



Blue Mars

Contemplative Learning in Space

24th TCC Worldwide Online Conference
April 16, 2019

Cynthia Calongne
aka Lyr Lobo

Colorado Technical University
Colorado Community Colleges System

Blue Mars

Mars Expedition – future of the space program

Centers on challenge-based reasoning

The future of the space program

Mars Geothermal – resources on Mars

Evaluated the role of identity in complex learning

Blue Skies on Mars – creating a habitat

A study of complex and complicated challenges

Adds machine learning & AI-augmented feedback



Mars Expedition: Blue Skies Challenge

Immersive VR Simulation

(Development of Mindsets with Contemplative Practices for Facing Complicated and Complex Challenges)

Andrew G. Stricker, PhD
Air University



Cynthia Calongne, DCS
Colorado Technical University



Barbara Truman, DCS
University of Central Florida



LtCol David Lyle, USAF
AETC/SC



JJ Jacobson, MSI
University of California, Riverside



Federal Virtual Worlds Challenge

Grand Prize Winner

(AU team partnership with NASA JPL and Colorado Technical University)



The Red Queen's Dilemma

The Red Queen's dilemma features the scene where Alice and the Queen run fast only to remain in the same place.

In online education, do we expend great energy, yet not seen advances?

What is the future of online education?

Mars Surface – Pods in Flight





Mars Expedition: Blue Skies Challenge

Immersive VR Simulation

(Development of Mindsets with Contemplative Practices for Facing Complicated and Complex Challenges)

What is the nature of a complex challenge faced by people?

- there are many factors and changing/emergent conditions, all embedded in a dynamic context,
- no two complex challenges are alike, and the solutions to them will always be custom designed and fitted,
- over time one acquires wisdom and experience about the approach to a complex challenge, but one is always a beginner in the specifics of a new complex challenge.

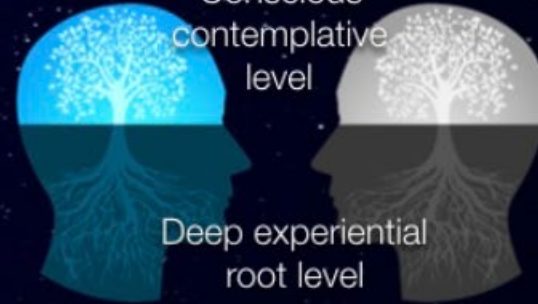


What is the nature of a complicated challenge faced by people?

- challenge can be well defined,
- there is a definite stopping point (correct solution); solution can be objectively evaluated as right or wrong,
- solution can be applied to similar categories of challenges.



Conscious
contemplative
level



Deep experiential
root level

Contemplative practices involve knowing how to switch between mindsets for best addressing complicated or complex challenges

Simulation AI-augmented tutoring on contemplative practices (mindsets) for facing challenges: tutoring offered through Red Queen kiosks throughout gameplay.



Blue Mars Features

Space Exploration Challenges

Work in space, exploration, and sustain life

Contemplative practices support the study of
Shared leadership, survival, character strengths, complex and
complicated problems to solve

Uses a web ontology to classify responses and player behavior

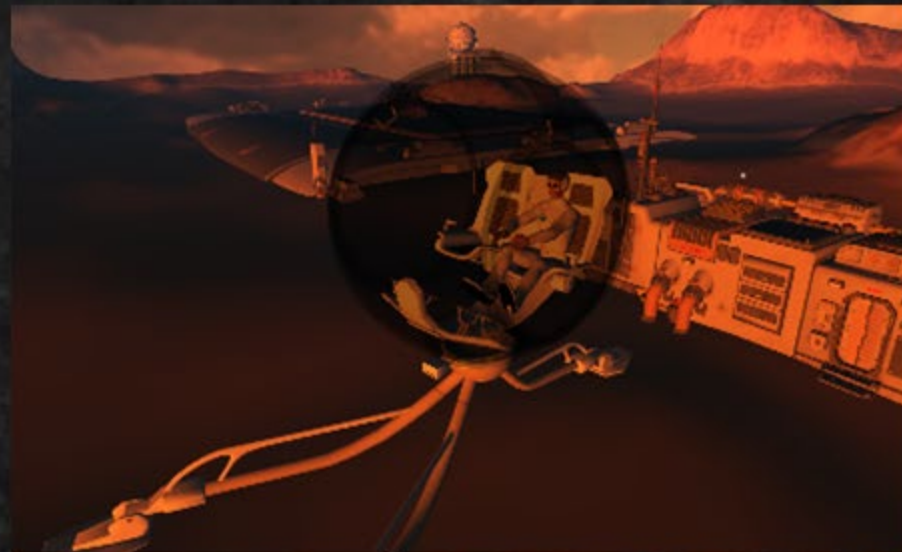
Observes behavior & develops a custom user profile with responses

Teaching in Imaginative Places

Imagine that your class took a virtual field trip

- What would you like to do on this field trip?
- What would you teach?
- How would you assess the value of the experience?

