sample
• Designing the questionnaire
  – Develop good questions facilitating analysis afterwards
• Administering the questionnaire
  – Take care to get good response rate
• Follow-up
  – Send results to participants
Good questionnaire design

Begin with non-threatening and interesting questions
Group items into logically coherent sections
Do not put important items at the very end of the questionnaire
Do not crowd a page with too many items
Avoid abbreviations
Avoid biased or suggestive items or terms
Number questions to avoid confusion
Pretest the questionnaire to identify confusing questions
Provide anonymity to respondents
Document analysis

- To understand the As-Is system
- Typical documents:
  - Process and Data models *(probably non-OO!)*
  - Forms
  - Reports
- Look for user additions to forms
- Look for unused form elements
Selecting the appropriate techniques

<table>
<thead>
<tr>
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<th>JAD</th>
<th>Questionnaires</th>
<th>Document Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of info</td>
<td>As-Is, To-Be Improv.</td>
<td>As-Is, To-Be Improv.</td>
<td>As-Is Improv.</td>
<td>As-Is</td>
</tr>
<tr>
<td>Depth of info</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Breadth of info</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Integration of info</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>User involvement</td>
<td>Medium</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Cost</td>
<td>Medium</td>
<td>Low-Medium</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>