Leveraging Serious Games to Assist Motivation and Education
Utilizing: CKEI - (Cyber-Kinetic Effects Integration)

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2

Core Challenge Problem – I

- Limited DoD resources for continuing training
  - Experts drive innovation
  - How to create outliers?

3

Core Challenge Problem - II

- Increasingly interconnected world
  - Cyber-Physical systems
- Changing face of DoD operations
  - Cyber-Supported operations

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Core Challenge Problem

- Cyber Operator Training
  - Lacks Integration with Kinetic Domains
    - Cyber Effects → Kinetic Domains
    - Kinetic Effects → Cyber Domains
    - Awareness of Cyber-Kinetic dependencies
  - Cyber operators not immersed in a 'living' environment
    - Importance of system C.I.A. not dictated by larger mission needs
    - Unrealistically locked down systems

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Bringing Back Reality

Two birds, one stone.

Approach

Integrate realistic representation of kinetic operations into cyber training

- Realistic Kinetic Simulation
- Mature Cyber Platform (STEP Technology)

Approach

- Drive engagement through gamified play experience
- Develop appreciation for realities of kinetic mission

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Scenario Overview

Participants placed in support role of cyber-kinetic operation.

- Training supports mission

- Real time mission execution

- Environment drives immersion

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Mission Overview

- Reporter held hostage by enemy forces
  - No-notice hasty operation

- Outmanned, outgunned
  - Must outsmart

Participants Attack and Defend

- ## Defend Cyber Infrastructure

  - ### Surveillance Drone
  - ### Communications Systems

- ## Attack Enemy Cyber-Physical Systems

  - ### Lighting
  - ### Security Cameras
  - ### Alarms
  - ### Power

Study Design – Attention
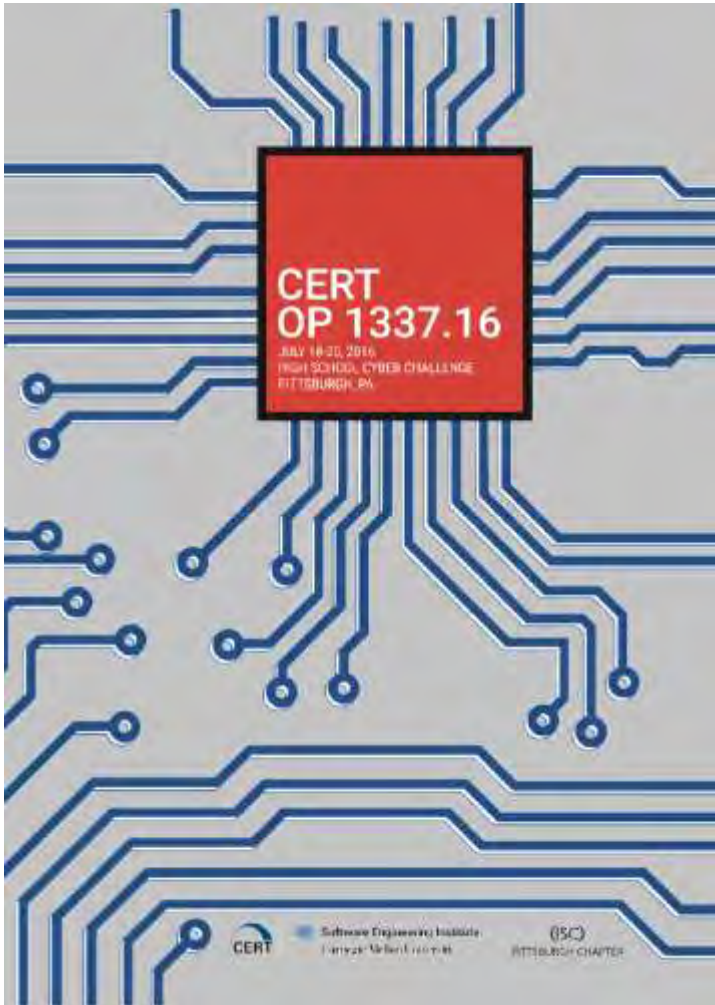
Cooperative Event

