SAVAGE Modeling Analysis Language (SMAL)

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Objective

Better methods are needed for improving the fusion and presentation of data required by the battlespace Commander. One method is to develop a 3D representation of the battlefield. Increasing the speed and ease of construction of 3D scenes to augment 2D displays via "autogeneration" is key to this next step of battlespace visualization (BSV).

Background

Developed by LCDR Travis Rauch, USN

Rauch, T. M., "Savage Modeling and Analysis Language (SMAL): Metadata for Tactical Simulations and X3D Visualizations," Master's Thesis, Naval Postgraduate School, Monterey, CA, March 2006.

http://theses.nps.navy.mil/06Mar_Rauch.pdf

Application to research projects in the Scenario Authoring and Visualization for Advanced Graphical Environments (SAVAGE) Research Group (SRG) in the MOVES Institute

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Purpose

- Strategy for identifying tactical, physical and simulation-oriented metadata for vehicles, terrain and entities in virtual environments (VEs)
- Collects and organizes information necessary to create and populate a 3D virtual environment
- Equivalent XML and X3D representations for SMAL are defined

Related XML-Based Languages

- Military Scenario Definition Language (MSDL)
- Joint Command, Control and Communication Information Exchange Data Model (JC3IEDM)
- Battle Management Language (BML)
- Tactical Assessment Markup Language (TAML)

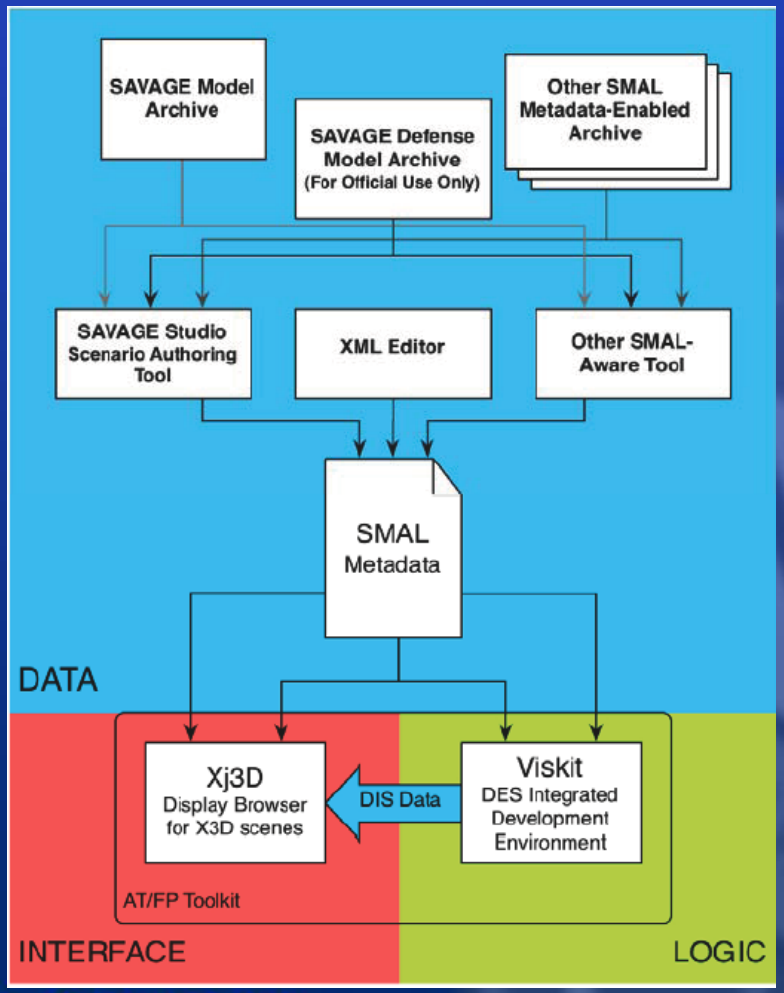
Supporting Data and Metadata Standards

- Dublin Core Metadata Initiative (DCMI)
- Resource Description Framework (RDF)
- Web Ontology Language (OWL)
- Geography Markup Language (GML)
- Joint METOC Broker Language (JMBL)
- Building Informational Model (BIM)