Exploration



The Microcosm



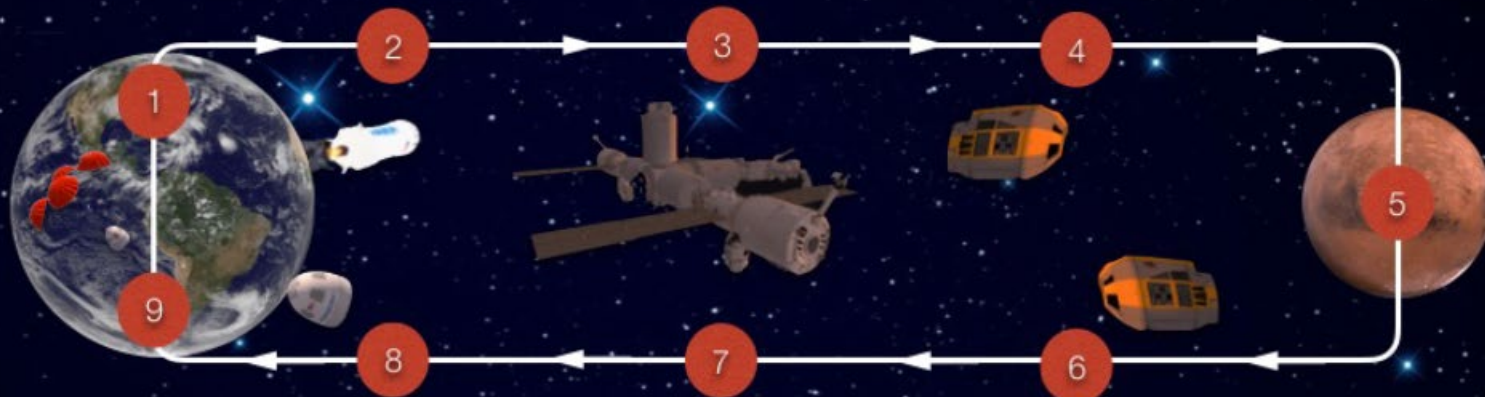


Mars Expedition: Blue Skies Challenge

Immersive VR Simulation

(Development of Mindsets with Contemplative Practices for Facing Complicated and Complex Challenges)

The Expedition



1 Liftoff from launch facility

2 Ride rocket to space station

3 Receive mission update

4 Take shuttle to Mars

5 Arrive at Mars outpost station

6 Take return shuttle to station

7 Receive mission debrief

8 Take capsule back to Earth

9 Return to launch facility

Simulation journey: Depiction of participant expedition through Mars simulation.



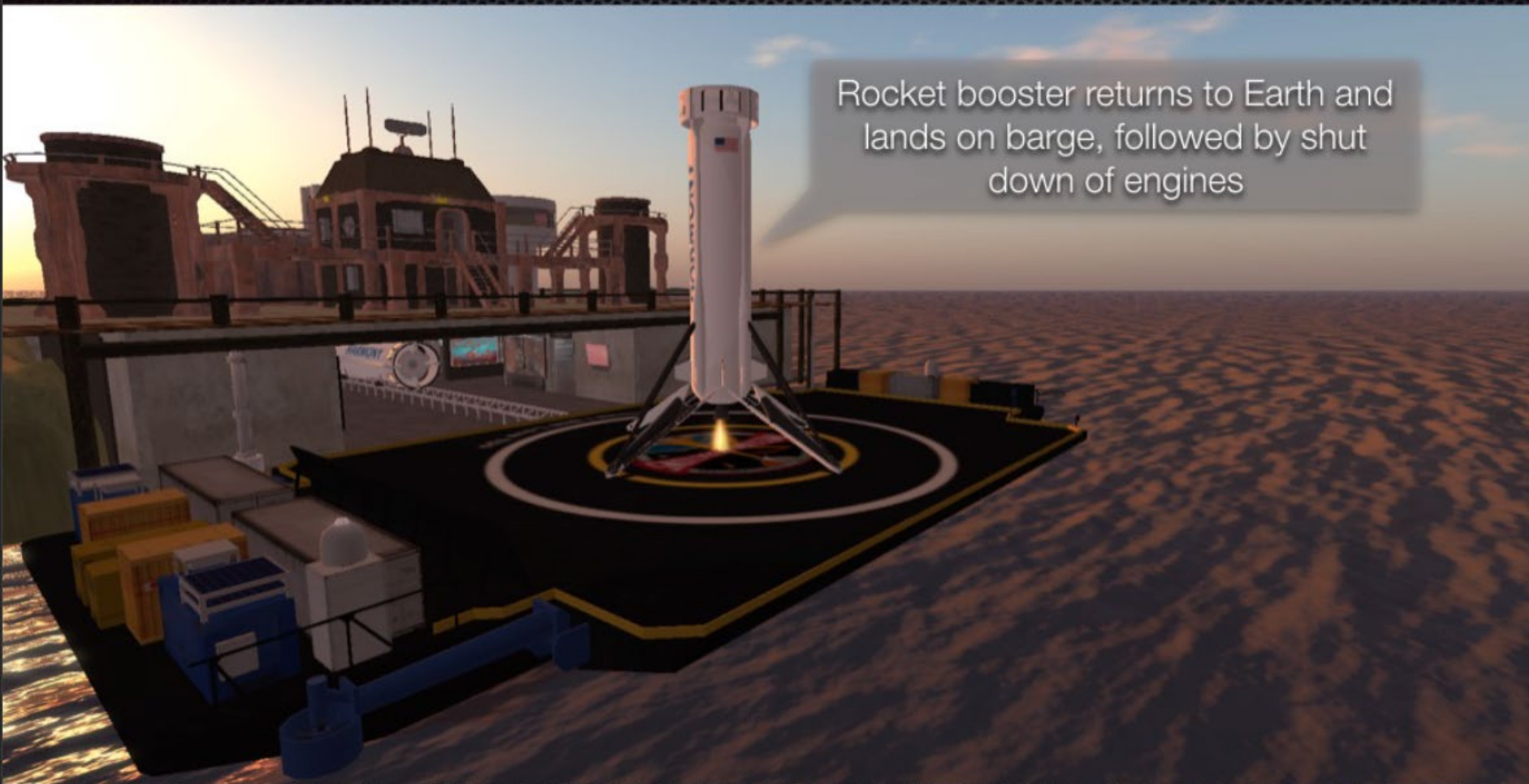


Mars Expedition: Blue Skies Challenge

Immersive VR Simulation

(Development of Mindsets with Contemplative Practices for Facing Complicated and Complex Challenges)

Rocket booster returns to Earth and
lands on barge, followed by shut
down of engines



Simulation scene: Harmony rocket booster returning to Earth and landing on "Of Course I Still Love You" barge.

