Gaining Cyber Dominance

Software Engineering Institute
Carnegie Mellon University

NETCOM G3/5/7 TREX

January 2015

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
15 JAN 2015	**N/A**	

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Gaining Cyber Dominance	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
Longo /Gregory	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)	8. PERFORMING ORGANIZATION REPORT NUMBER
Software Engineering Institute Carnegie Mellon University Pittsburgh, PA 15213	
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
Approved for public release, distribution unlimited.

13. SUPPLEMENTARY NOTES
The original document contains color images.

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**SAR**	**29**	

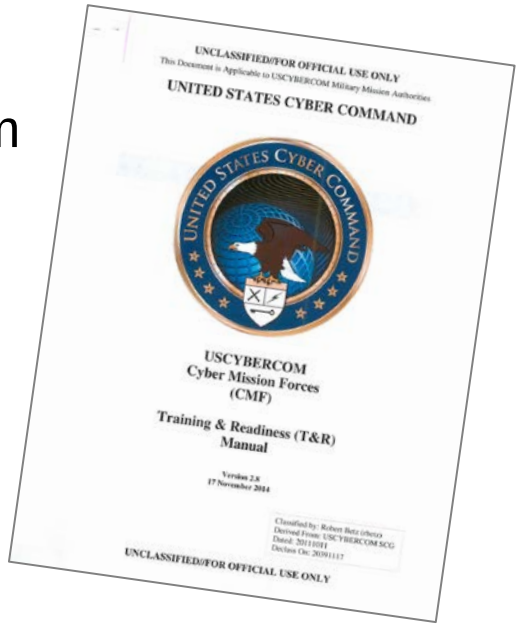
This material is based upon work funded and supported by the Department of Defense under Contract No. FA8721-05-C-0003 with Carnegie Mellon University for the operation of the Software Engineering Institute, a federally funded research and development center.

DM-0002090

Cyber Force Development Challenges

Customizable and scalable training solutions for globally dispersed cyber operations forces

Establishment of CMF collective training program


UNCLASSIFIED//FOR OFFICIAL USE ONLY

This Document is Applicable to USCYBERCOM Military Mission Authorities

UNITED STATES CYBER COMMAND

USCYBERCOM
Cyber Mission Forces
(CMF)

Training & Readiness (T&R)
Manual

Version 2.8
17 November 2014

UNCLASSIFIED//FOR OFFICIAL USE ONLY

"Our highest priority is developing and managing individual, collective, and sustainment training for our cyber mission forces." CG, ARCYBER (2014)

FY15 Initiatives

Gaining Cyber Dominance Program

- Army topology development
- PCTC infrastructure refresh
- RCC training and exercises (unclassified)
- CPT training and exercises (unclassified/classified)

Classified training environment

- STEP infrastructure on JIOR

GCD Program Overview

- ✓ Improve Individual Operator Skills
- ✓ Improve RCC/CPT Team Skills
- ✓ Establish integration of RCC/ADOC/JFHQ-C/CPT
- ✓ Provide input to RCC of the Year Award

The "CYBER Dominance" Team!

ELITE MERCURY Capstone Event

Collective Monthly Exercises (STEP)

Initial Individual Training (FedVTE)

The Team!

END STATE:
Cyber training and exercise program that provides hands on training for RCCs and CMF teams to exercise and refine operational TTPs and mission command including alignment with joint training standards and the ability to evaluate mission ready status of forces.

