



***"ALWAYS ON-ON DEMAND":
Supporting the Development, Test, and Training of Operational
Networks & Net-Centric Systems***

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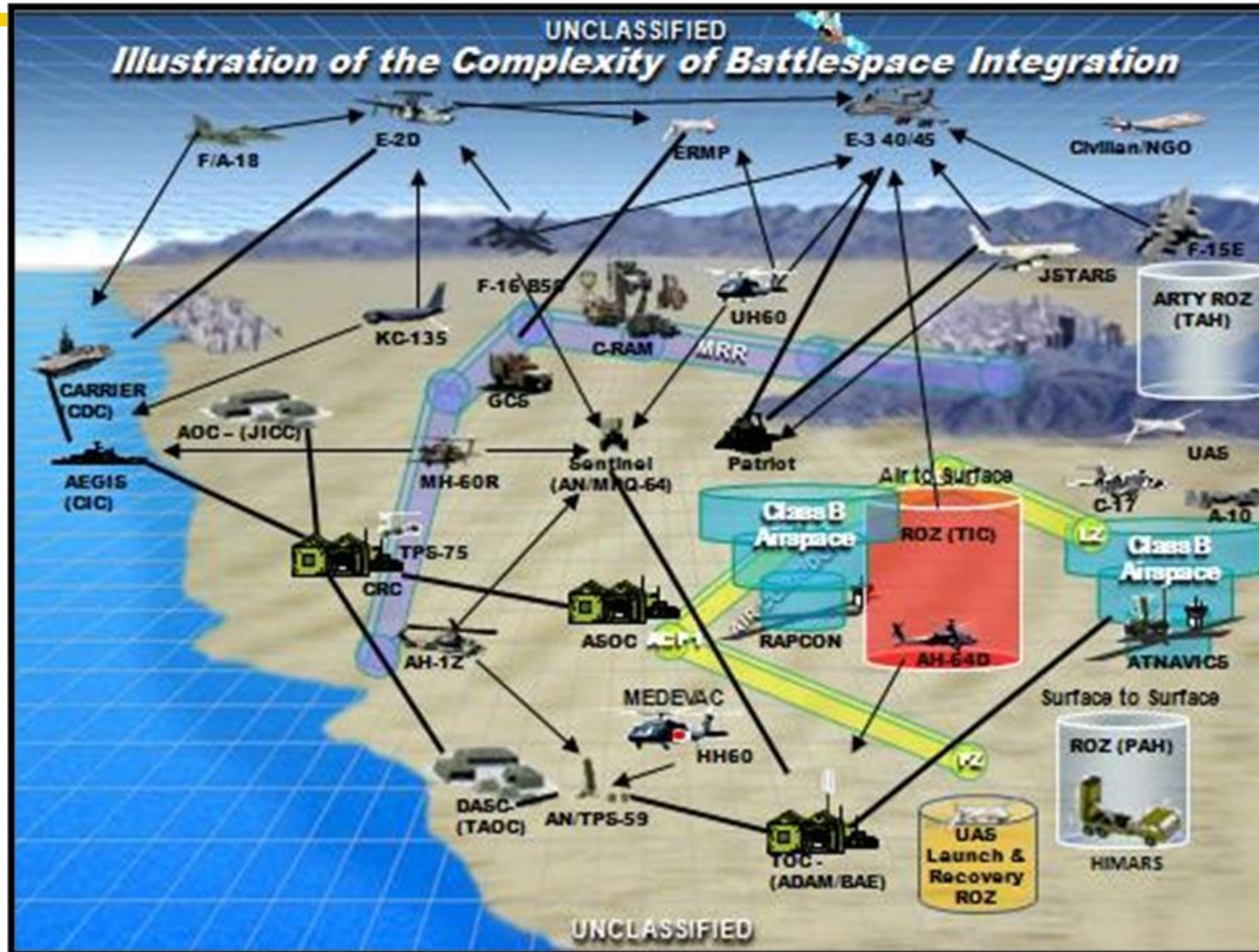


DESIGN • DEVELOP • DELIVER • DOMINATE 
SOLDIERS AS THE DECISIVE EDGE 

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The World of Operational Networks and Net-Centric Systems



Effective Operational Networks Critically Underpin Army Mission Success
The Network is the Army's Number One Modernization Priority

GAO Report on Army Networks January 2013





Assessing Operational Networks And Net-Centric Systems in Support of Network Modernization: Issues and Gaps



➤ Current Situation

- Individual efforts to address Operational Networks that are being done in a stove-pipe manner provide incomplete and/or inconsistent feedback about Operational Networks, **impacting Leadership Decision Making**
- NIE efforts attempt to integrate and evaluate capabilities but has only done so **on a limited level** due to expense (time and money) of live systems, live system availability, soldiers in the loop, stand up and tear down processes

➤ Existing Gap

- A capability to test and evaluate Operational Networks and Net-Centric systems that is:
 - Representative, realistic and relevant
 - Integrated across systems, creating a System of Systems
 - Readily available





What is Needed

- Development of a representative **realistic and relevant Technical and Operational Synthetic Environment** for use in the research, development, test, evaluation and experimentation of Network Modernization capabilities and gaps
 - Focus on Battlespace Integration at the Joint and Coalition Level
 - Optimize RDTE, operational testing, and experimentation by incorporating economies and efficiencies:
 - Cost avoidance: Integrating existing Government facilities and capabilities through distributed network technologies to form a virtual integration and testing environment rather than creating new components
 - Cost offset: Using M&S to augment, supplement, and/or replace live system testing and assessment
 - Cost savings: Economic investment of Acquisition PM testing dollars in existing Government owned testing environment rather than in Prime developed assets
 - Investment leverage: Continual build up of additional capabilities with each use via “leave behind” integrated technologies

"ALWAYS ON-ON DEMAND":

Supporting the Development, Test, and Training of Operational Networks & Net-Centric Systems





“ALWAYS ON-ON DEMAND” Approach



- “ALWAYS ON-ON DEMAND” is the integration of existing live, virtual, and constructive systems to create a persistent realistic and relevant Technical / Operational Synthetic Environment to address issues and gaps associated with Operational Networks and Net-Centric Systems that is available on demand
- “ALWAYS ON-ON DEMAND” is being developed to support Network Modernization across the life cycle
- ALWAYS ON-ON DEMAND” capabilities are being built on 15+ years of collaborative development between acquisition, testing, and combat development communities
- “ALWAYS ON-ON DEMAND” will leverage ongoing work in and collaboration between SoSE&I , CECOM, CERDEC, ATEC, TRADOC, etc
- Using distributed real-time interactive secure networks, “ALWAYS ON-ON DEMAND” will provide access to:
 - Army test ranges, battle labs, training locations, and R&D Centers
 - Joint and Coalition assets
 - Army and OSD Cyber Ranges

“ALWAYS ON-ON DEMAND” Focus:

Support Army and OSD Priorities and Objectives





“ALWAYS ON-ON DEMAND” Foundation Of Capabilities



What exists today that can be integrated to produce a more comprehensive capability

Integrated, Comprehensive Capabilities

- ✓ Scalable, real-time, network models with options for fidelity (conceptual, emulation, or abstract) that can be invoked depending on use cases (e.g. SRW, WNW, WIN-T, etc)
- ✓ High fidelity RF effects (e.g., urban terrain)
- ✓ System-in-the-loop (“SIL”) with live radios (e.g. GMR, HMS, etc)
- ✓ Software-in-the-loop with live battlefield applications (e.g. IBEX, FCBC2, etc)
- ✓ Interface with live network managers (e.g. JENM)
- ✓ Interface with instrumentation and data collection tools used on live networks (e.g. OASIS)
- ✓ Interface with external simulation tools (e.g. OneSAF)
- ✓ Representation of Multi-level Security
- ✓ Relevant Operational Contexts for TRL assessments