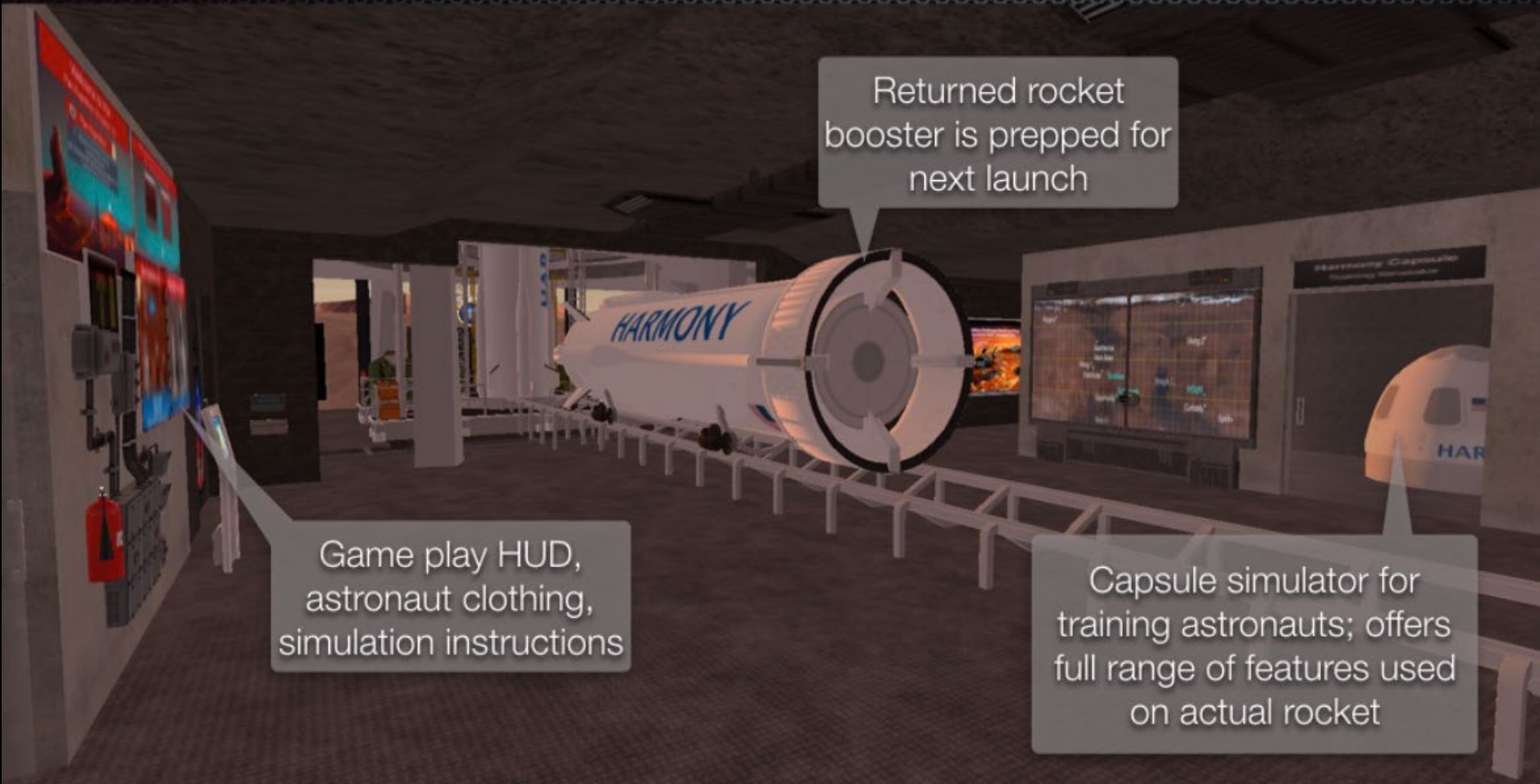




Mars Expedition: Blue Skies Challenge

Immersive VR Simulation

(Development of Mindsets with Contemplative Practices for Facing Complicated and Complex Challenges)



Returned rocket booster is prepped for next launch

Game play HUD, astronaut clothing, simulation instructions

Capsule simulator for training astronauts; offers full range of features used on actual rocket

Simulation scene: Returned Harmony rocket booster conveyed for reuse at Launch facility.