CMF Training Approach

US Army
Regional Cyber Centers
Theater Signal Command

Gaining Cyber Dominance

Cyber Flag

STEP Platform

Cyber Guard

Individual Training (FedVTE)

Unit Lead Collective Training Sandbox

Facilitated Collective Exercises

ELITE MERCURY Culminating Training Exercise

CMF Training

ARCYBER CPT CONOPS
USCC CPT CONOPS
USCC CMF T&R Manual
USCC CFCOE

Program Objectives

1. Offer challenging training opportunities tailored to meet the needs of the RCCs and CPTs
2. Enlarge the RCC training audience to include the RCC director - exercising Mission Command
3. **Build an enlarged/more complex virtual environment with a continued focus on realism**
4. **Within CPTs, focus on squads first, teams second**
5. Work with NETCOM/ARCYBER/USCC leadership to prioritize effort to establish JIOR nodes in each RCC and the ADOC
6. Enhance program flexibility where possible in order to adjust vignettes based on RCC standardization decisions, doctrine and TTP development, force structure modifications, and **short notice collective training preparation (ex. Pre-Cyber Guard train-up)**
7. Build on relationship with 1st IO command that was initiated during GCD 14

Training Themes

Experience with new operational capabilities

Validation of existing TTPs/SOPs

Development of new TTPs/SOPs

Incident reporting

RCC/CPT/ADOC interaction

CPT squad operations

Exposure to emerging threats

Deployment/Exercise prep

GCD 15 Training Objectives

Demonstrate the ability to detect, respond to, and recover from a cyber attack

Support the intelligence cycle by performing cyber threat/event analysis

Develop procedures to coordinate with JFHQ-C during RCC and CPT operations

Demonstrate the ability to engage RCC leadership and perform critical decision making during cyber-kinetic operations

Assess emerging doctrine ISO RCC and CPT mission integration during operations

Demonstrate the ability to perform CPT squad level 3000 tasks

USCC T&R Manual

CPT identifies & protects assets critical to mission accomplishment

CPT defends Cyber Key Terrain & critical assets in larger/overlapping areas of operation

Operates across Service controlled terrain; Protects Service & CCDRs' priorities ISO operational needs

"USCYBERCOM and CMF leaders and staffs shall use the CMF T&R Manual to develop their training and assessment plans for individual, staff, and collective levels. They will ensure that CMF exercise events incorporate CMF T&R Manual standards for assessment team readiness to perform our mission." – ADM Rogers

CPT Training Resources

Individual skill building

- FedVTE/PCTC courses -- lectures, demonstrations, labs

Collective experience building

- Scenario vignette library focusing on squad operations
- Facilitated exercises

Vignette Library

CPT Operations

- Prepare Phase
- Execution Phase
  - Survey
  - Secure
  - Protect
  - Recover

Squads

- **Mission Protect**
- Cyber Readiness
- Cyber Support
- **Discovery & Counter-Infiltration**
- **Cyber Threat Emulation**

Training Battle Rhythm

RCC

Month	Event
December – February	TEXN Build (CMU-SEI)
March	Cyber Sandbox 1 (24x7)
April	Mercury Challenge 1 (4hr)
May	Cyber Sandbox 2 (24x7)
June	Mercury Challenge 2 (4hr)
July	Cyber Sandbox 3 (24x7)
August	Mercury Challenge 3 (4hr)
September	Elite Mercury CTE (8hr)

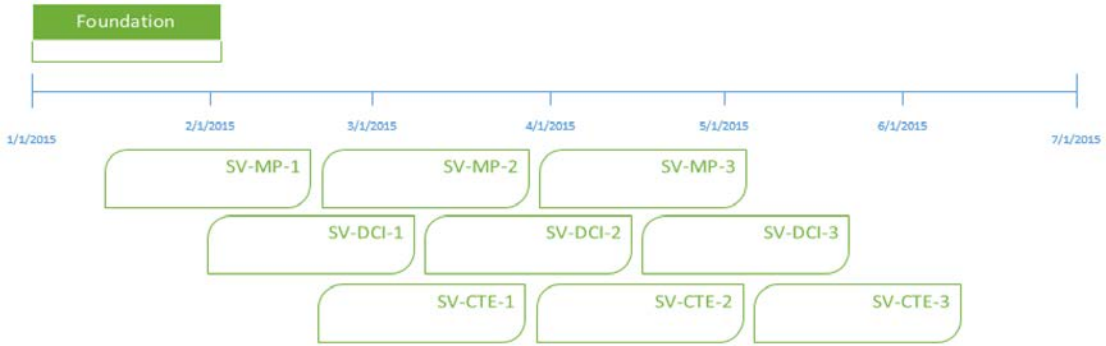
CPT

Month	Event
December – February	TEXN Build (CMU-SEI)
March	RCC Configuration
April	PTE Go-Live
May	CPT Exercise 1 (4hr)
June	Squad Vignette Training
July	CPT Exercise 2 (4hr)
August	Squad Vignette Training
September	Squad Vignette Training

