Workplace Examinations with the NIOSH EXAMiner Software

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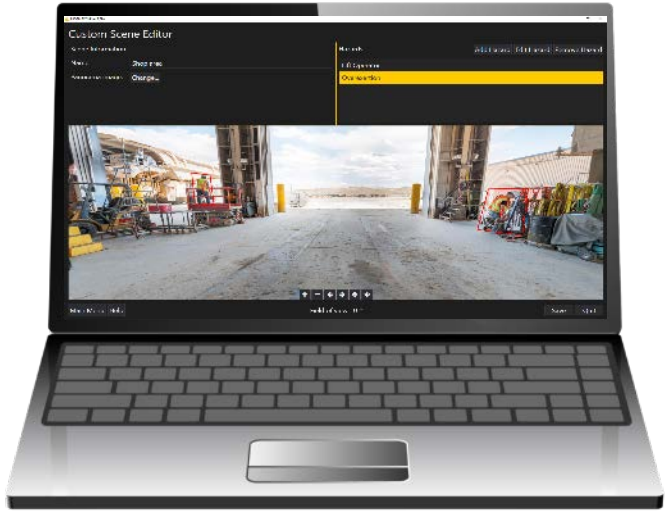
NIOSH Mining Program

Topics:

EXAMiner Research to Practice

EXAMiner Demonstration



Tips for Creating Custom Scenes in EXAMiner

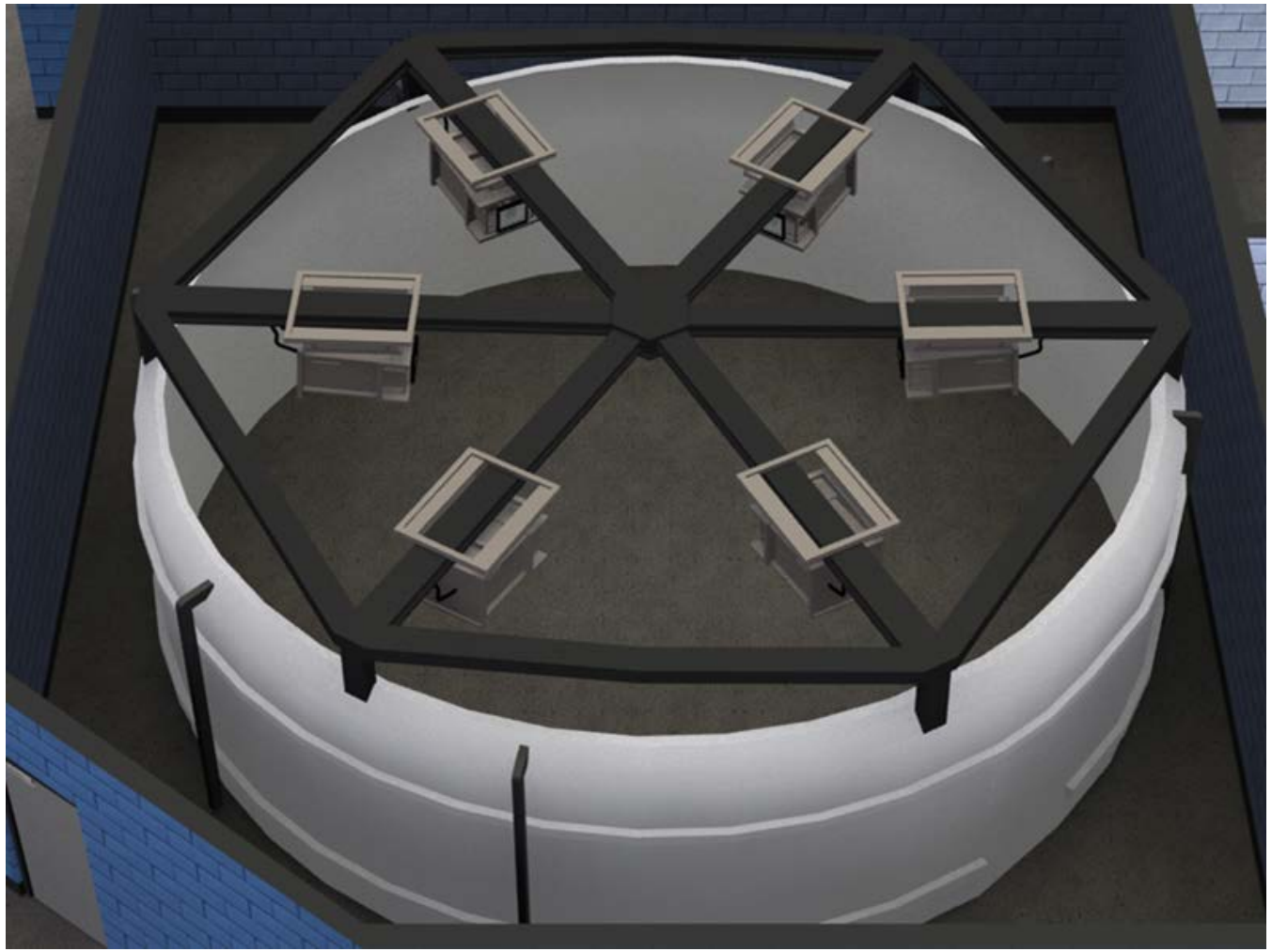
Background

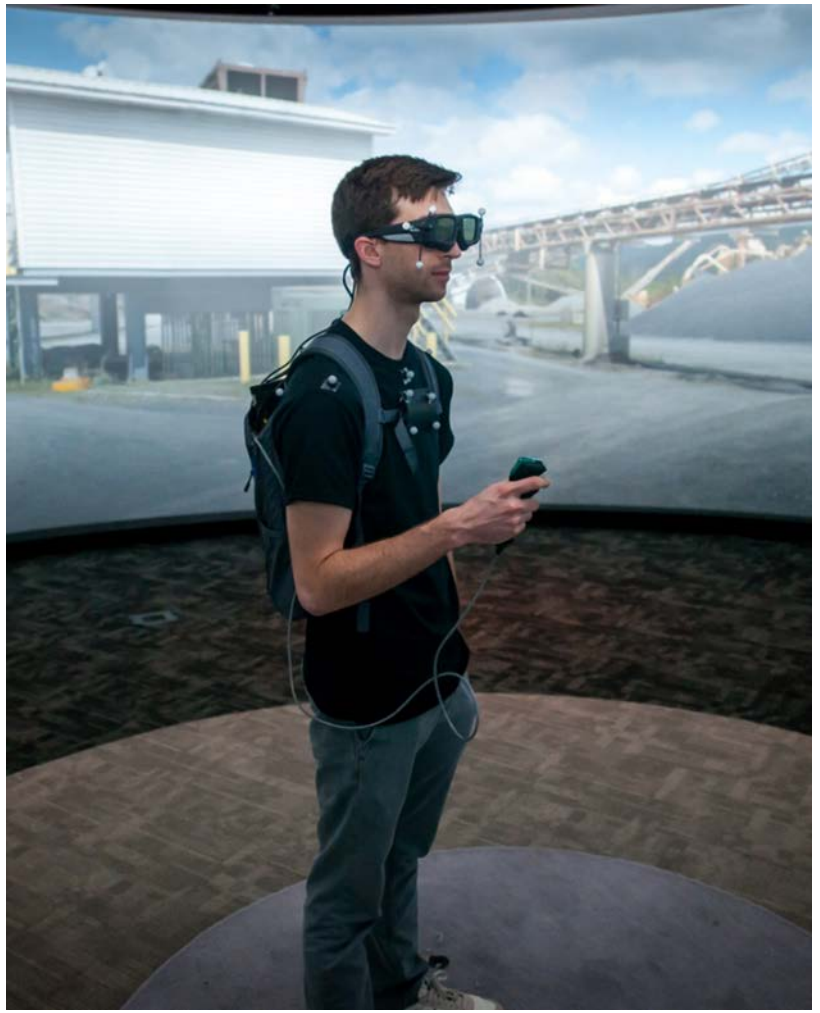
- Metal/nonmetal mining experienced an increase in fatal injuries between 2013 and 2015.

- To address this increase, the Mine Safety and Health Administration (MSHA) updated the Workplace Examination Rule (30 CFR Parts 56 and 57):
  - Workplace Examinations must be done before work begins or as mineworkers begin work in a location.
  - Examination records must include a description of the adverse conditions that are not immediately corrected.
  - Examination records must include the date on which an adverse condition was corrected.

