



AFTER ACTION REPORT

Cursor On Target International User Group Meeting 2013

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1. Introduction

Cursor on Target is centered around a set of xml schema which enable enhanced Situational Awareness via a simple, standardized data set. These schema are supported by a suite of powerful applications which support data translation, software development, and system integration. Key translators include Link-16, VMF, Google Earth and FalconView. CoT is operationally deployed 24x7 worldwide in over 200 systems.

MITRE works in the role of System Engineer for the Cursor on Target Program Office (run from AFLCMC/HNI at Hanscom AFB). We not only provide Configuration Management / Change Control for the schema and key applications, we also provide “best practices” for development of CoT-enabled systems, deployment of CoT data architectures, and concepts for integration of CoT into Enterprise networks. With over 1,500 users in the CoT User Group, MITRE (as directed by our government customers) endeavors to provide training and venues for exchanging information, future requirements, and operational concerns. The key event for each year is our CoT Annual User Group Meeting, which has heretofore been hosted in the Boston area.

This year’s 4th Annual User Group Meeting was significantly different from previous meetings. Instead of constraining attendance to US citizens, in 2013 we expanded the audience to allow foreign participation to address the growing international interest in CoT.

The challenge of foreign participation is based upon our constraints in sharing technology with non-US citizens; International Traffic in Arms Regulations (ITAR) required State Department approval for such discussions. Recognizing these restrictions, we developed presentations that were suitable for Public Release, and split the meeting into two sessions. Invitations were sent to known international users of CoT with the notice that we would welcome all users / potential users on the first day of the meeting. On the second day, we restricted our invitations to US citizens with a “need to know”, as FOUO material would be discussed.

Additionally, understanding that the budgetary impact of Sequestration would dramatically limit the ability of our US government users to travel, we developed a virtual environment for not only presentations but also Integration Testing of CoT-enabled systems.

We had four primary goals for the Annual Meeting:

- Provide interesting presentations that demonstrate the value of Cursor on Target
- Present technology updates and recommended “best practices” for development and deployment of CoT-based systems
- Conduct a Digital Exercise (DIGEX) to enable integration and testing of User CoT-enabled systems
- Provide training for CoT developers and system architects

Based upon feedback surveys, the Annual User Meeting was a tremendous success from the perspective of our attendees.

When considering that the CoT Program Office was thinking of cancelling the Annual User Group Meeting in December (2012) due to lack of facilities and uncertainty with respect to Sequestration-affected travel budgets, our ability to: 1) Hold an effective event; 2) Support international participation; and 3) Implement new virtual environments that supported data sharing and Integration Testing not only met but exceeded expectations.

2. Agenda

Topic	Presenter	Time	Comments
DAY 1			
CoT Program Office: FY13 Update	Captain Brownlee	0800 – 0815	<ul style="list-style-type: none"> • Deliverables • Exercise support • How the CoT PO supports the user
International Use of CoT	Jon Jacoby	0815 - 0830	<ul style="list-style-type: none"> • CSI • Finland
CoT Use in Finland	CDR Juha Ravanti	0830 - 0900	
CoT “deployable” Web Site	Lizzie DeYoung	0900 - 0920	
Use of CoT in Public Safety	Luke Savoie	0920 - 0950	
BREAK		0950 - 1000	
Use of CoT: SpotterRF	Brock Josephson	1000 - 1015	<ul style="list-style-type: none"> • Backpack Radar
Assessment of CoT, UCore, and NIEM	Scott Renner	1015 - 1045	
CoT Software Development Kit	Jon Homer	1045 - 1145	
Morning Wrap-Up	Captain Brownlee	1145 - 1200	
LUNCH		1200 - 1300	
CoT Fundamentals	Ernie Carozza	1300 -1400	
CoT DIGEX	Mike Dinsmore	1300 -1530	
CoT SDK Tutorial	Laura Bonanno	1400 -1500	
Wrap-Up	Captain Brownlee	1530 - 1600	DIGEX results evaluation Gather feedback from users regarding Day 1

DAY 2: US Only			
Morning Kickoff	Captain Brownlee	0800 – 0815	
mtcd update	Ernie Carozza	0815 - 0900	
Status Update: CoT as a Mil-Standard	Mike Cokus	0900 - 0930	
BREAK		0930 - 0945	
ATAK (Android Tactical Assault Kit)	Josh Sterling	0945 - 1045	
Use of CoT in Military Operations	Luke Savoie	1045 – 1115	
Use of CoT in Small UAS	Jacob Birmingham	1115 - 1145	
Morning Wrap-Up	Captain Brownlee	1145 - 1200	
LUNCH		1200 - 1300	
Requirements Gathering for FY13 / FY14	Jon Jacoby	1300 - 1400	
CoT DIGEX	Mike Dinsmore	1400- 1530	
CoT SDK Tutorial	Laura Bonanno	1400- 1530	
Wrap-Up	Captain Brownlee	1530 - 1600	DIGEX results evaluation Gather feedback from users regarding Day 2

3. Technical Architecture

3.1. Overview

Past user group meetings have consisted of presentations, discussions, and integration scenarios with real CoT systems on a local area network. While this year's meeting was planned in a similar format, it was highly desirable to extend the meeting to remote users as well. For the presentation and discussion portions of the meeting, a conferencing tool was required to share audio and slides. Coordinating a digital exercise that allowed remote users to connect to a local network was more complicated. The decisions to use Microsoft Lync and MITRE's Information Sharing Experimentation Environment to conduct the virtual aspect of the user group meeting met the requirements and generally worked well, despite some users experiencing connectivity issues.