- High-school Summer Cyber Challenge

- In Cooperation with ISC^2

- Within Subjects Design
  - Alternating:
    - Operation Opulent Bluegrass
      - Defeat Botnet
    - Operation Aluminum Kangaroo
      - Rescue Hostage

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Study Design – Self Motivation

Group A

Training & Labs (Traditional)

| Mission Brief (AK) | Gamified Labs | Gamified Evaluation (AK) | Mission Brief (OB) | Classical Labs | Classical Evaluation (OB) |

Group B

| Mission Brief (OB) | Classical Labs | Classical Evaluation (OB) | Mission Brief (AK) | Gamified Labs | Gamified Evaluation (AK) |

13
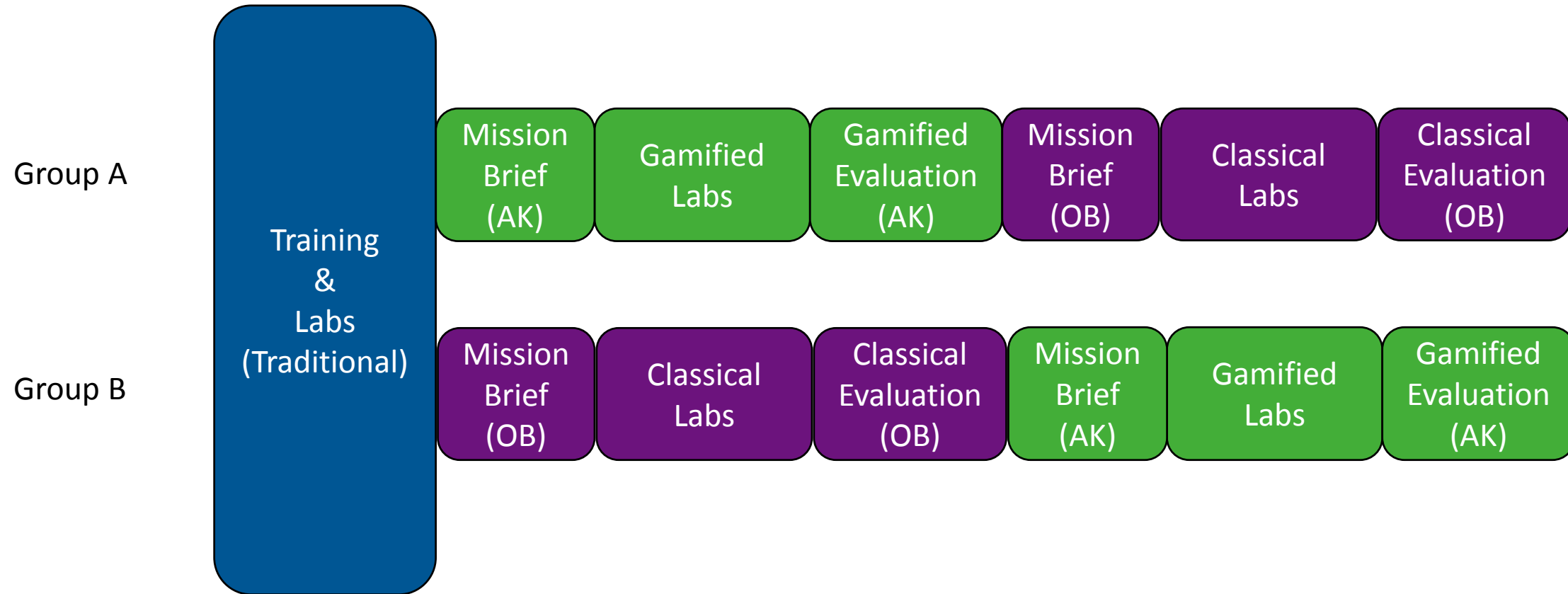
Opulent Bluegrass – Feedback Mechanism

Scrolling Task Board

- Projected at front of room

- Populated dynamically

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Opulent Bluegrass – Immersive Experience


