BUILDING A WORLD CLASS CYBER WORKFORCE

Cyber Quest 2018 TechNet Briefing
MAJ Scott MacPherson
Cyber Quest EXCON Chief
US Army Cyber Center of Excellence, Fort Gordon, GA
Panel Members:

Moderator – MAJ Scott MacPherson – Cyber Battle Lab, Cyber Center of Excellence, Fort Gordon, GA

ARCIC STRACD - Mr. Chris Warshawsky
MCOE - Mr. Harry Lubin or Edwin Davis
CERDEC, STCD - Jeff Huisignh
TCM Cyber - CPT Owens
TCM Electronic Warfare (EW) – Mr. Daniel Bush
TCM Network and Services (N&S) – MAJ McCullough
TCM Tactical Radio (TR) – MAJ Kang

*Note: TCM (Training and Doctrine Command (TRADOC) Capability Manager)
Agenda

• Placing Cyber Quest within context of other TRADOC Prototyping Assessments (ALPA), the TRADOC Campaign of Learning and external events— (30 min)
  ➢ STRACD overview of MFIX, MSSPIX – Mr. Warshawsky
  ➢ AEWE Brief – Mr. Lubin

• Cyber Quest 2018 - (60 min, incl 10 min for questions) - MAJ MacPherson
  ➢ Cyber Quest Mission and CONOPS
  ➢ Cyber Quest 2018 Initial Insights
  ➢ Key features
    » EW experiment features
    » Cyber experiment outcomes
    » Red Team capabilities

• Cyber Blitz brief (20 min)

• Cyber Quest 2019 BAA overview – (30 minutes)
  ➢ TCM Cyber
  ➢ TCM EW
  ➢ TCM N&S
  ➢ TCM TR

• Question and Answer Session (10 min)
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ARCIC Live Prototype Assessment (ALPA) Information Briefing

Christopher Warshawsky
Accelerated Capabilities Branch Chief
ARCIC, STRACD
21 Aug 2018
ARCIC Live Prototype Assessment (ALPA)

• **ALPA Defined:** ALPA provides a centralized management process for live prototype assessments under a single governance structure providing guidance and initial selection. It aligns live prototype assessments with the AWFC running estimates and the Learning Demands from the Campaign of Learning.

• **ARCIC Prototype Assessment End State:** Use verified data generated from live prototype assessment conclusions and recommendations to identify specific capabilities and the best transition strategy to inform interim solutions to Capability Gaps, AWFC Running Estimates, O&O Development and progression of F2025M efforts.

Each event has an end state with a conclusion, recommendation and a transition point.
ALPA Terms of Reference

• **ARCIC Live Prototype Assessment (ALPA):** Conduct experimentation to assess and refine initial O&O concepts and capabilities. Promising concepts inform future JWA exercise design through the Future Force planning process.

  – **Army Live Experimentation (ALE):** Provides capability developers, the science and technology community, and industry, with repeatable, credible, rigorous, and validated operational experiment venue(s) to assess possible solutions/technology in support of all Army Warfighting Challenges (AWFC). ARCIC sponsored ALE specific events include:

  – **Focused Assessment (FA):** More narrowly focused than an ALE, one-time only assessment, conducted anywhere, anytime, or any place. Assesses identified enabling concept shortfalls and modifies concepts. Uses prototype and surrogate systems to represent concept capabilities.
ARCIC Live Prototype Assessment (ALPA) Experimentation

- ARCIC Centralized Management Process for Prototype Experimentation
- Provide The Campaign of Learning Verified Data From Live Prototype Assessments
- Validate Technology Base, SESU and RP Capabilities Operational Effectiveness
- Assess Specific Capabilities to Mitigate Gaps
- Identifies Best Transition Strategy to Inform Capability Gap Solutions

ARCIC Live Experiment: Annual live, broad-based, multiple system recurring event with Soldier hands-on, force on force echeloned based (AEWE, MFIX, Cyber Quest, MSSPIX)

Focused Assessment (FA): Small scale, narrow focused, one-time only, conducted anywhere, anytime, or any place. Assesses identified enabling concept shortfalls and modifies concepts. Uses prototype and surrogate systems to represent concept capabilities.

