HLA Federation Development and Execution Process (FEDEP) & Supporting Tools

Marnie Salisbury and Chris Turrell

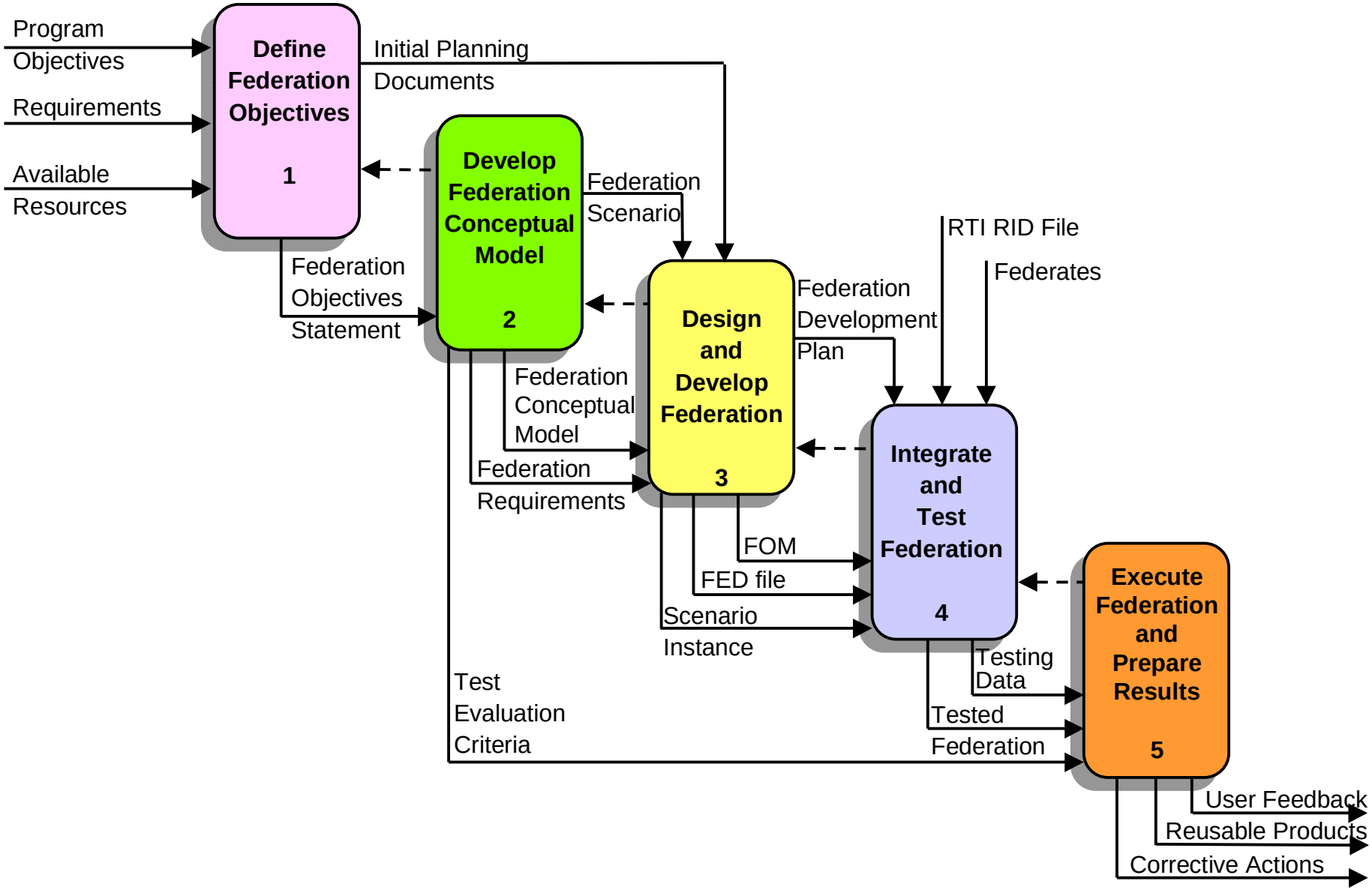
ASNE MSEA Internal Review

11 May 1999

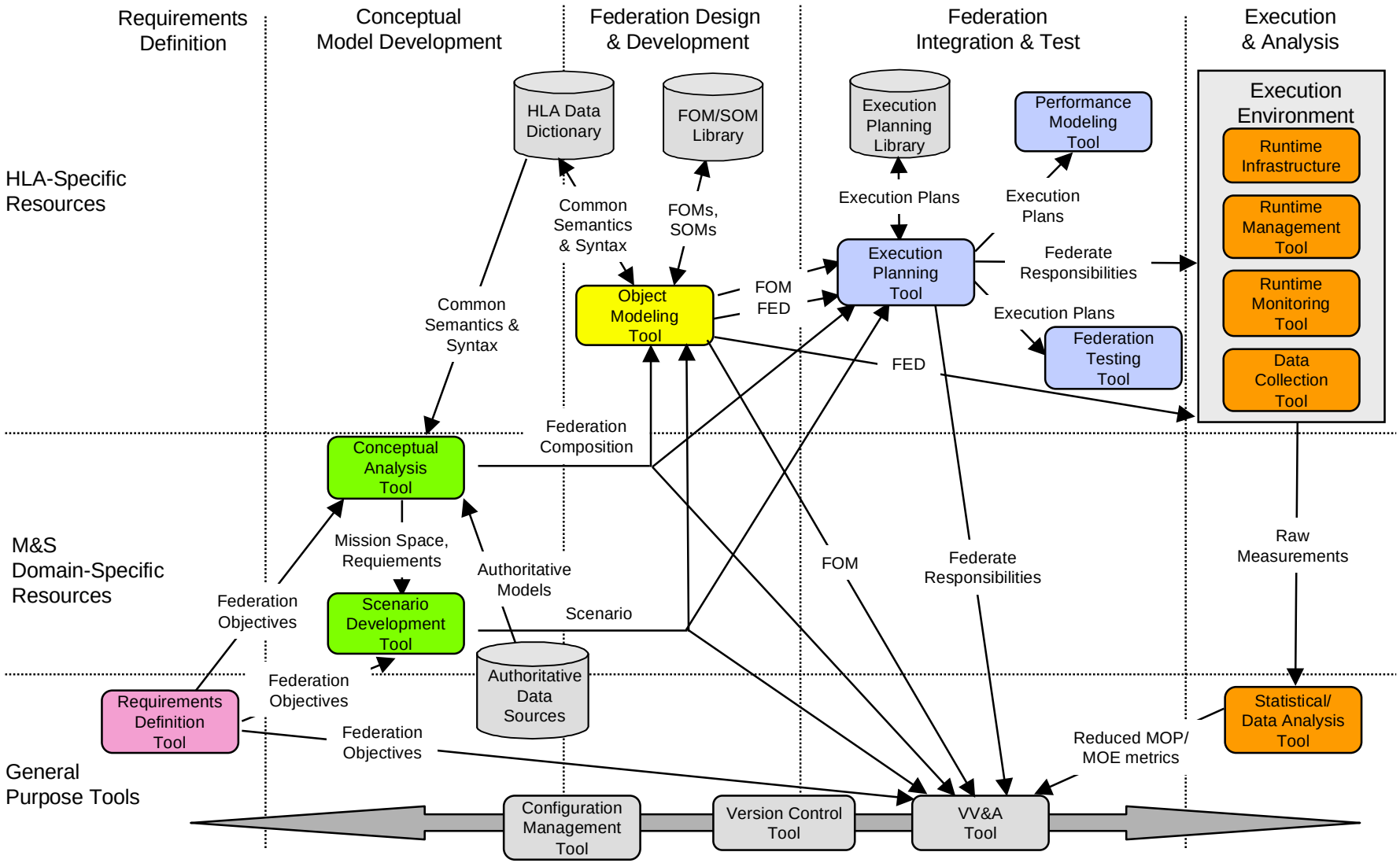
Description

- **The FEDEP ...**
  - **defines a generic framework for distributed simulation development**
  - **consists of a graphical model and supporting textual description**
  - **provides an organizing mechanism for open discussion of federation development practices and strategies at the SISO PROC Forum (and related forums)**
  - **provides a common foundation for defining functional overlays to the federation development process (e.g., VV&A, security, tools)**