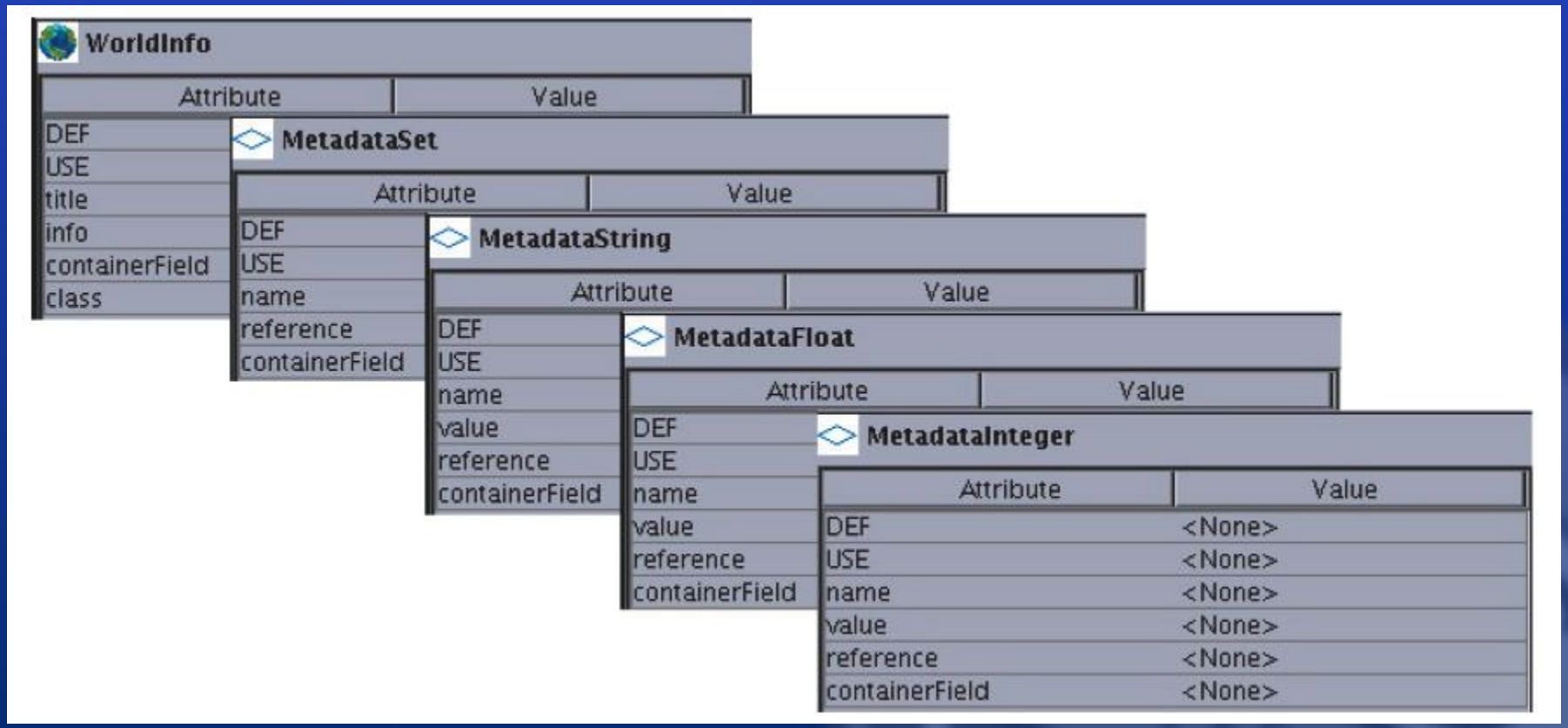
SMAL Usage

- Viskit event graph (EG) and Assembly modeling tool for designing and running Discrete Event Simulations (DES)
- SavageStudio scenario-authoring tool
- Savage and SavageDefense X3D model archives

