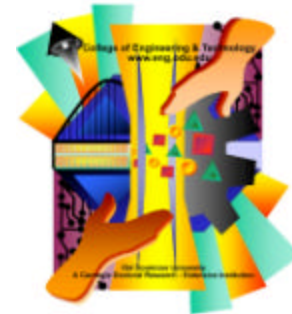


# *Synthetic Environments at VMASC*



**Andreas Tolk, Ph.D.**

Virginia Modeling Analysis and Simulation Center  
Old Dominion University

## Presentation Outline

- **Who is VMASC?**
  - **The Academic View of VMASC**
  - **The Government View of VMASC**
  - **The Industry View of VMASC**
- **Overview of the VMASC Battle Lab**
  - **Components**
  - **Applications**
- **Actual Research done at VMASC**
  - **XMSF**
  - **Composability**
  - **Homeland Security**
- **And Where is SEDRIS?**

## Who is VMASC?



**Virginia Modeling, Analysis & Simulation Center**

<http://www.vmasc.odu.edu>

## VMASC Overview

- Enterprise Center, College of Engineering & Technology, Old Dominion University
- Established July 1997 by the Commonwealth of Virginia
- Focus on Modeling & Simulation and Visualization
- Locations in
  - Suffolk, TCC-Portsmouth (VMASC West)
  - ODU-Norfolk Campus (VMASC East)
- Faculty/Staff - 60 full & part-time
- Multidisciplinary - activities have included faculty from all six academic colleges and from other universities (such as the Naval Postgraduate School, George Mason University, etc.)

**Academia**

**Military/Gov.**

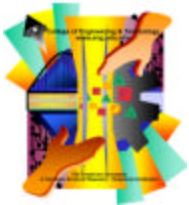
**Industry**

## VMASC – The Academic View



### Old Dominion University

- Virginia public university; organized 1930 as branch of the College of William & Mary; independent 1962
- Approximately 19,000 students and 1,000 faculty



### College of Engineering and Technology

- Full range of engineering programs
- M.S. and Ph.D. degrees in M&S (inter-departmental)



### Virginia Modeling, Analysis & Simulation Center

- University research laboratory, specializing in:  
***Modeling & Simulation, Visualization, and Analysis***
- Provider of engineering and technical services
- Home of M&S graduate programs

## The VMASC M&S Graduate Programs

### Master's Degree in M&S

- Multidisciplinary program
- Five departments:
  - Electrical and Computer Engineering
  - Engineering Management
  - Computer Science
  - Psychology
  - Occupational and Technical Education
- Two options:
  - Master of Science
  - Master of Engineering
- Core Courses plus electives

50

### Doctoral Program in M&S

- Established Fall 2000
- First doctoral program at a public university
- First Ph.D. in M&S in Fall 2003
- Core Courses
  - Advanced Discrete Systems Simulation
  - Foundations for Continuous and Real-Time Simulation
  - Simulation Theory and Formalisms
  - Ph.D. Seminar

35

## VMASC – The Government View

- Cooperative Research & Development Agreement (CRADA) of ODU with U.S. JFCOM
  - Joint War Fighting Center (JWFC) and Joint Battle Center (JBC) within the Joint Training Analysis and Simulation Center (JTASC) in Suffolk
  - U.S. Army's Training and Doctrine Command (TRADOC) and Military Traffic Management Command/Transportation Engineering Agency (MTMCTEA) in Newport News
  - U.S. Navy in Norfolk and Virginia Beach
  - U.S. Air Force in Langley
- National Center for Collaboration in Medical Modeling and Simulation Established by Congress in FY2002, joint program with Eastern Virginia Medical School (EVMS)

***Stimulate technology-related economic development in the Commonwealth of Virginia***



## VMASC – The Industry View

Employ “Value-Added Proposition” approach to aid industry partners to expand opportunities