  - **provides a clear, concise introduction to federation development for new HLA users**
  - **provides a common reference point for communication between federation development team members**

Five Step Process



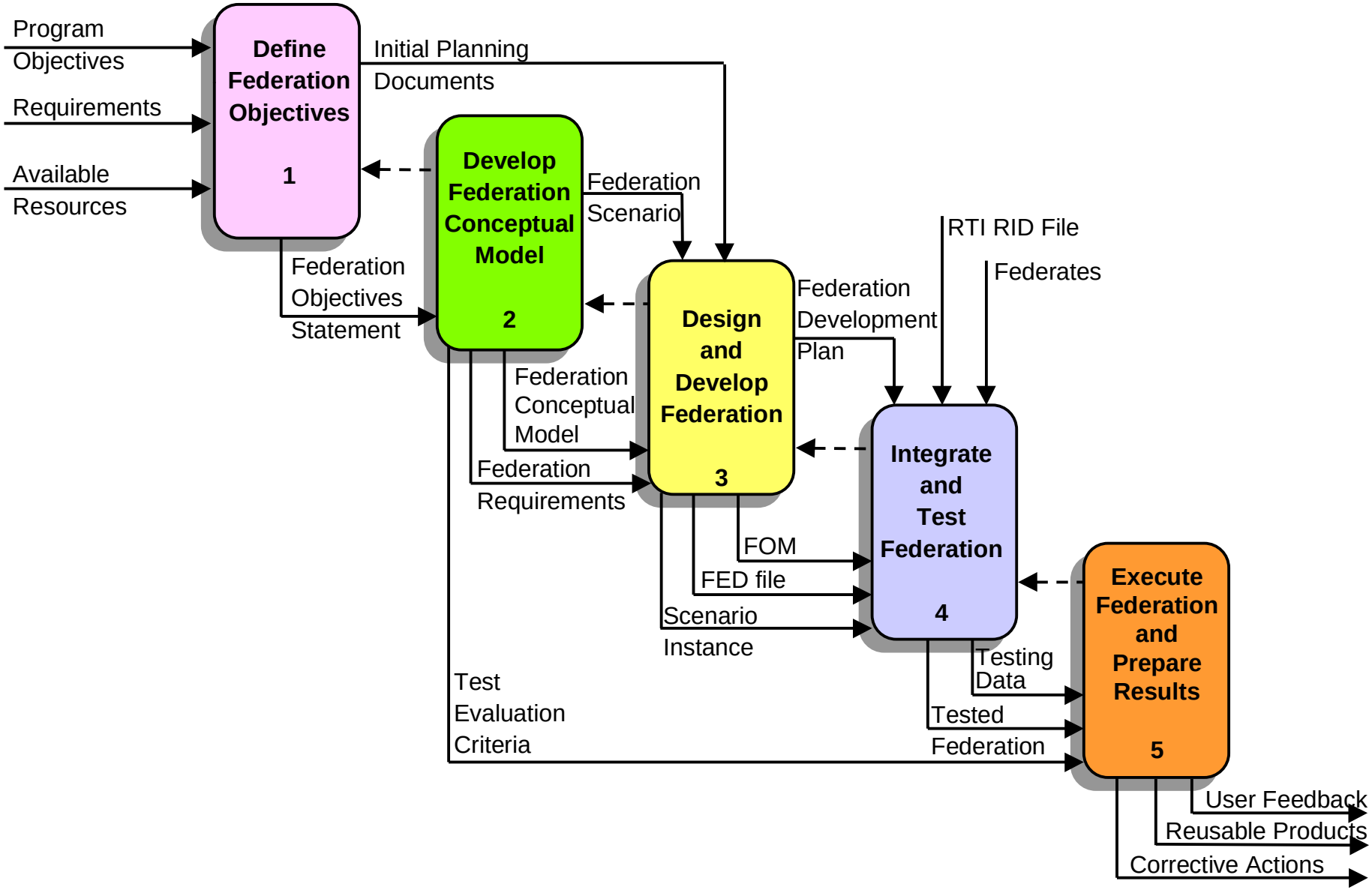
HLA Tool Architecture



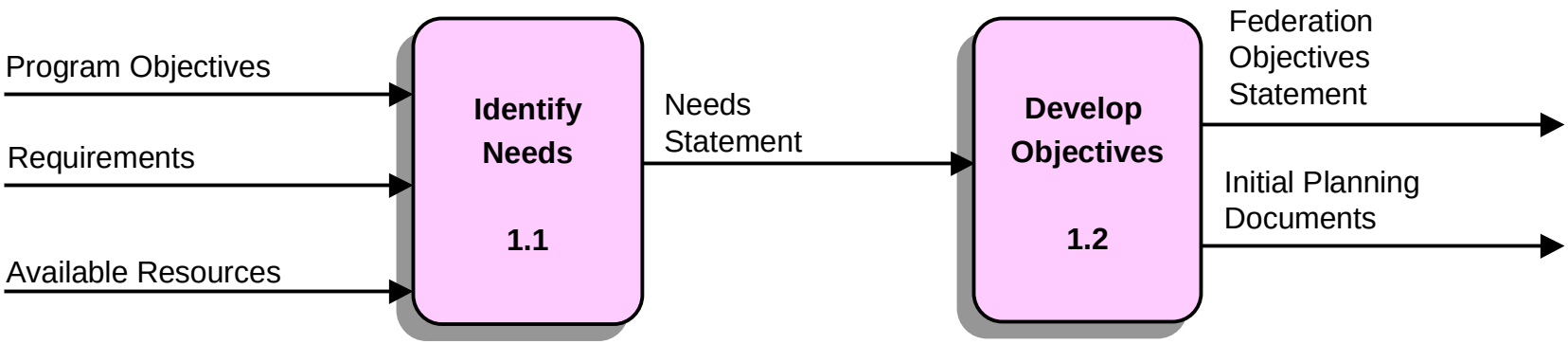
Tutorial Structure

- **A structured view of the FEDEP model**
- **Introduction to a problem set and walk through the FEDEP process to demonstrate and discuss the major products generated at each step**
- **Outline the tools that are applicable at each step of the FEDEP and discuss the alternatives that are available.**