Training Partnership

Event Design

- RCC/CPT trusted agent
- Design review



Assessment Strategies

- Embedded Observers
- Training Coordinators
- Hotwash/Shot Validation
- White Cell

Virtual Training Environments

Training enabler - Focus on providing the capability for units to conduct small team collective training while addressing time and scale

Environments based on training objectives

- Unclassified (NIPR)
- Classified (JIOR)

Platform and environment as a managed service

- Rapid prototyping based on training requirements (e.g. integrated JQR training database)

CERT® Private Cyber Training Cloud

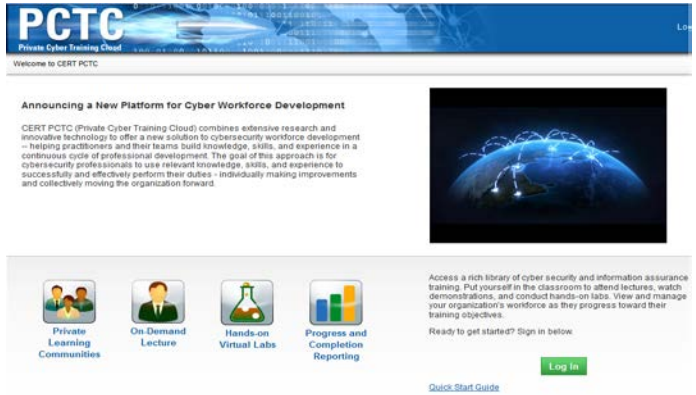
Intuitive Learning Management System

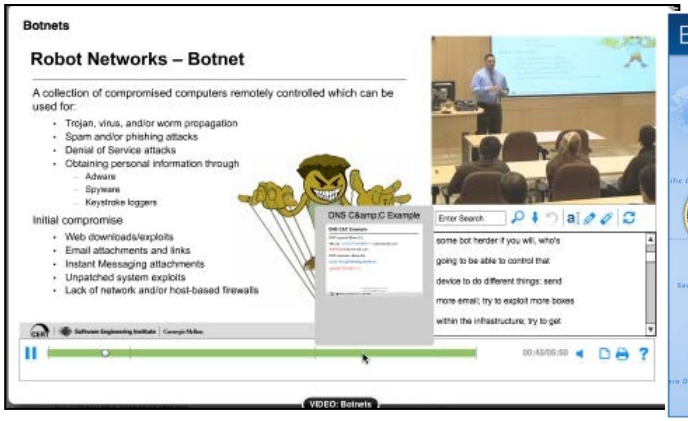
Thousands of hours of captured training

- Lectures, Demos, Hands-on Labs

Robust team exercise and simulation

- Air-gapped; isolation from production networks
- "Train as you fight" scenarios
- Advanced user and Internet Simulation





Training & Exercise Network (TEXN)

Build the most realistic representation of an Army enterprise yet for multi-mission element training

