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Acquisition Pilot: The Application of OAR in a Lead System Integrator Context

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Introduction to ASP OAR Pilot

Options Analysis for Reengineering (OAR) is a systematic, architecture-centric method for identifying and mining reusable software components within large and complex software systems.

OAR was initially developed for organizations that own both the legacy assets and the target system

ASP OAR pilot provided a customized version of OAR for the FCS system integrator to quickly evaluate whether specific legacy assets can be effectively mined for reuse within FCS.

Context: Why Mine Existing Components?

Few systems or product lines start from “green fields”

Problem of mining existing components:

- under what conditions should components be extracted
- what types of components are worth extracting
- issues in extraction:
  - existing components are often poorly structured and poorly documented
  - existing components differ in levels of granularity
  - organizations lack clear guidance on how to perform the salvaging

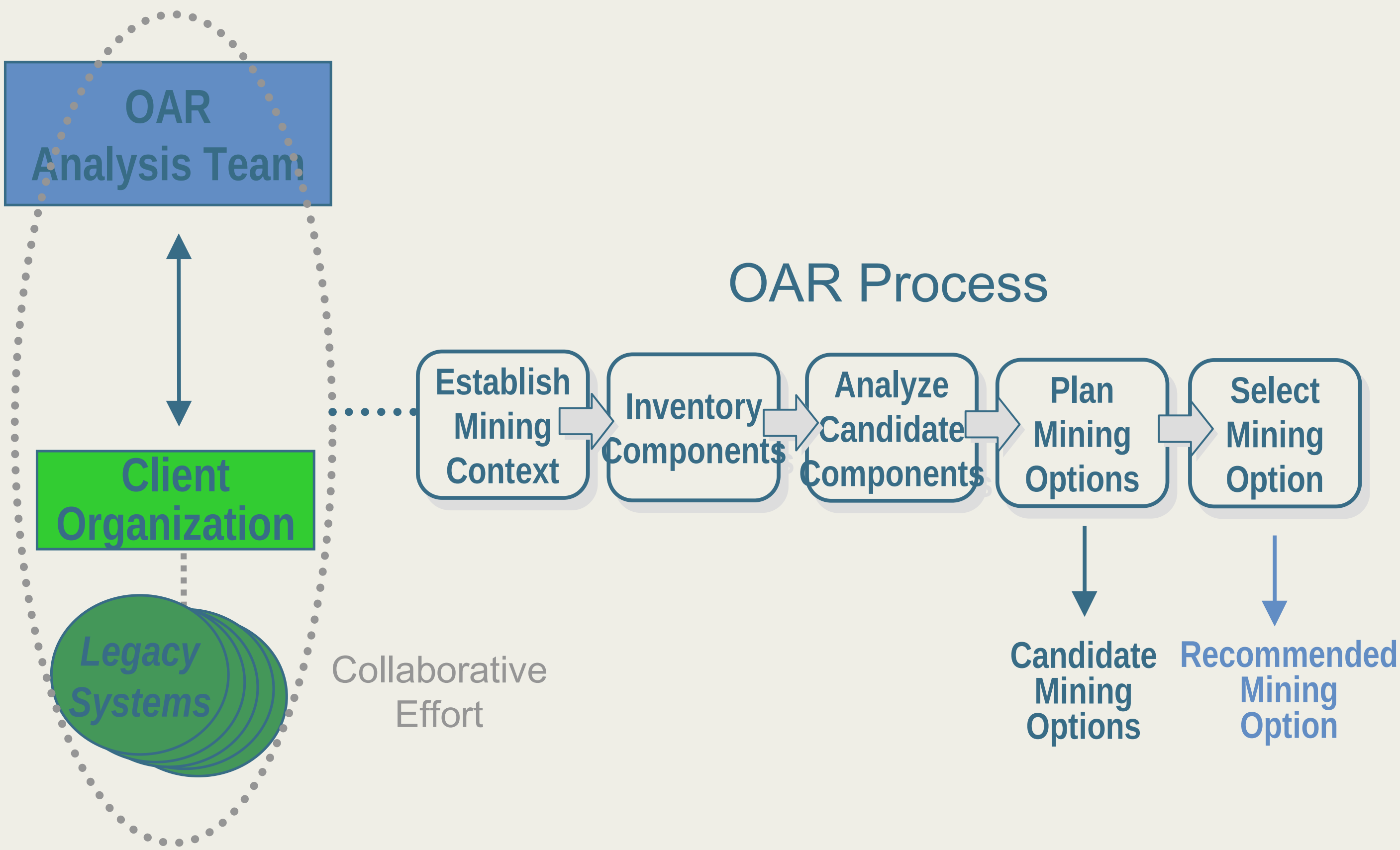
Bottom line: it is difficult to get off the dime!

What OAR Provides

OAR provides:

- quick identification of relevant and non-relevant components
- decision making based on consensus and “hands-on” analysis
- identification of target component needs that can be satisfied and those that cannot be satisfied
- estimates of the cost and risk of changes required to each legacy component to satisfy a product line need