- ✓ Operational Networks test bed environment capable of evaluating systems and system of systems effectiveness, current & future capabilities, as-is and to-be architectures
- ✓ Fast, agile, low risk integration of technology & operations for integration and test events such as NIE
- ✓ Repeatable, relevant, end-to-end test environment capable of executing larger than single thread scenarios
- ✓ Distributed Networked Live-Virtual-Constructive technologies environment reducing the need to ship equipment and relocate key personnel
- ✓ Leveraging the strengths and tool suites of each participating location, promoting collaboration and reuse of test assets across T&E, Planning, Analysis, Acquisition, Training, Cyber





The Challenge (“Opportunity to Excel”)



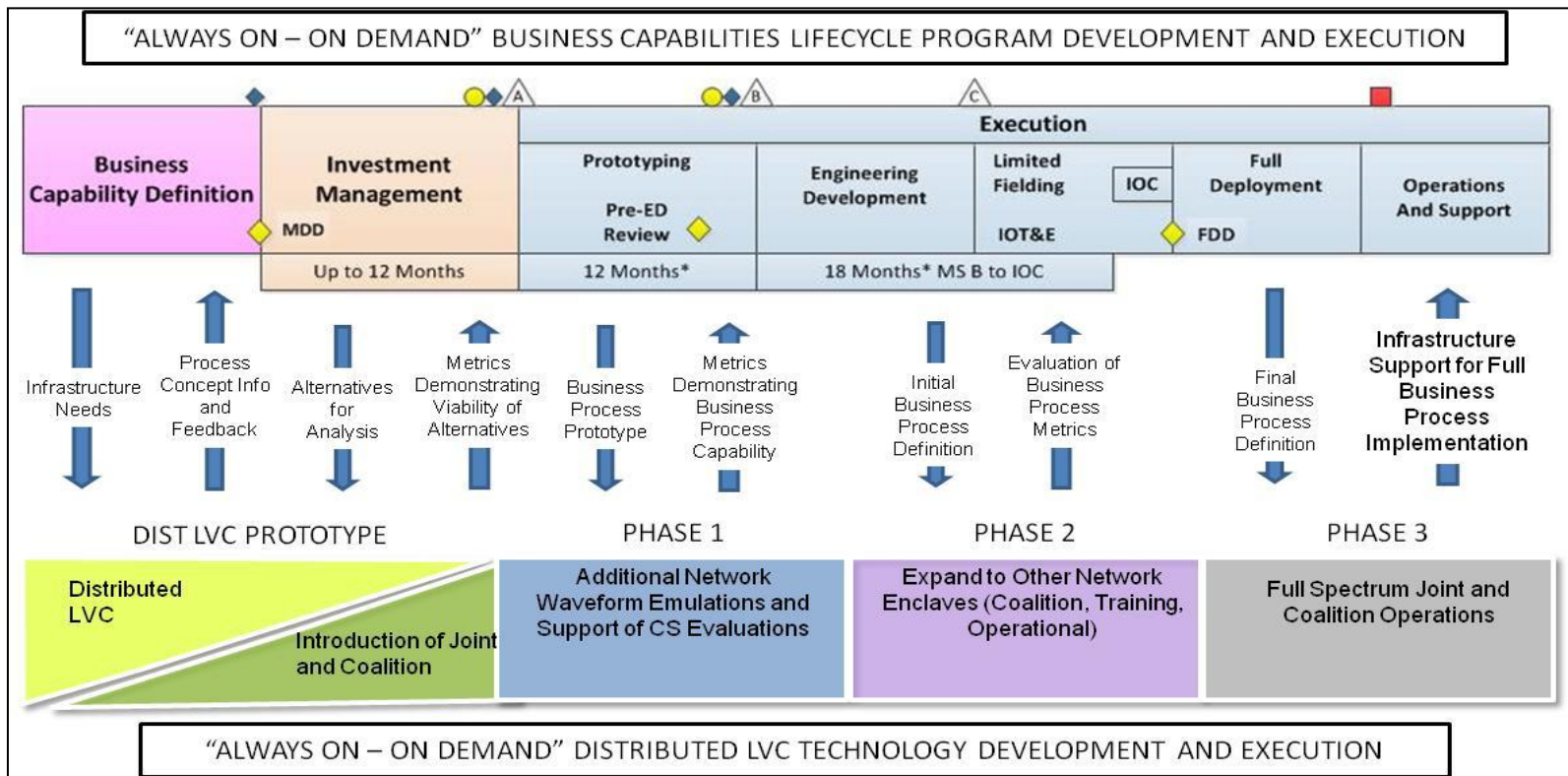
- *Applying sound Systems Engineering practices at a System-of-Systems level for the integration of existing, independent and disparate (Live-Virtual-Constructive) components to create a coherent representation of the Technical/Operational Environment necessary to support Network Modernization*
- *Optimizing business practices to insure a cost effective, readily available, re-usable capability without significant “overhaul” with each application*
- *Facilitating and incentivizing cooperation and collaboration between performing organizations to maximize the use of existing facilities, capabilities, and subject matter expertise*