Incorporate Joint Regional Security Stack (JRSS) systems

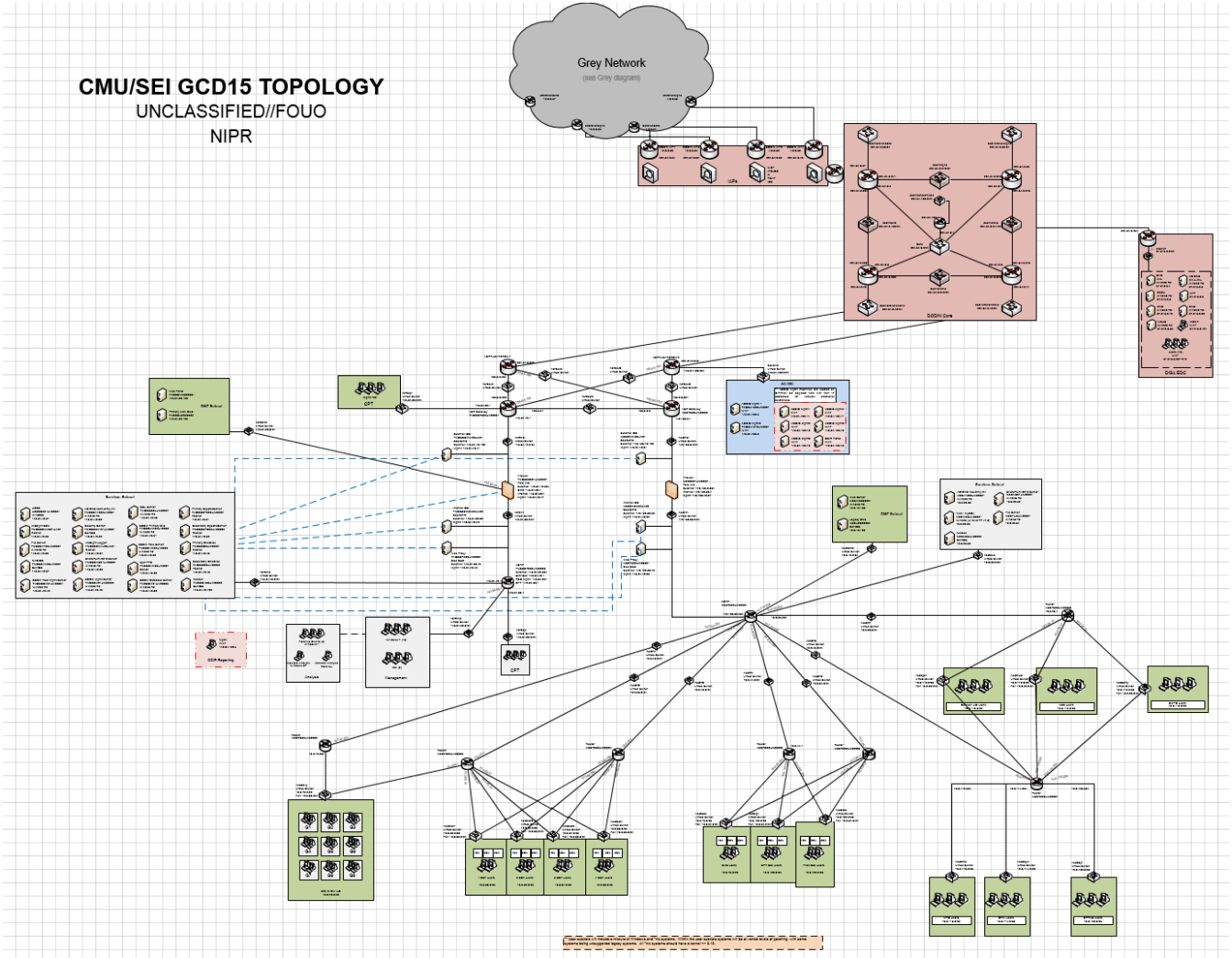
Current design based on inputs from RCC

- Many enterprise variations in the real world meant a single environment could not represent every region

CPT Capability Integration

- Security Onion
- SIFT (Linux/Windows)
- Kali
- Rucksack
- Docker
- VTS

TEXN Architecture



Training Collaboration

NETCOM

- Integration of RCC, CPT, ADOC, and 1st IO

Cyber Protection Brigade

- Individual training proficiency tracking (JQR)
- CPT training requirements

Cyber Center of Excellence

- Training advancements for emerging missions
- TTP/SOP development and codification

