Requirements:
Eliciting, Analyzing and Modeling for Success!

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RMC Senior Instructor
Who uses requirements?

- Why model requirements?
- Why document requirements?
- Why categorize requirements?
  - Requirements categories
  - Elicitation tips
Presentation Objectives

• Understand the value of modeling
• Learn the differences between Business, Stakeholder, Solution, and Transition Requirements
• Consider the differences between the Solution (product) and the Project
• Consider current state (As Is) vs. future state (To Be)
• Recognize CARRDs (constraints, assumptions, risks, requirements, and dependencies)
Who Uses Requirements?
## Who Uses Requirements?

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Role</th>
<th>Requirements Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Smith</td>
<td>Business domain SME</td>
<td>To confirm the business process is correctly understood and modeled</td>
</tr>
<tr>
<td>Eva Patel</td>
<td>Sponsor</td>
<td>To approve funding for the solution</td>
</tr>
<tr>
<td>Dennis Thomas</td>
<td>Architect</td>
<td>To design the technical solution</td>
</tr>
<tr>
<td>Shirley Lee</td>
<td>Implementation SME</td>
<td>To build the solution</td>
</tr>
</tbody>
</table>
Elicitation

- Draw out
- Draw forth
- Cause to be revealed
Why Model Requirements?

Modeling facilitates analysis and critical thinking
What Is a Model?

- **Definition**: A collection of artifacts that define a business domain or solution
- Why use models? Different perspectives shown in various formats produced with multiple techniques
Why “Document” Requirements?
Most people are visual learners
Writing something down makes it more concrete
To communicate with remote stakeholders
To get confirmation and approval
To provide implementation SMEs and testers product description
How Much “Documentation” Is Necessary?

- Agile vs. traditional
- Just enough
- Barely sufficient/lightweight
When you see these words, don’t assume high level of formality

- Artifact, deliverable, or document (noun): A product created to communicate business analysis work, formal or informal
- Document (verb): The act of recording information, formally or informally

Examples of business analysis artifacts:
- Meeting minutes
- Workflow diagrams
- Entity relationship diagrams
- Business models
Why Categorize Requirements?

- Different types of solutions
- Different levels of detail
- Different types require different communications and elicitation techniques
Why Categorize Requirements?

- Easy to document/collect
- Easy to find
- Ease of distribution to appropriate stakeholders
- Ease of reuse
Categorizing Requirements
Discussion: What Is a Requirement?
Requirement

Condition or capability needed by a stakeholder to achieve an objective
Is It a Requirement?

- “The system shall …”
- Assumption/constraint
- Feature/function of software/hardware
- Document/package of documents
- Diagram or model
- Decision table/tree
- Spreadsheet of requests
- Data element/base
- Business process/procedure
- Business rule
- Employee in the business
- External party involved with business (customer, vendor)
- Objective of project
BABOK® Guide “Requirements”

- Stakeholder
- Business
- Solution
  - Functional
  - Nonfunctional
- Transition
- As-Is (current state)
- To-Be (future state)
- Constraint
- Assumption
- Risk
- Dependency
- Project

Definitions: Solution, Product, Project

- **Solution** *(from BABOK® Guide)*
  - Changes to the business which will address the business need (process changes, personnel changes, technology changes)

- **Product** *(from PMBOK® Guide)*
  - Artifact that is produced by a project

- **Project** *(from BABOK® Guide and PMBOK® Guide)*
  - Temporary endeavor initiated to create a unique product or service
• **BABOK® Guide** requirements types:
  - Business, stakeholder, solution (functional and nonfunctional), and transition

• Requirements states:
  - Current state (As Is) and future state (To Be)

• CARRDs:
  - Constraints, assumptions, risks, requirements, and dependencies
Requirements Types

- Stakeholder Requirements
- Business Requirements
- Solution Requirements (Functional and Nonfunctional)
- Transition Requirements
- Technical Requirements
# Stakeholder Requirements