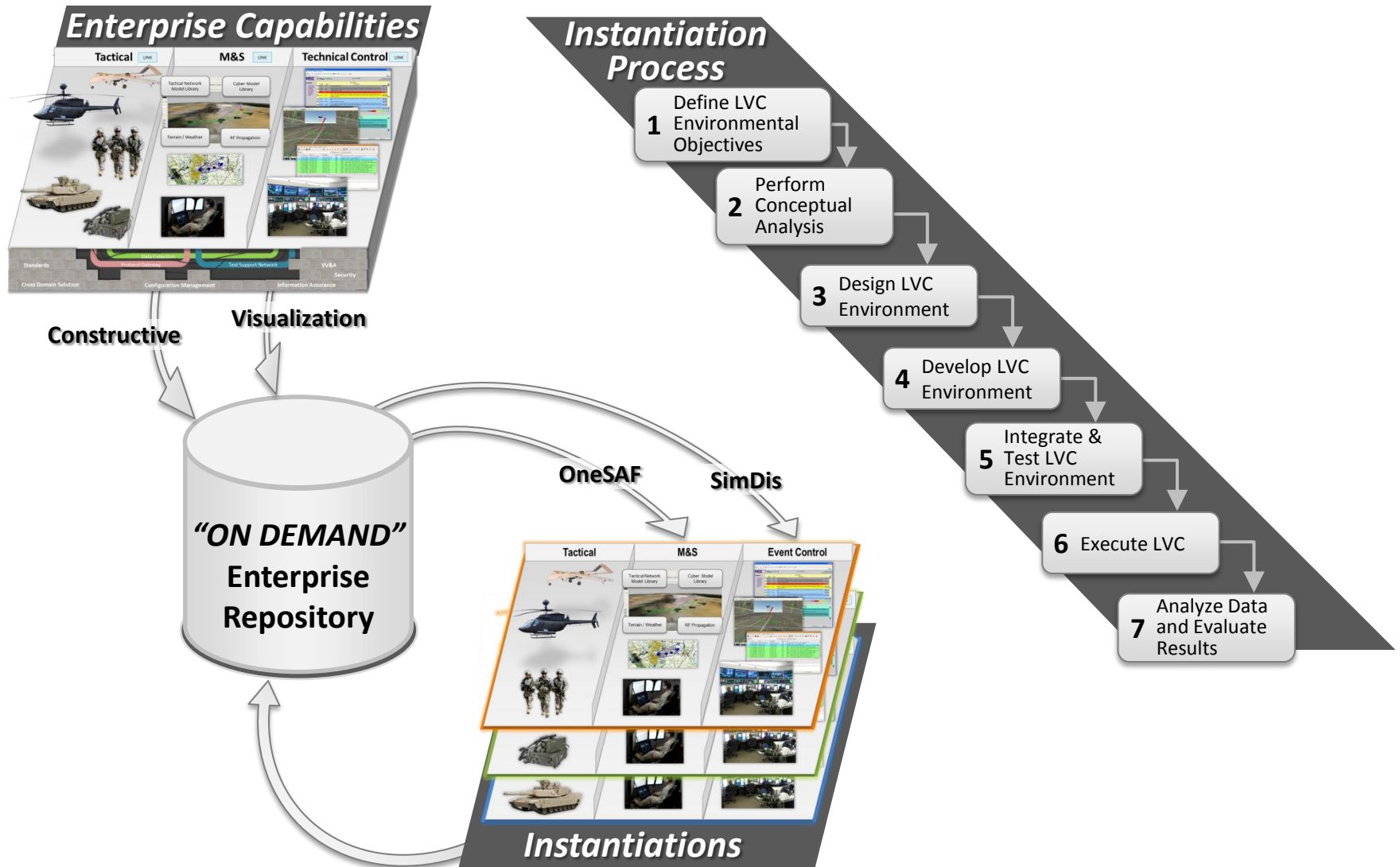
“ALWAYS ON-ON DEMAND” Program Structure

- Business Capabilities Lifecycle Effort
 - Well defined process for development and management
 - Parallel “Swim Lanes” of activity
 - Management Activities and Process Architecture
 - Distributed LVC Development and Execution Activities



