Applying Qualitative Risk Analysis to Software Maintenance

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Agenda

- Purpose
- Assessment steps
- Assessment process
- Software maintenance assessment areas
- Data collection questionnaire
- Applying the methodology
- Summary
Purpose

- Determine the readiness of an organization to perform software maintenance support
- Identify and assess the risks associated with software maintenance support
Assessment Steps

- Tailor the questionnaire to the specific organization and issues being assessed and provide a copy to the organization in preparation for the site visit.
- Perform a site visit (1 to 2 days) to conduct detailed interviews with appropriate personnel and to collect data and information related to the software support areas.
- Analyze the data and information collected during the site visit including, if available, organizational documents (e.g., Transition Plan, Computer Resource Life Cycle Management Plan (CRLCMP), Implementation Plan, Development Plan).
- Develop mitigation strategies for those risks that represent a high probability of occurrence or substantial risk to success.
Assessment Steps (Concluded)

- Document the results
- Conduct a follow-up meeting with the organization to provide feedback on the results and discuss the mitigation strategies
Assessment Process

Issues

Tailor to Request

Perform Site Visit and Interviews

Clarification

Identification and Analysis

Mitigation Documentation

Follow-Up

Lessons Learned
Software Maintenance Assessment Areas

- Availability of Contractor Deliverables
- Maintenance Personnel
- Facilities
- Software Development and Maintenance Process
- Configuration Management
- Quality Assurance
- Program Management
- Transition Planning
Data Collection Questionnaire

- Availability of Contractor Deliverables
  - Computer software and associated documentation
    - Has all computer software been delivered?
  - Support software and associated documentation
    - Has all support software documentation been delivered?
Data Collection Questionnaire (continued)

- Maintenance Personnel
  - Staffing
    - Does the organization have a staffing plan for the first year of operation? Is there a staffing plan for the outyears?
  - Training
    - Can the organization identify training (in-house and contract) which has been accomplished for organization personnel?
Data Collection Questionnaire (continued)

- Facilities
  - Development facilities
    - Are all software development facilities complete, furnished, and operational?
  - Lab test facilities
    - Are all needed software/firmware/tools/hardware/documentation available
Data Collection Questionnaire (continued)

• Software Development and Maintenance Process
  - Process definition
    • Is the software development process defined and documented? Are output products defined for each process step?
  - Reviews/audits
    • Has the organization defined informal reviews (e.g., code walk-throughs)?
  - Metrics
    • Does the organization have a written Metrics Plan which defines how metrics will be collected, analyzed, used, and reported?
Data Collection Questionnaire (continued)

- Configuration Management (CM)
  - CM system
    - Has the organization identified and acquired a tool to be used for CM? Is the tool operational?
  - CM plans, processes, and procedures
    - Has the organization identified and prepared all CM plans and procedures?
  - CM implementation
    - Are all contractor delivered items under configuration control?
  - Document control
    - Can the organization provide a current listing of all document holdings?
Data Collection Questionnaire (continued)

- Quality Assurance (QA)
  - QA plans, processes, and procedures
    - Does the organization have documented QA plans and procedures?
  - QA implementation status
    - Are all QA personnel available and trained?
Data Collection Questionnaire (continued)

- Program Management
  - Budget/financial practices
    - Does the organization have a work breakdown structure defined to an adequate level?
  - Program management practices
    - Does the organization have a Program Management Plan which defines how the program will be managed? Has the Plan been implemented?
  - Risk management practices
    - Does the organization have a Risk Management Plan for technical, schedule, and cost risks?
  - Organization structure
    - Are there written descriptions for roles and responsibilities associated with each position?
Data Collection Questionnaire (concluded)

- Transition Planning
  - CRLCMP
    - Does an approved and current CRLCMP exist?
  - Transition plan
    - Did the organization develop a Transition Plan?
  - Lab/facilities plan
    - Does the organization have an Acquisition Plan for all needed lab/facilities items?
Applying the Methodology

- DOD customer
- Early delivery of portions
- Multiple support sites with unique software
- Multiple users
- No centralized maintenance

Identify risks to support!
Are support agents ready?
What can we do?
Types of Risks

- What are the risks?
  - Programmatic
    - Risks associated with obtaining and using resources not controlled by the organization
  - Technical
    - Risks associated with evolving a complex product such as the system software
  - Supportability
    - Risks associated with fielding and maintaining the system software
  - Schedule
    - Risks associated with schedule slippage
  - Cost
    - Risks associated with cost growth
Likelihood of Occurrence

- Low - Likely that adequate support can be provided
- Moderate - With adequate risk planning, support can be provided
- High - Unlikely that support can be provided
Severity of Impact

- Low -- has the potential to cause disruption of schedule, increased cost, and/or degradation of performance; however, with a normal level of effort and monitoring, difficulties can probably be overcome.

- Moderate -- can potentially cause some disruption of schedule, increased cost, and/or degradation of performance; however, with close monitoring, increased attention to the problem, and application of appropriate risk handling actions, difficulties can probably be overcome.

- High -- likely to cause significant, serious disruption of schedule, increased cost, and/or degradation of performance.
## Sample Risk Summary

<table>
<thead>
<tr>
<th>Risk Area</th>
<th>Type of Risk</th>
<th>Likelihood of Occurrence</th>
<th>Severity of Impact</th>
<th>Overall Risk Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability of Contractor Deliverables</td>
<td>Programmatic Supportability Schedule Cost</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Informal Software Process</td>
<td>Programmatic Supportability</td>
<td>High</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Quality of Products Delivered by Development Contractor</td>
<td>Schedule Programmatic Supportability Cost</td>
<td>High</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
</tbody>
</table>
Sample Risk Mitigation

- Ensure products are delivered in a timely fashion
  - Request frequent status information
  - Review contract deliverables
  - Monitor and verify fulfillment of contract deliverables
  - Establish a formal process for transition to maintenance
  - Participate in technical interchange meetings
  - Ensure training requirements are in the contract and monitor fulfillment of requirements

- Formalize the software change process
  - Define and document a formal software change process
  - Establish independent formal QA group
  - Utilize an automated CM tool
Sample Risk Mitigation (concluded)

- Improve long-term maintainability
  - Perform re-engineering on delivered products that have a high McCabe complexity value
  - Resolve standards and comment inconsistencies
  - Complete test plans and procedures
  - Recognize the need for additional resources needed to upgrade the software
Summary

- Obtain management support
- Site visits are a must
  - Tailor the questionnaire
  - Do your homework
- Probe for underlying issues
- Provide feedback

Supports proactive management of software maintenance risks