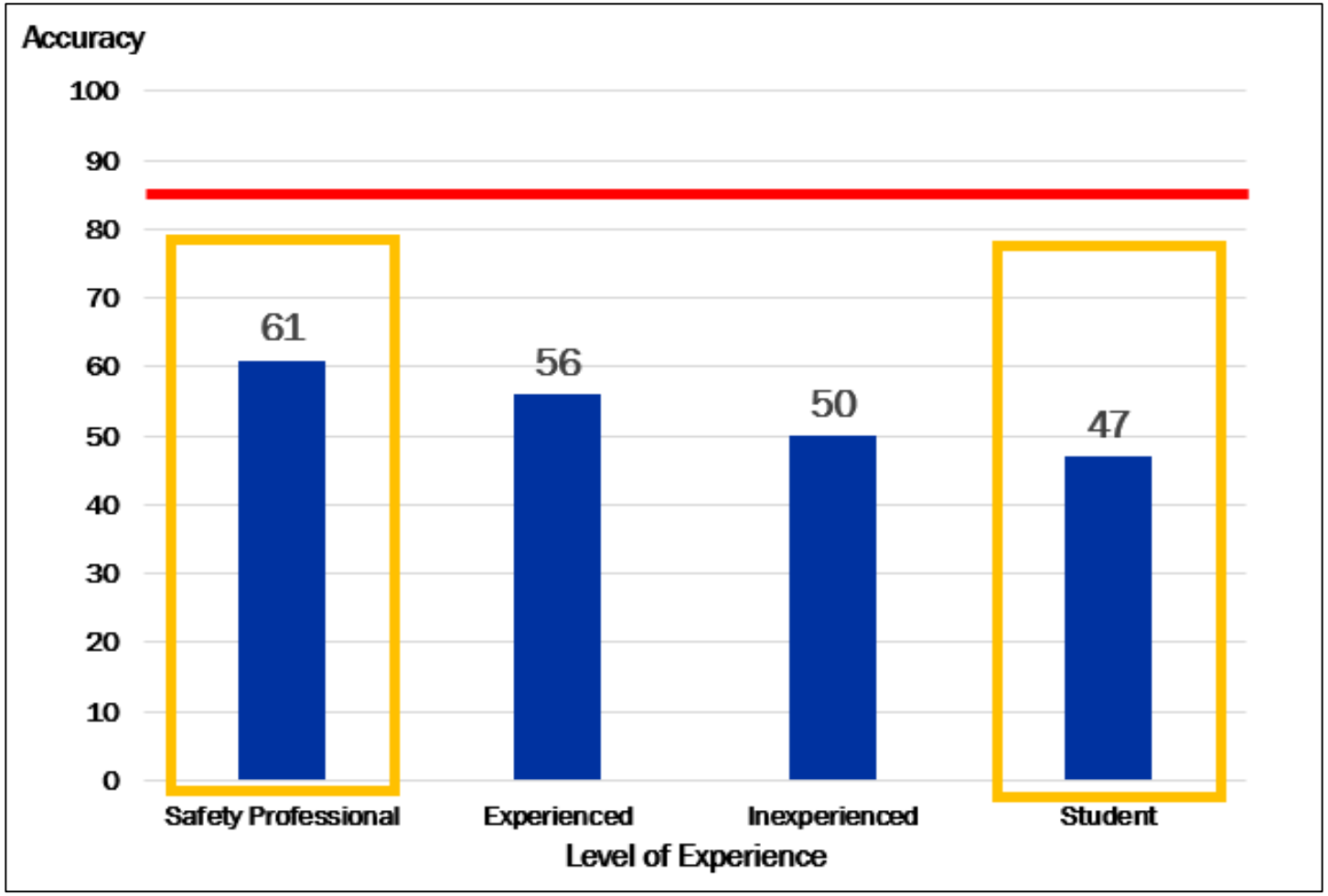
Recognizing worksite hazards is critical to the workplace examination.

Recent NIOSH research identified differences in hazard recognition accuracy based on mineworker experience



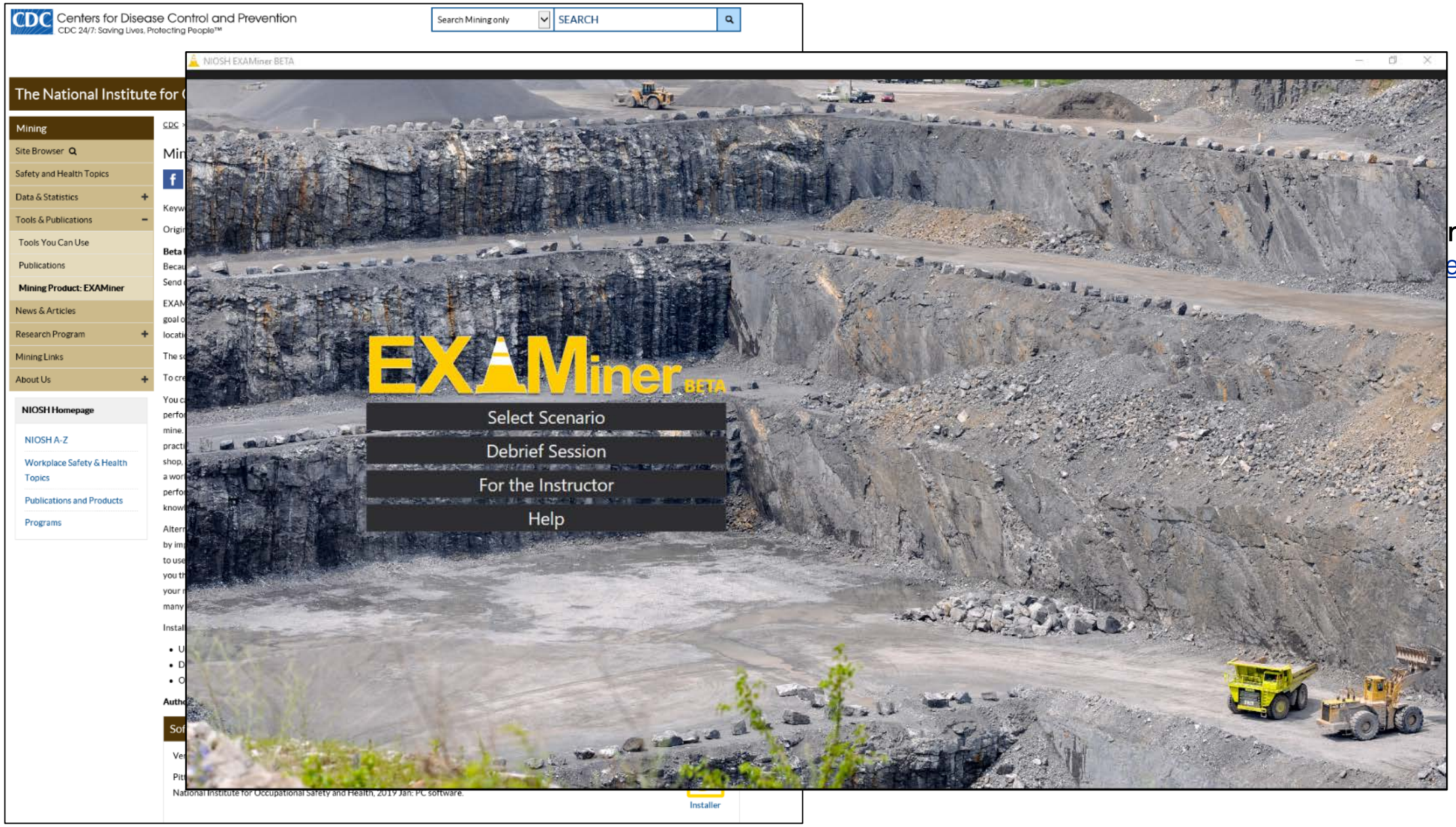


Participants with safety-specific experience identify significantly more hazards than other participant groups



To address this deficiency, NIOSH created EXAMiner—a portable workplace examination simulation.

EXAMiner is available for download on the NIOSH website



ning website:
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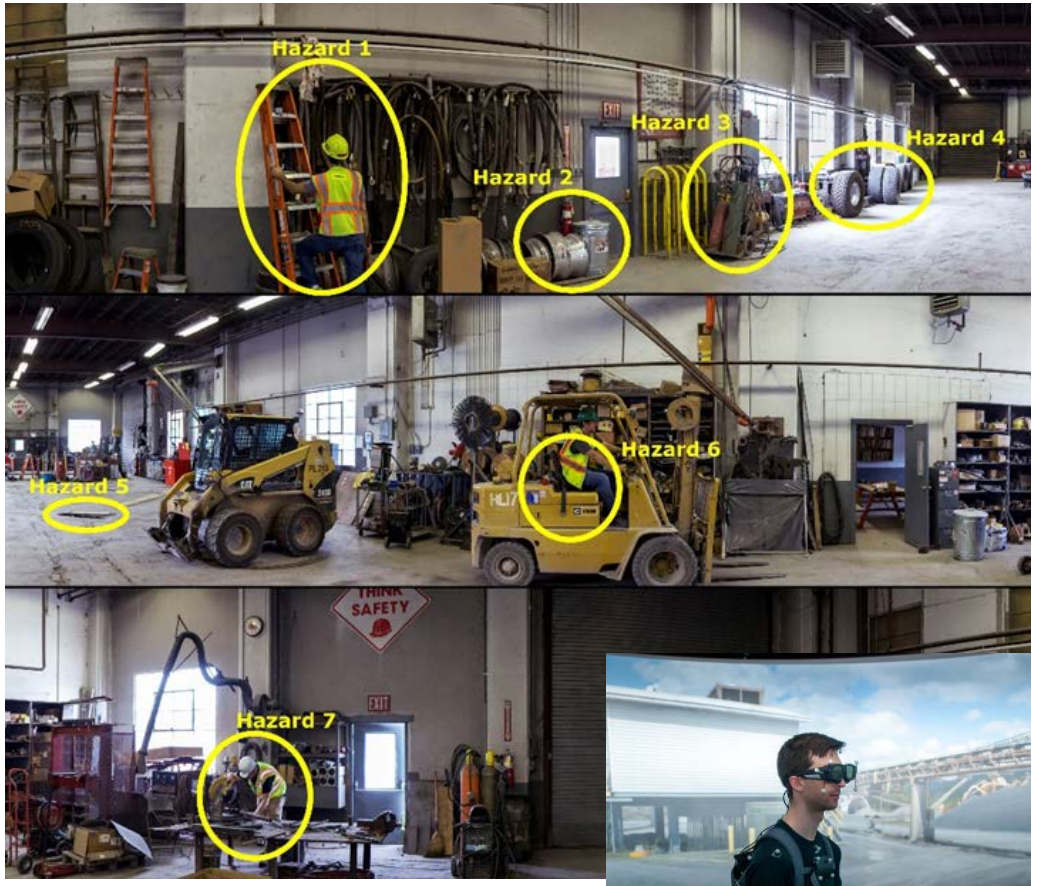
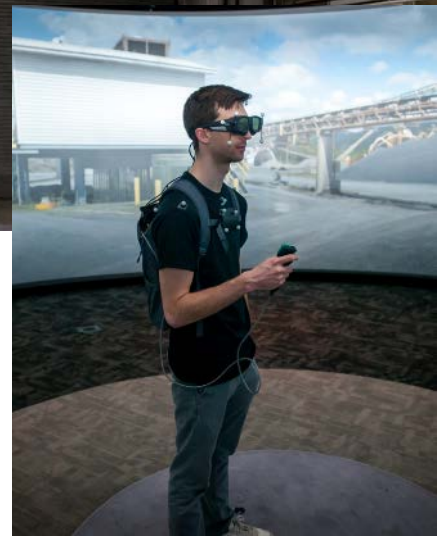
EXAMiner uses materials developed for the NIOSH lab study





EXAMiner includes:

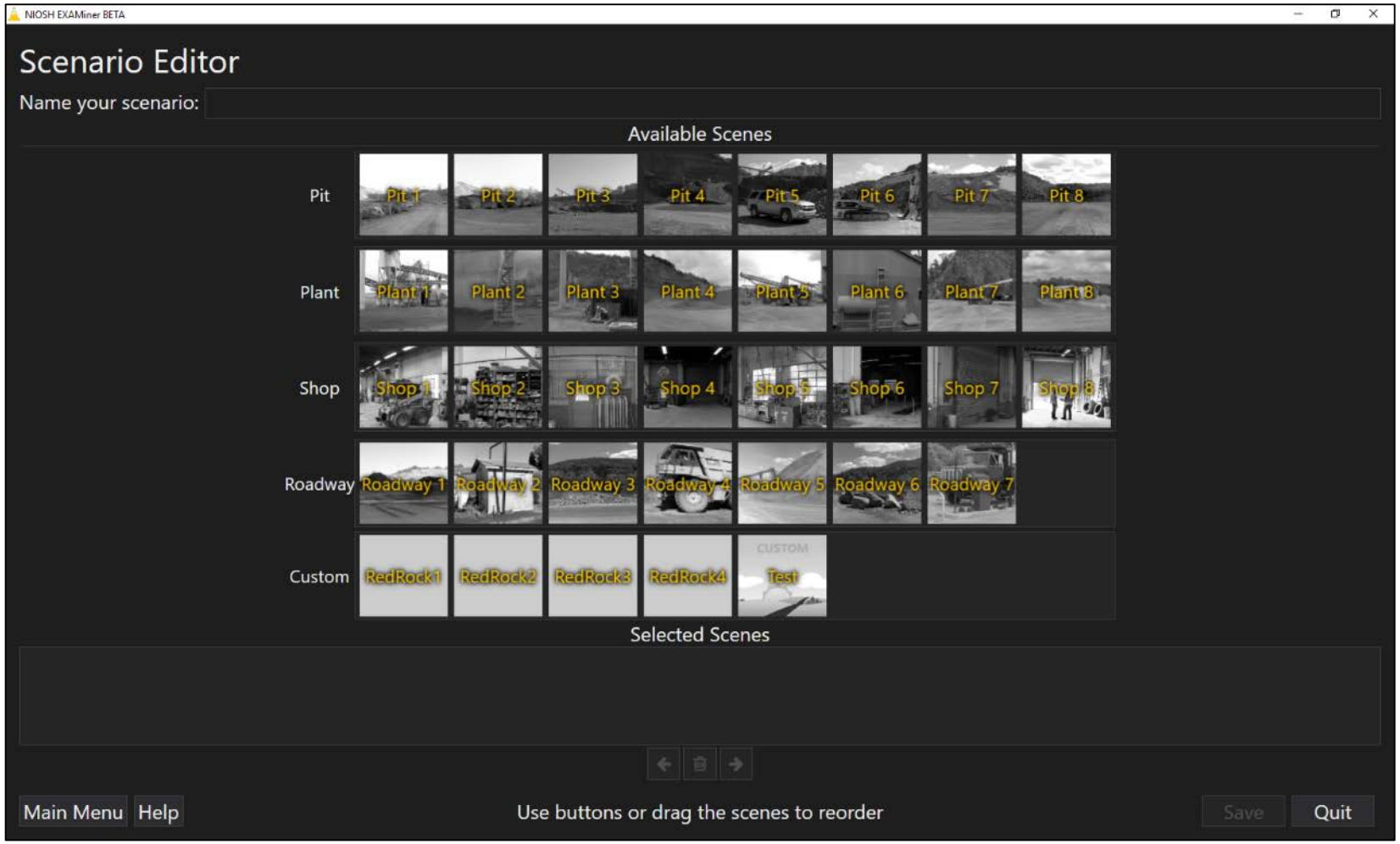
- 31 panoramic pictures at 4 mine locations (pit, plant, shop, roadway)
- 106 hazards
- Workplace EXAMination search task
- Debrief session

NIOSH designed EXAMiner for an instructor to use in a classroom setting

Who is the user?

- Metal/nonmetal mining sector
- Part 46 training: required by law
- Safety trainers during Instructor-led training
- Classroom setting with a projector and screen
- Customized material

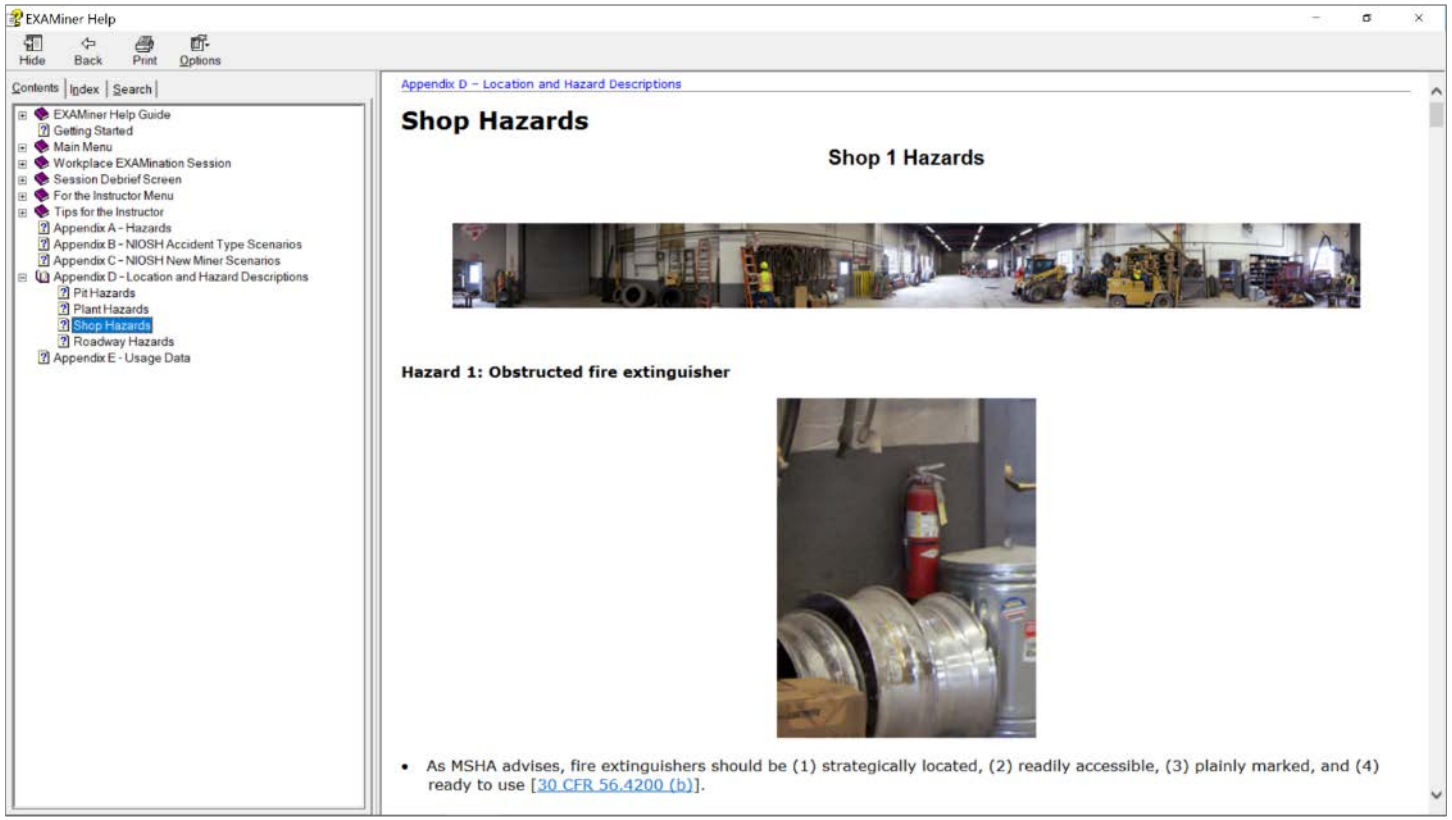
Instructors can create custom training scenarios to address specific hazards or highlight specific mine locations



A *session* includes the virtual workplace examination search task.

A *scenario* is a sequence of images or *scenes* the trainees search during the workplace examination search task.

EXAMiner includes guidance documentation to facilitate use

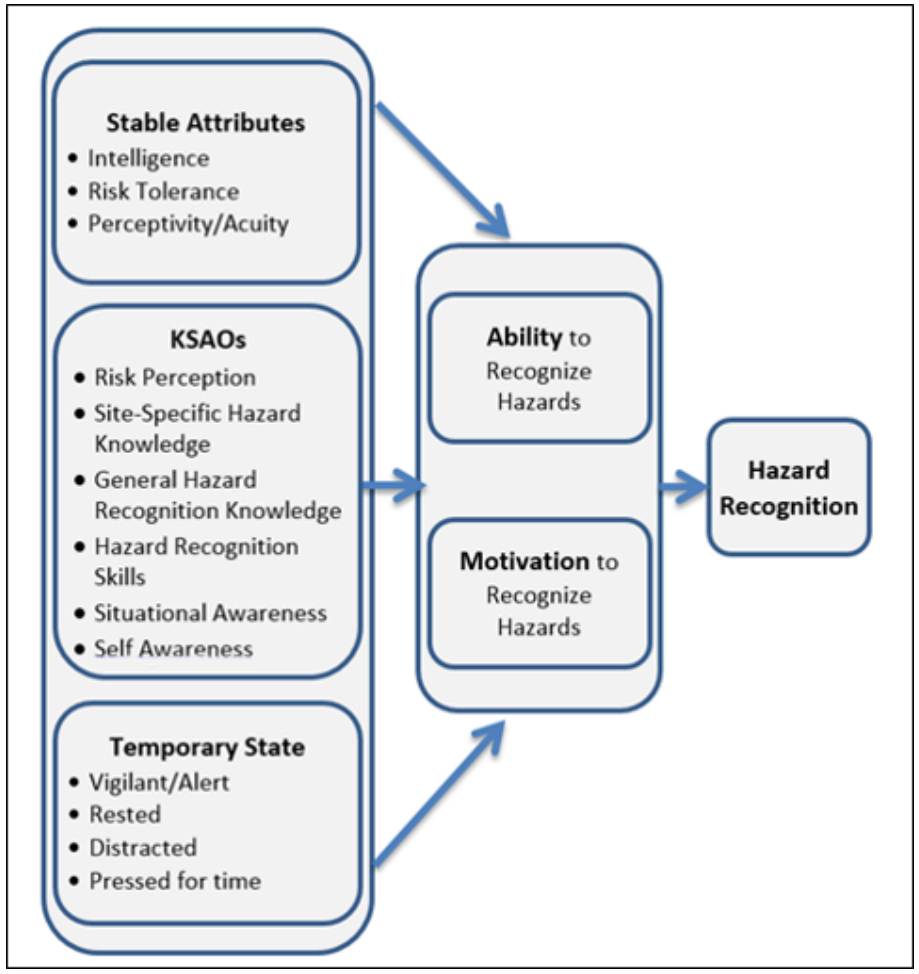


EXAMiner includes:

- Help guide
  - User instructions
  - Descriptions of software functionality
- Tips for the instructor
  - Suggestions for use during classes
- Appendices with all hazard information
- 9 NIOSH scenarios

EXAMiner addresses critical hazard recognition competencies using scientifically based training strategies

Hazard Recognition Competencies
Theoretical Framework



Competencies

- General hazard knowledge
- Site-specific hazard knowledge
- Visual search
- Pattern recognition

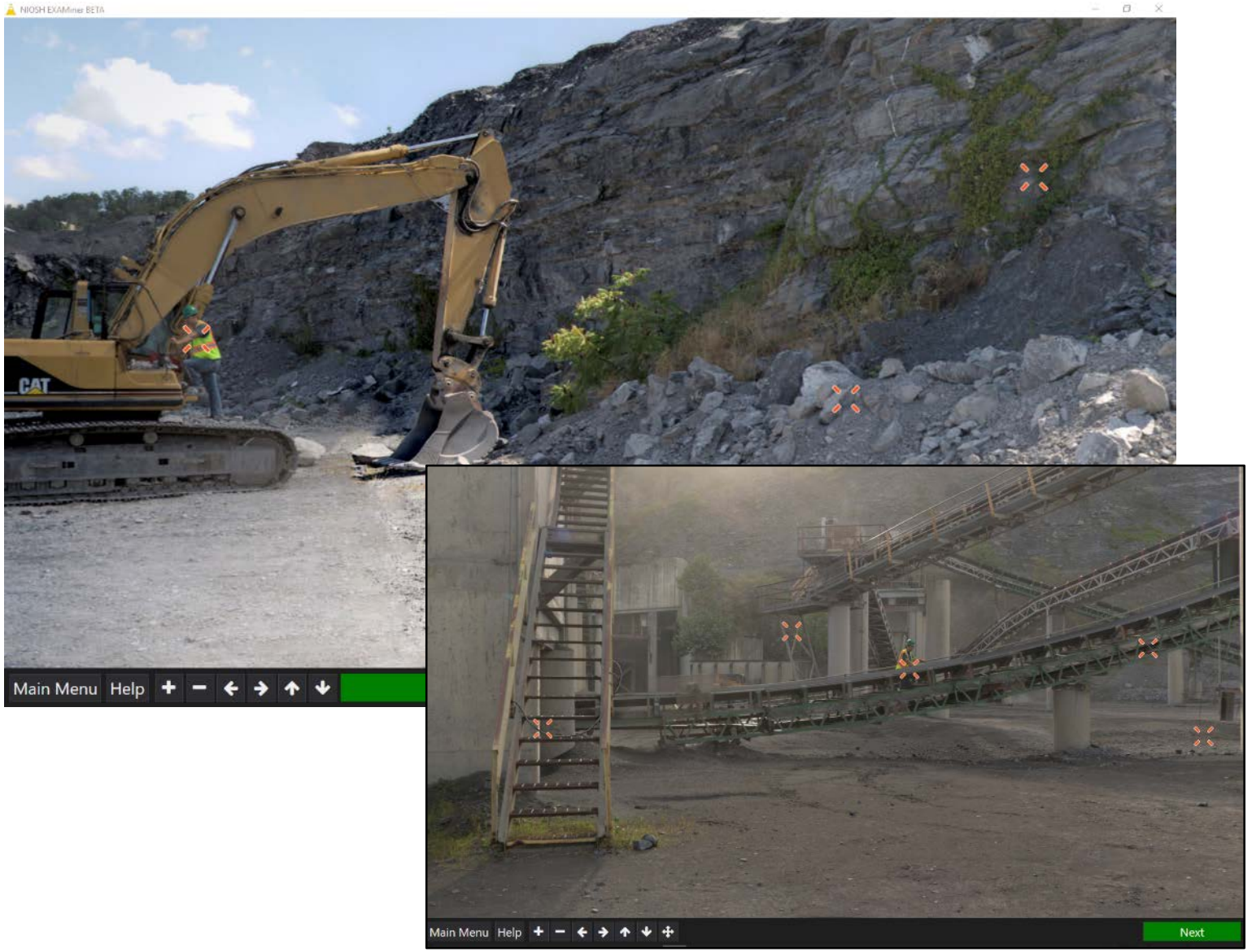
Training Strategies

- Information
- Demonstration
- Practice
- Feedback

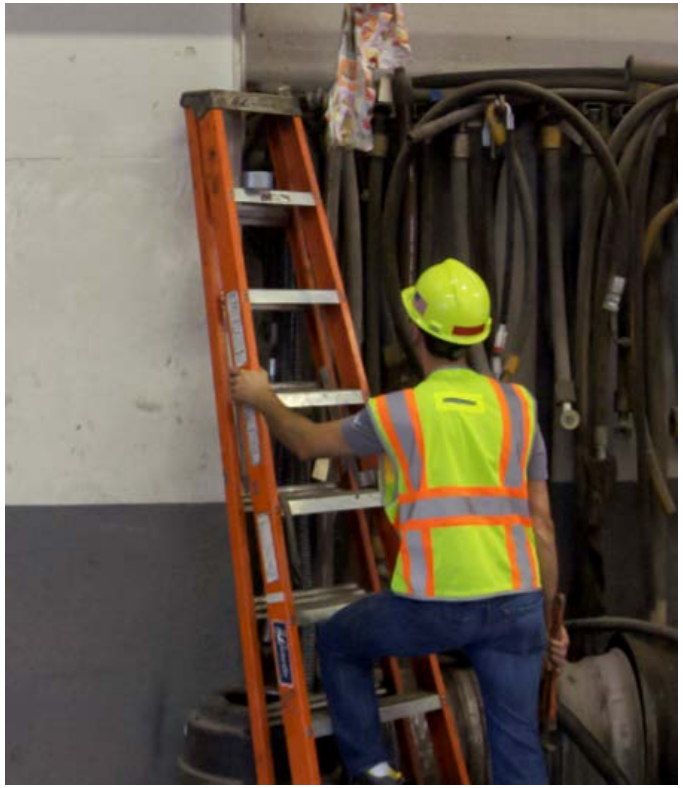
NIOSH designed the workplace examination search task to improve trainees' ability to search for and find hazards

Workplace EXAMination Search Task

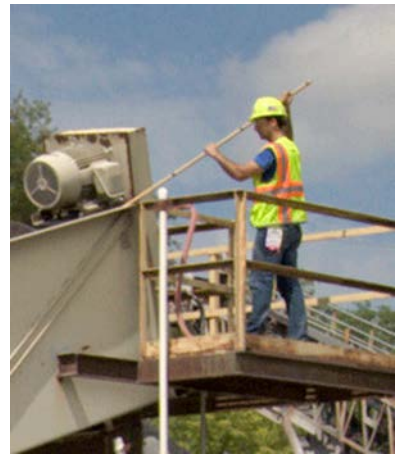
- Used to demonstrate hazard recognition.
- Provides opportunity to practice visual search.
- Instructions: Please search as if you were performing a workplace examination at your work location.



Trainees perform a simulated workplace examination by searching high-fidelity panoramic scenes for hazards



Trainees are able to search for variations of the same types of hazards to strengthen pattern matching skills



The session debrief gives trainers the opportunity to review and discuss trainees' performance during the search task

