ATEC Test Integration Network (ATIN)

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29 Apr 04

Our Army . . .Our Soldiers . . .Our Equipment

ATIN Background

- November 02 Instrumentation Briefing with CTO highlighted several related projects

SoSIL Range Interconnection:

Stimulator/Simulator Interoperability Test Bed
FCS Real-Time Master Mission Control
FSTD SoSIL Connection for FA & FS Testing
FCS Distributed Test Enhancement
FCS Integrated Tactical Test Stimulator (FITTS)

Portable Range Commo:

FCS Engagement Area - Secure Laser Data Link
CRTC - FCS Range Communications Extension
CRTC - FCS Remote Networked Data Acquisition
FCS Telemetry Expansion
FCS Test Network Data Collection
FCS: Encrypted Data Transfer Capability

- LSI asked to see one integrated project

ATEC Test Integration Network - *ATIN*

ATIN Background (Cont'd)

- Nov 02 LSI asked ATEC to combine distributed communications requirements into one instrumentation project
- Feb 03 ATIN kicked off with 1st ATIN Conference in Austin TX
- Apr 03 ATIN documented in the FCS TEMP
- Jul 03 Developed first-cut Intra-range connectivity requirements
- Aug 03 First Command-wide scrub of ATIN Intra-range requirements and update
- Sep 03 Briefed requirements to CTO
- Jan 04 Briefed ATIN Management Plan (AMP) to CTO
- Mar 04 ATIN Leadership Meeting to plan way ahead

ATIN Objectives

- **Provide connectivity to:**
  - **ATEC Ranges and Test Centers/Directorates through the Distributed Test Control Centers (DTCCs)**
  - **Fixed Test Facilities**
  - **Mobile/Remote Test Systems**
  - **Contractor Facilities**
  - **Individual And Central Test Data Bases**
  - **AEC Evaluators**
- **Common architecture**
- **Common hardware where practical**

Scope

- Scope
  - Modeling & Simulation and Instrumentation (M&S&I)
  - Real-time test control, data collection, and data transport
  - Multilevel security
  - Future Combat Systems (FCS) System Integration Labs (SILs) & System of Systems Integration Lab (SoSIL)
  - High Performance Computing (HPC)
  - ATEC fixed installations and mobile instrumentation
  - External Organizations