3.2. Conferencing Tools

In designing the infrastructure, we selected our tools based upon the following requirements:

- Must be able to share audio and slides
- Should be able to share video
- Must allow external users to deliver presentations as well as listen
- Should be able to verify the identity of external users, if access needs to be limited to US citizens
- Must be able to handle at least 200 connected users

Defense Connect Online (DCO) was considered as an option. However, members of the CoT Program Office have had poor experience in the past with large meetings hosted on DCO, noting that users were disconnected when attendance was too high. The CoT Program Office decided to use Microsoft Lync instead. MITRE has recently invested in Lync as a conferencing tool within the company and for external partners. It has been tested with 200 connections, and our limited experience with it had been good.

Our most challenging requirement was related to identification of external users. For some discussions, we needed to limit participation to US citizens only. Ideally, we would be able to create "guest accounts" for remote users to ensure only authorized users would have access. With Lync, all non-MITRE employees needed to connect as guests. Had we used DCO, all users without a Common Access Card would have needed to connect as guests.

We implemented an inefficient and cumbersome solution using Lync. The Lync Connection Guide instructs new participants to set their guest name to "<First Name> <Last Name> (<Email Address>)." The guest were then added to the meeting lobby, waiting for

admission. Once added to the lobby, users were instructed to send an email, from the email address stated in the username, to a MITRE mailing list requesting admission. Several MITRE employees monitored the mailing list, cross referencing the email addresses and phone numbers with the list of approved attendees, admitting users as emails were received.

This was clearly frustrating for several users, especially ones that had connection problems and needed to re-join the meeting. Given the need to protect access to the US-only portion of the meeting, there were few alternatives. If a similar solution is implemented in the future, using DCO will ensure that at least all US government personnel will have minimal difficulty connecting to the meeting.

Another drawback to Lync 2010 is that the web client is incapable of streaming audio or video. Additionally, remote participants needed to either install Lync Attendee on their computer or dial in separately from a telephone. Installing Lync Attendee was problematic for several users. There were also connection issues for employees of other companies that use Lync but who have not “federated” with MITRE. In most cases, these users needed to use the web client for slides and dial in separately for the audio component of the presentation. It is expected that most of these problems will be fixed when MITRE migrates to Lync 2013. The web client in Lync 2013 is fully featured removing the need for installation of Lync Attendee. As an alternative, MITRE allows other companies to federate with MITRE’s Lync server (example, Worcester Polytechnic Institute). The only thing external participants need to do is to contact the MITRE helpdesk.

When planning the next CoT User Group Meeting, the Program Office will conduct a new review of Lync 2013 and DCO, as well as any other conferencing tools available, to determine the best option based on the technology available. Future events should also consider the use of more traditional ISDN-based video teleconference systems such as Polycom. MITRE has successfully bridged multiple remote government and MITRE sites in the past with this VTC capability. Future releases of Microsoft Lync within MITRE may have such seamless integration available.

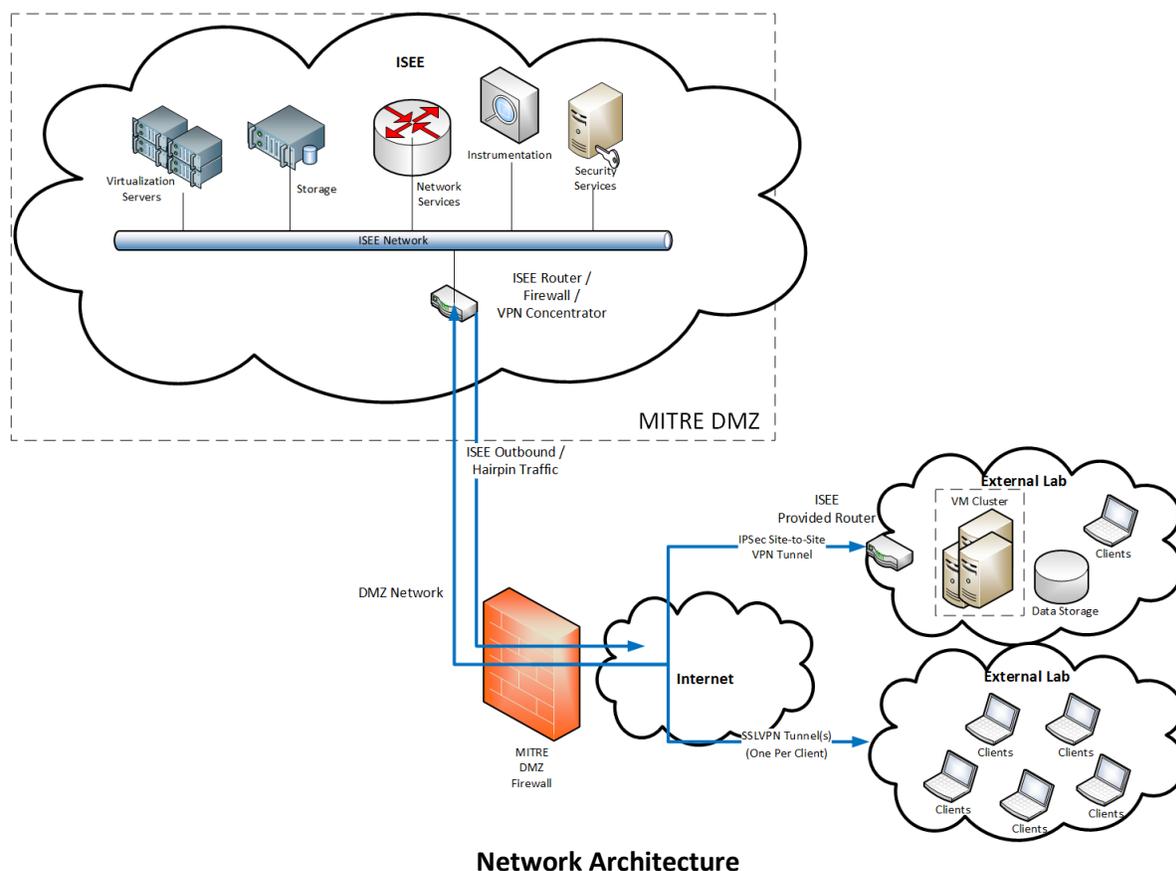
3.3. The Virtual Environment

3.3.1. Technical Overview

A highlight of past user group meetings was the ability for developers to bring their systems onto a network, exchange CoT messages with each other, and receive feedback from other users. This is helpful for new systems as well as existing systems, as they have the opportunity to test and rapidly integrate with other systems.

