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Challenges of Over-Reliance on Software and Applications during CTBTO On-Site Inspections

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INTRODUCTION AND MAIN RESULTS

This presentation examines the role of the GIMO system in CTBTO On-Site Inspections (OSIs) and highlights challenges of over-reliance on software. It identifies natural and technological barriers affecting mission reliability and proposes strategies—training, hybrid methods, and system resilience—to ensure effective OSI operations.

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Introduction

OSI – CTBT's Final Verification Tool

- To determine whether a nuclear weapon test explosion or any other nuclear explosion has been conducted in violation of Article I (of the CTBT)
- To gather facts that may help identify any potential violator

OSI Inspection methodology - guided by inspection team functionality → defines decision-making, communication, and reporting structures

GIMO (Geospatial Information Management for OSI) a practical tool to implement this

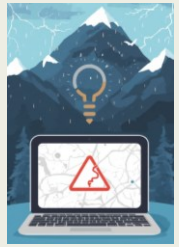
- Supports all search logic steps (from defining search zones → mission execution → reporting).
- Provides map-based interface to acquire, integrate, analyze, and disseminate data
- Integrates geospatial & analytical tools to support OSI operations
- Enhances multidisciplinary coordination → ensures efficient and effective inspections

GIMO - directly supports field operations

Potential Challenges - GIMO

Natural Barriers

- **Rugged terrain** → GPS errors
- **Extreme weather** → compromises GPS accuracy, digital map reliability and device functionality
- **High humidity, heat, or cold** → device malfunction, tablet performance
- **Poor networks** → updates fail



Technological Barriers

- Software bugs & instability
- Cybersecurity vulnerabilities
- Inspector training gaps

Implications for OSI

- **Mission delays -**
  - *Software bugs, device failures, or poor connectivity may halt inspections*
  - *Extra time needed for troubleshooting reduces time in the field*
- **Reduced efficiency -**
  - *GPS disruptions or corrupted digital records may create errors in mapping and sample locations*
- **Compromised Decision-Making -**
  - *Inspectors relying only on digital tools may miss alternative strategies*
- **Dependence on Human Proficiency -**
  - *Inadequate inspector training on GIMO reduces the effective use of tools*
  - **Over-reliance without field adaptability = inefficiencies and errors**

Strategies for Mitigation

- Enhanced inspector training
- Incorporating hybrid methods that balance digital tools with traditional techniques
- Improving system resilience

Conclusions

Dependence on software and hardware introduces unique challenges, especially in field deployment in unknown and unpredictable environments.

Balancing innovation with resilience ensures OSI reliability in unpredictable environments

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