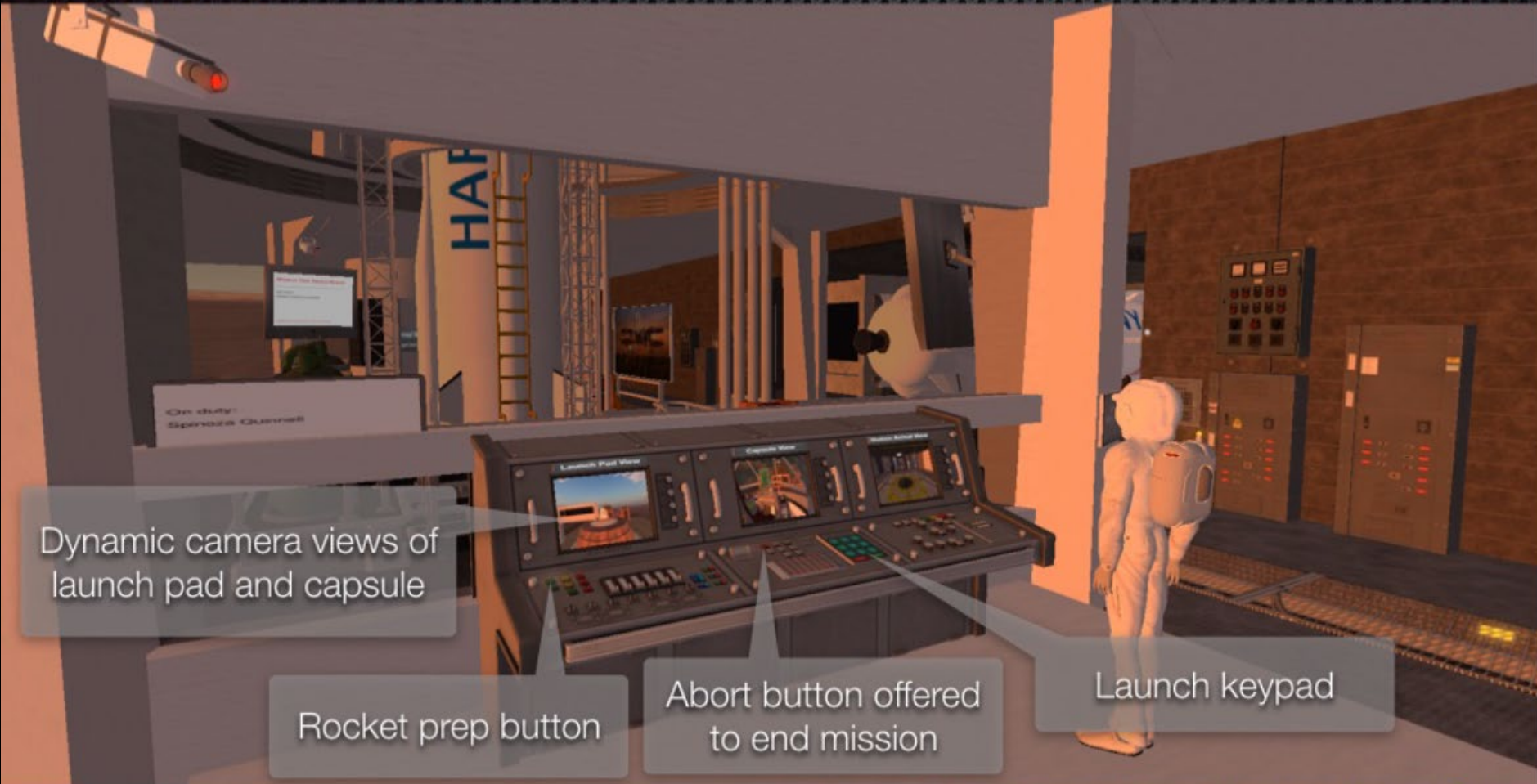




Mars Expedition: Blue Skies Challenge

Immersive VR Simulation

(Development of Mindsets with Contemplative Practices for Facing Complicated and Complex Challenges)



Dynamic camera views of launch pad and capsule

Rocket prep button

Abort button offered to end mission

Launch keypad

Simulation scene: Launch facility control console used to prep, launch, or abort missions.





Mars Expedition: Blue Skies Challenge

Immersive VR Simulation

(Development of Mindsets with Contemplative Practices for Facing Complicated and Complex Challenges)

Dynamic status board offers regular updates on mission operations throughout simulation gameplay



Simulation scene: Launch facility with Harmony rocket ready for boarding by astronaut.





Mars Expedition: Blue Skies Challenge

Immersive VR Simulation

(Development of Mindsets with Contemplative Practices for Facing Complicated and Complex Challenges)

Salon Brainstorming

Collaborative design thinking for exploring "Art-of-the-possible" and juxtaposition of ideas



VM Environment Prep

Development of Cloud-based tiered architecture for data exchange among platforms (OpenSim and Unity) with common databases



Model Development

MBR design applied to in-world devices; user and administrative data dashboards, game-based instruments, assessment tools

Rapid prototyping

Quick iterations testing out design options, usability, reliability, and application of gamification features

Alpha & Beta

Game flow analysis, user feedback, adaptations and improvements, experimental research



Simulation: Design, model development, prototyping, and testing pathway.





Mars Expedition: Blue Skies Challenge

Immersive VR Simulation

(Development of Mindsets with Contemplative Practices for Facing Complicated and Complex Challenges)

Capsule is entered from
Astronaut Walkway

Launch keypad for
manual control of
rocket by astronaut

Abort button offered
to end mission inside
of capsule

Simulation scene: Astronaut on board capsule preparing for launch.