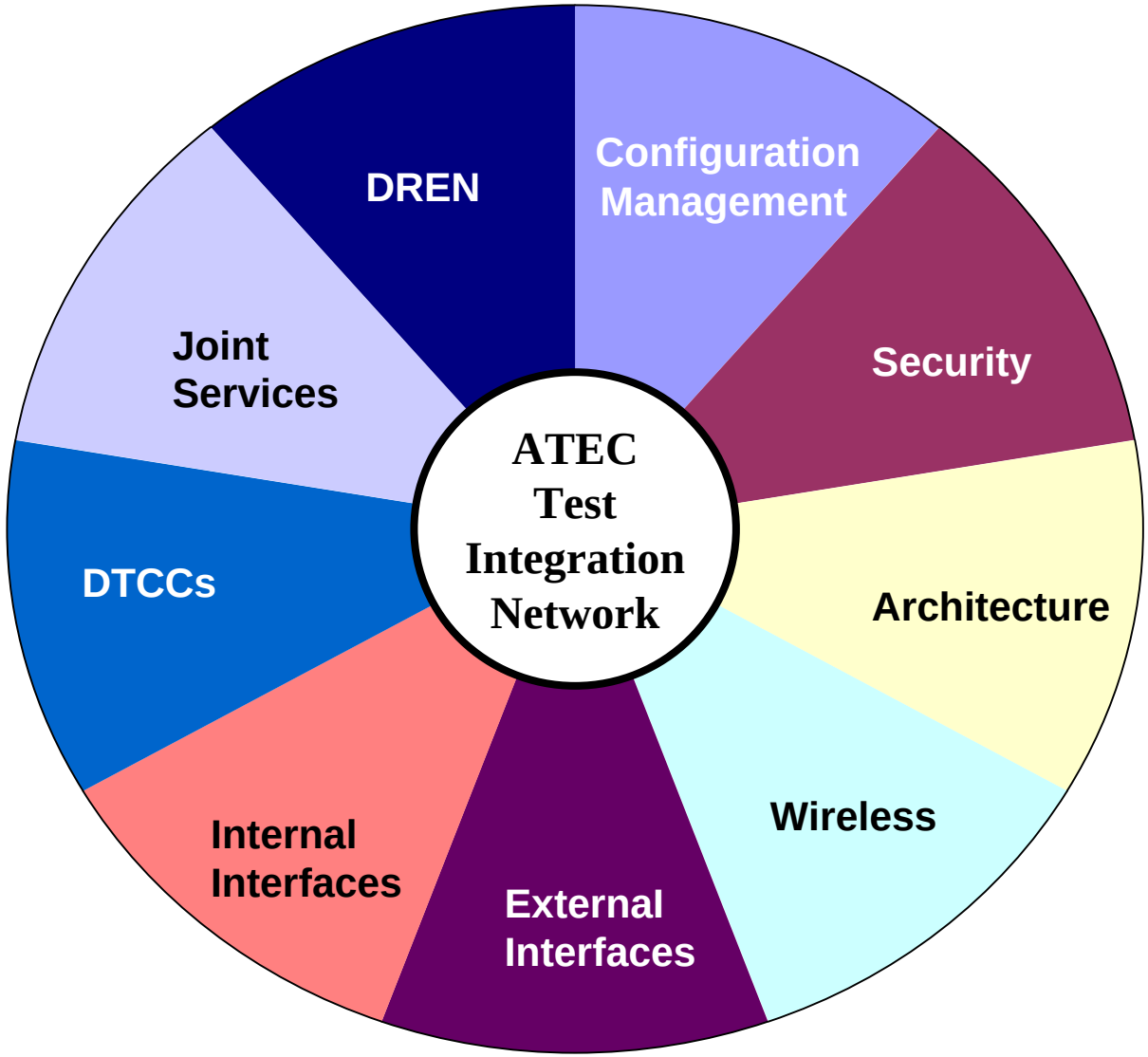
Combined ATEC Requirements

- **Sufficient bandwidth to meet data transmission requirements**
  - **Streaming Video**
  - **M&S**
  - **Near Real Time Data**
  - **Voice Over IP**
- **Reliable data communications capabilities**
  - **Compliant with Information Assurance rules**
  - **Meet quality of service requirements**
  - **Links all ATEC organizations**
- **Integration into Army Active Directory**
- **Data storage capabilities with reliable access**
  - **Distributed, Non-duplicative**
  - **Expandable**
- **Connectivity to HPC**
- **Integration of instrumentation, telecommunications, IT**

Combined ATIN Capabilities

- **No port or protocol blocks between ATEC sites**
- **Multiple security levels via private ComSec keys**
- **Real Time visualization of network Service Level**
- **50% of bandwidth available for burst traffic**
- **Low end-to-end latency**
- **High speed security stack (firewall)**
- **ATEC managed IP space**
- **IPv6 enabled backbone**
- **External access via IP Virtual Private Network from anywhere**

ATIN Core Capabilities



ATEC Test Integration Network

Linking FCS Development to Army Test Ranges Throughout the Development Process

FLFO

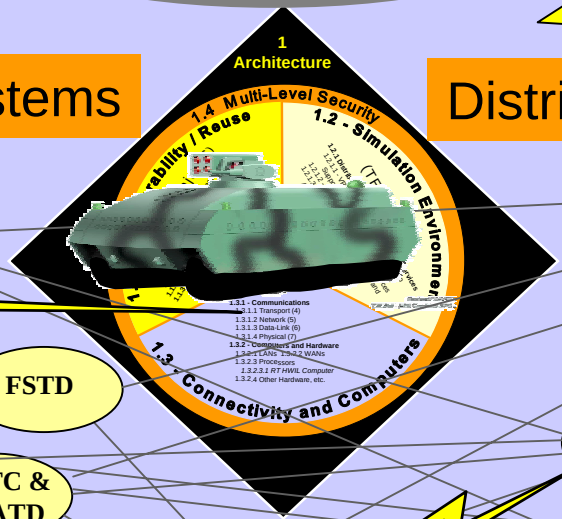
Leveraging Defense Research & Engineering Network (DREN)

V & V
Live Test
Supporting M&S

Network-Centric Testing!