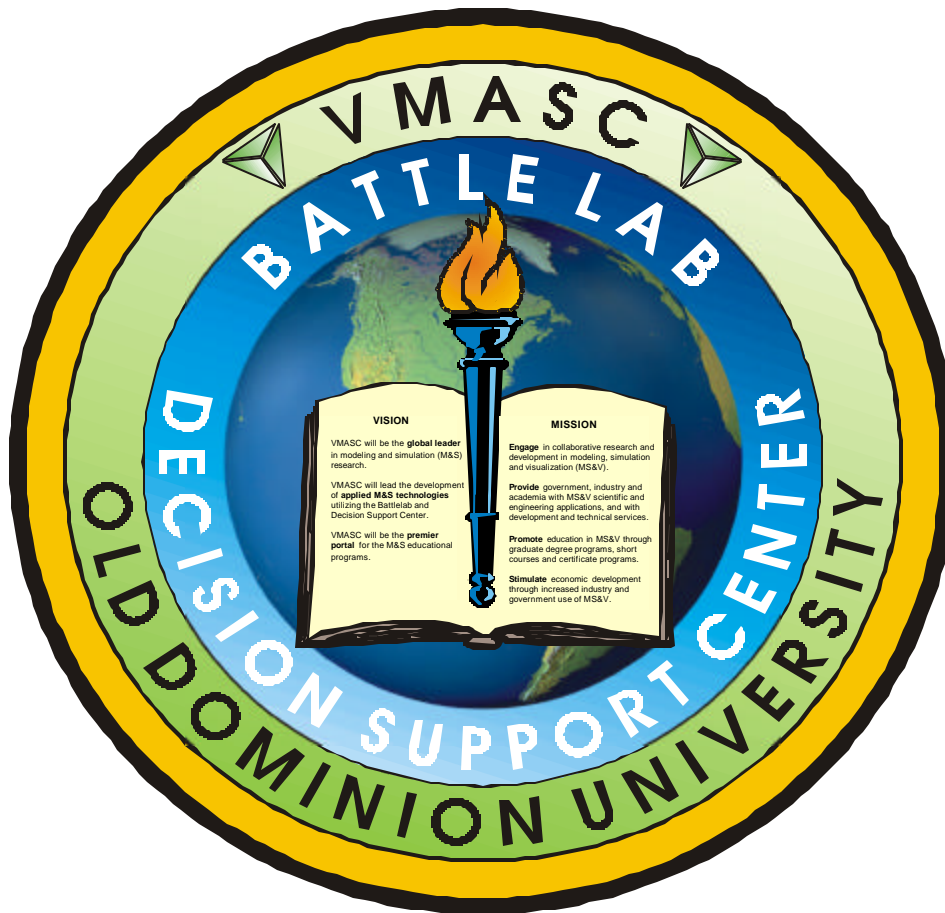
150 MEMBERS

9	Academic
15	Affiliate
24	Government
102	Industry



## The VMASC Battle Lab

## Overview of the VMASC Battle Lab



### Points of Contact:

Technical Director:  
Dr. Roland R. Mielke

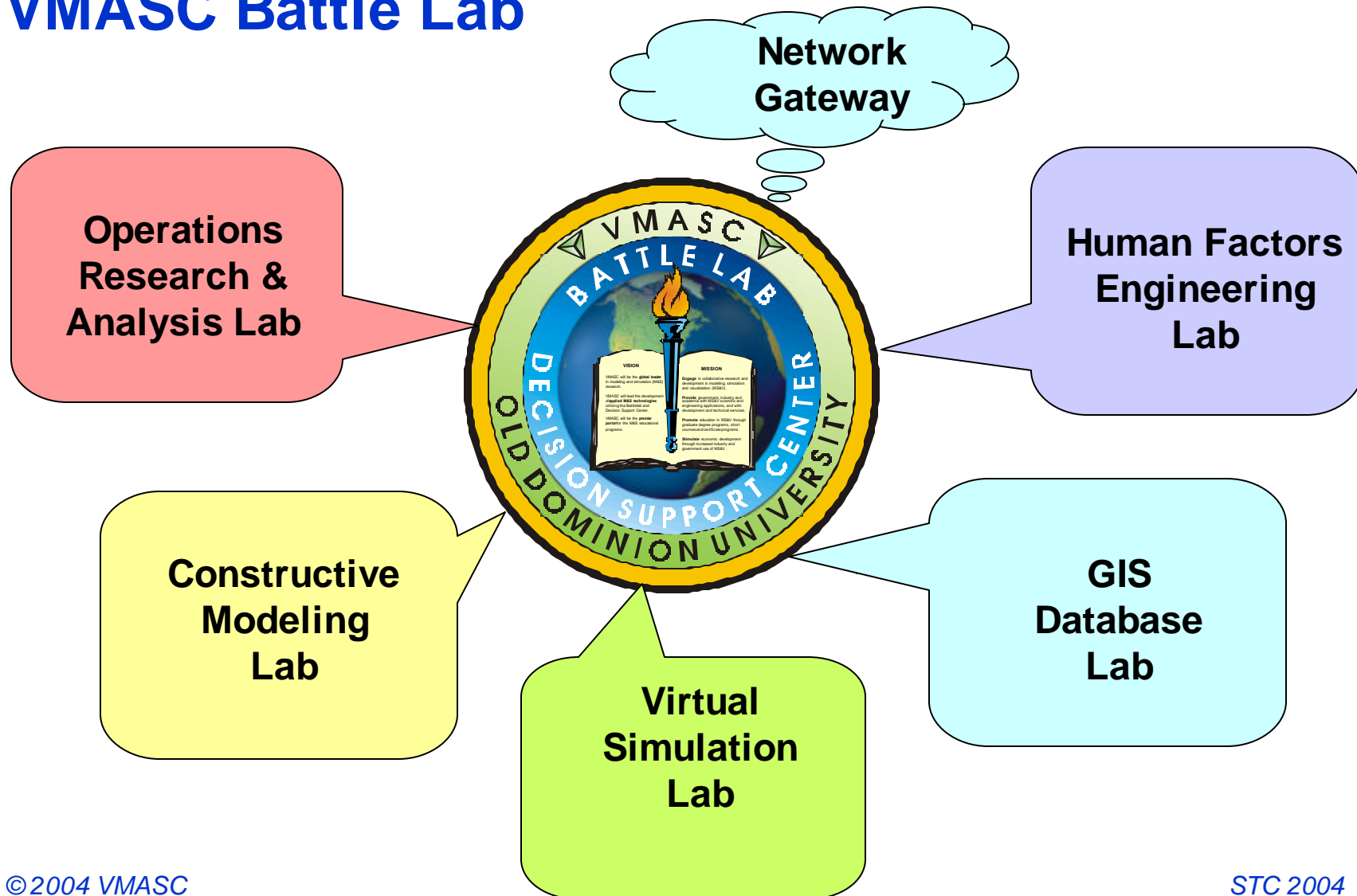
Battle Lab Director:  
Mr. Mark A. Phillips