Conventional Application of OAR



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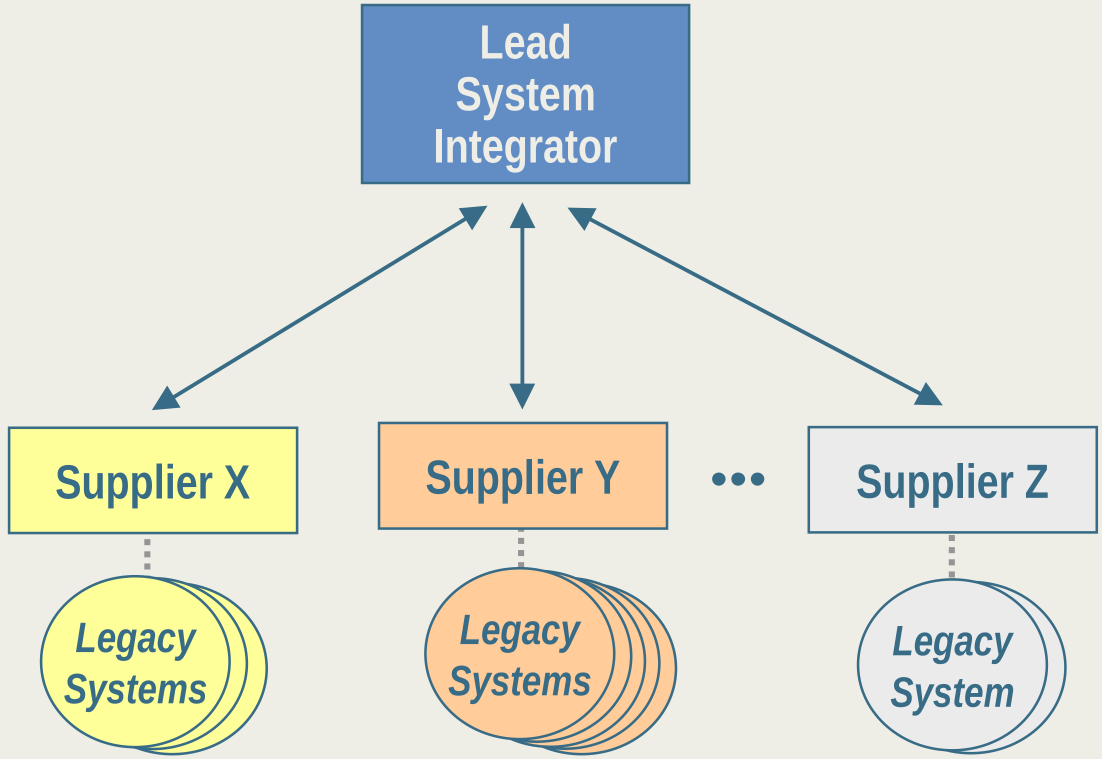
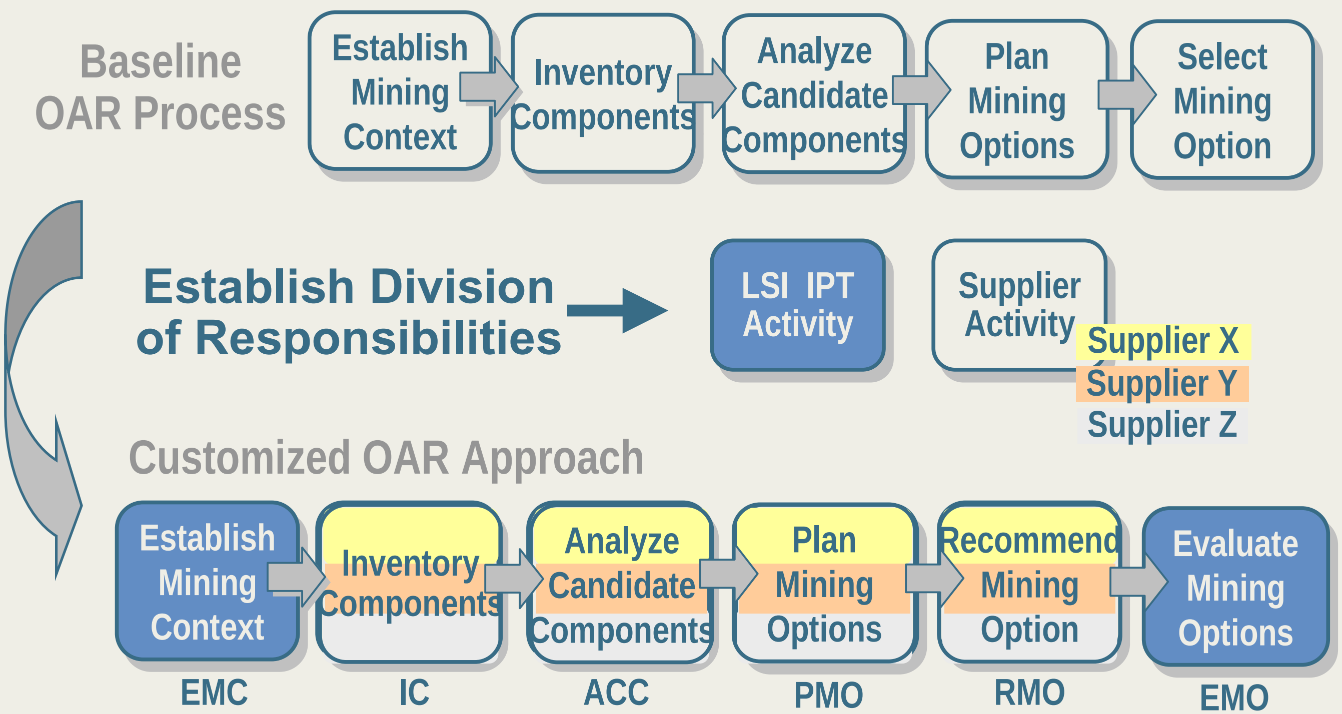
Multiple Supplier Context for Applying OAR. Lead System Integrator (LSI) Integrates Components From Various Sources