System of Systems

Distributed Capability



FCS SoSIL Central Facility
C²

WDTC

FSTD

YPG

EPG & IEWTD

WSTC & ADATD

OTC & CTSF

ATC

ABSOTD

RTTC

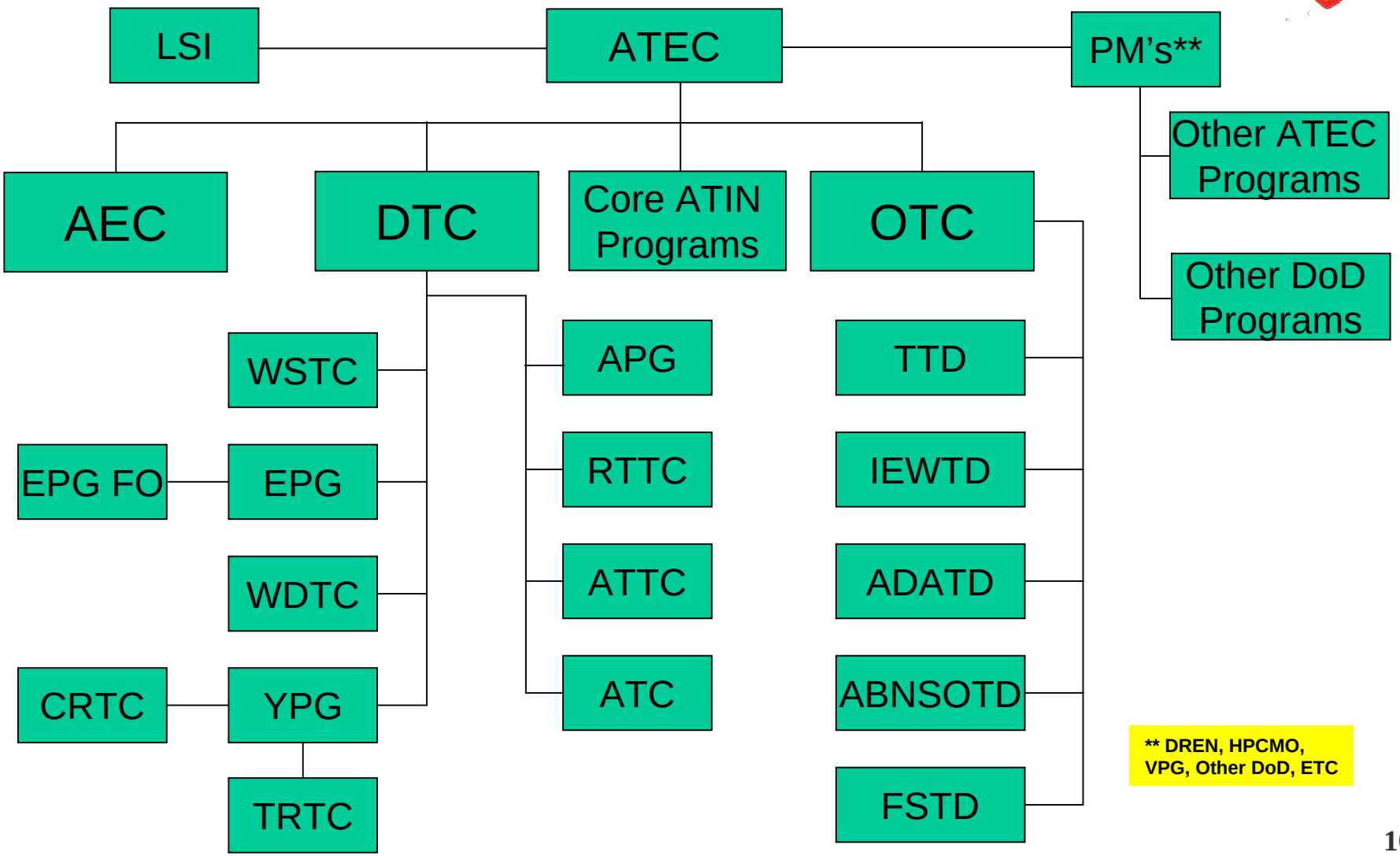
ATTC

Natural Environments

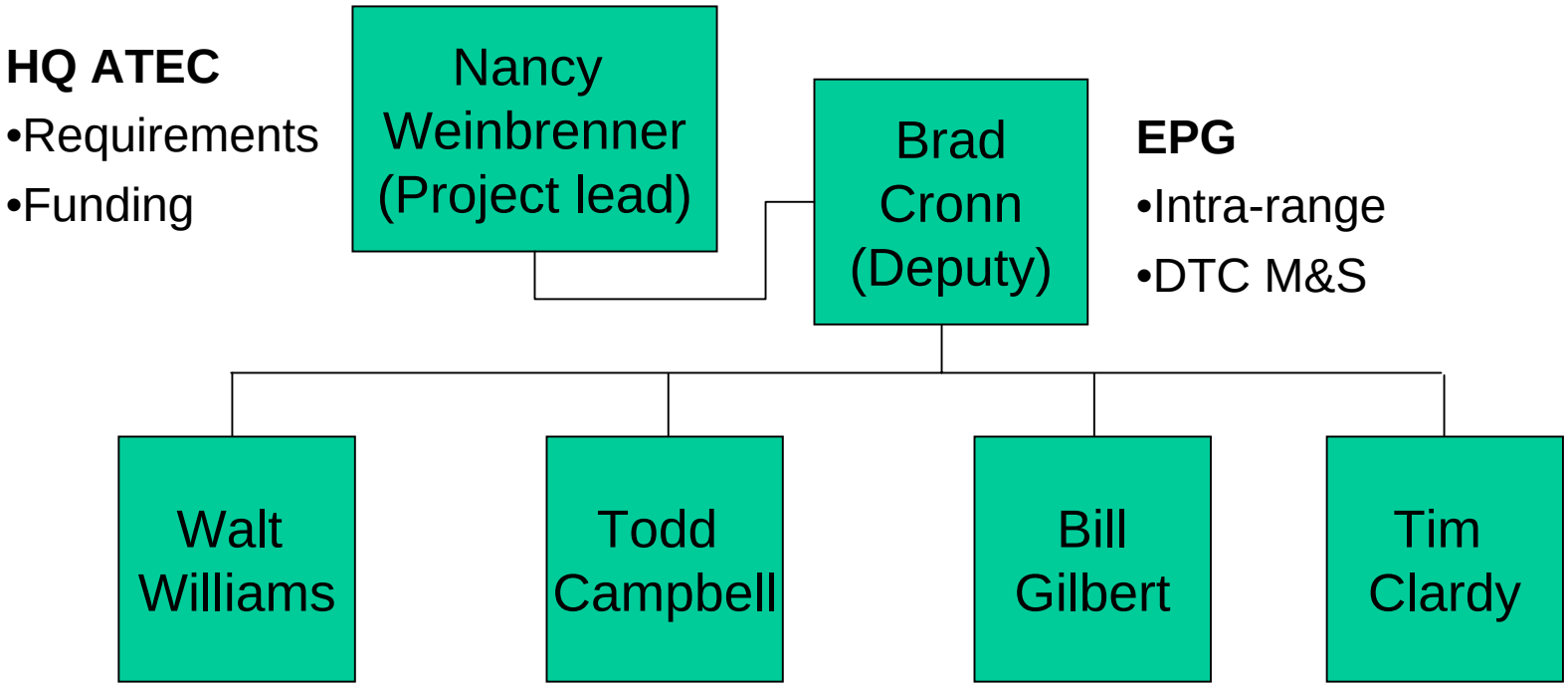
Synthetic Environments

