



**IMRB 2017  
VIRTUAL REALITY  
TRAINING AID  
PRESENTATION**



# FERDENO

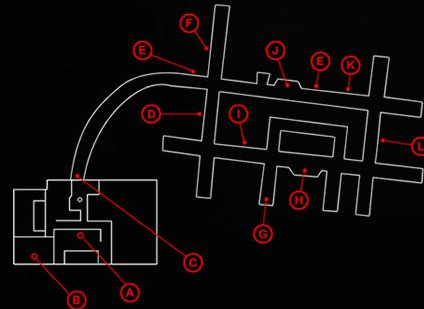
## MINING THE FUTURE FOR OUR FUTURE MINDS

**FERDENO** is the world's first digital and interactive underground mine providing endless opportunities for training and development, engaged and immersive learning, product development and demonstration, and mining industry education and awareness.



[www.ilcn.co](http://www.ilcn.co)  
[hello@ilcn.co](mailto:hello@ilcn.co)

We are both a creative “think-tank” and an innovative “do-tank” working with our customers to deliver meaningful experiences in an interactive environment. We believe that immersive learning is the future of gaming and learning / development.



### Operations Legend

- |                        |                           |
|------------------------|---------------------------|
| (A) Surface Operations | (G) Training Room         |
| (B) Industrial Shops   | (H) Material Storage      |
| (C) Adit Entrance      | (I) Pump Room             |
| (D) Cap Storage        | (J) Electrical Substation |
| (E) Refuge Station     | (K) Storage               |
| (F) Powder Storage     |                           |

[www.FERDENO.com](http://www.FERDENO.com)

# Background • Задний план

- Other jurisdictions have developed and used “virtual” Mine Rescue training over the past decade:
  - Australia (New South Wales)
  - Colorado School of Mines
  - Другие юрисдикции разработали и использовали «виртуальную» тренировку по спасению мин за последнее десятилетие:
    - Австралия (Новый Южный Уэльс)
    - Колорадская школа шахт
- Ontario Mine Rescue was approached by a Canadian training company (NORCAT) to create something similar
  - Канадская учебная компания (NORCAT) обратилась к Онтарио по спасению мин, чтобы создать нечто похожее

# Pilot • пилот

- Tool was used during the 2017 Canadian Inter-University Mining Games as a Mine Rescue evaluation event.

Инструмент использовался во время Канадских межвузовских шахматных игр 2017 года в качестве мероприятия по оценке спасения мин.

- Currently on display in Sudbury Mining Museum for visitors to attempt a virtual Mine Rescue using the simulator

В настоящее время на выставке в Музее Садбери Майнинг для посетителей, чтобы попытаться виртуального спасения шахт с помощью симулятора







CURRENT OBJECTIVE STATUS

4/10



Secure Required Gear From Van and Load Stretcher







CURRENT OBJECTIVE STATUS

2 m



Secure Required Gear From Van and Load Stretcher



# Goal • Цель

- Never intended to replace any classroom or field skills based training  
Никогда не собирался заменять обучение на классных или полевых навыках
- Can a simple virtual environment evaluate procedures and decisions, as an ADDITIONAL tool available for a Mine Rescue administration organization?  
Может ли простая виртуальная среда оценивать процедуры и решения, как ДОПОЛНИТЕЛЬНЫЙ инструмент, доступный для организации администрирования Mine Rescue?

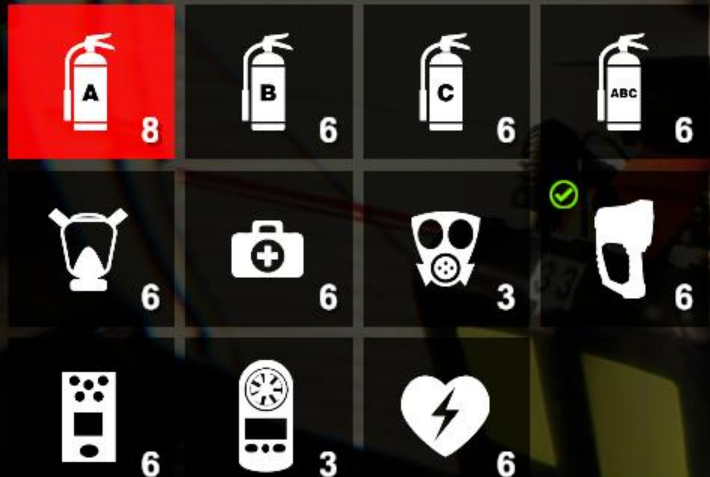




## EQUIPMENT STORAGE

Select items for current rescue mission

Page 1 / 1



### FIRE EXTINGUISHER [A]

A extinguisher with a Class A rating are effective against fires involving paper, wood, textiles and plastics. The primary chemical involved to fight the fire is monoammonium phosphate. It has a greater ability to smother fires with these types of materials.

SCROLL



SELECT



CLOSE

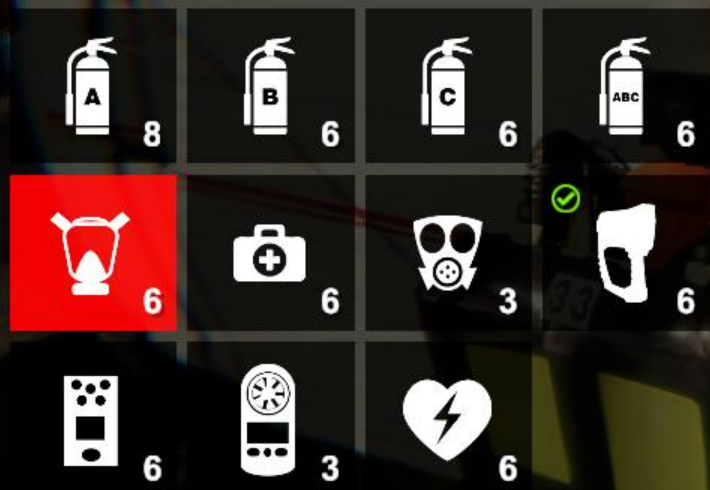




## EQUIPMENT STORAGE

Select items for current rescue mission

Page 1 / 1



### CAREvent RESPIRATOR

A self-contained breathing apparatus provides complete respiratory protection against toxic gases and O<sub>2</sub> deficiency. The weater is independant of the surrounding atmosphere because he is breathing with a system that admits no outside air.

