

Discovery and Reuse of Modeling and Simulation Resources

M&S COI Discovery Metadata Specification & M&S Catalog

Roy Scrudder

DoD M&S Coordination Office
roy.scrudder@osd.mil

Topics

- Purpose of Discovery
- Need for Consistent Discovery Metadata
- Structure for Describing M&S Resources
- Making Resources Visible
- Summary

MSC-DMS

M&S Catalog

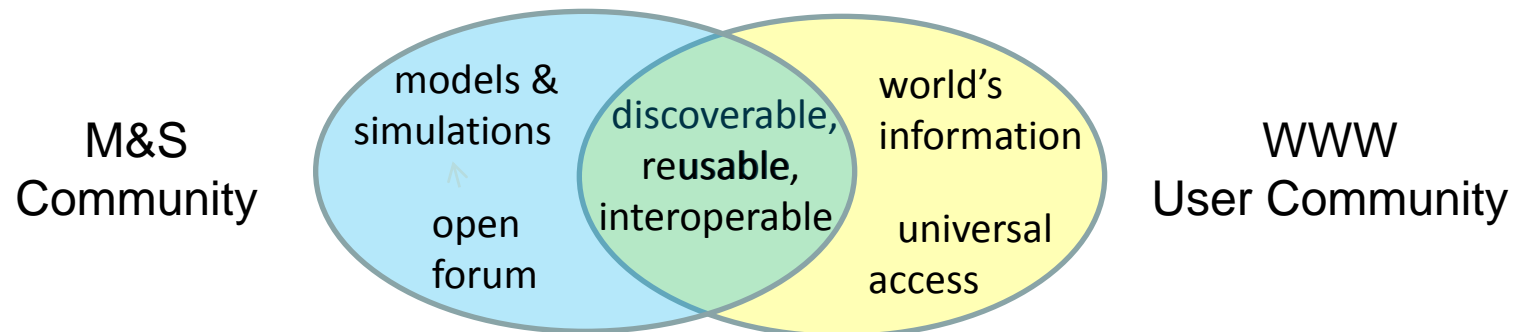


Purpose of Discovery

- To find M&S resources (aka, “assets” that can be applied to meet a user requirement
- Reuse is important to M&S users in DoD, industry, and academia (*consider SISO*)
- Discovery is something we try to do everyday (*think of Google*)

= REUSE

“to provide an **open forum** that promotes the **interoperability** and **reuse** of **models & simulations**”



Discovery of existing M&S resources is critical for effective **reuse** and for reduced duplication

Discovery of Resources

- Discovery the Google way:
 - Web pages crawled / indexed
 - “Associations” (citations, links) interpreted as **votes**
- Examine / exploit the “metadata within the markup”
 - Web pages have HTML (*layout + content + links*)
 - What do M&S Resources have?
- Key is to make sense of *content* vs. *keywords*



Discovery of M&S resources can best be achieved through a **consistent set of relevant metadata**

M&S Resources

- **M&S Software** (*implements a model or simulation*)
- **M&S Adjunct Tools** (*data loggers, visualization tools, or interfaces to live systems*)
- **Federations of simulations** (*a named set of interacting federates such as simulations & adjunct tools*)
- **M&S Software Components** (*reusable building blocks used to construct simulations and/or provide functionality*)
- **M&S Services** (*delivers data or interactions in support of M&S*)
- **M&S Data** (*in M&S-usable format / M&S produced data*)
- **M&S Data Models** (*structural metadata for describing M&S data*)
- **Interface Specifications** (*agreement for facilitating communication exchange among M&S Resources*)
- **M&S Software Design Documents** (*plan or specification, which affects / controls function or development of M&S resource*)

Different Views of Metadata

Structural Metadata

- “Rules governing a chunk” - Name, description, data constraints, and relationships of tags used in information resources to delimit one chunk of data from another chunk
- Artifacts where structural metadata is described:
 - XML schemas
 - RDBMS structures
 - taxonomies
- Register in DoD Metadata Registry, use submission package
- About Making things understandable

