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IBM Rational - A workbench approach to Systems of Systems Architecture

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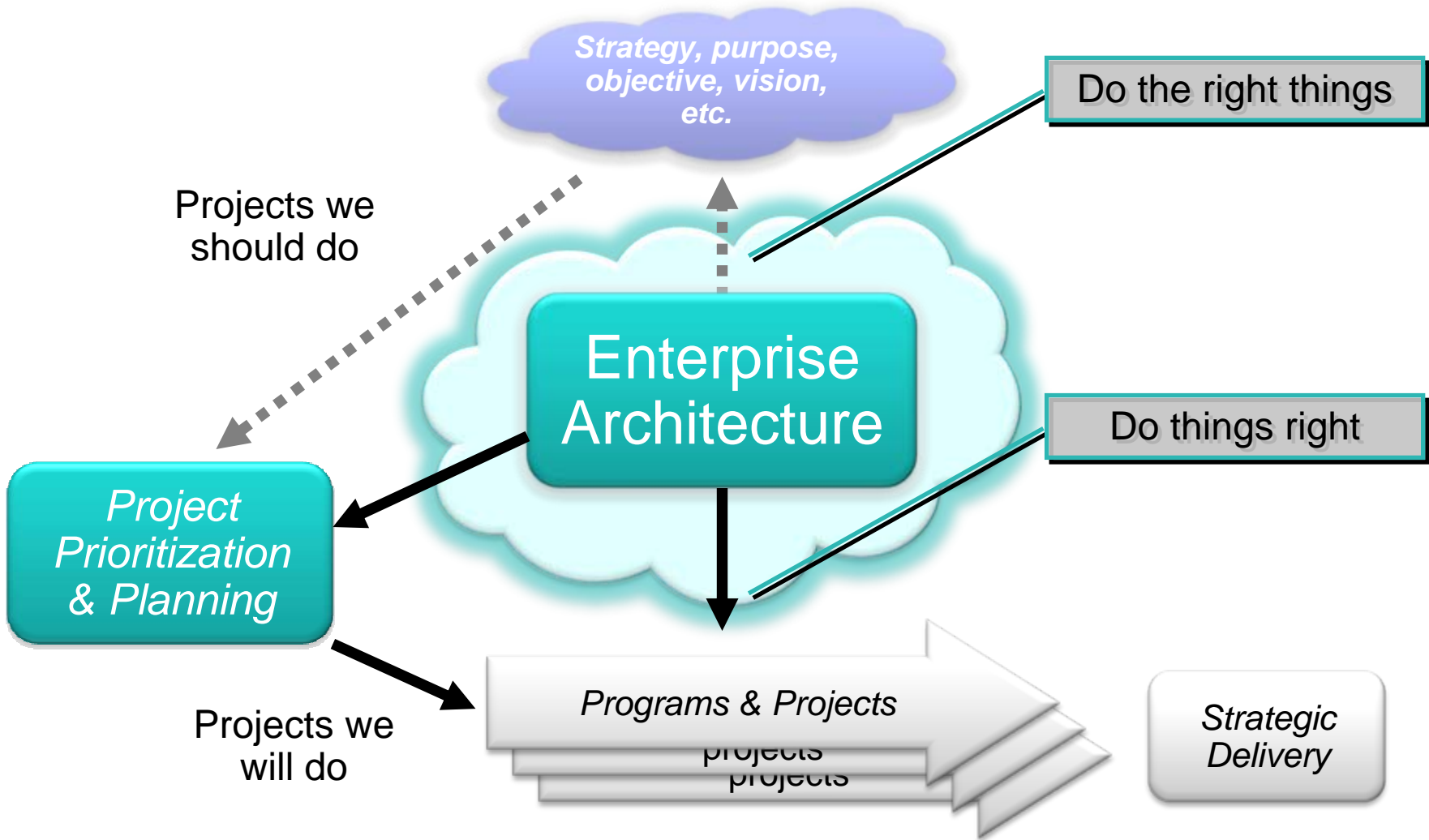


About MODAF

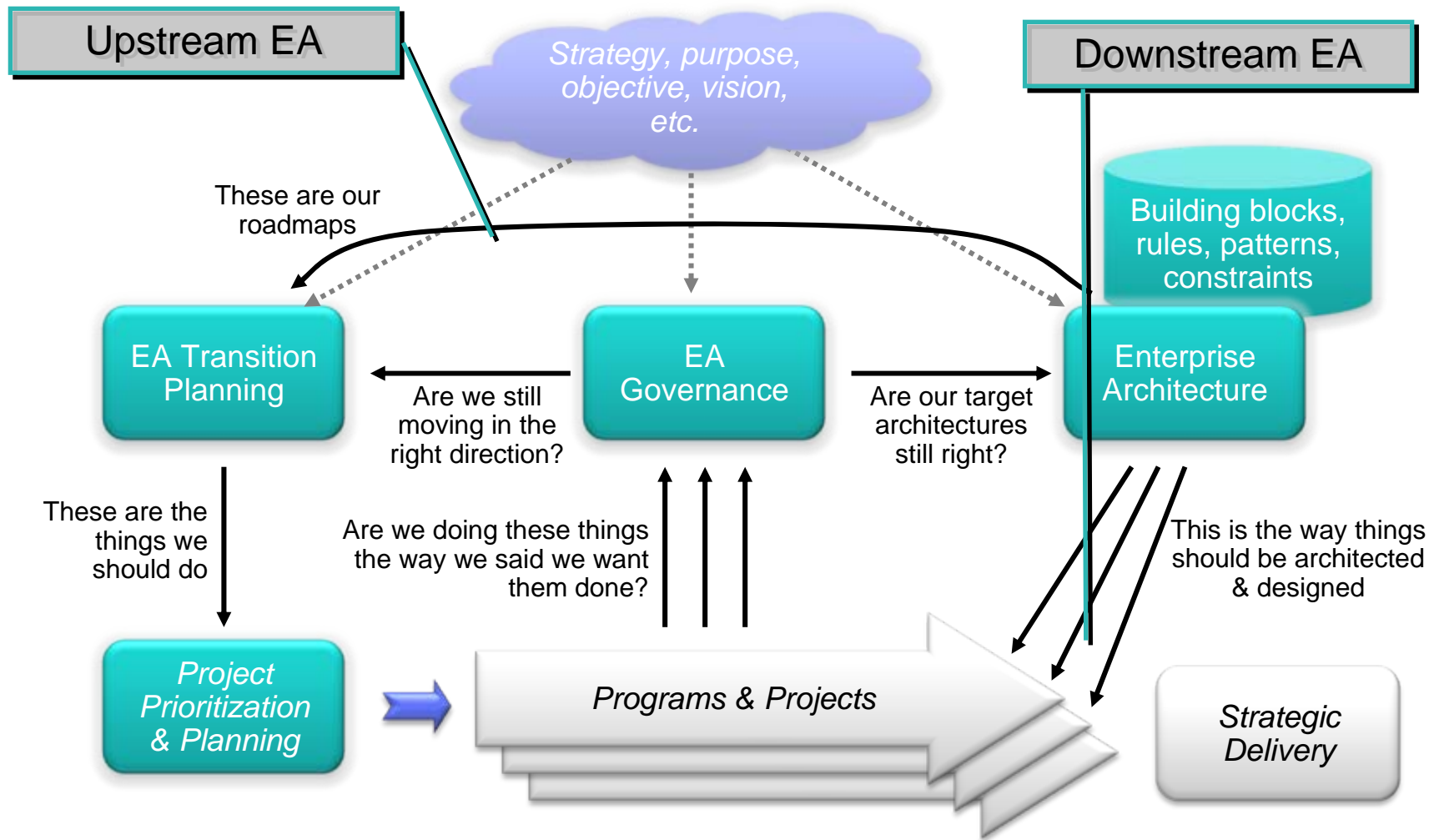
- MODAF is an architectural framework supporting a systems of systems approach
- Systems of Systems provides a context for both Systems and IT domains
- Covers a broad range of users and viewpoints
- Can be made actionable both upstream and downstream...