SCROLL



SELECT



CLOSE

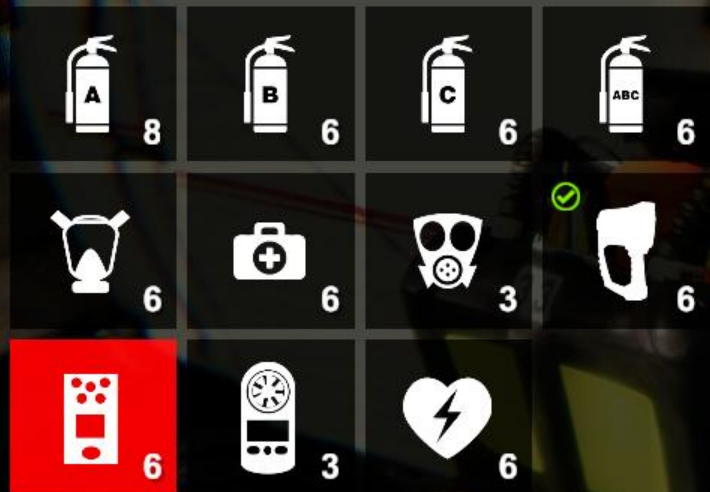




## EQUIPMENT STORAGE

Select items for current rescue mission

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### MULTI GAS MONITOR

For detecting air quality CO2 emission and other gas that can be harmful

SCROLL



SELECT



CLOSE





# Limitations • Ограничения

- Budget (zero, in-kind development contribution by NORCAT)  
Бюджет (ноль, вклад в развитие натурального продукта NORCAT)
- Potential use  
Потенциальное использование
- Did not want to invest time & effort into an “aspirin” to go looking for “headaches.” That is, if there ended up being no use for the tool, it would be dropped  
Не хотел вкладывать время и усилия в «аспирин», чтобы искать «головные боли». То есть, если в инструменте не будет использоваться, оно будет удалено



CURRENT OBJECTIVE STATUS

0 m



Secure Required Gear From Van and Load Stretcher



HEAT MONITOR







CURRENT OBJECTIVE STATUS

0 m



Secure Required Gear From Van and Load Stretcher



Activate Stretcher

HEAT MONITOR







CURRENT OBJECTIVE STATUS

0 m



Secure Required Gear From Van and Load Stretcher

33



Drop Stretcher



HEAT MONITOR



# Development Results • Результаты развития

- Virtual emergency simulator, easiest description would be that its similar in nature to a “video game”

Виртуальный экстренный симулятор, самым простым описанием было бы то, что его схожая по своей природе с «видеоиграми»

- Uses a PC platform and handheld controller

Использует платформу ПК и карманный контроллер

- No intention to revolutionize the method of delivery

Не намерен революционизировать метод доставки



CURRENT OBJECTIVE STATUS

9 m



Enter Mine and Proceed to Drift Cross Section



HEAT MONITOR







CURRENT OBJECTIVE STATUS

193 m



Search for Reported Fire and Injured Worker



HEAT MONITOR





CURRENT OBJECTIVE STATUS

198 m



Search for Reported Fire and Injured Worker

33

Seven



25°C

DRY BULB

28°C

WET BULB



60%

RELATIVE HUMIDITY

HEAT MONITOR





CURRENT OBJECTIVE STATUS

198 m



Search for Reported Fire and Injured Worker

33

Good to go Captain.



21%  
OXYGEN



80PPM  
CO



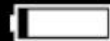
MULTI GAS MONITOR





# Tool Results • Результаты инструмента

- Built on Ontario Mine Rescue communication and team protocol  
Построено на коммуникационном и командном протоколе Mine Rescue Ontario
- Logic in the background is evaluating whether correct or incorrect decisions were made during travel or tasks, including minute procedural details and communications  
Логика в фоновом режиме оценивает, были ли приняты правильные или неправильные решения во время поездок или задач, включая мелкие процедурные данные и сообщения
- Operator is scored and provided with feedback and results  
Оператор получает и получает обратную связь и результаты

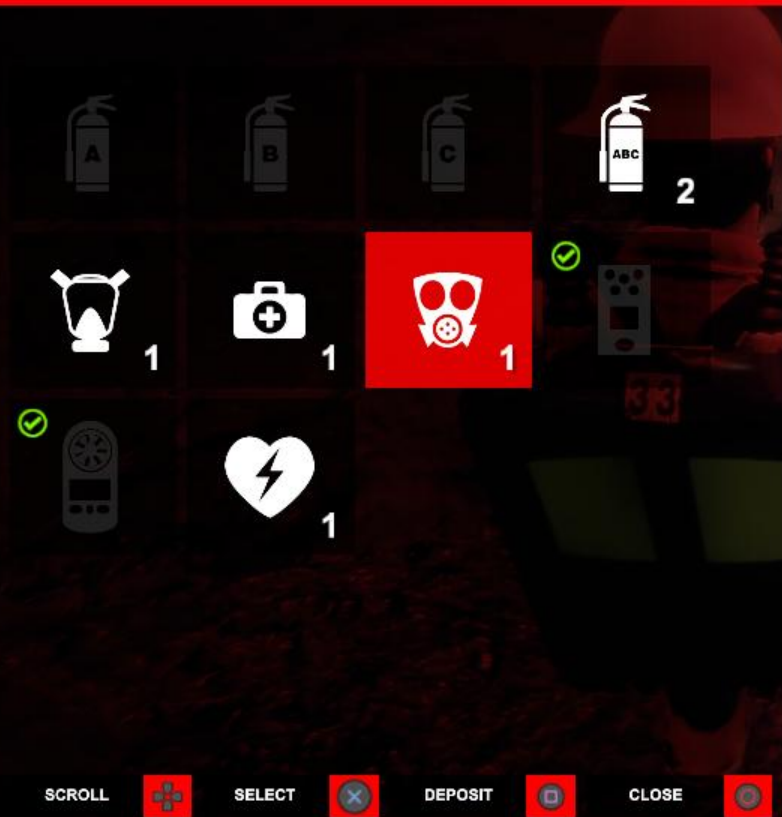




## STRETCHER INVENTORY

Deposit and retrieve items from stretcher inventory

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### SSR90 SELF BREATHING APPARATUS

A self-contained closed circuit oxygen breathing apparatus with a lifespan of at least 90 minutes at a media heavy workload is essential to rescue conscious trapped miners.