Live ⟷ Virtual ⟷ Constructive

ATIN Project Organization

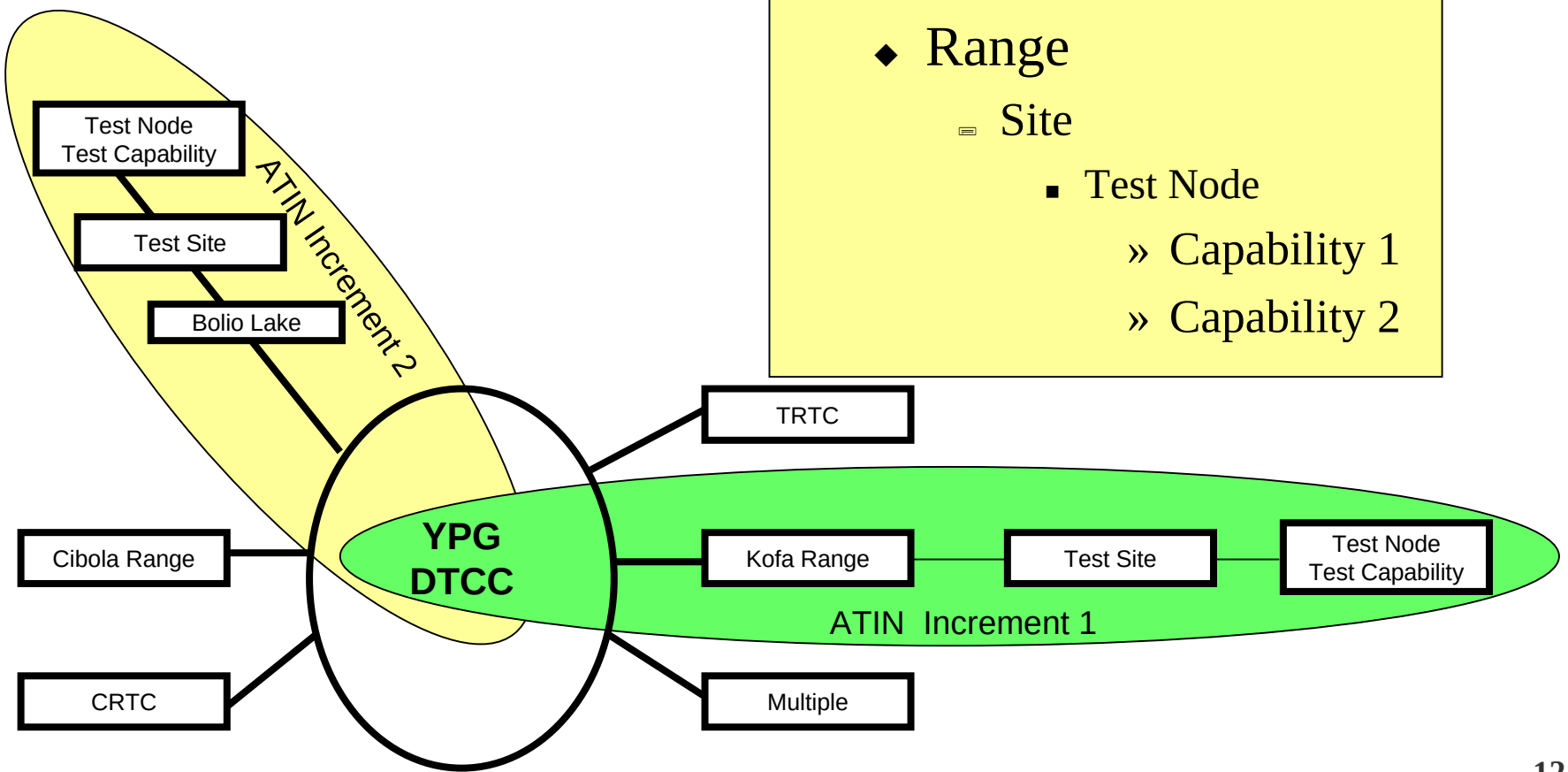


ATIN Project Management Leadership



ATIN Development Concept

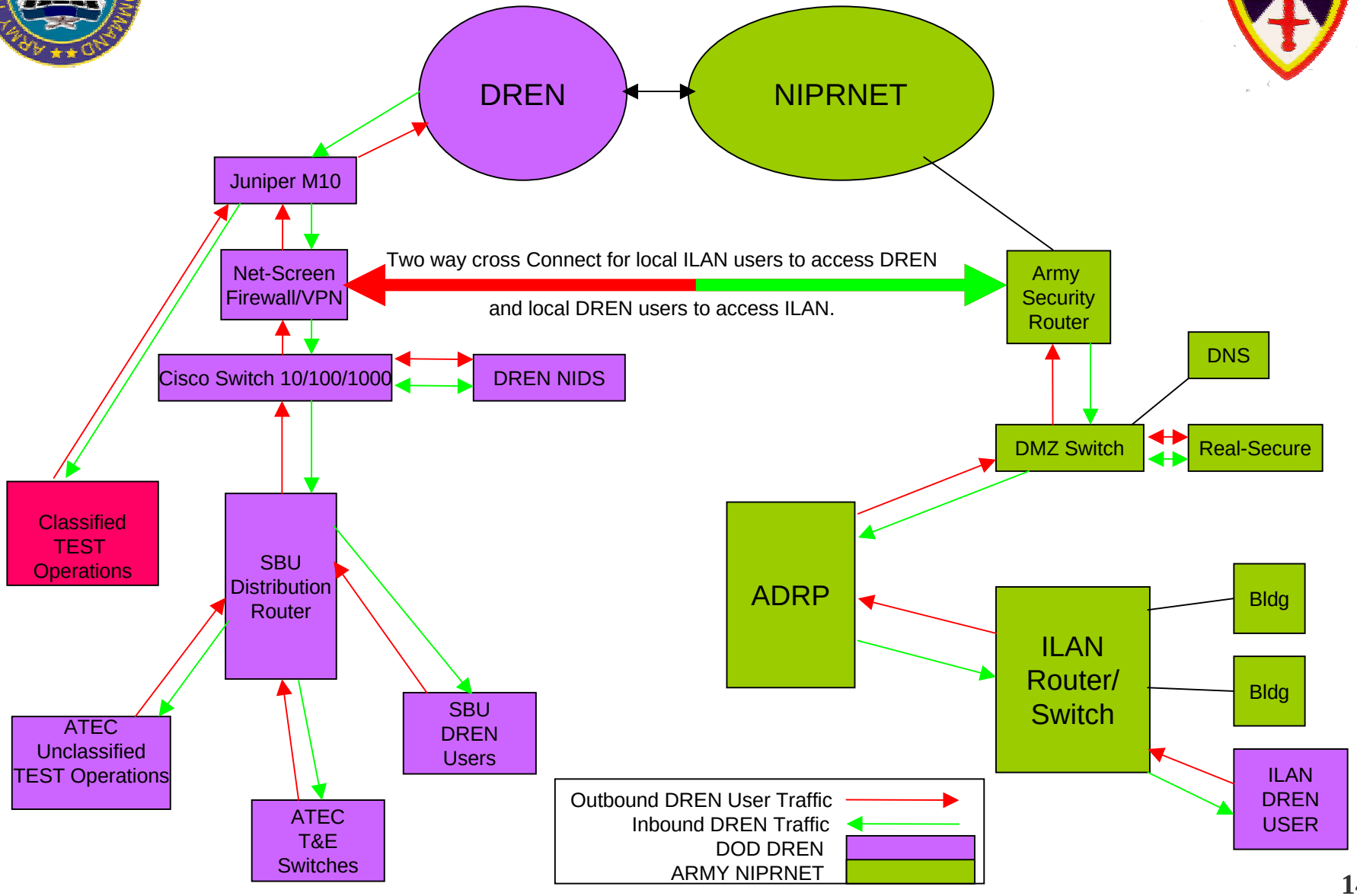
- Test Center
  - Range
    - Site
      - Test Node
        - » Capability 1
        - » Capability 2



