



U.S. Army Research, Development and Engineering Command



***TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.***

ProtoCore

DoD M&S Conference

10 March 2008

# Report Documentation Page

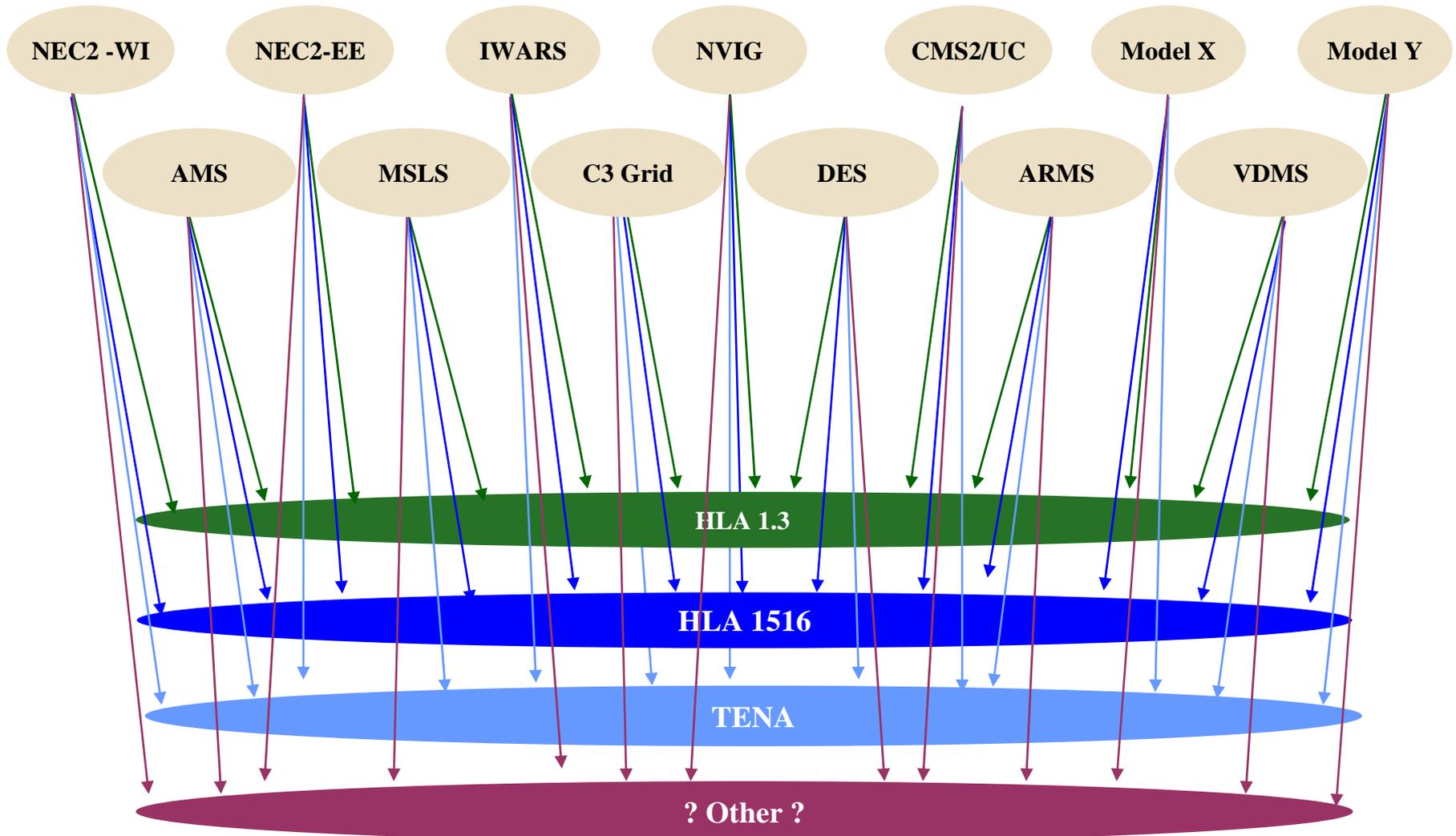
*Form Approved*  
*OMB No. 0704-0188*

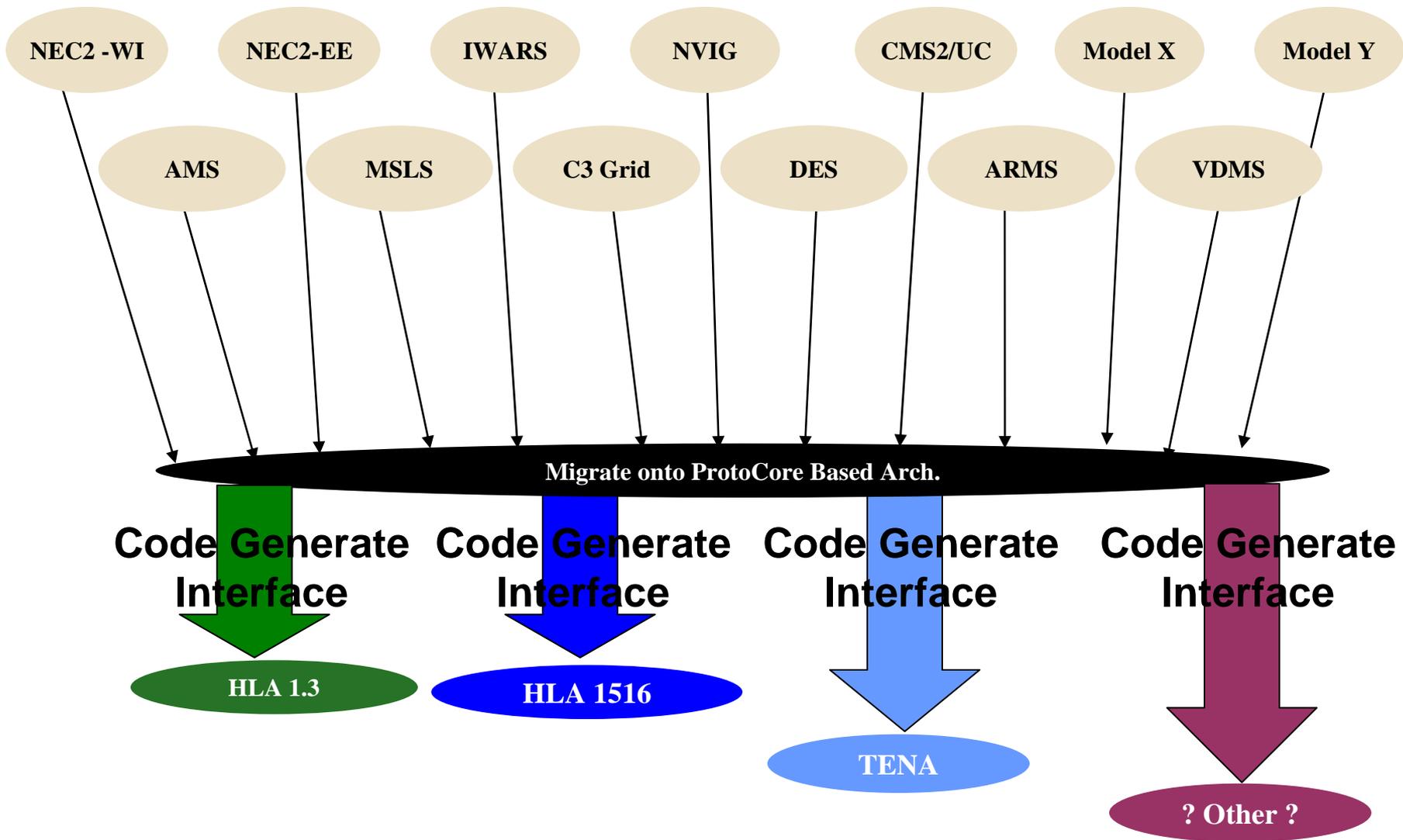
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1. REPORT DATE <b>10 MAR 2008</b>	2. REPORT TYPE <b>N/A</b>	3. DATES COVERED -	
4. TITLE AND SUBTITLE <b>ProtoCore</b>		5a. CONTRACT NUMBER	
		5b. GRANT NUMBER	
		5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)		5d. PROJECT NUMBER	
		5e. TASK NUMBER	
		5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>U.S. Army Research, Development and Engineering Command</b>		8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S)	
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release, distribution unlimited</b>			
13. SUPPLEMENTARY NOTES <b>2008 DoD M&amp;S (Modeling and Simulation) Conference Presentations held in Orlando, Florida on March 10 - 14, 2008, The original document contains color images.</b>			
14. ABSTRACT			
15. SUBJECT TERMS			
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>	<b>UU</b>
			18. NUMBER OF PAGES <b>13</b>
			19a. NAME OF RESPONSIBLE PERSON



