

PETALS: Improving Learning of Expert Skill in Humanitarian Demining

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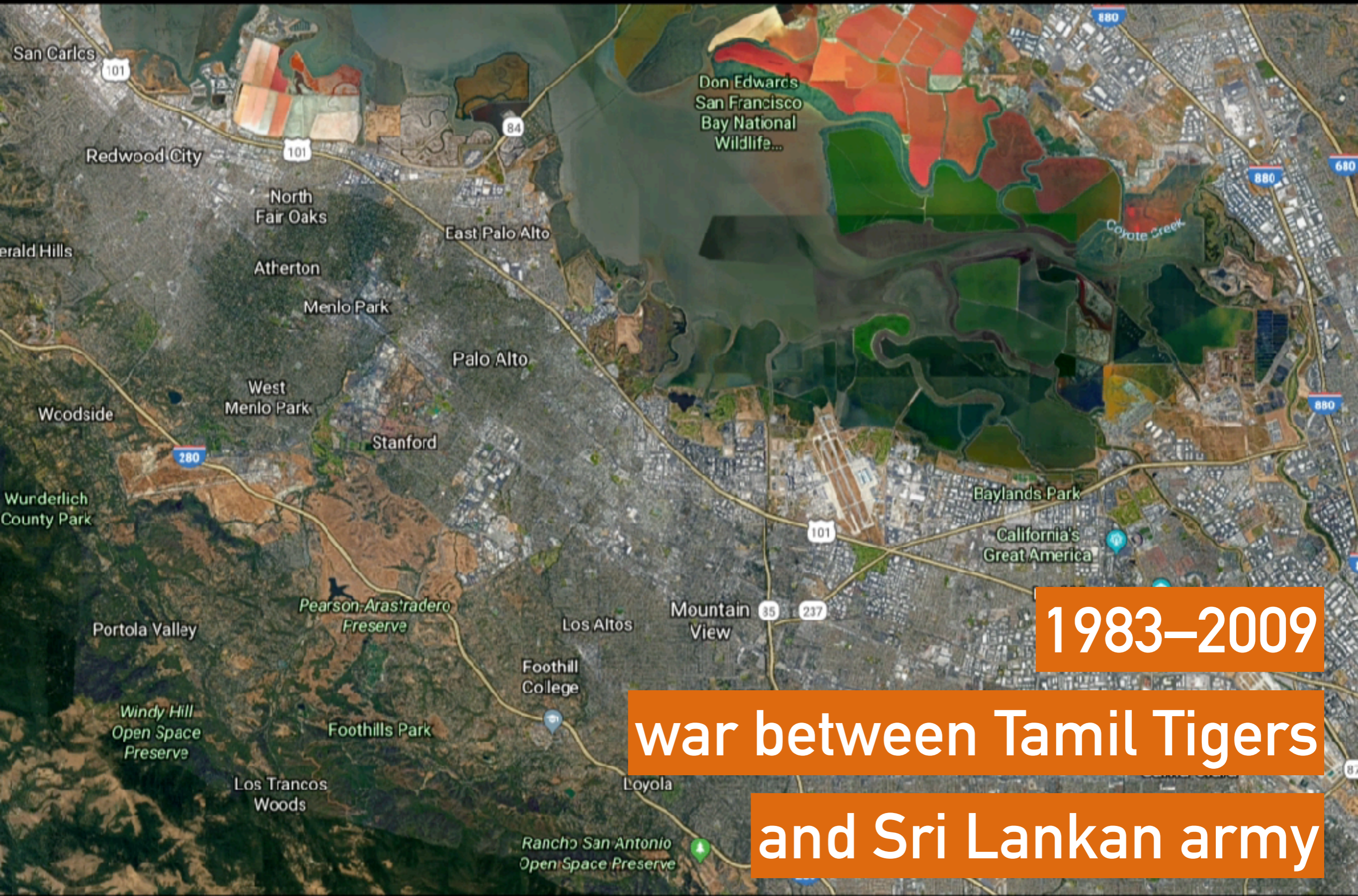
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Lahiru

Jayatilaka

Photo: Justin Ide/Harvard Staff Photographer



1983-2009

war between Tamil Tigers

and Sri Lankan army



1983–2009

war between Tamil Tigers

and Sri Lankan army





6,461 casualties in 2015

in 61 countries

78% were civilians

38% were children

Source: Landmine Monitor 2016



DANGER MINES!

பாதிக்கப்பட்டிருக்கிற அபாயம்!

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Photo: HALO Trust Archives

Lahiru's Mission:

**Use the power of Computer
Science to improve the safety
and efficiency of humanitarian
landmine clearance**

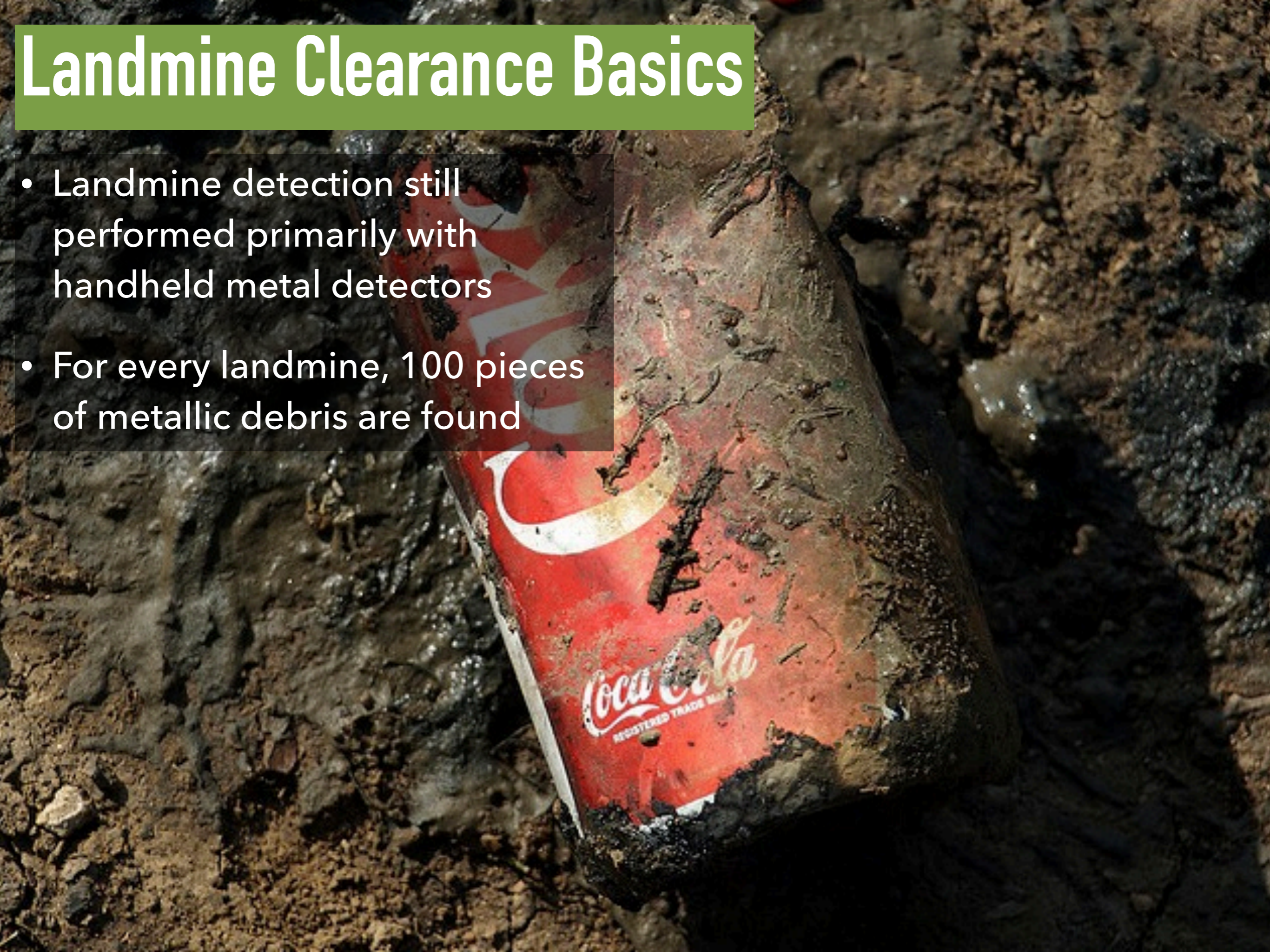
Landmine Clearance Basics

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- For every landmine, 100 pieces of metallic debris are found



