OBJECTIVE STRUCTURED CLINICAL EVALUATION (OSCE) OF AN ARTIFICIAL INTELLIGENCE (AI) CLINICAL DECISION SUPPORT SYSTEM (CDSS) TOOL

Human Research Program

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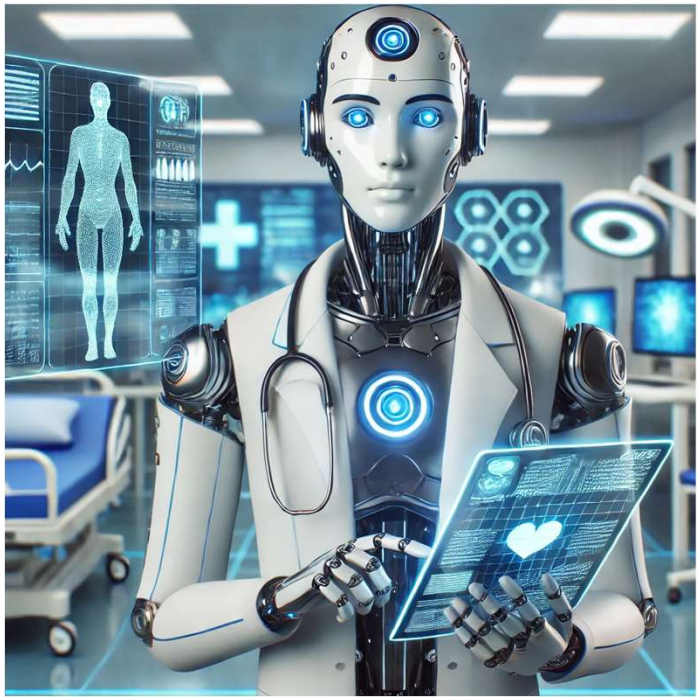
Agenda

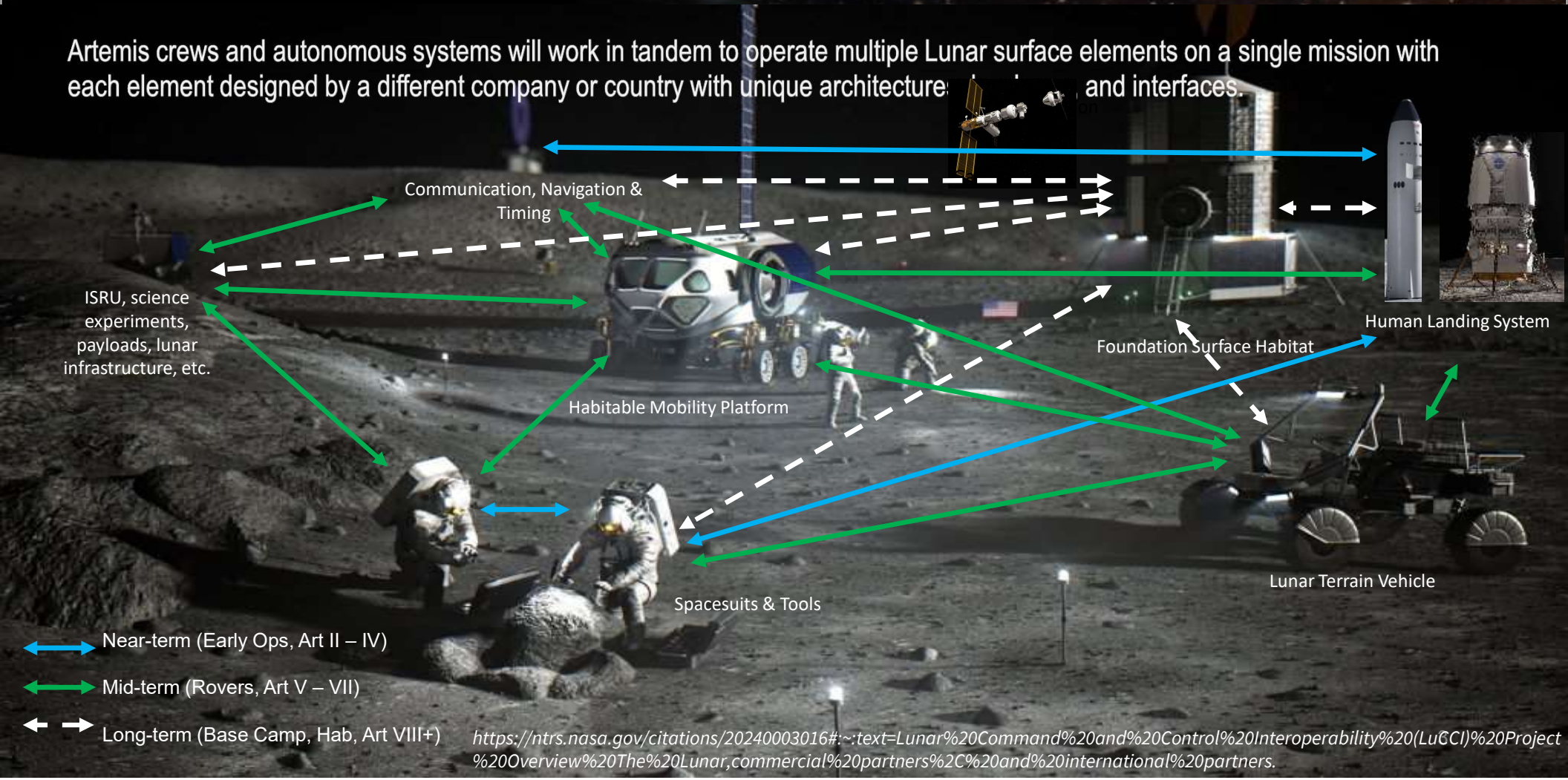
- Background
- Objective
- Approach
- Challenges and Limitations
- Lessons Learned