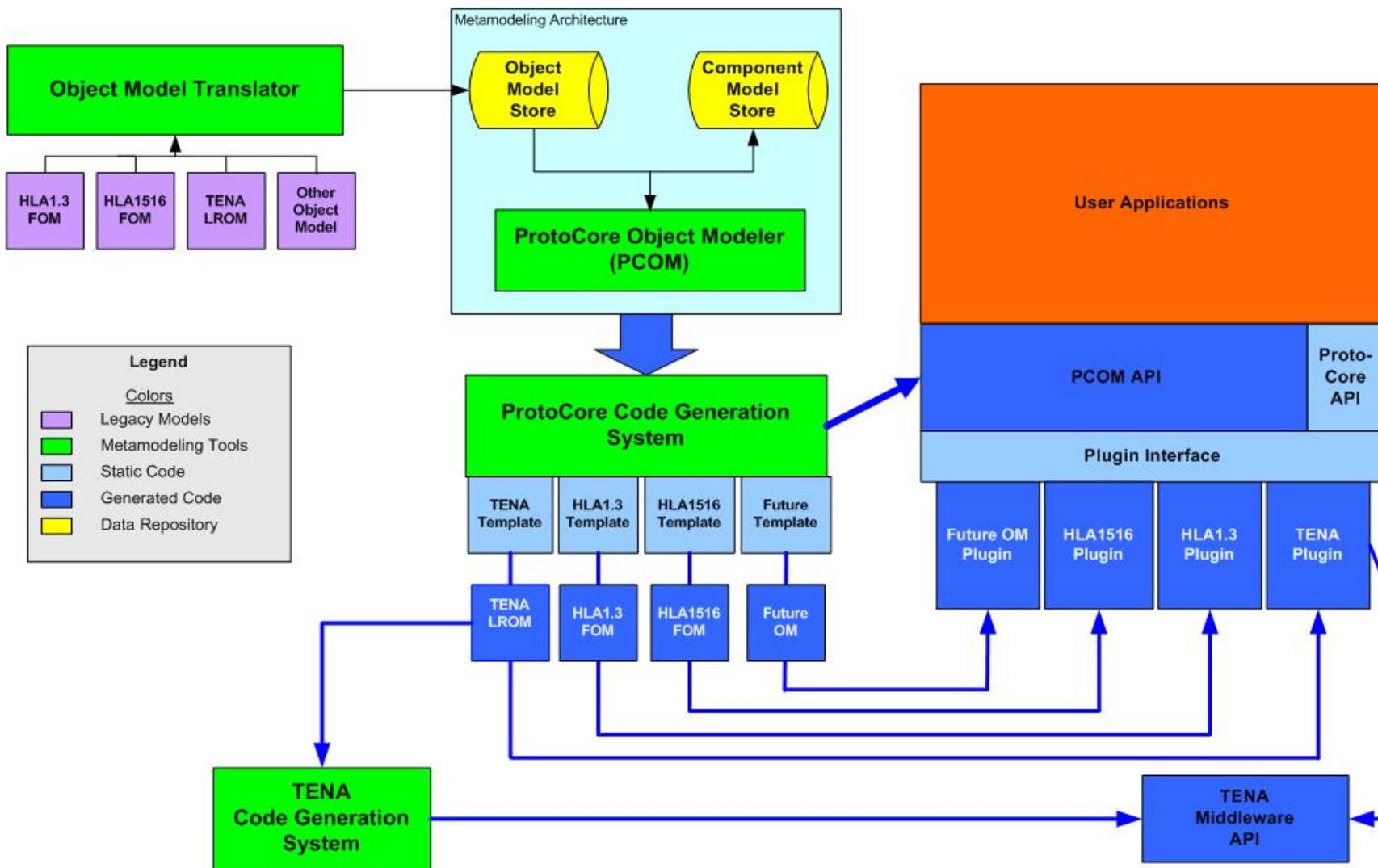
- Legacy middleware architectures, used in many simulation environments, do not make use of modern programming practices and can be cumbersome and error prone to use. e.g. HLA
- More and more middleware architectures are being used within the Army and DoD Modeling and Simulation for various purposes.
  - Existing infrastructures continue to be used for legacy simulations which have invested a lot of resources developing and maturing that environment. Switching is difficult and expensive.
  - Middleware to be used for given exercises is unknown and often open to change.
  - The application developer potentially needs to be an expert user for all existing and emerging architectures: e.g. HLA 1.3, HLA 1516, TENA, DIS, OOS
- Application developers are spending more and more time porting applications between various middleware architectures to enable Live-Virtual-Constructive (L-V-C) experimentation.