## Why an Academic Battle Lab?

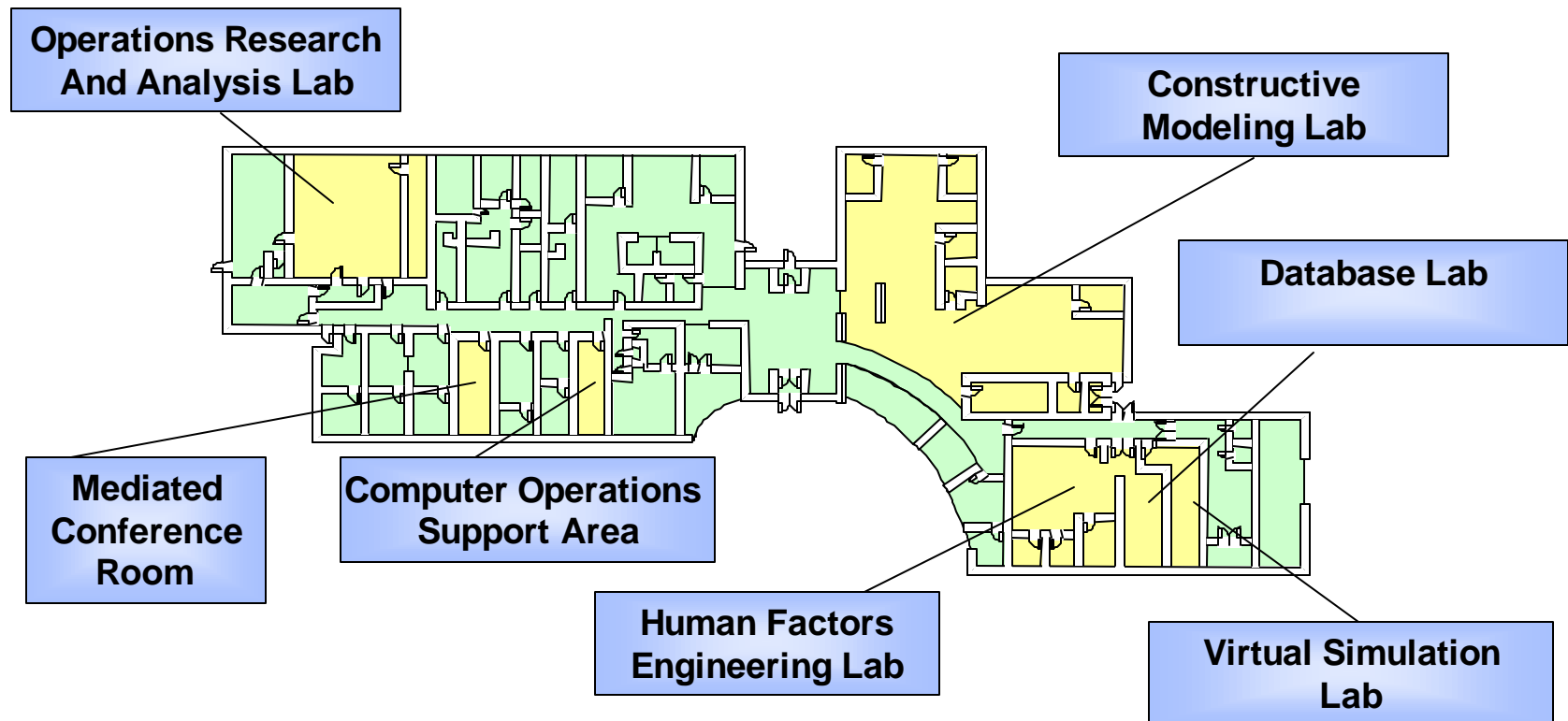


- Establishing the infrastructure required at VMASC for **conduction of research and graduate education** in computer modeling, simulation, and visualization.
- Positioning VMASC to better **support military commands** that utilize simulation for training and experimentation.
- Enhancing VMASC ability to **transfer this technology** for the use by government and industry.