This year, a local area network was setup in the Agile Capability Mashup Environment (ACME) Lab at the Bedford MITRE office to connect user group meeting attendees who

arrived in person. We also wanted to enable external users to connect into this network to collaborate remotely. MITRE's Information Sharing Experimentation Environment (ISEE) provided the infrastructure to support this. ISEE is a MITRE CI&T resource that provides a virtual sandbox, enabling users from disparate locations to connect and collaborate over an IP network.



Inside the ISEE network hosted in Virginia, a virtual local area network (VLAN) was created for the CoT User Group Meeting. External users were given the ability to tunnel into this network via a virtual private network (VPN). At the MITRE Bedford office, where user group meeting attendees arrived in person, ISEE provided a Cisco router that formed a site-to-site VPN with the ISEE lab network. The hub of CoT traffic on the network was a virtual machine (VM) on the CoT VLAN. This VM hosted the CoT router, used to receive and distribute all CoT messages generated by participating systems. By leveraging the existing infrastructure of ISEE, little additional effort was required to build this network and make it available to users. Future events should also provide an InfoSec approved wireless access point for local participants that wish to send/receive CoT using mobile devices.

Despite a few users who had trouble getting connected or staying connected, the network infrastructure provided by ISEE worked remarkably well. The one problem encountered is that multicast did not work across the VPN tunnel. While multicast was used within the ACME Lab for those who attended in person, it was necessary to create rules in the CoT

router to unicast traffic to all remote users. In the future it may be possible to use Generic Routing Encapsulation (GRE) tunnels to send multicast over IPSec.

3.3.2. Infrastructure Preparation

Starting at the end of Feb we conducted weekly tests of our MITRE facility, the audio system, the audio system through the Lync system and the phone & audio System for the online viewers. We conducted each of these tests for periods in excess of 4 hours, including simultaneous Lync meetings to verify compatibility with lab systems and determine administrative requirements for the event. We set up a remote Lync PC to test the system for the online users (from the online participants view).

Lync tests were conducted to assess connection with not only the classrooms but also video recording and for the audience's ability to hear and participate in the event.

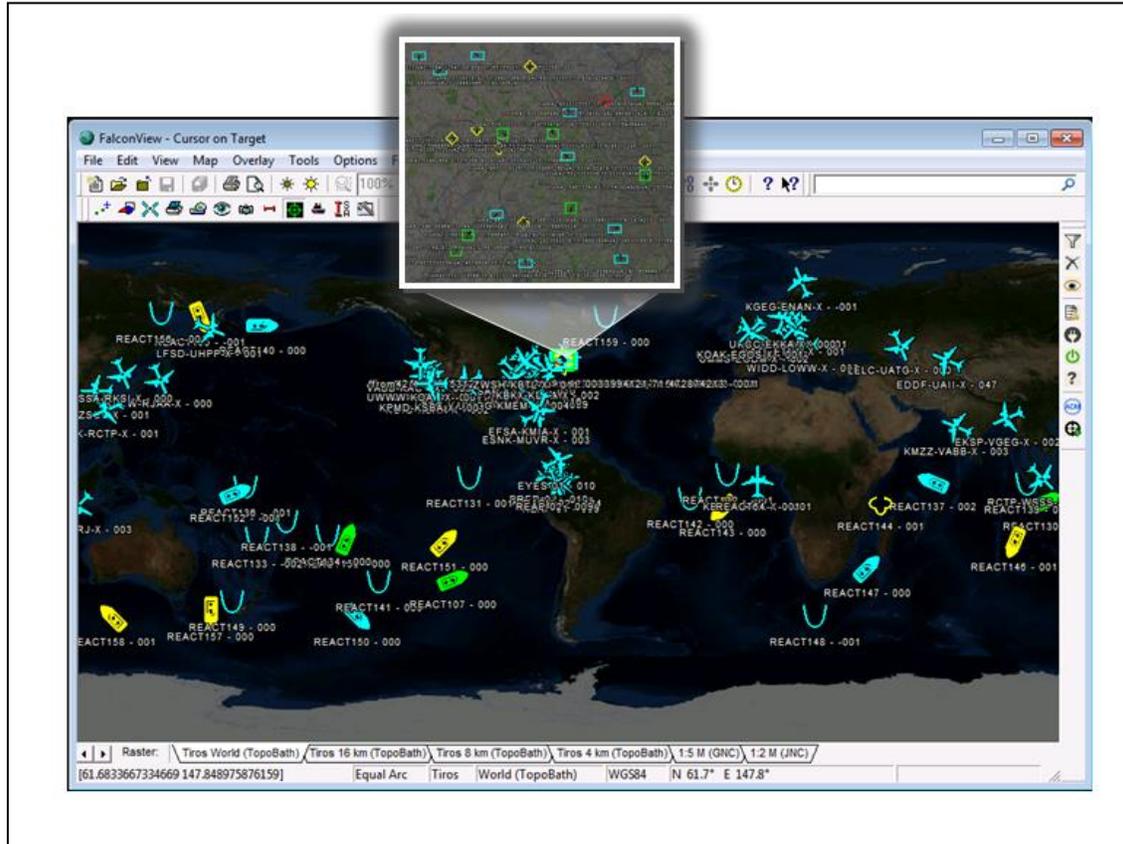
3.3.3. DIGEX Coordination

In order to remotely participate in the digital exercise (DIGEX), users were instructed to contact the CoT Program Office in order to receive login credentials. These users received an email with connection instructions and access to the Cisco AnyConnect VPN client, used to connect into the DIGEX network.