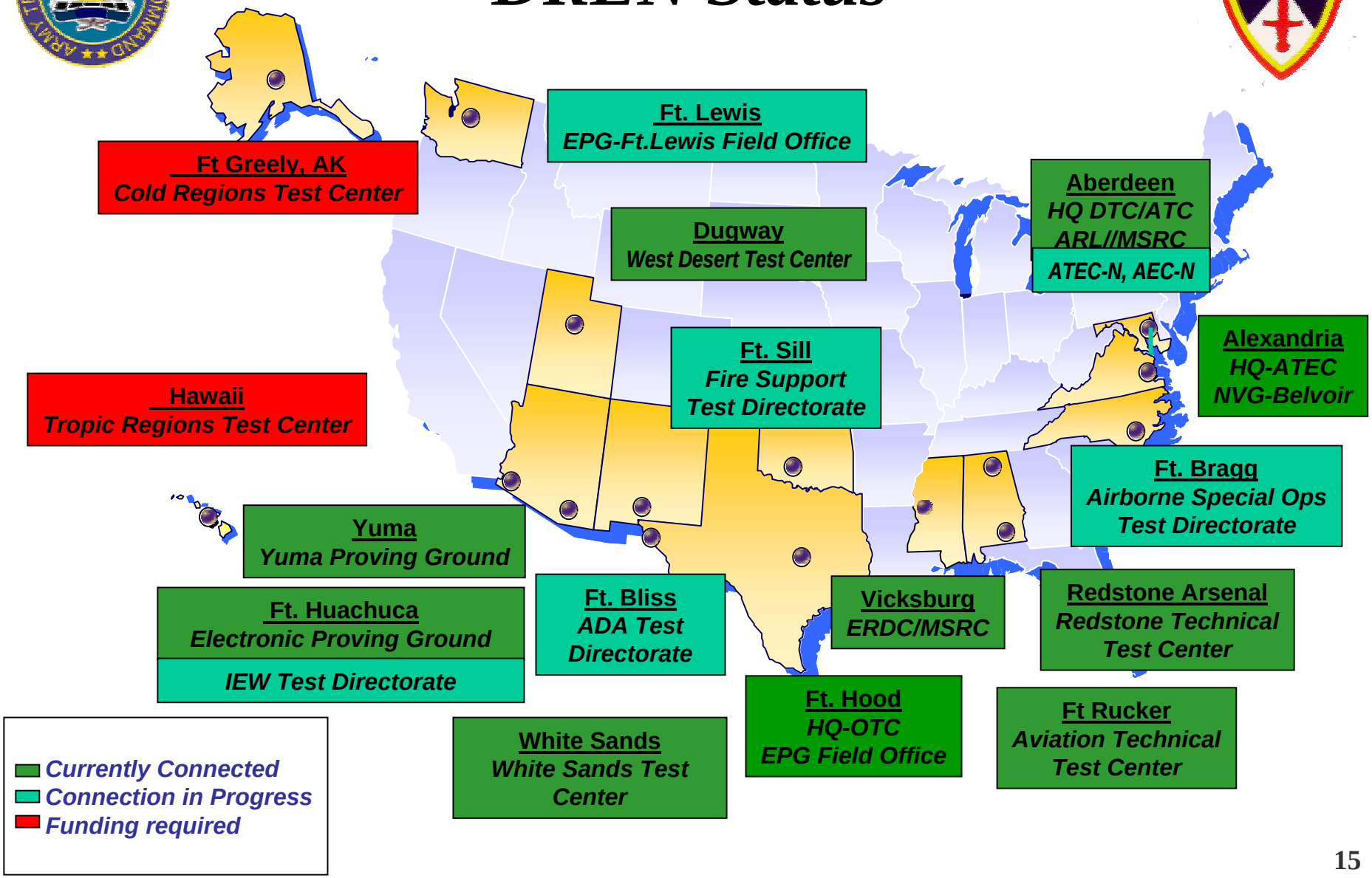
The NETCOM Solution
Army/DoD Workgroup

- **Connect ATEC T&E directly to DREN**
- **Stand up HPC security Stack at each SDP**
- **Maintain connectivity through DREN to ILAN cross connection**
- **Extend DREN access to external network users via a Virtual Private Network that terminates at the Netscreen firewall**

DREN–Army Architecture



DREN Status


Ft. Lewis
EPG-Ft.Lewis Field Office
Ft Greely, AK
Cold Regions Test Center
Dugway
West Desert Test Center
Aberdeen
HQ DTC/ATC
ARL//MSRC
ATEC-N, AEC-N
Alexandria
HQ-ATEC
NVG-Belvoir
Ft. Sill
Fire Support
Test Directorate
Hawaii
Tropic Regions Test Center
Ft. Bragg
Airborne Special Ops
Test Directorate
Yuma
Yuma Proving Ground
Ft. Huachuca
Electronic Proving Ground
IEW Test Directorate
Ft. Bliss
ADA Test
Directorate
Vicksburg
ERDC/MSRC
Redstone Arsenal
Redstone Technical
Test Center
Ft. Hood
HQ-OTC
EPG Field Office
Ft Rucker
Aviation Technical
Test Center
White Sands
White Sands Test
Center
Currently Connected
Connection in Progress
Funding required

