ERP Requirements Management

Air Force Mentor-Protégé Program

ERP Requirements Management

Ronald E. Giachetti, Ph.D.
Associate Professor
Industrial and Systems Engineering
Florida International University

Duane P. Truex, Ph.D.
Associate Professor
Robinson College of Business
Department of Computer Information Systems
Georgia State University

ERP Methodology and Project Management
Air Force Mentor-Protégé Program

Agenda

- ERP Project Scope
- ERP Requirements Environment
- Requirements Gathering Methods
- ERP Requirements
- Requirements Management
- Summary

Air Force Mentor-Protégé Program

ERP Project Scope

- Scope is the logical set of self contained business processes that can be enabled by a standard software solution.
- ERP systems can define scope by:
  - Module – each module contains business processes (e.g. in SAP the Business Process Master List (BPML)).
  - By cross-functional business process, which may be obtained by cross module mappings to the implementation reference architecture.
Air Force Mentor-Protégé Program

ERP Requirements Environment

- **Multiple stakeholders** concurrently engineer the requirements and the architecture design to create a solution based on pre-existing ERP components.
- Requirements Engineering (RE) team extensively **reuses** predefined requirement artifacts (such as reference models).
- **Business process modeling** drives the RE cycle and is the key to acquiring, communicating, and validating enterprise knowledge and business requirements.
- The organization adopts an **architecture-centric approach** to manage systems and business changes and to establish and maintain a common information infrastructure across business units.
- RE teams emphasize consistency in **analytical measures**, such as systematic selection of common process and data requirements; **constructive measures**, such as consistent RE methods and tools; and **organizational measures** such as institutionalized quality assurance procedures.

Managing RE Teams

- To manage implementation complexity divide ERP project into subprojects based on the modules.
- Each **subproject** has a dedicated RE team.
  - Responsible for running the RE cycle and delivering the business process requirements document for the module.
  - Team includes:
    - ERP consultants with in-depth knowledge of process and ERP modules.
    - Process owners such as department mgs and domain experts with knowledge of operational procedures the solution will support.
    - Process Architect to support teams. Knows ERP architecture; consults on requirements reuse, process methods, and RE tools.
      - Process Architect is shared among all teams.
  - Identify interfaces between modules, negotiate interface requirements.
Air Force Mentor-Protégé Program

RE in an Iterative Life Cycle Model

- Three main activities:
  - Requirements elicitation: finding, communicating, and validating facts and rules about the business.
  - Enterprise modeling: analyzing and representing business processes and data.
  - Requirements negotiation: validating process and data architectures, resolving process and data issues, and prioritizing requirements.
- Deliver business blueprint.

Air Force Mentor-Protégé Program

Requirements Gathering Methods

- Sampling of existing documentation, forms, and databases
- Research and site visits
- Observation of the work environment
- Questionnaires
- Interviews
- Prototyping
- Joint requirements planning (JRP)
- Modeling
Joint Requirements Planning

**Joint requirements planning (JRP)** – a process whereby highly structured group meetings are conducted for the purpose of analyzing problems and defining requirements.

- JRP is a subset of a more comprehensive joint application development or JAD technique that encompasses the entire systems development process.

Guidelines for Conducting a JRP Session

- Do not unreasonably deviate from the agenda
- Stay on schedule
- Ensure that the scribe is able to take notes
- Avoid the use of technical jargon
- Apply conflict resolution skills
- Allow for ample breaks
- Encourage group consensus
- Encourage user and management participation without allowing individuals to dominate the session
- Make sure that attendees abide by the established ground rules for the session
Brainstorming

- Sometimes, one of the goals of a JRP session is to generate possible ideas to solve a problem.
  - Brainstorming is a common approach that is used for this purpose.

**Brainstorming** – a technique for generating ideas by encouraging participants to offer as many ideas as possible in a short period of time without any analysis until all the ideas have been exhausted.