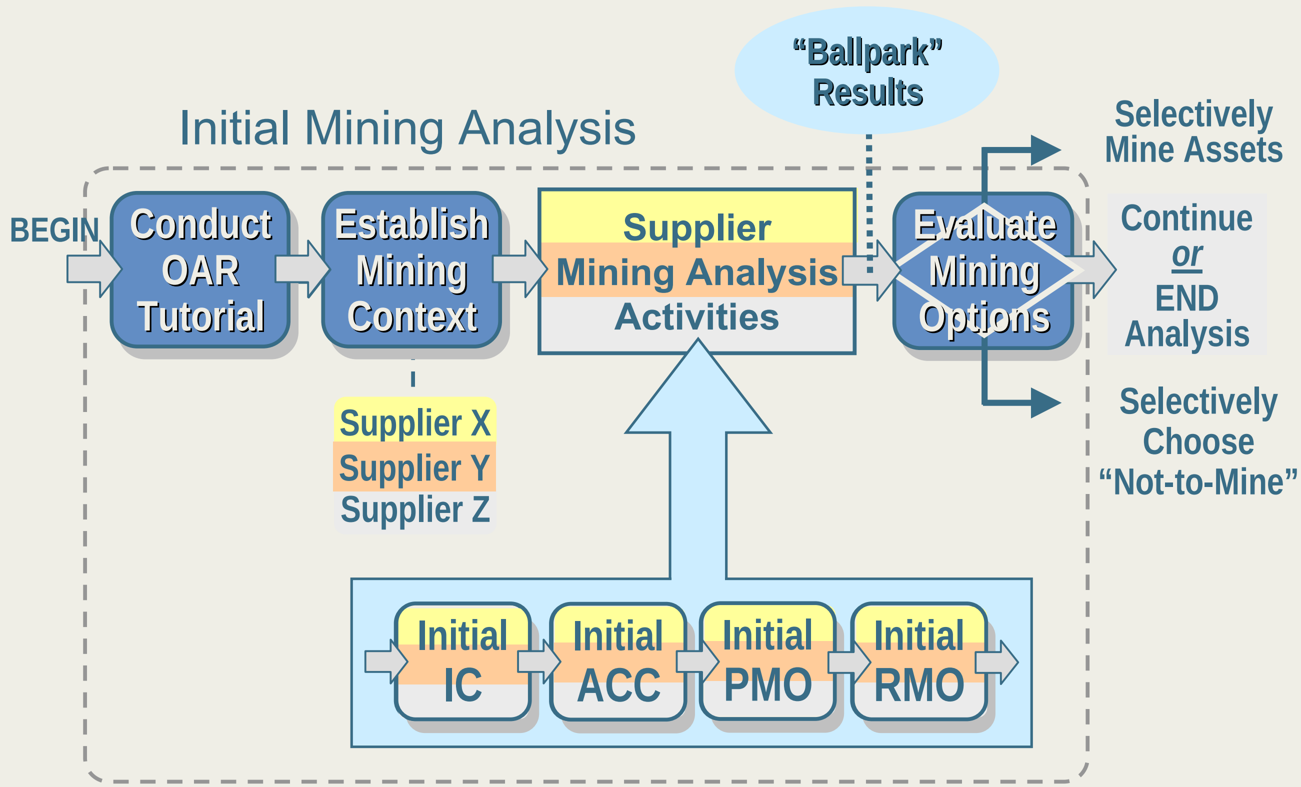


"Divide and Conquer" Approach



Customize baseline activities and add others as required

Phase 1 Activities



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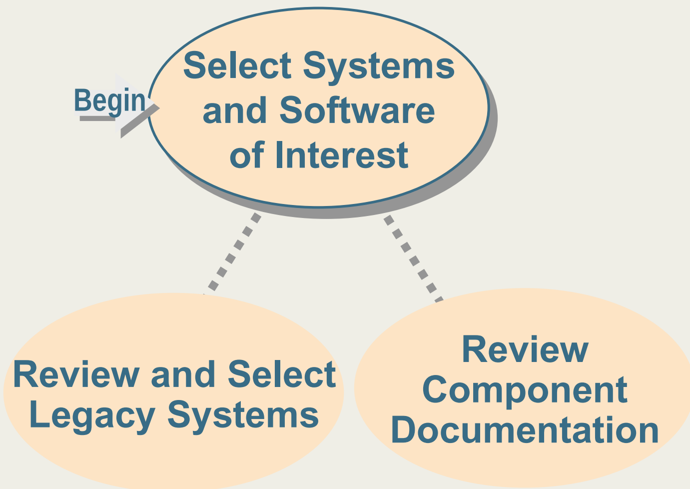
IC: Inventory Components



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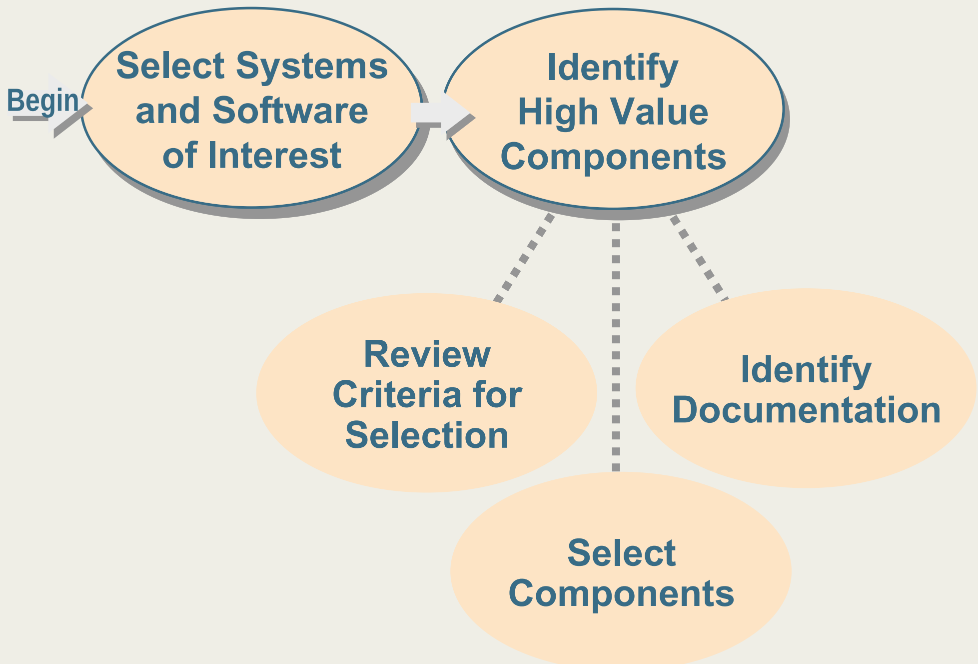
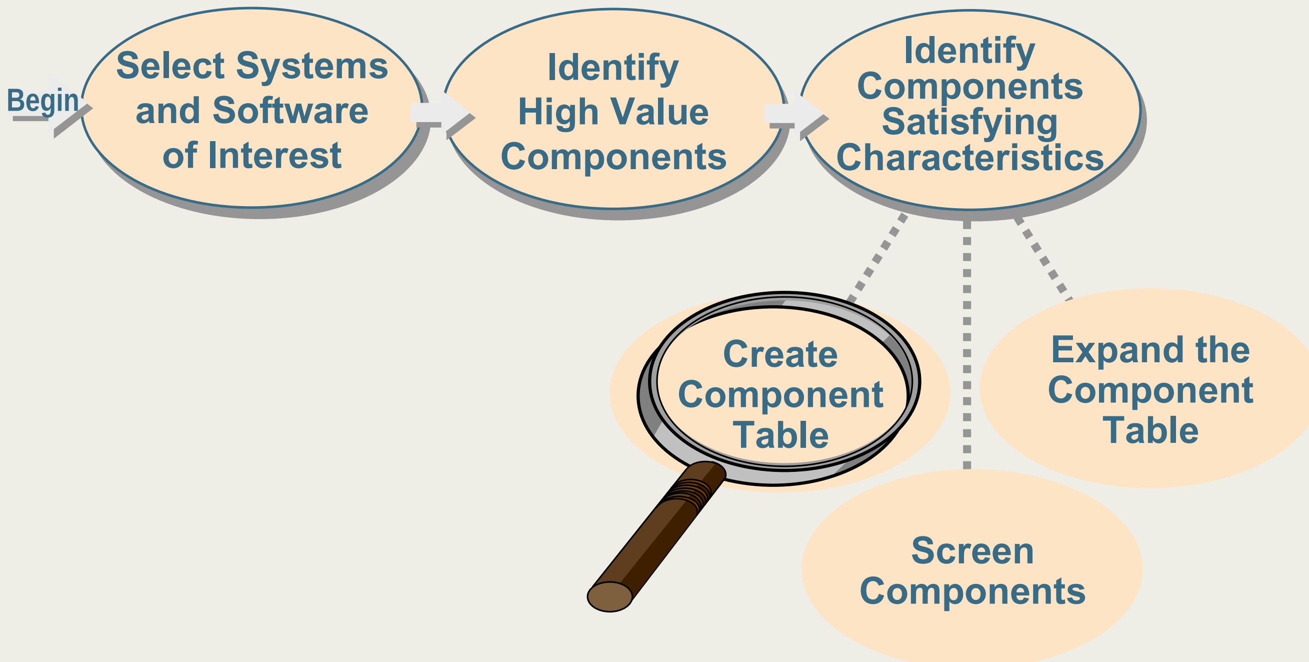
IC: Inventory Components