Discovery Metadata

- Aids in the recall and retrieval of artifacts (M&S resources), such as
 - Adjunct tools (e.g., data loggers)
 - Federations of simulations
 - M&S services
 - M&S data
 - M&S data models
 - Interface specifications
 - M&S software design documents
- Registered in “Metadata Catalogs”
- The Department of Defense Discovery Metadata Specification (DDMS) is the core specification that Communities tailor
- About Making things visible

Agreed-Upon Markup for Describing Resources

- Need a Markup Syntax -
 - HTML (fixed)
 - XML (flexible)
- Need a Metadata Structure
 - Defines how resources are described
 - Should support variety of resources
 - If XML then XSD (*Schema*)

Some potential XML-based specifications

- Model Id (HLA FOM, BOM)
- DDMS
- M&S tailoring of the DDMS
- Dublin Core
- *Roll your own?*

Choose the most **useful information**
for describing M&S resources

M&S COI Discovery Metadata Specification (*MSC-DMS*)

M&S Resource Types Addressed

- 1.M&S Software
- 2.M&S Adjunct Tools
- 3.Federations of Sims
- 4.M&S SW Components
- 5.M&S Services
- 6.M&S Data
- 7.M&S Data Models
- 8.Interface Specifications
- 9.Design Documents

M&S Descriptors

- ID
- Title
- Type
- Description
- Dates
- Version
- Security
- Rights
- Releasability
- Associations
- POCs
- Keywords
- Usages
- Media

MSC-DMS is consistent with the DoD Net Centric Data Strategy and represents an M&S COI extension of the DoD Discovery Metadata Specification

MSC-DMS Markup (XML Excerpt)

```

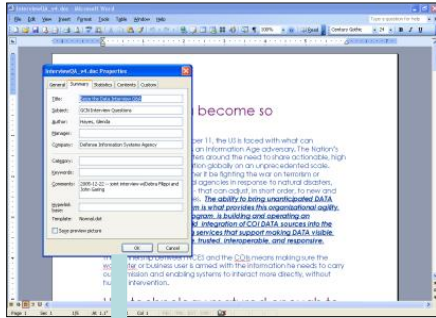
<?xml version="1.0" encoding="UTF-8"?>
<ms:Resource ms:ID="432">
  1 <ms:Title ms:value="sim sprocket model"/>
  2 <ms:Type ms:value="software"/>
  3 <ms:Description>
    <ms:Text>Software that models space sprockets</ms:Text>
  </ms:Description>
  4 <ms:Dates>
    <ms>Date ms:type="created" ms:value="2007-08-13"/>
  </ms:Dates>
  5 <ms:Version ms:value="1.4"/>
  6 <ms:Releasability ms:value="A: Unlimited distribution "/>
  7 <ms:POCs>
    <ms:POC>
      <ms:Role ms:value="publisher"/>
      <ms:Person>
        <ms>Name ms:first="Samuel" ms:last="Adams"/>
        <ms:AddressInfo/>
        <ms:Phone ms:type="work" ms:number="555.123.4567"/>
        <ms:Email ms:type="work" ms:address="sadams@sprocket.sims"/>
      </ms:Person>
    </ms:POC>
  </ms:POCs>
  8 <ms:Keywords> <ms:Keyword ddms:value="software"/> </ms:Keywords>
</ms:Resource>

```

“only 8 out of 15 root elements must be filled in”

Detailed POC structure

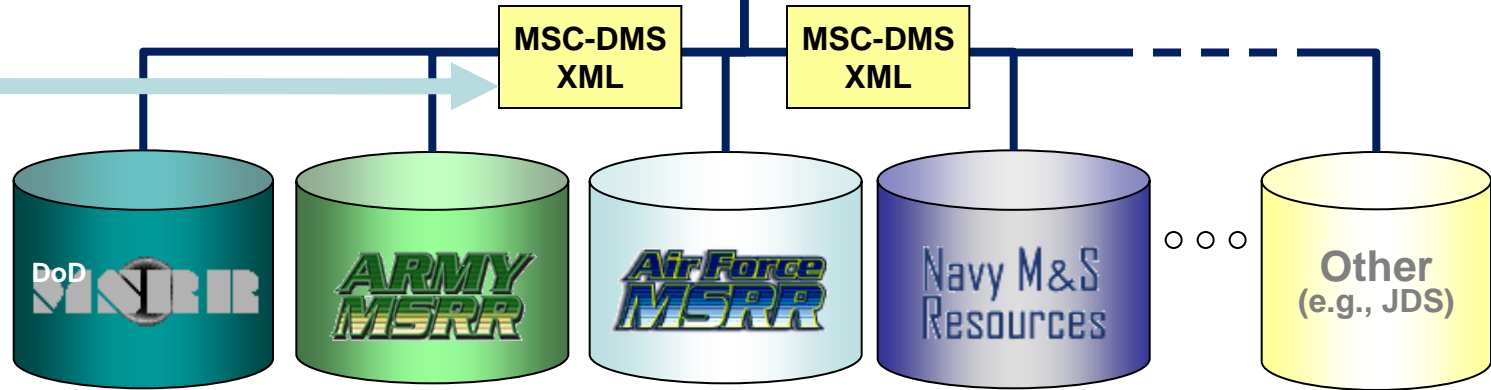
Getting Visibility to Resources: The M&S Catalog