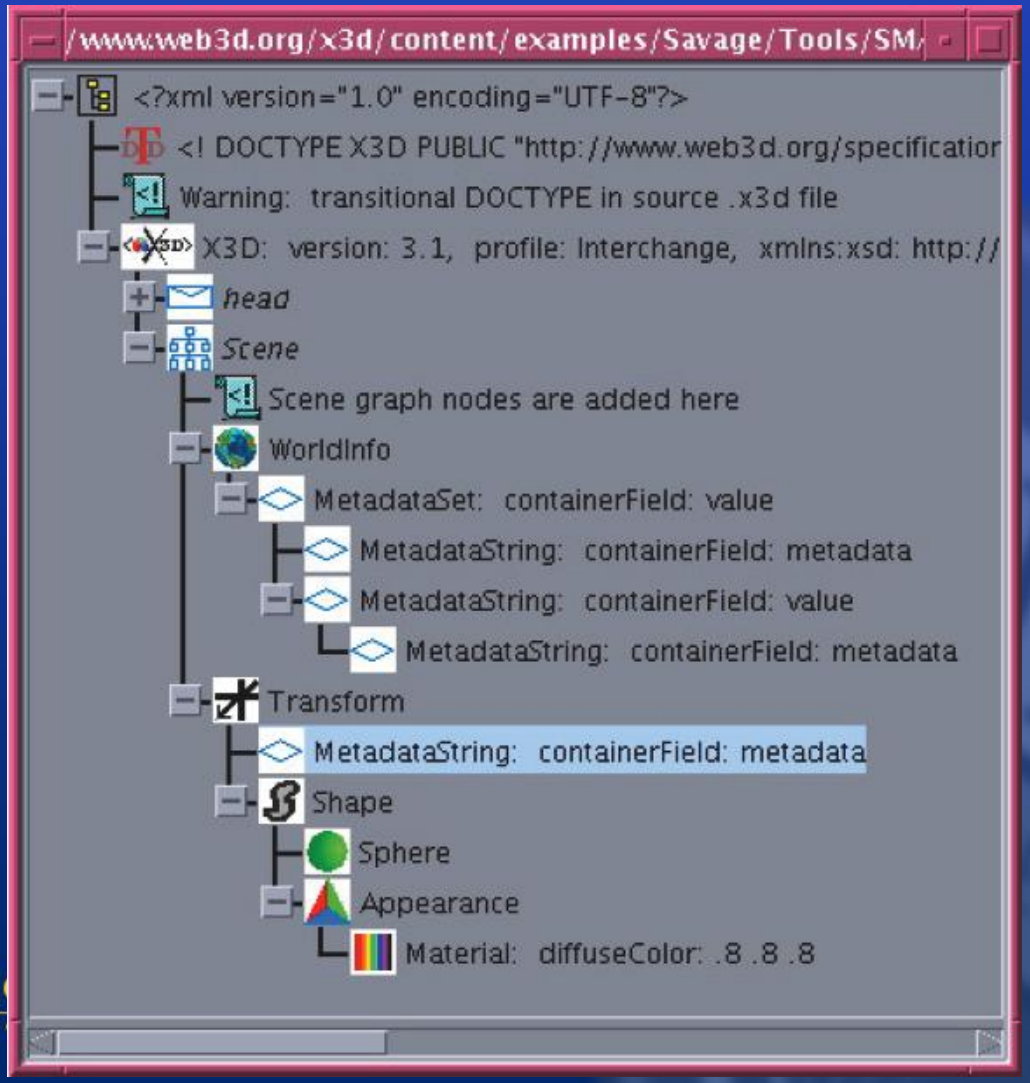
Role of SMAL in 3D Visualization



X3DMetadataObject



Tree Structure from X3D Edit



SMAL In XML Form

```
<X3D profile='Interchange' version='3.0' xmlns:xsd='http://www.w3.org/2001/XMLSchema-instance'
      xsd:noNamespaceSchemaLocation='http://www.web3d.org/specifications/x3d-3.0.xsd'>
 <head>
  <meta/>
 </head>
 <Scene>
  <WorldInfo info='"http://www.hazegray.org/worldnav/mideast/iran.htm#4"' title='Speedboat Iraq Idle'>
   <MetadataSet containerField='metadata' name='SMAL'>
    <MetadataString containerField='value' name='version' value='1.0'>
     <MetadataString name='appinfo' value='This is the version of SMAL employed, not of the model.'/>
    </MetadataString>
    <MetadataSet containerField='value' name='EntityDefinition'>
     <!-- Identifying metadata for the current simulation of interest -->
     <MetadataSet containerField='value' name='Classification'>
      <MetadataString containerField='value' name='level' value='UNCLASSIFIED'>
       <MetadataString name='appinfo' value='UNCLASSIFIED, FOUO, CONFIDENTIAL, SECRET, or TOPSECRET'/>
      </MetadataString>
      <MetadataString containerField='value' name='reference' value='"http://www.hazegray.org/worldnav/mideast/iran.htm#4"'>
       <MetadataString name='appinfo' value='The published source of classified information, if any, contained in the Metadata.'/>
      </MetadataString>
      <MetadataString containerField='value' name='rationale' reference='"http://www.hazegray.org/worldnav/mideast/iran.htm#4"' value='All
    information derived from a unclassified public source'>
       <MetadataString name='appinfo' value='The specific element which contains the information classifying this document.'/>
      </MetadataString>
     </MetadataSet>
     <MetadataSet containerField='value' name='IdentificationParameters'>
      <MetadataString containerField='value' name='name' value='Speedboat Iraq Idle'>
       <MetadataString name='appinfo' value='The plain language name of the vehicle this model represents, i.e. the base class (DDG-51), or
    vehicle designation (M1A2).'/>
      </MetadataString>
      ...
   </MetadataSet>
  </WorldInfo>
```

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Resources Available

https://savage.nps.edu/Savage/Tools/SMAL/SMAL.html
SMAL schema documentation
SavageModelingAnalysisLanguage1.0.dtd
SavageModelingAnalysisLanguage1.0.xsd
SavageModelingAnalysisLanguageDataTypes1.0.xsd
SavageModelingAnalysisLanguageEnumerations1.0.xsd