Once users are networked inside the VPN, there is a need to coordinate configuration (ports, protocols, IP addresses) and exercise activities. To support DIGEX coordination and collaboration, a separate Microsoft Lync conference was setup in parallel to the one used for presentations and discussions. In the ACME Lab where the DIGEX was physically hosted, microphones and the integrated sound system enabled verbal communication with remote attendees. Instant messaging was also available via Lync when voice wasn't an option. To keep track of network configuration, such as port numbers and IP addresses, the screen sharing portion of the Lync meeting was continually updated as new systems came online.

Between local and remote users, there were on the order of 20 CoT systems that participated over the two day user group meeting. Given the ease and low cost of conducting new experiments and the potentially high value in doing so, it is likely the Cursor on Target Program Office will conduct future exercises on a semi-annual basis.

Given the need for accurate clocks, having a common time server was important. Fortunately one of the Active Directory Domain Controllers was able to serve this purpose but it was not published initially. Having a GPS synced time server setup ahead of time and properly disseminated to the group would be useful in future events.



FalconView Display of Simulated CoT Tracks

3.3.4. DIGEX Simulation

Local and remote developers connected their systems to the DIGEX and received various dynamic CoT messages provided by a flexible simulation backbone. As in past years, the Program Office made use of MITRE’s Resources for Early and Agile Capability Testing (REACT) lab to provide this simulation functionality. This year’s scenario provided worldwide data for air, land, surface, and subsurface tracks (see figure above). A popular component was the “REACT News” aircraft and live video stream which participants could task using CoT. An additional CoT message file containing other background activity was provided by MITRE’s NCEL lab. Using web based REACT tools developed under past MITRE Innovation Program funds, the DIGEX could adjust and connect messages produced by industry to the simulation activity. Several participants commented favorably on the utility of this “always-on development and test environment.”

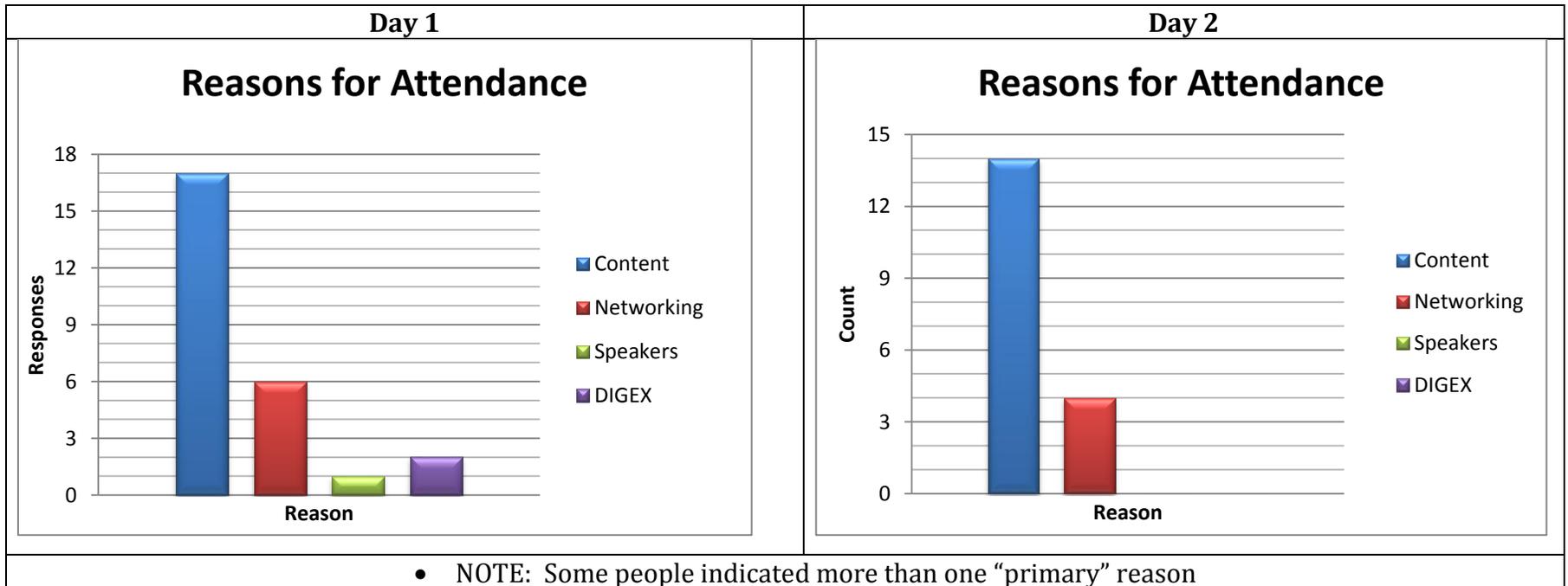
3.3.5. Execution of the Virtual Event

The training courses *CoT SDK* - L. Bonanno and *CoT 101* - E. Carozza, were conducted in the ACME Lab, with an participation of 67 online instances and in-room attendance of 30+. Based upon feedback, the infrastructure met or exceeded remote User expectations.