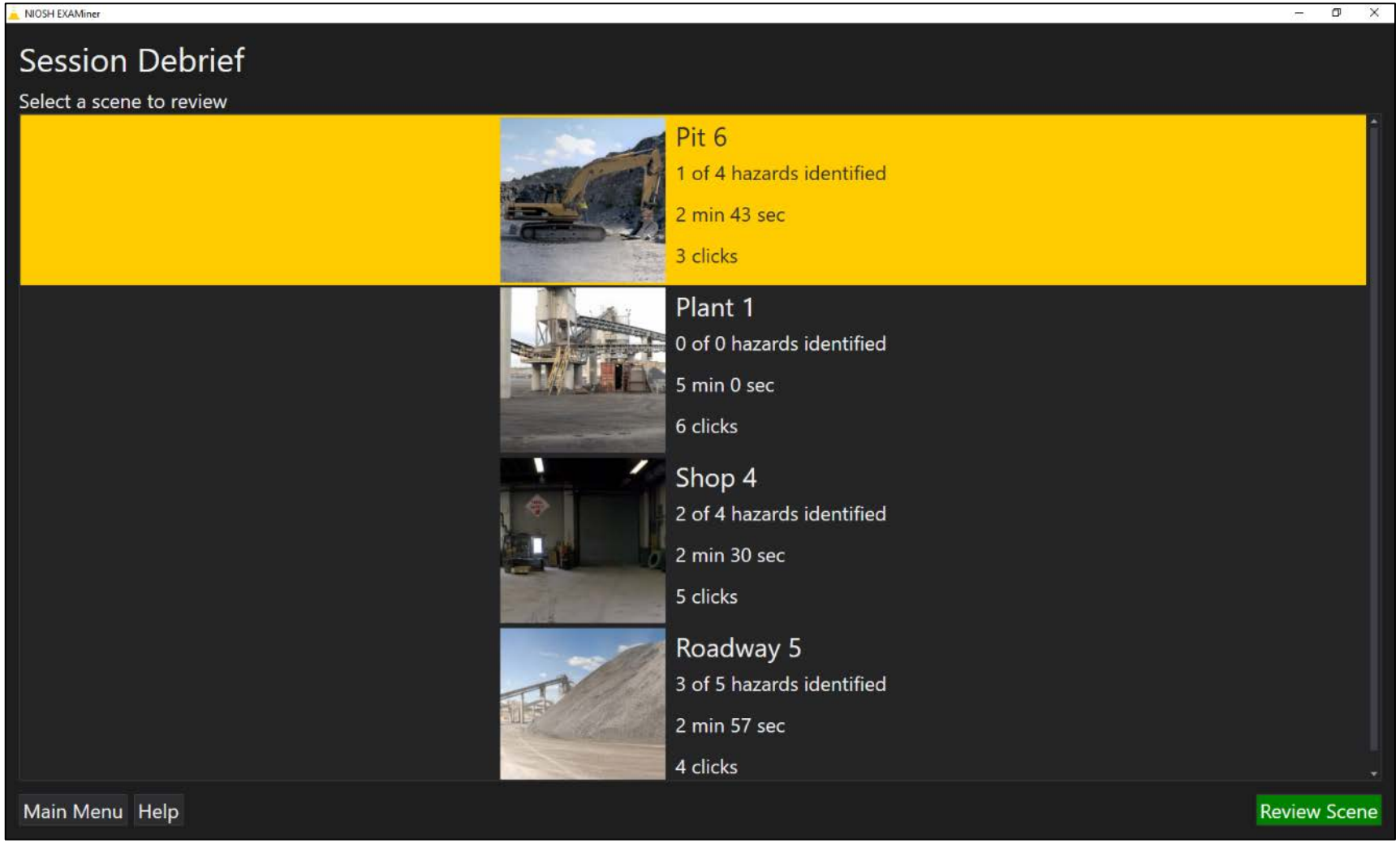
Session Debrief

- Critical for learning and retention.
- Opportunity to review searched scenes.
- Discuss hazards that were identified.
- Discuss hazards that were missed.
- Provide explanation for hazards.
- Discuss site-specific policies.

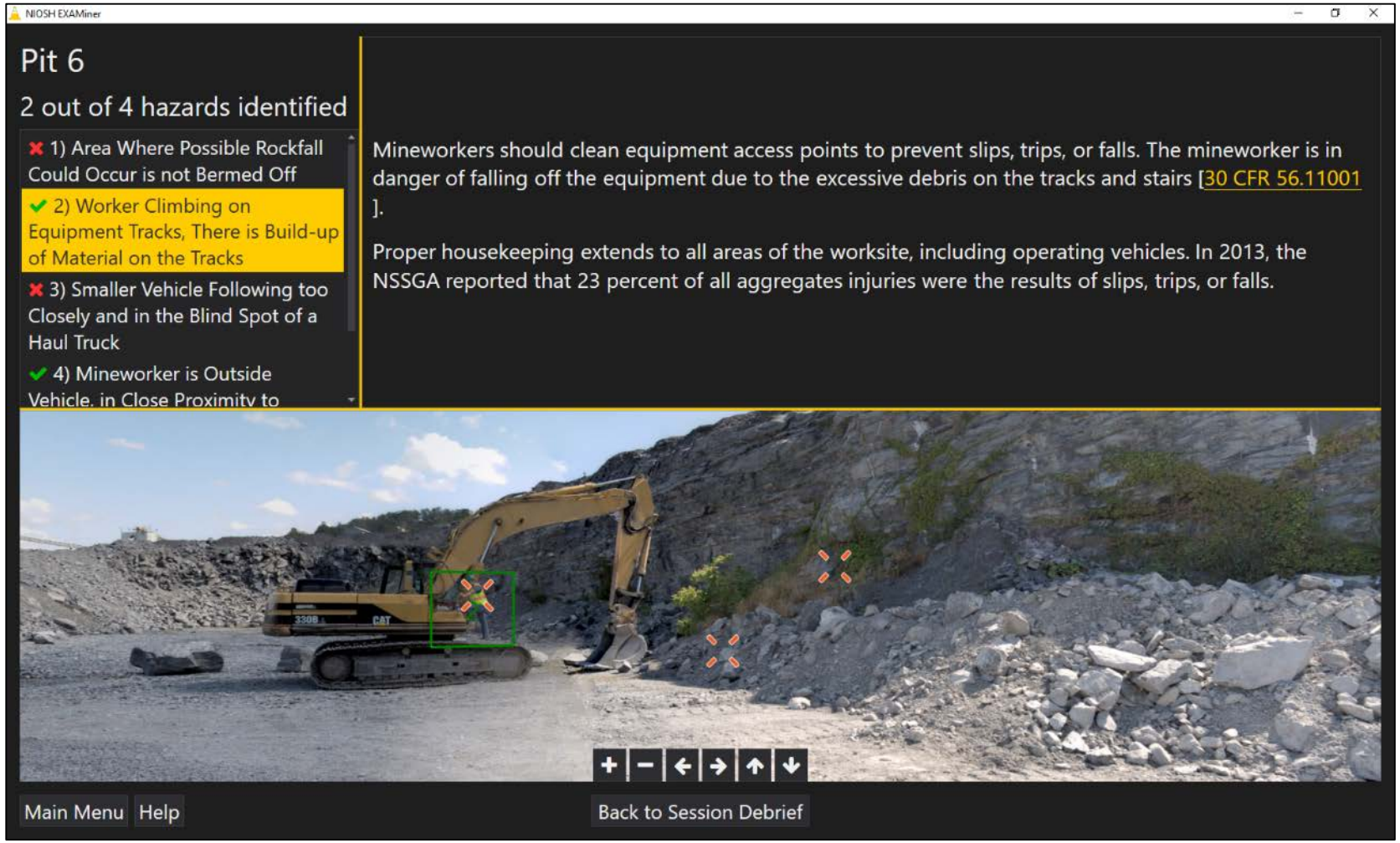
The session debrief provides feedback for all scenes searched in a scenario

Feedback

- Accuracy
- Search time
- Number of clicks



To reinforce hazard knowledge, NIOSH researchers provide additional information during the scene review



Accuracy Information

- Hazards that were accurately identified
- Hazards that were missed
- Additional clicks

Hazard Information

- Brief description
- Injury statistics
- Mitigation strategies

The mining community is currently using EXAMiner

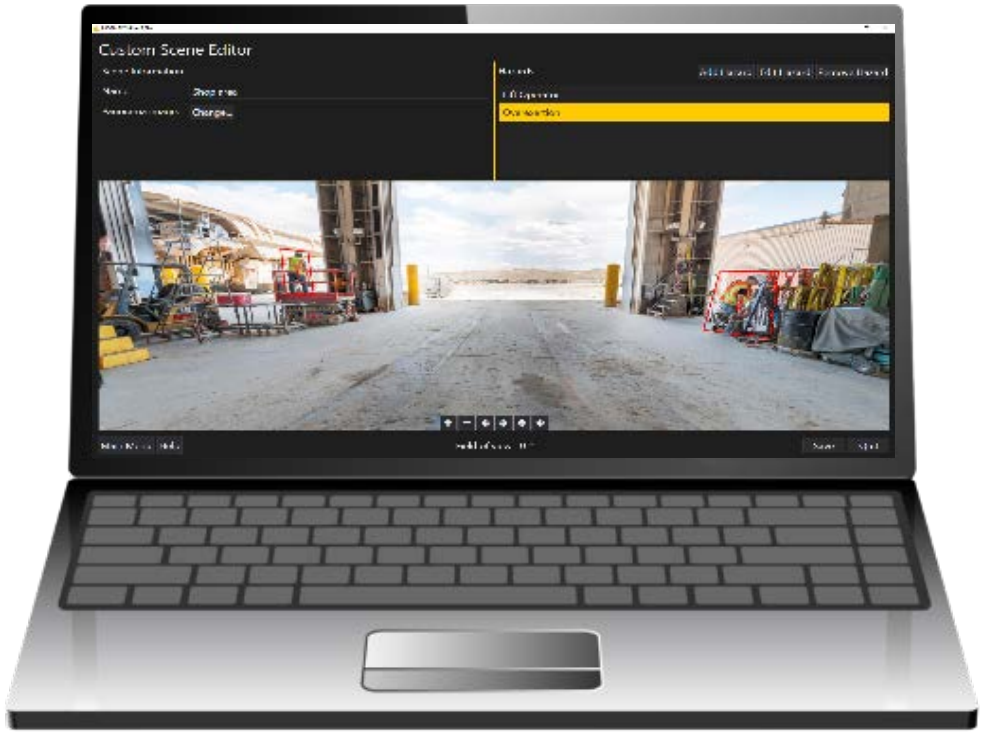
Field Observations

- NIOSH researchers observed 6 safety trainers using a beta version of the EXAMiner software.

- Safety trainers are using EXAMiner as an interactive training tool. The software:
  - Encourages active participation.
  - Can be used to evaluate trainees knowledge.

EXAMiner Demonstration

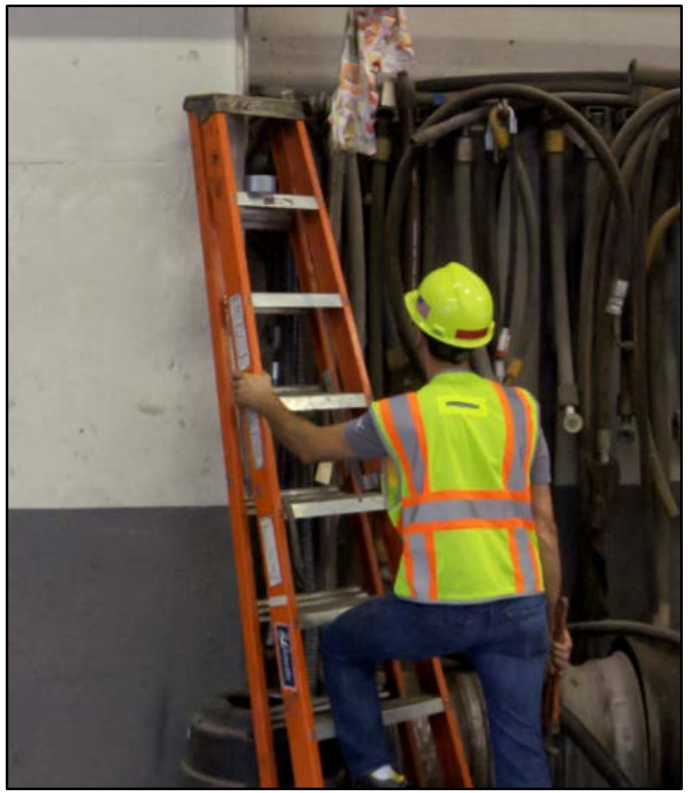
Tips for creating custom scenes



1. Look at the data.
2. Talk to people.
3. Inspect your sites.
4. Can you create a panoramic image to visually represent hazards or a specific hazardous situation?