The EA Lifecycle



The EA Lifecycle



Upstream and Downstream Enterprise Architecture

■ UPSTREAM EA

Identifying viable projects to help realise the enterprise architecture

requires a good set of "models", capable of portraying the overall "as is" and "to be" architectural landscape

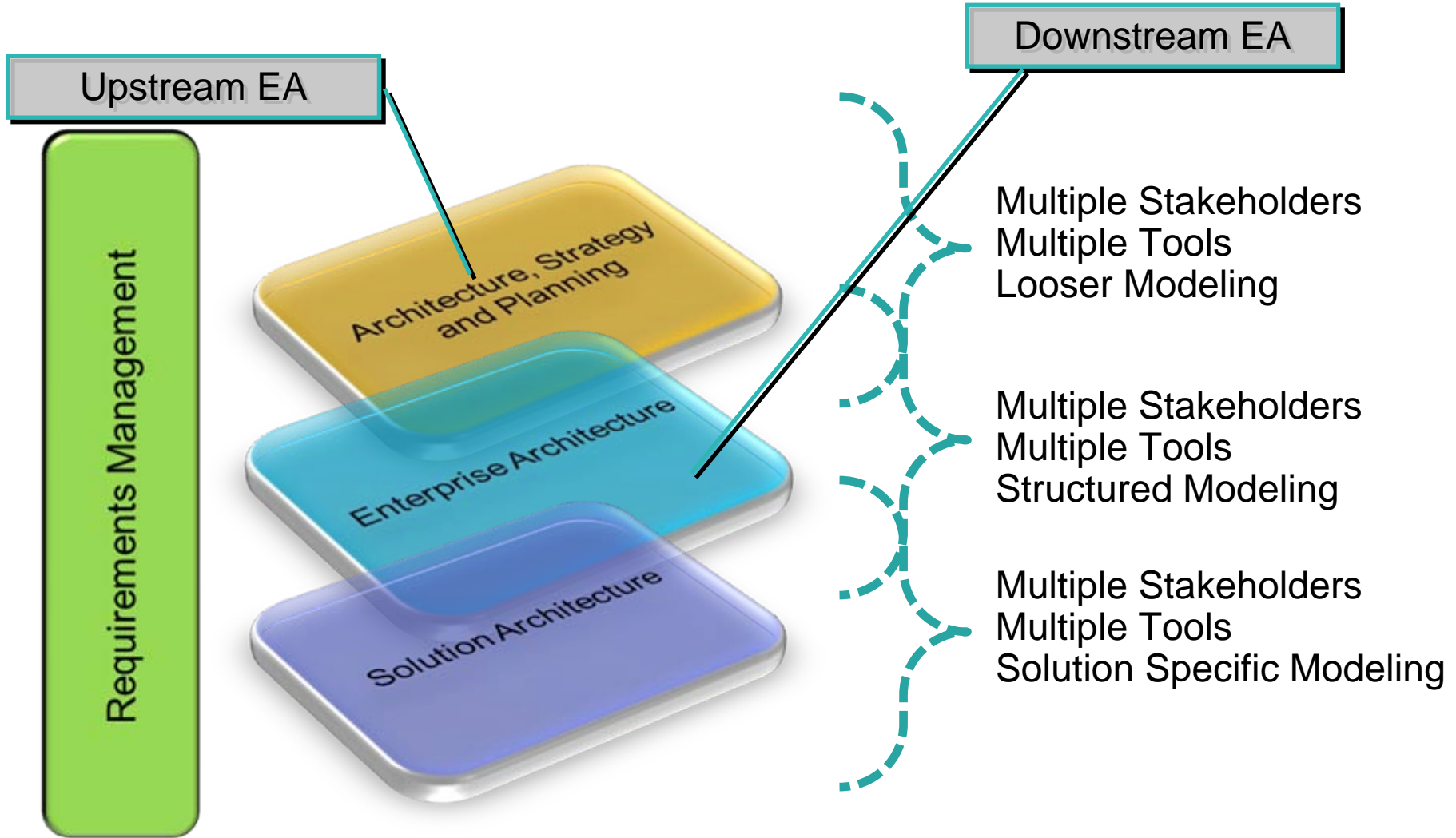
■ DOWNSTREAM EA

Ensuring projects can exploit the architecture's "standard components" or building blocks

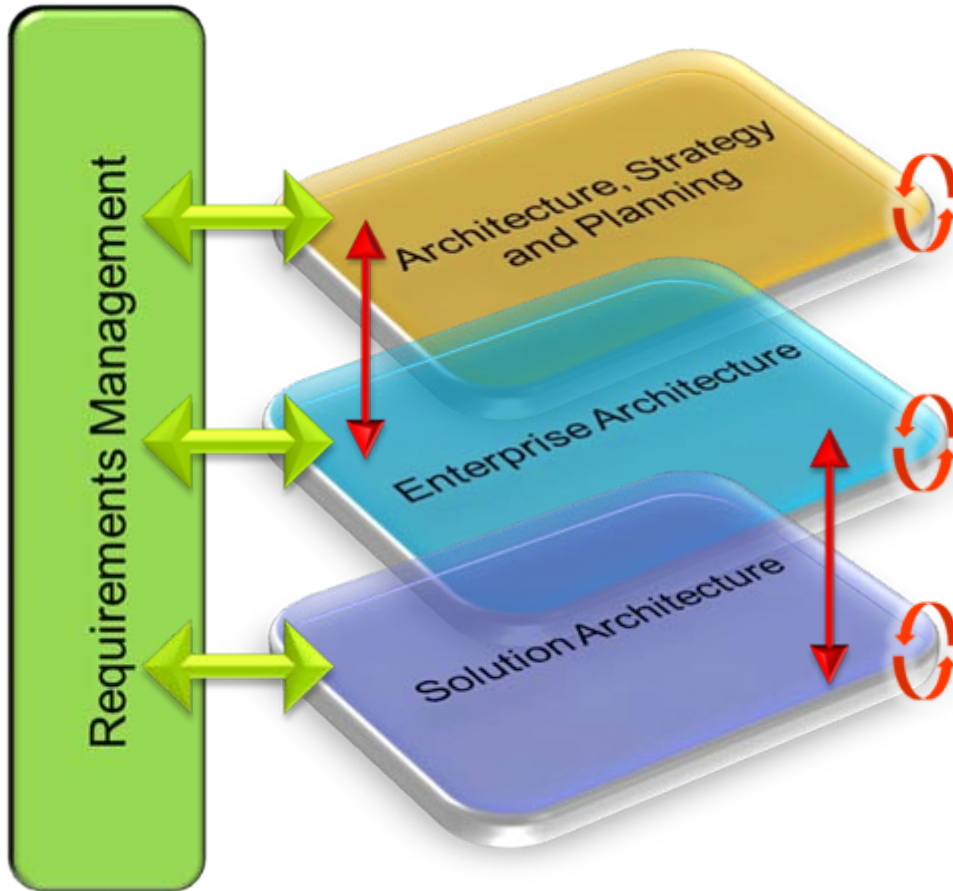
requires each part to be described and published in an easy-to-use, easy-to-find "catalogue like" format



Architecture Management

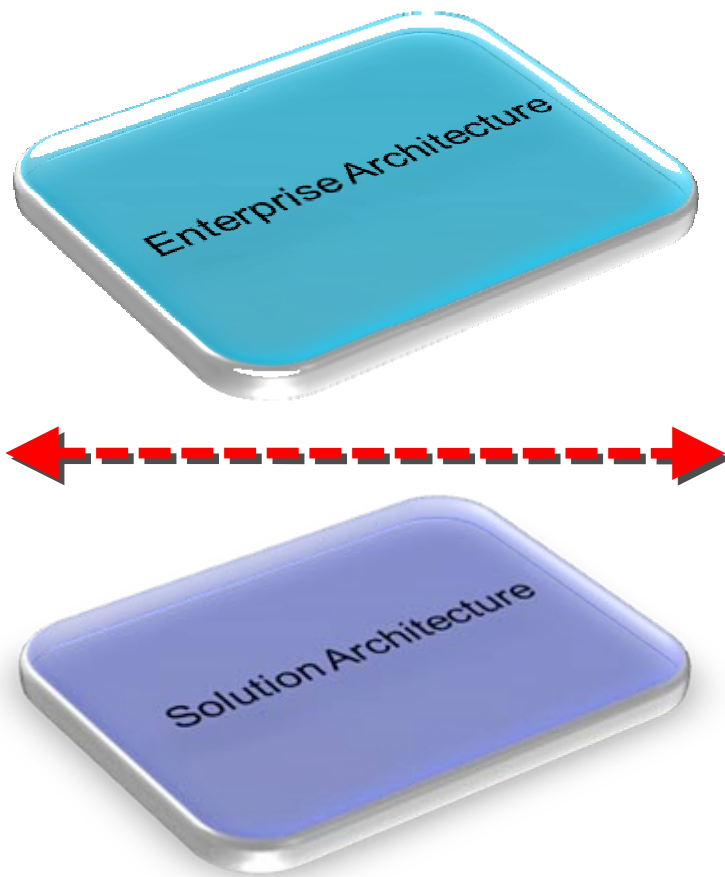


Architecture Management (Vertically)



