Blue Skies on Mars*
Melding Fiction & Science for Sparking the Imagination
with Immersive Learning Simulations

* Mars Simulation was a Federal Virtual Worlds Challenge
  Grand Prize Winner
  (AU team partnership with NASA JPL and Colorado Technical University)

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I've seen things you people wouldn't believe. I have known adventures, seen places you people will never see, I've been Offworld and back...frontiers!

I've stood on the back deck of a blinker bound for the Plutition Camps with sweat in my eyes watching the stars fight on the shoulder of Orion. I've seen it...felt it!*

*in original script for Rutger Hauer in Blade Runner
SIMULATION LEARNING OBJECTIVE
DEVELOPING AGILE MINDSETS FOR COMPLICATED AND COMPLEX CHALLENGES*

Chessboard Mindset

Knowing

About and Having

the means to

Balance Usage of Mindsets

Web-network Mindset

Al-Augmented Mindset Aid

*see Gary Klein’s Streetlights and Shadows and Anne-Marie Slaughter’s The Chessboard and the Web: Strategies of Connection in a Networked World
Our Design and Prototyping Journey

**Salon Brainstorming**
Collaborative design thinking for exploring “Art-of-the-possible” and juxtaposition of ideas

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

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

**Rapid prototyping**
Quick iterations testing out design options, usability, reliability, and application of gamification

**Alpha & Beta**
Game flow analysis, user feedback, adaptations and improvements, experimental research
The Shared Journey With the Red Queen to Mars*

1. Red Queen**
   Initial presentation of complicated and complex problems at the Launch Facility

2. Red Queen
   Identification of initial constraints and perspectives solicited at Space Station

3. Red Queen
   Juxtaposition of ideas and internal reframing of problems and approach solicited at Spaceship in orbit around Mars

4. Red Queen
   Social reframing and solution frameworks solicited at Mars Surface and Underground facilities

5. Red Queen
   Communication and application of solution frameworks solicited at Mars Station Lab

**The phrase "Red Queen" comes from *Through the Looking Glass* (Carroll 1872). In Alice’s dream about the looking glass house, she first finds that things appear left-to-right, as if shown in a mirror. The Red Queen then leads Alice directly to the top of the hill. Along the way, the Red Queen explains that hills can become valleys, which confuses Alice. Already, in this world, straight can become curvy, and progress can be made only by going the opposite direction; now, according to the Red Queen, hills can become valleys and valleys can become hills.

At the top of the hill, the Red Queen begins to run, faster and faster. Alice runs after the Red Queen, but is further perplexed to find that neither one seems to be moving. When they stop running, they are in exactly the same place. Alice remarks on this, to which the Red Queen responds: "Now, here you see, it takes all the running you can do to keep in the same place."

The Red Queen helps Alice to discern and face complexity.

*Red Queen: AI-augmented mindset aid
Simulation HUD with health & performance factor weights across 7-levels of gameplay.
Example AI-Augmented Mindset Aid Results

Red Queen Processing Results

<table>
<thead>
<tr>
<th>Simulation:</th>
<th>Processor: OWL-Mars Ontology</th>
<th>Kiosk ID: Station 1: Launch Control Facility</th>
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</thead>
<tbody>
<tr>
<td>Mars Expedition</td>
<td></td>
<td></td>
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Processing Date/Time: 11/24/2018 02:53:02 pm Central

<table>
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<tr>
<th>Construct</th>
<th>Topic</th>
<th>Relevance</th>
<th>Explore</th>
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</thead>
<tbody>
<tr>
<td>Complexity</td>
<td>Wicked problems</td>
<td>95</td>
<td>Link</td>
</tr>
<tr>
<td>Life forms beyond Earth</td>
<td>Case for organic matter on Mars</td>
<td>82</td>
<td>Link</td>
</tr>
<tr>
<td>Human life sustainment beyond Earth</td>
<td>Case for oxygen generation on Mars</td>
<td>80</td>
<td>Link</td>
</tr>
<tr>
<td>Human habitation beyond Earth</td>
<td>Case for colonizing Mars</td>
<td>75</td>
<td>Link</td>
</tr>
</tbody>
</table>

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.

*Note: above table is a screen snapshot of dynamically-generated web page showing results generated for participant on basis of response to Red Queen question
AI-Augmented Mindset Aid
High-level Architecture

Lambda on the Cloud is triggered

Lambda runs code and returns stored data back using node.js

Simulation data stored on the Cloud

API Gateway

OpenSim & Unity3D game engine platforms on Cloud Linux VMs

Optional Echo Device (connections between Physical & virtual spaces)

Immersive VR 3rd- and 1st-person user interfaces (voice, chat, and MBR devices) supported with physics engine

OWL Ontology Interface
GROK QUESTIONS?