IC: Inventory Components



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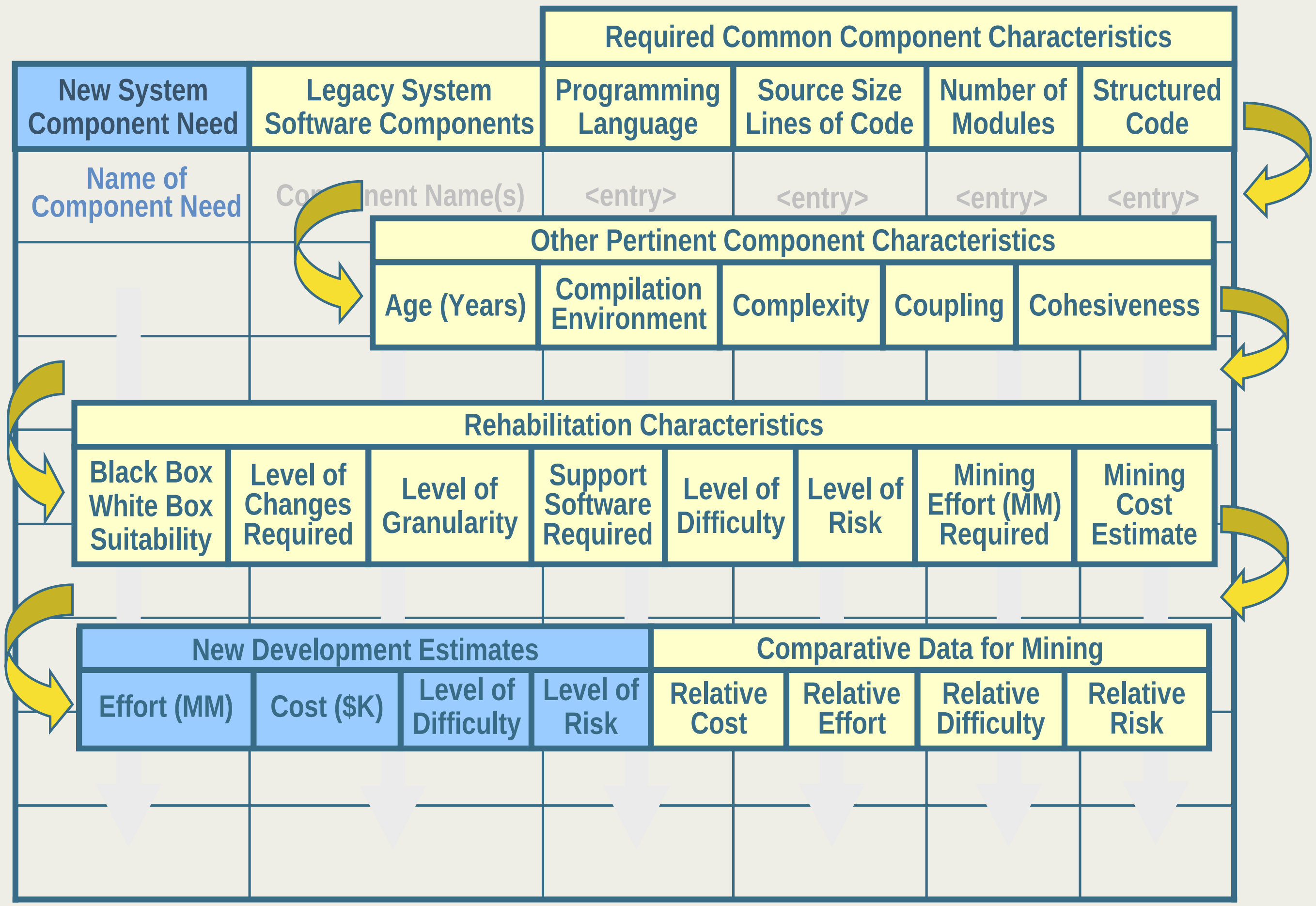
Component Table



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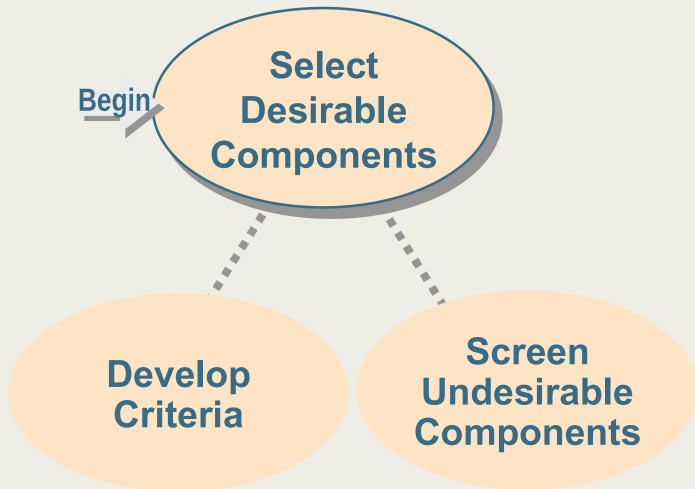
ACC: Analyze Candidate Components