Focused Assessments

- Effective Energy for Expeditionary Operations (E2X)
- Pacific Manned-Unmanned Teaming (Ground) - Initiative (PACMAN-I)

FA Examples

Sponsor
- ASA(ALT)
- DARPA
- Industry
- RCO
- SCO
- RDECOM
- Etc.

Operational Effectiveness Requirements Lens

Planning Working Group
- Campaign of Learning (CoL)
- System-of-System Enhances Small Units (SESU)
- Rapid Prototyping (RP)

ALE

Analytically Supportable Recommendations for Capability Development

- Inform Learning Demands in the Campaign of Learning
- Operational Validation of Technology
- Force design change recommendations
- Accelerated development / equipping
- Risk Reduction JWA / NIE
- Further technology
- Transition to a program of record status
- Inform JCIDS
- Inform the Army that an idea does not have merit
CDLD – Implementing FY19-23 Themes

Far *
2036+
UQ

Mid*
2026-2035
UC
COE
ALPA**
JWA

Near*
Now – 2025
COE
NIE

2018
MDB 2.0 – Joint Partnerships

2019
Capabilities and Capacity to Defend a Nation

2020
Alternative Futures

2021
Science and Technology Investments to Win in 2050

2022
Science and Technology Investments to Win in 2050

2023
Multi-Domain Warfare – Informing MDB 3.0

2018
MDB 2.0 – Convergence at EAD

2019
MDB 2.0 – Multinational Partnerships

2020
AOC 2025-2050

2021
Operationalize the AOC: How to fight 2035

2022
Operationalize the AOC: JIM Partner Integration

2023
Operationalize the AOC: Formations of Army 2035

ALPA 18
ALPA 19
ALPA 20
ALPA 21
ALPA 22

ALPA themes are one year ahead of JWA

Proposed updates in blue
* Consistent with language in Army Strategic Plan

ARCIC Director Approved 28 Nov 2017
Campaign of Learning (CoL)

Experimentation Linkage

- Army Operating Concept (AOC)
- Functional Concept (FC)
- Organizational & Operational Concept
- Army Warfighting Challenge (AWFC)
- Required Capability (RC)
- Capability Gap
- Capability Need Analysis (CNA) Gap Prioritization (AWfC Running Estimate)
- Proposed Solution / Technology Prototype
- ARCIC Live Prototype Assessment (AELA)
- Exercise Objective & Focused Assessment
  AEWE, MFIX, Cyber Quest, MSSPIX
- Limited Objective Assessment(s) (LOA) can be added
- Same Linkage for UQ, JWA, UC, NIE, JE
## Army Expeditionary Warrior Experiments (AEWE), Ft. Benning, GA [FEBRUARY]

<table>
<thead>
<tr>
<th>Lead</th>
<th>Fires Center of Excellence (FCoE)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purpose</strong></td>
<td>Develop, evaluate and expand integrated concepts, emerging doctrine, organization, training and material capabilities focused on how Fires enhances tactical operations below the Brigade Combat Team.</td>
</tr>
<tr>
<td><strong>Primary AWFCs</strong></td>
<td>#9, #10, #11, #12, #13, #15, #16</td>
</tr>
</tbody>
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## Maneuver Support, Sustainment, Protection Integration Experiments (MSSPIX), Ft. Leonard Wood, MO [APRIL]

<table>
<thead>
<tr>
<th><strong>Co-Leads</strong></th>
<th>Maneuver Support and Sustainment Center of Excellence (MSCoE &amp; SCoE)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purpose</strong></td>
<td>Conduct physical integration, demonstrations, assessments, and evaluations of contingency basing, base defense, and sustainment capabilities and technologies in an operationally relevant environment.</td>
</tr>
<tr>
<td><strong>Primary AWFCs</strong></td>
<td>#5, #6, #16</td>
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</tbody>
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## Cyber Network & Electromagnetic Integration Experiments (Cyber Quest), Ft. Gordon, GA [JUNE]

<table>
<thead>
<tr>
<th><strong>Co-Leads</strong></th>
<th>Cyber and Intelligence Center of Excellence (CCoE &amp; ICoE)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purpose</strong></td>
<td>Experimentation to inform solutions and DOTMLPF changes for critical capability gaps facing Cyberspace Operations, Signal, Electronic Warfare, and Situational Understanding operational forces.</td>
</tr>
<tr>
<td><strong>Primary AWFCs</strong></td>
<td>#1, #7, #19</td>
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# Battle Rhythm