## VMASC Battle Lab

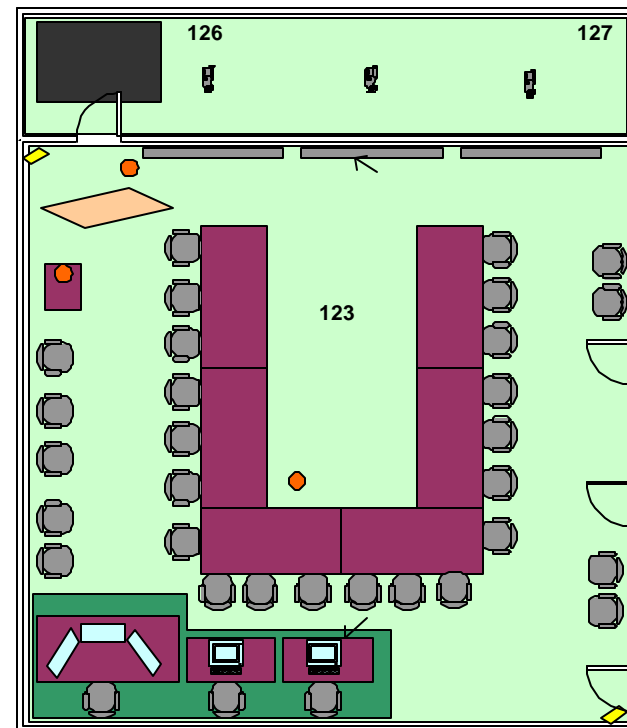


## VMASC Battle Lab Components



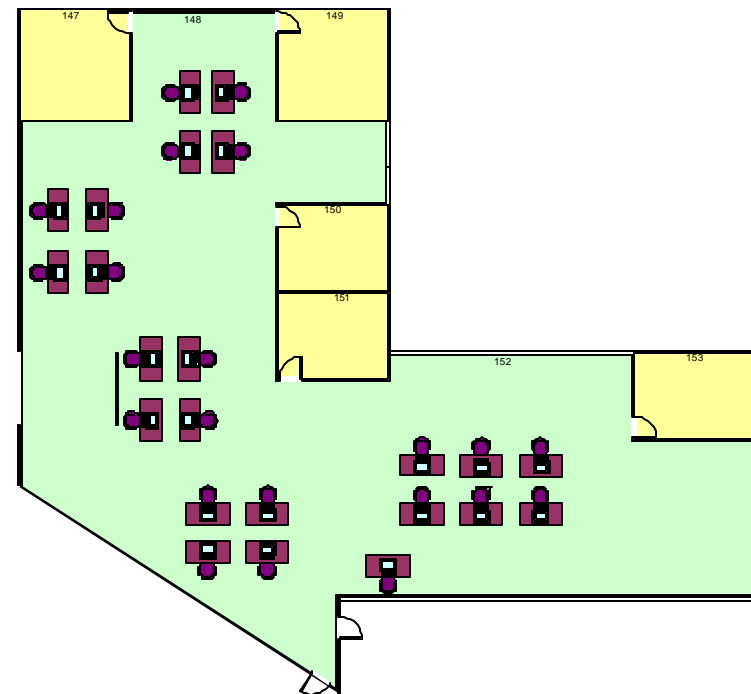
# OPERATIONS RESEARCH & ANALYSIS LABORATORY

- **Configuration**
  - Large open area configured as a small auditorium/classroom
- **Equipment**
  - Three rear-projection wall displays
  - Teleconference and collaboration systems
- **Utilization**
  - Group presentations and teleconferences
  - Classroom for short-courses and training sessions
  - Analysis sessions and collaborative design meetings



# CONSTRUCTIVE MODELING LABORATORY

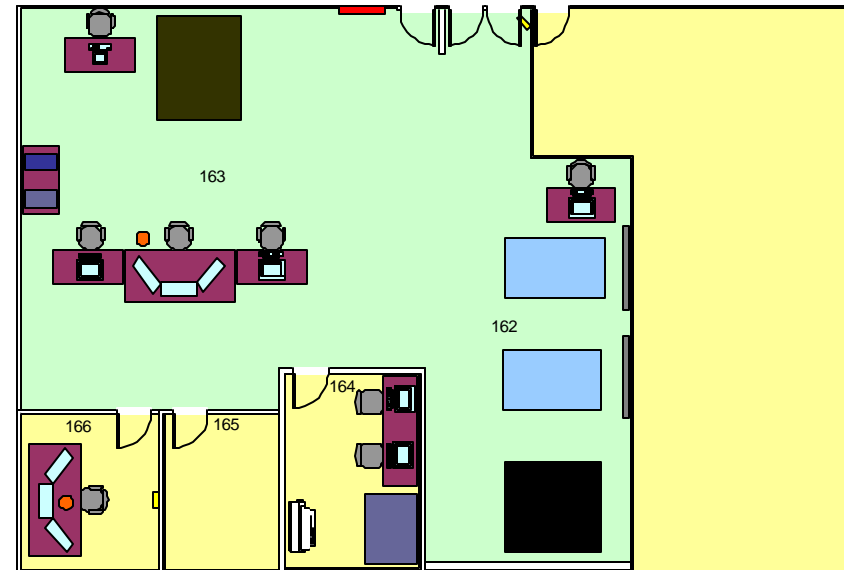
- **Configuration**
  - Large, re-configurable computer workstation laboratory
- **Equipment**
  - Thirty computer workstations
  - Digital communication system with data-logging feature
- **Utilization**
  - Model and simulation code development
  - Team areas for wargame exercises
  - General computer laboratory