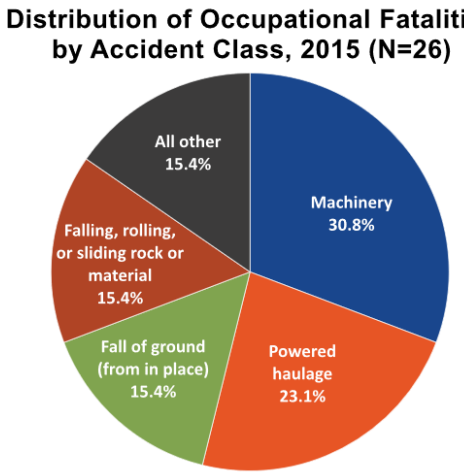
Identify critical hazards or hazardous situations your mineworkers are exposed to at your mine site(s)

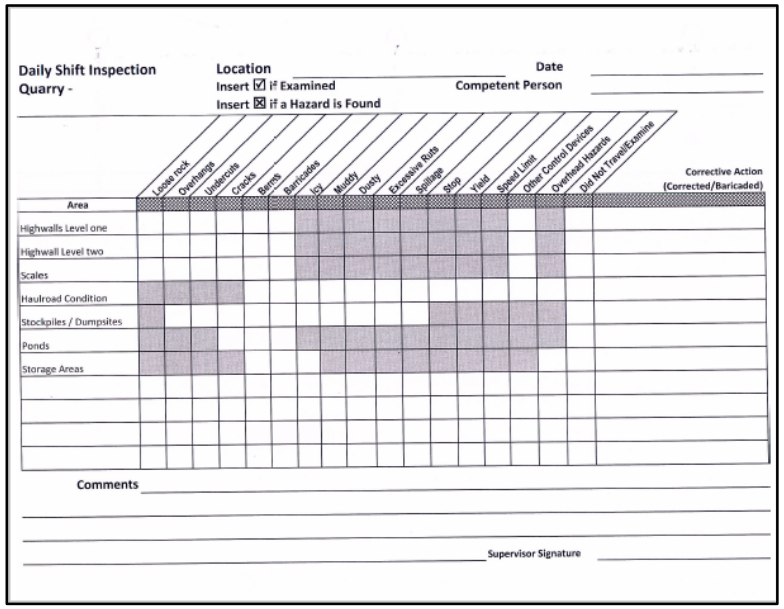
Location: Shop

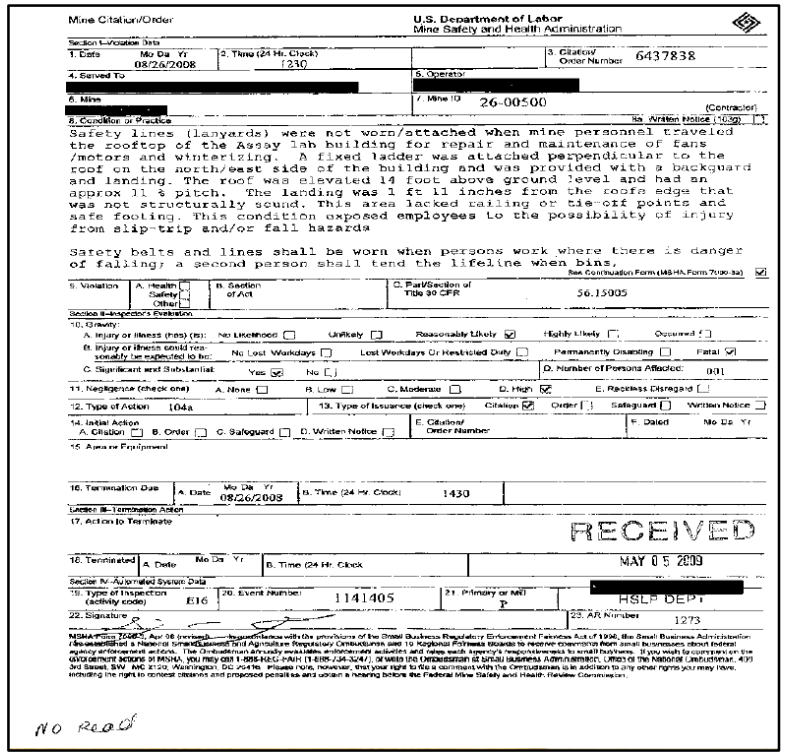


Accident Type	Examples	Necessary Tools/Equipment
Ignition or Explosion of gas accident	Flame (sparks) near flammable materials	Drum; Flammable material storage; Oxygen cylinder; Acetylene cylinders
	Unmarked containers	Drum
Fall from ladder	Damaged ladder: missing wrung, broken foot	
	Incorrectly used ladder	
	Propped in wrong place	Righ inside/outside of door
		Under closing door
	Angle of prop is too steep or shallow	
	3 points of contact	Person; Tool/bucket
Fall to same level	Trip hazard	Tool/bar/hose
	Debris	Accumulation
	Moving equipment over debris	
	Contaminant	Oil; Water; Slick material

