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The Development of an Example Precision Information Environment for International Safeguards Use Cases

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U.S. DEPARTMENT OF ENERGY

Overview

- Motivation
- Technical Background
- Capability Descriptions
- Conclusions

Motivation

- Increasing inspector responsibilities in the field
- Effective information management and analysis can support situational awareness, inspector access to relevant data, task planning and tracking
- PNNL developed a proof-of-concept system for international safeguards, demonstrating potential capabilities and “vision” for implementation
- Leveraged PNNL’s Precision Information Environment (PIE)

Technical Background - PIE

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- Secure, collaborative environment
- Supports remote data acquisition, storage, processing, analysis, and collaboration
- Local and mobile clients (i.e. desktops, tablets, smartphones)
- Originally developed for emergency response community

www.youtube.com/user/PNNLgov

Capability Descriptions - Platform

- Platform – the device on which the software functions
- For safeguards, we targeted mobile platforms
- Tablets selected over smartphones for screen size
- PIE originally developed in Android
- Other platform options could be Windows or iOS.
- System not meant for actual deployment

Capability Descriptions – Information Download and Synchronization

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- Automated, task-specific downloads
- Updated based on location, activity
- Rule-based file selection process (determined by folders)
- Deployable system could consider metadata/keyword-based recommendations, user interaction-based system (e.g., Amazon.com-type recommendations)

- Server sync harmonizes data between central server and mobile system
- Due to IAEA inspector work environments, online and offline mode were required
- Future considerations:
  - Syncing options by information type
  - Multi-user collaboration on a single document
  - Syncing frequency

Capability Descriptions – Photo Capture and File Upload

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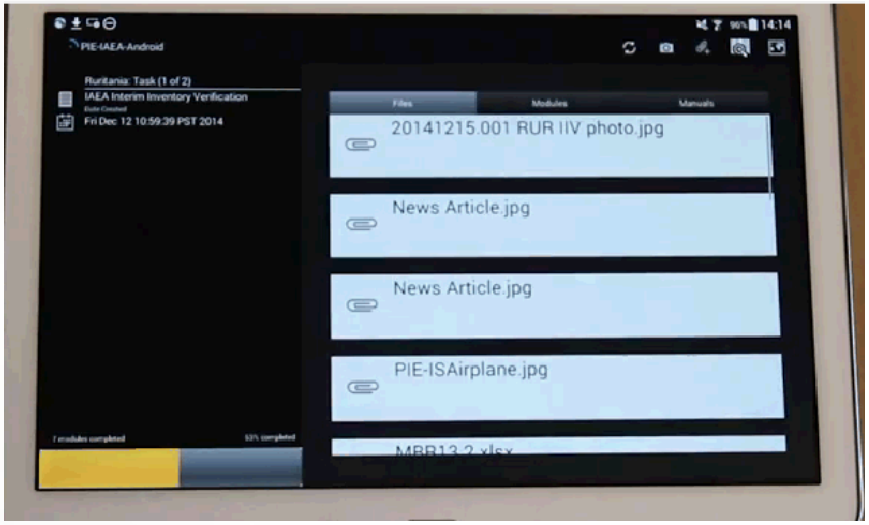
- Use mobile device's integrated camera to take a photo within the information environment
- Automated saving to current safeguards project
- Make notations, comments, etc.

- Incorporate photos, documents, records into a project
- New information from facility operator, emailed data, photo from outside of the environment
- Information becomes part of standard repository