**4 ALE Events Annually**

<table>
<thead>
<tr>
<th>FY17</th>
<th>FY18</th>
<th>FY19</th>
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</thead>
<tbody>
<tr>
<td>AEWE 17</td>
<td>MSSPIX 18</td>
<td>AEWE 19</td>
</tr>
<tr>
<td>MSSPIX 17</td>
<td>CQ 18</td>
<td>MSSPIX 19</td>
</tr>
<tr>
<td>MFIX 18</td>
<td>JWA 18.1</td>
<td>MFIX 19</td>
</tr>
<tr>
<td>CCRB 19/20</td>
<td>JWA 18.1</td>
<td>CCRB</td>
</tr>
</tbody>
</table>

**Abbreviations:**

- AEWE – Army Expeditionary Warrior Experiments [MCoE]
- MSSPIX – Maneuver Support, Sustainment, Protection Integration Experiments [MSCoE & SCoE]
- CQ – (Cyber Quest) Cyber Network & Electromagnetic Integration Experiments [CCoE & ICoE]
- MFIX – Maneuver Fires Integration Experiments [FCoE]
- JWA – Joint Warfighting Assessment
- UC – Unified Challenge
- JWA – Joint Warfighting Assessment
- NIE – Network Integration Evaluation

**Legend:**

- Planning Working Group (PWG)
- Concept and Capability Review Board (CCRB)
- ARCIC Approval/Guidance
- ARCIC Live Experimentation Event
Focused Assessment
Robotic Complex Breach Concept

Experiment Partner: STRACD, MCoE, JMC, ARDEC, MSCoE, USMC.

What: The MBL assesses a robotic complex breach, including employment of Robotic and Autonomous Systems (RAS) in intelligence, suppression, obscuration, and reduction tasks at Grafenwoehr, Germany as part of JWA 19 at Fort Lewis, WA.

Problem: Current Combined Arms Breach doctrine, techniques, and equipment require Soldiers to be at the Point of Breach, which is an extremely high risk, vulnerable, and well targeted area by threat integrated effects. Joint and US Army forces need to develop a breach concept enabled by autonomous systems that provides assured mobility without compromising operational tempo.

Purpose: Inform assured mobility concepts and future capability requirements. Inform RAS capabilities in support of the Movement and Maneuver functional concepts/doctrine.

Background: CG TRADOC directed inclusion of a complex obstacle breach using just robotic systems for the "first wave" in JWA 18.1. ARCIC leverages existing venues to evolve concepts and prototype capabilities, culminating at JWA 19.1, including AEWE 18 and 19 as risk reductions. RCBC is an ARCIC resourced Focused Assessment in JWA 18.1 conducted in Germany (Grafenwoehr) 27 March 2018 to 06 April 2018. STRACD was the overall lead for RCBC 18 and for RCBC 19, of which planning is currently underway.

RCBC Systems:

Intelligence
RCBC Systems

Puma
Buried Object Detection
x2

Instant Eye
Chemical Detection
x2

Automated Direct/Indirect Mortar
Destroy/Suppress/Obscure
5
x1

Lethal Miniature Aerial Munition
Defeat/Destroy Target
x10

Suppress
RCBC Systems

Obscure
RCBC System

M58 Wolf
Obscure
x2

Assault Breacher Vehicle
ABV

Reduce
RCBC System

UK Terrier
Reduce/Proof
x2
ALPA Sponsorship / Planning Working Group (PWG)

Science, Technology, Research, and Innovation

Centers of Excellence (CoE)

TRADOC Warfighting Lab Incentive Fund (WLIF)

Sponsors generate solution/technology RFI and augment venue with applicable assessors

ARIC Dep Dir Approved FAs & LOAs

ALPA Quarterly Planning Working Group(s) (PWG)

In Coord With

Army Rapid Capability Office (RCO)

Defence Advanced Research Projects Agency (DARPA)

Army Service Component Command(s) (ASCC)

Memorandum Of Agreement (MOA) with sponsors external to the Army

Discover

Enabling the Future – Force 2028

Event Execution

[CoE Battle Lab]

Refine

Experience Objectives

1. How do we enable small units to conduct novel combined arms engagements across LLC and multiple operations to sustain operational effectiveness?