consumer

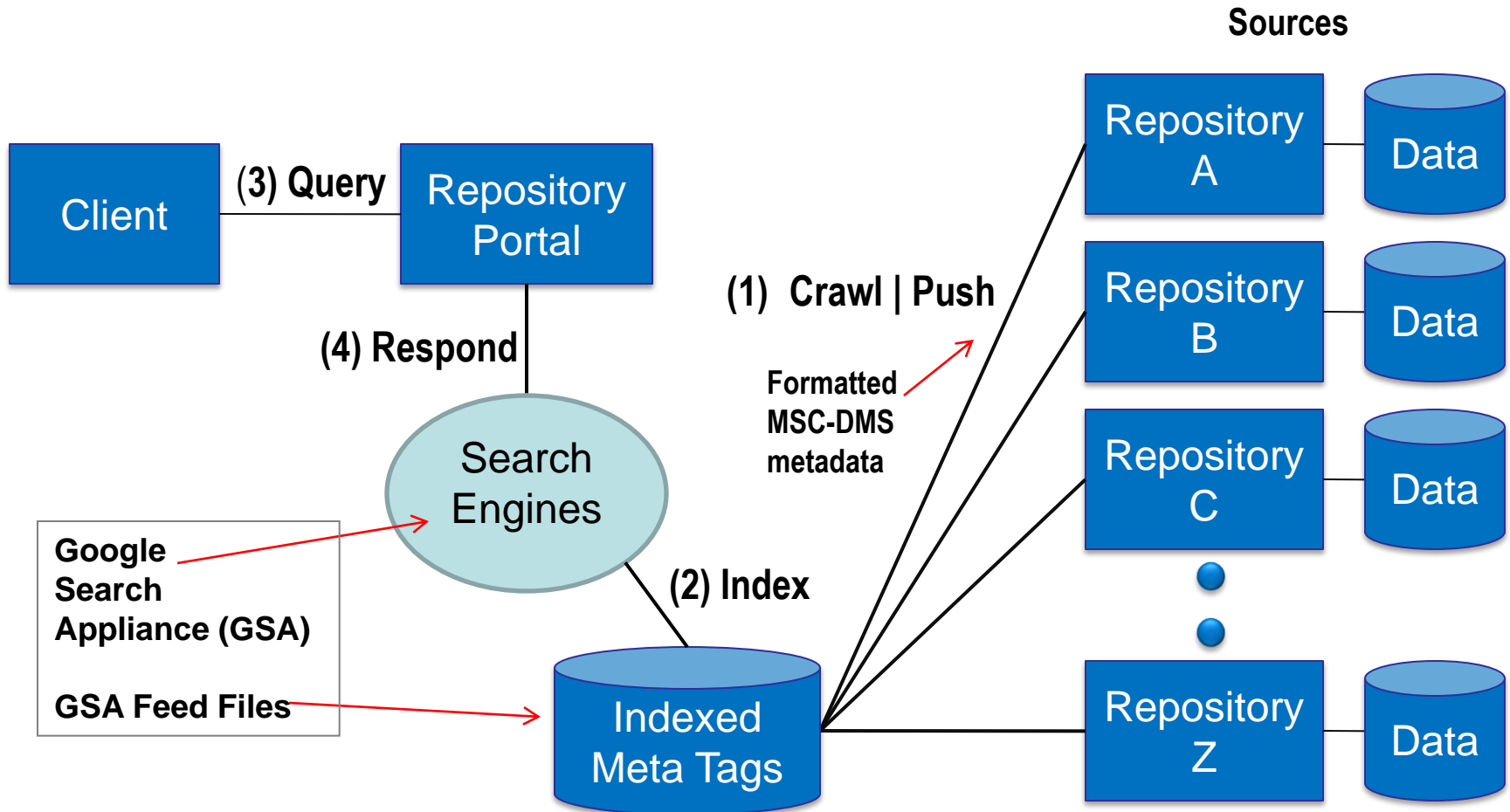


Sources send MSC-DMS formatted records to Catalog



User interested in a resource can learn of availability from multiple repositories w/ single query

How the M&S Catalog Works



Negotiated data exchange agreements with sources determine level of user's access

Case #1: General Query- "ITEM"

... purposes only.
For questions or assistance, please contact the M&S Catalog Help Desk at MSCatalogHelpDesk@mso.navy.mil

Search...
Modeling & Simulation Catalog

[Advanced](#) ?

ITEM

<input type="checkbox"/> Title	<input type="checkbox"/> References
<input type="checkbox"/> Type	<input type="checkbox"/> POC
<input type="checkbox"/> Description	<input type="checkbox"/> Keywords
<input type="checkbox"/> Dates	<input type="checkbox"/> Acronym
<input type="checkbox"/> Version	<input type="checkbox"/> Media
<input type="checkbox"/> Rights	<input type="checkbox"/> Security

This is what we want →

[Army Modeling & Simulation Resource Repository](#)
... Make a Comment Military **Item** Disposal Instructions and Military Environmental Information Source Data Source - Dataset Initial Submission Date: 03/01/2000. ...
www.msrr.army.mil/view_detail.cfm%3FRID%3DDTS_A_1000383 - 18k - - [cached](#)

Army

[Resource Item Details](#)
Resource Details, Resource Information Domain-Type, DOD/Agency-Model. Template Type, MSRR. Date Registered, 2001-07-05. General Information ...