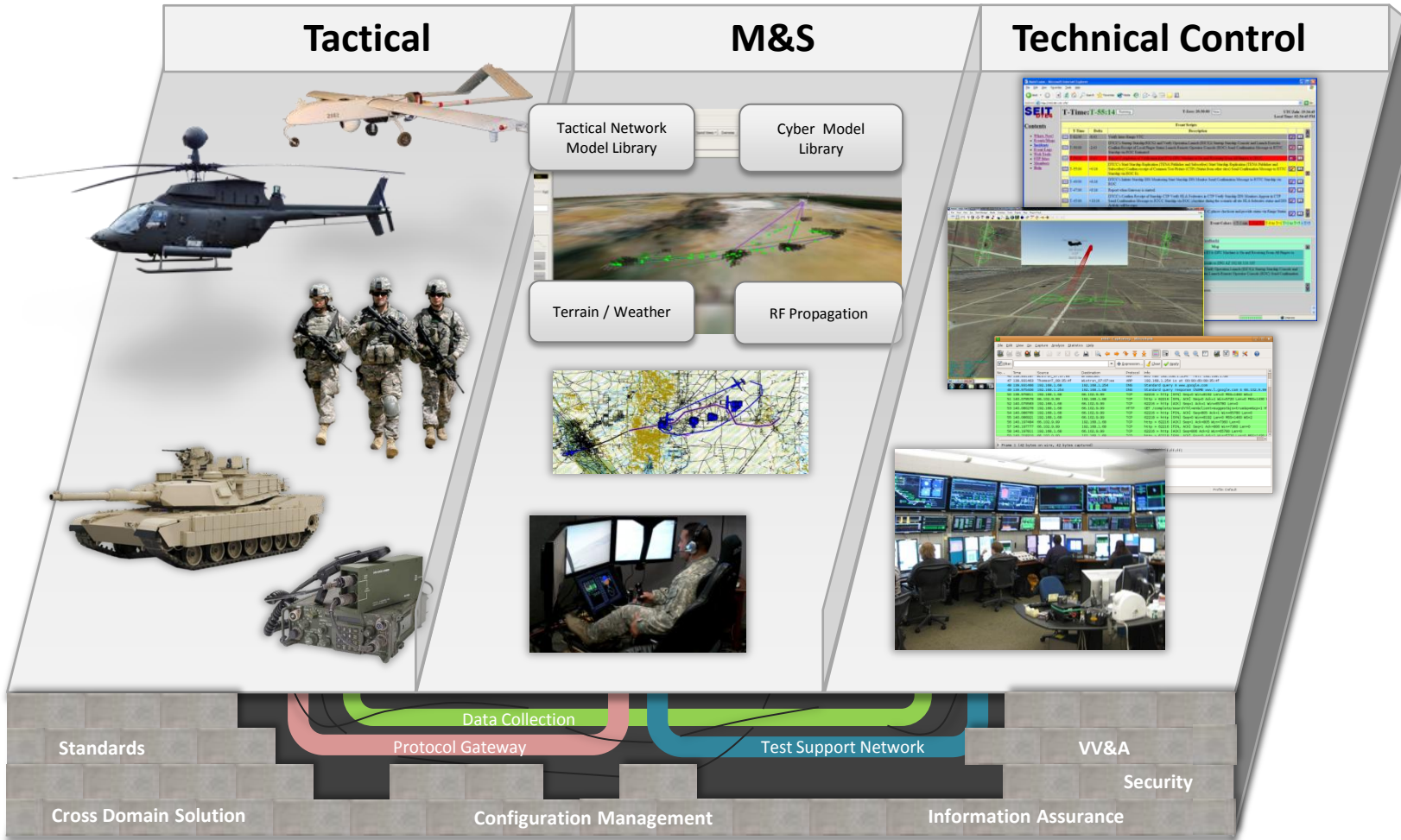


"ON DEMAND" Process Architecture Overview



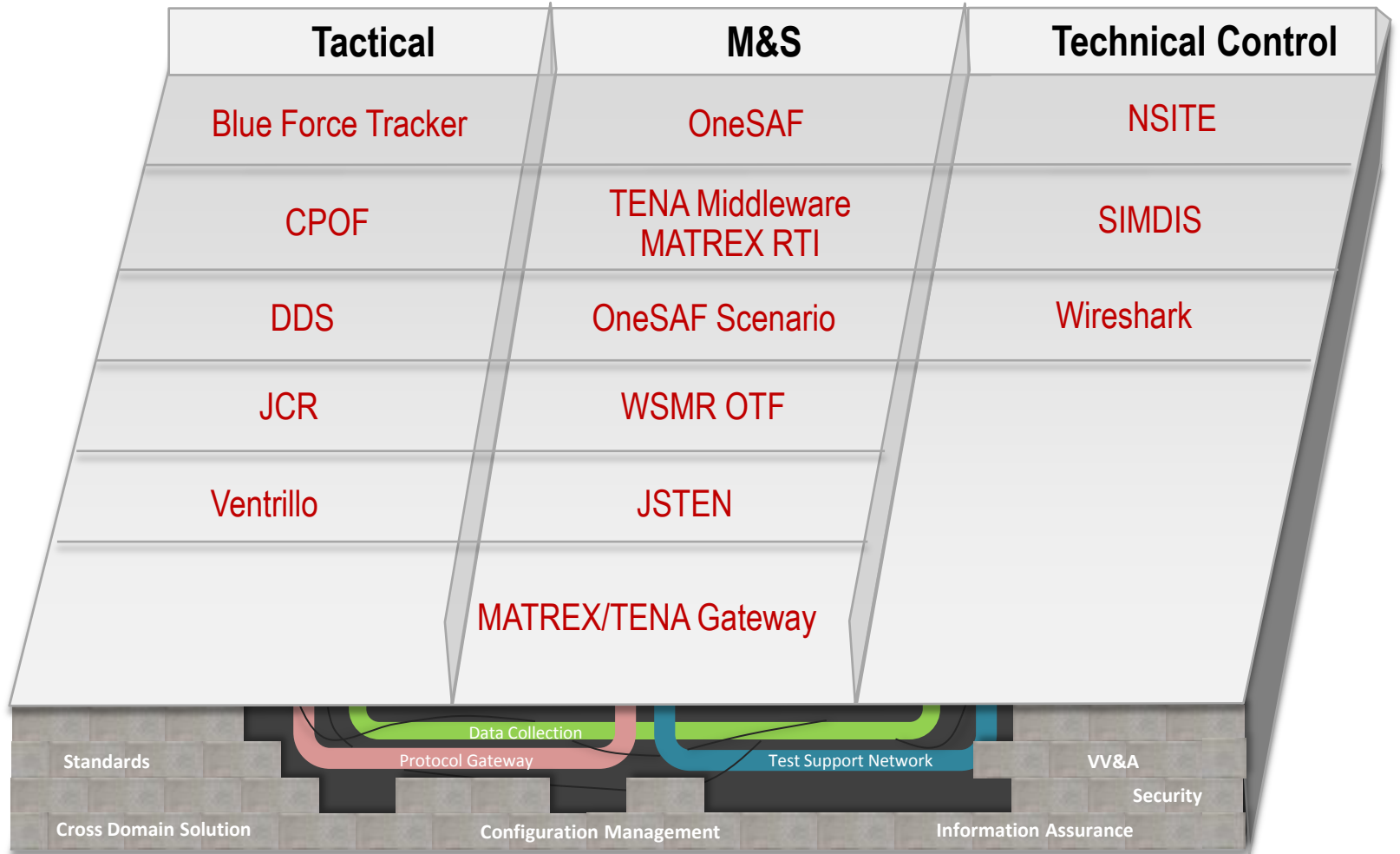


"ON DEMAND" Enterprise Capabilities





"ON DEMAND" Instantiations - Generic Event Example -





"ALWAYS ON-ON DEMAND" Enterprise Repository

Enterprise Repository

- Contains assets for the elements of the Enterprise Capabilities
- There may be more than one asset for each element
 - Events will have different requirements
- The "ON DEMAND" Repository is initially populated with assets identified based on past experience
- The Enterprise Repository promotes reuse of event products that are not currently reused
- A status "stop light" chart can be created that will identify capability gaps

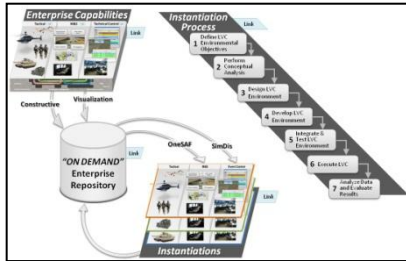
Repository Review & Acceptance

- The architecture for each event will be based on the "ON DEMAND" Enterprise Capabilities
- However, each event will have new or unique requirements
- These requirements may not be met with assets in the "ON DEMAND" Enterprise repository and new assets integrated
- At the completion of an event the new assets will be considered for inclusion in the "ON DEMAND" Enterprise repository based on criteria set by governance board
- Capture VV&A and documentation for each asset

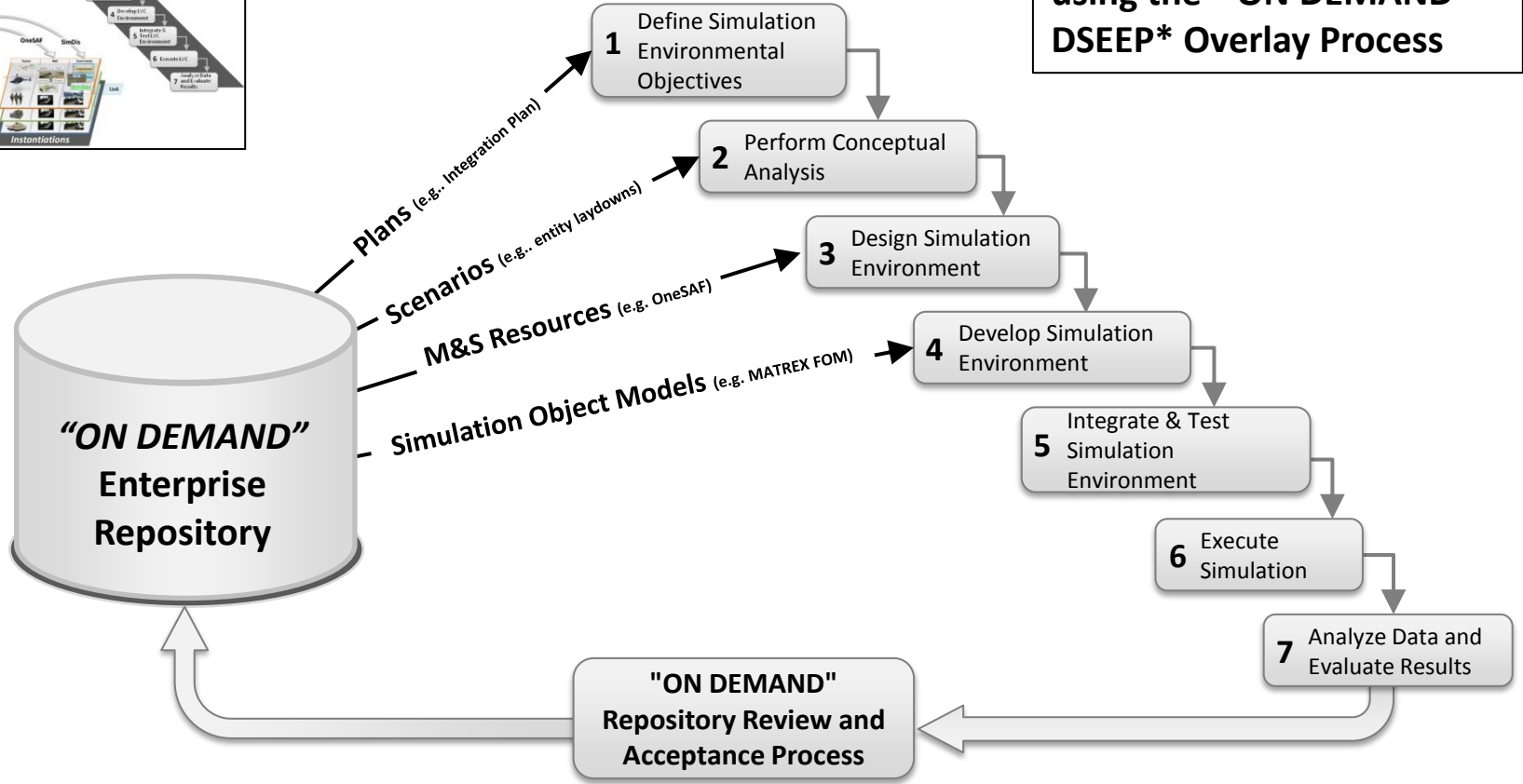




"ON DEMAND" Event Instantiation Process



Specific Events are created using the "ON DEMAND" DSEEP* Overlay Process



*DSEEP = Distributed Simulation Engineering and Execution Process - IEEE Std 1730-2010