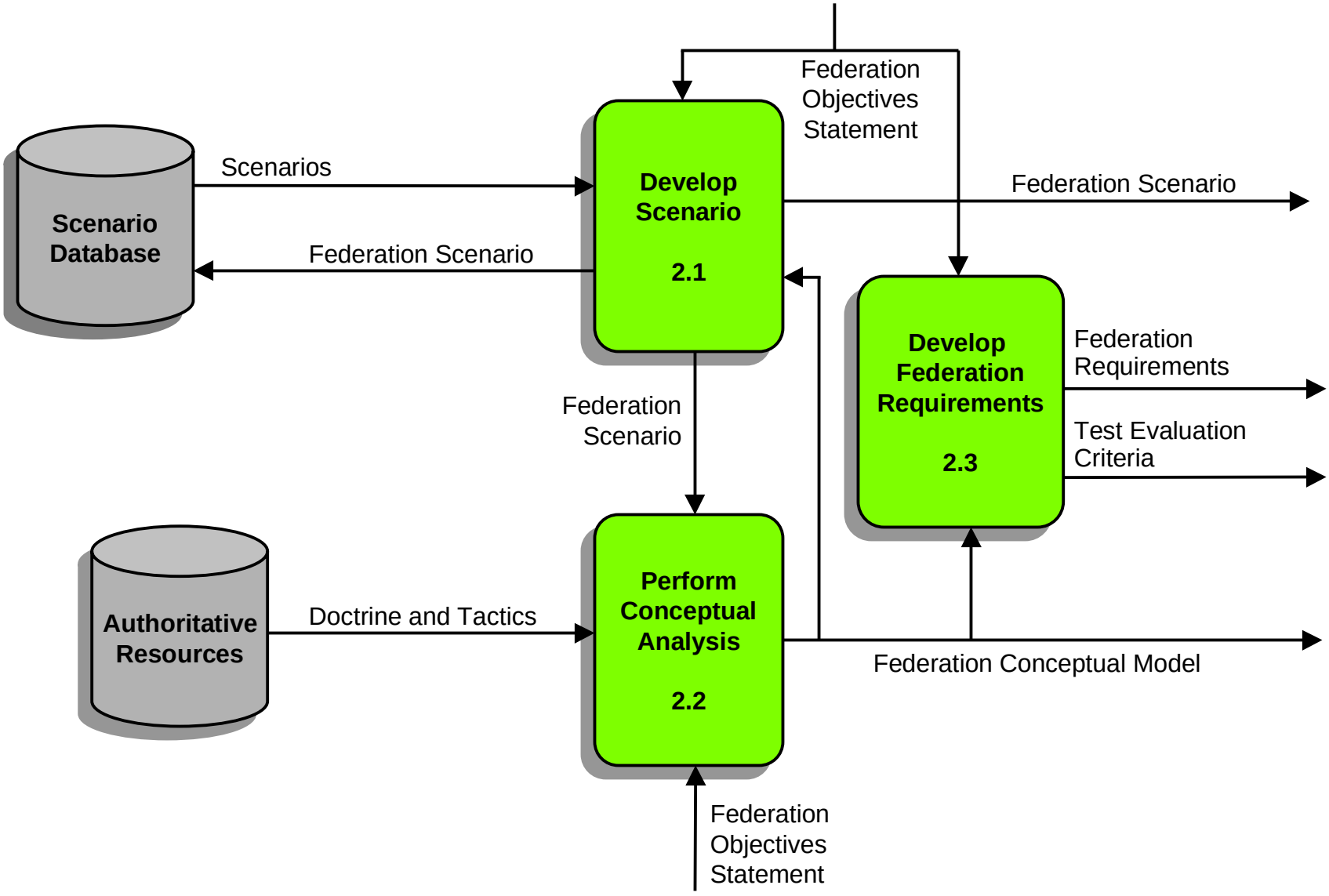
Five Step Process



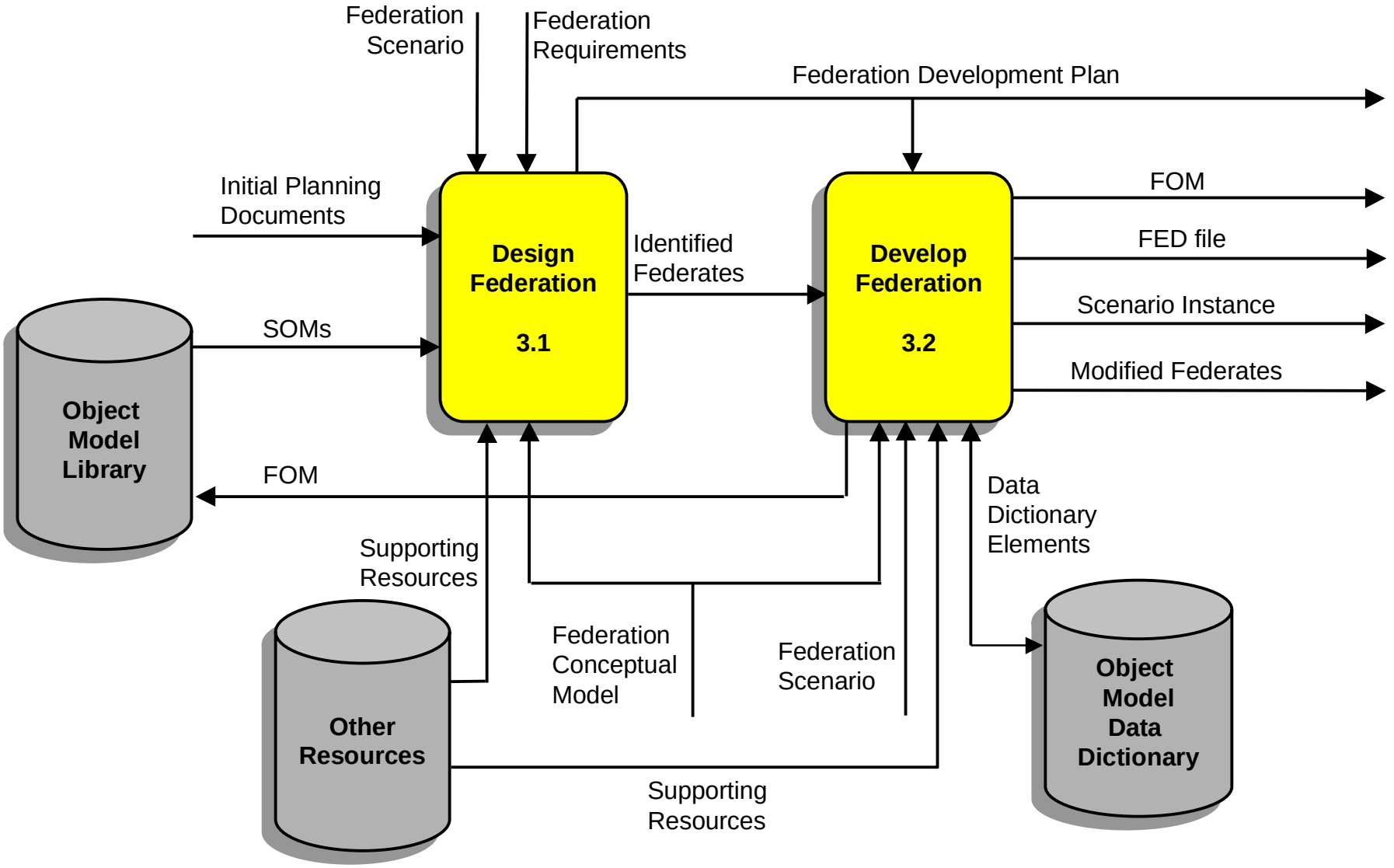
Define Federation Objectives



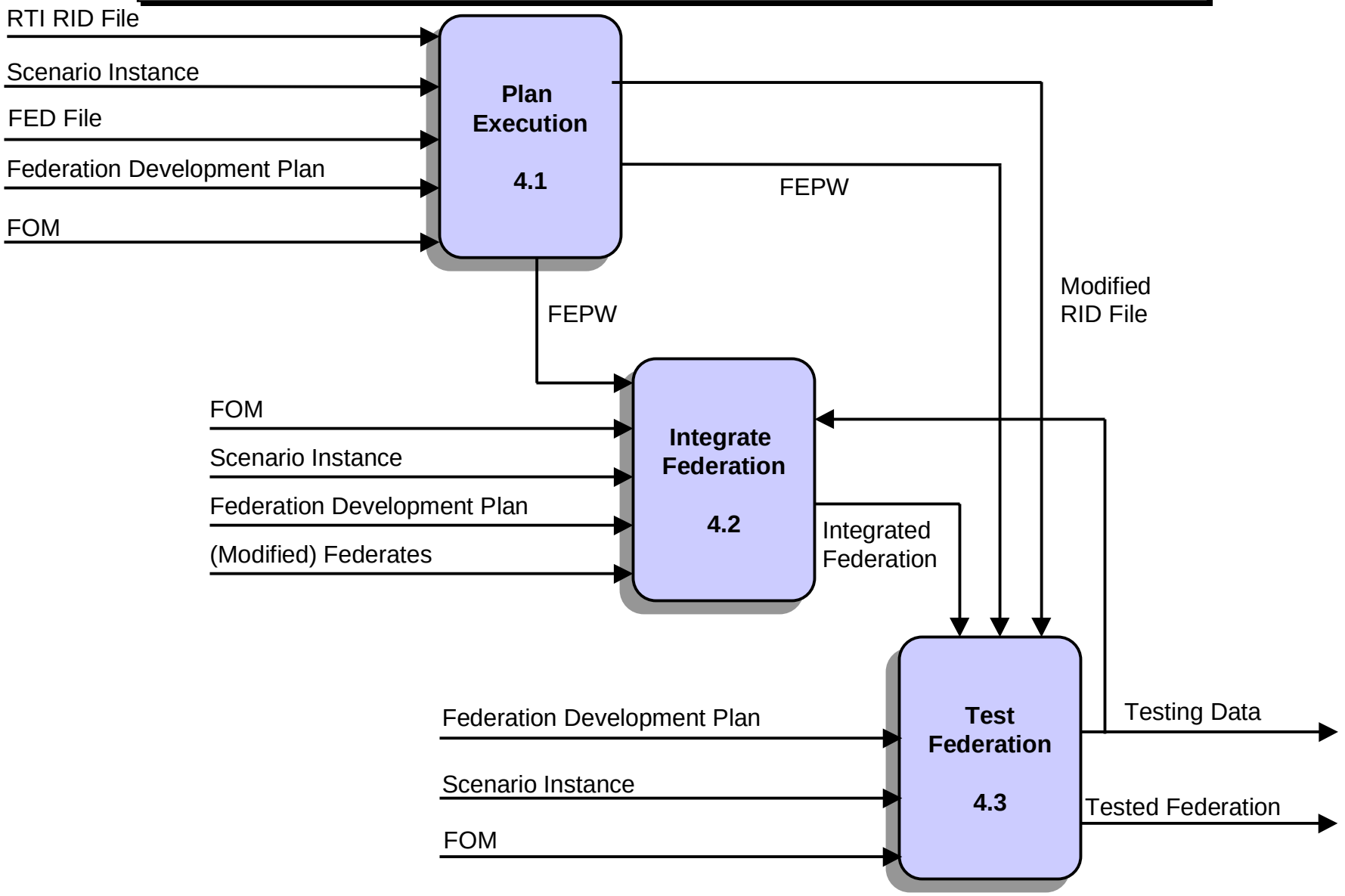
Develop Federation Conceptual Model



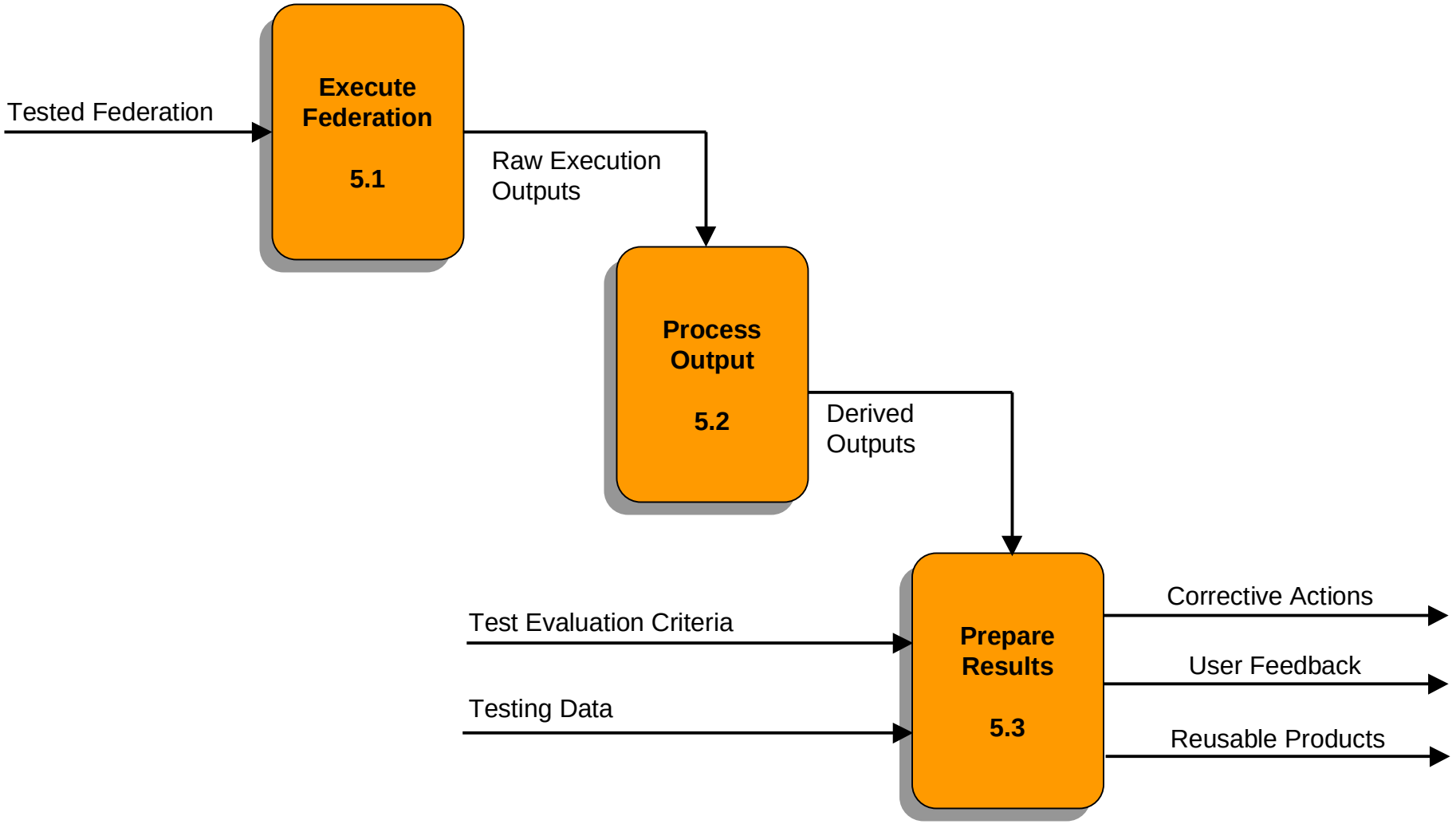
Design and Develop Federation



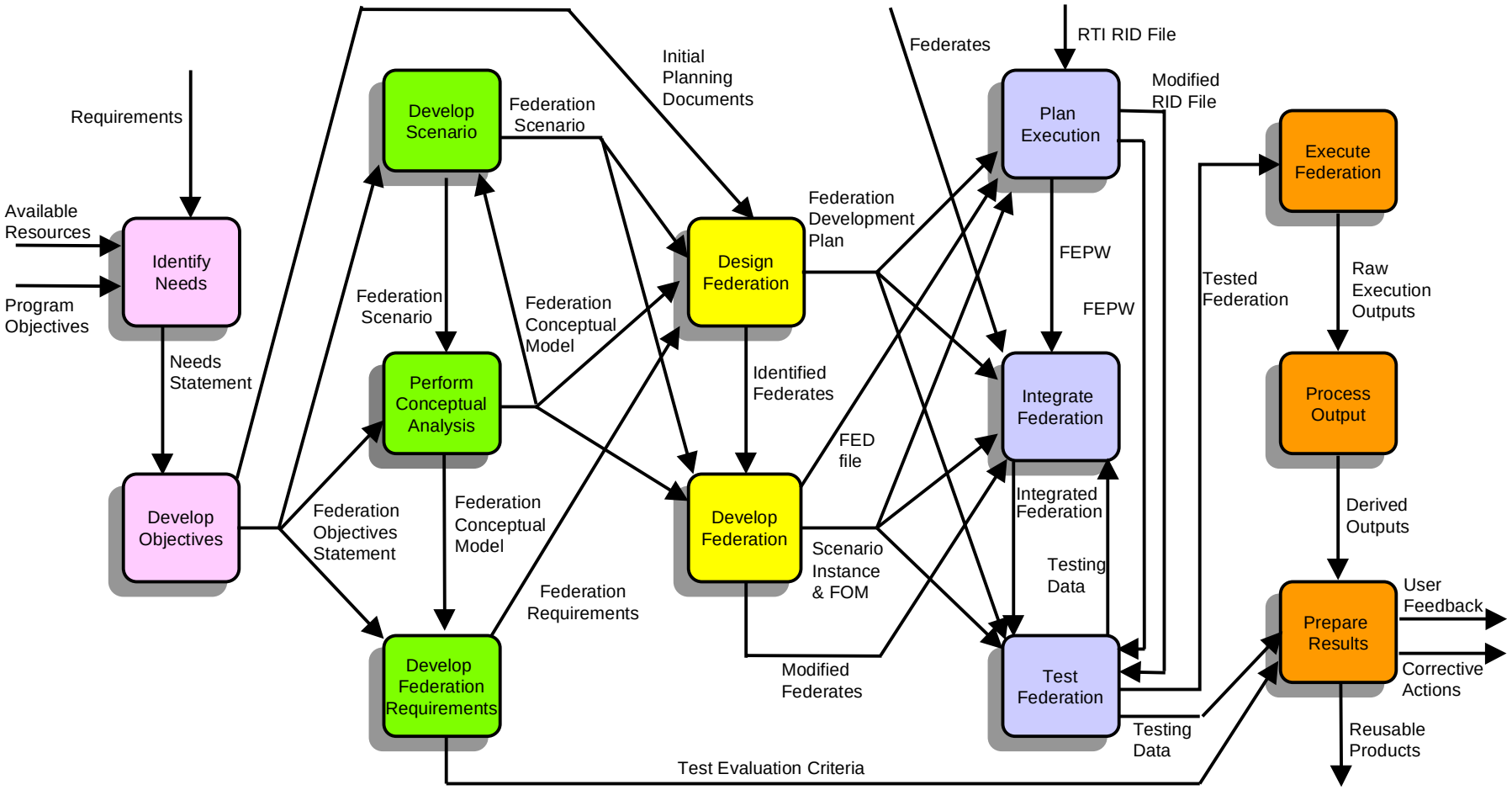
Integrate and Test Federation