**Needs of a particular stakeholder or group of stakeholders**

<table>
<thead>
<tr>
<th>ID</th>
<th>Feature</th>
<th>Requested by</th>
<th>Priority</th>
<th>Estimate Cost</th>
<th>Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>Allow HR administrator to track home office equipment</td>
<td>B. Smith</td>
<td>5</td>
<td>Low</td>
<td>3</td>
</tr>
<tr>
<td>F2</td>
<td>Allow employee to report to more than one manager</td>
<td>S. Dinkins</td>
<td>8</td>
<td>High</td>
<td>2</td>
</tr>
<tr>
<td>F3</td>
<td>Allow worker to report work by hour, day or project assignment</td>
<td>B. Smith</td>
<td>6</td>
<td>Med</td>
<td>4</td>
</tr>
<tr>
<td>F4</td>
<td>Allow worker to change their phone number, email address or mailing address</td>
<td>B. Smith</td>
<td>6</td>
<td>Low</td>
<td>2</td>
</tr>
</tbody>
</table>
Elicitation Tips – Stakeholder Requirements

Stakeholder requirements are typically communicated by:

- Project request documents
- Defect/problem reports
- Informal and formal interviews
Business Requirements

- Goals
- Objectives
- Needs (problems and opportunities)
  - Business models
  - Business processes, rules
  - Information (data) models
  - Organization models

From business perspective — no technical jargon
Business Requirements

Learn the business!
Example: Human Resource Goals

- Maintain a high quality workforce
- Provide workers with state of the art equipment and performance tools
- Provide workers with pay and benefits which are in line with their competencies and industry standards
Example: Process Decomposition

- Maintain Worker Profiles
  - Change Worker Status
  - Assess Worker Performance
  - Acquire Worker
  - Release Worker
  - Respond to Worker Request
    - Identify Candidate Worker
    - Evaluate Candidate Worker
    - Negotiate Worker Agreement
Example: Business Workflow Diagram

<table>
<thead>
<tr>
<th>Phase</th>
<th>HR</th>
<th>Candidate</th>
<th>Payroll System</th>
<th>New Employee Manager</th>
<th>Employee</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Receive application and resume</strong></td>
<td><strong>Compare to job requirements</strong></td>
<td><strong>Forward to dept manager</strong></td>
<td><strong>Evaluate Candidate</strong></td>
<td><strong>Email</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Reject</strong></td>
<td><strong>Reply to candidate</strong></td>
<td><strong>Add employee department code</strong></td>
<td><strong>Approve</strong></td>
<td><strong>Email</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Rejected</strong></td>
<td><strong>Notify all employees and managers</strong></td>
<td><strong>Employee Records</strong></td>
<td><strong>Notify HR of offer</strong></td>
<td><strong>Email</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Make Offer</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>Email</strong></td>
</tr>
</tbody>
</table>
Elicitation Tips – Business Requirements

Typically found through:

- Document analysis
  - Existing business models
  - Existing procedure manuals
  - Policy and guideline manuals

- Observation: Study the As-Is

- Informal and formal interviews
Design a Solution to Meet Business and Stakeholder Requirements

Business and Stakeholder Requirements
(Problems, Needs, Requests, Opportunities)

Solution Requirements
Solution Requirements

**Functional**  
(what the solution must do)

- Behaviors of solution
- Example: Create web site with job openings

**Nonfunctional**  
(how well the solution must do it)

- Environmental conditions of solution
- Example: Candidates should be able to enter their application within 10 minutes
Example: Functional (Prototype)
Example: Functional (Use Case Model)
Example: Functional (Data Model)
Nonfunctional Requirements

- How well does the system perform for daily use?
- How easy is it to correct errors and add functions?
- How easy is it to adapt to changes in the environment?