Brainstorming Guidelines

- A facilitator runs the session, limits digressions and resolves or minimizes disagreements.
- Isolate the appropriate people in a place that will be free from distractions and interruptions.
- Make sure everyone understands the purpose of the meeting.
- Appoint one person to record ideas.
- Remind everyone of brainstorming rules.
- Within a specified time period, team members call out their ideas as quickly as they can think of them.
- After the group has run out of ideas and all ideas have been recorded, then and only then should the ideas be analyzed and evaluated.
- Refine, combine, and improve the ideas that were generated earlier.
### Use of Narrative Techniques

- Poor requirements specification is often a problem in many IT projects.
  - In a study of 67 SAP implementations about 13.5% appeared successful from an engineering perspective but did not meet the real needs of the organization (Daneva 2003).
- Narrative type techniques help user groups better express needs.
- For example: A major cruise company gathered requirements on reservations by having reservation agents focus on scenarios (such as honeymoon couple reservation, group reservation, etc.).

### Modeling Requirements

- Use Case modeling has become very popular for documenting software requirements.
- ERP projects are different – The primary requirements are driven by the business processes – hence process modeling is more appropriate means to document requirements.
- Model ‘As-Is’ and ‘To-Be’ business processes.
- Extensive academic research on enterprise modeling to better capture requirements.
Air Force Mentor-Protégé Program

**ERP Requirements Best Practice**

- **Balance Technical and Business aspects.**
  - Both sides (functional and technical) need to cooperate and have input into the ERP project.

- **User Involvement**
  - Users can help identify and resolve potential issues early, thereby improving implementation quality.
  - Less likely to resist change.
  - Opportunity for management to better gauge and influence user expectations.

---

**Who Defines Requirements?**

- ASAP approach has business team members work side-by-side with implementation consultants to define business process requirements.

- The risk is the consultants are biased to define requirements based on what is most convenient to configure as opposed to what is best for the organization.

- This is a type of conflict of interest.
Strategic Assessment

- The impact of ERP on the business can be analyzed by a strategic assessment.
- A fault with some requirements analysis is they do not explore the deeper organizational requirements that define a successful ERP.
- Missing strategic requirements become apparent over time when companies will need to embark on new projects to satisfy these needs.
- SWOT Analysis
  - INTERNAL
    - Strengths
    - Weaknesses
  - EXTERNAL
    - Opportunities
    - Threats
- SWOT analysis facilitated with checklists and consultants.

Example: Hydro Agri

- A SAP R/3 project from 1995 – 1999 with a total budget of $126 M.
- 10 modules fully or partially implemented and more than 3000 end-users trained.
- Project was considered successful.
- BUT … follow-up ‘improvement projects’ were necessary to meet strategic needs.
Example Continued

- Insufficient Evaluation of Strategy
  - Management needs were underestimated at strategic and tactical level. Hydro Agri use of Value-Based Management was not taken into account and its basic reporting requirements were not completely fulfilled in the first version.
  - A follow-up improvement project concentrated on the business side of the system.

Requirements in Government Acquisition of ERP

- The purchase of ERP is a major acquisition program.
- Consulting teams must submit cost and technical proposals for the work.
- The government agency must define the scope and requirements for the project.
Air Force Mentor-Protégé Program

ERP Requirements

- **Business Process Requirements**: The critical requirements for ERP are not technical system requirements but are related to the business process.
- **Information assurance requirements**: Ensure availability, integrity, authentication, confidentiality, and non-repudiation of transactions.
- **Performance requirements**: Transaction throughput and response times.
- **Control requirements**: (including Privacy and security)
- **Reliability requirements**: Availability of system.
- **Interface requirements**: There will still be legacy systems, other ERP, etc.
- **Data conversion requirements**: How to convert legacy data to ERP.

- **Configuration requirements**: Constraints on configuration changes.
- **Certification requirements**: For government contracts such as DCAA compliant (for accounting standards).
- **Supportability requirements**: Constraints on specialized software tools, maintenance.
- **User Interface requirements**: Requirements on the input and output formats and user interaction.
- **Training and document requirements**: ERP is a change management project, need to train users. Also, need to document system for maintenance.
- **Reporting Requirements**: Reporting is an integral part of ERP. Standard reports and ad hoc reports.
### Criteria to Define System Requirements

- **Consistent** – requirements are not conflicting or ambiguous.
- **Complete** – requirements describe all possible system inputs and responses.
- **Feasible** – requirements can be satisfied based on the available resources and constraints.
- **Required** – requirements are truly needed and fulfill the purpose of the system.
- **Accurate** – requirements are stated correctly.
- **Traceable** – requirements directly map to the functions and features of the system.
- **Verifiable** – requirements are defined so they can be demonstrated during testing.