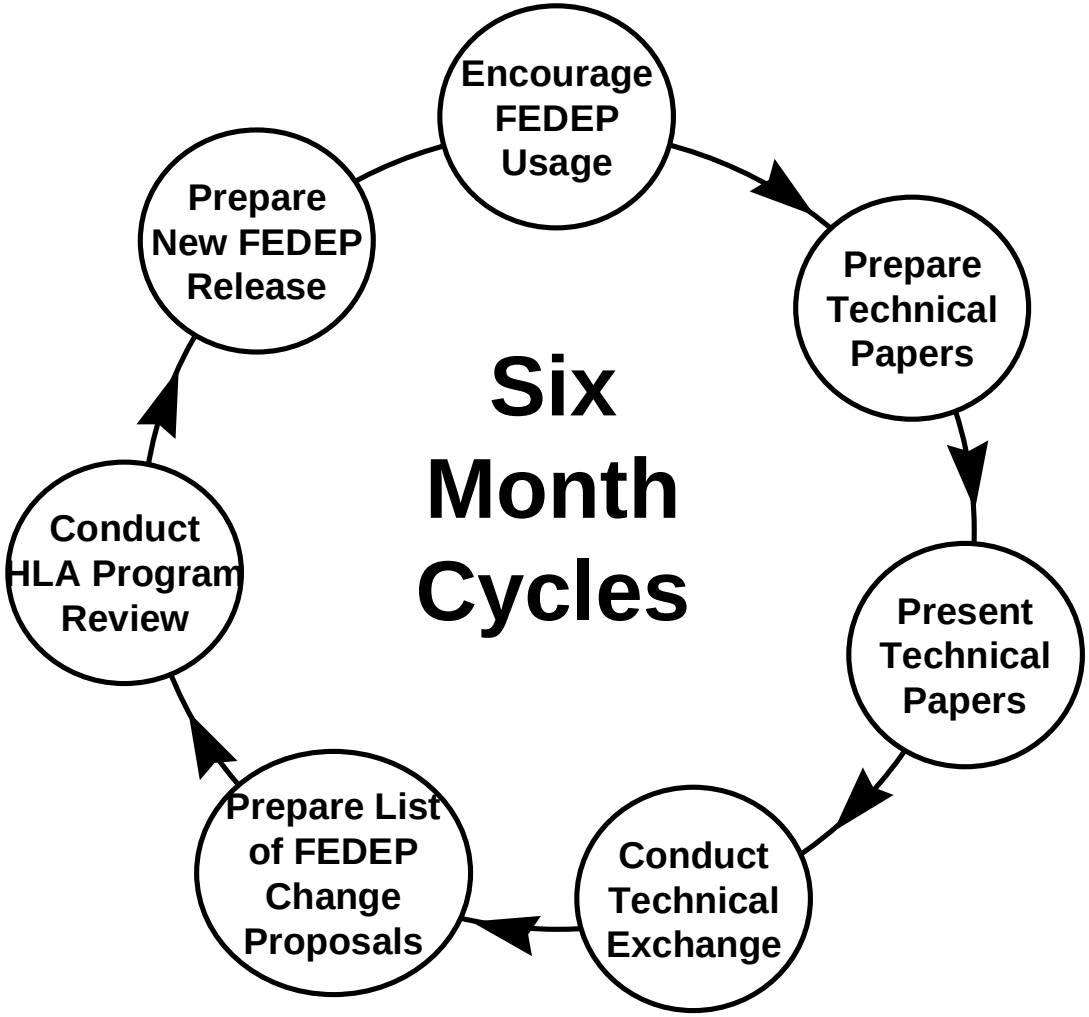
Execute Federation and Prepare Results



Develop and Execute HLA Federation



FEDEP Development
Concept of Operations



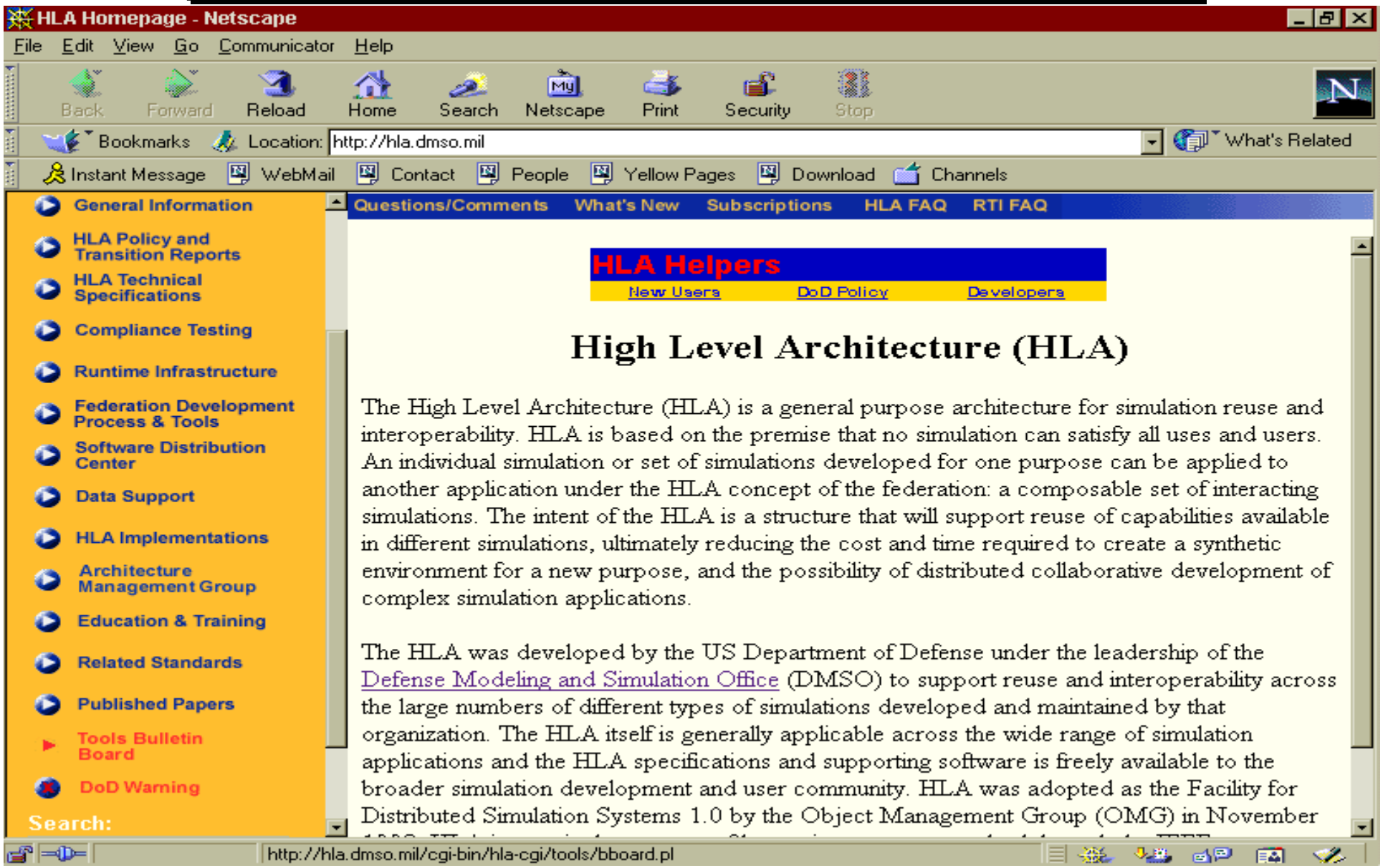
HLA Tools Philosophy and Architecture

- **HLA is an architecture, not software -- however to facilitate cost-effective implementation of HLA,**
  - **DMSO is developing an initial suite of HLA support software (including Runtime Infrastructure software and a variety of integrated tools)**
- **DMSO facilitates open development of supported tools**
  - **Open access to the specification**
  - **Creation of formal data interchange formats (DIFs) where necessary**
  - **Industry participation in DIF development**
- **Developed to:**
  - **Help identify requirements for tools to automate specific portions of the FEDEP**
  - **Established as an open framework for the development of HLA tools**
  - **Promotes an interoperable set of tools**
  - **Creates an extensible tool set that will evolve as requirements grow**