THERMAL CAMERA







CURRENT OBJECTIVE STATUS

194 m



Search for Reported Fire and Injured Worker



THERMAL CAMERA





CURRENT OBJECTIVE STATUS

186 m



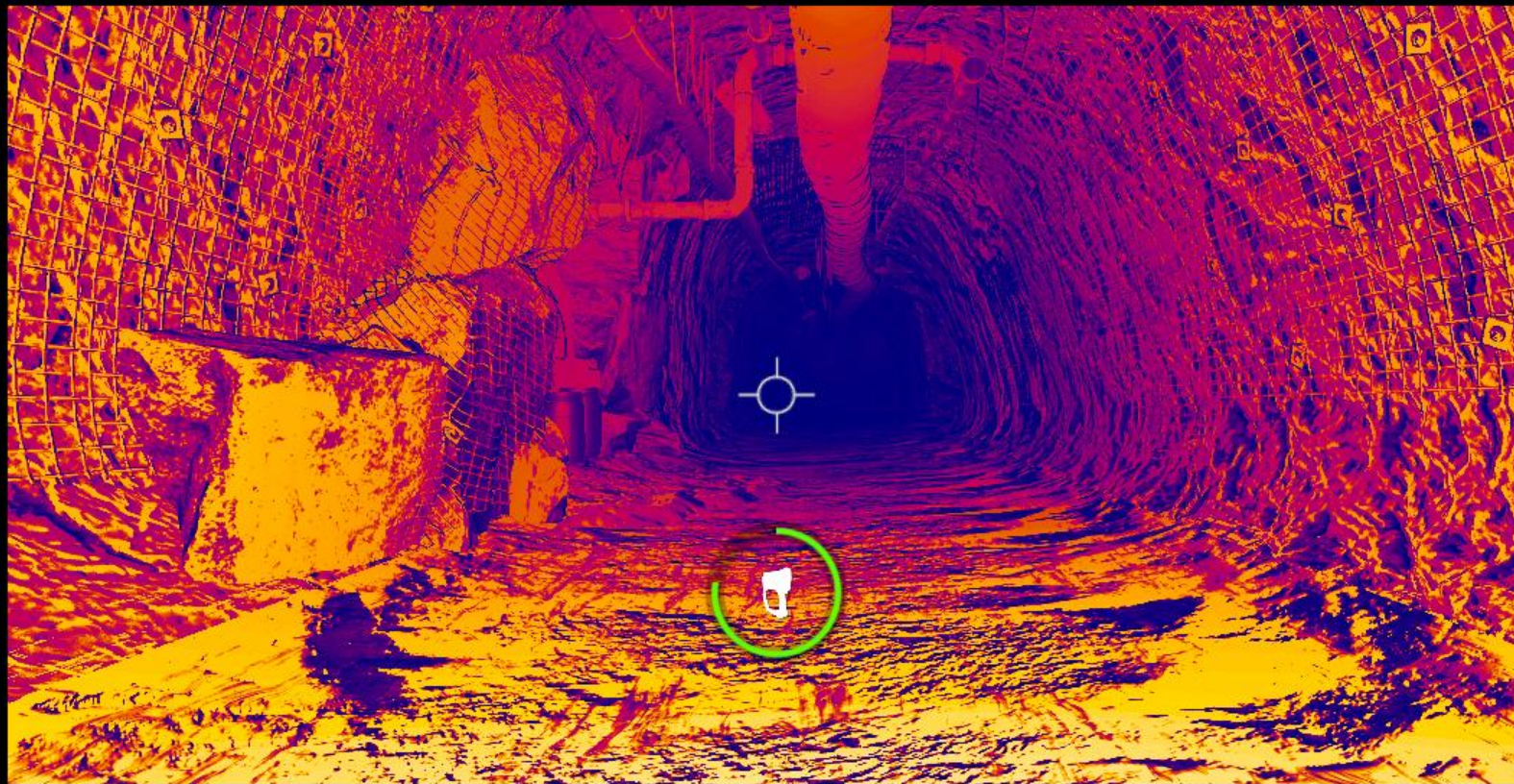
Search for Reported Fire and Injured Worker