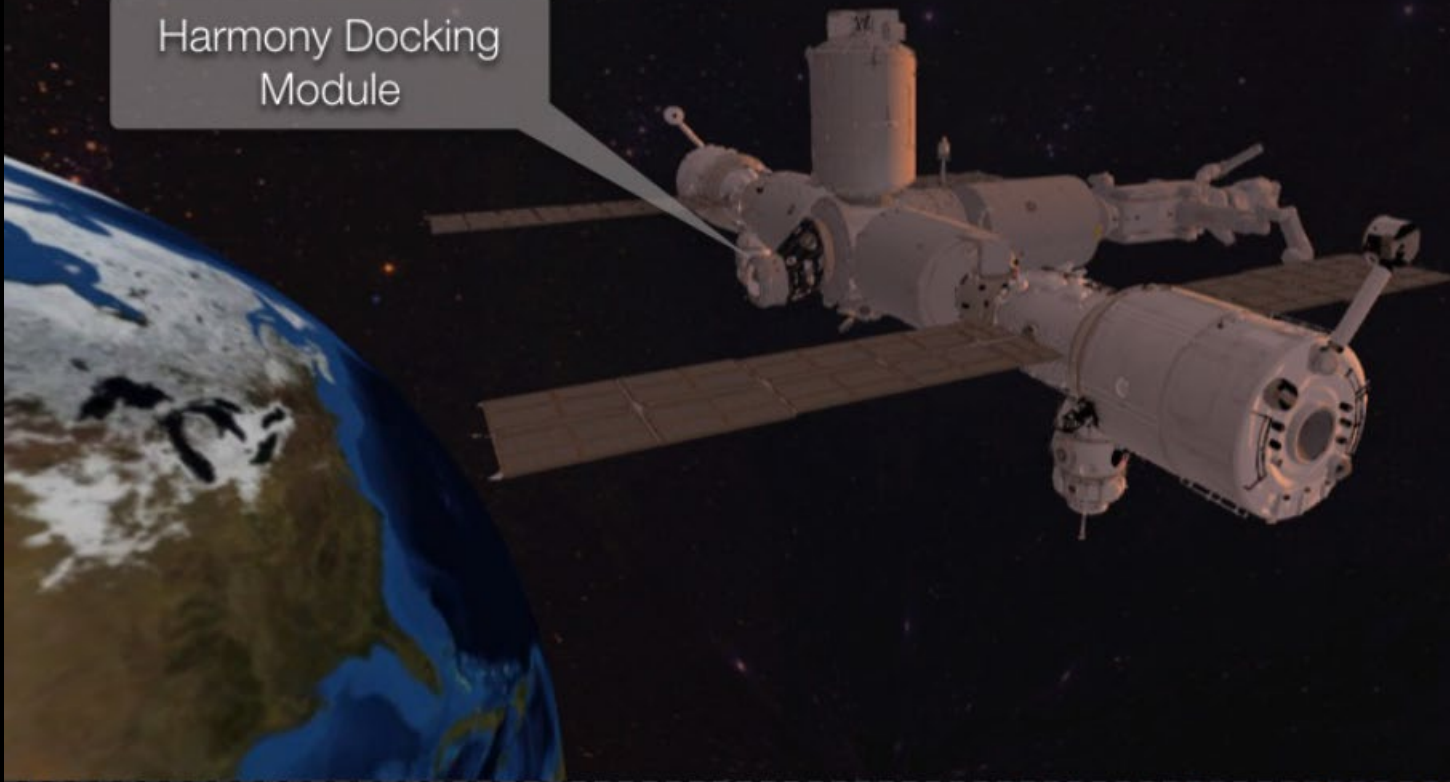


Mars Expedition: Blue Skies Challenge

Immersive VR Simulation

(Development of Mindsets with Contemplative Practices for Facing Complicated and Complex Challenges)

Harmony Docking
Module



Simulation scene: Harmony Space Station in orbit around Earth. Modules designed after International Space Station.





Mars Expedition: Blue Skies Challenge

Immersive VR Simulation

(Development of Mindsets with Contemplative Practices for Facing Complicated and Complex Challenges)



Simulation scene: Main connecting hub on Harmony space station.





Mars Expedition: Blue Skies Challenge

Immersive VR Simulation

(Development of Mindsets with Contemplative Practices for Facing Complicated and Complex Challenges)



Simulation scene: Harmony Space Station Operations module.





Mars Expedition: Blue Skies Challenge

Immersive VR Simulation

(Development of Mindsets with Contemplative Practices for Facing Complicated and Complex Challenges)



Simulation scene: Harmony space station crew commons area.





Mars Expedition: Blue Skies Challenge

Immersive VR Simulation

(Development of Mindsets with Contemplative Practices for Facing Complicated and Complex Challenges)

Enigma console used to start simulation; connected to OWL engine supporting AI-augmented assistance during simulation gameplay

Mission Ops Status Board

Open mission.
Pilot is ready for boarding.

Grok Connect

Wired
Wireless
Voice
Video
Click to Grok

Practice devices for simulation gameplay

Unity-based engine simulating Mars Network and cyber tools

Simulation scene: Launch facility simulation training for game play.