2. How do we embed small unit battle groups in LLC environments?

3. How do we enable whole army support to small unit efforts, to include logistic support and sustainment?

4. How do we provide the capability to extend and expedite research and development efforts, increase operational effectiveness, reduce demand, and evacuate casualties in austere environments?

Hack the Army

Battle Lab

EOs

Memorandum of Agreement (MOA) with sponsors external to the Army

Discover

Refine

How do we increase situational understanding, lethality and sustainment of maneuver forces while reducing manpower and risk?
Army Futures Command

- Five processes have been approved by LTG Wesley
  - Concepts
  - Experimentation
  - Requirements
  - Science and Technology
  - Business Practices

- Concurrently reviewing five COAs for high level organizational structure with projected decision the end of August

- EXORD signed 21 Aug

- Command stand up 24 Aug

- COAs approved are broken down into Directorate, Division, and Branch Level. Approval around Thanksgiving. Implementation 1 – 31 January 19

- Impact on STRACD and ALPA is unknown.
Conclusion

• ARCIC Live Experimentation is primarily focused on improving enabling concepts.

• ARCIC Live Experimentation venues can be leveraged by external TRADOC and pending future AFC organizations.

• Army MOAs to be established to formalize ARCIC / CoE support to external organizations/agencies.

• ALPA is linked to the CoL by informing interim solutions to Capability Gaps, running estimates of AWFCs, O&O Development and progression of Army Force Modernization efforts.

• External organizations/agencies executing LOAs are not required to conduct experimentation to support the CoL.

• Army Futures Command is going to bring changes to all experimentation, Live, Virtual and Constructive. Quick turn around is going to be the key for most future prototype efforts.
Questions
Maneuver and Fires Integration Experiment (MFIX)

**Purpose:** Develop, evaluate and expand integrated concepts and material capabilities in order to inform how Fires enhances tactical operations at Brigade and below, retain current advantages over adversaries and accelerate investments on contested future capabilities in support of the Army’s Campaign of Learning (CoL).

**Method:** The Maneuver Brigade’s Fires Cell (FA, ADAM/BAE, Space, and CEMA) employs cross-domain fires in direct support to the Brigade Combat Team.

**FY 19 Objectives**
- Mission Command for Fires Synchronization and Integration in Multi-Domain Battle.
- Future Platforms that enable/facilitate cross-domain fires.
- Sensor to Shooter Linkages that will enable/facilitate cross-domain fires, target acquisition, and transfer of data from sensor platform through positive identification.
- Provide an ALPA venue for CoE focused assessments and government demonstrations.

**MFIX 19 Key Tasks**

- Establish Sensor to shooter linkages
- Detect, identify, and defeat a wide range of aerial threats
- Integrate sensors and shooters both organic and attached
- Conduct tactical targeting
- Provide close support and shaping fires
- Integrate Army and joint capabilities at the tactical level

Learning (AWFCs 17/18 plus 11, 12, 13, 14, 15)
Key Dates

Systems Integration Event (SIE) #1: MAY 18
SIE #2: JULY 18
MFIX 2019: OCT – NOV 18

Experiment Design

• FY 19 Objectives: Mission Command for Fires
  Future Fires Platforms
  Cross-domain sensor to shooter
  Non-Line of Sight Engagements

• White Cell: Maneuver and Fires Battalions

• Tactical Units: Brigade (-), ADA Battery, Maneuver Company

• Cross-Domain Tactical Vignettes

• Above the Horizon Laser Engagements

• Support Maneuver Support Center of Excellence focused assessment

Technologies

System Highlights:

• 35 systems to include integrated Programs of Record participating at Brigade and below
• 10 New Systems (Government & Industry)
• 20 Returning Technologies
• 40 Total Tech Submissions

- AUDS with 30mm
- FIST-X
- Kestrel Eye
- Light Tactical Vehicle Surveillance System
- Mobile Expeditionary High Energy Laser
- High Energy Laser Weapon System
- Aerostat
- High Energy Laser Mobile Test Truck
- Brutus (Truck Mounted 155mm)
MSSPIX 19 Key Tasks

- Understand the operational environment and shape activities to influence the local population, enemy forces and other actors.

- Mitigate the effect of obstacles and provide enhanced protection capabilities.