“ON DEMAND” Enterprise Process

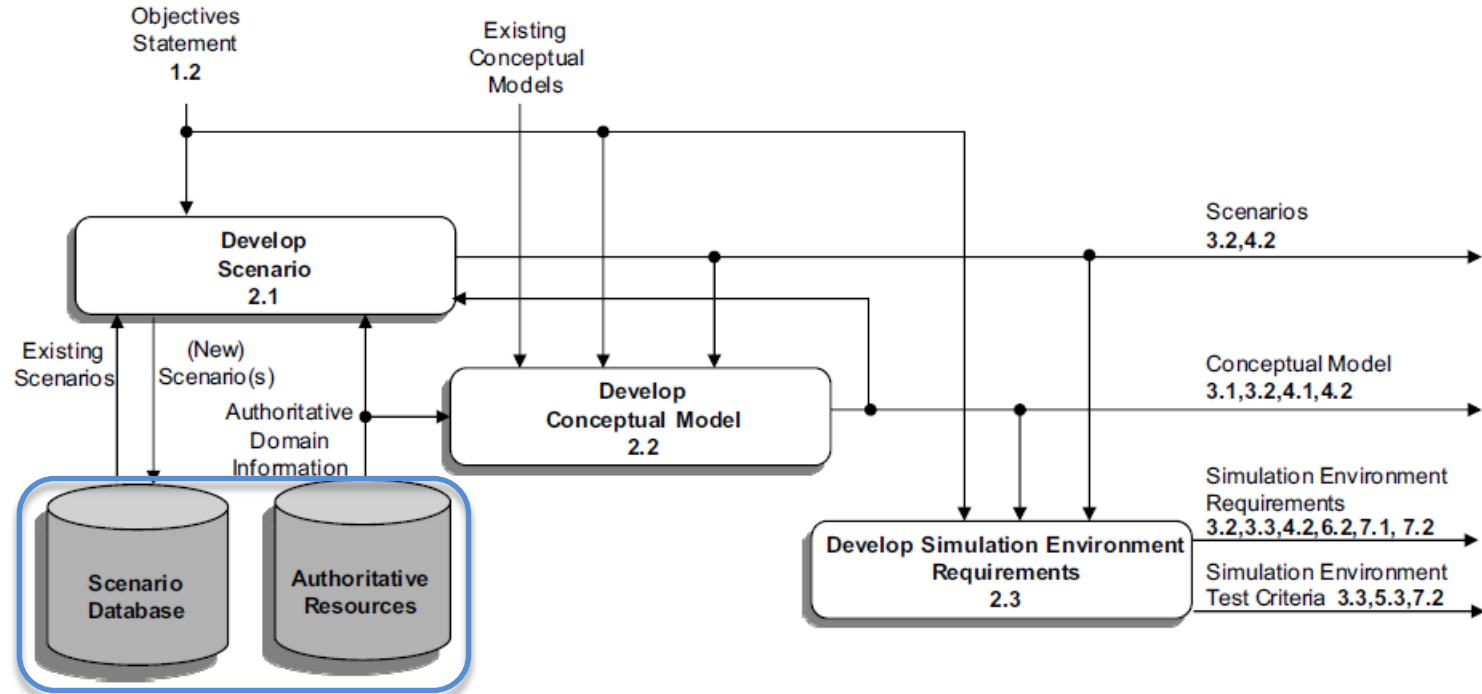


- “ON DEMAND” Enterprises Process is based on IEEE Recommended Practice for Distributed Simulation Engineering and Execution Process (DSEEP)
 - IEEE Std 1730-2010
- A generalized process for building and executing distributed simulation environments
- DSEEP is a 7 step process with defined data products produced in one step and used by another
- Each step is decomposed into activities
- Each activity has:
 - Activity inputs
 - Recommended tasks
 - Activity outcomes