- Each has their own lifecycle(s)
- Models are at different granularities
- Traceability between model artefacts is key and allows traceability from top to bottom
- Information is presented in the style consumable to the stakeholder
- Requirements are managed throughout the lifecycle
- Traceability of Requirements is managed top to bottom

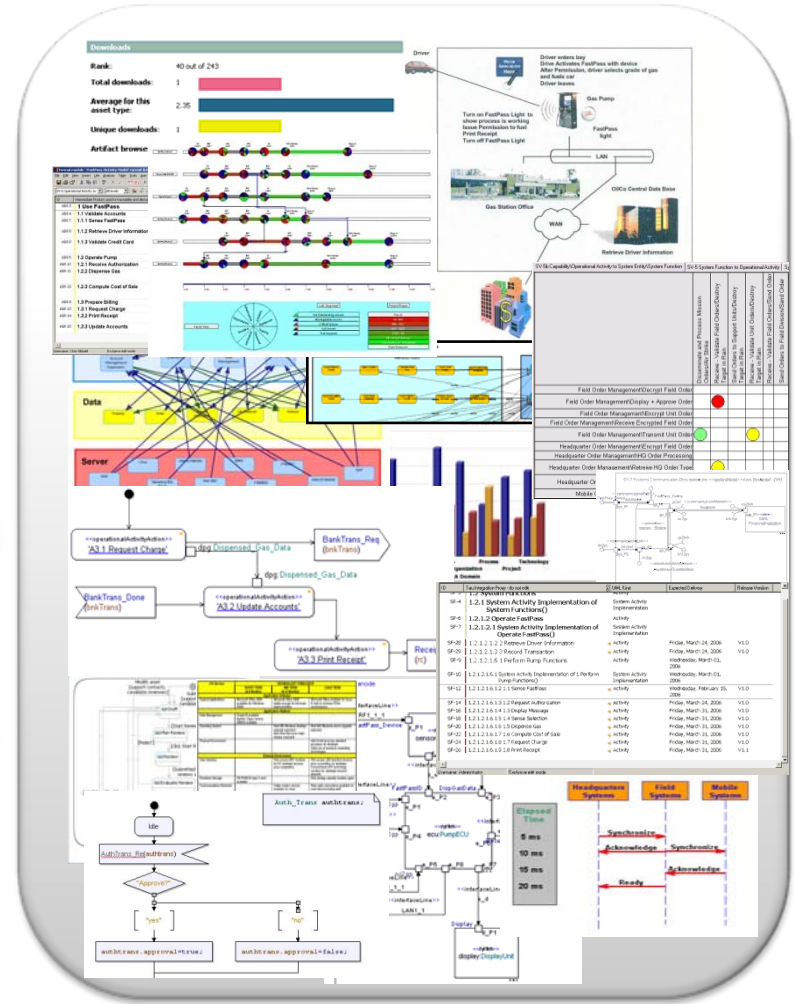
Architecture Management (Horizontally)



- Model content within the same level of granularity should be capable of being visualized in the tool of the users choice
- The semantic meaning of the model is the same
- Translation of model content can be done either through tool bridges or industry standards e.g. UML, BPMN 2, PES

Deliverables (assets)

Requirements Management

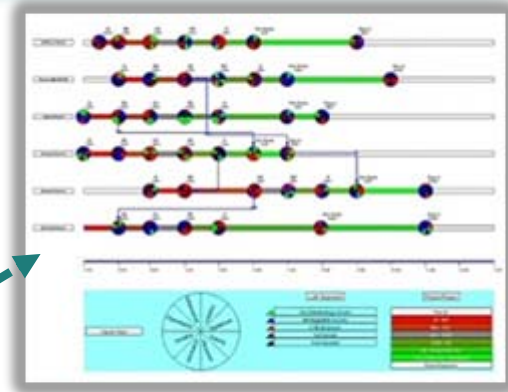
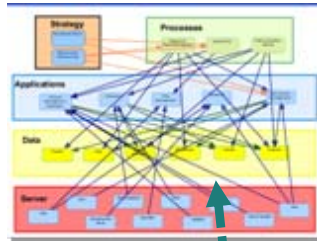


What is an Architecture Asset?

- The *EA Lifecycle* produces work products:
 - ▶ **Artifacts** are models expressing:
 - Strategy, Operational Activities, High Level Architecture, Services and Capabilities, Roadmaps, Organizations, Plans and so on
 - ▶ EA change is continuous, albeit slower than change in s/w development and requires medium-high approval cycle (**governance**)
 - ▶ An **Asset**
 - is a container/collection of EA modeling artifacts (building block)
 - it is isolated for the purpose of a dedicated project or program
 - can be “baselined”, creating a frozen snapshot in time of the entire architecture or a subset of the architecture
 - ▶ For example, publishing a “**to-be**” **architecture** where cross-team collaboration, evaluation, review, and consumption can take place is the basis for creating an asset.



An **Asset** is a published **collection of artifacts** that needs to be shared or referenced across the organization to meet a recurring business or technical need. It may contain or reference many other assets



MODAF Executive Summary

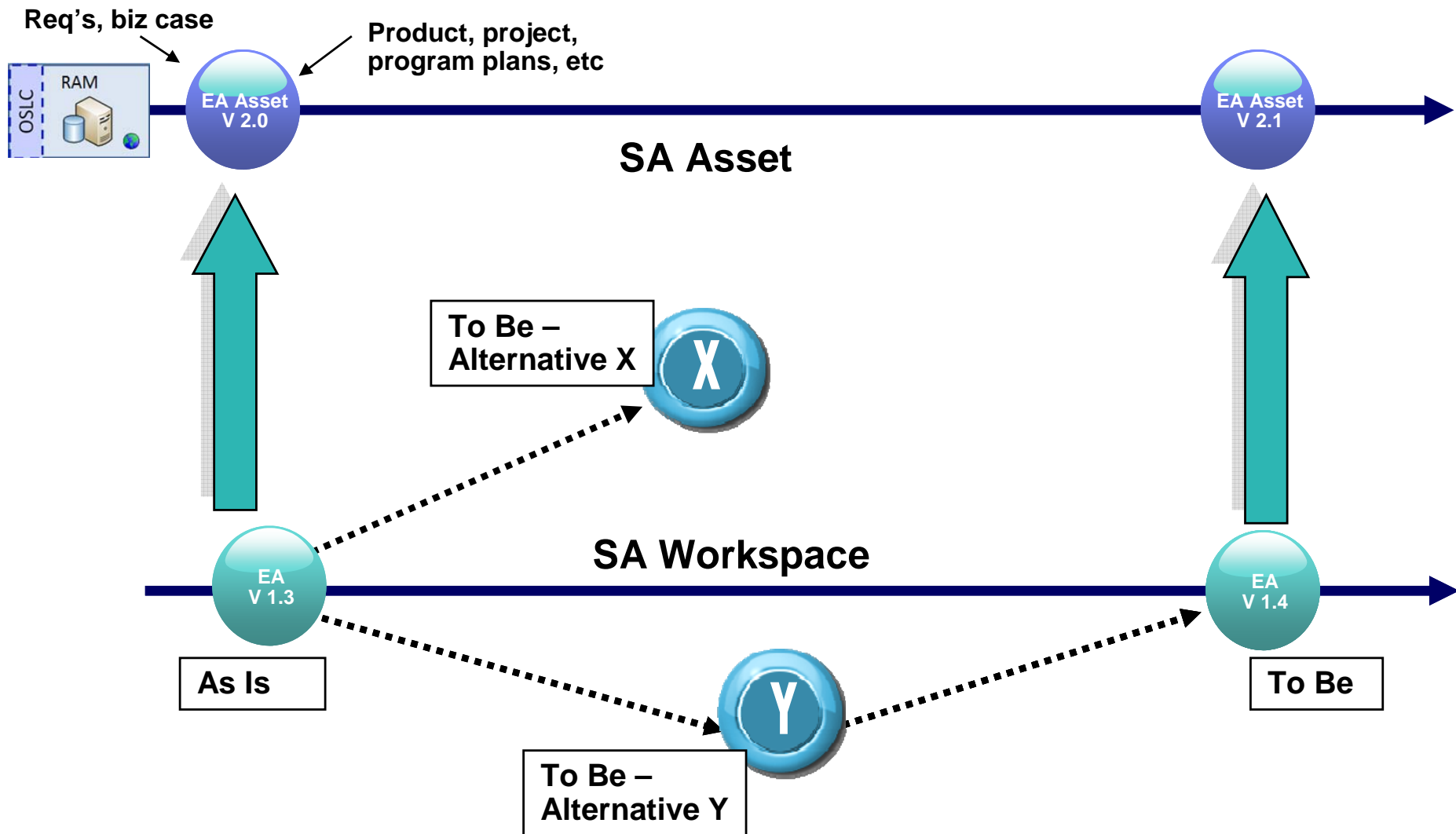
- MODAF Overview
- MODAF Technical Handbook
- MODAF COI Deskbook
- View Overview
- Meta Model
- Taxonomy
- MODAF Acronyms List
- MODAF Glossary of Terms