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Backup Slides

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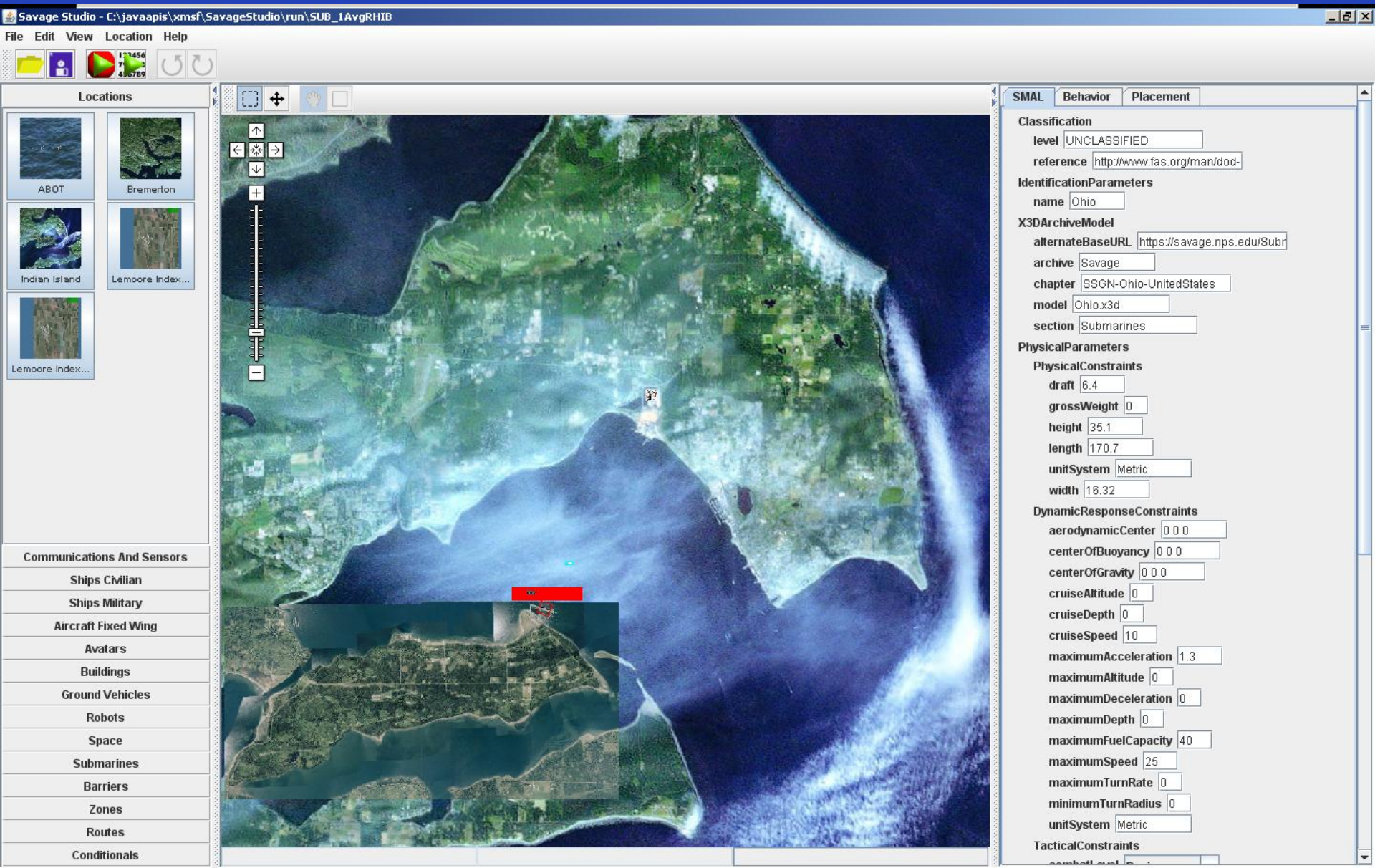
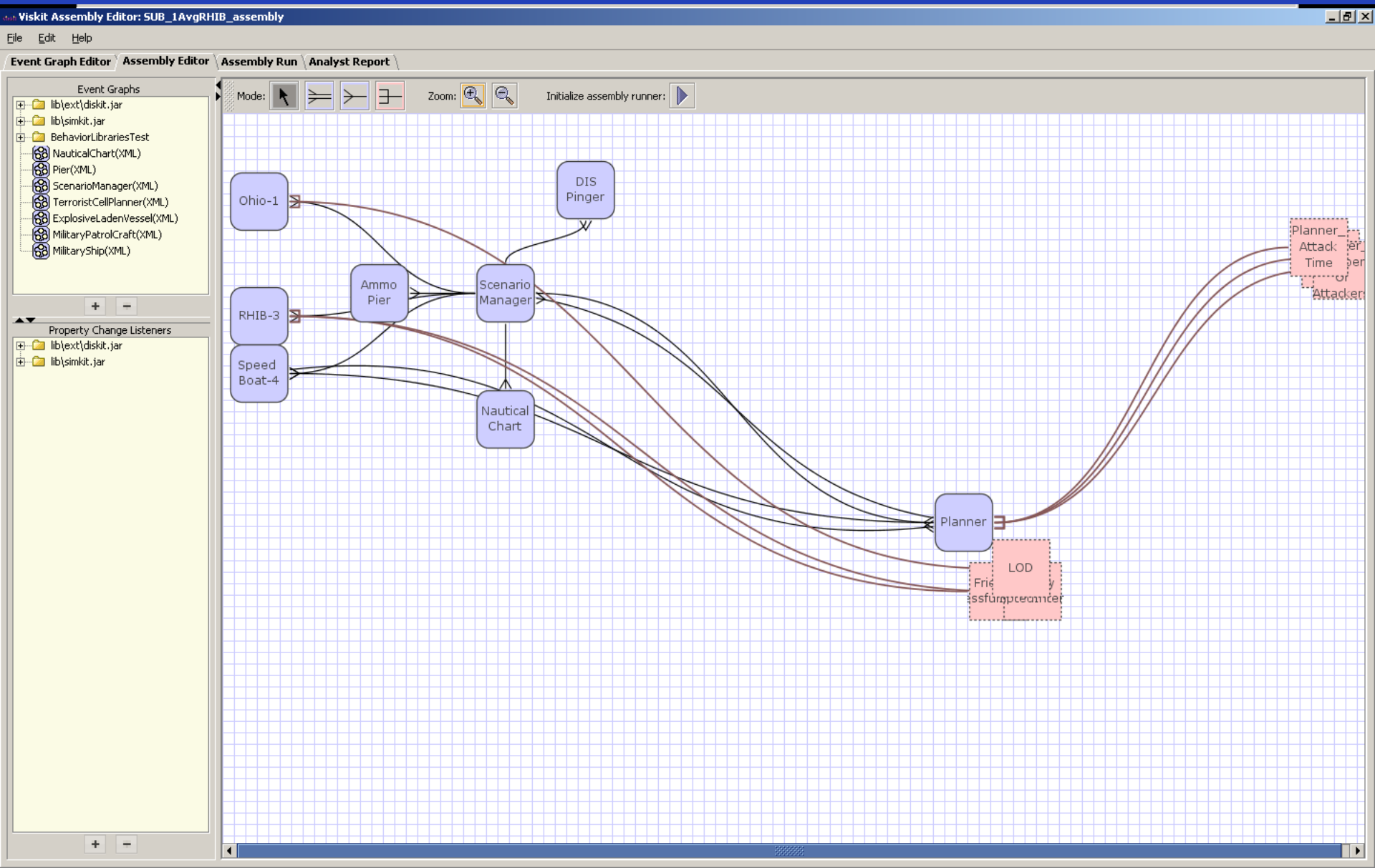
SavageStudio Scenario Authoring