DSEEP Example: Step 2

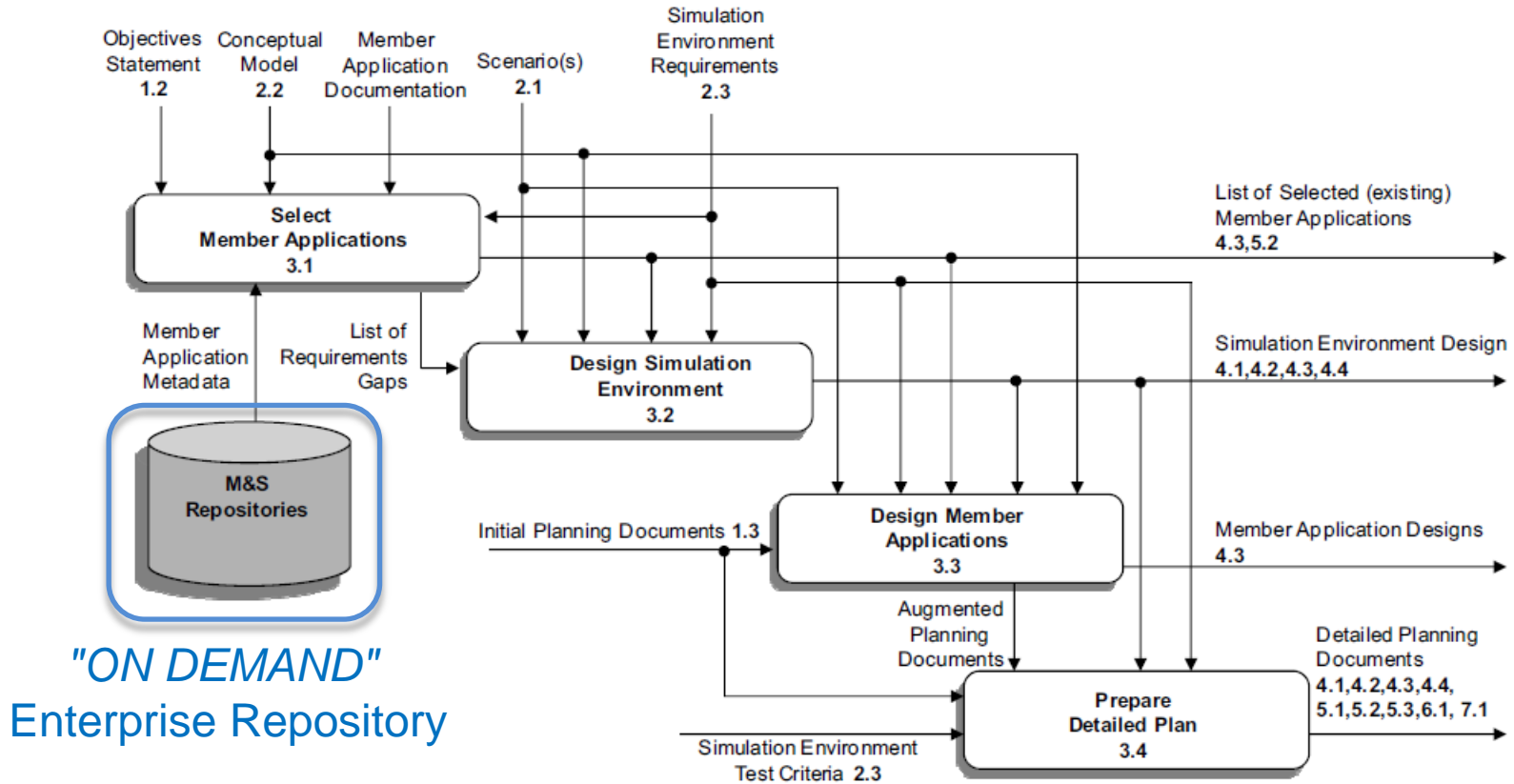


"ON DEMAND"
Enterprise Repository





DSEEP Example: Step 3

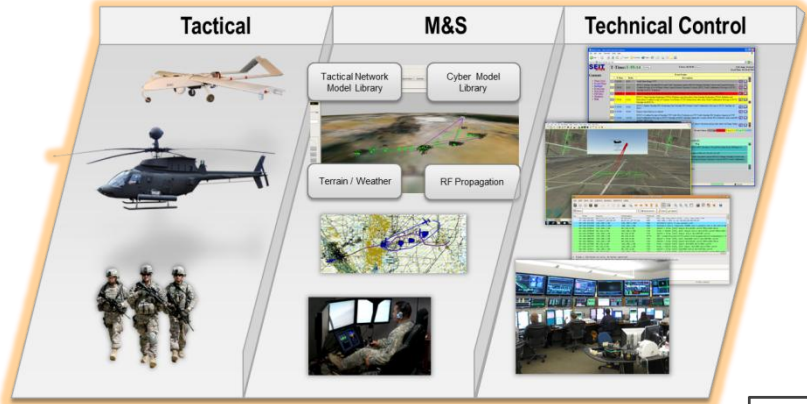




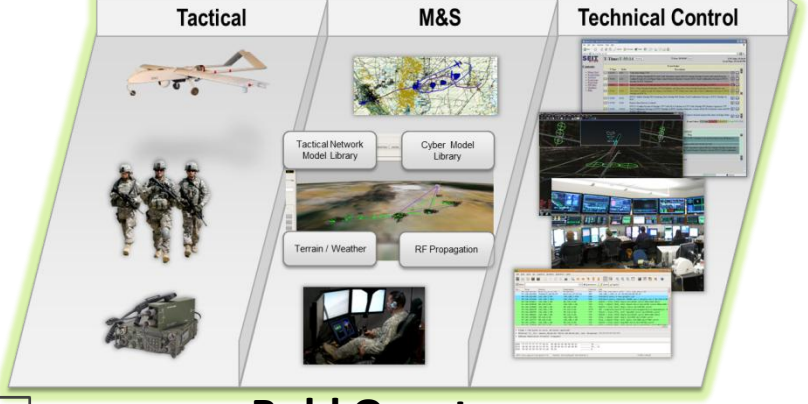
Examples of "ON DEMAND" Instantiations

Testing

Experimentation

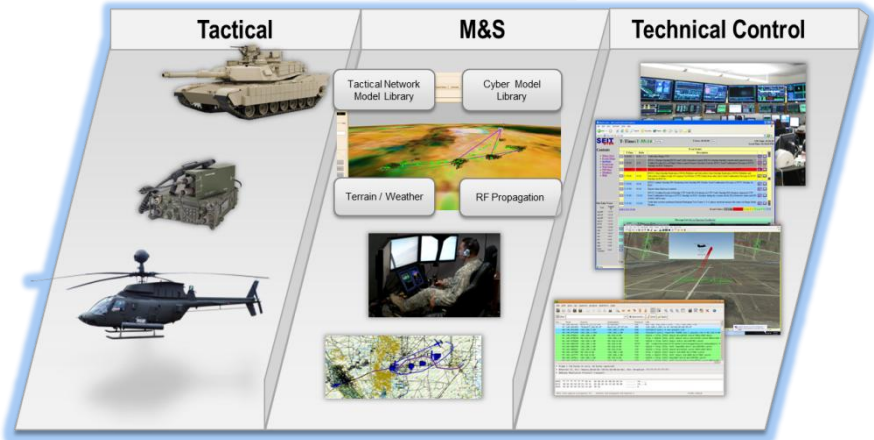


NIE



Bold Quest

Training



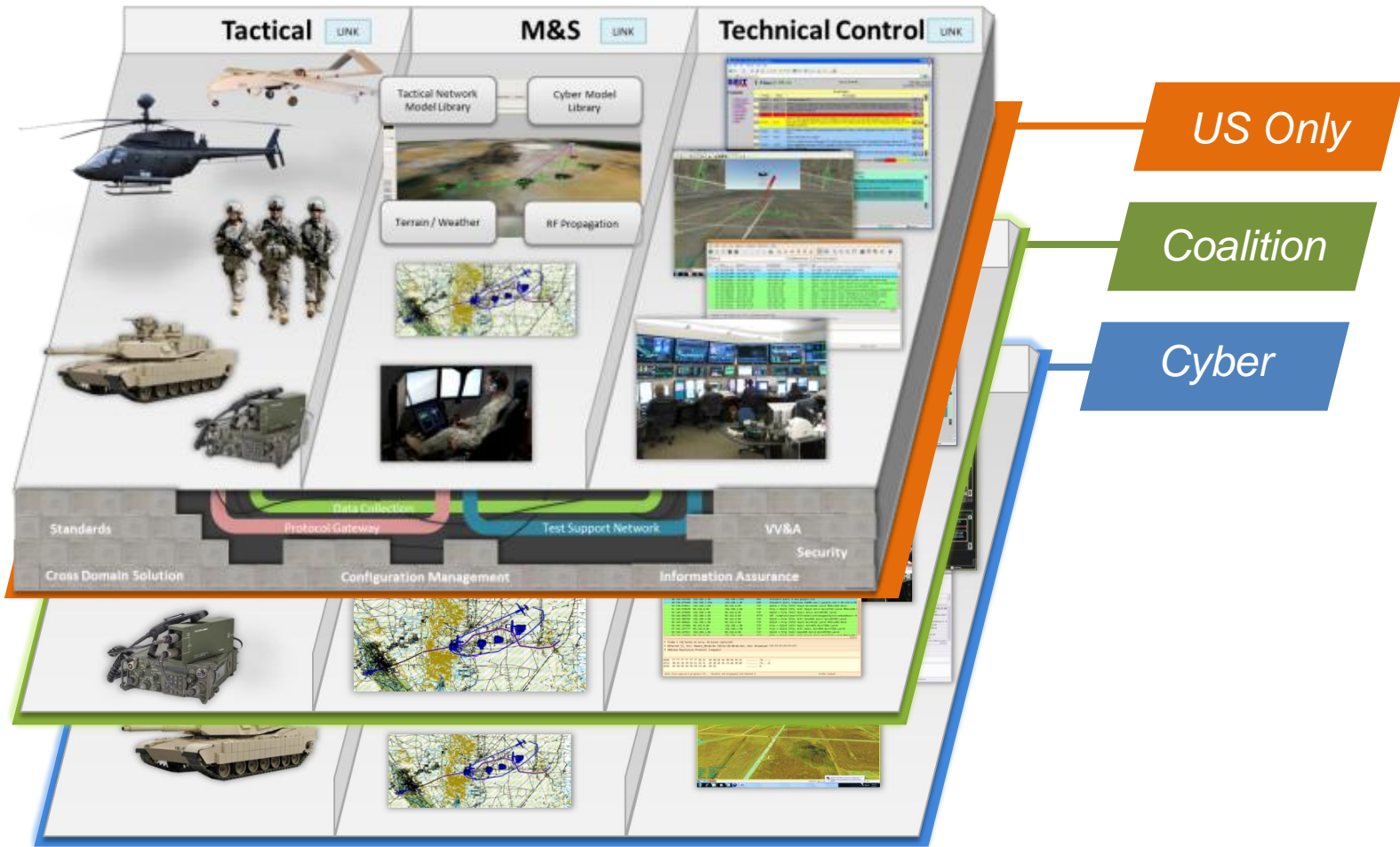
Cyber Training Event

"ON DEMAND" Enterprise Capabilities Can be Instantiated to Meet Different Requirements





"ON DEMAND" Integration Across Event Environments





Final thoughts...