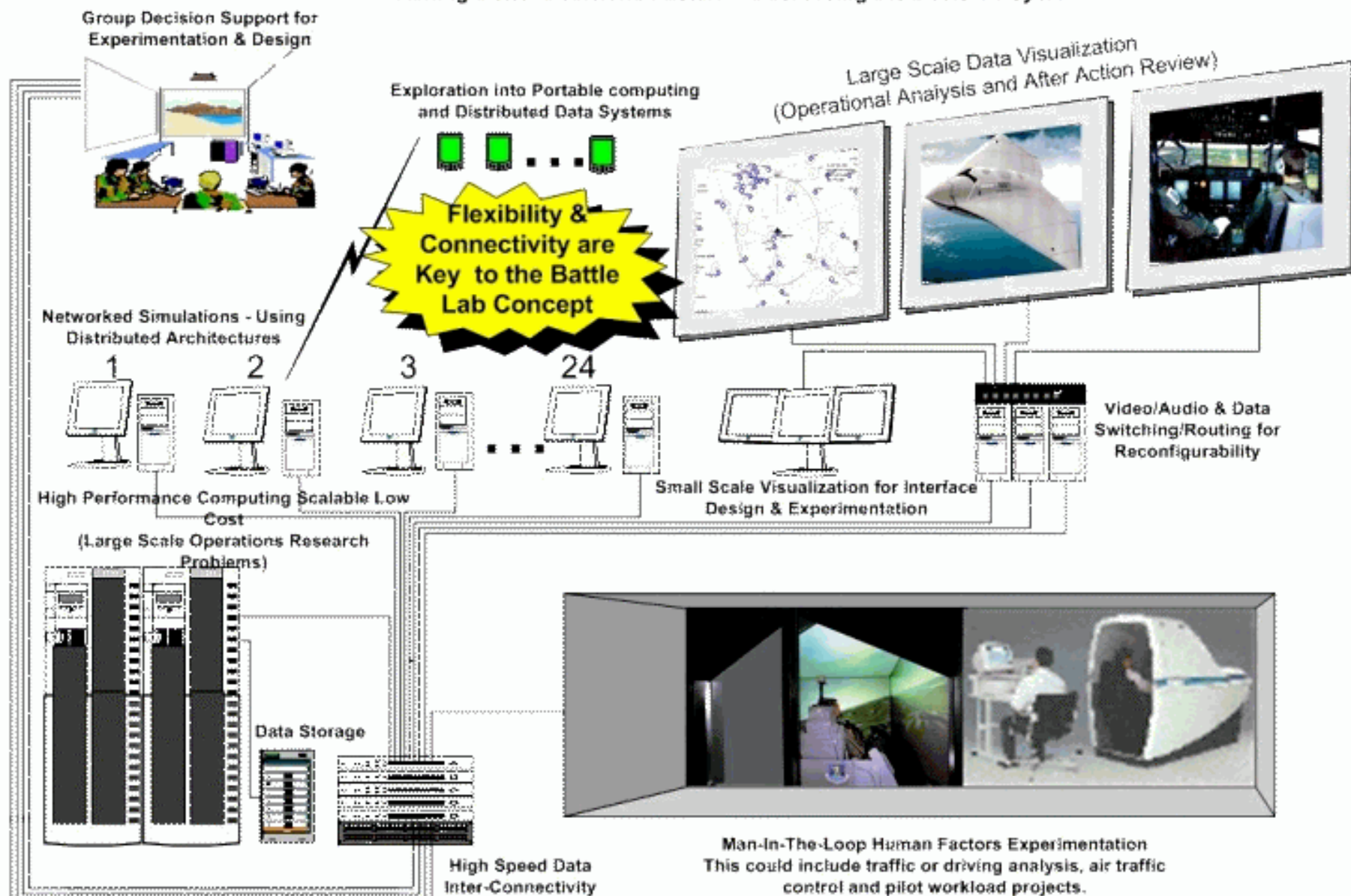




# HUMAN FACTORS ENGINEERING LABORATORY

- **Configuration**
  - A controlled environment suitable for testing human subjects
- **Equipment**
  - Visualization workstations
  - ImmersaDesk 2
  - Flight Simulators
  - Subject Monitoring
  - GIS/Database Work Area
- **Utilization**
  - Human-computer interface studies and experiments
  - Visualization experiments





## **The VMASC Battle Lab in the M&S Program**

- MSIM 630:  
Development and Application of Combat Models  
(Combat Modeling II)
- Master Thesis Students
  - Computer Science
  - Electrical and Computer Engineering
  - Engineering Management
- Student Support (GRA) in all Projects
- Computer Science Tutorial on Applied Artificial Intelligence (AI): Military Application Domain

## Actual Research at VMASC

## Extensible M&S Framework (XMSF)

### **VMASC is one of the Core Architects of XMSF:**

- MOVES Institute,  
Naval Postgraduate School
- C3I Center,  
George Mason University
- Virginia Modeling Analysis & Simulation Center, Old  
Dominion University
- SAIC, San Diego