• Image courtesy of ChatGPT

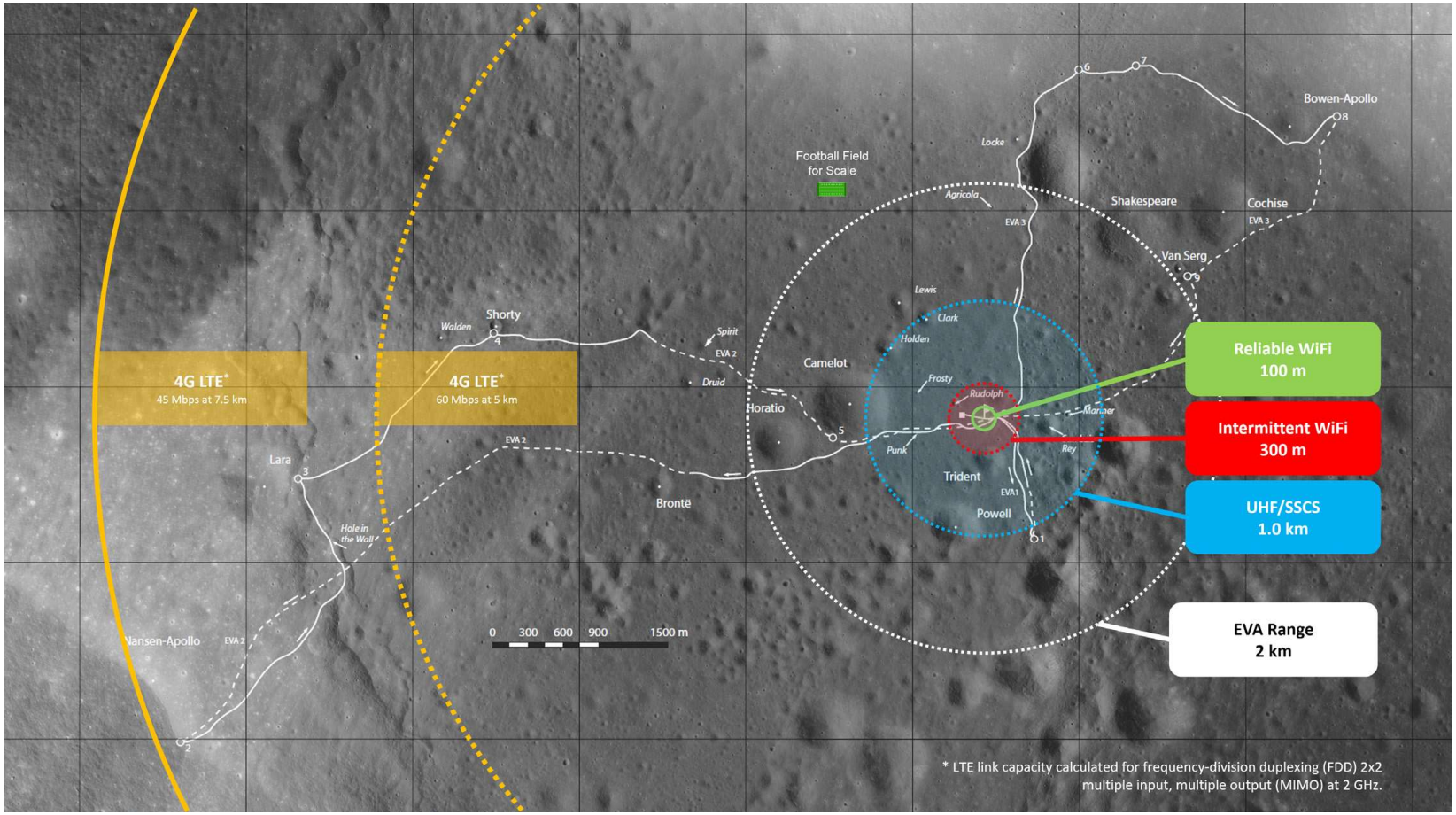
Lunar Operations

Artemis crews and autonomous systems will work in tandem to operate multiple Lunar surface elements on a single mission with each element designed by a different company or country with unique architecture and interfaces.



https://ntrs.nasa.gov/citations/20240003016#:~:text=Lunar%20Command%20and%20Control%20Interoperability%20(LuCCI)%20Project%20Overview%20The%20Lunar,commercial%20partners%2C%20and%20international%20partners.