This is a work in progress ... and will always be a work in progress:

- Warfighter mission needs are changing as the world dynamics change
- Technology is rapidly evolving
- New processes are needed to be responsive
- The need for more, timely, authoritative information will never change

***"ALWAYS ON-ON DEMAND":
Supporting Network Modernization***



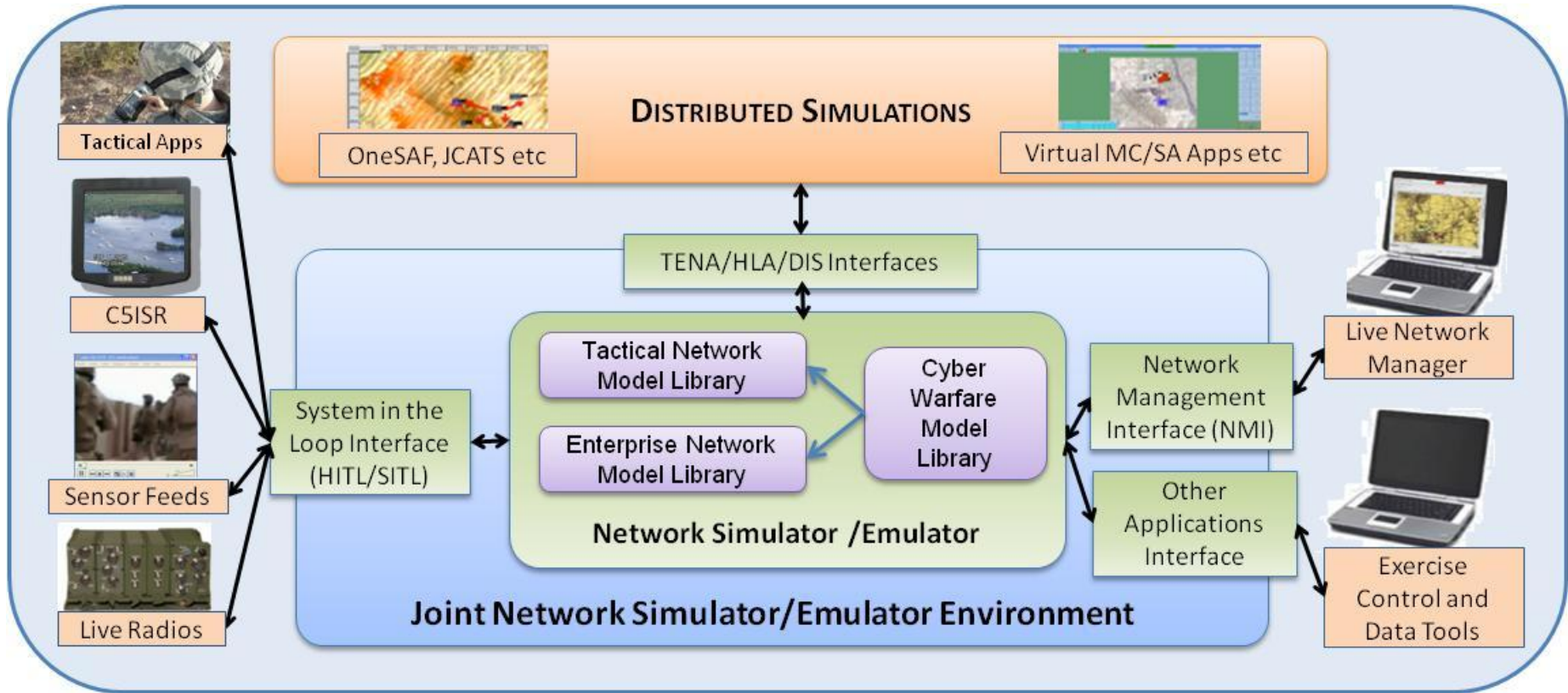


Back Up Information





"ALWAYS ON - ON DEMAND" Live-Virtual-Constructive Architecture

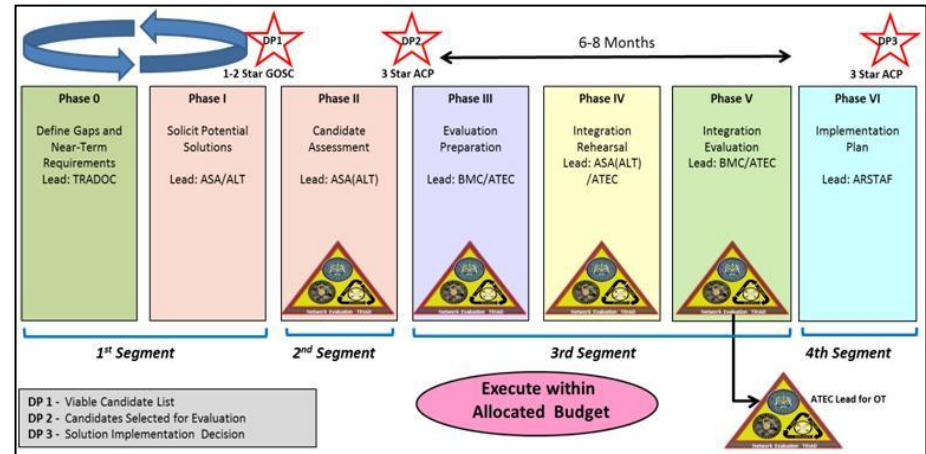
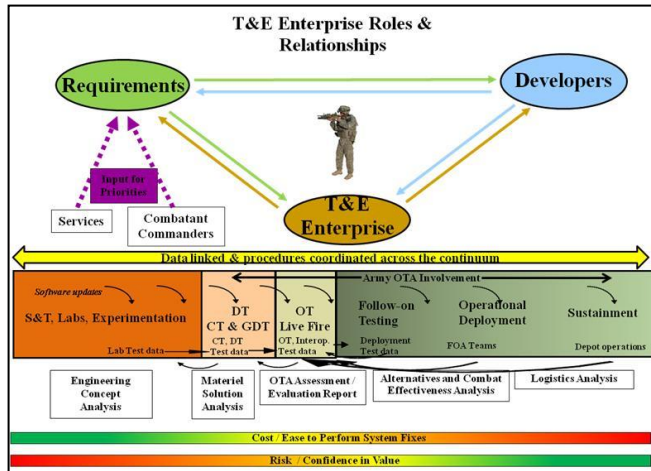


Providing A Network Modernization "Integration/Test Harness" Capability Which Can Support Multiple Use Cases Across The Acquisition Life Cycle





“ALWAYS ON-ON DEMAND”: Support for Army Process Improvements



- Supports The Army T&E Enterprise Strategic Plan 2013 initiative to leverage modeling and simulation (M&S) to augment / replace tests and shorten testing
- Supports The Army Agile Capabilities Life Cycle Process by optimizing assessment of new technologies
- Supports recommendations from the T&E Efficiencies Study 2013 to increase the use of M&S to create efficiencies





Management and Execution Areas of Responsibility

Oversight and Management

M&S GOSC:
Policy

ASA(ALT) SoSE&I:
Oversight

TRMC:
OSD Alignment

Enterprise Management Team:
Governance and Oversight
Policy Enforcement
Orchestration/Synchronization of Assets
Resourcing Recommendations