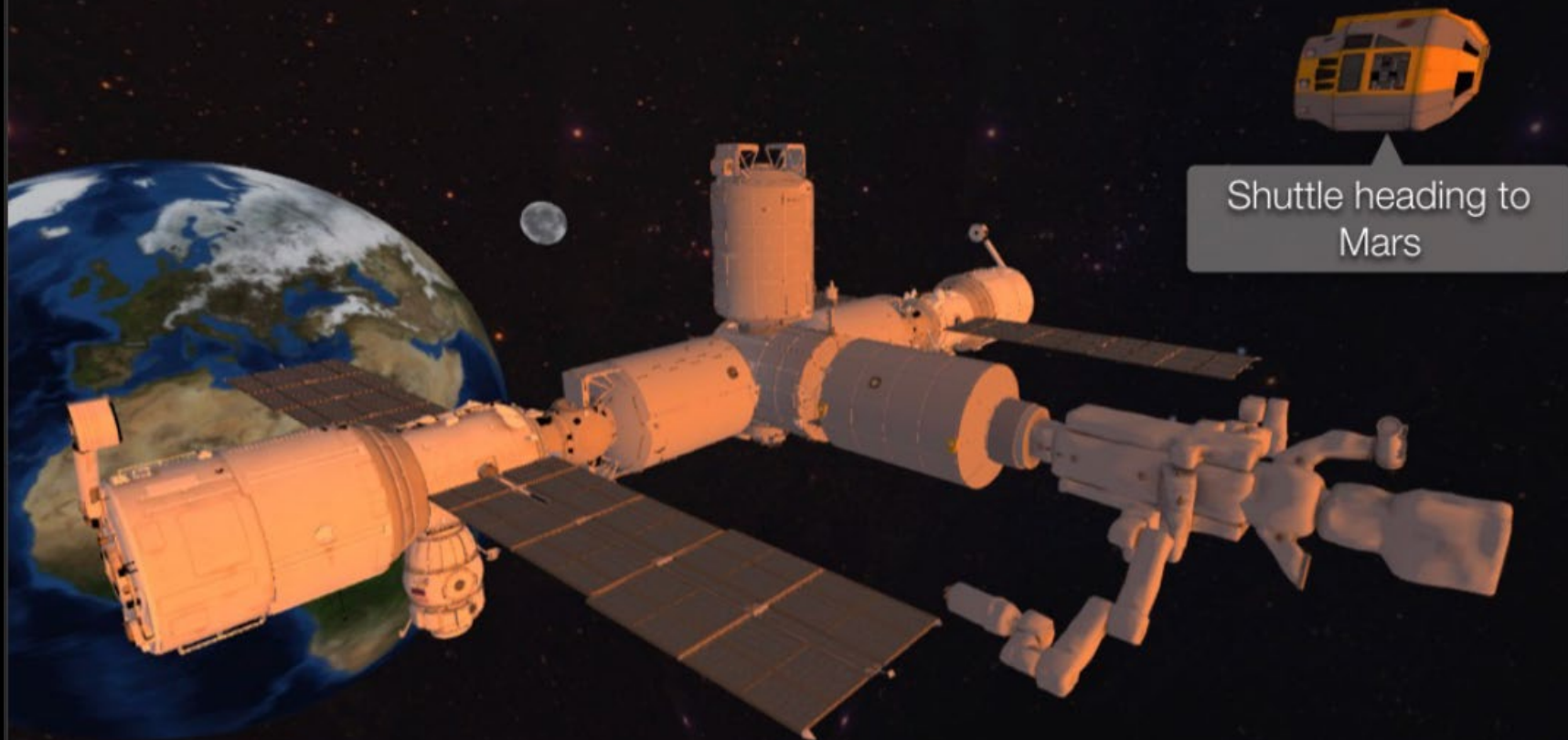




Mars Expedition: Blue Skies Challenge

Immersive VR Simulation

(Development of Mindsets with Contemplative Practices for Facing Complicated and Complex Challenges)



Simulation scene: Red Lion Shuttle heading to Mars station.





Mars Expedition: Blue Skies Challenge

Immersive VR Simulation

(Development of Mindsets with Contemplative Practices for Facing Complicated and Complex Challenges)



Simulation scene: Red Lion shuttle pilot preparing for departure from Harmony space station to Mars station outpost.

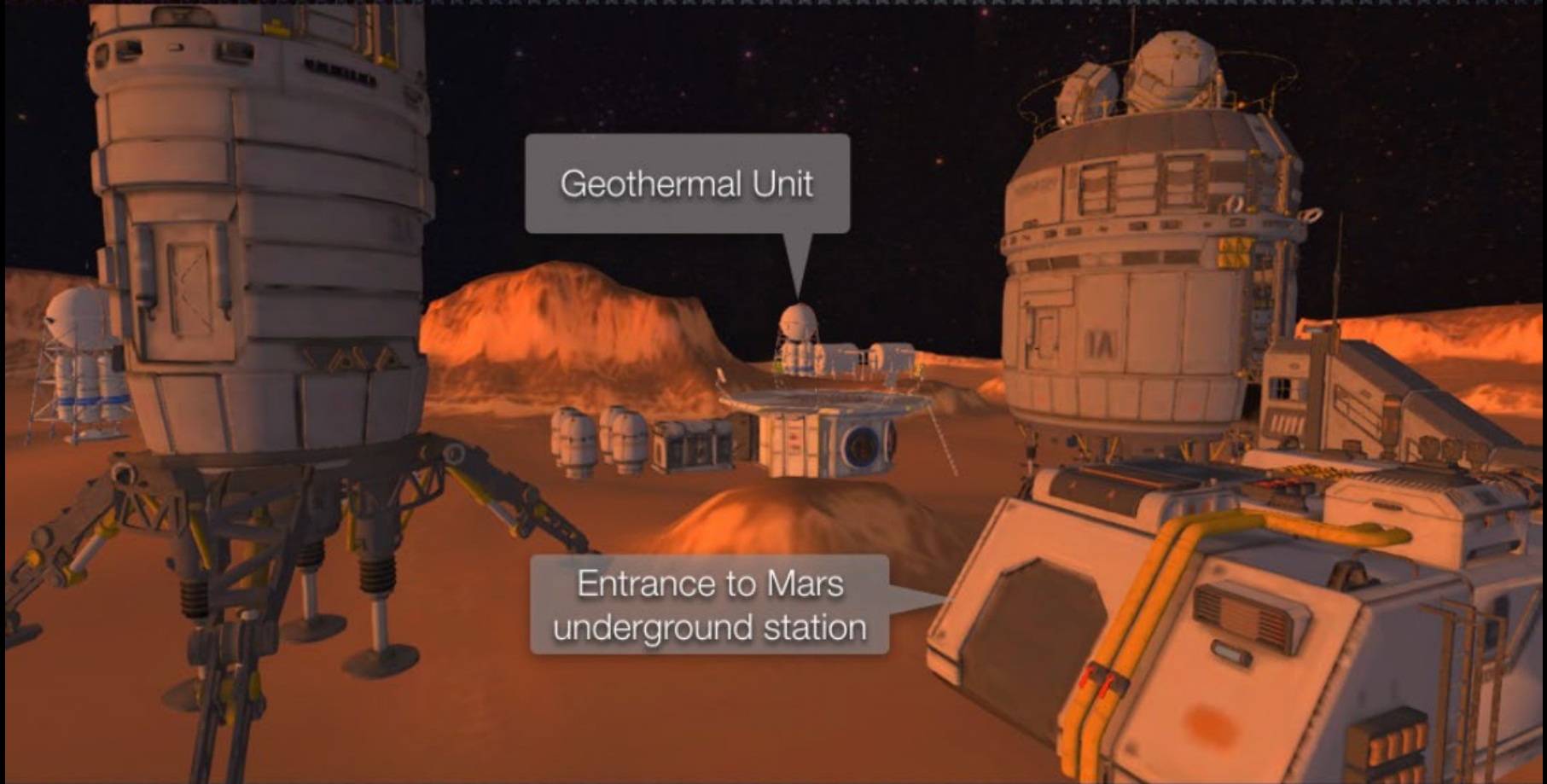




Mars Expedition: Blue Skies Challenge

Immersive VR Simulation

(Development of Mindsets with Contemplative Practices for Facing Complicated and Complex Challenges)



Simulation scene: Surface view of Mars station outpost.