Lunar Command and Control Interoperability

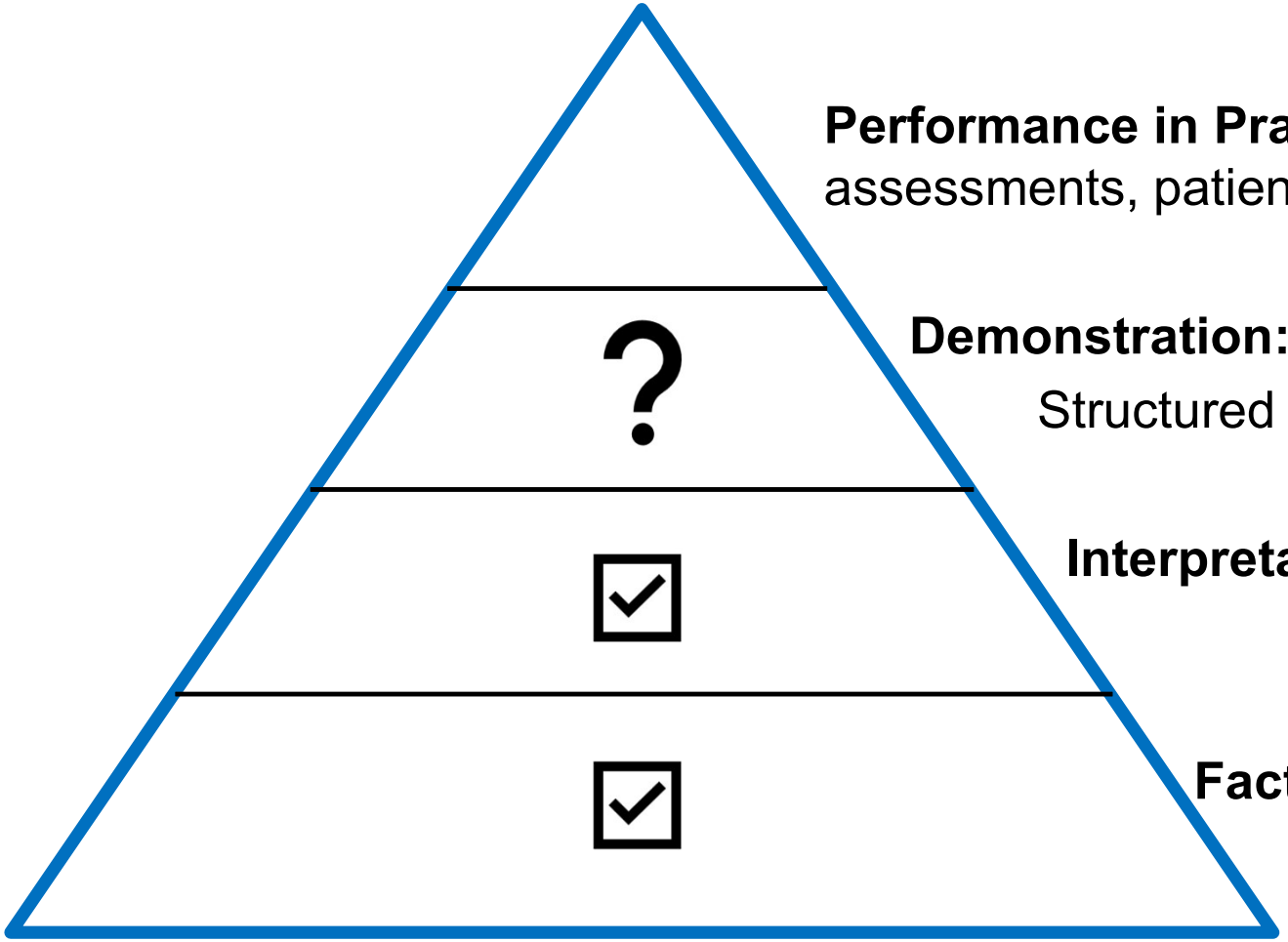


- *NASA's Lunar Communications and Navigation Architecture. 2023 Moon to Mars Architecture Concept Review.* https://www.nasa.gov
- /wp-content/uploads/2024/01/lunar-communications-and-navigationarchitecture.pdf?emrc=f1a91a

Objective

- Explore the use of AI as a novel Clinical Decision Support System (CDSS) tool.
- Develop a natural language model-based artificial intelligence (AI) tool to streamline clinical evaluation of astronaut crewmembers in support of Earth Independent Medical Operations (EIMO).
- Evaluate this “Doc in a Box” via an Objective Structured Clinical Evaluation (OSCE).

Miller's Pyramid of Mastery



Performance in Practice: Workplace based assessments, patient outcomes.

