

# Assessing Commercial Off the Shelf Software in Industry Using ATAM<sup>SM</sup> and RUP<sup>®</sup> Analysis

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## Learner Objectives

1. Understand the iterative states of a use case and how to apply them to right size for the selection process to minimize risk.
2. Understand the key quality drivers of a Commercial Off-the-shelf (COTS) integration project in industry as inputs to ATAM<sup>SM</sup> and how to apply them to component evaluations.
3. Understand the modified the realization diagram based on components and how to realize solutions using COTS.

## Background

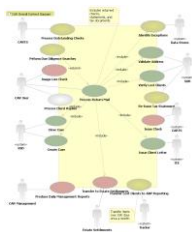
- Industry is moving away from custom development to integrating COTS for those business functions not within the company's core competencies (e.g., finance, procurement, human resources, etc.).
- Use of out of the box functionality of "best in breed" COTS components (particularly integrated suites) facilitates the adoption of industry standard or best practices.
- Businesses with practical experience in integration COTS develop patterns and sources of quality requirements to facilitate integration based on best practices.
- Published methods such as Rational Unified Process (RUP®) and Architectural Tradeoff Analysis Method<sup>SM</sup> (ATAM<sup>SM</sup>) can be adapted for COTS to meet industry's time to market.
- Methods were piloted to select COTS components and are summarized in the case study.

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## Iterative States of a Use Case

### 1. <<identified>> state



#### Description and Benefits

- Use case diagram
- Communicates business needs and scope visually (no other docs)
- Can be easily prioritized (using colors)
- Identifies important stakeholders up front
- Identifies complexity of integration (many system actors)
- Provides immediate, visible progress
- Does not require a template

### 2. <<described>> state

User assigns a new purchase order to an approved statement of work resulting in the articulation of at least one line and, if appropriate, sub-line items.

#### Description and Benefits

- One or more paragraph description, including outcome
- Provides detail as details are needed
- Aligns team on the use case's intended outcome
- Can be written during the meeting
- Does not require a template

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# Iterative States of a Use Case

## 3. <<outlined>> state

### Description and Benefits

- Leverages <<described>> state
- Useful for ownership discussions and analysis
- Constrains details to a single page
- Can be leveraged for a “bake off”
- Provides required meta-data for <<detail>> state
- BP: All should progress to this state for solicitation

## 4. <<detailed>> state

### Description and Benefits

- Leverages <<outlined>> state
- Developed for use case with high sensitivity points
- BP: Use for complex integration points prior to solicitation

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# Use Case Template

### Overview

<<Describe the business context, what might be changing, etc.>>

### Owner

<<business owner's name>>

### Author

<<author's name>>

### Use Case Description

Describes the process of <<describe the business process>>

### Pre Conditions

<<List the things that must be in place prior to starting this use case—this is a good place to list dependencies on the results of other use cases.>>

### Post Condition

<<Write one sentence on what happens as a result of the use case.>>

### Trigger

<<Identify the event that would require the user to execute the use case.>>

### Actors

<<List all human and system actors required by the use case.>>

### Assumptions/Notes

<<assumptions>>

### Use Case Description

1. <<Insert high level steps>>

<<User Notes:

1. At a minimum, complete the left hand side of this slide for each use case <<identified>> to bring it to the <<described>> state.
2. Determine the nature of the changes to the current business use case/process. (If low, go to last step, if medium or high, go to next step.)
3. Document steps in the space above to bring the use case to the <<outlined>> state, focusing on critical steps, steps that need to be changed to meet the project scope, steps required to communicate with new cross commit.
  - Ten to twelve steps is good.
  - Use the formula Actor + Verb + Object and then state what needs to happen.
4. If no there are no changes, consider inserting a use case diagram instead of the next page.