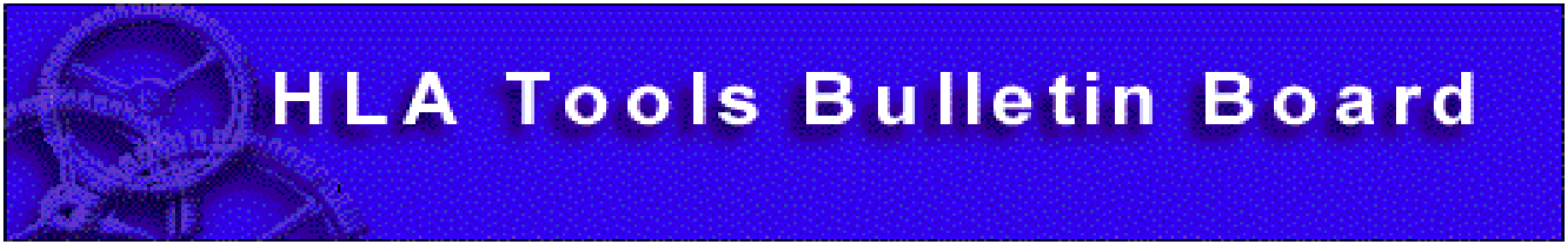
DMSO Sponsored
HLA Supporting Software /Tools

- **Object Model Tools - Available now**
  - **Object Model Development Tool (OMDT)**
  - **Object Model Library (OML)**
  - **Object Model Data Dictionary (OMDD)**
- **Federation Execution Planning and Verification - Available now**
  - **Federation Execution Planners Workbook (FEPW)**
  - **RTI Initialization Data (RID) Editor**
- **Runtime Tools**
  - **Runtime Infrastructure (RTI)**
    - **1.3- Available now**
    - **1.3 NextGeneration - In Beta**
  - **Federation Verification Tool (FVT) - In Beta**
  - **Federation Management Tool (FMT) - In Beta**
  - **Data Collection Tool (DCT) - In Beta**

HLA Website


HLA Homepage - Netscape
File Edit View Go Communicator Help
Back Forward Reload Home Search Netscape Print Security Stop
Bookmarks Location: http://hla.dmso.mil What's Related
Instant Message WebMail Contact People Yellow Pages Download Channels
General Information
HLA Policy and Transition Reports
HLA Technical Specifications
Compliance Testing
Runtime Infrastructure
Federation Development Process & Tools
Software Distribution Center
Data Support
HLA Implementations
Architecture Management Group
Education & Training
Related Standards
Published Papers
Tools Bulletin Board
DoD Warning
Search:
Questions/Comments What's New Subscriptions HLA FAQ RTI FAQ
HLA Helpers
New Users DoD Policy Developers
High Level Architecture (HLA)
The High Level Architecture (HLA) is a general purpose architecture for simulation reuse and interoperability. HLA is based on the premise that no simulation can satisfy all uses and users. An individual simulation or set of simulations developed for one purpose can be applied to another application under the HLA concept of the federation: a composable set of interacting simulations. The intent of the HLA is a structure that will support reuse of capabilities available in different simulations, ultimately reducing the cost and time required to create a synthetic environment for a new purpose, and the possibility of distributed collaborative development of complex simulation applications.
The HLA was developed by the US Department of Defense under the leadership of the Defense Modeling and Simulation Office (DMSO) to support reuse and interoperability across the large numbers of different types of simulations developed and maintained by that organization. The HLA itself is generally applicable across the wide range of simulation applications and the HLA specifications and supporting software is freely available to the broader simulation development and user community. HLA was adopted as the Facility for Distributed Simulation Systems 1.0 by the Object Management Group (OMG) in November
http://hla.dmso.mil/cgi-bin/hla-cgi/tools/bboard.pl

HLA Tools Bulletin Board



Commercially Developed Tools

Government Sponsored Tools

- A service to inform the community of tools and services available to support HLA implementations
- Products are listed alphabetically by company name
- Solicitation for product postings is made through the Bulletin Board
- Bulletin board is available through HLA Home Page to DoD, Academia and Industry

Summary

- **The FEDEP defines a generic, tailorable framework for the development of distributed systems**
- **A set of software tools have been developed under DMSO sponsorship to support HLA-specific FEDEP activities**
- **Commercial vendors are actively developing new software tools to augment (or supplant) existing HLA tools**
- **The FEDEP (and associated tool architecture) will continue to evolve based on inputs from the HLA user community**
  - **SIW PROC Forum provides an open forum for sharing federation development experiences**