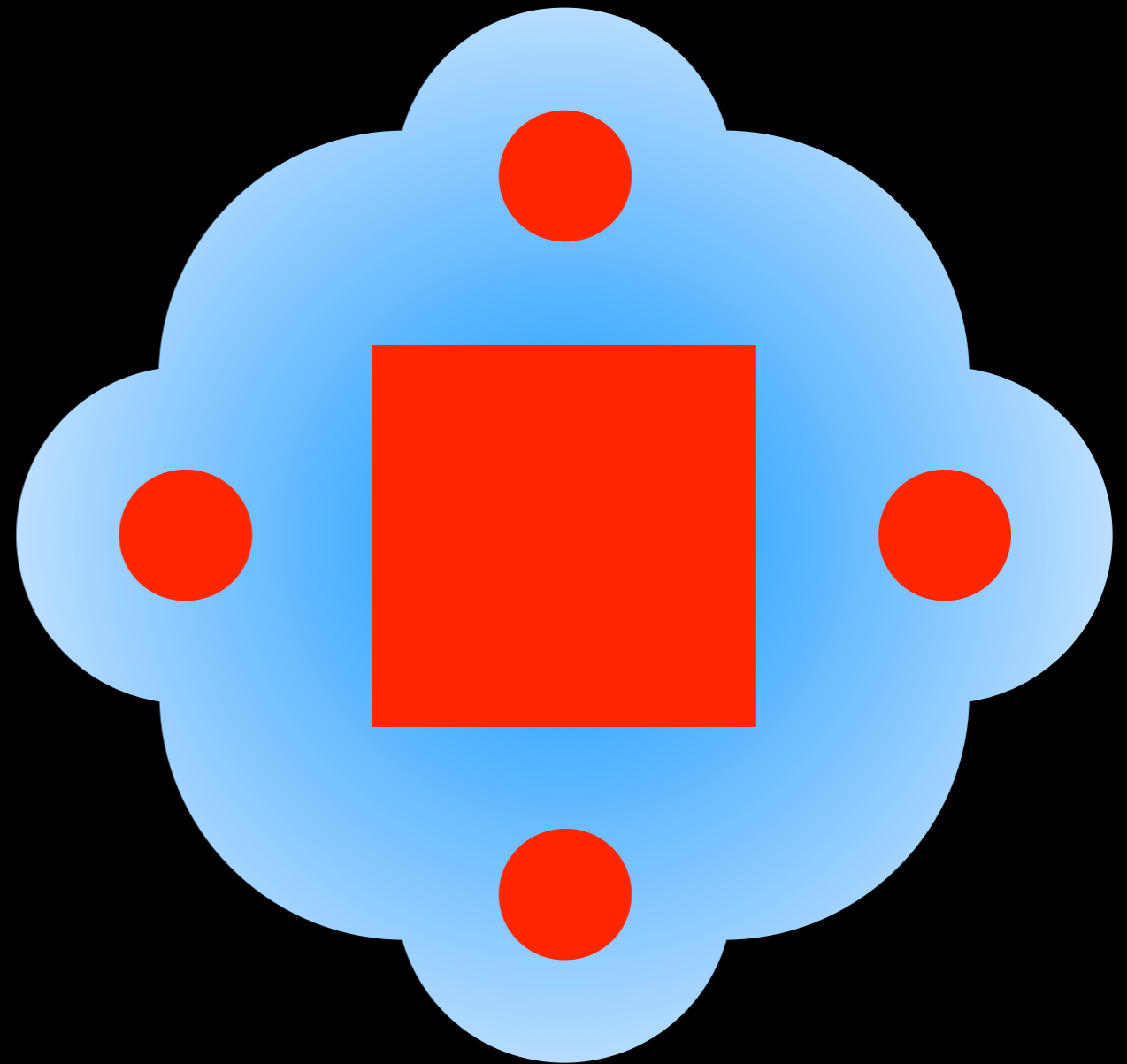
Landmine Clearance Basics

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- For every landmine, 100 pieces of metallic debris are found
- When mines are placed in a cluster configuration, it is hard to tell how many mines there are and where they are located



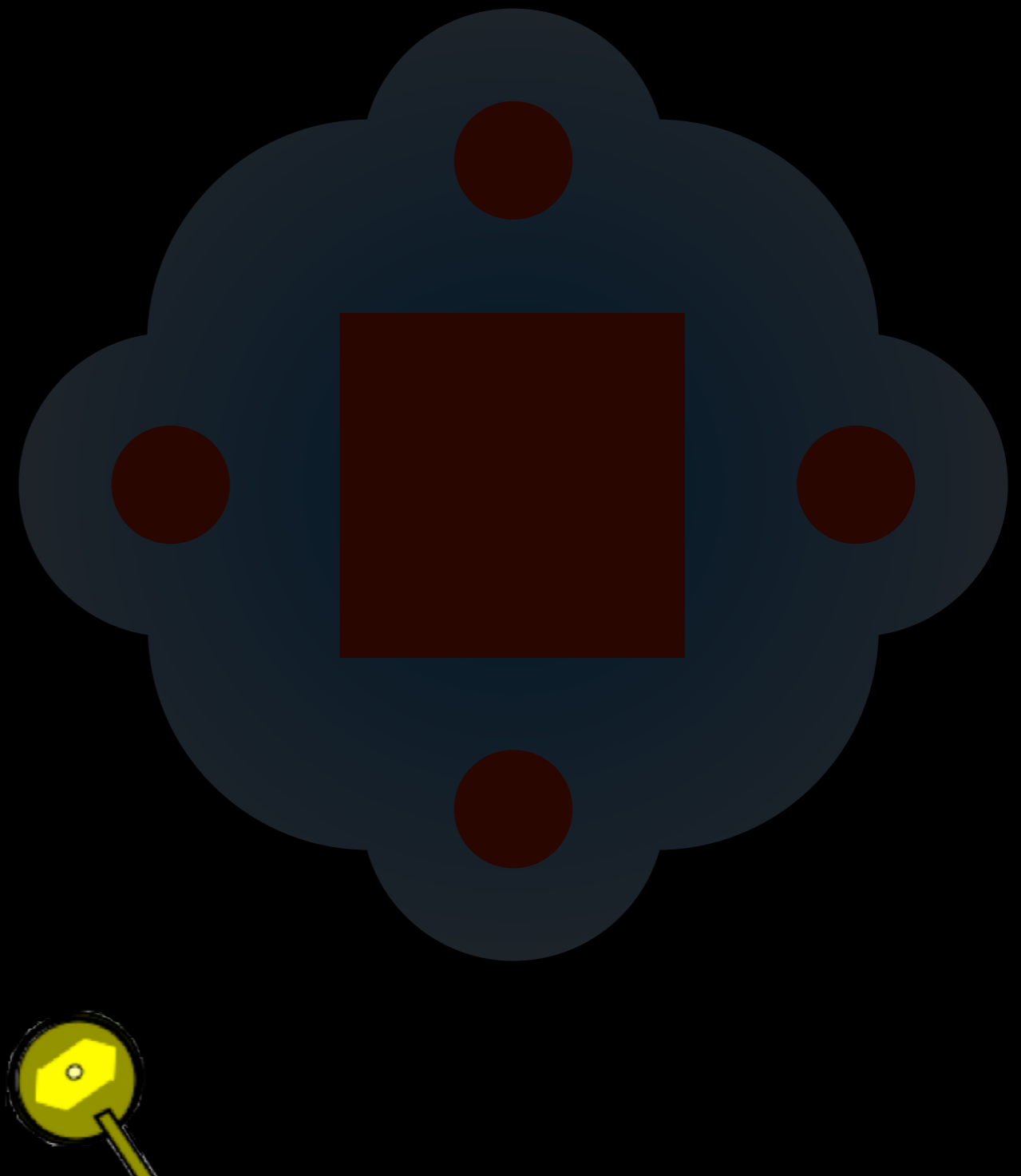
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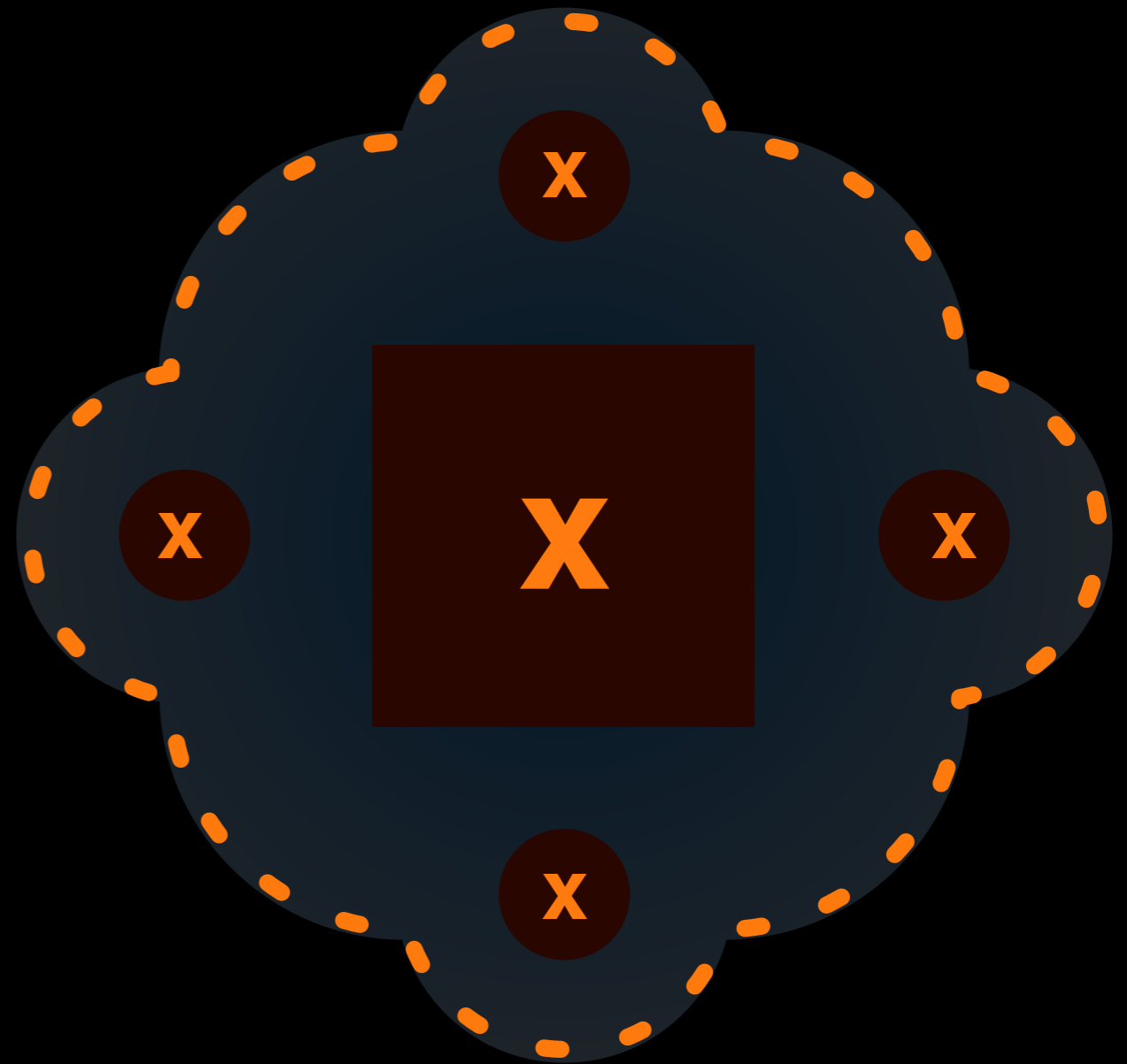
Expert Approach: Metallic Signature Method