Capability Descriptions - Reporting and Task Management

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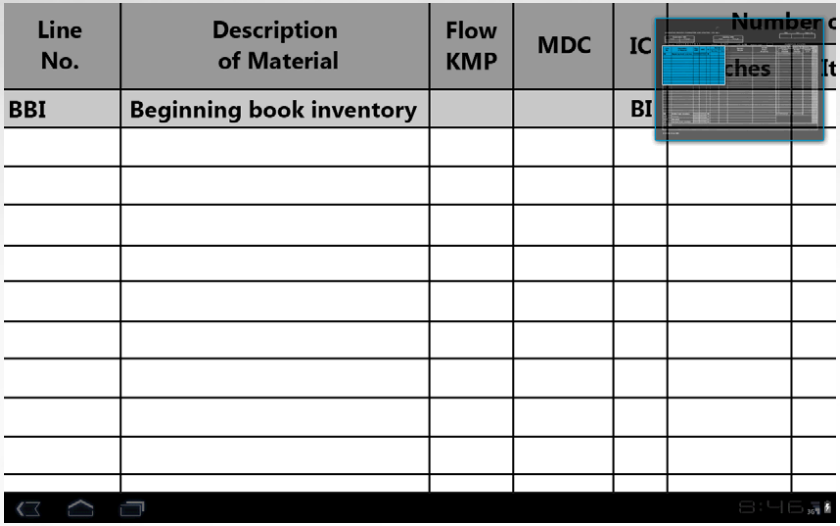
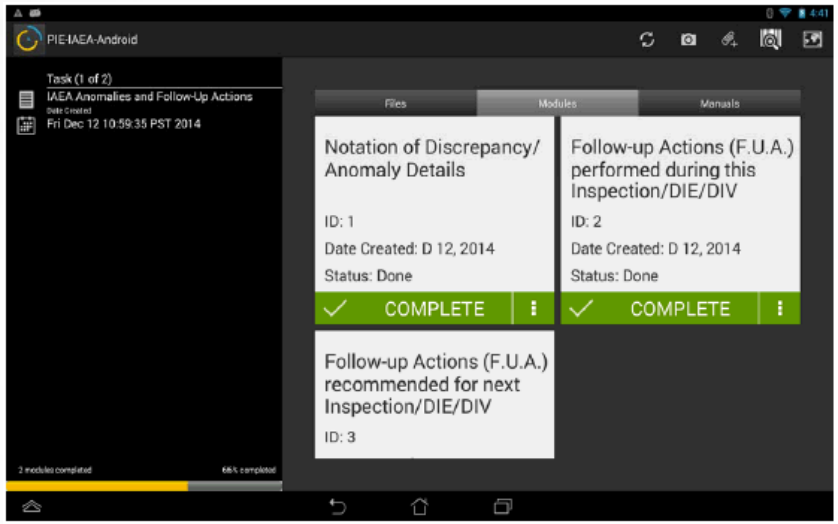
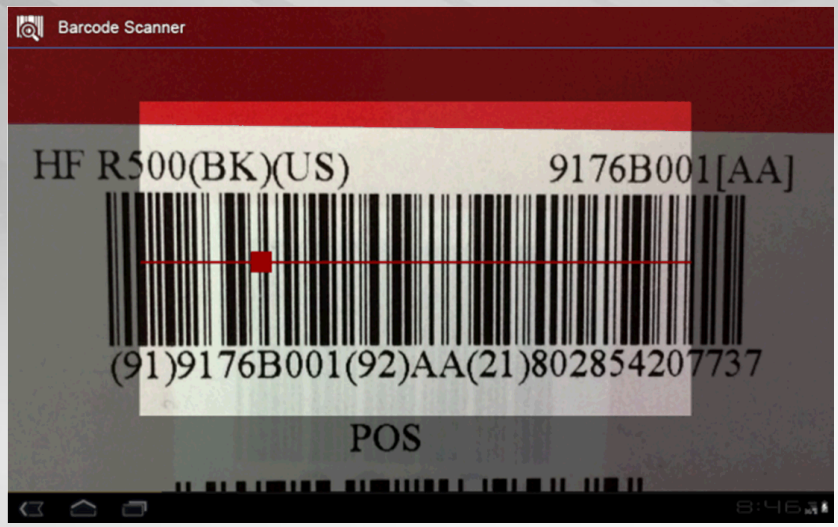
- IAEA requires inspection documentation in a Computerized Inspection Report
- Modules of the report were input into PIE for tablet-based completion
- Task and progress monitoring allows user to document completion status





Capability Descriptions – Barcode Scanner



- Use the tablet's integrated camera to identify and read barcodes
- Access corresponding information from a database
- Could support sample tracking, measurement equipment information, inventory taking at facilities