THERMAL CAMERA











CURRENT OBJECTIVE STATUS

14 m



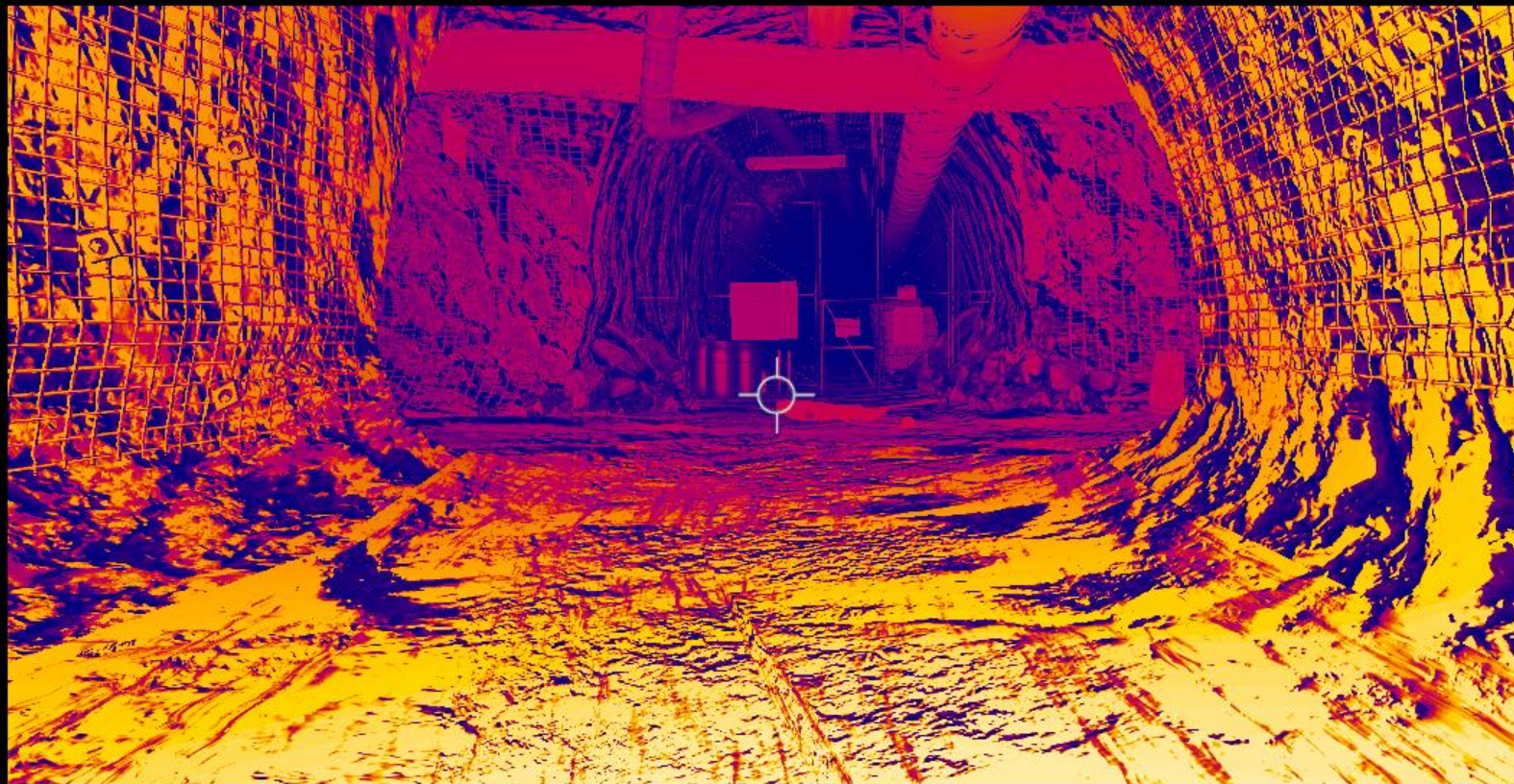
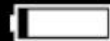
Search for Reported Fire and Injured Worker

Control group to team. We haven't heard from you in a while. Just checking in.



THERMAL CAMERA







CURRENT OBJECTIVE STATUS

2 m



Attend to the Injured Worker



FIRST AID KIT







CURRENT OBJECTIVE STATUS

2 m



Attend to the Injured Worker



INJURED WORKER STATUS



BPM

120  
80

70



Apply Respirator Mask



Attend to First Aid



Place Objective Item



FIRST AID KIT





CURRENT OBJECTIVE STATUS

2 m



Attend to the Injured Worker



Attend to First Aid

THERMAL CAMERA





CURRENT OBJECTIVE STATUS

2 m



Attend to the Injured Worker







CURRENT OBJECTIVE STATUS

2 m



Attend to the Injured Worker





CURRENT OBJECTIVE STATUS

2 m



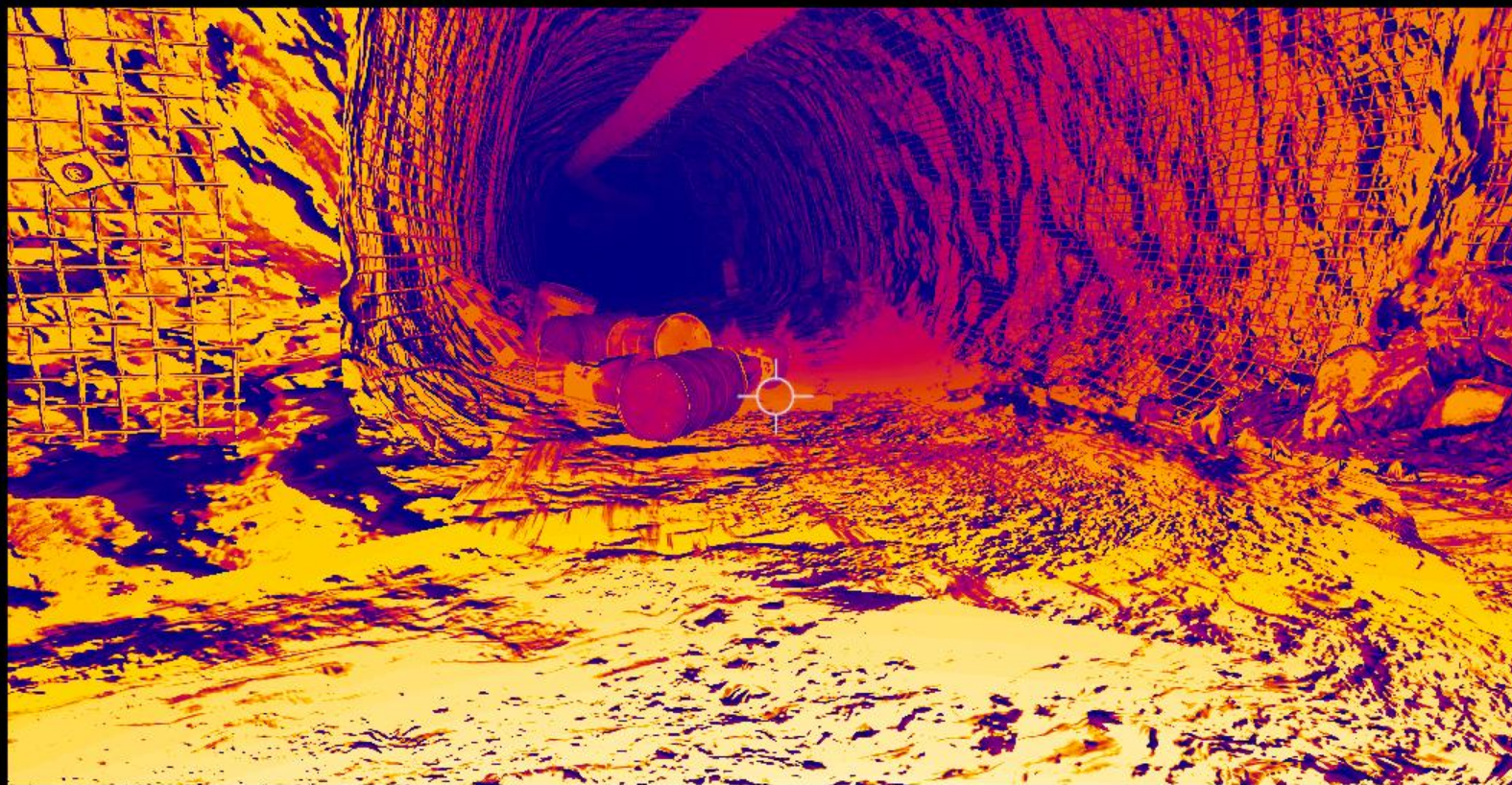
Get to the Stretcher and Securely Load Injured Worker