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# Key Quality Drivers

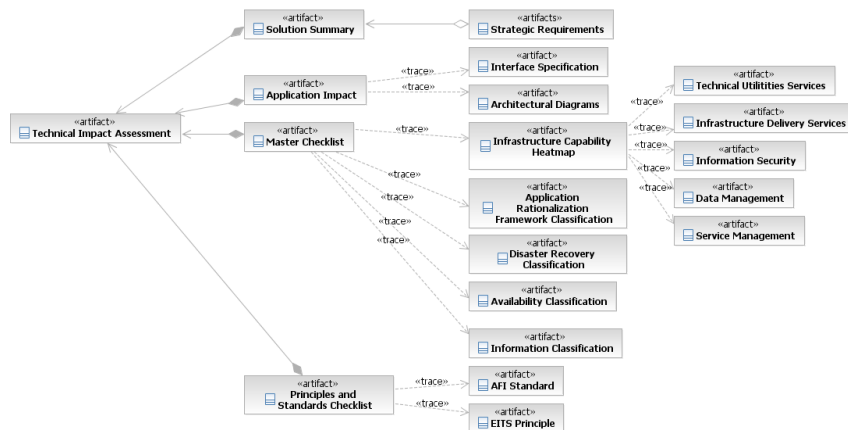
The key quality drivers and sources are:

1. Architecture Strategic Requirements, Directives, and Principles
2. Key Interface Specifications (based on use cases)
3. Infrastructure Standards (security, data, compute, network, protocols, etc.)
4. Scalability (transaction volumes, growth based on use cases)
5. Availability Tier (overall system (of systems))
6. Disaster Recovery Tier (overall system (of systems))
7. Assessment Tools and Best Practices

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## Quality Driver Traceability



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# Assessment Process

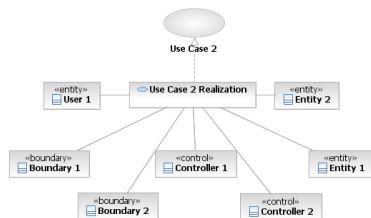
The assessment process consists of the following steps:

1. Develop the initial analysis model based on use cases.
2. Assess impact by architecture domains with team (includes quality requirements, tradeoffs, and sensitivity points).
3. Prepare vendor packet (use cases, questionnaires, topics, etc.).
4. Conduct assessment of each COTS component (iterative and plan for a minimum of two weeks, although it may take more or less time).
5. Summarize and review tradeoffs with stakeholders.
6. Use tradeoffs in the negotiation process to ensure quality requirements are met.

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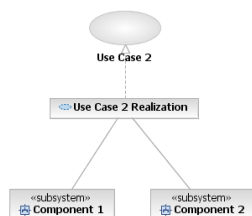
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## Standard vs. Modified Analysis Products



### Standard Analysis Products

- Is abstract by nature
- Multiple steps to get to the solution
- Contain many classes
- May be used of new business domain
- Primarily suited for development



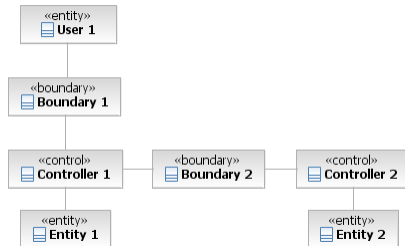
### Modified Analysis Products

- Streamlines analysis process
- Clearly communicates which component realizes each use case
- Identifies the need to for integration between components
- Prepares team for realization that more than one component may be needed

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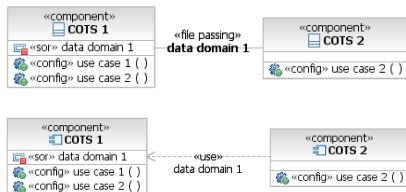
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# Modified Analysis Products



## Unmodified Analysis Products

- Is abstract by nature
- Multiple steps to get to the solution
- Contain many classes
- May be used of new business domain
- Primarily suited for development



## Modified Analysis Products

- Streamlines analysis process
- Clearly communicates which component realizes each use case
- Identifies the need to for integration between components and integration type
- Places data domains as system of record (SOR) when two components can serve the role