- Provide modern Object Oriented and type safe Application Programming Interface (API) to distributed simulation services
  - Provide automatic handling of menial tasks, such as data marshaling, required for some infrastructures.
  - Type safe API allows more errors to be caught at compile time rather than runtime.
- Provide mechanism to connect API to various network protocols in near-term and minimize work of moving applications between them
  - Code-Generate connectivity to protocols from a common Object Model
  - Plugin architecture used to allow single application binary to run over various protocols without modification.
- Leverage existing software investments and minimize impact
- Provide a forward path for legacy object models and component models into the future



- **Application Portability**
  - Able to be used with multiple different transport protocols
  - Plugins only a single application binary simplifying deployment
- **Preservation of Object Model**
  - Existing object models can be used with and migrated to newer transport protocols
- **Existing tools and applications can be migrated to new transport protocols**
  - Preserve capability of existing models
  - Preserve test cases and capability

- **Code Generator**
  - Allows users to compile libraries for customized FOMs
  - Allows users to create custom templates for generating specific applications from Object Model
- **Functionality**
  - Simulation Management
  - Object Management
  - Interaction Management
  - Synchronization Points
  - DDM
  - Multiple Encoding/Decoding Schemes
- **Current Plug-ins**
  - HLA 1.3 Plug-in
  - HLA 1516 Beta Plug-in (Dynamic Link Compatible (DLC) API)
  - Prototype of TENA MW Plug-in
- **Java Bindings**
  - Supports JDK (Java Development Kit) 1.5+

- **Functionality**
  - Improve dynamic DDM support
  - Remote Method Invocation
  - Time Management
  - Ownership Management
  - Object Model Agility
  - Object Model Translator
- **Modeling Architecture**
  - Enhance ProtoCore Meta-Model to reflect additional semantic information captured within MATREX SDD Information Architecture
  - Provide tools to translate existing object models
- **Plugins**
  - Complete the HLA 1516 plugin (completed – in verification)
  - Complete the TENA plugin (completed – in final testing)
  - SoSCOE and DIS plugin in design and planning stage



# Customers



- Current

- RDECOM (RDEC's)

- Aviation and Missile Research, Development and Engineering Center (AMRDEC)
    - Army Research Laboratory (ARL)
    - Natick Soldier Research, Development and Engineering Center (NSRDEC)
    - Tank and Automotive Research, Development and Engineering Center (TARDEC)

- Naval Research Laboratory (NRL)

- OASES

- FCS/LSI

- Mule
    - ANS

- ATEC

- DCARS
    - OT-TES
    - STORM
    - IMASE
    - ExCIS FSA

- Future

- TRADOC

- Battle Laboratory Collaborative Simulation Environment (BLCSE)
    - Mounted Maneuver Battlespace Lab (MMLB)

- ATEC

- JANUS

- Additional RDEC (ARMS, MSLS)

- Armament Research, Development and Engineering Center (ARDEC)

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MATREX IDE Website: <https://www.matrex.rdecom.army.mil>



# BACKUP



- API distributed in binaries within the MATREX Tools release
- User and programming documentation exists in HTML format in tools release. Documents are generated from comments in code to help ensure it is kept current
- Support reflector and bug database for user support