CECOM

- Army cyber range working group

ARCYBER JFQH-C

- Training coordination
- CMF training alignment

Curriculum Development

Leverage PCTC beyond the exercise portal

Custom course development integrating LMS features, courses, and labs

Integration of Army training content

QUESTIONS

Contact Information

Bruce Madalinski, NETCOM G3/5/7 TREX
bruce.a.madalinski.civ@mail.mil
520-538-8439

Greg Longo, CMU/SEI
ggl@cert.org
412-268-8330

BACKUP

CWDi Approach to Training

- Knowledge Building:
  lectures and demos
- Skill building:
  hands-on labs
- Experience building:
  team-based exercises
- Evaluation

AUTL

ART 5.9.1.2 Conduct Defensive Cyberspace Operations

Units conduct and coordinate, as required, defensive cyberspace operations to effectively detect, identify, and respond to enemy and adversary actions against friendly networks and information resident in these networks. (FM 3-38) (USAMCCoE)

No.	*Scale*	*Measure*
01	**Yes/No**	**Unit employed tactics, techniques, and procedures to detect intrusions and cyber attacks into the Army's portion of the Department of Defense information networks called LandWarNet,**
02	Yes/No	Unit coordinated, deconflicted, and conducted defensive cyberspace operation response actions outside the LandWarNet.
03	**Yes/No**	**Unit coordinated, deconflicted, and employed internal defensive measures inside the LandWarNet.**
04	**Yes/No**	**Unit conducted rehearsals to react to enemy cyber attacks on friendly networks and per operation order, battle drills, and standard operating procedures.**
05	Yes/No	Unit coordinated and conducted cyberspace information collection to support defensive cyberspace operations.
06	Yes/No	Unit developed and submitted cyber effects request formats as required in support of defensive cyberspace operations.

Condition

- Using network resources while under cyber attack
- Operate through degraded network conditions

AUTL

ART 5.9.1.3 Coordinate Network Operations

Units that perform this task coordinate, integrate, and synchronize network operations within Department of Defense information networks and the LandWarNet to support cyberspace operations. (FM 3-38) (USAMCCoE)

No.	*Scale*	*Measure*
01	**Yes/No**	**Unit enabled and facilitated cyberspace operations inside friendly force networks.**
02	**Yes/No**	**Unit enabled and facilitated cyberspace operations outside friendly force networks.**
03	Yes/No	Unit enforced cyber electromagnetic policies and standards that guided the development, deployment, and management of personnel, products, and processes.

Condition

- Using network resources while under cyber attack
- Operate through degraded network conditions

AUTL

ART 5.9.1.4 CONDUCT CYBERSPACE SUPPORT

Units conduct cyberspace support actions to enable cyberspace operations and the accomplishment of the mission. (FM 3-38) (USAMCCoE)

No.	Scale	Measure
01	Yes/No	Unit performed development, engineering, and analysis to enable the enterprise network.
02	Yes/No	Unit conducted legal, regulatory, and policy analysis and coordination.
03	**Yes/No**	**Unit performed vulnerability assessments.**
04	**Yes/No**	**Unit performed forensics.**
05	**Yes/No**	**Unit performed remediation in response to unauthorized intrusions or attacks.**

CONDITION

- Using network resources while under cyber attack
- Operate through degraded network conditions

AUTL

ART 5.9.1.5 Develop Cyberspace Situational Awareness

Units develop and provide cyberspace situational awareness to gather, process, and communicate relevant information to enable cyberspace operations. (FM 3-38) (USAMCCoE)

No.	Scale	Measure
01	Yes/No	Unit developed, disseminated, and maintained relevant information enabling the commander and staff to achieve situational understanding of friendly and adversary use of cyberspace.
02	**Yes/No**	**Unit conducted cyberspace information collection contributing to the common operational picture and answering the commander's critical information requirements.**
03	Yes/No	Unit coordinated with host nation to develop situational awareness of critical infrastructure and key resources.
04	Yes/No	Unit identified and applied the legal considerations, intelligence gains or losses, and associated risks supporting the commander's decisions within the operations process.

Condition

- Using network resources while under cyber attack
- Operate through degraded network conditions

Joint Training Manual (CJCSM 3500.03D)