www.msrr.dmsomil/share/resourceitem/ViewDetails.jsp%3Fresid%3D3991 - 12k - - [cached](#)

DoD

[Resource Item Details](#)
Resource Details, Resource Information Domain-Type, DOD/Agency-Model. Template Type, MSRR. Last Updated By, Msrr Administration. Last Updated, 2008-03-04. ...
www.msrr.dmsomil/share/resourceitem/ViewDetails.jsp%3Fresid%3D3991%26schema%3DMSRR - 13k - - [cached](#)

[Army Modeling & Simulation Resource Repository](#)
... Army Logistic Support Activity, Major **Item** Information Center Requisition Validation System REQVAL Data Source - Other Initial Submission Date: 04/23/1998. ...
www.msrr.army.mil/view_detail.cfm%3FRID%3DDTS_A_1000010 - 8k - - [cached](#)

[Integrated Theater Engagement Model \(ITEM\) \(U\)](#)
<P>(U) Used to model engagements between platforms in support of analysis, **ITEM** gives representation sufficient to conduct JMS Assessments and IBR analyses. ...
<https://jds.pae.osd.mil> - 4k - - [cached](#)

JDS

- Title: Integrated Theater Engagement Model (ITEM) (U)
- Description: <P>(U) Used to model engagements between platforms in support of analysis, ITEM gives

Case #2: Targeted Query: Acronym="ITEM"

https://modsim.chs.spawar.navy.mil/web/guest/4?p_id=simplesearchpaetestdevbanner_WAR_paetestdevbanner_INSTANCE_m2xN&p_p_action=1&p_p_state=maximized& Go

Search

Results 1 - 1 of 1 for . Search took 0.01 seconds.

This is a development version for demonstration and testing purposes only.