- Sustain Operations and Maintain Freedom of Movement within the context of Multi-Domain Battle and Cross Domain Maneuver.

**Purpose:** MSSPIX serves as a venue to provide capability developers, the Science and Technology (S&T) community, and industry a repeatable, credible, rigorous, and validated operational experiment venue to support both concept and materiel development.

**Method:** Conduct physical integration, demonstration, assessments, and evaluations of Maneuver Support, Sustainment and Protection capabilities and technologies in an operationally relevant environment.

**FY 19 Objectives**

1. Better enable F2025B Soldiers to understand the operational environment. (Subterranean Mapping, Terrain & Infrastructure Assessment)

2. Conduct shaping activities to influence the local population and enemy forces. (Terrain Shaping Obstacles, Area/Route Clearance)

3. Better mitigate the effect of obstacles. (Breach Complex Obstacles and Clear/Breach Obstacles in Stride, WMD Operations)

4. Provide enhanced protection capabilities. (Enemy Detection, Improved Protective Structures, Base Camp Security)

5. Extend endurance and operational reach, increase operational readiness, reduce demand, and execute responsive sustainment to widely dispersed units. (Autonomous Resupply, Improved Tactical Power Management and Distribution, Enabled Mission Command)
Base Defense & Security Scenario
- Small base camp to protect forward deployed forces while they sustain and project combat power
- Capabilities managed by a Base Defense Operations Center (BDOC)
  - Perimeter Defense Sensor Technologies
  - Advanced Materials/Structures
  - Decision Support Software Tools
  - Renewable Energy Technologies
  - Physiological Status Monitoring

Mobility Operations Scenario
- Capabilities will be projected from the base camp to mitigate the effects of obstacles to enable freedom of movement and maneuver for friendly forces.
  - Hazard Detection Sensor Technologies
  - Autonomous Route Clearance Technologies
  - Obstacle Reduction, Breaching, and Clearance Technologies
Army Expeditionary Warrior Experiment

1 August 2018
AEWE 2018 Video
22 October 2018 – 15 March 2019


**Purpose:** AEWE is the Army’s primary venue for small unit modernization, providing capability developers, Science and Technology (S&T) community, and industry a repeatable, credible, rigorous, and validated operational experiment supporting both concept and materiel development.

**Method:** AEWE campaign provides operational insights on experiment objectives by exploring new concepts, organizations, training methods and integrating prototype capabilities into an operational environment. Experiment is executed through Live Fire, Non-networked and Force on Force phases.

**Key outcomes**

- Informs Army concepts and strategies.
- Validates requirements.
- Serves as a risk mitigation venue for future programs.
- Advances Army Programs-of-Record.
- Frames Army requirements to steer industry internal research and development investment.
- Shapes Army S&T development.
- 5 year partnership with United Kingdom, growing relationship with Australia.
- Supports the broader Army Campaign of Learning including JWA.
Significant Outcomes

**PEO Soldier** fielding three brigades with the latest version of Nett Warrior dismounted mission command system.

**Nett Warrior**

Early prototypes in AEWE since 2009. The goggle is now the POR night vision goggle.

**AN/PSQ 20 Enhanced Night Vision Goggle**

- **Concepts, Doctrine, and TTPs Informed**
  - Consideration of 3rd Dimension
  - Counter-UAS
  - Virtual Reality Training
  - Tactical CBRN Decontamination
  - Armed UAS
  - Command Post Manning
  - 6x36 Common Scout Platoon

**Electronic Warfare Signals Detection**

- RDECOM precision fires application on Nett Warrior transitioned to Program of Record for forward observers.

**MAFIA**

- Soldier Borne Sensor
- 2,500 SBS purchase FY19.
- 276 larger quad rotor UAS purchased in 2016.

**Robotics**

Army purchasing 5,700 after iterative lessons learned in experimentation.

**Cased Telescoped Ammunition and weapons**

- Prototypes demonstrated immediate impact--resulted in Rapid Fielding effort.
- Cased Telescoped Ammunition and weapons reduce weight. Next Generation Squad Weapons technology.
AEWE 2017 Observations

- **Expeditionary Additive Manufacturing** of ARL 3D printed UAS demonstrating a proof of concept: manufacturing at the point of need.

- **Tactical Decontamination.** A U.S. Army Chemical School concept for a rapid, crew performed hasty decontamination capability reduced hasty decon time to 2 hours.