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- Experts have a way of dealing with clutter and cluster configurations, but their method is hard to teach

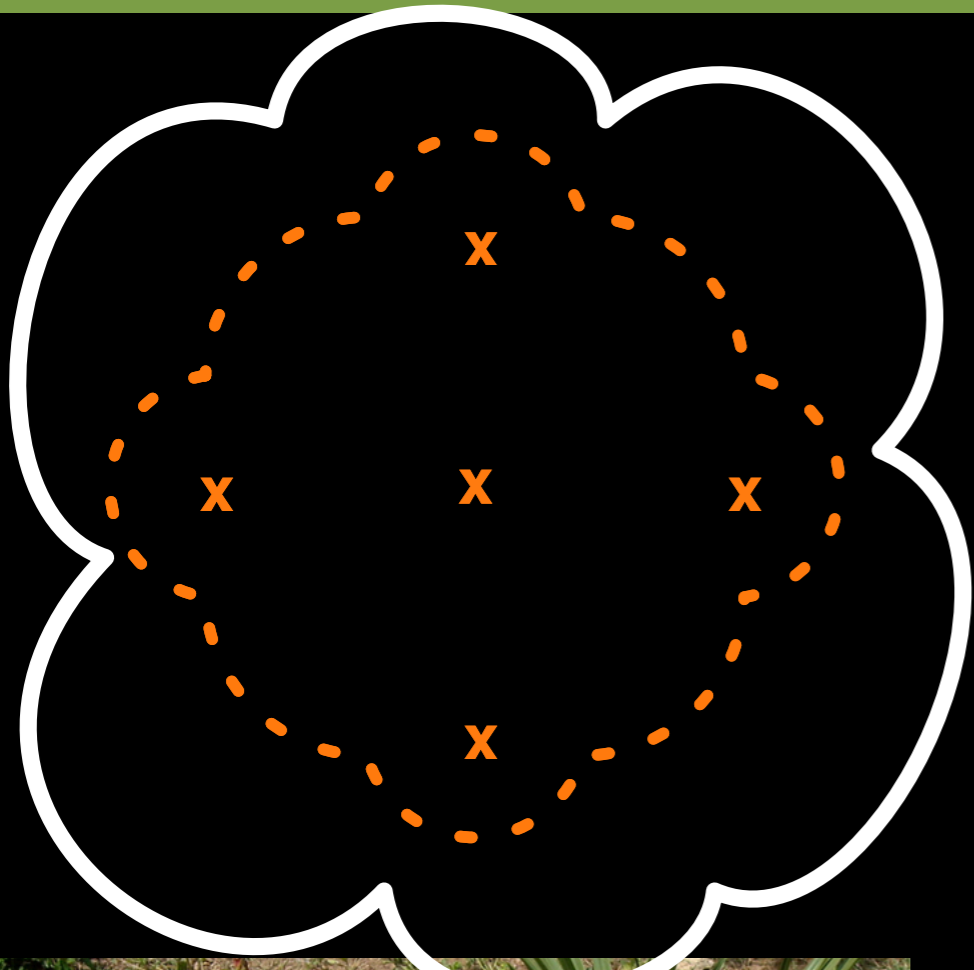


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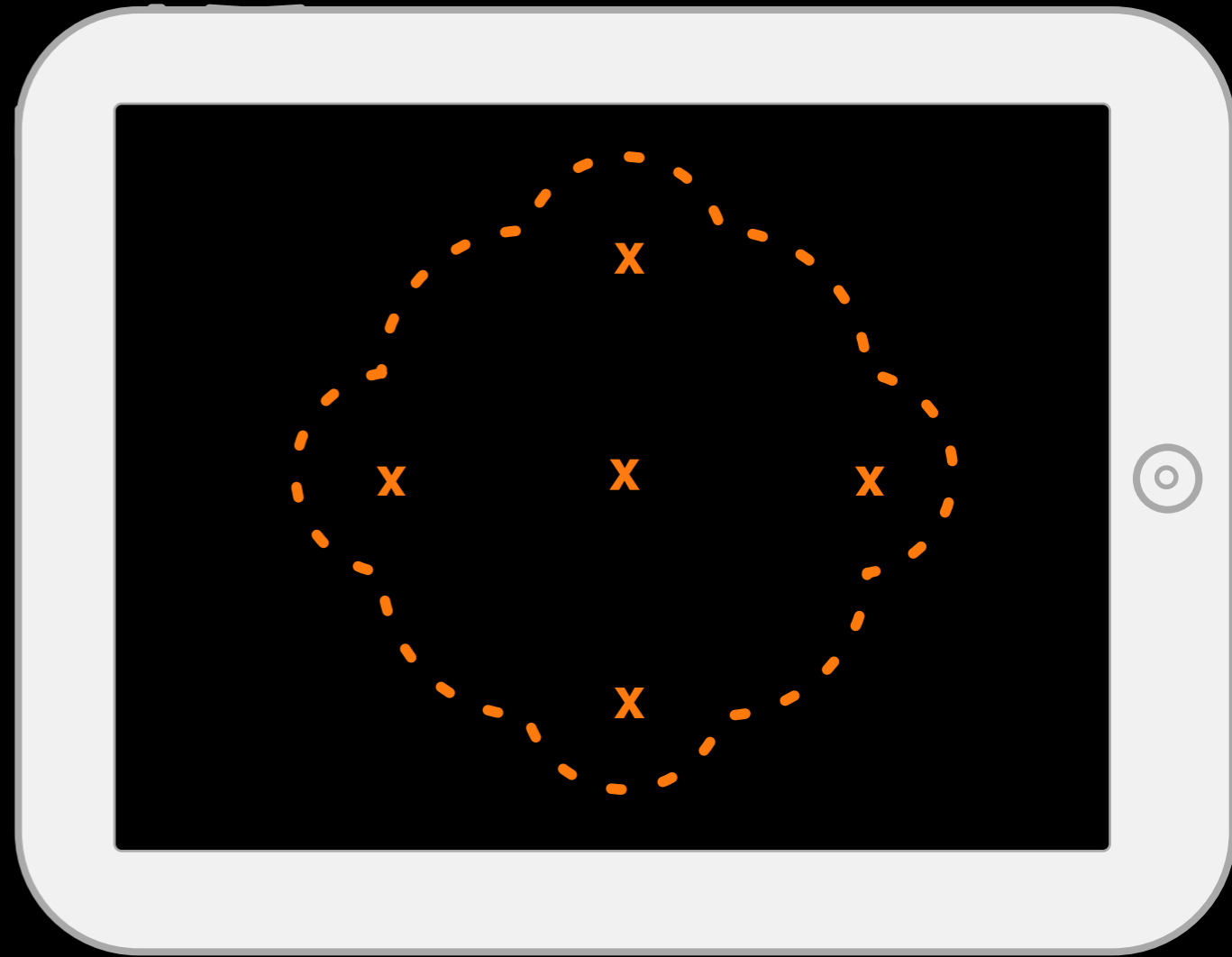
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Key Idea: Visualize Metallic Signatures