Execution

Contracting

Warfighter
Requirements

Technical
Requirements

Systems
Architecture

Test Environ.
Infra-Structure

Threat Systems
and Cyber

Data
Interoperability

Test Planning
and Support

Systems Design,
Dev, Integration

Sys Interop, VVA,
TRL Assessment

Government

Industry

Academia





"On Demand" Organizations and Roles



Management

Governance:

Army M&S GOSC /SoSE&I

Enterprise Management:

SoSE&I; TBD

Systems Architecture, Systems Engineering, ConOPS:

SoSE&I, PEO STRI, ATEC

Materiel Developers:

PEO STRI, ATEC, RDECOM, JTNC, Industry

Systems Integration:

SoSE&I / PEO STRI

Technical Advisory

Group:

Requirements Leads

Coordinator:

SoSE&I/AMSO

Warfighter Requirements:

TRADOC

Analysis:

TRAC/AMSAA

Experimentation:

TRADOC/ARCIC

Technical:

CIO G6, CECOM, PEO C3T

Acquisition:

PEO/PMs

Testing and Evaluation:

ATEC, ARL/HRED

Data, Algorithms, V&V:

AMSAA

Training:

TRADOC

HPC Applications:

HPCMO, PETTT

Threat and Cyber Representation:

TRAC G6, PM ITTS TSMO, ARCyber

Component Development

Leads

Operational Network:

PEO C3T/CECOM/RDECOM CERDEC, DISA

C2 Applications:

PEO C3T/RDECS, JTNC

Sensors:

PEO IEW/CERDEC NVESD

Platforms and Systems:

PEOs/RDECS

Test Infra-structure/Instrumentation:

ATEC, PEO STRI, TRMC

HPC Assets:

HPCMO, ATEC

Simulations:

RDECOM ARL-STTC/RDECS, STRI

Data and Algorithms:

AMSAA

Threat and Cyber Representation:

TRAC G6, PM ITTS TSMO, ARCyber

Related M&S Orgs

OSD M&SCO (Multi-Service)

OSD AMSWG (Multi-Service)

OSD TRMC (Multi-Service)

AMSO (Army)

Army RDECOM M&S SWG (RDECS)

Army SoSE&I PoR M&S WG(PEOs,PMs)

Army TRADOC CoC for M&S





"ON DEMAND" Enterprise Capabilities Concept



- "ON DEMAND" defines a set of architectural elements required for each aspect (Tactical/M&S/Technical Control) of the architecture
- For each element in the "ON DEMAND", architecture, assets will be identified and placed in the "ON DEMAND" Enterprise repository
- A stop light chart will be created for each element showing the status of assets in the Enterprise Repository

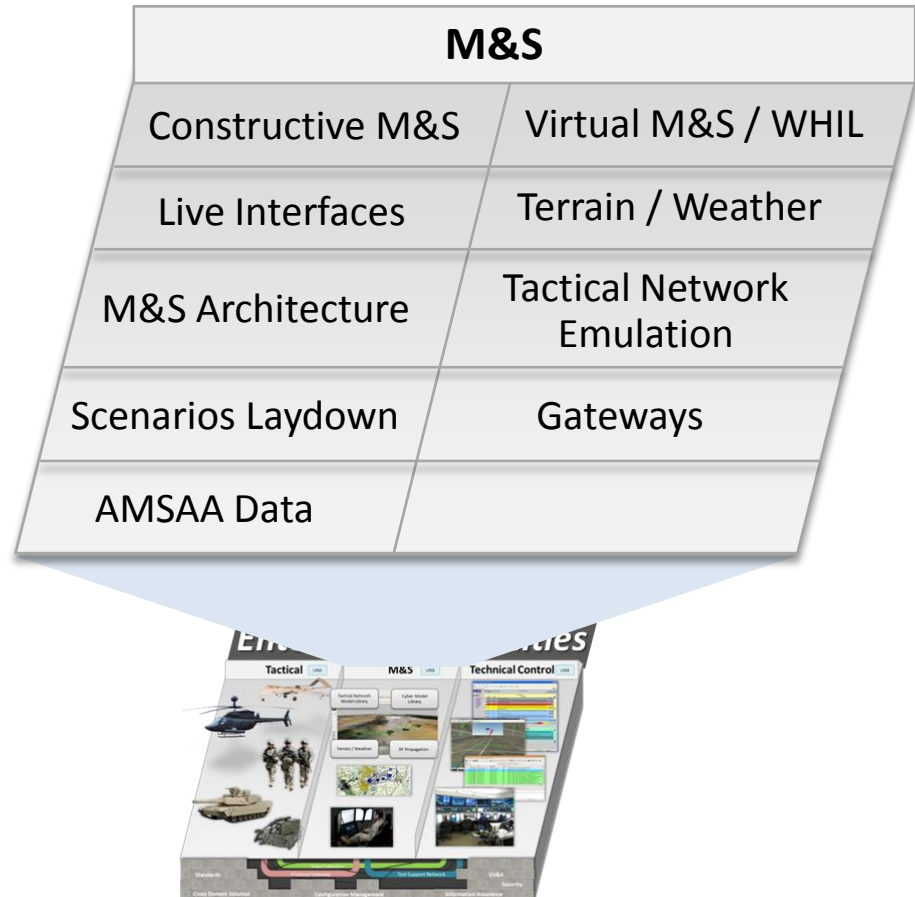
Example: Notional

M&S	
Constructive M&S	●
Virtual M&S / WHIL	●
Live Interfaces	●
Terrain	●
Weather	●
M&S Architecture	●
Tactical Network Emulation	●
Scenarios	●
Gateways	●
AMSAA Data	●





"ON DEMAND" Enterprise Capabilities - M&S -



WHIL = Warfighter Hardware in the Loop





“ON DEMAND” M&S Assets Examples



M&S			
Constructive M&S	OneSAF	Virtual M&S / WHIL	VBS2/OSRVT
Live Interfaces	RTCA	Terrain / Weather	WSMR
M&S Architecture	TENA	Tactical Network Emulation	JSTEN
Scenario Laydowns	MSL 1.0	Gateways	DIS/TENA, HLA/TENA
AMSAA Data	OneSAF Database		

RTCA - Real Time Causality Assessment
 HLA - High Level Architecture
 VBS2 - Virtual Battlespace 2™

WSMR - White Sands Missile Range
 JSTEN - Joint Scalable Tactical Emulated Network
 DIS - Distributed Interactive Simulation

Overview





"ON DEMAND" Enterprise Capabilities - Technical Control -



Technical Control	
Test Support Network	Data Collection / Reduction / Analysis
Collaboration	Event Control
Voice / Chat / VTC / Email	Visualization
Network Monitoring	Time Synchronization
Cross Domain Solution	





"ON DEMAND" Technical Control Examples



Technical Control

Test Support Network	JMETC	Data Collection / Reduction / Analysis	JANET, NSITE
Collaboration	Wiki, SharePoint, AKO	Event Control	TestTalk, STARSHIP
Voice / Chat / VTC / Email	VOIP, Openfire, DCO	Visualization	SIMDIS™
Network Monitoring	Wireshark, SolarWinds®	Time Synchronization	NTP, GPS
Cross Domain Solution	SimShield™		

JMETC - Joint Mission Environment Test Capability
 AKO - Army Knowledge Online
 VOIP - Voice Over Internet Protocol
 DCO - Defense Connect Online

NTP - Network Time Protocol
 GPS - Global Positioning System