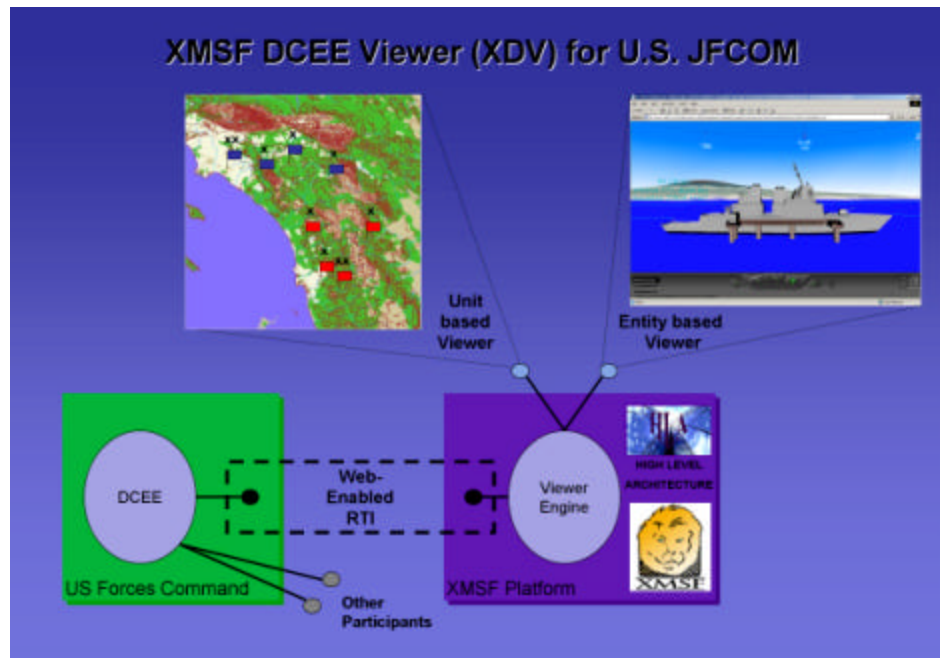
*The Extensible Modeling and Simulation Framework (XMSF) is defined as a set of web-based technologies and services, applied within an extensible framework, that enables a new generation of modeling & simulation (M&S) applications to emerge, develop and interoperate.*

*Current work in Web Services are an appropriate basis for organizing and composing the many necessary capabilities of Web/XML and Internet/networking needed for M&S applications.*

## XMSF DCEE Viewer (XDV)

### XMSF 1:

Develop an open standard based Viewer for the Distributed Continuous Experimentation Environment (DCEE) of the U.S. Joint Forces Command Experimentation Directorate



**Project Lead: GD/AIS**

**Partners: SAIC; NPS**

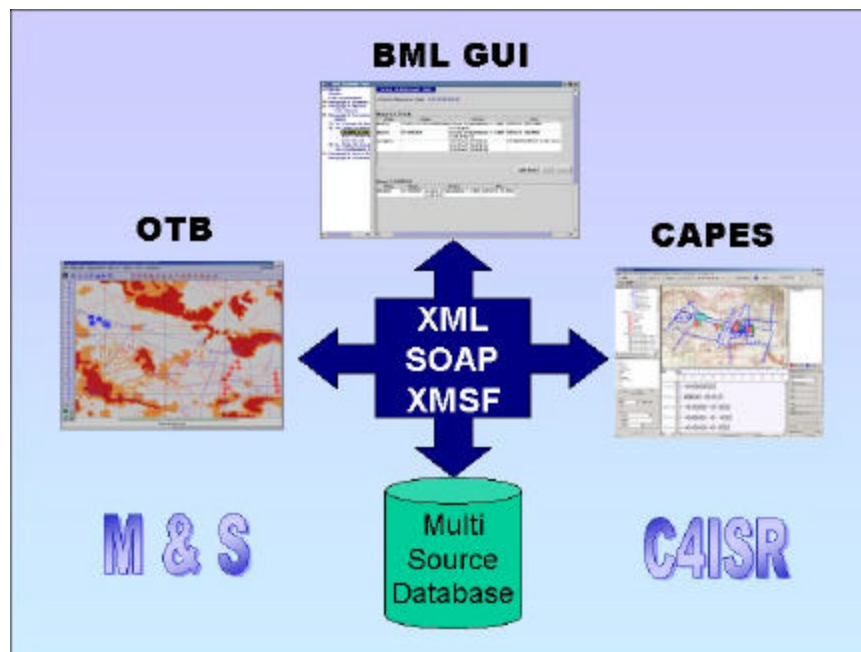
### The XMSF DCEE Viewer (XDV)

- Runs on Commercial-off-the-Shelf (COTS) PCs,
- Uses web-based protocols to display the actual situation within the DCEE federation
- Can be used by eligible DCEE users wherever an Internet-connection is available
- Comprises the Web-Enabled RTI, an Entity Based Viewer, and a Unit Based Viewer

## XMSF Battle Management Language (XBML)

### XMSF 2:

Transfer the Army Project Battle Management Language to a Joint and Combined Solution based on Open Standards