Examples

- Availability
- Integrity
- Reliability
- Security
- Usability

- Flexibility
- Maintainability
- Scalability

- Expandability
- Portability
- Reusability

Adapted from *The Quest for Software Requirements*, Roxanne E. Miller, 2009.
## Examples: Nonfunctional Requirements

<table>
<thead>
<tr>
<th>Security Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NF1</strong> Employee login name and password must be created by the HR system and sent to each new employee in separate communications</td>
</tr>
<tr>
<td><strong>NF2</strong> Upon initial login to the system, the employee must change his or her password immediately</td>
</tr>
<tr>
<td><strong>NF3</strong> Each employee must change his or her password every 6 weeks to maintain access to the system</td>
</tr>
<tr>
<td><strong>NF4</strong> Each employee will only have access to his or her own profile information</td>
</tr>
</tbody>
</table>
Elicitation Tips – Solution Requirements

Typically elicited using:

• Brainstorming
• Prototyping
• Vendor package assessment
• Requirements workshops
• Focus groups
• Benchmarking (competitive analysis)
Transition Requirements

Things which will assure a smooth transition:

• Implementation strategy
• Rollout plan
• Communication plan for the change
• User and employee training plan
• Update procedure manuals
## Example: Transition Requirements

### Rollout Plan

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>December 1</td>
<td>E-mail blast to all registered workers of the corporate system notifying them of the new web site. (AS IS Procedures) for 3 months to assure a smooth transition and no interruption of service. Rollout Schedule.</td>
<td>E-mail should be brief and have a link to more information with screen shots and new procedures.</td>
</tr>
<tr>
<td>December</td>
<td>Approved vendors and servicers will be contacted by their procurement specialist and informed of the new procedures.</td>
<td>Vendors and servicers have already been notified that this change is coming.</td>
</tr>
<tr>
<td>January 1</td>
<td>Website is live.</td>
<td>Website will include a FAQ and feedback section.</td>
</tr>
<tr>
<td>January 2</td>
<td>E-mail blast with link to new site.</td>
<td>Include April 1 deadline for phone requests.</td>
</tr>
<tr>
<td>January-March</td>
<td>Facilities group accepts via existing procedures but encourages workers to try the website.</td>
<td></td>
</tr>
<tr>
<td>January 29</td>
<td>Website maintenance based on feedback from early adopters.</td>
<td>Changes will be prioritized using the change control process.</td>
</tr>
</tbody>
</table>
Elicitation Tips – Transition Requirements

Typically elicited using:

- Organizational readiness assessment
- Interviews
- As-Is vs. To-Be gap analysis
Technical Requirements

- Database design
- Network configuration
- SQL code
- HTML code
Requirements States: As-Is and To-Be

- Current state
- Future state
Elicitation Tips: As-Is and To-Be

- Current state – Discovery, investigation
- Future state – Creative imagining, prototyping, what-if analysis
- Allows for gap analysis
Examples
Example: Process Improvement

• Business requirement: Patient check-in taking too long; streamline the process
  - Create an As-Is workflow diagram

• Solution requirement: Install a high-speed scanner for patient forms and ID cards to be scanned rather than data entered
  - Create a To-Be workflow diagram
Example: Vendor Package Selection

- **Business requirement:** Old software no longer supported; need a system built on a current technology platform
- **RFP:** System must be web-enabled, mobile-enabled, and allow for upgrades to future browser platforms
Example: New Product Development

- **Business requirement:** Our customers want us to keep track of their certifications and renewal dates

- **Solution requirement:** Store data for each customer including:
  - Full Name
  - Contact phone number and email address
  - Certifying organization name
  - Certificate name
  - Certification number
  - Date awarded
  - Expiration date
Example: ERP System Change

**Business requirement:**
Workers are less tied to a physical location; we need an HR module to track worker travel and home office locations.