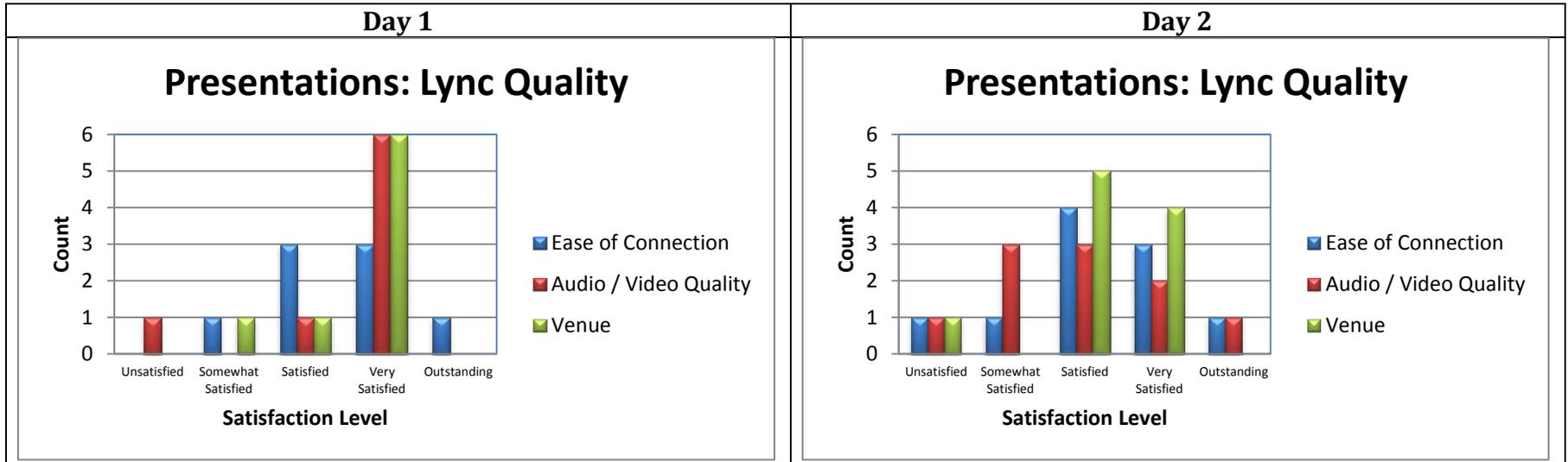
4. Meeting Feedback

The following charts are organized to show side-by-side comparisons of responses by Day, by meeting attendees. There were 19 surveys returned for Day 1 (when International participation was allowed) and 16 surveys returned for Day 2 (which was “US-only”).