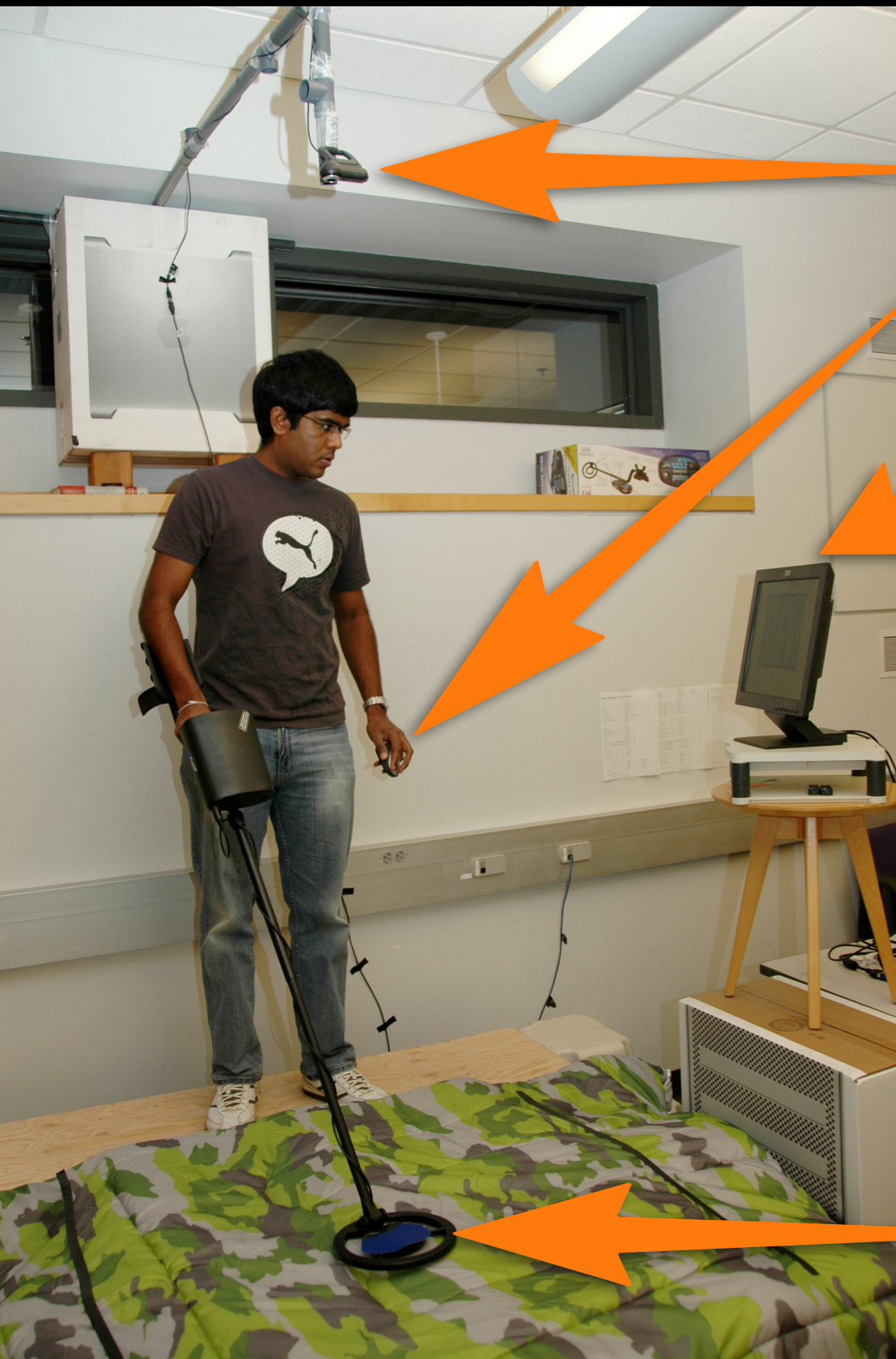


Key Idea: Visualize Metallic Signatures



Approach 0: Support Deminer in the Field

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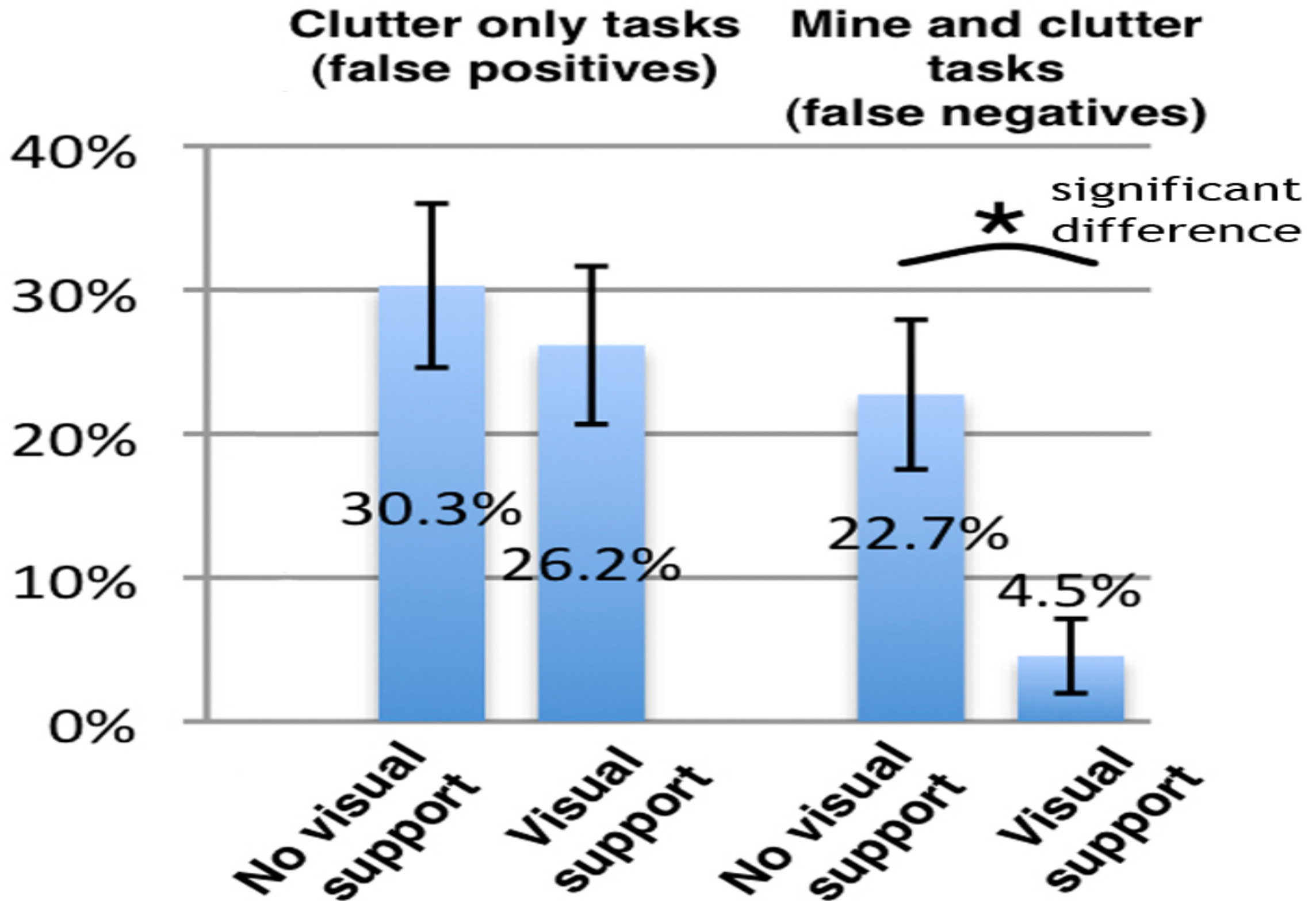


Camera
Trigger
Display



Color patch

Approach 0: It Works! But...