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## Case Study

### Procurement Systems Selection

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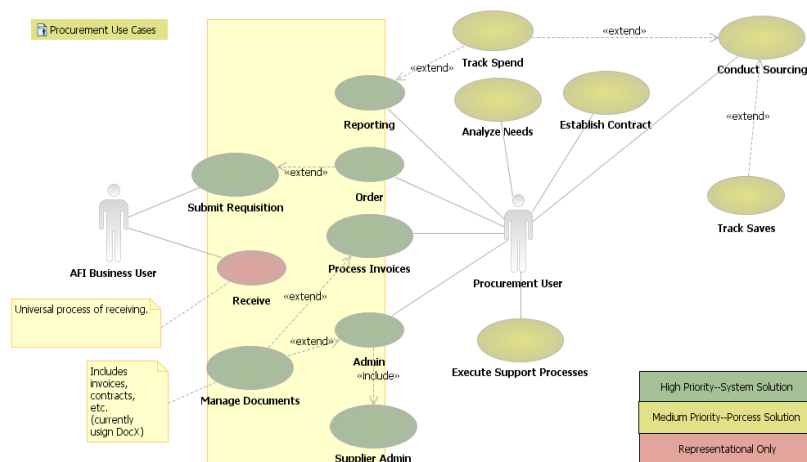
## Background and Outcome

- Business decided to in-source procurement and accounts payable processes and the Business Domain Architect was invited to transition briefing to assist in identifying transition requirements.
- A joint business, architecture, and vendor team reviewed and prioritized the proposed use cases vis-à-vis the existing processes and systems (reverse engineer), resulting in alignment to seek a new system.
- The same joint team discussed related use cases that would not be met by a procurement solution, but may need to be considered as part of the overall transition.
- Based on the requirements a use case diagram with use cases in the <<identified state>>.
- The Architect created an initial analysis model to represent architecturally significant classes to be considered by a procurement solution.
- Business engaged the two recommended vendors of recommended COTS components and added scope (including two vendors).
- A joint architecture team assessed seven COTS components using ATAM<sup>SM</sup> over the course of two months.

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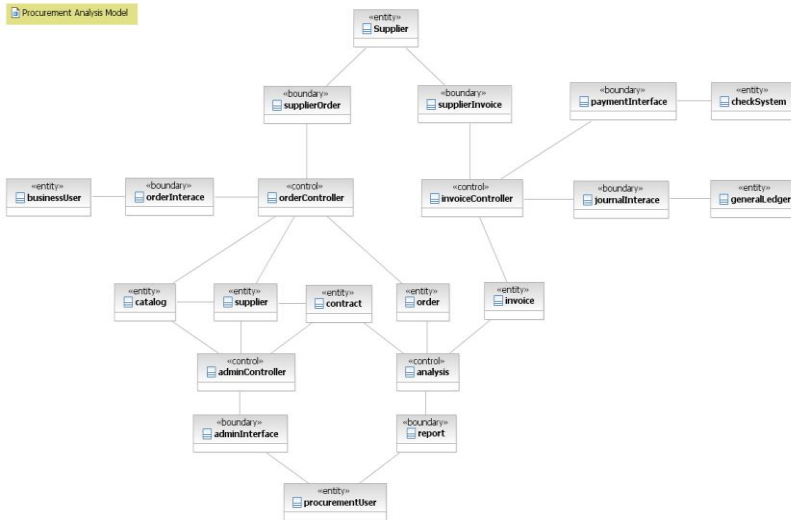
## Procurement Use Case Model



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# Initial Procurement Analysis Model



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## Initial Assessment

- Current solution evolved into a system of systems over the course of many years.
- Virtually no components can be reused as-is in an in-sourcing model and must be procured.
- Business will need to procure more than one component to meet business needs.
- Suites of bundled components exist that can meet the business needs.
- Products should be chosen based on their ability to integrate versus best in breed.