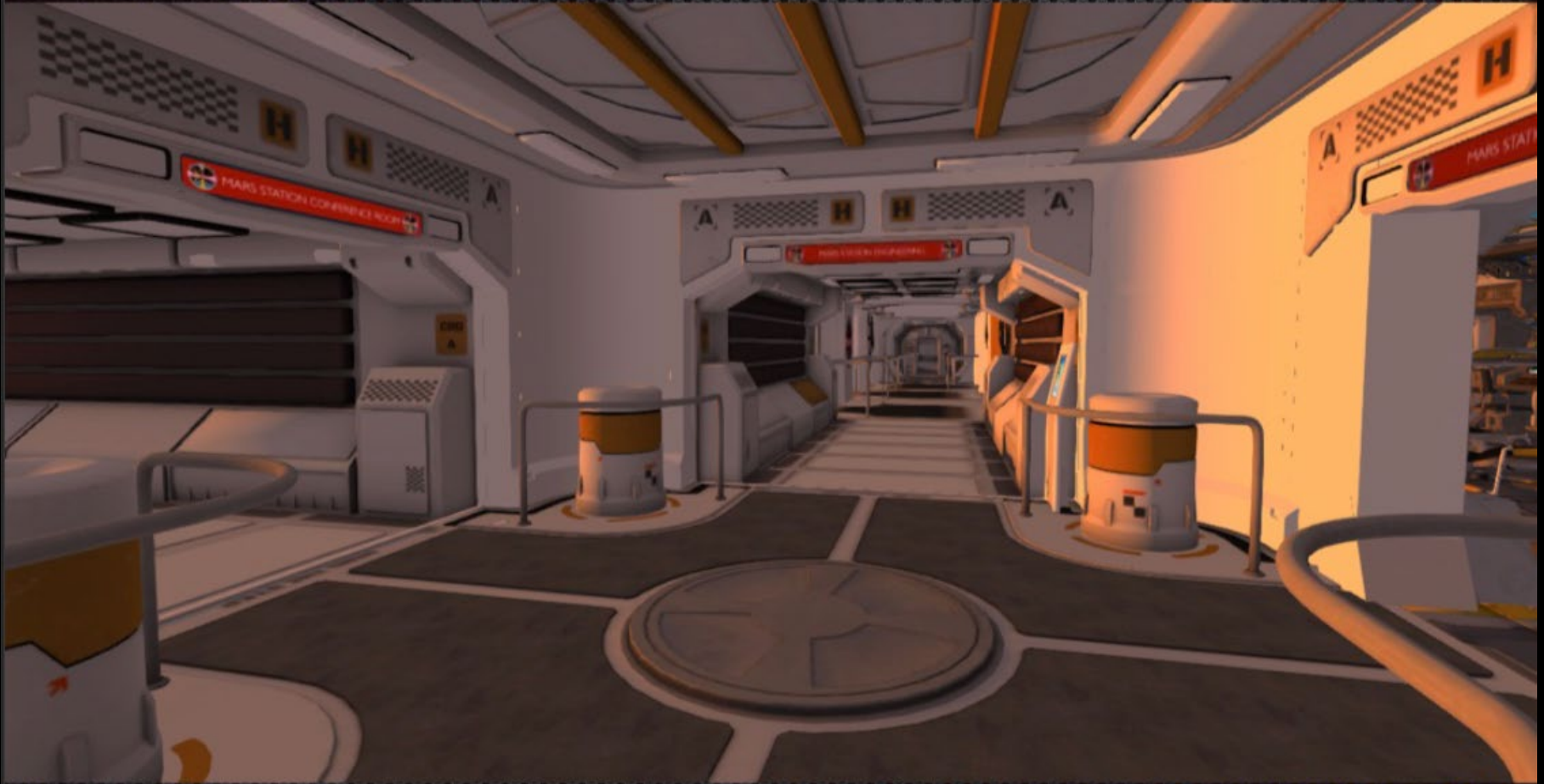




Mars Expedition: Blue Skies Challenge

Immersive VR Simulation

(Development of Mindsets with Contemplative Practices for Facing Complicated and Complex Challenges)



Simulation scene: Underground Mars station outpost hub.





Mars Expedition: Blue Skies Challenge

Immersive VR Simulation

(Development of Mindsets with Contemplative Practices for Facing Complicated and Complex Challenges)



Simulation scene: Underground Mars station outpost medical bay.





Mars Expedition: Blue Skies Challenge

Immersive VR Simulation

(Development of Mindsets with Contemplative Practices for Facing Complicated and Complex Challenges)



Simulation scene: Successful outcome of simulation results in blue skies on Mars.





Mars Expedition: Blue Skies Challenge

Immersive VR Simulation

(Development of Mindsets with Contemplative Practices for Facing Complicated and Complex Challenges)



Simulation: Participant can earn badges depicting number of completed Mars expeditions (instructors set minimum points). Badge placed on participant spacesuit.