For questions or assistance, please contact the M&S Catalog Help Desk at MSCatalogHelpDesk@nmso.navy.mil

JDS

[Integrated Theater Engagement Model](#)

Used to model engagements between platforms in support of analysis. Model gives representation sufficient to conduct JMS Assessments and IBR Analyses. It is a campaign ...
[nmso.navy.mil/index.cfm%3Frid%3DMNS_N_1000210 - 3k - - cached](#)

- Title: Integrated Theater Engagement Model
- Description: Used to model engagements between platforms in support of analysis. Model gives representation sufficient to conduct JMS Assessments and IBR Analyses. It is a campaign-level model used in the joint arena for strategy assessment and evaluation of force composition and effectiveness.
- Sponsor: CNO (NB) Assessment
- Acronym: ITEM
- Releaseability: This resource is UNCLASSIFIED

Exactly what we want.

Search... Modeling & Simulation Catalog

[Advanced](#) ?

<input type="checkbox"/> Title	<input type="checkbox"/> References
<input type="text"/>	<input type="text"/>
<input type="checkbox"/> Type	<input type="checkbox"/> POC
<input type="text"/>	<input type="text"/>
<input type="checkbox"/> Description	<input type="checkbox"/> Keywords
<input type="text"/>	<input type="text"/>
<input type="checkbox"/> Dates	<input type="checkbox"/> Acronym
<input type="text"/>	<input type="text" value="ITEM"/>
<input type="checkbox"/> Version	<input type="checkbox"/> Media
<input type="text"/>	<input type="text"/>
<input type="checkbox"/> Rights	<input type="checkbox"/> Security
<input type="text"/>	<input type="text"/>

AFAMS & NMSO: Title Includes "Extended"

This is a development version for demonstration and testing purposes only.

For questions or assistance, please contact the M&S Catalog Help Desk at
MSCatalogHelpDesk@nmsc.navy.mil

Search...
Modeling & Simulation Catalog

[Advanced](#)

Search >

Title References

Extended

Type POC

Description Keywords

Dates Acronym

Version Media

Rights Security

[Brawler is a Monte Carlo simulation of air combat between multiple ...](#)

Brawler is a Monte Carlo simulation of air combat between multiple flights of aircraft. It features detailed, data-driven models of most avionics and weapons systems ...

[afmsrr.afams.af.mil/view_detail.cfm%3FRID%3DMDL_AF_1000009-3k--cached](#)

- Title: Extended Air Defense Simulation/Brawler Confederation
- Description: Brawler is a Monte Carlo simulation of air combat between multiple flights of aircraft. It features detailed, data-driven models of most avionics and weapons systems found on modern fighter aircraft. The purpose of confederating EADSIM and Brawler is to capture the effects of the pilot decision process in
- POC: Resource Coordinator 407-208-5768 afmsrr-rc@afmsrr.afams.af.mil
- Releasability: This resource is available as both Classified and Unclassified.
- Security: NULL

[Extended Air Defense Testbed \(EADTB\) is a stochastic, event ...](#)

Extended Air Defense Testbed (EADTB) is a stochastic, event-stepped simulation intended for joint-service, international use. The object-based simulation supports ...

[afmsrr.afams.af.mil/view_detail.cfm%3FRID%3DSMN_AF_1000032-5k--cached](#)

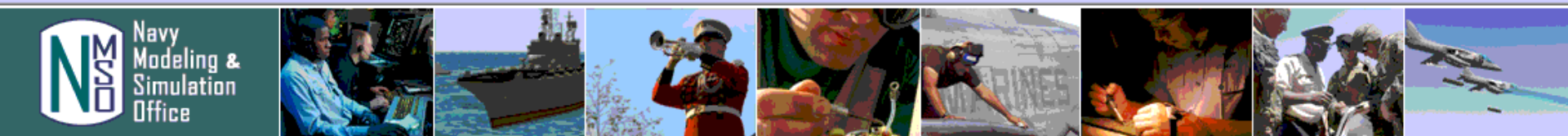
- Title: Extended Air Defense Testbed
- Description: Extended Air Defense Testbed (EADTB) is a stochastic, event-stepped simulation intended for joint-service, international use. The object-based simulation supports modeling from the battery/fire-unit level up to theater-level scope with a high degree of flexibility in detail level and aggregation. It offers a
- POC: Primary Contact Menchaca 505-846-4257 steve.menchaca@kirtland.af.mil
- Releasability: This resource is UNCLASSIFIED
- Security: NULL

[Extended Air Defense Simulation](#)

Model Air Defense, Theater Ballistic Missile Defense and limited strike scenario assessment.