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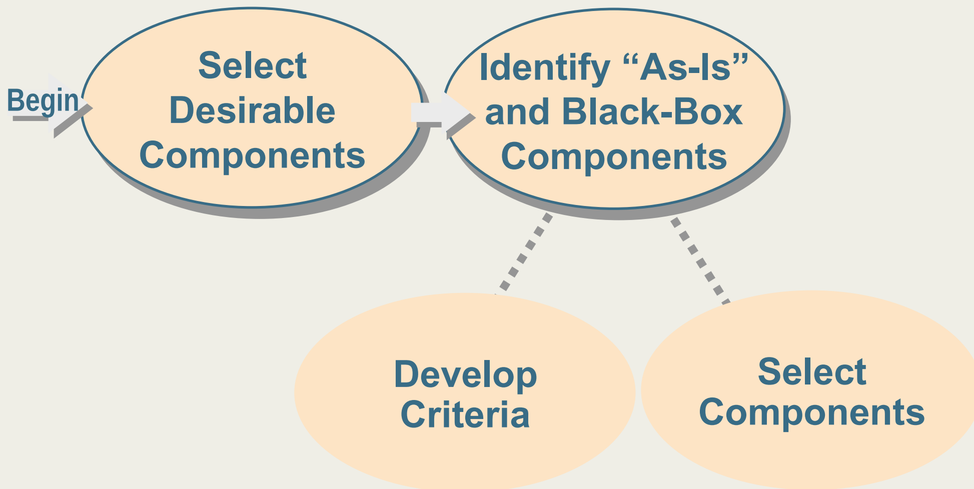
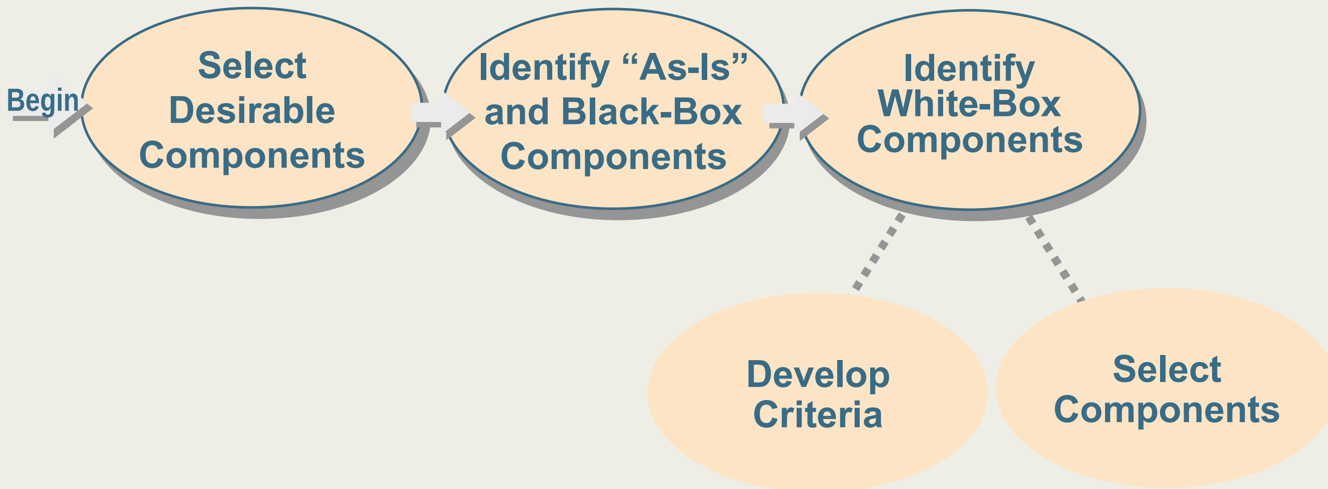
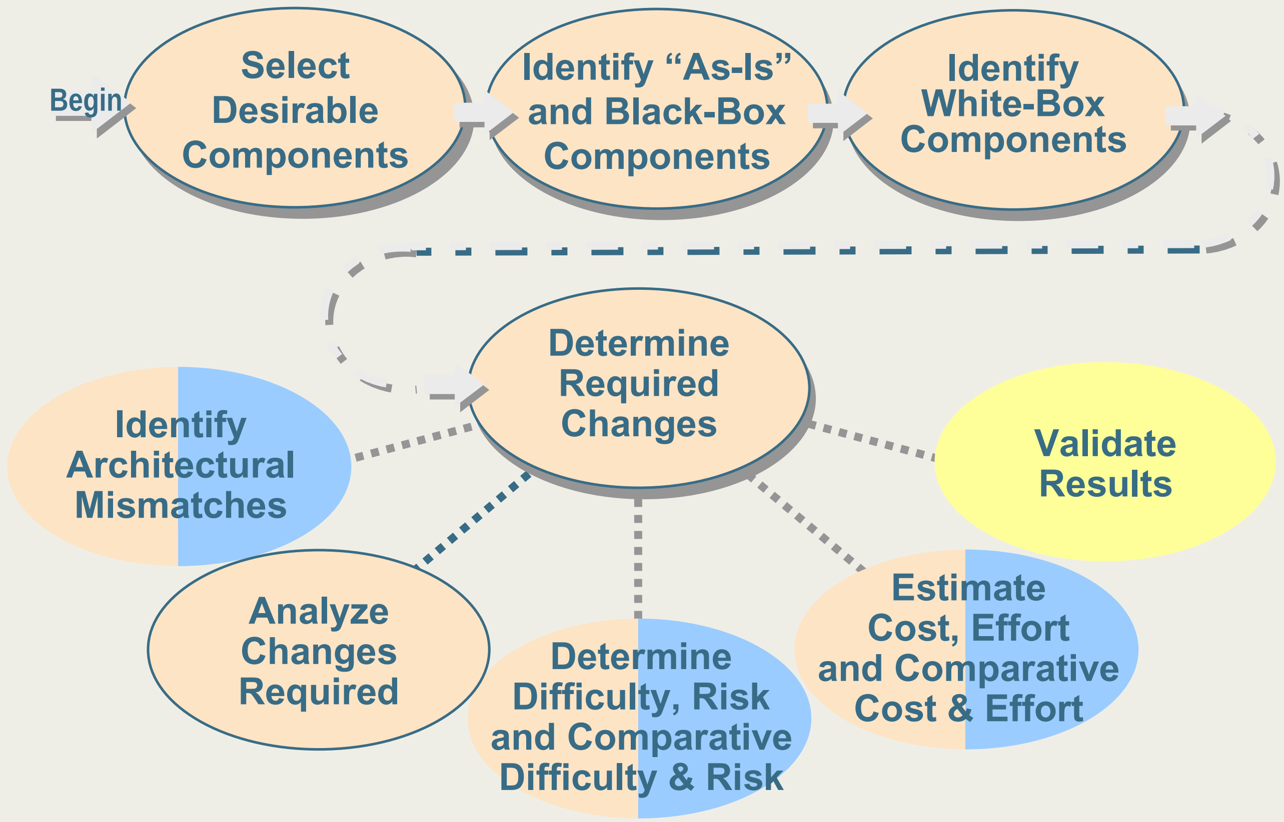