Approach 1: Scaffold Trainees' Learning

Approach 1: Scaffold Trainees' Learning



Approach 1: Scaffold Trainees' Learning



Approach 1: Scaffold Trainees' Learning



Overhead camera



training lane

Instructor console

tracking computer



Approach 1: Scaffold Trainees' Learning



Camera

Trigger

Color patch

Approach 1: Scaffold Trainees' Learning



Display

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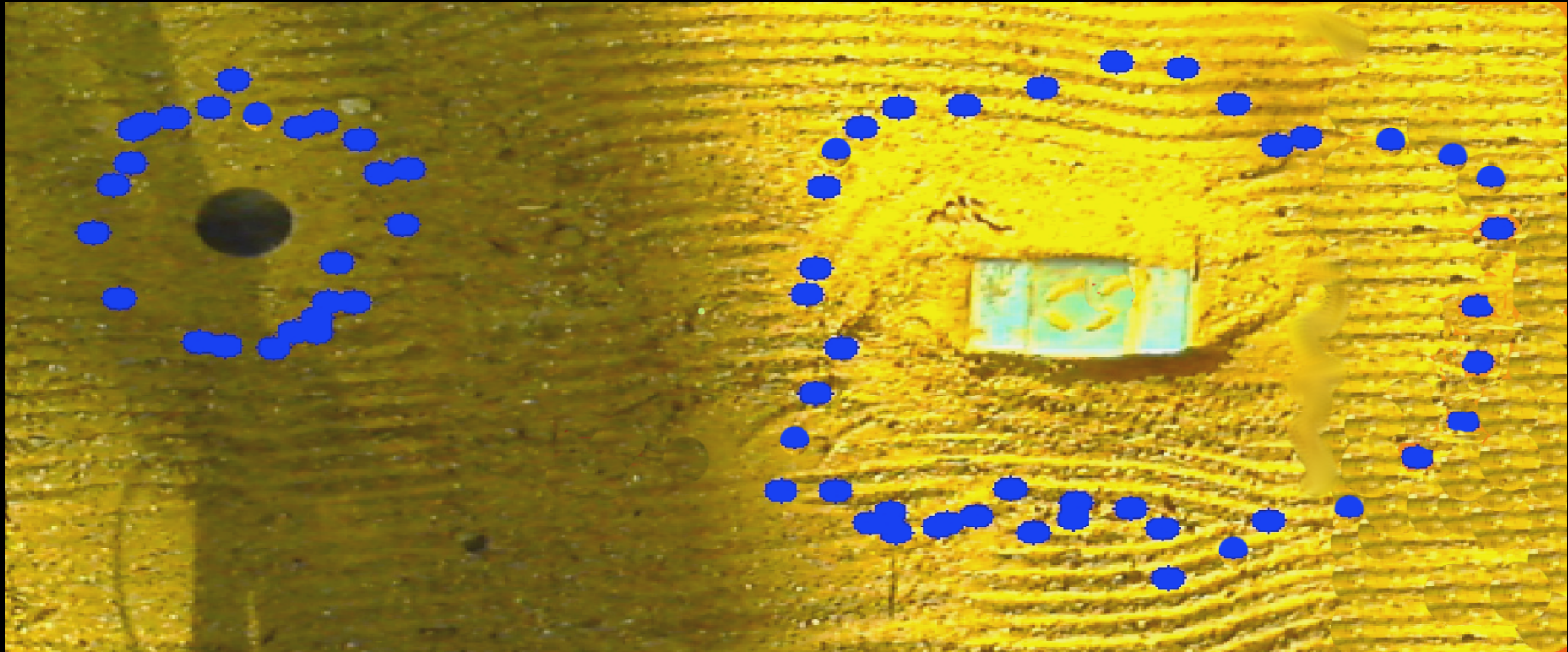
Approach 1: Lessons Learned

- Real-time visualizations were not effective
- PETALS allowed instructors to monitor performance of multiple trainees simultaneously
- PETALS allowed instructors to communicate personalized process feedback after completion of each practice lane