AEWE 2018 Observations

- **Cyber Electro Magnetic Activities (CEMA)** enabled pinpoint location of opposing forces.

- **Robotic Complex Obstacle Breach** concept matured at AEWE and executed by MCoE MBL at JWA 18.1.
AEWE 2019
### Experiment Objectives

#### 1. How can we improve sustainment for mounted and dismounted Small Tactical Units?
- Assured resupply
- Precision aerial resupply
- Demand reduction solutions
- Automation of Soldier tasks
- Meet demand at point of need
- Water from air capability
- 3D printing or additive manufacturing
- Solutions to meet demand at point of need
- Soldier biofeedback devices (hydration, nutrition, sleep, distance, heartrate, core temp)
- Reduced power demand
- Power management solutions
- Demand reduction for 7-day semi-independent operations (task org, design configuration, new technologies)
- Push/pull aerial resupply solutions

#### 2. How can we increase mounted and dismounted Small Tactical Unit mobility?
- Next Generation Combat Vehicle
- Robotic breach
- Reduced Soldier load
- Robotic solutions to reduce physical & cognitive load
- Improved transportation for the main battle tank
- RAS for the mounted formation (bridging and platform recovery)
- UAS launch and recovery while mounted

#### 3. How can we make mounted and dismounted Small Tactical Units more lethal?
- Indirect precision fires
- Directed energy weapons & energetics
- Precision shoulder launch munitions
- Advanced small arms fire control
- Advanced sensors
- Improved unmanned systems
- Unmanned systems swarming
- Turreted mortar
- On the move mounted manned-unmanned-teaming
- Unmanned systems which support lethality and joint fires
- Remote direct fire engagement at extended ranges
- Robotics and autonomous systems (RAS) for the mounted formation (ISR, artillery, mortar, platform direct fire, support by fire)

#### 4. How can we increase mounted and dismounted Small Tactical Unit survivability?
- Active vehicle protection systems
- Advanced vehicle armor
- Advanced Soldier protection
- ISR denial/prevention
- Counter UAS (dismounted & mounted)
- Detect threat acquisition and targeting sensors (left of launch)
- Non-dedicated short range air defense
- Electromagnetic signature obscuration, reduction and decoy of mounted platforms, command posts, and small tactical units
- Survivable command post configurations for semi-independent operations
- RAS for the mounted formation (CBRNE detection and decon)

#### 5. How can we improve mounted and dismounted Small Tactical Unit mission command?
- Expeditionary network communications
- Extended network range
- Low probability of detection communications
- Geospatial data transport solutions
- Link-16 radio for FO and FIST
- Real-time full motion video
- G2/OPEX tool for mission planning
- Situational awareness in degraded, denied, and disrupted space operations environments
- Improved/protected antenna
- RAS for mounted formations (air/ground retrans, offset antenna)

#### 6. How can we optimize Soldier and Small Tactical Unit Performance through physical, cognitive and social (cohesion) training interventions?
- Collective simulator (gunfighter gym) to increase repetitions toward mastery
- Performance enhancement training using sports psychology methods
- Adaptive learning systems
- Squad Overmatch/Tactical Combat Casualty Care
- Tactical Athlete Performance Program Pilot - P3 Education, TAPC Facility, Enhanced PT Program
Phase I Live Fire/Excursions: ~15 October 18 – 25 January 19
- Company Training Meeting 20 August 18 (8 weeks out)

Phase II Force-on-Force: 29 January 19 – 15 March 19
- Allied troop arrival 29 January 19
- Tech Rodeo 30 January 19
- Technology Training 1 – 21 February 19
- Squad lanes 25 – 28 February 19
- Film Day 1 March 19
- Platoon Lanes 4 – 8 March 19
- Company Lanes 11-15 March 19

Insights Brief 19 March 19
Lightweight carbine in an intermediate caliber designed to improve probability of hit and lethality.

Provides tactical small units with LOS/BLOS effects planning/coordination/synchronization tools to optimize effects.

Drones launched from ground robots and controlled remotely increase standoff and situational awareness.

Cybersecurity software for defending mobile wireless tactical networks.

Graphics and navigation heads up display ease cognitive load and speed decision making.

Improved UAS with extended flight time, better imagery, and integrated controls.
Questions?