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# Sample

## Use Case 11: Process Time Cards

### Overview

Approved labor charges by vendor need to be produced on a defined or ad hoc basis in order to reconcile vendor invoice and assure accuracy of vendor payment. This requires that Project Management System (PMPS) feed the approved/posted hours by resource to Procurement system for use in calculating approved labor charges.

### Owner

John Smith

### Author

Susan Jones

### Use Case Description

Procurement system must obtain feed of approved/posted hours from PMS and store for use in calculating approved labor charges by vendor.

### Pre Conditions

Time is entered in the PMS

### Post Condition

Time is validated against spending limits and is ready for approval

### Trigger

Regular invoice schedule or ad hoc request.

### Actors

Procurement Team

PMS interface/feed

### Use Case Description

1. PMS weekly posting process kicks off interface feed to Procurement system.
2. Posted hours by vendor resource for previous week are fed to Procurement system.
3. Procurement system receives feed and loads hours data by resource.

### Assumptions

1. PMS carries adequate data at the timesheet line item level to identify the type of rate that should be used for the hours on that line item (i.e., onshore regular, onshore premium, offshore regular, offshore premium).

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## Quality Requirements

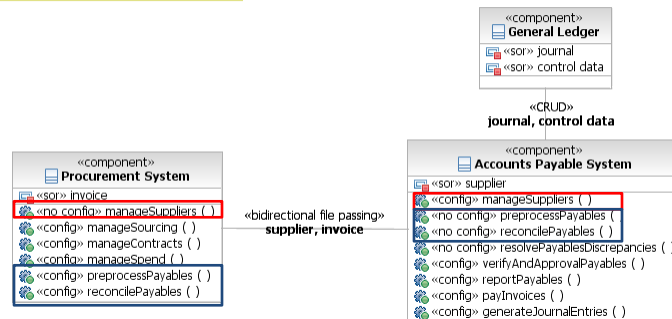
1. **Security:** Conforms to the company's security policies for the level of data to be processed on the system.
2. **Extendibility:** Conforms to at least one of the company's standard file integration patterns.
3. **Extendibility:** Implements out of the box integration with existing or other planned COTS components.
4. **Accessibility:** Conforms to at least one of the company's standard authentication integration patterns.
5. **Scalability:** Provides the ability to expand to n transactions within n years.
6. **Recoverability:** Conforms to the company's disaster recovery policies for the recovery tier of the impacted business processes.

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# Analysis Model for Tradeoffs

Procurement Component Class Diagram



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## Conclusions

1. Use cases quickly facilitate business alignment on scope, identify upfront the need for and dependencies between multiple systems, and enable tradeoff analysis between components.
2. Integration patterns, pre-existing sources of quality requirements, and sensitivity points based on lessons-learned are key to quickly vetting the COTS components.
3. Modified RUP<sup>®</sup> products are key to the process and also serve as starting points for additional work, depending on organizational adoption of RUP<sup>®</sup> practices.

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## References

- [1] Rick Katzman, Mark H. Klien, Paul C. Clements, "ATAM: Method for Evaluating Software Architectures," <http://www.sei.cmu.edu/pub/documents/00.reports/pdf/00tr004.pdf>, accessed November, 2007.
- [2] Cecile Peraire, "The IBM Unified Process for COTS-based Project: An Introduction," <http://www.ibm.com/developerworks/rational/library/aug05/peraire-pannone/index.html>, accessed November 2007.
- [3] Kurt Bittner, "Driving Iterative Development with Use Cases," <http://www.ibm.com/developerworks/rational/library/4029.html>, accessed January 2010.
- [4] Eclipse.org, "Concieto: Entity-Control-Boundary Pattern," [http://epf.eclipse.org/wikis/openuppt/openup\\_basic/guidances/concepts/entity\\_control\\_boundary\\_pattern\\_uF-QYEAhEdq\\_UJTvM1DM2Q.html](http://epf.eclipse.org/wikis/openuppt/openup_basic/guidances/concepts/entity_control_boundary_pattern_uF-QYEAhEdq_UJTvM1DM2Q.html), accessed January 2010.

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