Patched up, Oxygen is on and he is breathing on his own. He's ready to be loaded into the stretcher.



THERMAL CAMERA









NEW OBJECTIVE

DELIVER WORKER TO SURFACE



THERMAL CAMERA





CURRENT OBJECTIVE STATUS

196 m



Deliver Injured Worker to EMS Waiting on Surface

Good job guys, let's get him safely up to surface.



THERMAL CAMERA





CURRENT OBJECTIVE STATUS

44 m



Deliver Injured Worker to EMS Waiting on Surface



THERMAL CAMERA







CURRENT OBJECTIVE STATUS



Deliver Injured Worker to EMS Waiting on Surface



THERMAL CAMERA







CURRENT OBJECTIVE STATUS

0 m



Deliver Injured Worker to EMS Waiting on Surface

33

Captain. You need to signal us when you want to stop.



THERMAL CAMERA



# The way scoring was achieved:

## Достигнуты результаты:

Students Scores start at 100% assuming they will make every step perfect.

Each event has a weighted value towards correct or incorrect interactions

ie. Check In:

Required Check-In for the event = 4

Each Check-In now is worth 25% of total Check-In Score

Total Check-In is weighted to 10% of overall Score

Студенческие баллы начинаются со 100% при условии, что они сделают каждый шаг совершенным.

Каждое событие имеет взвешенное значение для правильного или неправильного взаимодействия

то есть. Регистрироваться:

Обязательная регистрация для события = 4

Каждый Check-In теперь стоит 25% от общей суммы регистрации заезда

Общая сумма регистрации взвешивается до 10% от общего показателя





# RESCUE MISSION COMPLETED

Post Rescue Mission Score Breakdown

Score Type

Count

No Response

0

Basket Failed Start

9

Basket Failed Stops

9

Team Check In

1

Team Check In Failed

2

Injured Worker Notification

0

Temperature Check

0

Air Quality Check

1



TEAM SCORE

350.77

B

SCROLL SCORE TYPE



QUIT TO MAIN MENU





# RESCUE MISSION COMPLETED

Post Rescue Mission Score Breakdown

Score Type	Count
Thermal Camera Check	20
Backing Up From Fire	0
Fatigue	103
NON Required	0
Team Consoling	24
Mission Time	823
BAR Score	0
AI Ball Response	0



TEAM SCORE

350.77

B

SCROLL SCORE TYPE



QUIT TO MAIN MENU



# Event Values and Scoring Requirements

## Значения событий и оценки

**Scoring for consoling interactions when carrying injured worker back in basket.**

**Scoring for responding to Leaders Whistles**

**Подсчет очков за утешительные взаимодействия при возвращении раненых в корзину.**

**Подведение итогов для ответов на свистки лидеров**



# Multiplayer

## Мультиплеер

**Scoring for consoling interactions when carrying injured worker back in basket.**

**Scoring for responding to Leaders Whistles**

**Подсчет очков за утешительные взаимодействия при возвращении раненых в корзину.**

**Подведение итогов для ответов на свистки лидеров**



**You have just read the whiteboard, but you can always do something else when you run back out inside and outside of the zone that makes this thing work. You can do it, yeah you can, blah blah blah, lalalala.....**

**HOLD TO CONTINUE**





CURRENT OBJECTIVE STATUS

4 min



Proceed to Fire Area







CURRENT OBJECTIVE STATUS

339 m



Extinguish the Fire Hazards Blocking the Injured Worker (0/3)

P

A

S

Y

**PULL**

Pull the Pin from the Extinguisher



Tap Repeatedly To Pull Pin



FIRE EXTINGUISHER [ABC]





CURRENT OBJECTIVE STATUS

339 m



Extinguish the Fire Hazards Blocking the Injured Worker (0/3)

P

A

S

TV

AIM

Aim towards the base of the Fire



FIRE EXTINGUISHER [ABC]







CURRENT OBJECTIVE STATUS

119 m



Extinguish the Fire Hazards Blocking the Injured Worker (0/3)



0%



P

A

S



**SPRAY**

Squeeze and Spray the Extinguisher



0%

FIRE EXTINGUISHER [ABC]







CURRENT OBJECTIVE STATUS

339 m



0%



0%



Extinguish the Fire Hazards Blocking the Injured Worker (0/3)



P

A

S

S

**SWEEP**

Sweep Extinguisher Back and Forth



FIRE EXTINGUISHER [ABC]





CURRENT OBJECTIVE STATUS

339 m



0%



0%



Extinguish the Fire Hazards Blocking the Injured Worker (1/3)



P A S S

COMPLETED

You have completed the PASS System!