4.1. Primary reason for attending

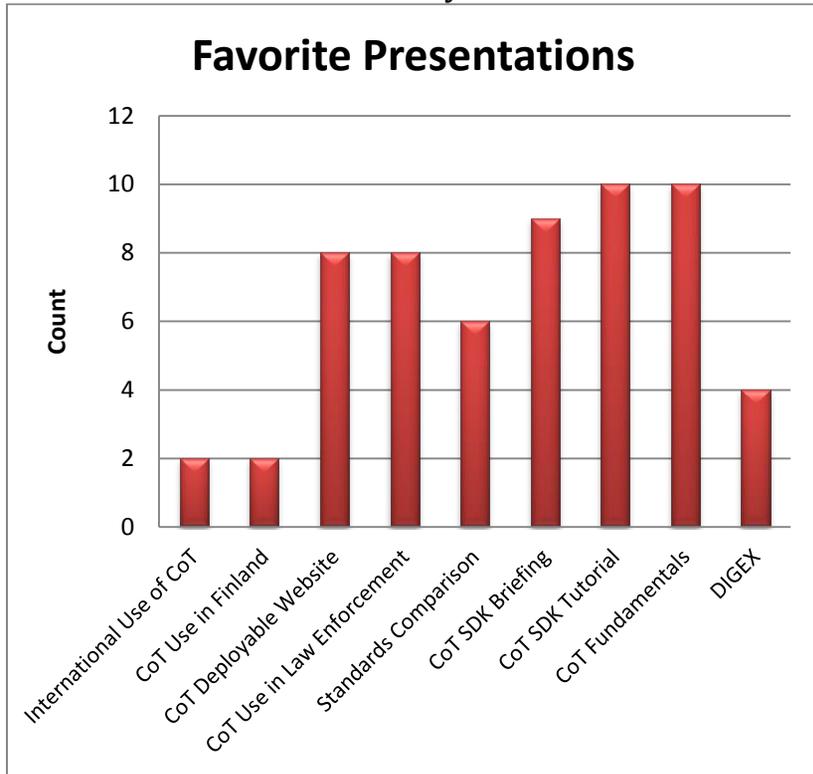


4.2. Virtual Attendee feedback on Lync

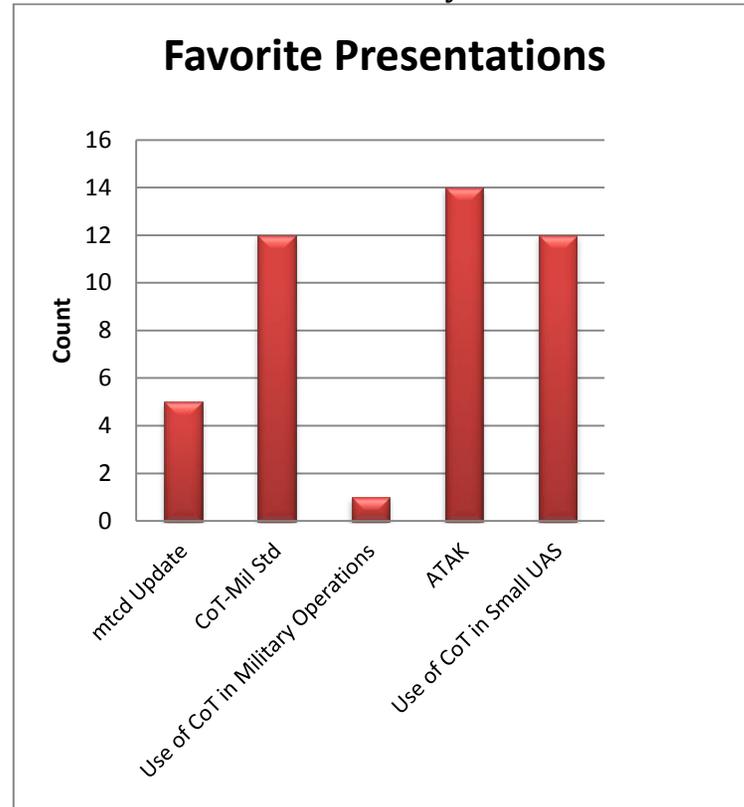


4.3. Favorite Presentations

Day 1



Day 2



4.4. DIGEX

Day 1: 5 DIGEX participants were identified among the 19 surveys. The following scale was used to provide feedback from the Users:

- 5: Outstanding
- 4: Very Satisfied
- 3: Satisfied
- 2: Somewhat Satisfied
- 1: Dissatisfied

Assessment: The people who could connect rated it highly; the person who couldn't connect rated it low.

Participant?	Ease of VPN Connection	Quality of VPN Connection	Scenario	Overall Satisfaction
Y	2	2	1	1
Y	4	5	5	4
Y	3	3		3
Y	4	4	4	4
Y	4	4	5	5

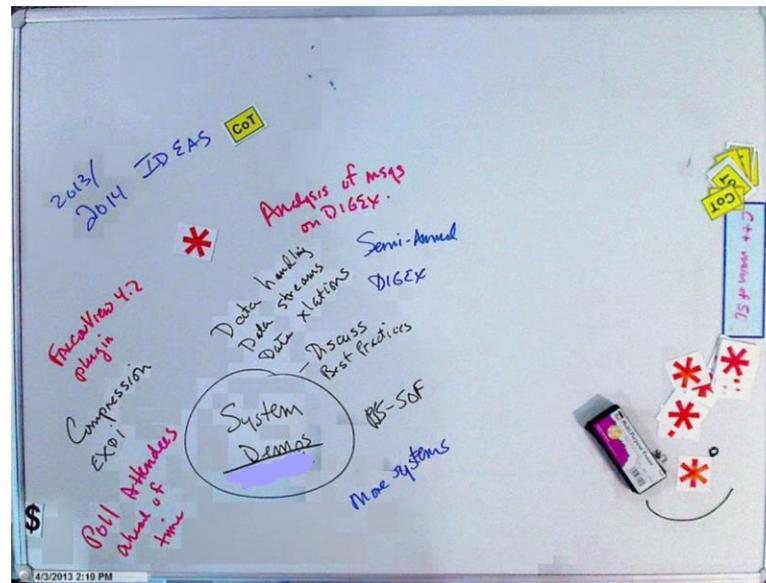
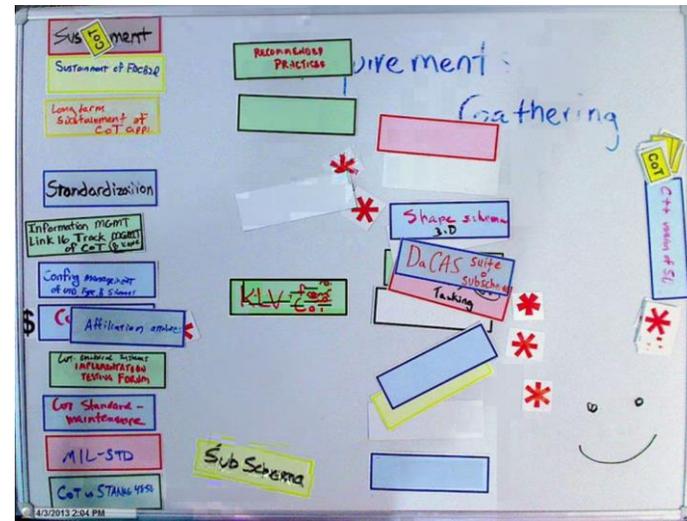
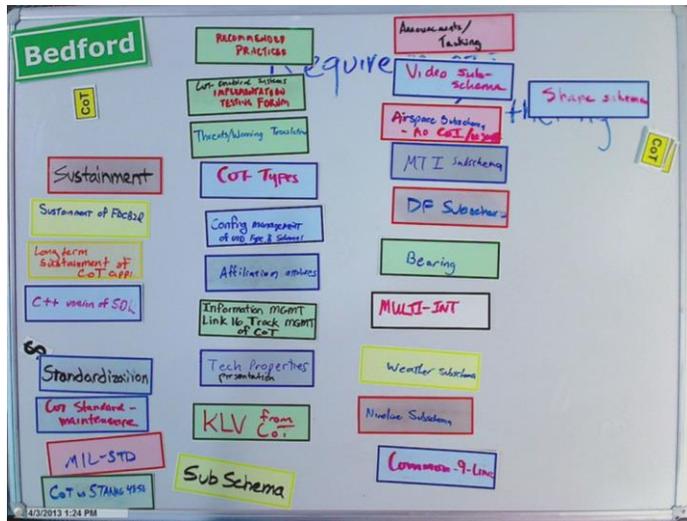
Day 2: Only 1 DIGEX participant was identified among the 16 surveys. *Assessment:* People who filled out forms for Day 1 didn't fill out another form for Day 2.