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Back Up Slides

Bob Lutz and Chris Turrell

SimTecT 99

29 March- 1 April 1999

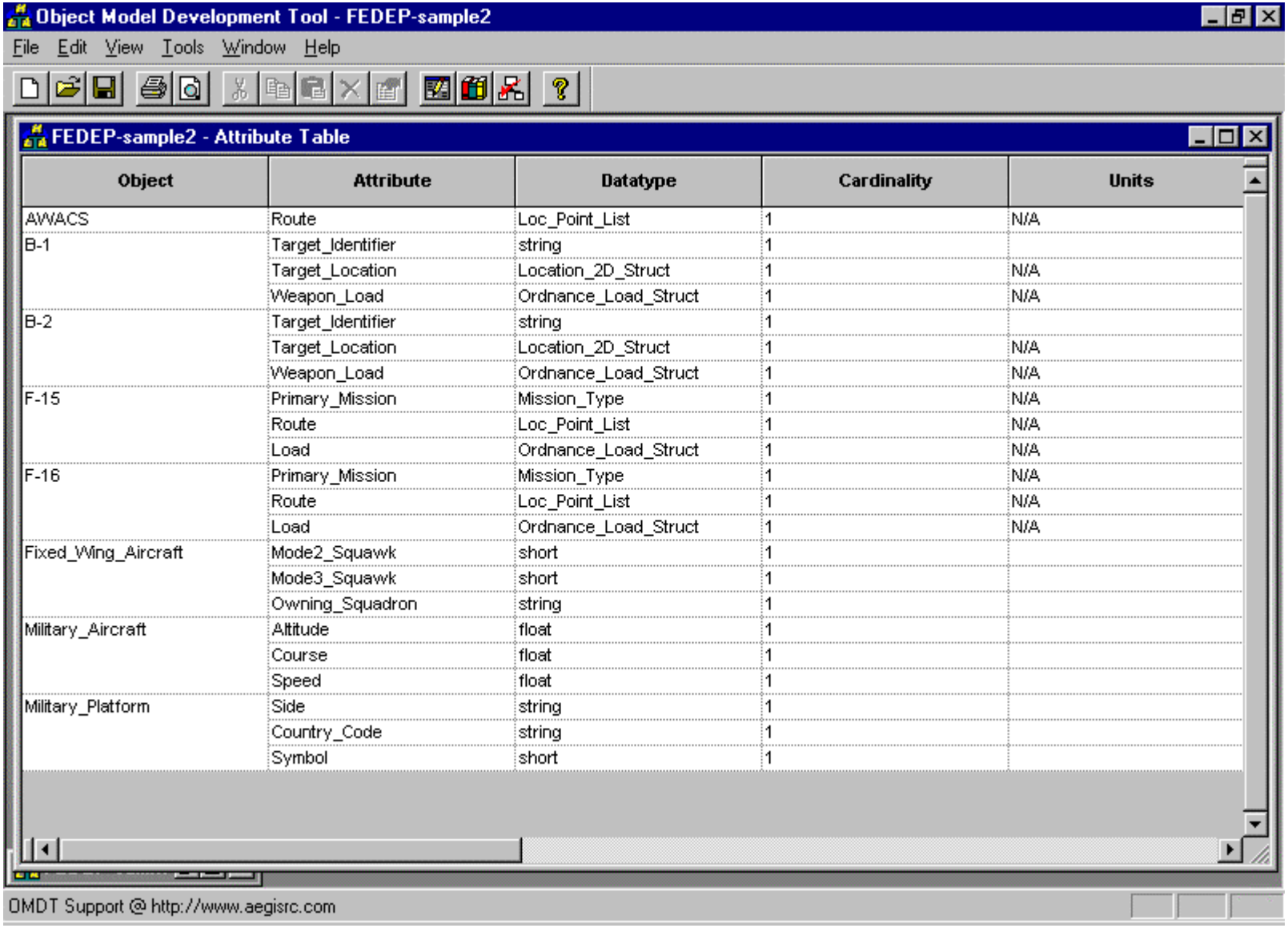
FEDEP History

- **FEDEP V1.0 (Sep 96)**
  - **Based on protofederation experience and feedback**
  - **OMT Working Group provided forum for sharing federation development practices/approaches**
- **FEDEP V1.1 (Nov 97)**
  - **Complete existing process description**
  - **Review uniformity of process description**
  - **Implement “minor” changes to FEDEP diagram**
- **FEDEP V1.2 (July 98)**
  - **Include roles/products in process description**
  - **Federation reuse**
- **FEDEP V1.3 (Dec 98)**
  - **Improved graphical representation**

OMDD Export


OMDDS - Netscape
File Edit View Go Communicator Help
Back Forward Reload Home Search Netscape Print Security Stop
Bookmarks Location: http://s3.arlut.utexas.edu/omdds/code/index.cfm
What's Related
Instant Message WebMail Contact People Yellow Pages Download Channels
Component To Browse:
Object Class
Interaction Class
Generic Element
Complex Data Type
Enumerated Data Type
Name Begins with Letter:
A-E F-L M-P Q-S T-Z
Submit
Help
Copy
Reset
Help
Selection
Component Name
Aggregate_Entity
Air_Defense_Unit
Air_Mission
Aircraft
Unknown File Type
You have started to download a file of type text/x-tabdelimited
Click "More Info" to learn how to extend Navigator's capabilities.
More Info
Pick App...
Save File...
Cancel
EXPORT AREA FOR CTURRELL - Netscape
EXPORT AREA FOR CTURRELL
Export
Delete
Reset
Help
Generate DIF File
Export
Delete
Type
Name
CLASS Air_Mission
CLASS Air_Defense_Unit
CLASS Aircraft
CLASS Amphibious_Assault_Vehicle
CLASS Close_Air_Support_Request
NOTE: Items shown in italics are OMDD components related to the items you selected for inclusion in the export area.
Home
Browse
Search
Utilities
About
Support
Document: Done

Sample: OMDT Attribute Table



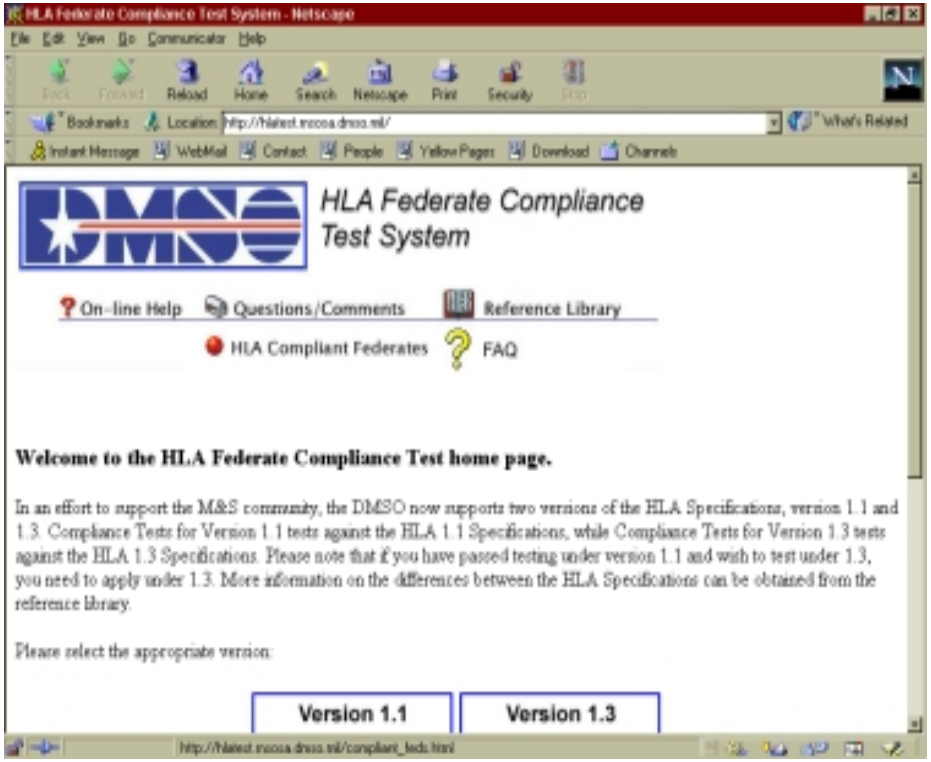
Object	Attribute	Datatype	Cardinality	Units
AWACS	Route	Loc_Point_List	1	N/A
B-1	Target_Identifier	string	1	
	Target_Location	Location_2D_Struct	1	N/A
	Weapon_Load	Ordnance_Load_Struct	1	N/A
B-2	Target_Identifier	string	1	
	Target_Location	Location_2D_Struct	1	N/A
	Weapon_Load	Ordnance_Load_Struct	1	N/A
F-15	Primary_Mission	Mission_Type	1	N/A
	Route	Loc_Point_List	1	N/A
	Load	Ordnance_Load_Struct	1	N/A
F-16	Primary_Mission	Mission_Type	1	N/A
	Route	Loc_Point_List	1	N/A
	Load	Ordnance_Load_Struct	1	N/A
Fixed_Wing_Aircraft	Mode2_Squawk	short	1	
	Mode3_Squawk	short	1	
	Owning_Squadron	string	1	
Military_Aircraft	Altitude	float	1	
	Course	float	1	
	Speed	float	1	
Military_Platform	Side	string	1	
	Country_Code	string	1	
	Symbol	short	1	

4.2 & 4.3 Integrate and Test Federation

Bring federation team together in a unified operating environment to determine whether the federation executes correctly and meets the sponsor requirements.

- **Three categories of federation testing**
  - **Inter-federate testing**
  - **Full federation testing**
  - **Compliance testing**
- **Encourage federate teams to conduct technical tests at their facility prior to larger federation tests**
  - **Using surrogate applications that publish or subscribe to selected data (e.g., TestFederate)**

Federate Compliance Testing Philosophy



- Federates are tested to the HLA Specifications (IF, OMT, Rules)
- Test process is straight forward:
  - Federate Under Test (FUT) submits a description of its capabilities via a SOM and Conformance Statement (CS) to the Certification Agent (CA)
  - Federate demonstrates it can use the specifications correctly through a set of tests
  - CA verifies the federate conforms to the specifications by analyzing test results
- Test process is supported by automated tools to reduce time and cost associated with testing
  - FVT joins the federation as a federate, collects data from