**Solution requirement:**
Ability to store multiple office locations and travel itineraries for each worker with mailing addresses for the shipment of equipment and other supplies.
Example: Data Analytics - Marketing

- **Business requirement:** Find buying patterns from existing customer behaviors

- **Solution requirement:** Mine customer data and social media sites looking for trends and patterns related to product purchase
CARRDs

C – Constraints
A – Assumptions
R – Risks
R – Requirements
D – Dependencies
Constraints

- Limitations on the solution
- Unchangeable conditions which influence the solution design

Example:
- All computers use MS Windows 7.0 operating system
- Not all users will have access to the Internet
## Turning Constraints Into Requirements

<table>
<thead>
<tr>
<th>Constraint</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>All computers use MS Windows 7.0 operating system.</td>
<td>The application must run on MS Windows 7.0 operating system.</td>
</tr>
<tr>
<td>All users will not have access to the internet.</td>
<td>A manual or standalone procedure must be available for users without access to the internet.</td>
</tr>
</tbody>
</table>
Assumptions

Something which is taken for granted; a supposition

Examples:

• All users will have internet access
• Most employees prefer to enter their profile information themselves
• Banks allow direct deposit changes anytime
## Turning Assumptions into Requirements

<table>
<thead>
<tr>
<th>Assumption</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>All users will have Internet access</td>
<td>The application may be accessible via the Internet</td>
</tr>
<tr>
<td>Most employees prefer to enter their profile information themselves</td>
<td>Allow employees to enter their profile information via a secured login.</td>
</tr>
<tr>
<td>The bank will allow direct deposit changes anytime</td>
<td>Send direct deposit changes to the bank immediately after they are made</td>
</tr>
</tbody>
</table>
Risks

• Possible event which could (negatively or positively) impact the project or solution

• Involve an element of uncertainty

Examples

Project Risk: Vendor delivery of application is late

Business Risk: Payroll processing is not completed by last day of the month
<table>
<thead>
<tr>
<th>Business Risk</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payroll processing is not completed by the last day of the month</td>
<td>Allow payroll to be processed 3 days before the last day of the month (allowing time for review and corrections)</td>
</tr>
<tr>
<td>Employee direct deposit goes into the wrong bank account</td>
<td>Allow direct deposit enrollments and changes to be tested with a small deposit</td>
</tr>
</tbody>
</table>
Dependencies

A business need which relies on another business process or solution

Example:

Employee profile change

-is dependent on-

Employee secure login
Instructions:

• In teams, go to one of the flip chart pages for a requirement type

• Using your experience, list as many examples of that requirement type on the page as you can

• When instructed, move to each of the other flip charts, discuss the examples contributed by other groups, and add additional examples
Nonfunctional Requirements

How well does the system perform for daily use?

How easy is it to correct errors and add functions?

How easy is it to adapt to changes in the environment?

Examples

Availability
Integrity
Reliability
Security
Usability
Flexibility
Maintainability
Scalability
Expandability
Portability
Reusability

Adapted from *The Quest for Software Requirements*, Roxanne E. Miller, 2009.
Final Thoughts
What Is a Requirement?

- Analyze
- Organize
- Prioritize
- Estimate cost/benefit
- Specify/model
- Communicate
- Get approval

Approved Requirements

Raw or unrefined Requirements (Requests, features, capabilities, functions)

Progressive elaboration
What Is a Requirement?

- Raw or unrefined Requirements (Requests, features, capabilities, functions)
  - Analyze
  - Organize
  - Prioritize
  - Estimate cost/benefit
  - Specify/model
  - Communicate
  - Get approval

Progressive elaboration

Working Software
Review of Key Concepts

• Who uses requirements?
• Why model?
• Why document?
• Why and how to categorize?
  – BABOK® Guide requirements types
  – Requirements States: current state (As Is) and future state (To Be)
  – CARRDs
Questions?

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<table>
<thead>
<tr>
<th>Claim PDUs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>REP Provider:</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
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<tr>
<td><strong>Activity Name:</strong></td>
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<tr>
<td><strong>Activity Number:</strong></td>
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