Participant?	Ease of VPN Connection	Quality of VPN Connection	Scenario	Overall Satisfaction
Y	2	2	4	3

4.5. Requirements Gathering

We held a Requirements Gathering session in the MITRE ACME lab, utilizing the ACME Story Development Kit to collaborate and move to initial consensus regarding priorities for the CoT Program Office. The following pictures illustrate how the discussion proceeded (initial listing of concerns, organization of concerns, prioritization for FY14's User Group Meeting).

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Key priorities:

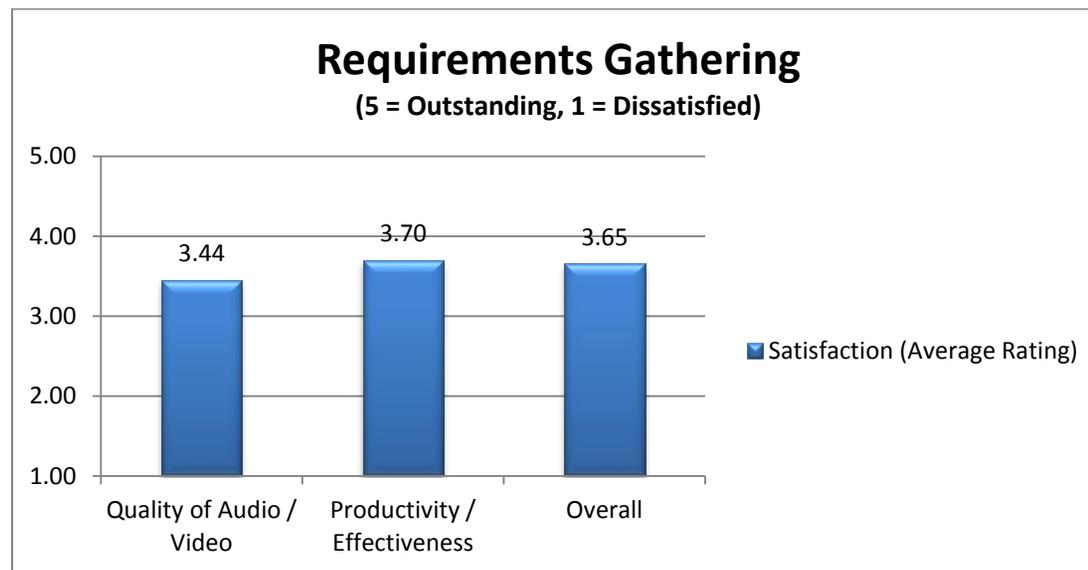
- Long-term Sustainment of CoT
 - CoT applications
 - Schema
 - CoT Types
 - C++ version of SDK
- Standardization
 - Mil-Standard development and maintenance
 - CoT movement to STANAG
- Schema Development
 - Intelligence Data
 - SIGINT
 - Multi-Int
 - Bearing
 - Weather
 - 9-Line
 - Digitally-aided CAS
 - 3-D Shape schema
- CoT support of Mil-Standard 6016-E
- CoT Types
 - Address problems with existing Types files:
 - Affiliation conflicts
 - Inconsistent branch definitions
 - Deprecation of non-recommended branches

Recommendations for next year's User Group meeting included:

- Polling of attendees well-in advance regarding topics, presentation, and the DIGEX
- System Demos
- More discussion regarding "best practices"
- "Break-out" Groups for specific areas of interest

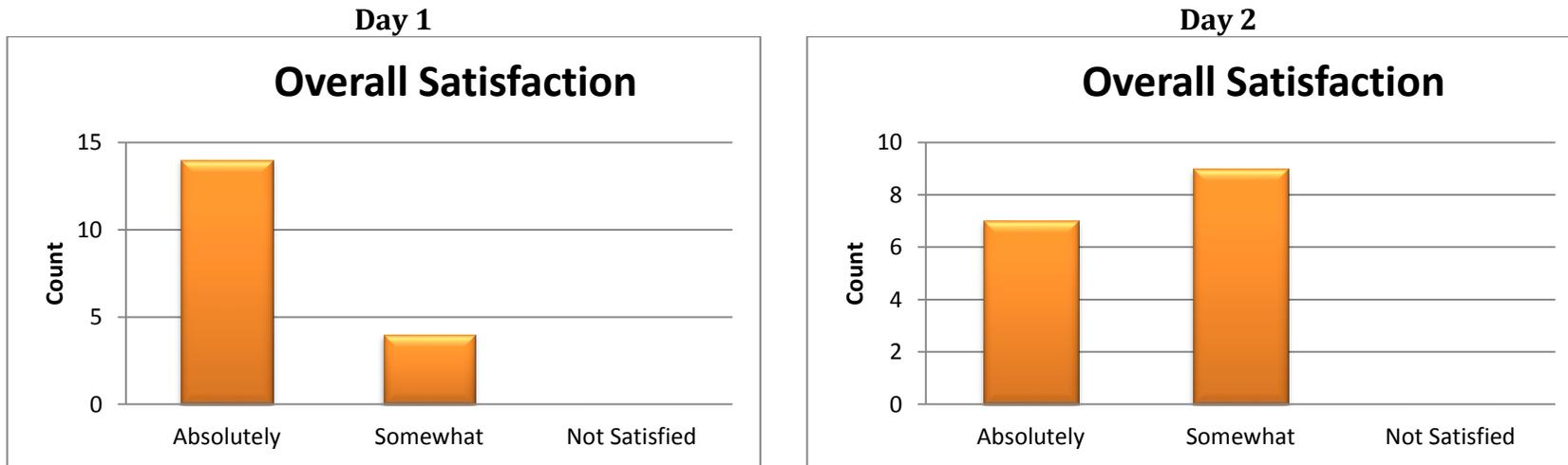
The following scale was used to provide feedback from the Users:

- 5: Outstanding
- 4: Very Satisfied
- 3: Satisfied
- 2: Somewhat Satisfied
- 1: Dissatisfied



Assessment: our experiment in executing a Virtual User Group Meeting worked out well. Note, however, that those who attended in person valued the face-to-face interactions.