---

### RE Should Stay Close to ERP Architecture

- Each ERP vendor offers an architecture concept that:
  - Defines underlying business principles
  - Structures the business reality (in terms of process and data views)
  - Provides conceptual modeling for each view
  - Contains predefined business processes and business objects
Government Agencies

- Government agencies might be hampered in adopting the best business practices embedded in ERP due to regulations and other laws.

Requirements Management

Requirements management - the process of managing change to the requirements.

- Over the lifetime of the project it is very common for new requirements to emerge and existing requirements to change.
- Studies have shown that over the life of a project as much as 50 percent or more of the requirements will change before the system is put into production.
### Requirements Management

- Understand requirements
- Obtain commitment to requirements
- Manage requirements changes
- Maintain bidirectional traceability of requirements
- Identify inconsistencies between project work and requirements

---

### Requirements Management

- Establish and maintain a plan for performing requirements management
- Provide adequate resources for performing the requirements management process, developing the work products, and providing the services of the process
  - Tools such as traceability matrix
- Assign responsibility and authority for performing the process, developing the work products, and providing the services of the requirements management process
- Requirements are a configuration item to be tracked and controlled
- Monitor and control the requirements management process against the plan for performing the process and take appropriate corrective action
Air Force Mentor-Protégé Program

Preventing Scope Creep

- Devise practices to prevent scope creep.
  - Establish standard criteria for completing the business blueprint and getting stakeholder acceptance.
  - Use reference models to monitor scope and check traceability through the artifacts.
  - Use standard Q&A (such as in SAP) to maintain links between what is asked and answered in the requirements elicitation sessions.

Air Force Mentor-Protégé Program

Documenting and Analyzing Requirements

- Document the draft requirements with various tools:
  - Process models (and other models)
  - Decision tables
  - Requirements tables
- Analyzing requirements to resolve problems of:
  - Missing requirements
  - Conflicting requirements
  - Infeasible requirements
  - Overlapping requirements
  - Ambiguous requirements
- Formalizing requirements
  - Requirements definition document
  - Communicated to stakeholders or steering body
- Document rationale for requirements.
  - Implementation of this practice eliminated 43% of the stated requirements in a Canada telecom.
### Prioritize Requirements

- **Standard practice to prioritize requirements**
  - Need to overcome reluctance of process owners to prioritize for fear the project will only accomplish ‘must-have’ requirements.
  - Need to overcome consultants reluctance to admit that not all requirements can be implemented in time and budget available.
- Need to build a win-win partnership between process owners and external consultants.

### Systematic Validation and Verification

- Do not skimp on requirements validation activities.
- Problems include:
  - Unnecessary implementation of complex functionality
  - Not realizing conflicting business drivers
  - Overlook critical technical issues
- Make RE teams aware of process.
  - **Validation**: ensure business requirements clearly describe the target solution.
  - **Verification**: confirms the requirements are technically implementable and the resulting architecture design satisfies the business requirements.
- Organize structured process validation walkthroughs.
Preventing Scope Creep

- Establish strong **change control process** to ensure requirements are met and to avoid “scope creep”.
- To prevent scope creep, form a **Requirements Review Board** to evaluate change requests and monitor progress against the requirements. Also define a rigid requirements management process.
- Assigning requirement IDs to each requirement helps the project manage scope creep.

Typical Requirements Management Documents

- Requirements acceptance criteria with results of requirements analysis
- Requirements document (agreed to requirements)
- Requirements impact assessments
- Requirements traceability matrix
- Requirements tracking system
  - Maintain requirements change history with rationale
- Requirements status
- Documentation of inconsistencies, including sources, conditions, rationale and corrective actions
Example Requirements Document for ERP Module on HR

Air Force Mentor-Protégé Program

Summary

- Requirements require balance of business and technical aspects.
- ERP requirements rely heavily on business process modeling.
- Documentation is important.
- Policies and practices to limit scope creep.