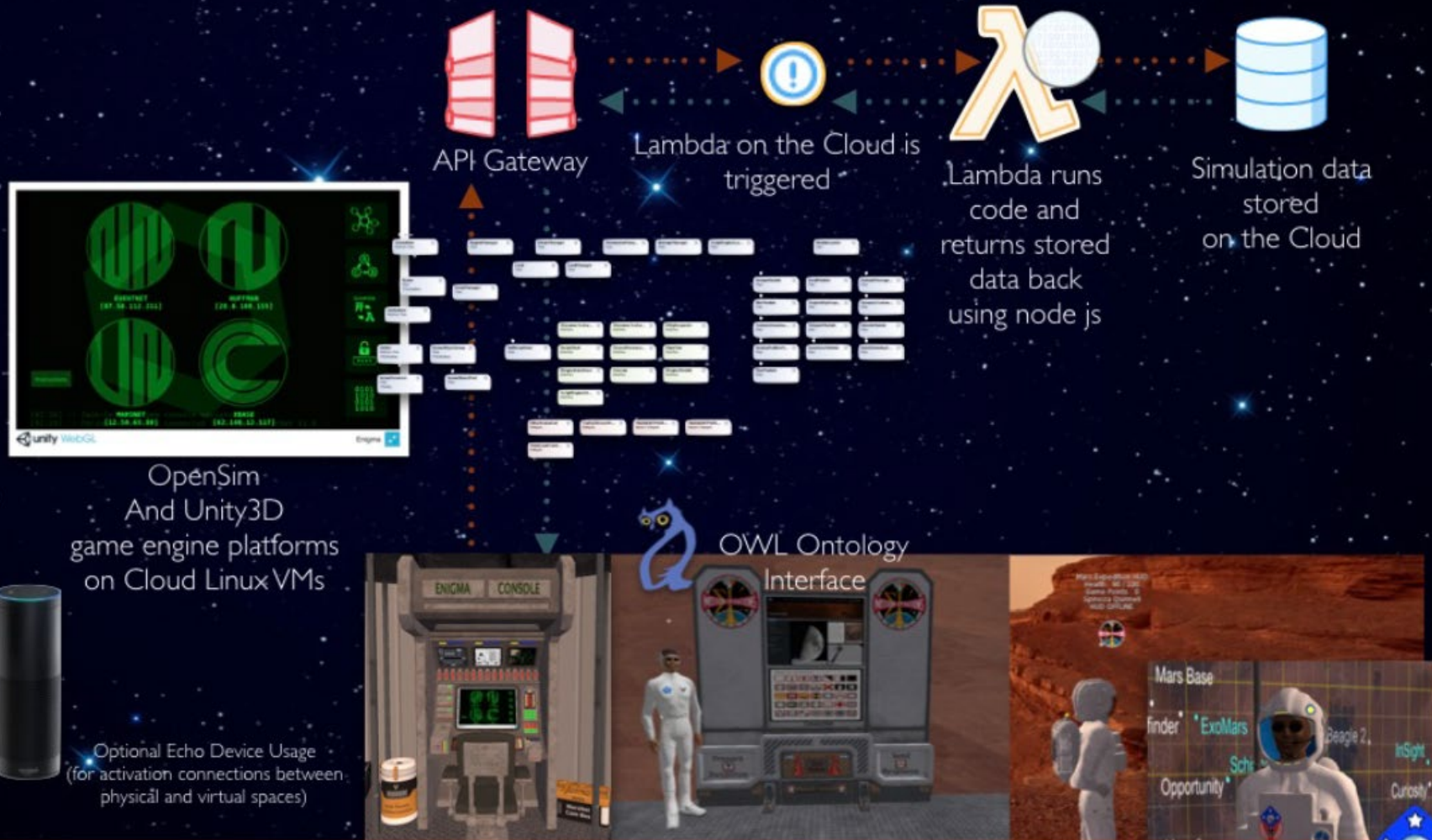




Mars Expedition: Blue Skies Challenge

Immersive VR Simulation

(Development of Mindsets with Contemplative Practices for Facing Complicated and Complex Challenges)



Simulation: High-level architecture.





Mars Expedition: Blue Skies Challenge

Immersive VR Simulation

(Development of Mindsets with Contemplative Practices for Facing Complicated and Complex Challenges)

Red Queen Processing Results



Simulation: Mars Expedition	Processor: OWL-Mars Ontology	Kiosk ID: Station 1: Launch Control Facility
---------------------------------------	--	--

Processing Date/Time: 11/24/2018 02:53:02 pm Central

Ontology Processing

Construct	Topic	Relevance	Explore
Complexity	Wicked problems	95	Link
Life forms beyond Earth	Case for organic matter on Mars	82	Link
Human life sustainment beyond Earth	Case for oxygen generation on Mars	80	Link
Human habitation beyond Earth	Case for colonizing Mars	75	Link

Contemplative Mindset Reflections

Overall, 10 semantic objects, and related groupings, were identified and processed using combined ontologies for feedback on the basis of your response to the simulation question presented by the Red Queen at Kiosk 1:

- Environment
- Technology_Internet
- Elon Musk
- Outer space
- Spaceflight
- Astronomy
- Mars
- Human mission to Mars
- Colonization of Mars
- National Aeronautics and Space Administration

There are multiple challenges associated with traveling to and sustaining human life on Mars. It is worthwhile to examine the above constructs collectively as a set of interdependent dimensions impacting the overall challenges. Recommend using the returned links to explore each construct and topic. Look for interdependent elements between the constructs and topics to deepen levels of understanding about complicated and complex problems associated with space travel and means to sustain human life beyond Earth.

Dynamically generated results using XML Mars Ontology nodes

Active links to XML Mars Ontology nodes' research suggestions

Semantic objects and groupings identified by Red Queen from participant response

Simulation: Example AI-augmented mindset aid results. AI-augmented tool is referred to as the Red Queen in the simulation.



Touring the Site



A Place for Discovery

- Enflame the imagination
- Increase engagement
- Explore diverse pathways
- Inspire design thinking
- Share a sense of presence
- Collaborate in a 3D space
- Remapping mental models of collaboration
- Independent work and collaborative projects
- Informal and formal ubiquitous learning
- Shared strengths
- Shared leadership
- Participatory ownership



Mars Expedition: Blue Skies Challenge

Immersive VR Simulation

(Development of Mindsets with Contemplative Practices for Facing Complicated and Complex Challenges)

Questions?



Simulation scene: Interstellar grid supports science fiction last gameplay level.