ATEC Control Concept

- **Distributed Test Control Centers (DTCCs)**
  - **Present at each ATEC Distributed Capability**
  - **Standardized Equipment/Configuration**
  - **Inter- and Intra-ATIN Communications**
  - **Local Point of entry to the DREN**
  - **Coordinate all Intra-ATIN Activities**

- **Inter-Range Control Center (IRCC)**
  - **Single Connection point to the SoSIL**
  - **Master Control for FCS Distributed Tests**

ATIN Quality

- Reality
  - 250 ms is maximum Human Factors Tolerance Level
  - DREN2 is designed to provide a maximum latency of: 2 X Speed of Light in Glass + 20ms
- Goals
  - Develop Baseline Network Capabilities
    - Evaluate Bandwidth used during SEIT DTE4
    - Evaluate jitter during SEIT DTE4
  - < 250 ms overall latency for human-in-the-loop
  - < 100 ms site-to-site round trip time (CONUS)
    - Includes through encryption devices

Leaves 150 ms For Test Hardware And Simulations

Actual DREN latencies 3/31/04

SOURCE MCI DREN SLA	RTTC	WSTC	APG	YPG	WDTC	OTC	HUCHUCA	SEATTLE	ATTC	ABNSOTD	ADATD	FSTD	ATEC
RTTC		57	17	67	56	35	35	88	9	23	71	24	17
WSTC	57		61	44	27	27	44	60	66	67	48	55	61
APG	17	61		77	77	51	77	91	26	17	81	40	7
YPG	67	44	77		43	55	12	51	26	84	16	44	77
WDTC	56	27	60	43		64	43	58	65	66	47	53	59
OTC	35	66	51	55	64		56	80	44	58	60	11	51
HUCHUCA	67	44	77	12	43	56		51	76	86	16	44	77
SEATTLE	88	60	91	51	58	80	51		97	100	55	69	91
ATTC	9	66	26	26	65	44	76	97		32	80	32	25
ABNSOTD	23	67	17	84	66	58	86	100	32		89	47	13
ADATD	71	48	81	16	47	60	16	55	80	89		48	81
FSTD	24	55	40	44	53	11	44	69	32	47	48		40
ATEC	17	61	7	77	59	51	77	91	25	13	81	40	