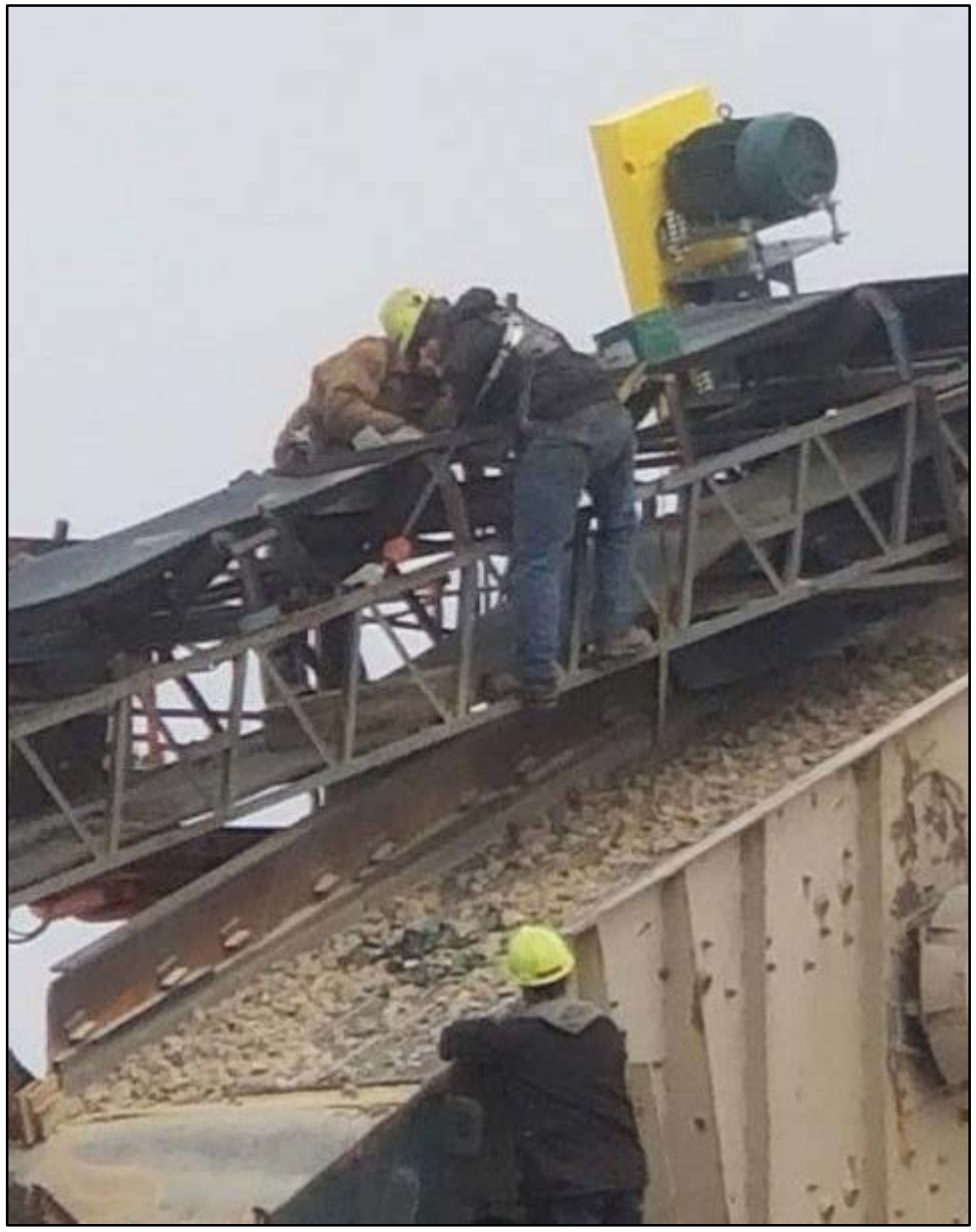
Look to the data



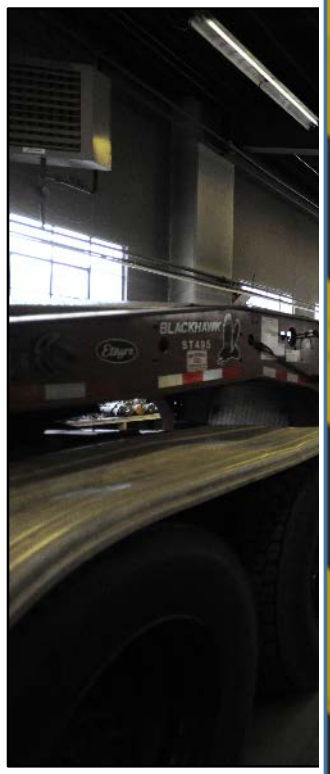




Talk to people



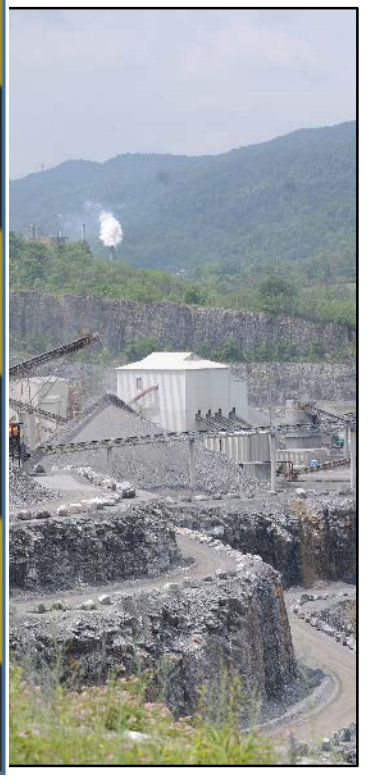
Inspect your worksites



Barriers to Hazard Recognition

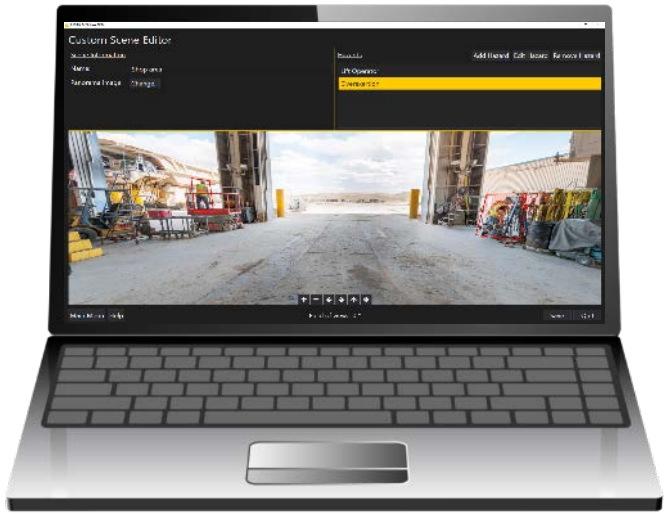
Many factors such as experience, complexity of the work environment, and change in the work environment can affect hazard recognition. When thinking about potential barriers in your work environment, remember:

- **Experience** affects the number of hazards that mineworkers recognize. Think about:
  - ✓ How many years have my employee(s) worked in the mining industry?
  - ✓ Are my employee(s) knowledgeable of hazards in the work environment?
  - ✓ Are my employee(s) focused on safety?
  - ✓ Will my employee(s) be exposed to a new or unfamiliar location in the mine?
- **Complexity** affects the number of hazards a mineworker is able to find. Think about:
  - ✓ Are my employee(s) working in cluttered work environments?
  - ✓ Are my employee(s) working in busy (high traffic, divided attention) locations?
  - ✓ Are my employee(s) working in areas where multiple hazards may be present?
  - ✓ Are my employee(s) performing tasks that require multiple safety procedures?
- **Change** in the work environment can affect hazard recognition. Think about:
  - ✓ What conditions are my employee(s) exposed to? (e.g., weather, time of day, etc.)
  - ✓ What changes may be made to the mine plan? (e.g., traffic pattern, location of roads, etc.)
  - ✓ What changes may be made to tools, equipment, and structures?
  - ✓ Are my employee(s) fit for duty? (e.g., fatigue, illness, distraction)