ACC: Analyze Candidate Components



ACC: Analyze Candidate Components



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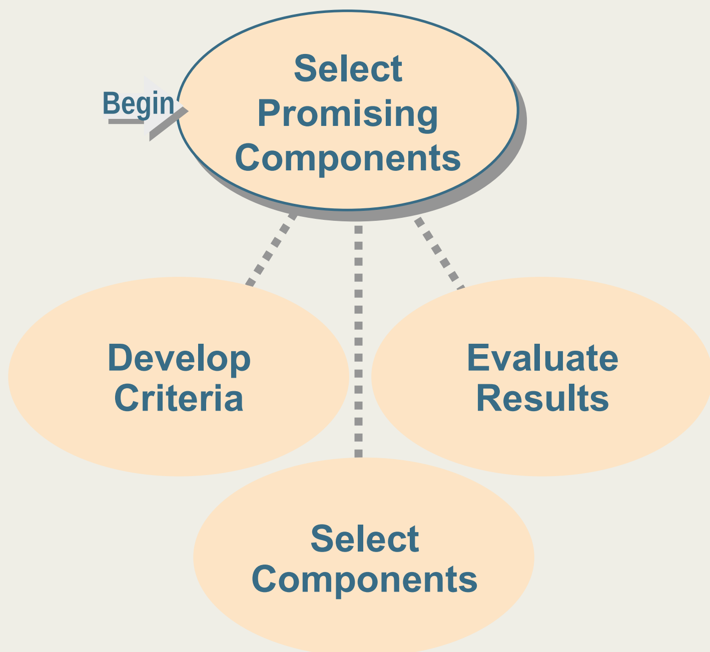
PMO: Plan Mining Options



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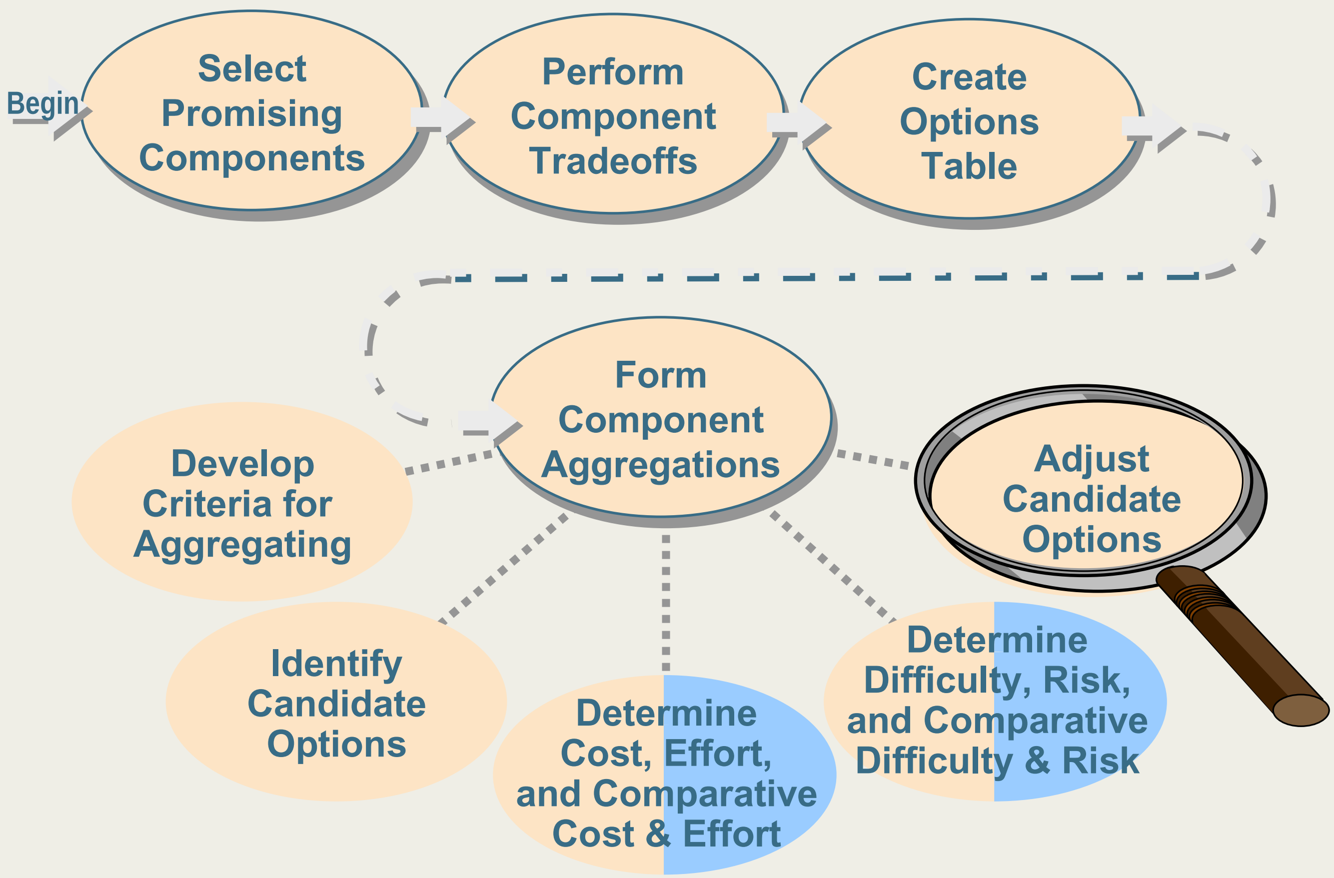
PMO: Plan Mining Options