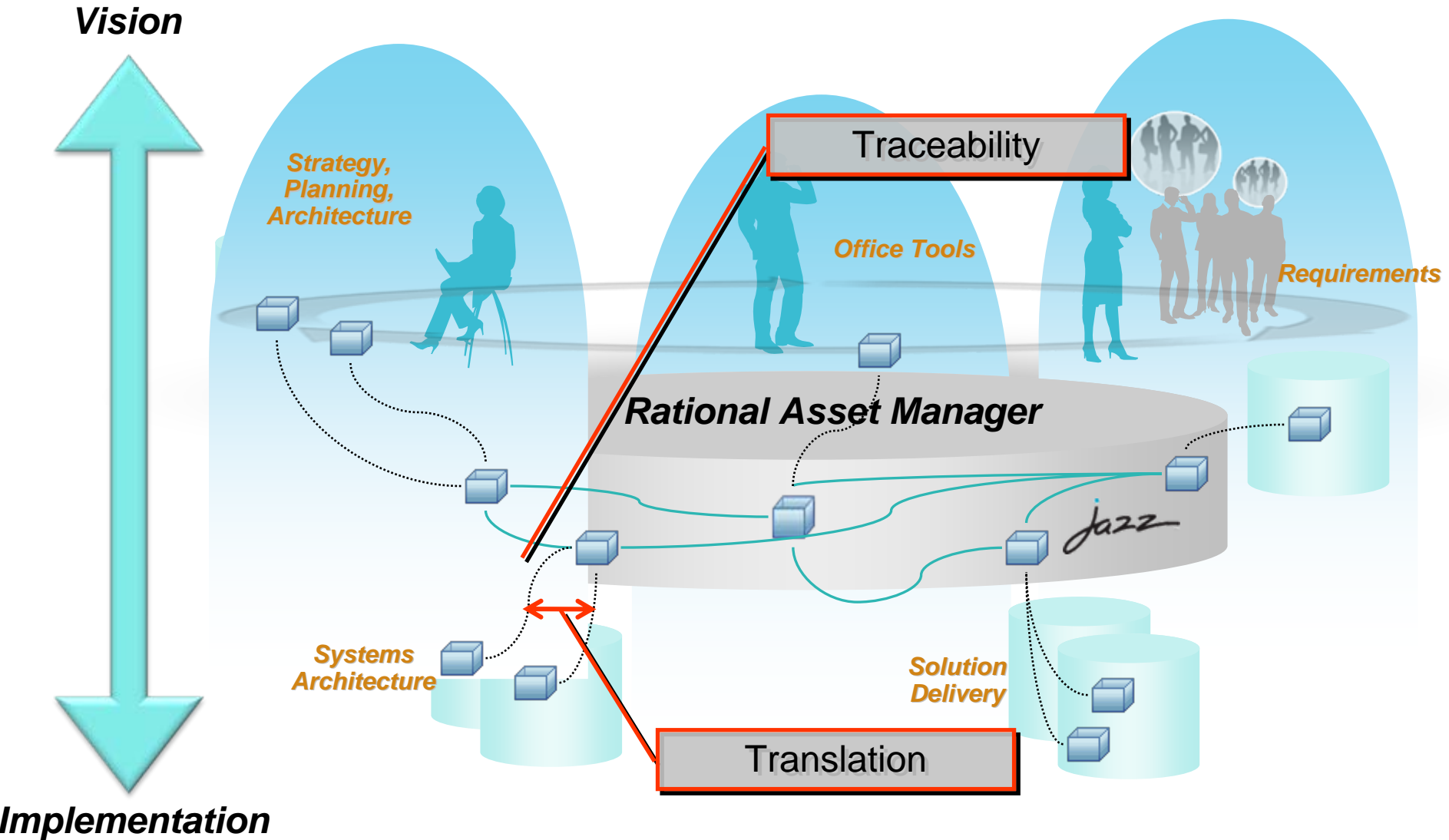
System	Activity	Start	End	Priority	Owner
...

JTA Service	TECHNOLOGY FORECASTS		
	SHORT TERM (0-4 Months)	MID TERM (6-12 Months)	LONG TERM
Application Software			
Support Applications	Microsoft Office 2000 available (for Windows 2000)	Microsoft Office 2000 stable enough for full-scale implementation	Microsoft Office available for Linux E-mail on wireless PDAs commonplace
Application Platform			
Data Management	Oracle 9i available MySQL (Open Source DBMS) available		
Operating System		Next MS Windows desktop upgrade expected Next Red Hat Linux major release expected	Next MS Windows server upgrade expected
Physical Environment			Intel IA-64 becomes standard processor for desktops Initial use of quantum computing technologies
External Environment			
User Interface		Thin screen CRT monitors for PC desktops become price competitive	Thin screen LED monitors become price competitive Conventional CRT technology monitors for desktops become obsolete
Persistent Storage	SG PCMCIA type 2 card available		Disk storage capacity doubles again
Communications Networks		Cable modem service available for most telecommuting staff	Fiber optic connections available for most telecommuting staff

An asset in the context of Rational System Architect (example)



Managing assets to get more value out of your MODAF solutions



Managing the assets of MODAF

- Without an Asset approach to the EA, it becomes very hard to share, reuse, enforce, and govern the published EA
- Solution Assets propagate with no compliance nor association to the EA Assets, resulting in solutions that may not solve business problems
- Enterprise Architects, Analysts, Engineers or others use asset management to do the following:
 - ▶ **UPSTREAM EA:** Identifying potential Solution Assets to help realize the enterprise architecture
 - ▶ **DOWNSTREAM EA:** Ensuring projects can exploit the architecture's "standard components" or building blocks
 - ▶ **CATALOGS:** Requires each part to be described and published in an easy-to-use, easy-to-find "catalogue like" format



A workbench approach to Systems of Systems Architecture

This approach will provide the ability to:

- Search, publish, manage and govern EA assets
- Enact policies to validate and monitor the integrity of SOSA solutions
- Graphically navigate the software assets of the Enterprise

Key Benefits

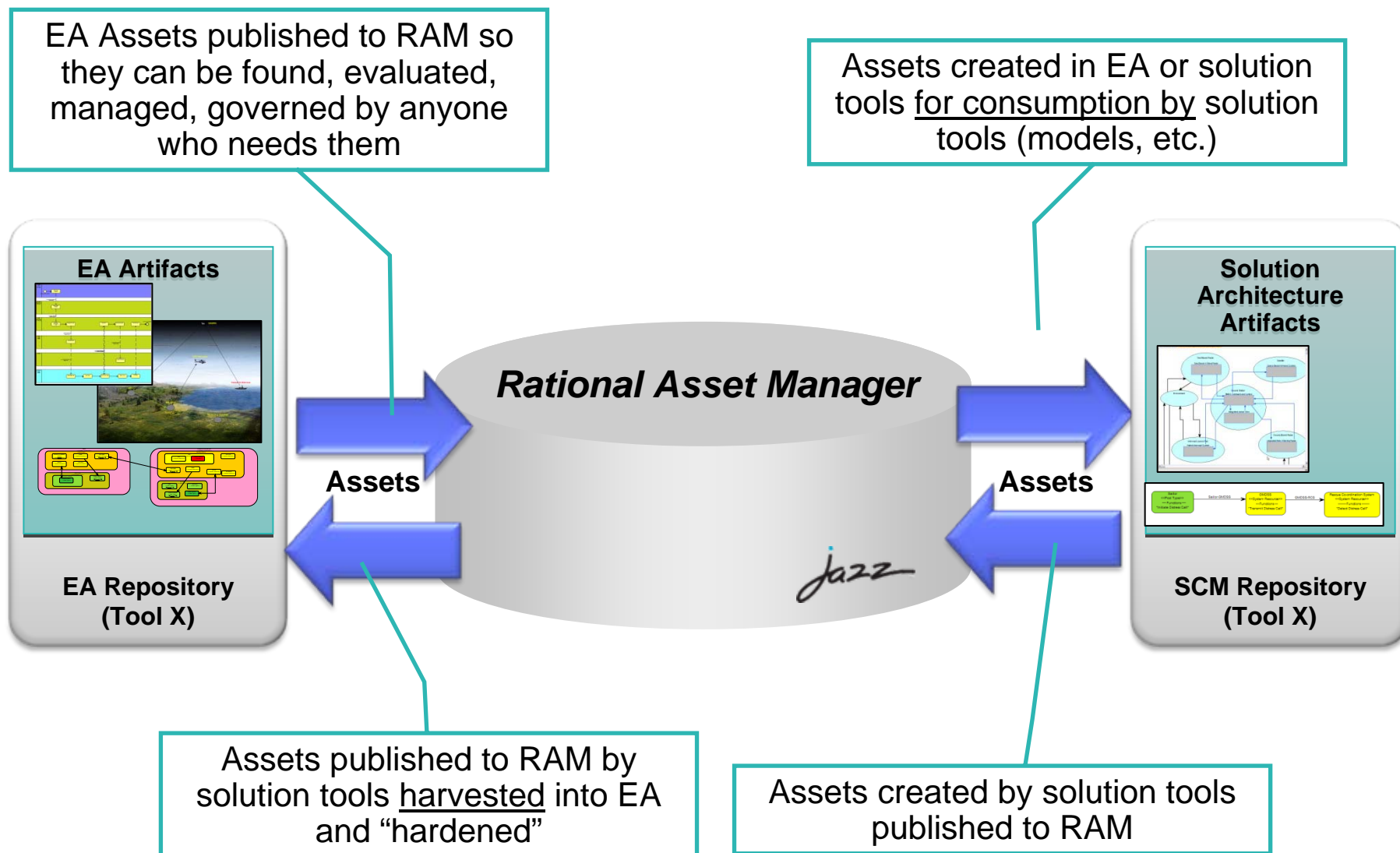
- Improves the ability to share and reuse the approved/published EA assets
- Helps architects and users make their EA actionable, by linking EA plans to solution delivery