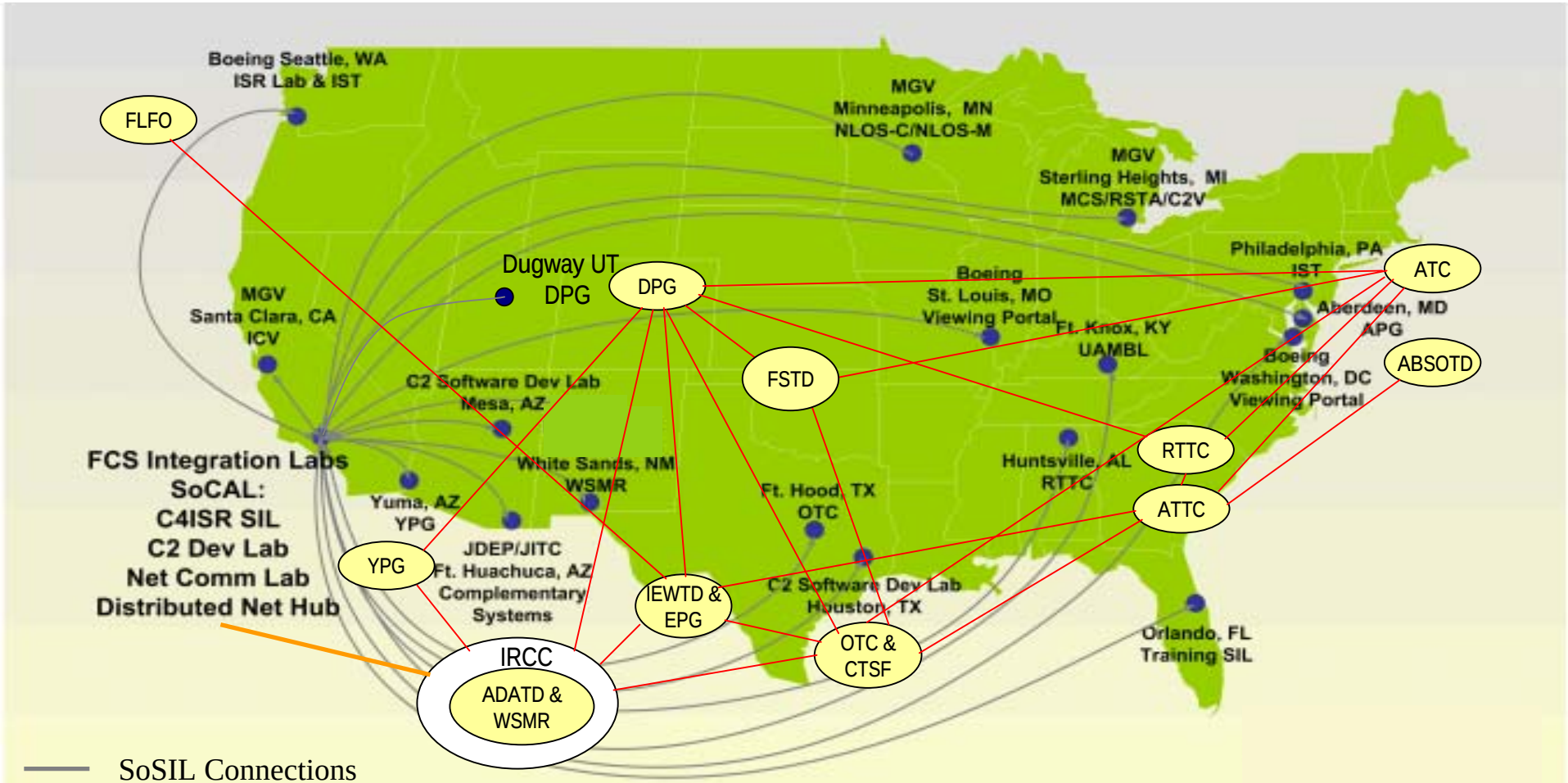
Related Internal Efforts

- **DTC**
  - **Virtual Proving Ground (VPG) Architecture Focus Group**
  - **VPG Tools Focus Group**
  - **Synthetic Environments Integrated Testbed DTE4**
  - **Inter-Range Control Center (IRCC)**
- **OTC**
  - **OASIS integrating M&S and Instrumentation for operational testing**

External Related Efforts

- **LSI connecting SILs and SoSIL through DREN**
- **RDECOM MATREX STO**
  - **Developing an integrating architecture for M&S**
- **JITC - JDEP DREN connectivity to SoSIL**
- **FI2010 / TENA / CTTRA**
- **Others**

Distributed Test Network



SoSIL Connections

ATIN Connections

ATEC to SoSIL

Current Initiatives

- **FY04**
  - **Complete/upgrade CONUS DREN Backbone across ATEC (Inter-ATIN)**
  - **Implement TLA across ATEC**
  - **Characterize Network Performance**
  - **Connect ATIN with SoSIL (California node)**
  - **Implement the ATIN Management Plan**
  - **Conduct Comprehensive Requirements Study with Baseline**
  - **Conduct Security Study**
  - **Field Classified ATIN capability via KG-175 TacLane**
  - **Developing Intra-range requirements in MS Project**
  - **Prioritizing FY05 sub-projects**

Current Initiatives (cont'd)

- **FY05**
  - **Complete OCONUS upgrade to CRTC**
  - **Implement standard architecture for Test Execution**
  - **Extend connectivity out to the Ranges and Test capabilities (Intra-ATIN)**
  - **Refine requirements for Wireless Ad-Hoc Networks**
  - **Complete Distributed Test Control Centers (DTCC) at each Test Center/Directorate**
  - **Integrate ATIN with SILs and SoSIL architectures through IRCC**
  - **Field Real Time / predictive network visualization tools**

The Road Ahead

- **Develop Test Execution Elements**
  - **Expand capability to incorporate M&S Federations to provide wrap-around test environment**
  - **Continue development of intra-range connections based upon the required capability**
  - **Connect UE organizations as required for FCS testing**
- **Develop standard Secure Data Links to remote systems**

Issue

- **Instrumentation requirements may change based on FCS Program**
  - **New requirements may emerge**
    - **Unmanned Vetronics Embedded Instrumentation (ATC)**
      - **If unmanned platforms don't have expected embedded instrumentation, this project develops miniaturized instrumentation suite**
  - **Projects not agreed to by LSI/CTO may become valid**
    - **High altitude Electromagnetic Pulse (HEMP) for FCS (WSMR)**
      - **January 03 ORD included nuclear weapons effects and directed energy weapons**

ATIN POCs

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BACK OF LAST SLIDES

ATIN GOALS

- Support Test and Evaluation
  - Stabilization
  - Interoperability
  - Standardization