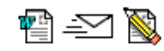
[nmsc.navy.mil/index.cfm%3FRID%3DMNS_N_1000021-4k--cached](#)

- Title: Extended Air Defense Simulation
- Description: Model Air Defense, Theater Ballistic Missile Defense and limited strike scenario assessment.
- Sponsor: Department of the Army
- Acronym: EADSIM
- Releaseability: This resource is UNCLASSIFIED



- Navy M&S Office
- About NMSO
- M&S Standards
- High Level Architecture
- VV&A
- Communities
- Navy M&S Information Service
- Navy MSRR
- Navy M&S Toolset
- News & Events
- Discussion Forums
- Related Sites
- Help

Navy M&S Resources



Extended Air Defense Simulation

Model/Simulation Submitted: 12/15/1996

Title: Extended Air Defense Simulation

Acronym: EADSIM

Version: 6 **Version Date:** 8/1/1997

Sponsor: Department of the Army

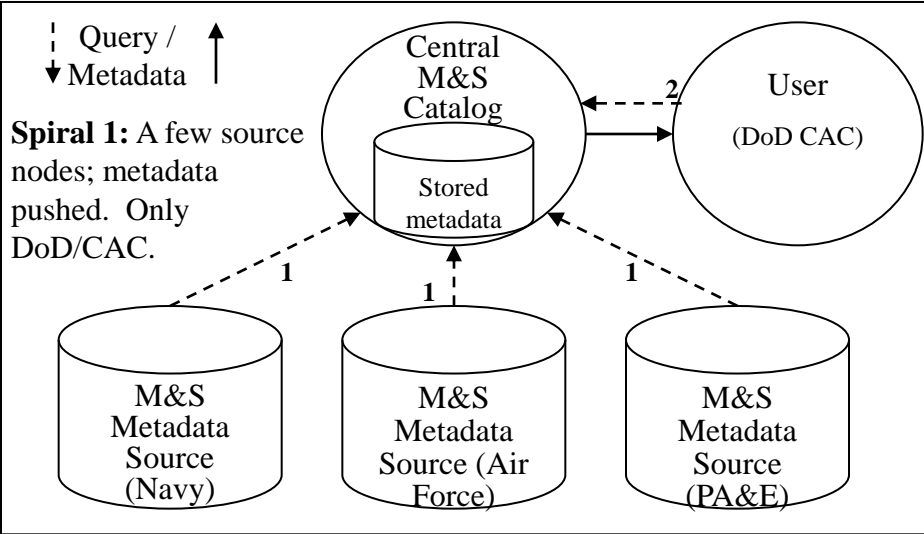
Narrative: Model Air Defense, Theater Ballistic Missile Defense and limited strike scenario assessment. EADSIM is a workstation-hosted, system-level simulation which is designed to be used by combat developers, material developers, and operational commanders to assess the effectiveness of Theater Missile Defense (TMD) and air defense systems against the full spectrum of extended air defense threats. It provides a many-on-many theater-level simulation of air and missile warfare, an integrated simulation tool to support joint and combined force operations, and a tool to augment exercises with realistic air defense training.