Key technology or integration components:

- IBM Rational System Architect and Rational Asset Manager integration
- Tool X and Rational Asset Manager



EA/Solution Assets and the role of RAM



Assets published to RAM by solution tools harvested into EA and "hardened"

Assets created by solution tools published to RAM

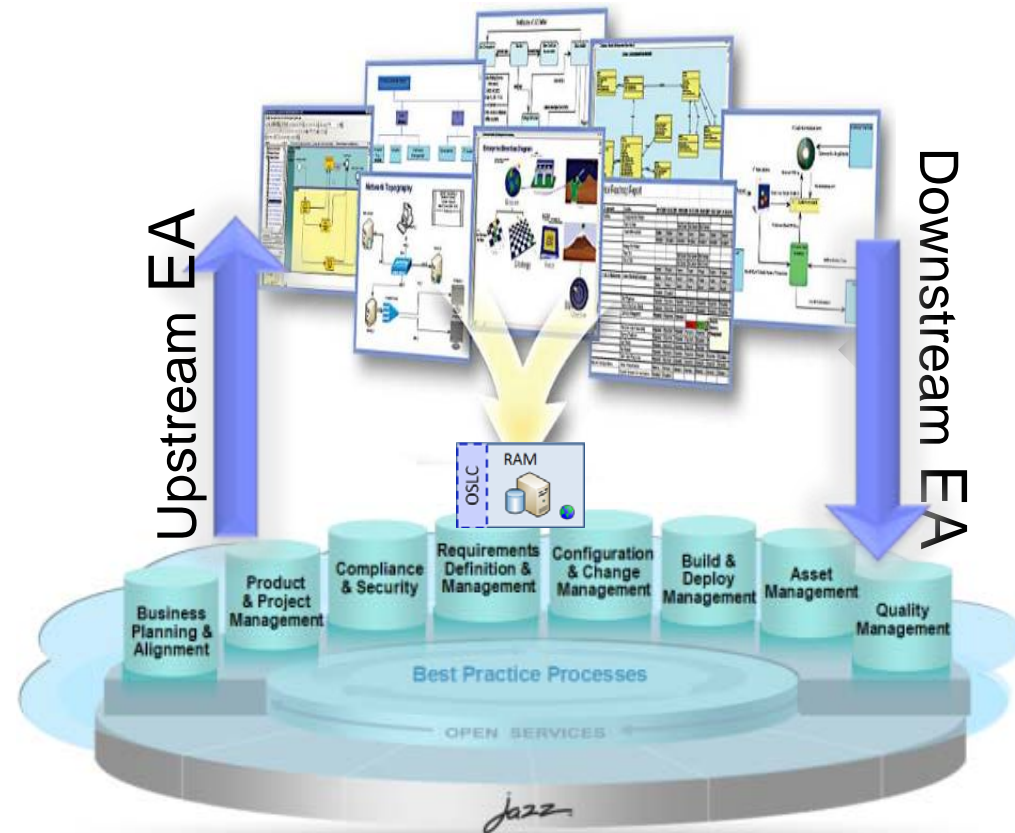
Assets created in EA or solution tools for consumption by solution tools (models, etc.)

EA Assets published to RAM so they can be found, evaluated, managed, governed by anyone who needs them



EA/Solution Assets and the role of RAM

- **RAM is a governance platform for assets**
 - ▶ Search / Find
 - ▶ Manage and Govern
 - ▶ Publish and Consume
- **RAM is not a platform for *tool integration***
 - ▶ RAM does not transform an Asset to be usable from one tool to another
- **RAM is not a *configuration management system***
 - ▶ RAM does not manage changes to the files and versions of files that makeup an artifact
- **RAM is not a *groupware / Content management* system**
 - ▶ When groupware artifact(s) are ready to be promoted as an Asset, they are published to RAM



Enterprise Architecture/Asset Management Integration scenarios

- Scenario 1: Top-down (Downstream EA)
 - ▶ EA users can ***publish, evaluate, search and import assets*** from one or more RAM repositories

- Scenario 2: Bottom-up (Upstream EA)
 - ▶ EA Asset Types in RAM can enact policies to ***validate the integrity*** of Solution Asset implementations

- Scenario 3: Graphically navigate the assets of the architecture
 - ▶ Navigation style and structure is ***customizable*** to reflect business organization
 - ▶ Navigation is ***personalized*** based on user role and access rights
 - ▶ Navigation ***dynamically*** reflects the underlying asset types, relationships and attributes



Scenario 1: Top-down (Downstream EA)

EA users can ***publish, evaluate, search and import assets*** from one or more RAM repositories

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EA user searches for an EA asset

Finding assets using keywords, filters, and tags

The image shows a composite screenshot of IBM Rational software. The top part is the Rational Asset Manager web interface, and the bottom part is the System Architect desktop application.

Rational Asset Manager Interface:

- Header:** Rational Asset Manager | Master Administrator | Log Out
- Navigation:** Home, My Dashboard, Communities, Assets, Administration
- Search Section:**
 - Submit an Asset button
 - Visual Browse button
 - Search for Assets (with help icon)
 - Search input field with "Search" text and a magnifying glass icon
 - Advanced search dropdown
 - Filters: none
 - Navigation: Previous | 1-1 of 1 | Next
 - Table with columns: Name, Version, State
 - Table content: SAR Team Structure | 1.0 | Submitted
 - Navigation: Previous | 1-1 of 1 | Next
 - Select columns... link
 - Filter your search sidebar:
 - Type: MODAF Asset [1]
 - State: Submitted [1]
 - Community: SEIG [1]
 - Tags: rescue, search, searchandrescue
 - Tag counts