Tips for Taking Panoramic Pictures for Use in EXAMiner

Take panoramic pictures for EXAMiner – *it's EASY!*

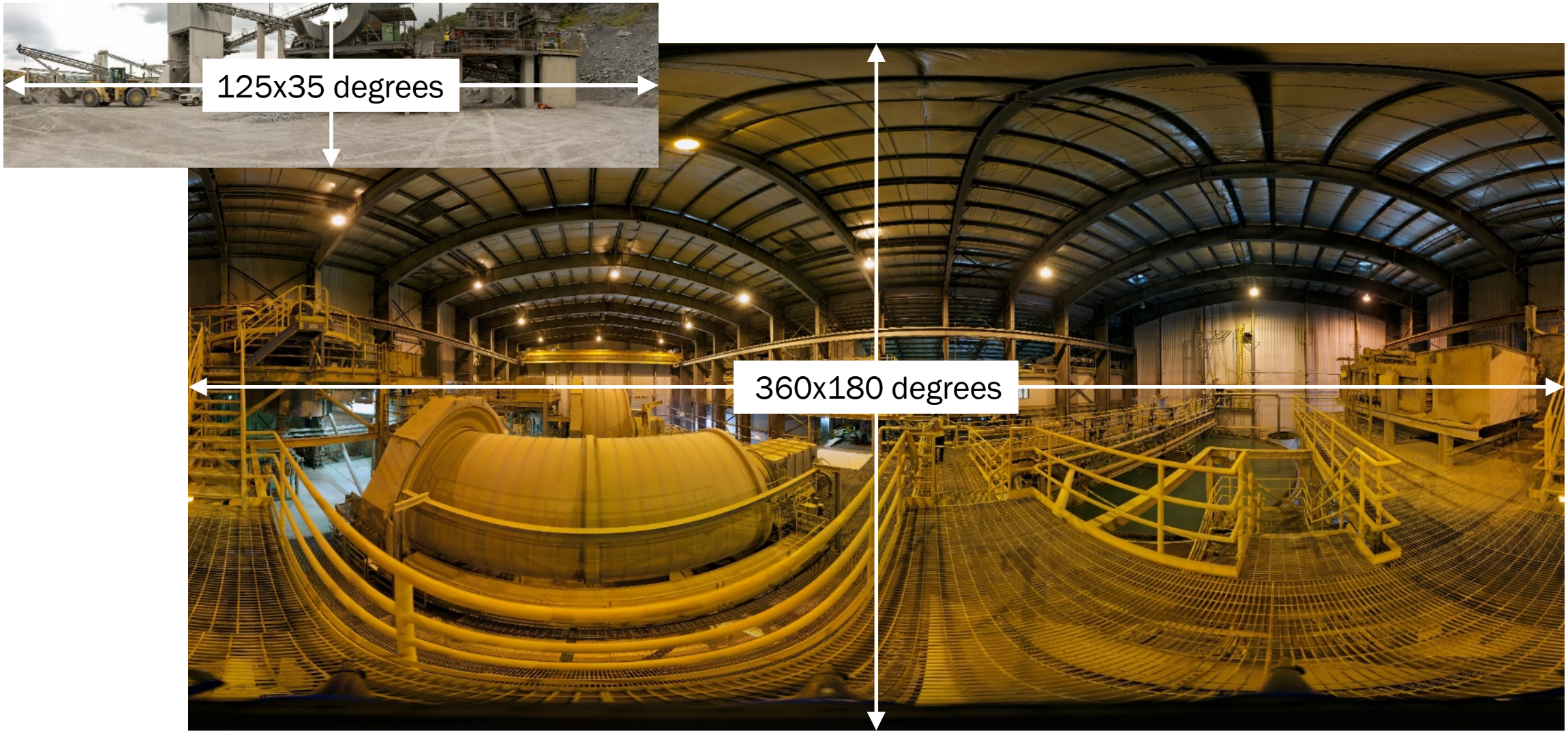


Phone

Computer

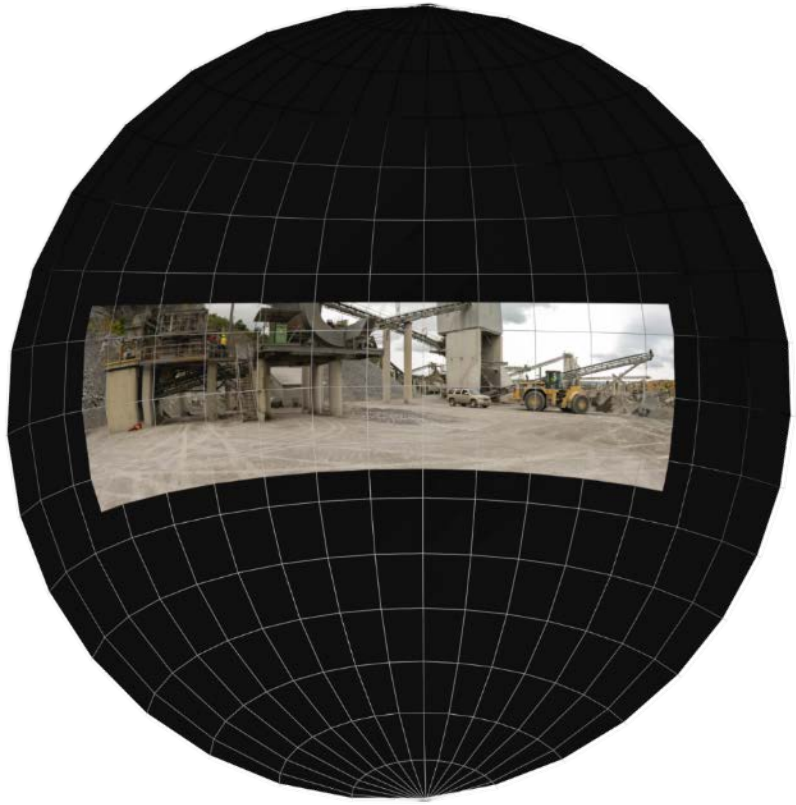
EXAMiner

Panoramic width

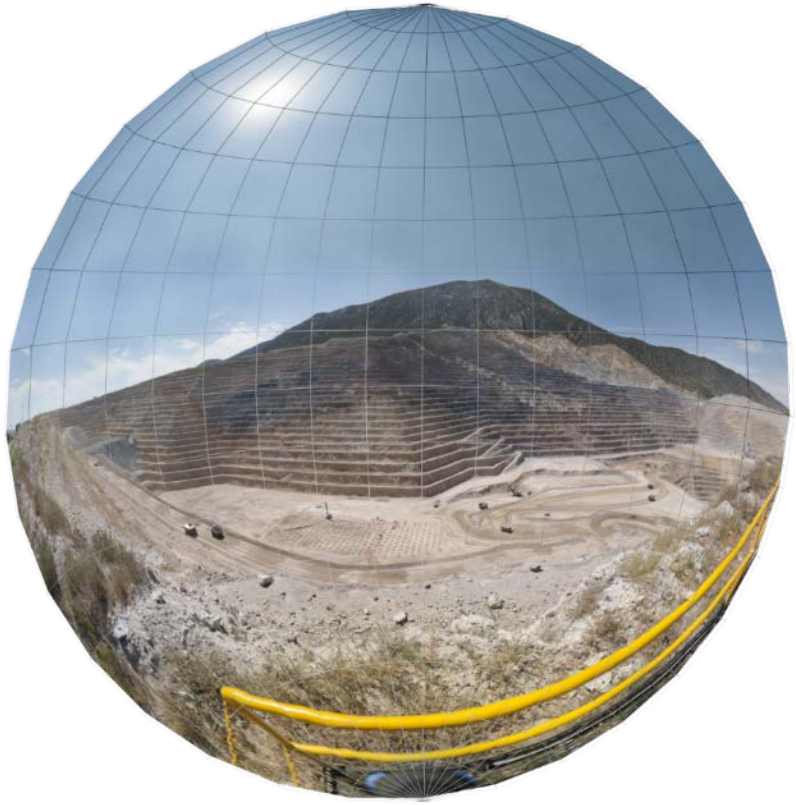


Panoramic overlay on spherical surface

125x35 degrees



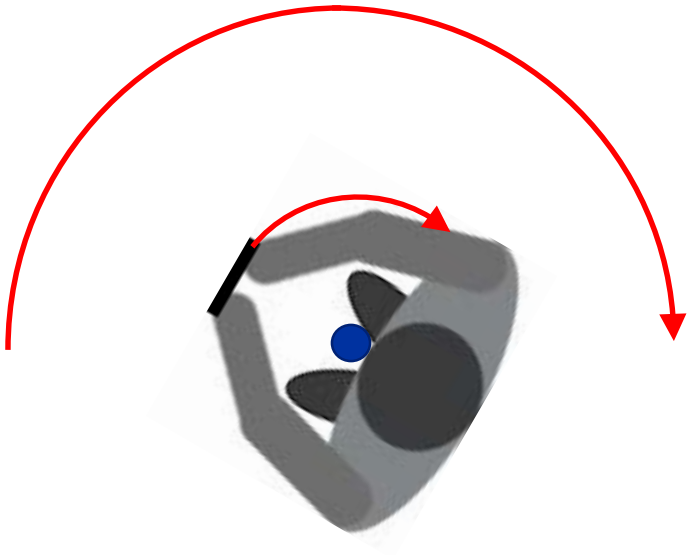
360x180 degrees



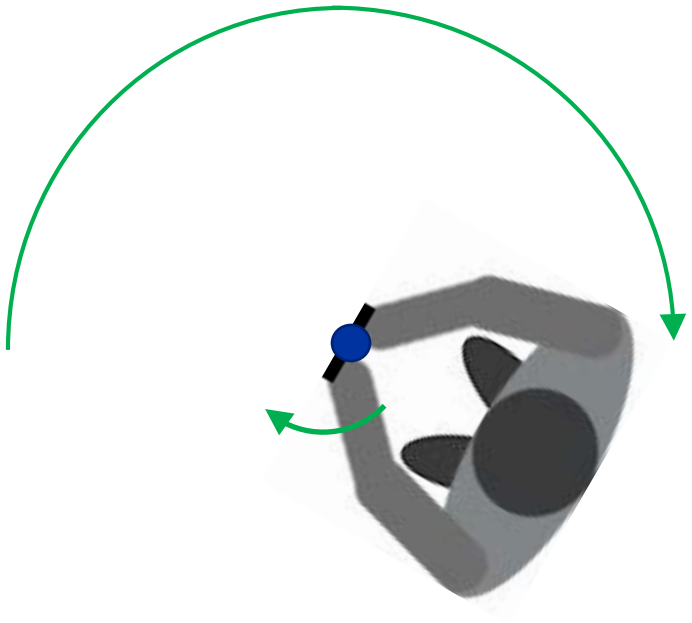
Composition

1. Distances (foreground, subject, background)
2. Occlusion or visual clutter
3. Main pitfall – relative size of the subject

Pivot around the camera, not around your feet



Pivot around the camera, not around your feet




PNC PARK

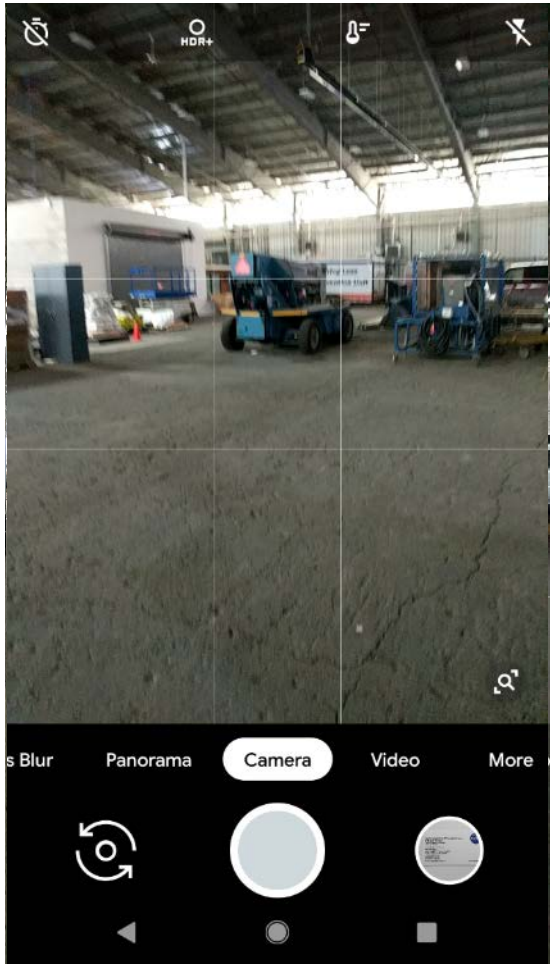
Motion and scene dynamics

Find your camera app on your phone

Android

Apple

Take a panoramic picture



Camera Activity: Practice taking a panoramic photo

1. Find your camera app
2. Set mode to panorama
3. Take a panoramic photo

Capture Panorama

- ☐ Open Camera App
  - o Press camera icon
  - o Center camera on horizon
  - o Press circle (lower center)
  - o Slowly rotate camera 360 degrees clockwise
  - o Allow time for panorama to process
- ☐ Exit Camera App or Repeat

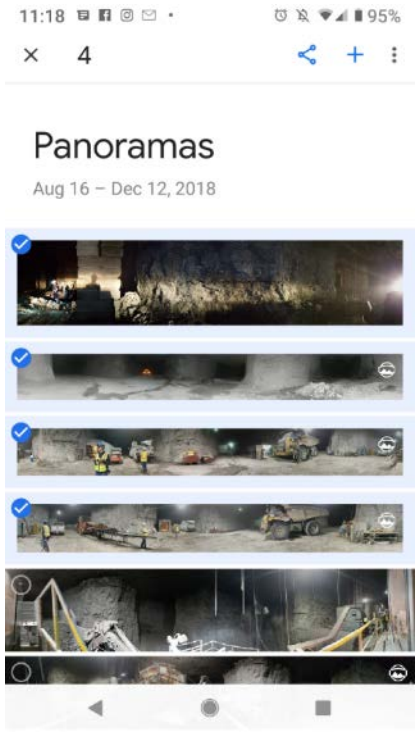
Camera Activity: Photoshoot

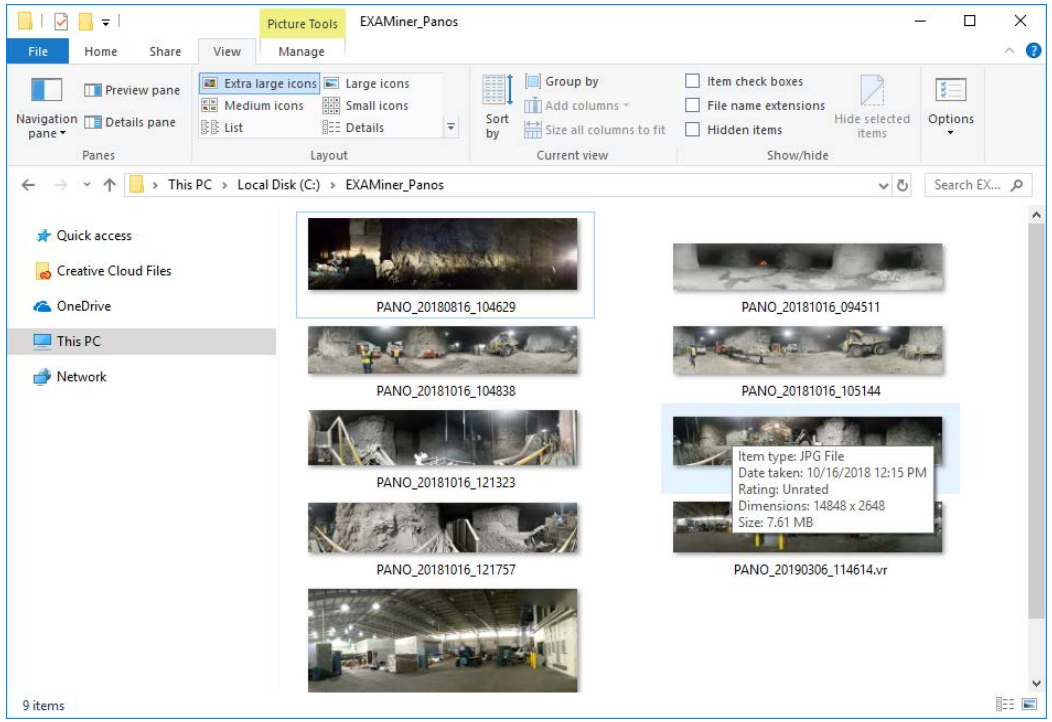
1. Identify the primary subject
2. Identify secondary subjects – at least one
3. Select point of view for shot (lighting and composition)
4. Capture panoramic image(s)

Capture Panorama

- ☐ Open Camera App
  - o Press camera icon 
  - o Center camera on horizon
  - o Press circle (lower center)
  - o Slowly rotate camera 360 degrees clockwise
  - o Allow time for panorama to process
- ☐ Exit Camera App or Repeat

Transfer your pictures from your phone to your computer





1. File share service such as Google Drive
2. Email
3. USB cable to connect to PC.

Available now on NIOSH Mining Website:

https://www.cdc.gov/niosh/mining/works/coversheet2050.html

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