Approach 2: Support Instructors

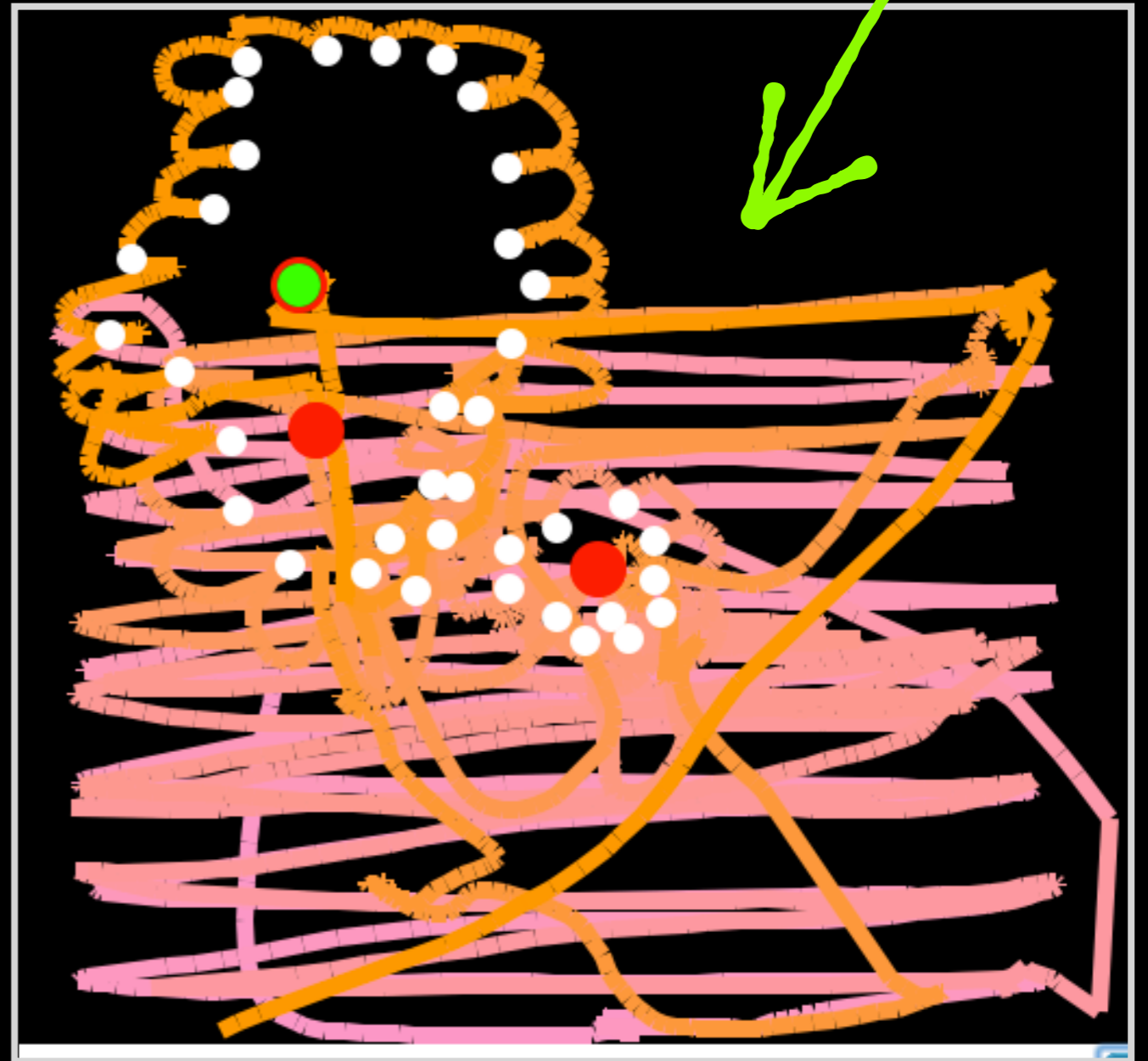
Approach 2: Support Instructors



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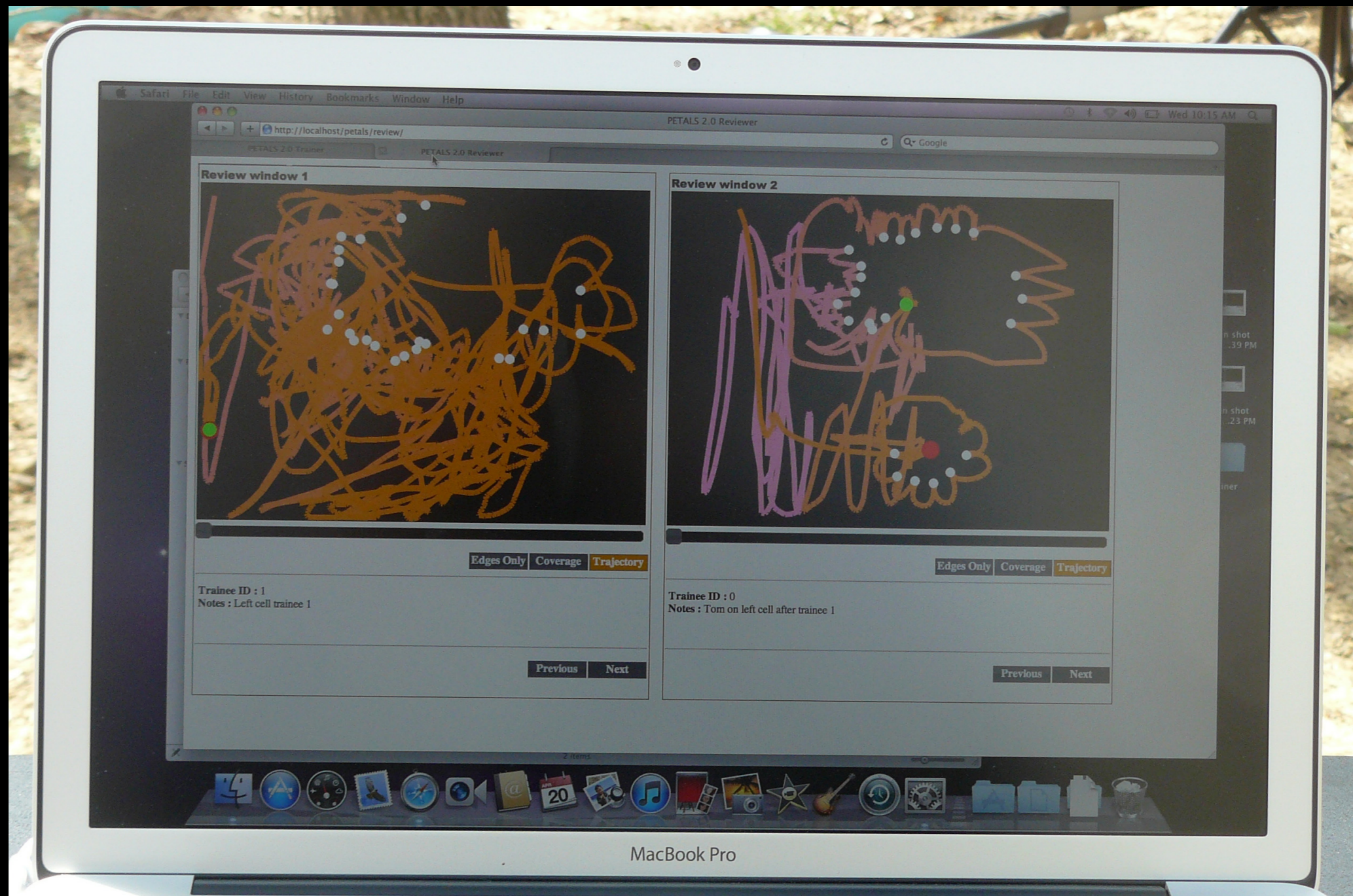