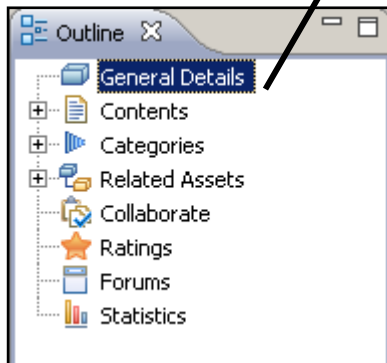
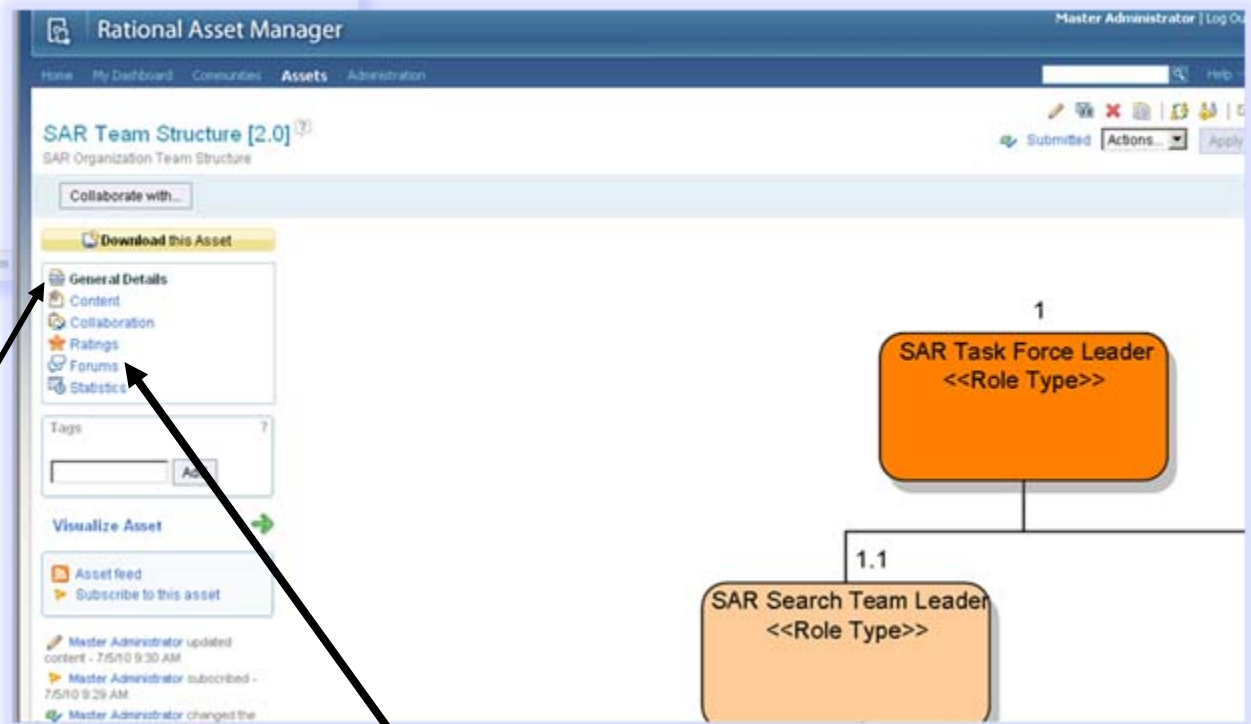
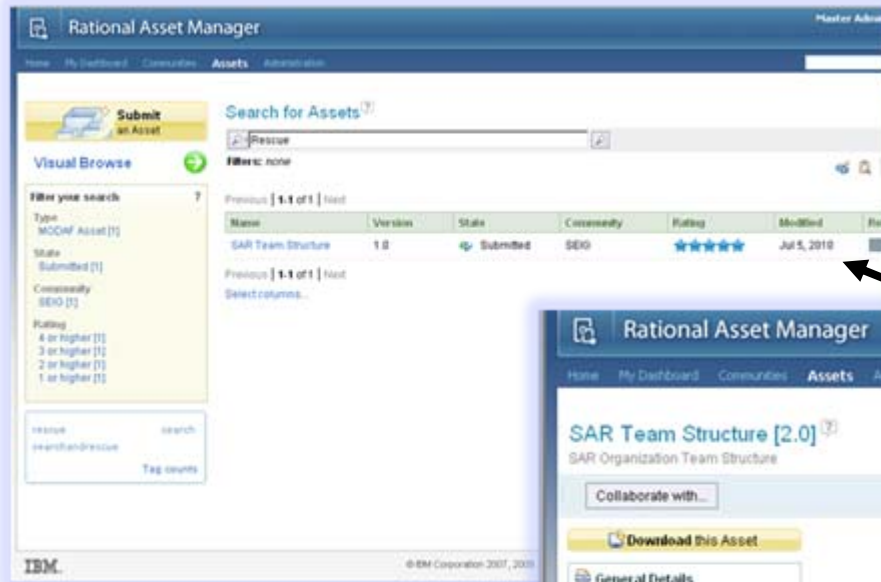
System Architect Interface:

- Window Title:** System Architect - Local Server 2003-SE-SERVERR5A(MODAF 1-2)
- Menu:** File, Edit, View, Format, Draw, Tools, Dictionary, Reports, Window, Help
- Explorer:**
 - Diagrams
 - Activity
 - Class
 - OV-02 Op. Node Relationships
 - SAR UGV Nodes
 - OV-04 Org. Relationships Chart
 - SAR Team Structure
- Diagram View:** SAR Team Structure (OV-04 Org. Relationships Chart)
 - Root node: SAR Team Structure (Role Type)
 - Level 1 nodes: SAR Search Team Lead (Role Type) and SAR Rescue Team Lead (Role Type)
 - Level 2 nodes: SAR SW/Deck (Operation Type) and SAR Deck (Operation Type)



EA user evaluates assets found during search

- Evaluate asset details before selecting the right asset to import
- Asset List
- Asset Details



Evaluating assets using the rating and feedback capabilities and discussion forums

Integrated view of published asset for evaluation

- The RAM EA Model asset is categorized, has attributes, and other metadata to align with the EA Framework/Taxonomy (such as MODAF)
- The RAM EA Model asset contains one or more of the following
 - ▶ References/Links back to EA reports, published output or live model content for the selected scope (such as a view)
 - ▶ Distributable reports

SAR Team Structure [2.0]
SAR Organization Team Structure

Collaborate with...

Download this Asset

General Details
Content
Collaboration
Ratings
Forums
Statistics

Tags
Add

Visualize Asset

Asset feed
Subscribe to this asset

Master Administrator updated categorization - 7/5/10 9:48 AM
Master Administrator updated general information and content - 7/5/10 9:43 AM
Master Administrator changed the state to Approved - 7/5/10 9:38 AM
Master Administrator updated content - 7/5/10 9:30 AM
Master Administrator subscribed - 7/5/10 9:29 AM
Master Administrator changed the state to Submitted - 7/5/10 9:29 AM
Master Administrator submitted - 7/5/10 9:29 AM

View all

one

```

graph TD
    SAR_TFL[SAR Task Force Leader <<Role Type>>] -- 1.1 --> SAR_STL[SAR Search Team Leader <<Role Type>>]
    SAR_TFL -- 1.2 --> SAR_RTL[SAR Rescue Team Leader <<Role Type>>]
    SAR_STL -- 1.1.1 --> SAR_LSW[SAR LSW Section <<Organization Type>>]
    SAR_STL -- 1.1.2 --> SAR_S[SAR Section <<Organization Type>>]
  
```

Featured Content

Attributes

Owner:	Master Administrator
Community:	SEIO
Type:	MODAF Asset
Unique ID:	{23344CD3-F4FD-7019-6A56-76E4B1A4288C}

Categories

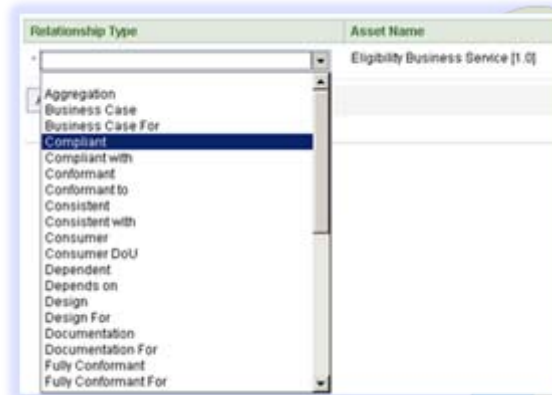
MODAF
Architecture View: OV-4

Versions
SAR Team Structure [2.0]

EA Architecture Compliance

- Ensuring the compliance of individual projects with the enterprise architecture is an essential aspect of architecture governance
- Asset relationships** between the architecture and the implementation can communicate the compliance level:

- ▶ Irrelevant
- ▶ Consistent
- ▶ Compliant
- ▶ Conformant
- ▶ Fully Conformant
- ▶ Non-conformant



Irrelevant:

The implementation has no features in common with the architecture specification (so the question of conformance does not arise).

Consistent:

The implementation has some features in common with the architecture specification, and those common features are implemented in accordance with the specification. However, some features in the architecture specification are not implemented, and the implementation has other features that are not covered by the specification.

Compliant:

Some features in the architecture specification are not implemented, but all features implemented are covered by the specification, and in accordance with it.

Conformant:

All the features in the architecture specification are implemented in accordance with the specification, but some more features are implemented that are not in accordance with it.