4.6. Overall Satisfaction



The ratio of “Absolutely” satisfied to “Somewhat” satisfied indicates that we were more successful in meeting User objectives on the first day of the meeting. Possible reasons for this include:

- Day 1 had more briefings, addressing a wider audience.
- Day 2 had more technical users with higher expectations. Common feedback critique included:
 - Desire for improvement of the Virtual Experience.
 - Desire for improvement in answering questions delivered via Chat.
 - Desire for more frequent meetings.
 - Desire for more breakout sessions.
 - Desire for more information regarding real-world CoT deployments.

4.7. Comments

Most beneficial	Comments / Suggestions for Improvement	Recommended topics / themes
	<p>Requirements Gathering: "Well Done!"</p> <p>Recommend breakout sessions for different levels of CoT expertise.</p> <p>Rooms, AV, and facilities were Outstanding. Food was satisfactory.</p>	
<p>Face to face discussions with other SME and CoT engineers.</p>	<p>Breakfast sessions and working group meetings</p>	
<p>Effective collaboration in Requirements Gathering session.</p> <p>Learning a lot about CoT. I'm relatively new to CoT and this User Group Meeting helped me understand it a lot better.</p>	<p>Standardization. It seems like there is a lot of debate on how CoT should work. Having it become a Mil-Standard would be very helpful.</p>	
<p>Information</p>	<p>Improve the virtual experience</p>	<p>Mil-Standard Development</p>
<p>DIGEX</p>		<p>System integration using CoT</p>

Most beneficial	Comments / Suggestions for Improvement	Recommended topics / themes
	<p>Overall satisfaction = 4; Food services = 5</p> <p>Definitely poll for requirements requests ahead of time. Better multimedia system setup (though you did have a really cool setup and multimedia thing!)</p>	
	<p>Give a list of attendees to all so I can network.</p>	<p>CoT and BAO Kit. Field incompatibility between CoT and other data standards (e.g., JREAP, VMF, Link-16)</p>
	<p>Tutorials</p>	<p>Open web access to Source Forge for industry guys who don't have CACs.</p> <p>CoT use by Programs of Record and unconventional use of CoT.</p>
<p>I thought that the background material was very useful</p>	<p>I could seriously use information on the process for submitting and gaining approval for a specialized sub-schema. I have drafted a potential sub-schema for use in the personnel recovery mission area. From today's meeting, I get the impression that I can just work with my potential consumer (TPG) and use it, but I would rather get some feedback on whether or not my proposal could be improved/refined rather than learn this from the field.</p>	
<p>Speaking in person with MITRE people is always good.</p>	<p>Rooms, facilities, overall satisfaction: Outstanding</p>	<p>Learning about CoT deployments (where used).</p>

Most beneficial	Comments / Suggestions for Improvement	Recommended topics / themes
Improved my knowledge of CoT	Earlier DIGEX details would have enabled our participation. Some questions posted by others to IM but not always asked to presenters. Couldn't attend all sessions due to time difference.	CoT standardization outside the US e.g. NATO
That I could listen to some of it and not have to dedicate 3 days to the event.	Record the sessions, and post the slides	
Meeting the players involved in CoT. Seeing other uses of CoT was somewhat illuminating.	Very satisfied with room, food, and facilities Might be better if folks described the subschemas they are using.	CoT Types, Targeting Pod (TGP) control using slew-and-queue, deep dive into sub-schemas
	TWG updates	There were no agenda items related to ongoing TWGs or talk about potential / new TWGs. Probably hard to do in a Virtual environment, but in previous UG meetings we had breakout sessions.
ATAK Briefing	I agree with the suggestions given after the Req's Gathering session.	
	CoT use in Android Facilities, network: Outstanding; Food "very satisfied"	
Keeping tabs on what's going on.		

Most beneficial	Comments / Suggestions for Improvement	Recommended topics / themes
We are still in early development stage so we were focused more on the success stories and technical tips. It was actually eye opening to hear of the wide usage of CoT in the community.		

5. VPN Participants:

There were 12 US and 2 foreign participants. Data was successfully exchanged between all systems. Of note, Finland injected 500 tracks to the Digital Exercise.

[For a detailed list of participants, please contact the Cursor on Target Program Office:
cot@hanscom.af.mil]

6. CoT User Group Pictures



Captain Brownlee welcomes attendees



Jon Homer discusses the new CoT Software Development Kit



Conducting the Digital Exercise (ACME Lab)



Gathering Requirements using the ACME Collaborative Story Development Kit

After Action Report: International CoT User Group Meeting (2-3 April 2013)



Laura Bonanno conducts SDK training



Ernie Carozza teaches "CoT Fundamentals"



Lizzie DeYoung demonstrates the Deployable Website



Luke Savoie (Force-X) presents use of CoT in Law Enforcement

7. Summary

This year's Cursor on Target Annual User Group Meeting took into account the growing number of CoT users, their need to minimize travel costs due to Sequestration, and moved to incorporate participation by International stakeholders. In doing so, we successfully leveraged new technology (Microsoft Lync, MITRE's ISEE architecture) and developed a capability which should be able to meet the needs of future CoT education, training, and collaboration requirements.