Gapping

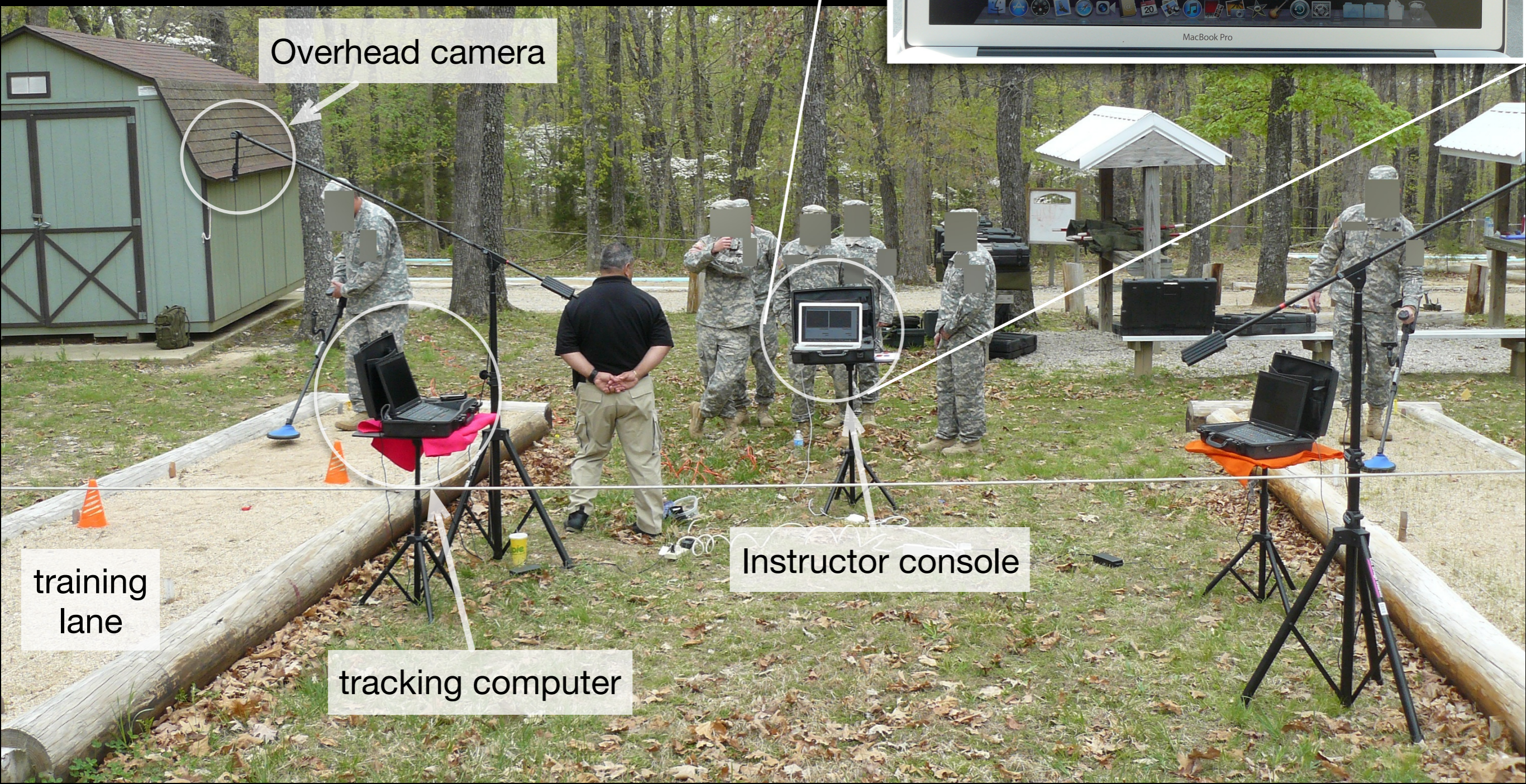


Target Lock

Approach 2: Support Instructors



Approach 2: Support Inst



Overhead camera

training lane

tracking computer

Instructor console

Approach 2: Support Inst

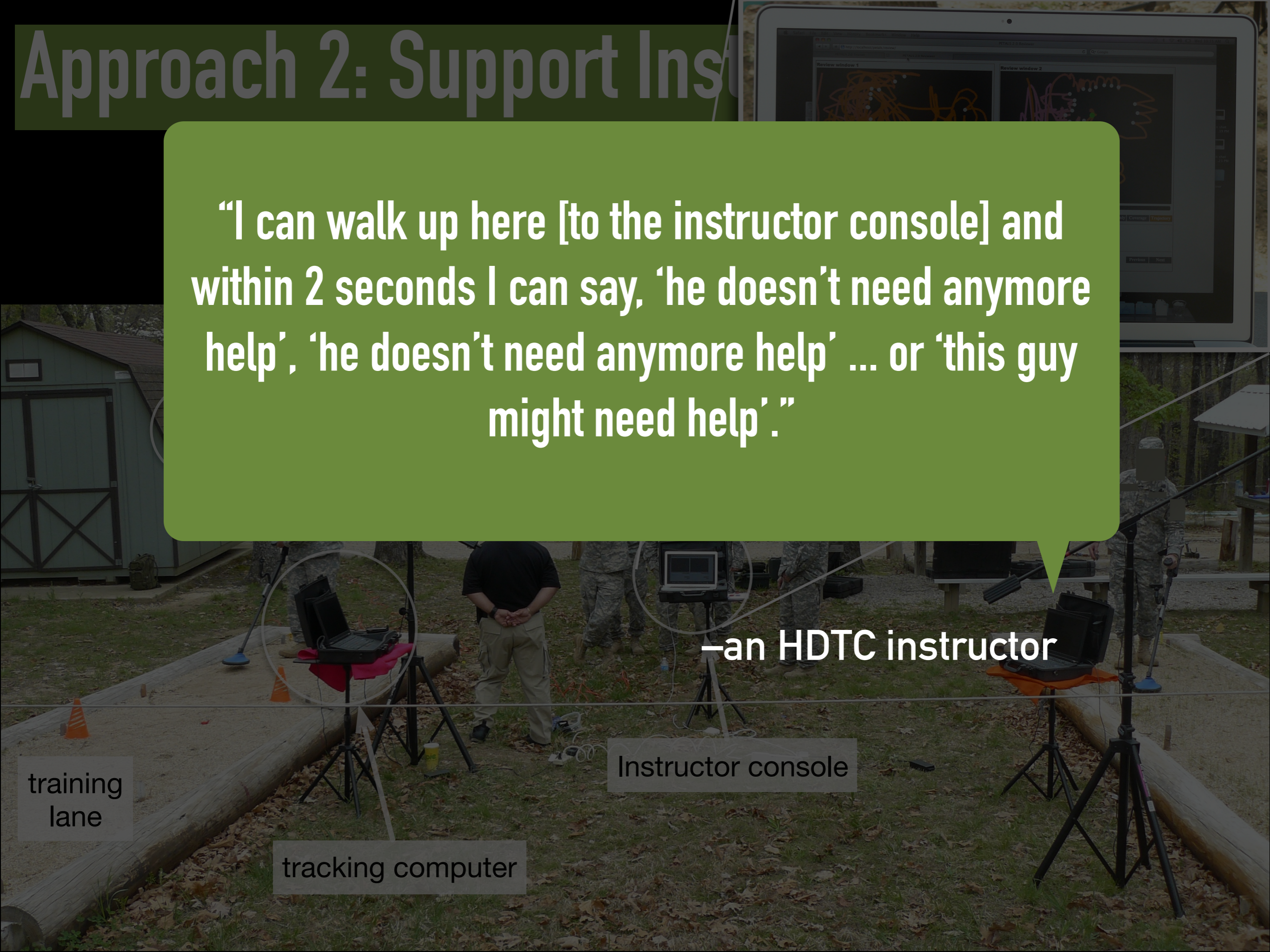
“I can walk up here [to the instructor console] and within 2 seconds I can say, ‘he doesn’t need anymore help’, ‘he doesn’t need anymore help’ ... or ‘this guy might need help’.”

—an HDTC instructor

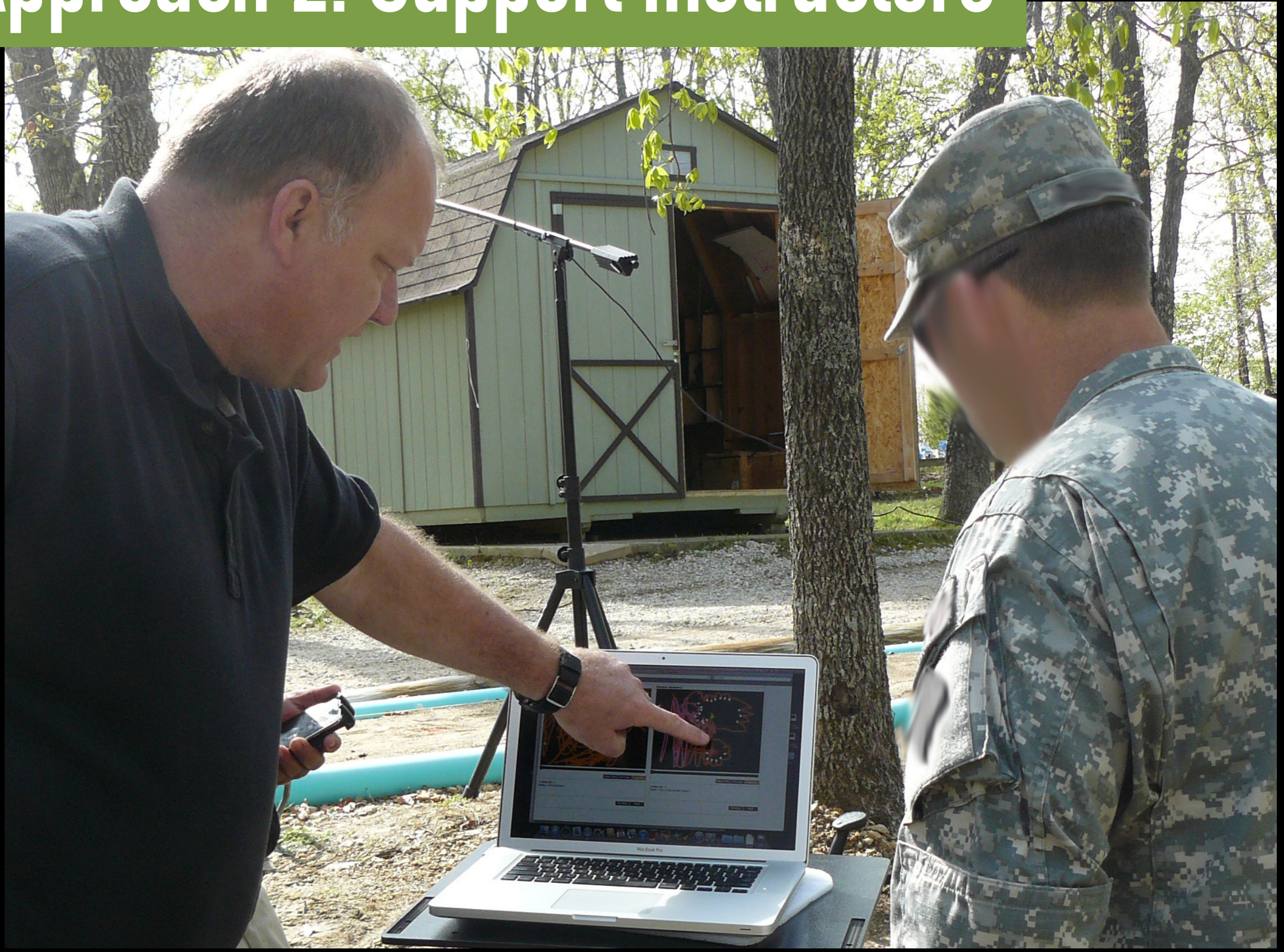
training
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Approach 2: Support Instructors