OAR Options Table (Multiple Options)

Option Number	Component Need Satisfied	Rehabilitation Estimates						New Development Estimates				Mining Versus New Development			
Mining Option # 1	Name of Component Need														
	Option Summation	N	Q	Q	Q	MM	$K	MM	$K	Q	Q	%	%	Q	Q
Mining Option # 2	Name of Component Need														
	Option Summation	N	Q	Q	Q	MM	$K	MM	$K	Q	Q	%	%	Q	Q
Mining Option # 3	Name of Component Need														
	Option Summation	N	Q	Q	Q	MM	$K	MM	$K	Q	Q	%	%	Q	Q

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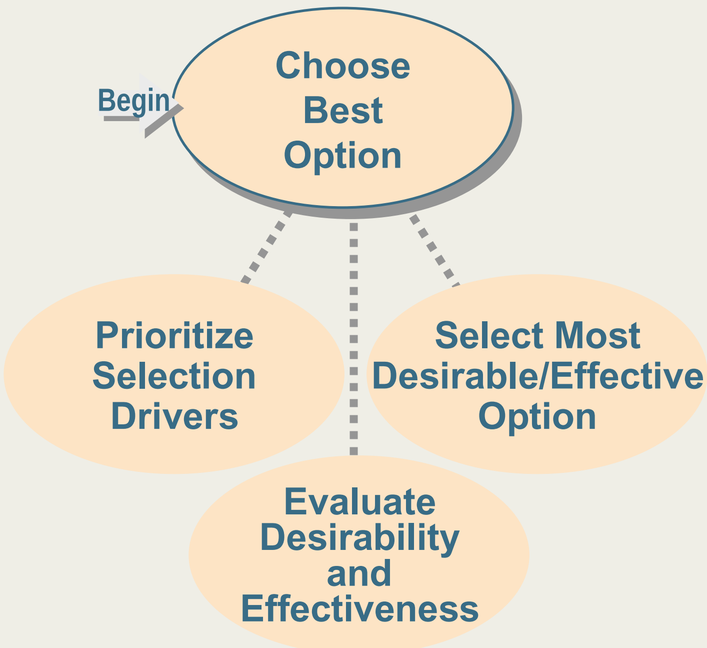
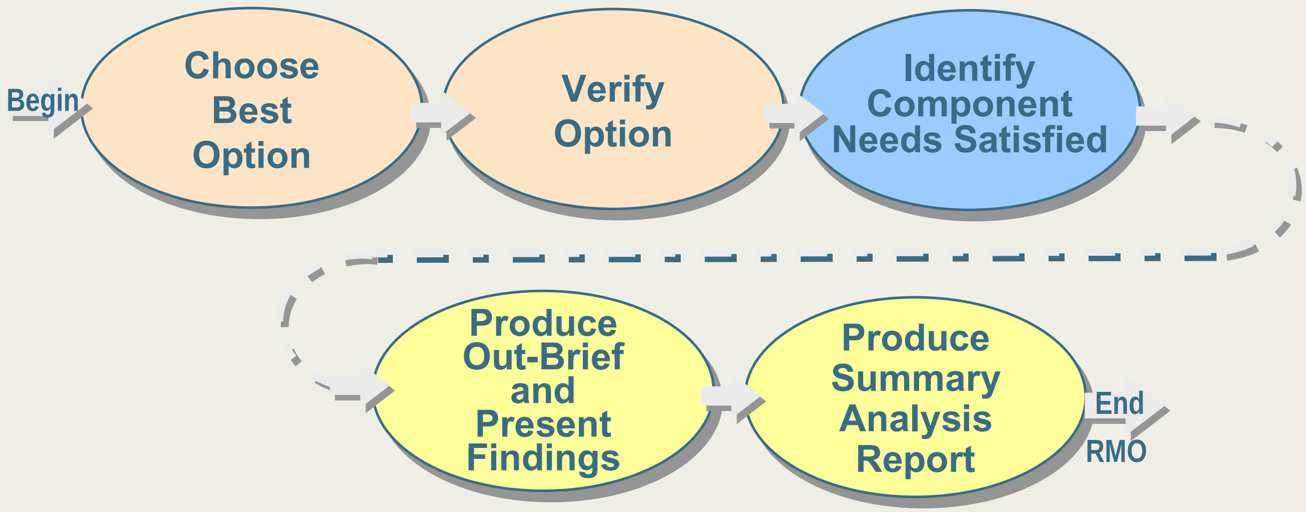
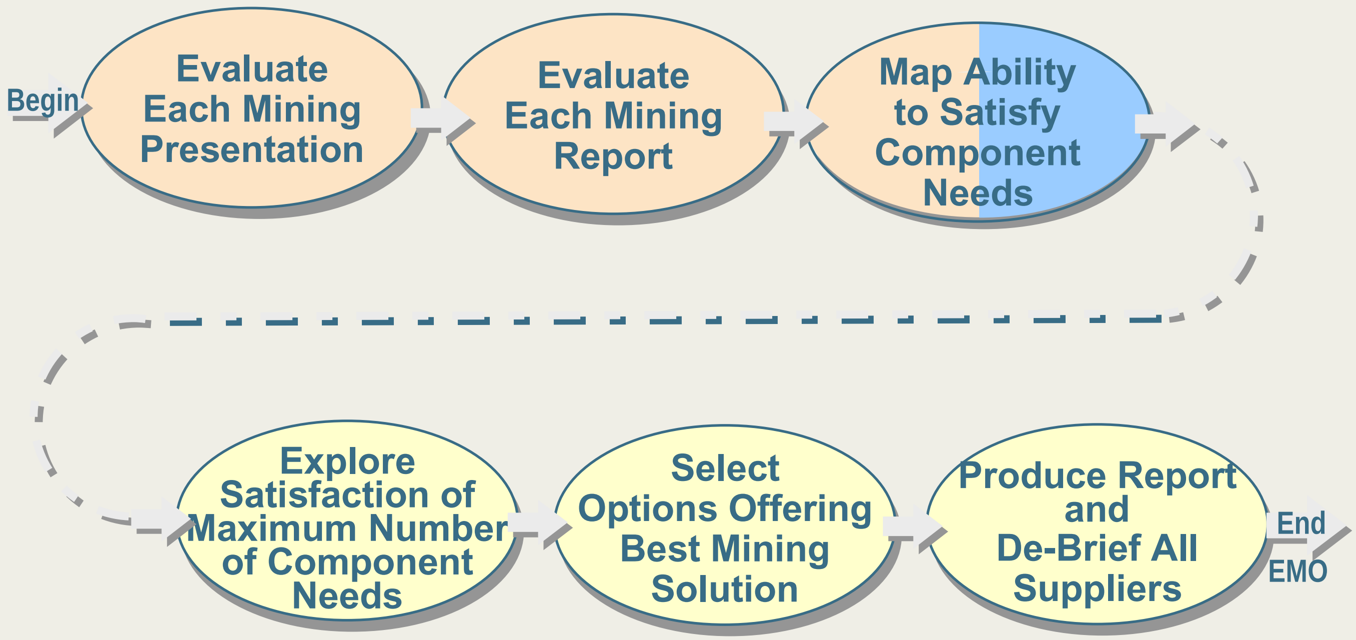
RMO: Recommend Mining Option