Distribution:
A: Unlimited distribution

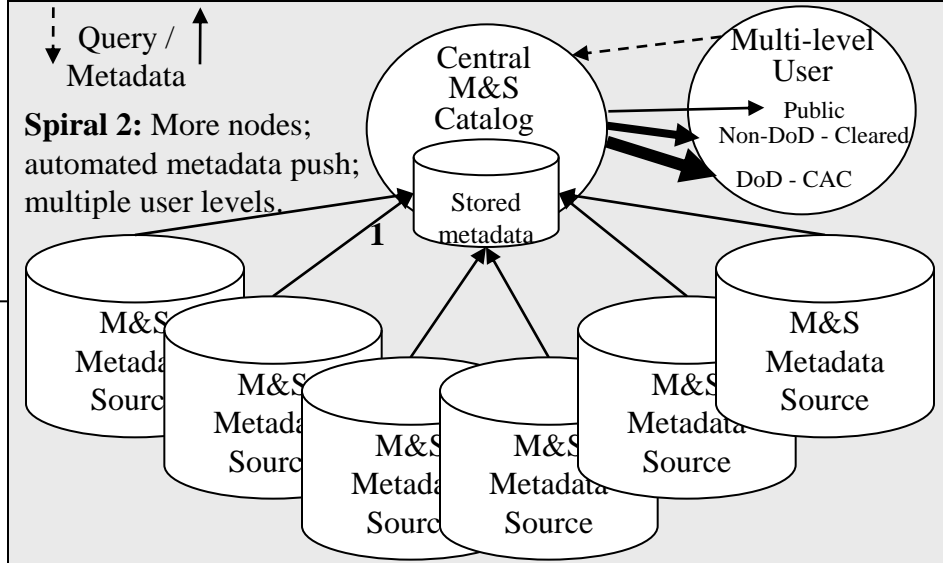
Reach-back
from EADSIM
to NMSO

Spiral 1 (FY07/08)

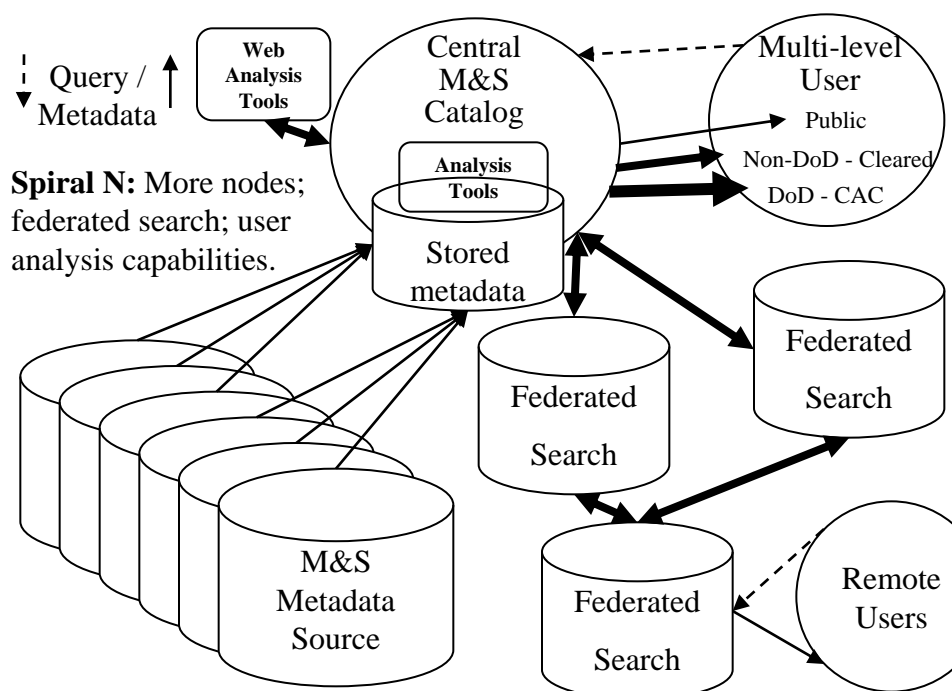
M&S Catalog Spiral Development



Spiral 2 (FY09)



Spiral N



Spiral 1: Low-risk threshold then improve. Plan for future.

Spiral 2: Improve metadata foundation. More sources. Grow capabilities. Document search & discovery process. Governance. Sustainment.

Summary

- We explored useful ways to help achieve discovery and reuse of M&S resources
- Enablers
 - **MSC-DMS Schema** as a way to describe resources
 - **M&S Catalog** as a way to search across the enterprise

Recommendation:

The M&S Community at large begin taking steps towards cataloging M&S resources in a common way

For More Information

- MSC-DMS
 - www.msco.mil (follow link to “Resource Discovery”)
 - Roy Scrudder roy.scrudder@osd.mil
 - Paul Gustavson pgustavson@simventions.com
- M&S Catalog
 - Public availability (CAC restricted) planned for mid FY10
Kevin Charlow kevin.charlow@navy.mil
 - Dr. Richard Daehler-Wilking r.daehler-wilking@navy.mil

To become a beta tester to integrate your repository with the M&S Catalog contact Dr. Richard Daehler-Wilking