**Project Lead: GMU**  
**Partners: ACS; Alion**

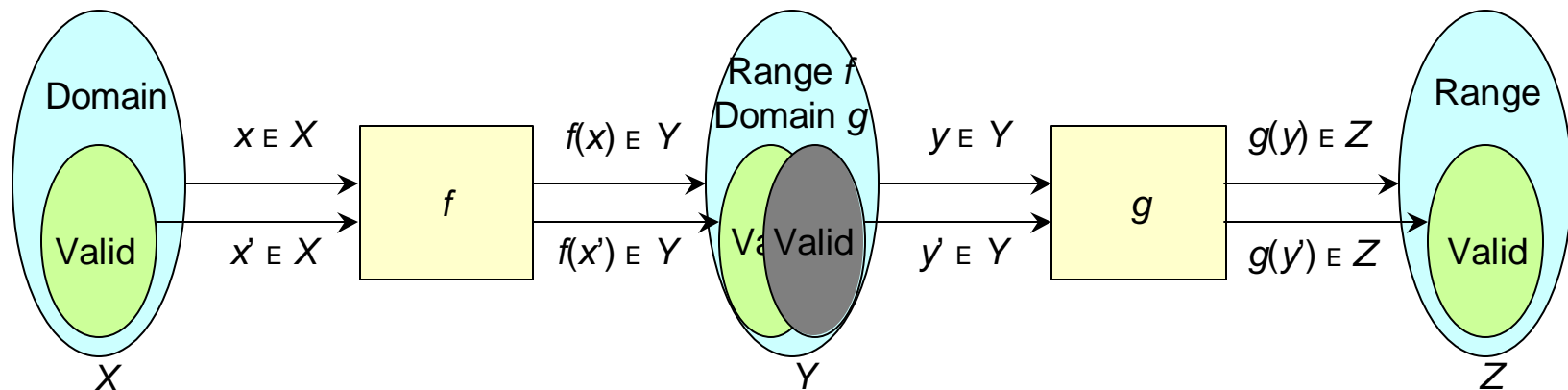
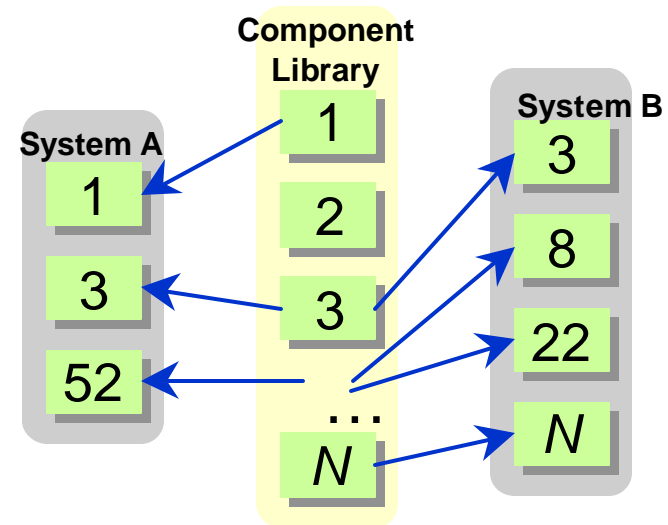
BML is the unambiguous representation of doctrine applicable for C4ISR, M&S, and robotics



# Composability

## Composability 1:

Develop theory of semantic composability of models based on computability theory and mathematical logic