Summative Evaluation

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Summative Evaluation

1. Initial lecture



Summative Evaluation



2. Training

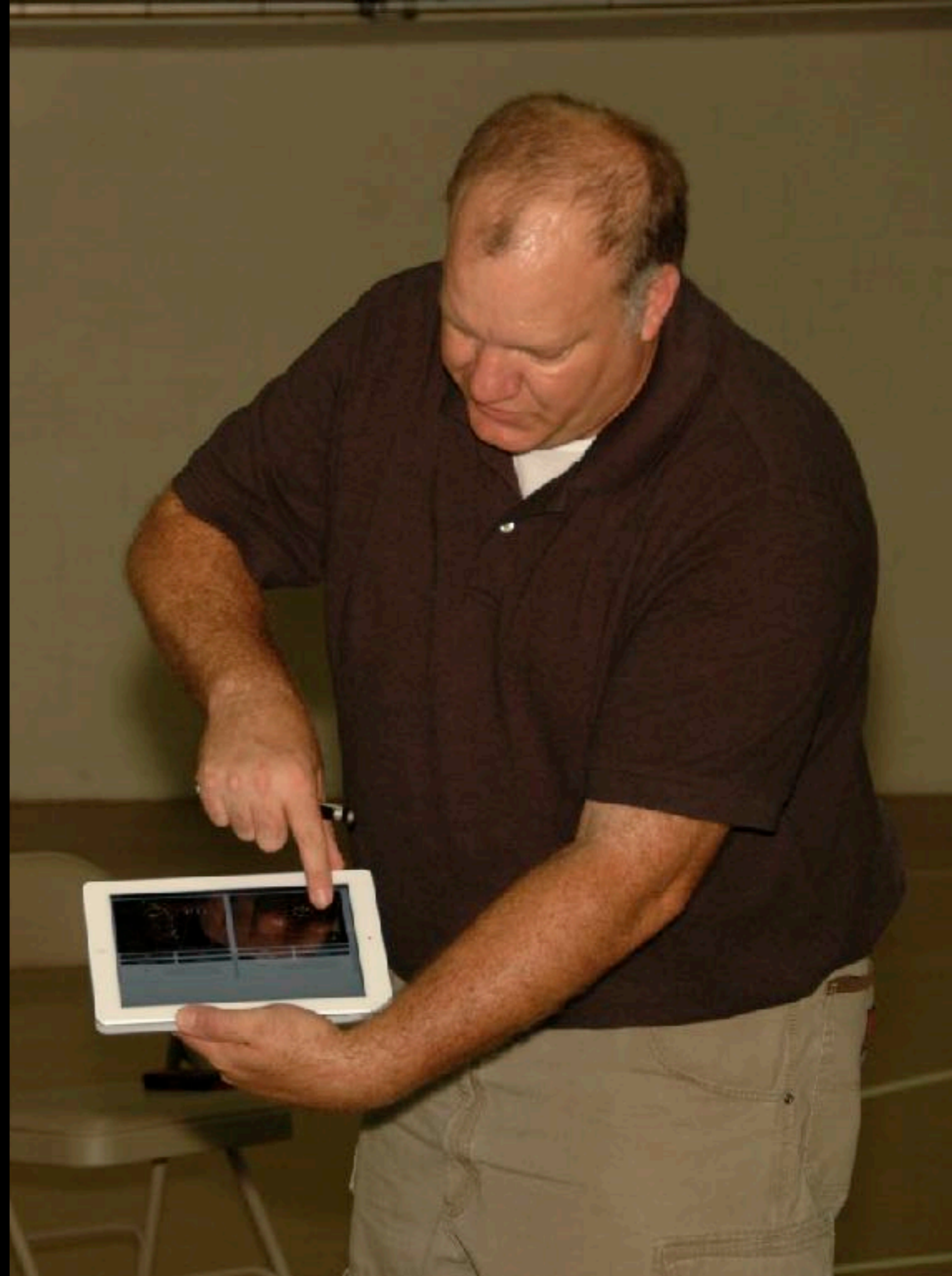


Summative Evaluation



3. Exam

1. Initial lecture



2. Training



2. Training



2. Training



3. Exam



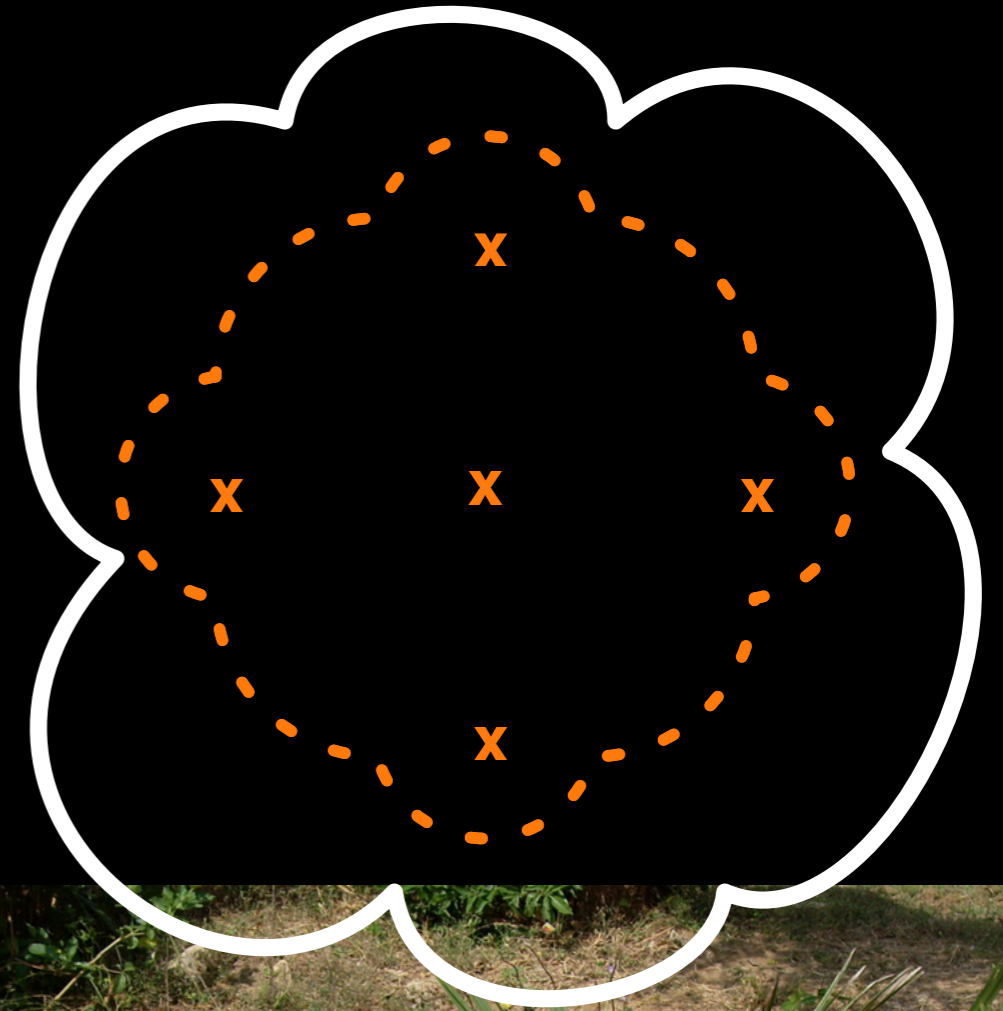
Take Aways

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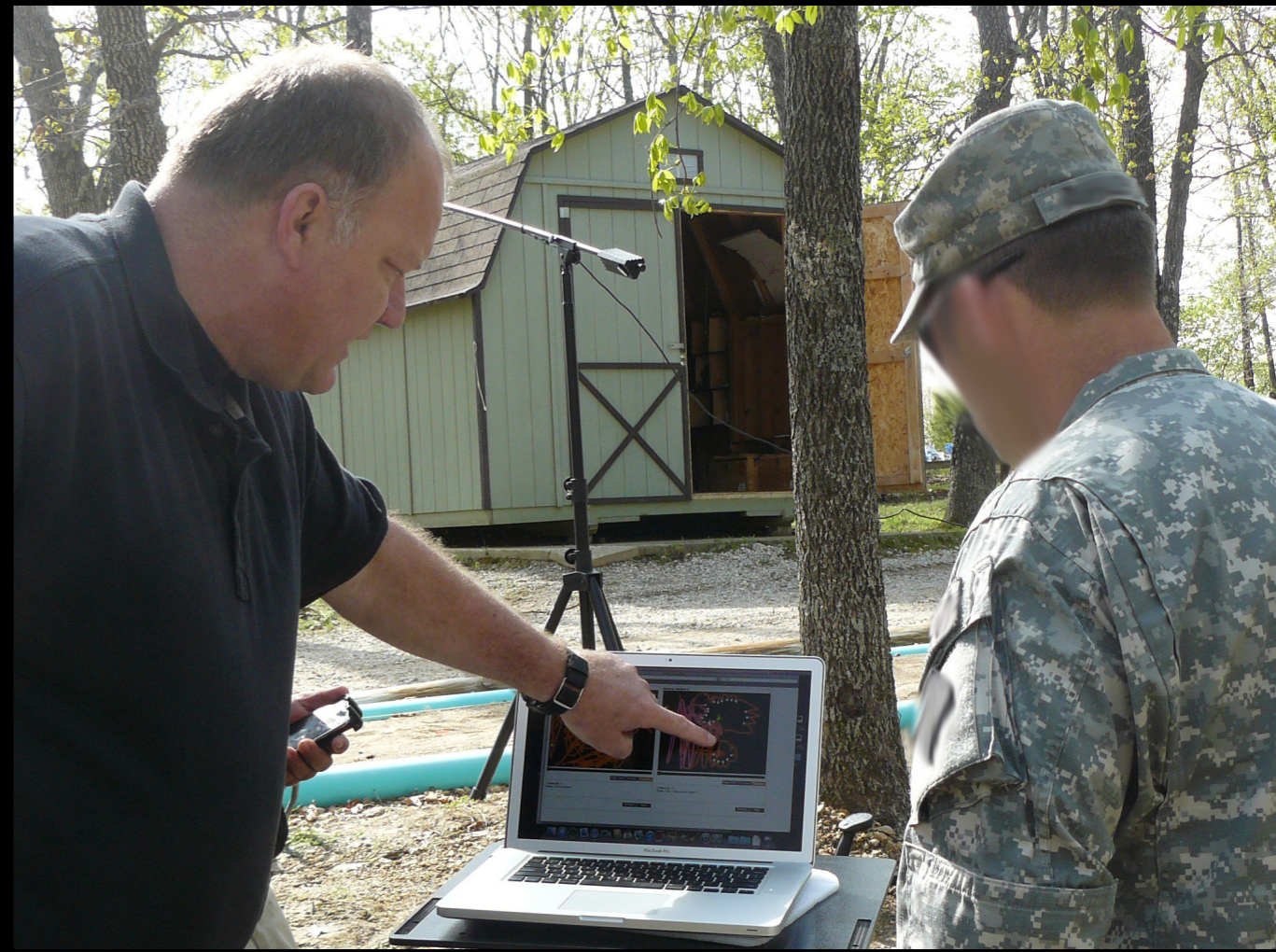
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Innovation = Invention + Implementation