RMO: Recommend Mining Option



EMO: Evaluate Mining Options



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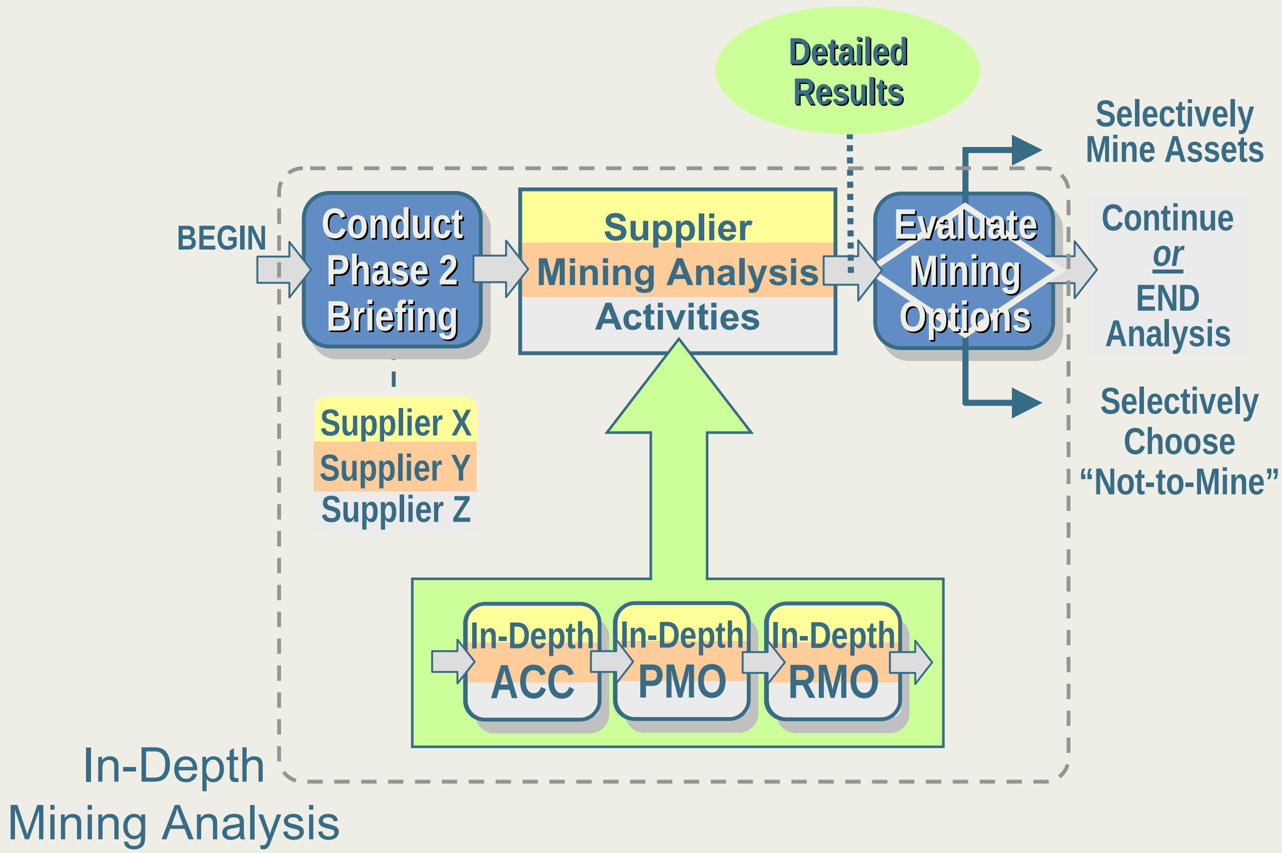
LSI OAR Phase 2 Activities



Outcome of Disciplined Reuse Decision-making Process

RESULTS

- ⇨ Findings describing results of analyses
- ⇨ Description of each option with ranking
- ⇨ Rationale for option or combination of options selected
- ⇨ Cost and effort of selected mining options
- ⇨ Final list of satisfied and unsatisfied component needs corresponding to options selected

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Impact of LSI OAR Approach

The benefits of the LSI approach include:

- **Work is allocated corresponding to a natural division of responsibilities (i.e., who is in best position to perform activity).**
- **Obtaining early "Ballpark" results will speed up decision making process.**
- **Fewer LSI resources (manpower and time) required to complete the mining analyses resulting in reduced cost.**
- **In-Depth analysis accommodates desired refinement of analysis results.**
- **Common process will ensure consistency of results and equitable evaluations.**
- **Process focuses on what needs to be done -- suppliers have freedom to decide how to best perform the prescribed activities/tasks and collect the needed data.**

More planning and coordination though are required by the LSI.

Results of Pilot

- The pilot was performed on a small set of reusable assets. The results provided more credible reuse estimates.
- The LSI has adapted the general OAR approach, but has permitted suppliers to use their own specific processes to produce the OAR outcomes.
- The results were fed into the COCOMO II estimating model. Follow-up work is analyzing how to systematically connect OAR with COCOMO II.
- Government acquisition officers view the method as a mechanism for getting better metrics as well as better estimates.

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ASP OAR Documentation

- CMU/SEI-2003-TN-009: Application of Options Analysis for Reengineering in a Lead System Integrator Environment