SUPRESSED

FIRE EXTINGUISHER [ABC]







# Scene

Profiler

Animator

Shaded

2D



Gizmos

Interactive Waypoint - FIRE FIGHT

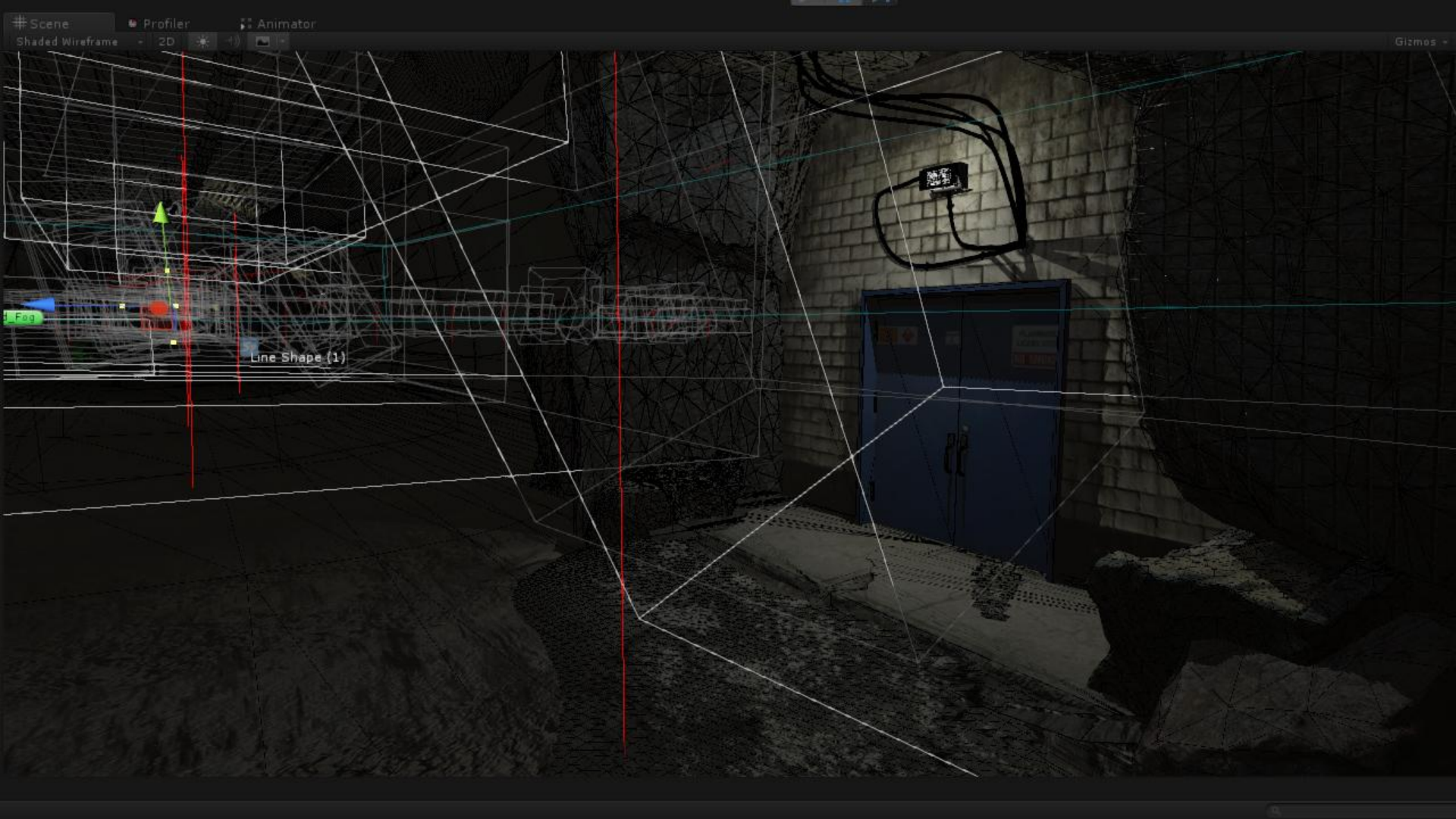
Line Shape (1)