Capability Descriptions – Optical Character Recognition

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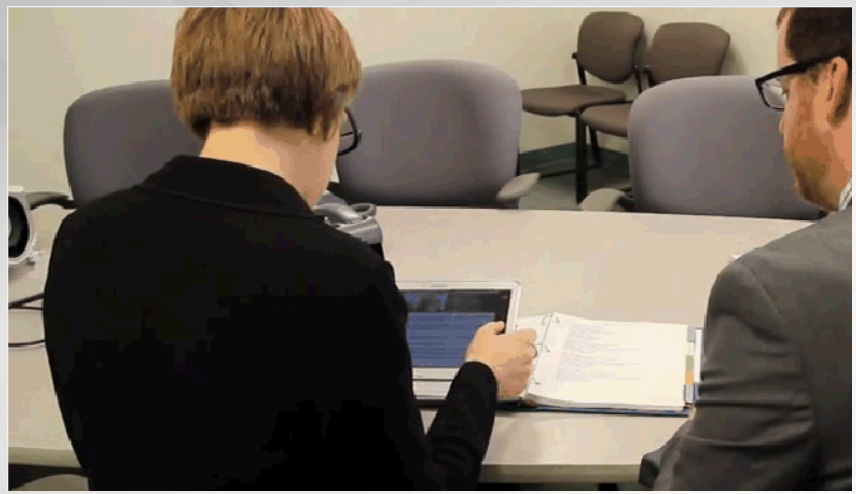
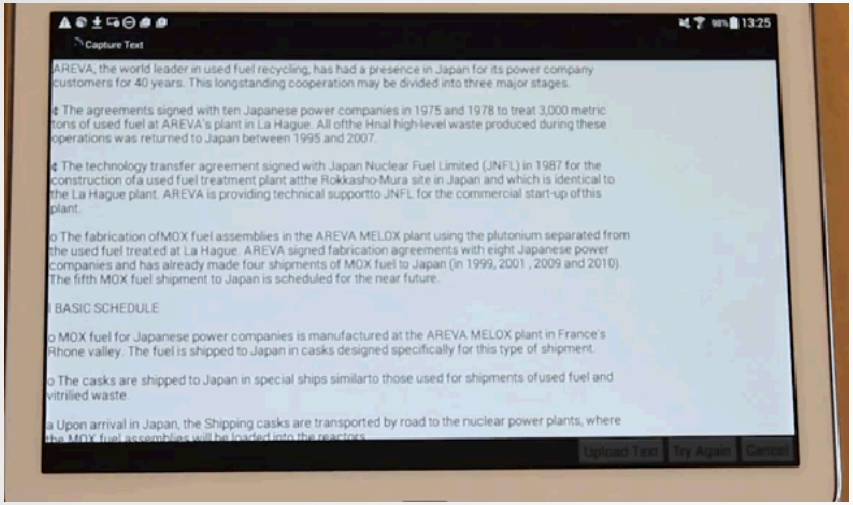
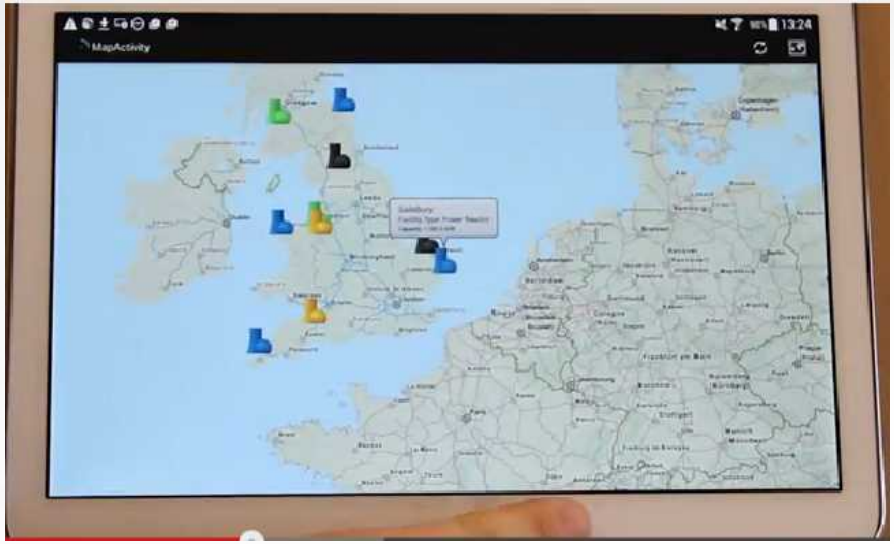




- Ingest image of a document, and convert to searchable text
- Photograph a document using the mobile device's camera, and save as a searchable document
- Varies with hardware (camera quality), characteristics of the document, and environment

Capability Descriptions – Map Viewer

- View, modify, and access information via a map view
- Combined with GPS, could provide path tracking, estimate distance, speed, altitude
- Safeguards uses: information visualization, navigational support, path tracking at facilities, situational awareness



Capability Descriptions – Detector Interface

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- Investigated interface between identiFINDER2 and Android tablet, ultimately unsuccessful in establishing interface.
- Could be used to ingest data directly from measurement equipment onto mobile device
- Analyze and record data within the current safeguards project

Conclusions

- Explored a variety of capabilities, but there are many more
- Meant to serve as a demonstration of potential applications, not a deployable system
- Documentation of the project can support future development projects
- In addition to technical development issues, deployment issues must also be considered

Acknowledgements and Advertisements

- PIE development for safeguards funded by the National Nuclear Security Administration office of Nonproliferation and International Security, and leveraged PNNL work completed for the Department of Homeland Security's FEMA

- Check us out on YouTube!
  - Special thanks to Ian Roberts who produced our video
  - Search PNNL YouTube for PIE-IS

- Related PNNL work
  - Travis Gitau – deployment feasibility
  - Joel Doehle – information security