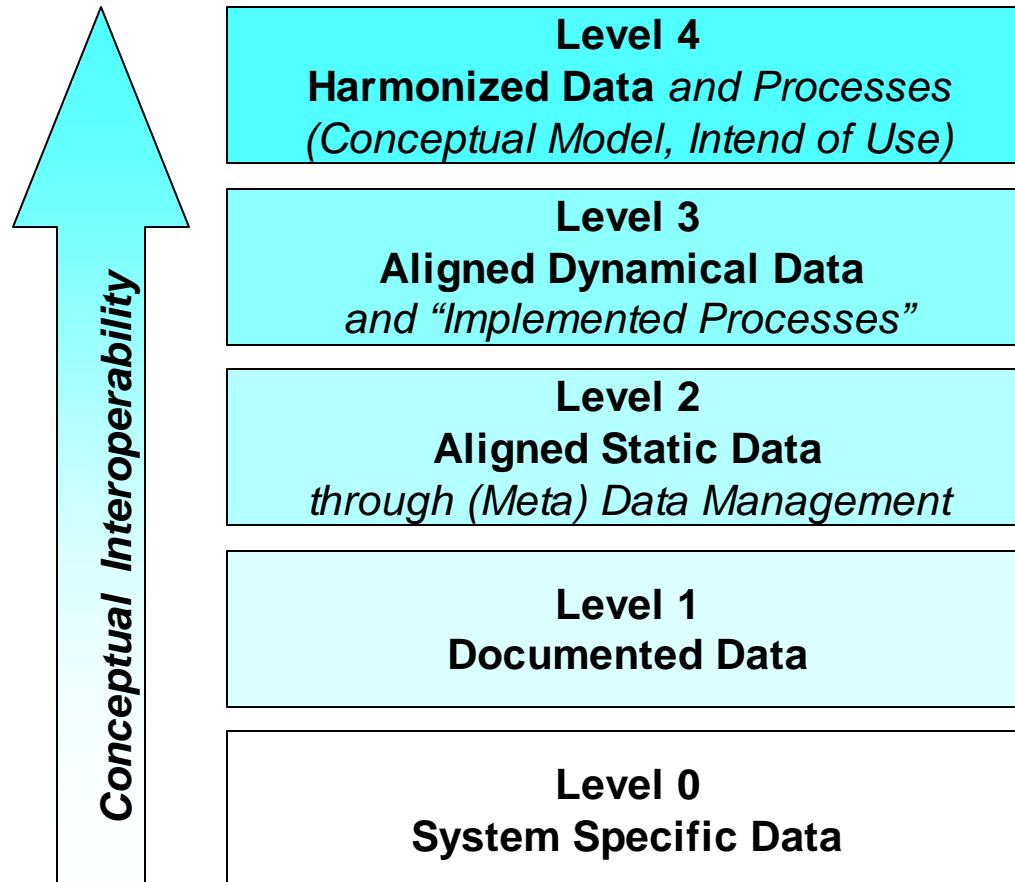
$$z = g(f(x))$$



# Composability

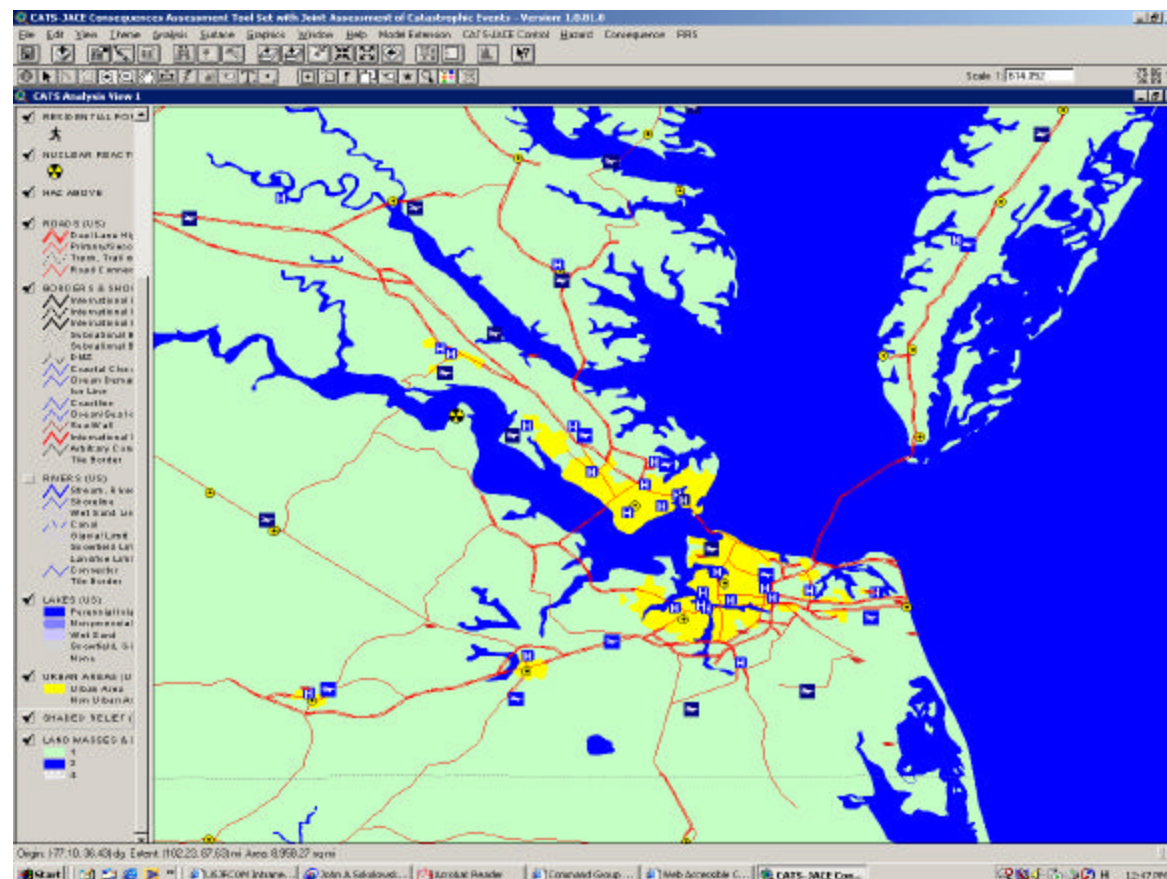
## Composability 2:

Applicability of software engineering methods to increase interoperability Of M&S: The Levels of Conceptual Interoperability Model (LCIM)



## Homeland Security

Develop persistent simulation capability and facility for civil authorities to conduct Homeland Security training, analysis, and decision support



Where is SEDRIS?

## SEDRIS at VMASC

- M&S Program
  - MSIM 620: Combat Modeling I  
Introduction to SEDRIS (3 hours)
  - MSIM 630: Combat Modeling II  
SEDRIS Tutorial and Applications (3 – 6 hours)
- VMASC Research
  - XMSF: Web Services for SEDRIS
  - Composability: Influence of SEDRIS
  - Homeland Security: Applicability of SEDRIS

Please, give us **SEDRIS XML**  
for XMSF and C4ISR/GIG

**VMASC is proposing SEDRIS whenever adequate to consider the solutions within the Research Projects**

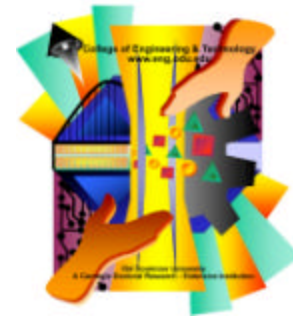
## Point of Contacts at VMASC

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## *Questions*



<http://www.vmasc.odu.edu>