Fully Conformant:

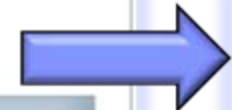
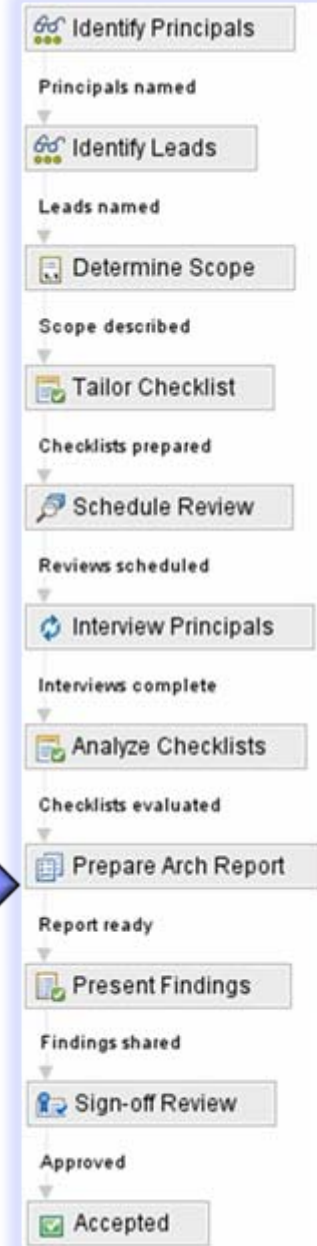
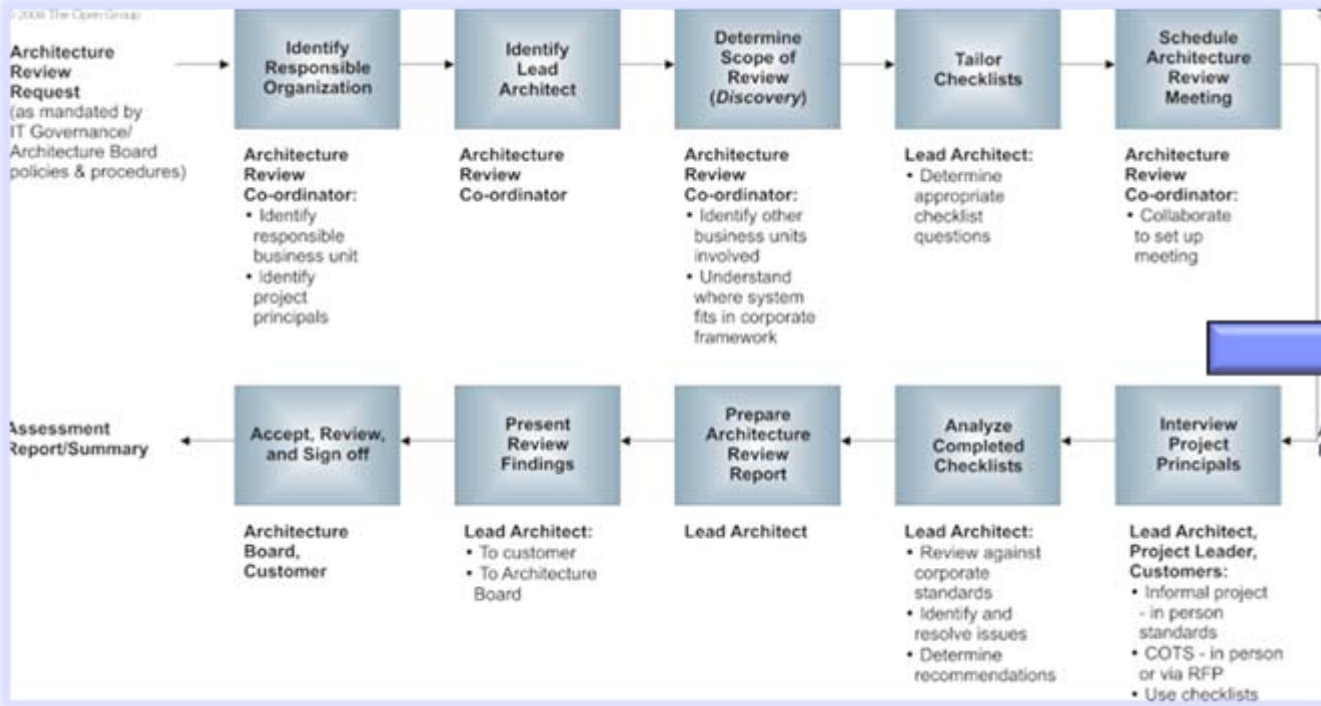
There is full correspondence between architecture specification and implementation. All specified features are implemented in accordance with the specification, and there are no features implemented that are not covered by the specification.

Non-conformant:

Any of the above in which some features in the architecture specification are implemented not in accordance with the specification.

RAM and Lifecycle Governance

- RAM provides lifecycle governance for assets in RAM
- EA assets placed in RAM can go through various approvals
- When a segment of the EA has all its pieces in approved state, that segment itself may be approved
- E.g. EA Architecture Compliance Review Process**



Scenario 2: Bottom-up (Upstream EA)

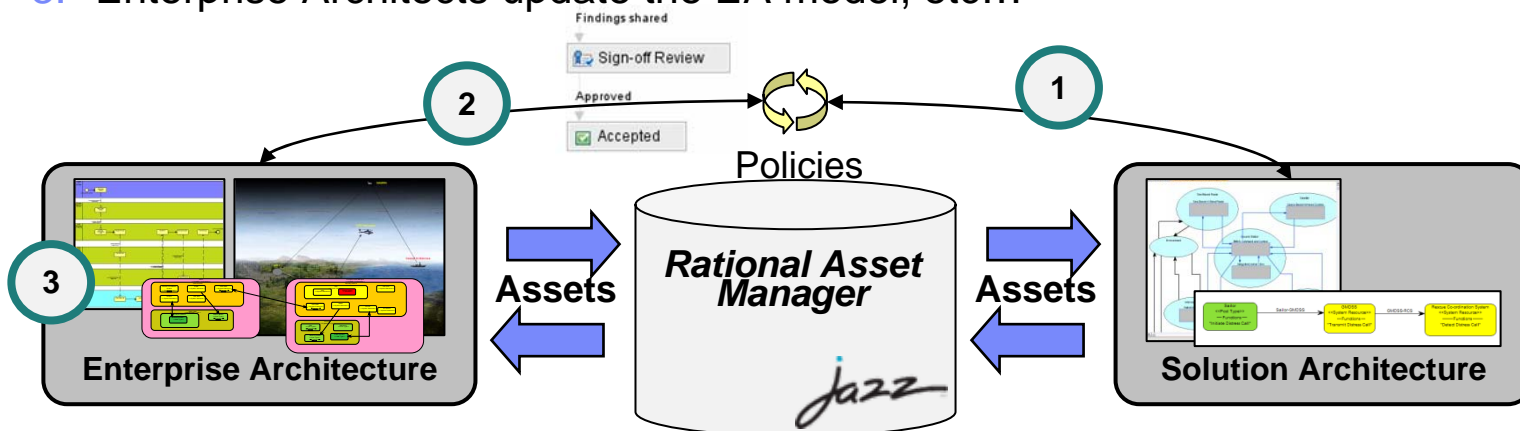
EA Asset Types in RAM can enact policies to **validate the integrity** of Solution Asset implementations

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Bottom-up (Upstream EA)

- Problems
 - ▶ Update EA model with development/delivery changes which impact the EA
- Scenarios addressing those problems
 - ▶ Development assets proceed with delivery which are not compliant or have no association with RAM EA Model asset(s)
 1. RAM policies discover non-compliant implementation asset
 2. RAM notifies EA regarding new assets not connected to EA assets or non-compliant assets which are in a certain state (such as 'approved', 'deployed', ...)
 3. Enterprise Architects update the EA model, etc...



EA user imports an asset

- Importing assets and any related assets, and linking artifacts in assets to an EA Workspace

SAR Team Structure [2.0]
SAR Organization Team Structure

Collaborate with...