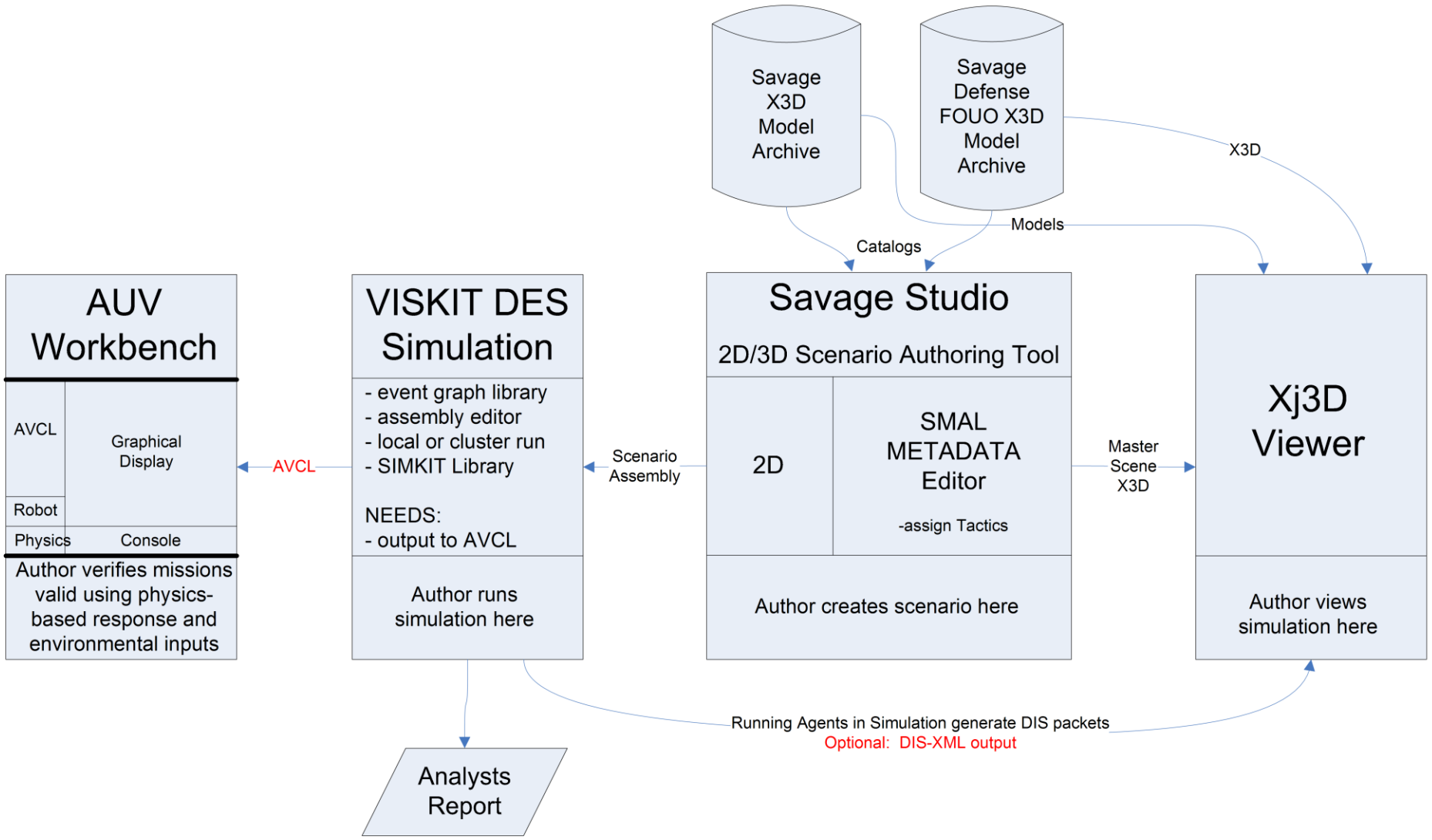


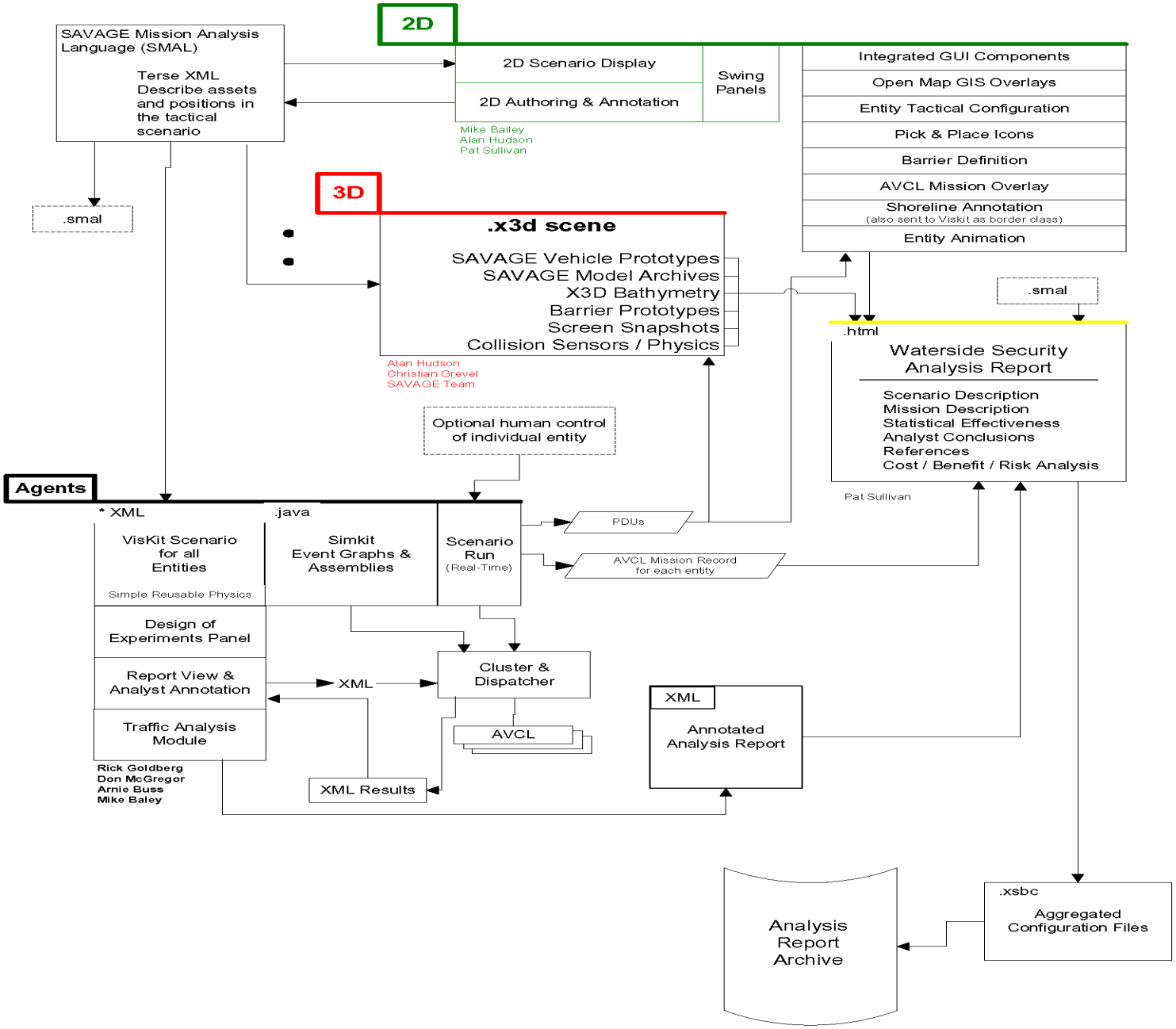
Viskit Application



Savage Studio Simulation Analyst Workflow

Tuesday, August 15, 2006




SAVAGE Mission Analysis Language (SMAL)
Terse XML Describe assets and positions in the tactical scenario
.smal
2D
2D Scenario Display
2D Authoring & Annotation
Swing Panels
Mike Bailey
Alan Hudson
Pat Sullivan
Integrated GUI Components
Open Map GIS Overlays
Entity Tactical Configuration
Pick & Place Icons
Barrier Definition
AVCL Mission Overlay
Shoreline Annotation
(also sent to Viskit as border class)
Entity Animation
3D
.x3d scene
SAVAGE Vehicle Prototypes
SAVAGE Model Archives
X3D Bathymetry
Barrier Prototypes
Screen Snapshots
Collision Sensors / Physics
Alan Hudson
Christian Grevel
SAVAGE Team
.smal
.html
Waterside Security Analysis Report
Scenario Description
Mission Description
Statistical Effectiveness
Analyst Conclusions
References
Cost / Benefit / Risk Analysis
Pat Sullivan
Optional human control of individual entity
Agents
* XML
.java
VisKit Scenario for all Entities
Simple Reusable Physics
Simkit Event Graphs & Assemblies
Scenario Run
(Real-Time)
PDUs
AVCL Mission Record for each entity
Design of Experiments Panel
Report View & Analyst Annotation
Traffic Analysis Module
XML
Cluster & Dispatcher
AVCL
XML Results
Rick Goldberg
Don McGregor
Arnie Buss
Mike Baley
XML
Annotated Analysis Report
Analysis Report Archive
.xsbc
Aggregated Configuration Files