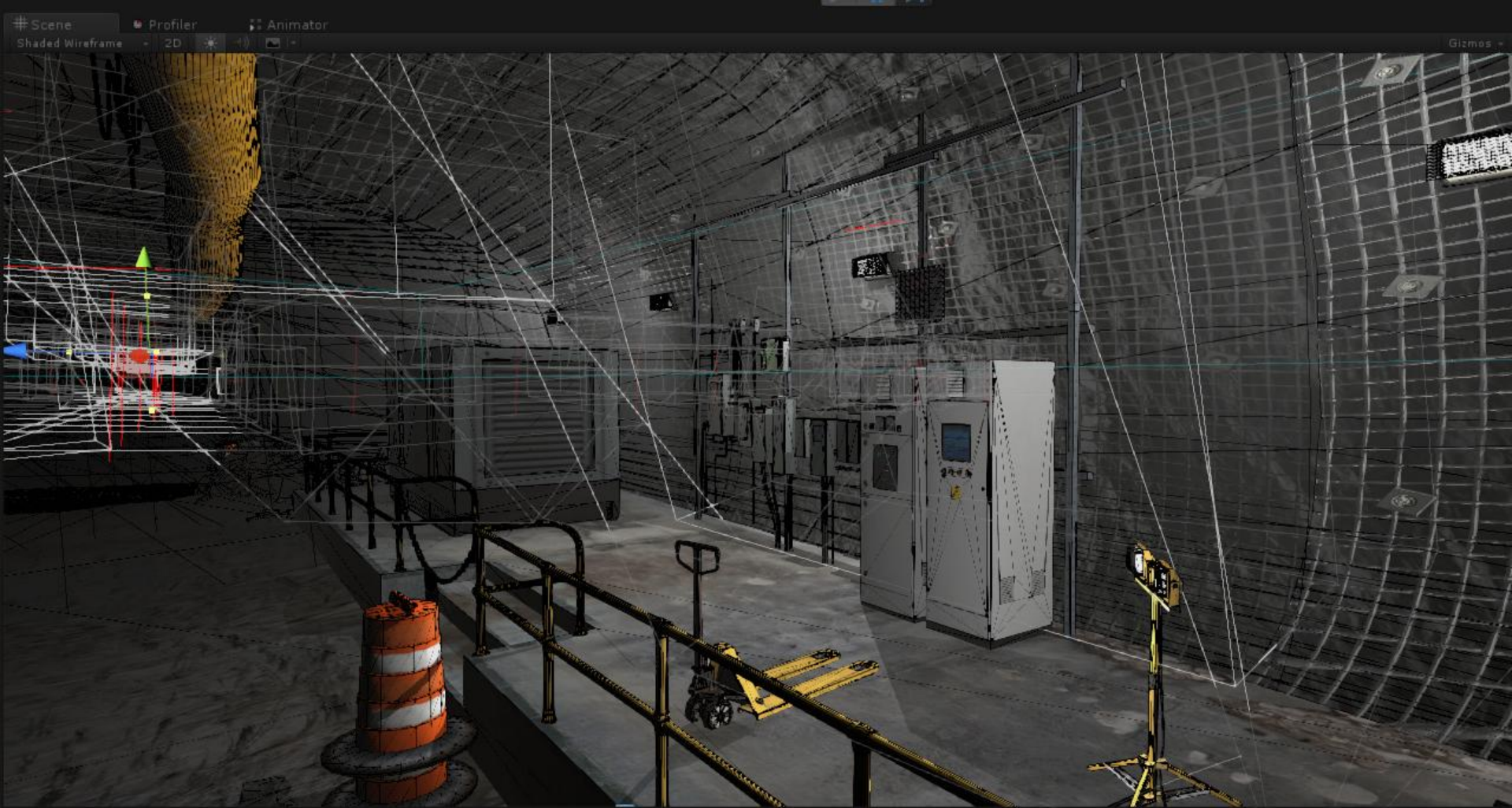


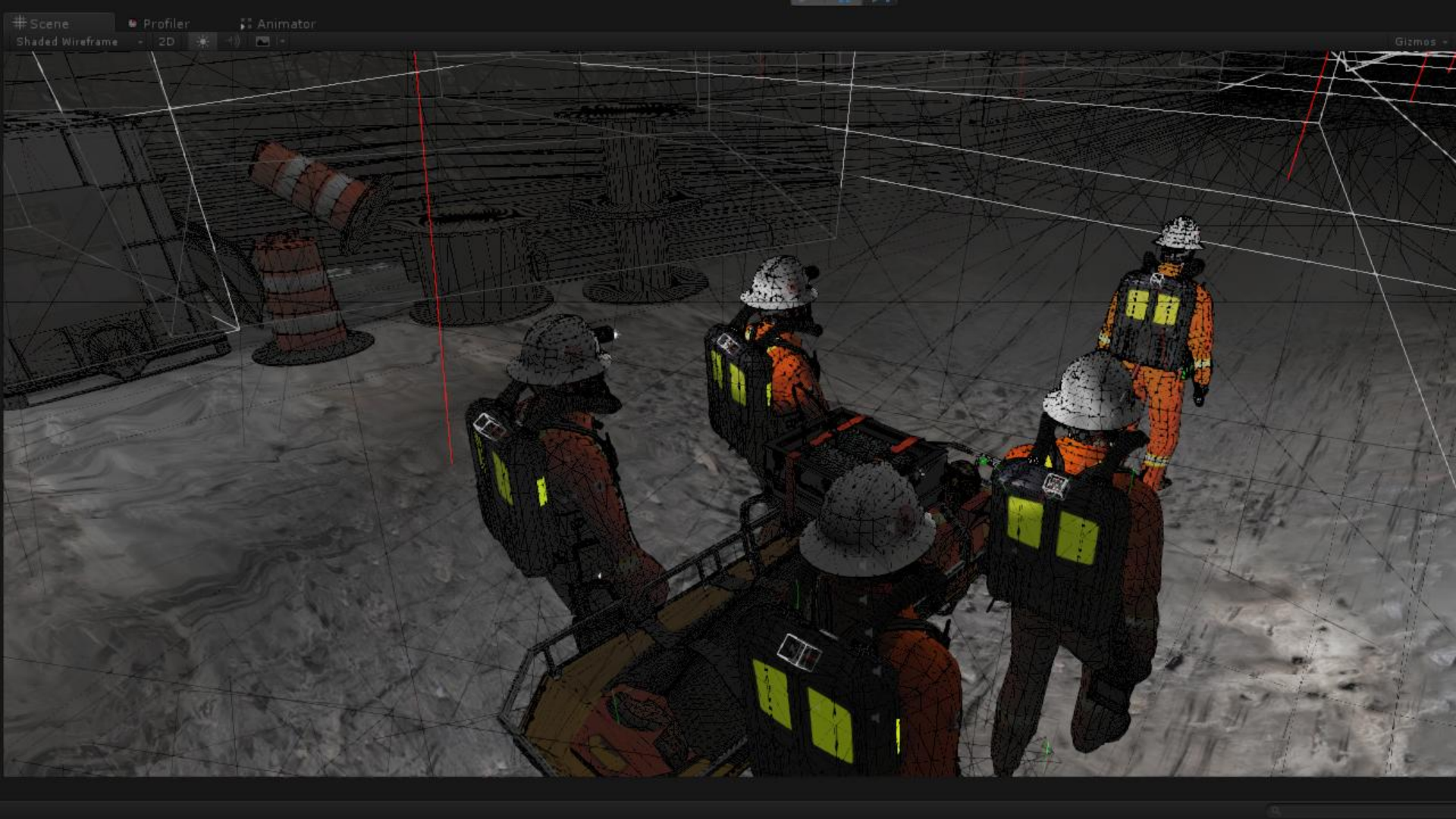




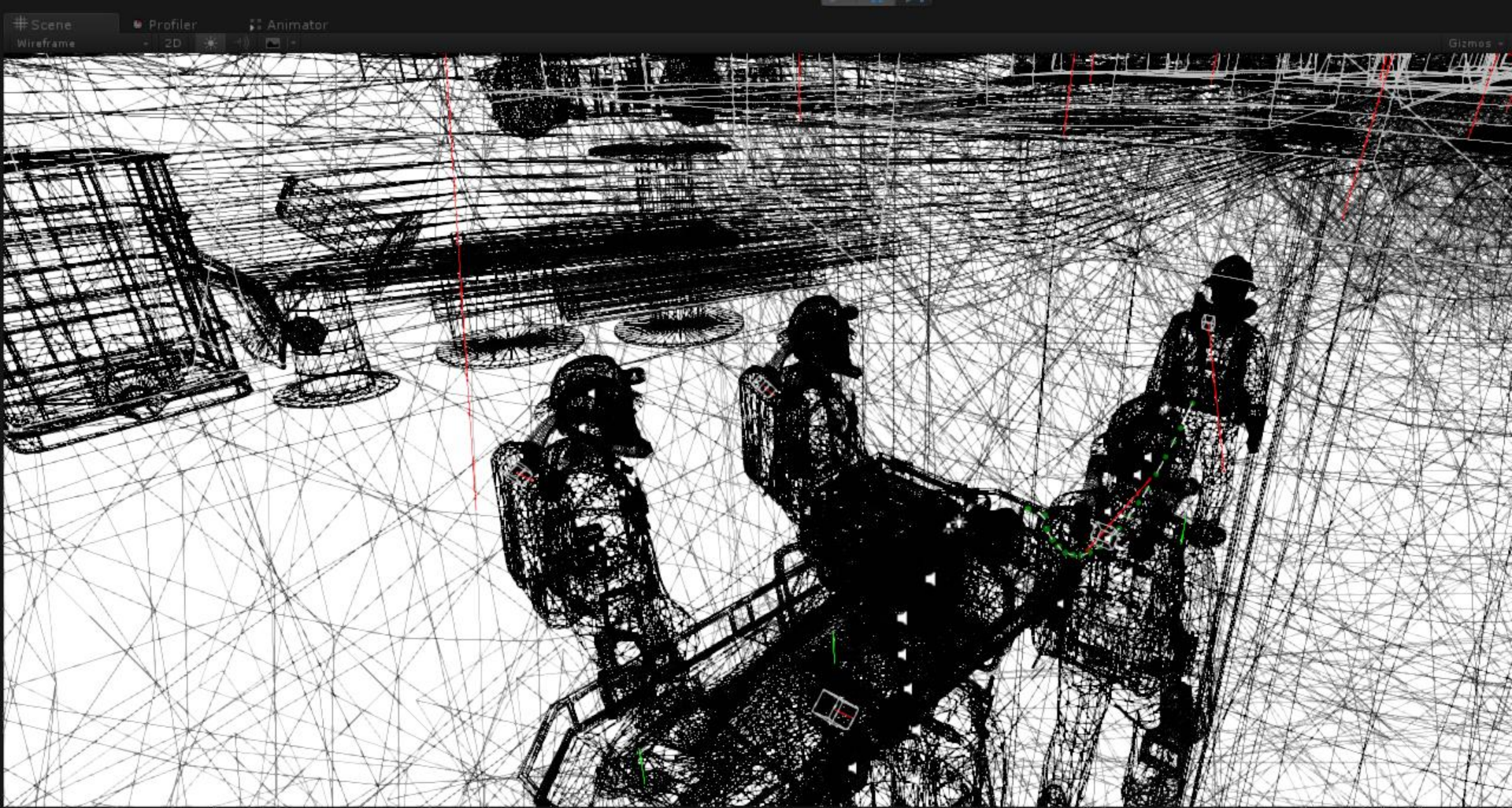


















# Potential Use • Потенциальное использование

- The limited pilot project used a single 3D mine plan for simplicity, however the potential would be to input 3D models of each mine in Ontario to enable site-by-site specific simulations

В рамках ограниченного пилотного проекта для простоты использовался один план 3D-шахт, однако потенциальный потенциал будет заключаться в том, чтобы вводить 3D-модели каждой шахты в Онтарио, чтобы обеспечить возможность моделирования по отдельности

- The tool allows infinite variations of scenarios and conditions

Инструмент позволяет бесконечные вариации сценариев и условий

- Administrator can tell the system what the “ideal” solution would be for scoring purposes in each scenario, then allow the participant to choose their path

Администратор может сообщить системе, что такое «идеальное» решение для целей подсчета очков в каждом сценарии, а затем разрешить участнику выбирать свой путь



# Conclusions • Выводы

- Virtual tools have been proven to have merit in other jurisdictions  
Было доказано, что виртуальные инструменты заслуживают внимания в других юрисдикциях
- Ontario Mine Rescue currently undecided on expanded use of this simulator as an additional training tool.

Ontario Mine Rescue в настоящее время не определилось с расширением использования этого симулятора в качестве дополнительного инструмента обучения.

# Questions • Вопросы

- Where does the training time come from? Our goal is to maximize the time “at the face” underground training. This would require “net new” time from the trainees above their minimum

Откуда взялось время обучения? Наша цель - максимально увеличить время «под открытым небом». Это потребует «чистого нового» времени от обучаемых выше их минимума

- Is this a value-added evaluation or can the same goals be achieved through table-top “paper” exercises

Является ли это оценкой с добавленной стоимостью или могут быть достигнуты одни и те же цели с помощью настольных «бумажных» упражнений

**Thank You**  
**Спасибо**



# Video Game Demonstration

## Демонстрация видеоигр