Download this Asset

General Details
Content
Collaboration
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```

    graph TD
      A[SAR Task Force Leader <<Role Type>>] -- 1.1 --> B[SAR Search Team Leader <<Role Type>>]
      A -- 1.2 --> C[SAR Rescue Team Leader <<Role Type>>]
      B -- 1.1.1 --> D[SAR UGW Section <<Organisation Type>>]
      B -- 1.1.2 --> E[SAR Section <<Organisation Type>>]
    
```

Featured Content

Attributes

Owner:	Master Administrator
Community:	SEIO
Type:	MODAF Asset
Unique ID:	{23344CD3-F4FD-7019-6A56-76E4B1A4288C}

Categories

MODAF
Architecture View: OV-4

Versions

SAR Team Structure [2.0]



Publish an asset

The screenshot displays the Rational Asset Manager interface. The main window shows the 'SAR Team Structure [2.0]' asset, which is an 'SAR Organization Team Structure'. The asset is currently in an 'Approved' state. A tree diagram shows the structure: 'SAR Task Force Leader' (Role Type) is the root, with 'SAR Search Team Leader' (Role Type) as a child. 'SAR Search Team Leader' has two children: 'SAR Section' (Organisation Type) and 'SAR Section' (Organisation Type). The 'SAR Section' (Organisation Type) has two children: 'SAR Section' (Organisation Type) and 'SAR Section' (Organisation Type).

On the left, there is a 'Download this Asset' button and a 'General Details' section. Below this, there is a 'Category Configuration' table with columns for 'Architecture View', 'Metadata Type', and 'Architecture Column'. The table lists various categories and their associated views and columns.

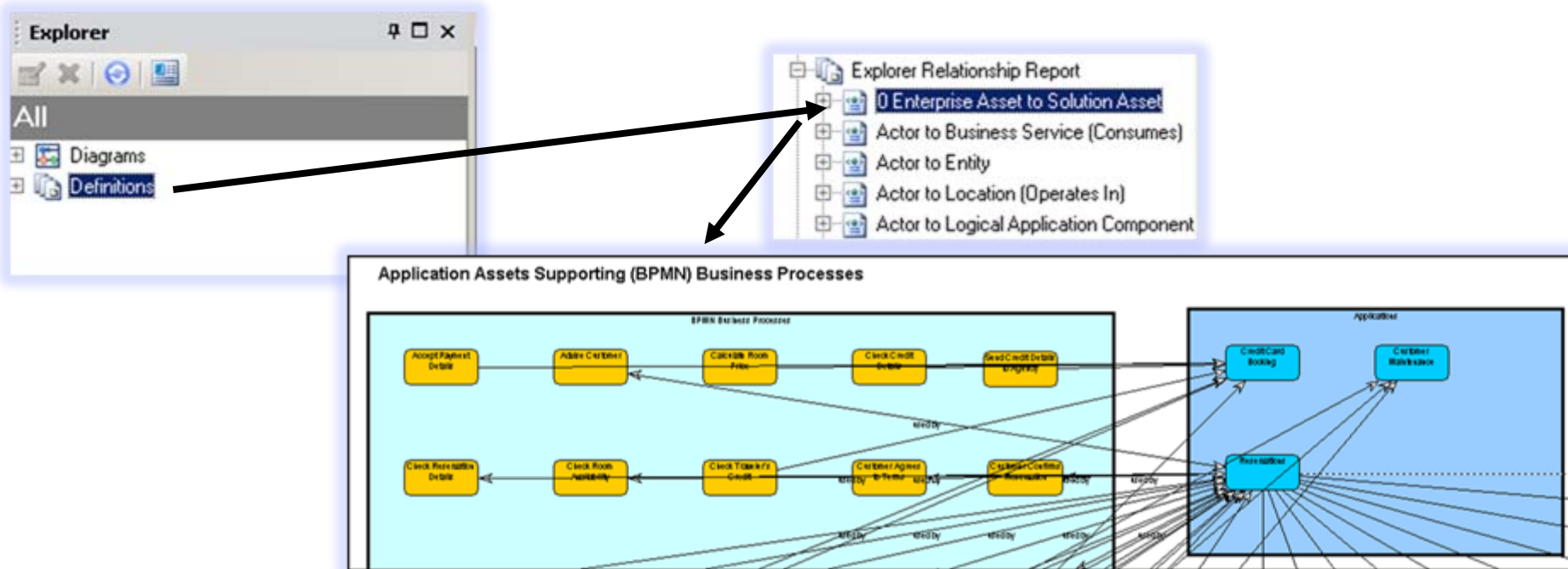
On the right, a window titled 'Asset: SAR Team Structure - IBM Rational Asset Manag...' shows the 'Implicit Asset Lifecycle'. The current state is 'Approved'. The lifecycle diagram shows a flow from 'Submitted' to 'Approved' via a 'Publish' action, and from 'Approved' back to 'Submitted' via a 'Revert' action.

At the bottom of the main window, the user is identified as 'Master Administrator' and the community is 'SEIG'. The status bar shows 'state to Approved - 7/5/10 9:38 AM' and 'Community: SEIG'.



EA user can explore Asset relationships

- System Architect Explorer diagrams can be used to visualize the relationships between Enterprise and Solution **Assets**
 - Application Asset information comes from RAM



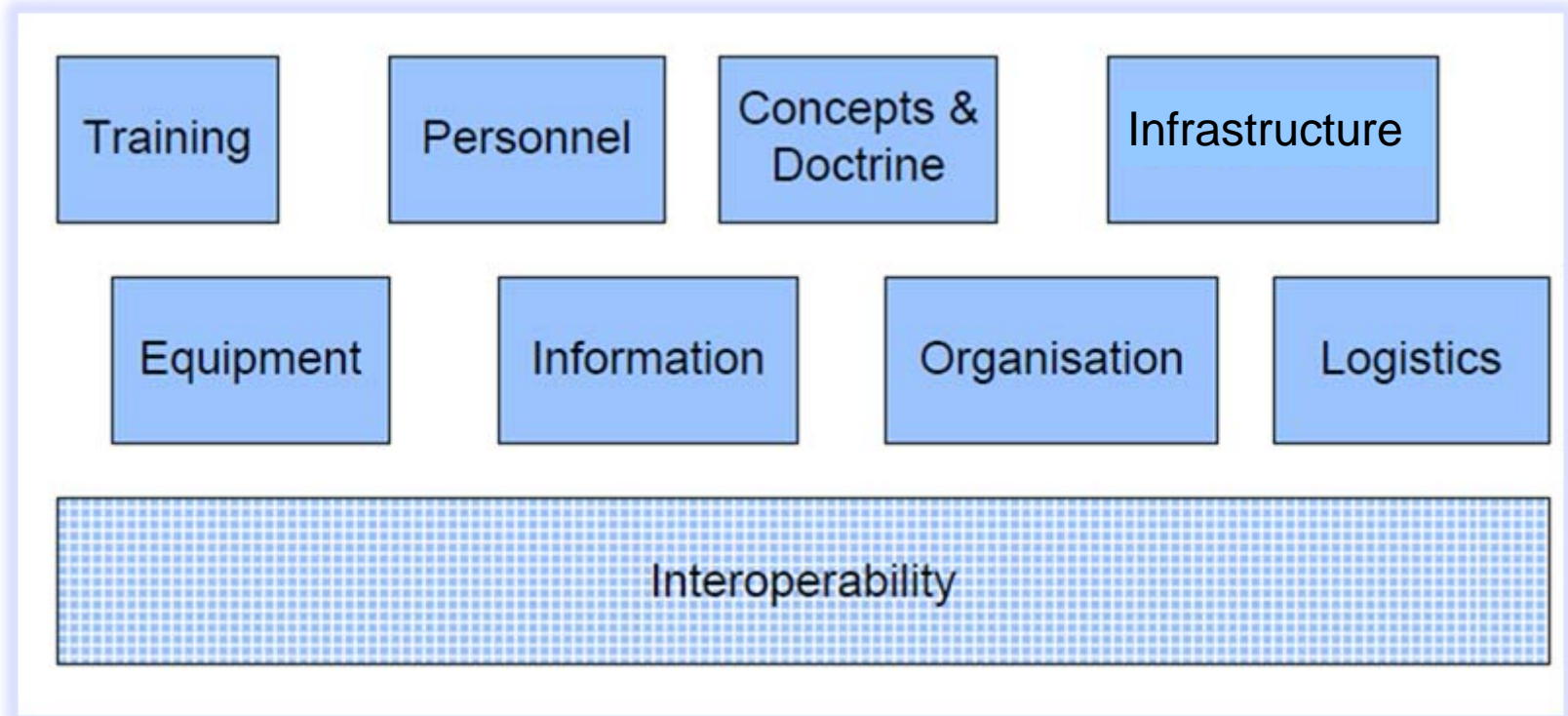
Scenario 3: Graphically navigate the assets of the architecture

- ▶ Navigation style and structure is **customizable** to reflect business organization
- ▶ Navigation is **personalized** based on user role and access rights
- ▶ Navigation **dynamically** reflects the underlying asset types, relationships and attributes

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Navigating the EA Catalog



- Navigation by clicking on area of interest
- Click directly on the area of interest
- Zoom in if necessary

Summary

- EA Lifecycle produces work products (Assets)
- Work products are at differing levels of detail
- Produced in different tools in MOD and Suppliers
- Assets need to be understood and catalogued for re-use and for traceability
- Assets need to be easily found, governed and subscribed to
- Role based access control and security are key considerations





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Demonstration

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Pedestals for a demonstration***

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