Regional Cyber Center East

- Background Audio

- Projected Scoreboard

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Aluminum Kangaroo – Feedback Mechanism
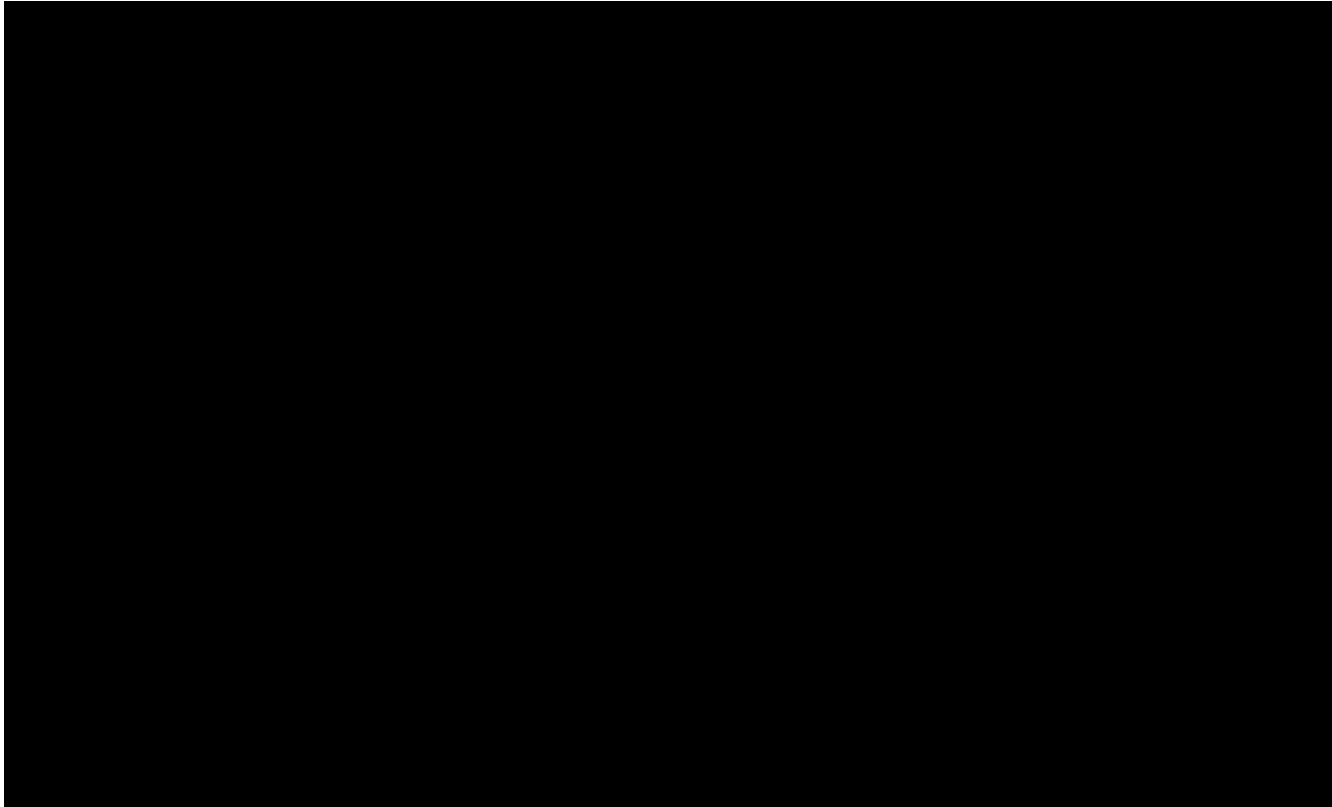
Cyber Shooting Range

- Projected for each workgroup

- Events triggered by completing lab tasks

- Provides engaging stimulus

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Aluminum Kangaroo – Immersive Experience

Forward Operating Base Kyle

- Camo Netting

- Background Audio

- Projected Mission Planning Documents

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Aluminum Kangaroo – Mission Support

Kinetic Operator Needs Help

- Staff Run

- Student Supported

- Anecdotal: High Engagement

Aluminum Kangaroo – Mission Support

Cyber-Kinetic Operator Teamwork

- Participant Run

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Live Demo

Nothing ever goes wrong with these…

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