ATEC Architecture OV-4a

ATEC Architecture

ATEC Distributed T&E Architecture

Current T&E

Enterprise Architecture

Modeling, Simulation, Architecture

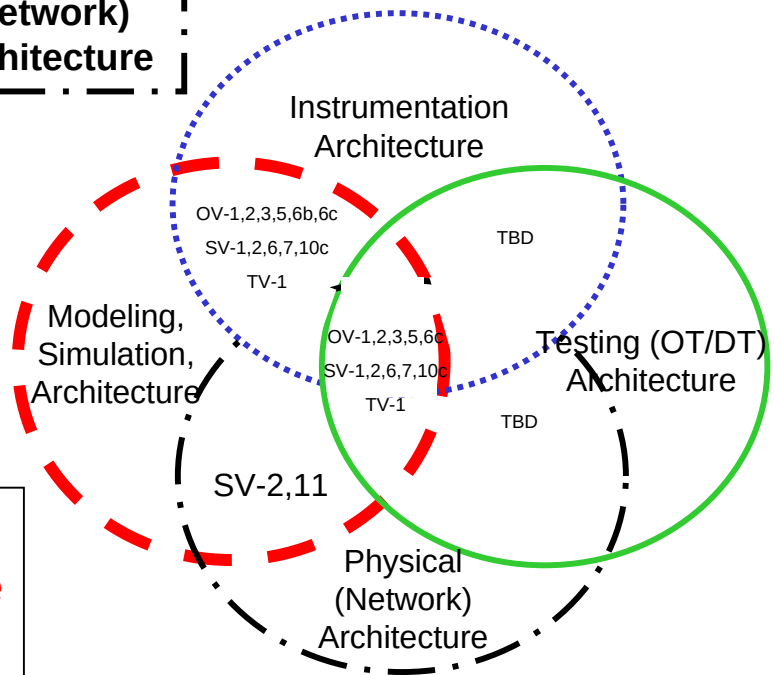
Instrumentation Architecture

Testing(OT/DT) Architecture

Physical (Network) Architecture

TECOE Architecture

DoDAF

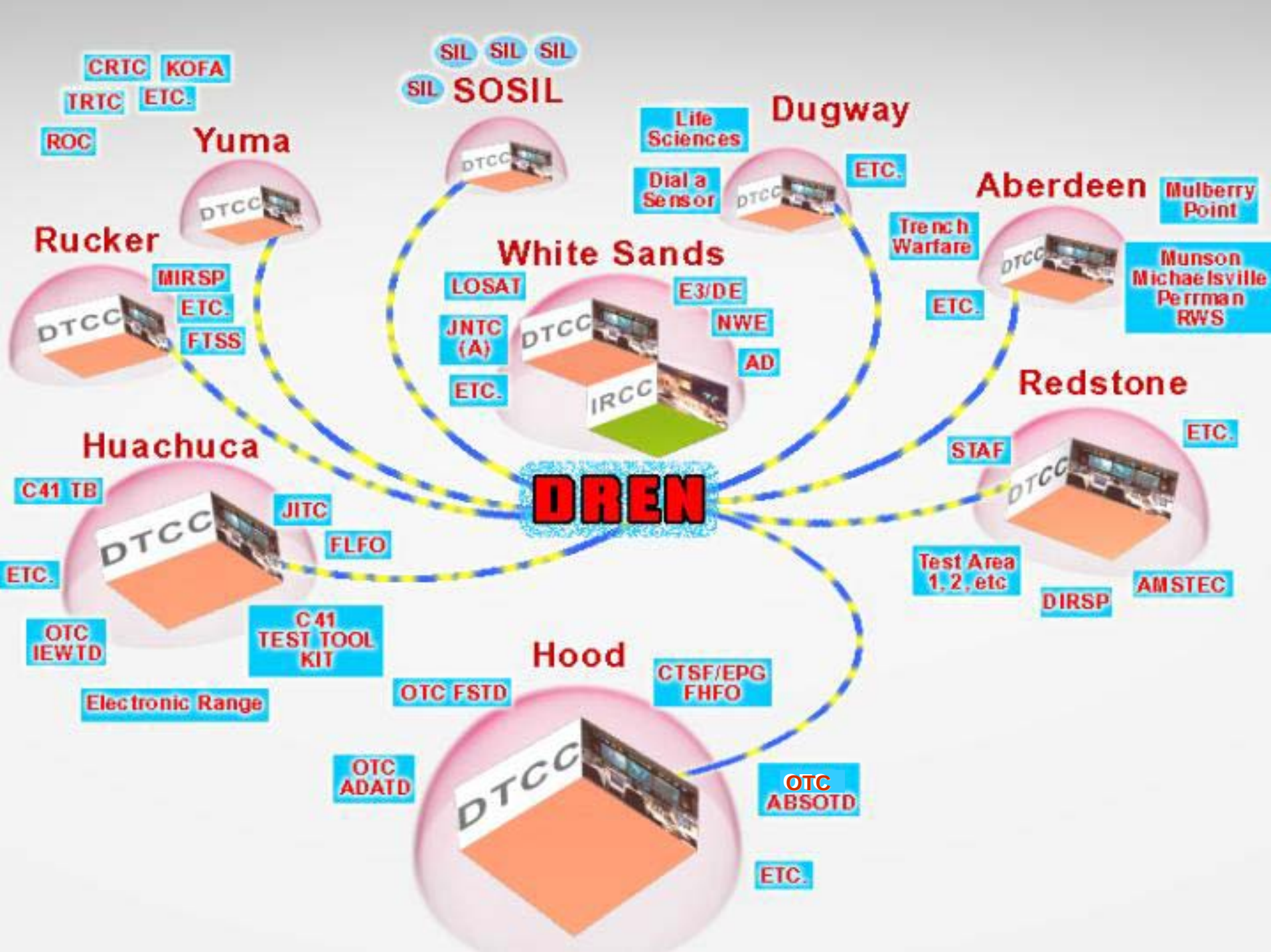


Interrelated Views

Legend:

M&S is Interrelated to other Architecture Areas.

TECOE: T&E Common Operating Environment


CRTC
KOFA
TRTC
ETC.
ROC
SIL
SIL
SIL
SIL
SOSIL
Yuma
DTCC
Rucker
DTCC
MIRSP
ETC.
FTSS
DTCC
LOSAT
JNTC (A)
ETC.
White Sands
E3/DE
NWE
AD
DTCC
IRCC
Life Sciences
Dial a Sensor
Dugway
ETC.
DTCC
Trench Warfare
ETC.
Aberdeen
Mulberry Point
Munson
Michaelsville
Perrman
RWS
DTCC
Redstone
ETC.
STAF
DTCC
Test Area 1, 2, etc
DIRSP
AMSTEC
DREN
Huachuca
C41 TB
JITC
FLFO
ETC.
DTCC
OTC IEWTD
C41 TEST TOOL KIT
Electronic Range
Hood
OTC FSTD
CTSF/EPG FHFO
OTC ADATD
DTCC
OTC ABSOTD
ETC.

RDECOM MATREX

- **Currently funded $65M - $70M over 5 years**
- **FY04 funding at $6.8M**
- **Delivered SoSIL Virtual Framework (SVF) Version 1.0 to LSI**
- **FY04 Efforts**
  - **Continue improvement of SVF for LSI**
  - **Initialize a model or simulation from the DoD Architecture Framework (DoDAF)**
  - **Network effects within the integrating architecture**
- **FY05 Efforts**
  - **Continue the network effects**
  - **Continue work on initialization from DoDAF**
  - **Identify any interactions between M&S initialization and network effects**
- **ATIN working the physical infrastructure and connectivity**
- **Define OT scenarios and mission threads for "prove out" exercises to test this architecture**

JITC

- **Joint Interoperability Test Command**
  - **HQ at Ft. Huachuca, AZ**
  - **Facility at Indian Head, MD**
- **Joint Distributed Engineering Plant (JDEP)**
  - **DOD-wide, distributed, interoperability tool for design, software support, test, and evaluation**
  - **Battlefield representative environments for SoS**
- **Will connect to FCS SoSIL through DREN**