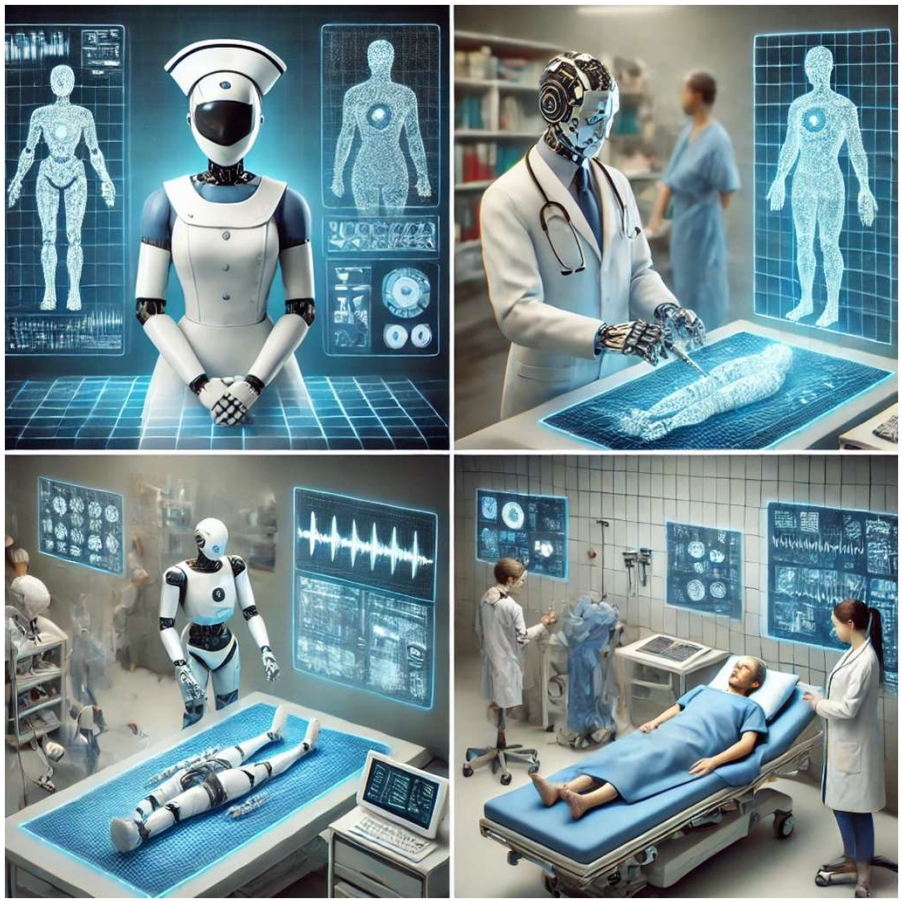
Demonstration: Simulation, Objective Structured Clinical Examination (OSCE)

Interpretation: Cases

Fact Recall: Multiple Choice Questions (MCQs)

Agentic Approach

- History
- Physical Exam
- Differential Diagnosis
  - Diagnostics
- Plan of Care



- Image courtesy of ChatGPT

OSCE Checklist

- **Google Gemma 2 model**
  - **27** billion parameter
- **Llama 3.1 model**
  - Optimized for multilingual dialogue
  - 8B, 70B and 405B
  - Current hardware 27B so **tested 8B**

Image by Moondance from Pixabay https://blogs.ed.ac.uk/teaching-matters/student-assessors-in-objective-structured-clinical-examinations-osces/

Agentic AI = Chatbot

Next Steps:

I will consult with the physician to determine the next course

Please let me know if this summary is accurate and if you have

this is good. we can switch now.. thanks

||Switch||

hi

I'm here to assist you with the physical examination process f

Let's begin with the **Respiratory Examination**.

Purpose: To assess Alex's respiratory system and identify any

Step-by-Step Instructions:

1. **Positioning**: Have Alex sit comfortably on an exam table
2. **Observation**: Observe Alex's breathing pattern, looking f
   - Increased respiratory rate
   - Use of accessory muscles (e.g., neck and shoulder m
   - Nasal flaring

heart sounds are normal and pulses are normal.

Thank you for those findings.

Based on the information gathered so far, we have:

- **Respiratory Examination:** Normal respiratory effort, decreased breath sounds on the right side, no chest tenderness.
- **Cardiovascular Examination:** Normal heart sounds, regular rhythm, normal pulses.

||Switch||

hi

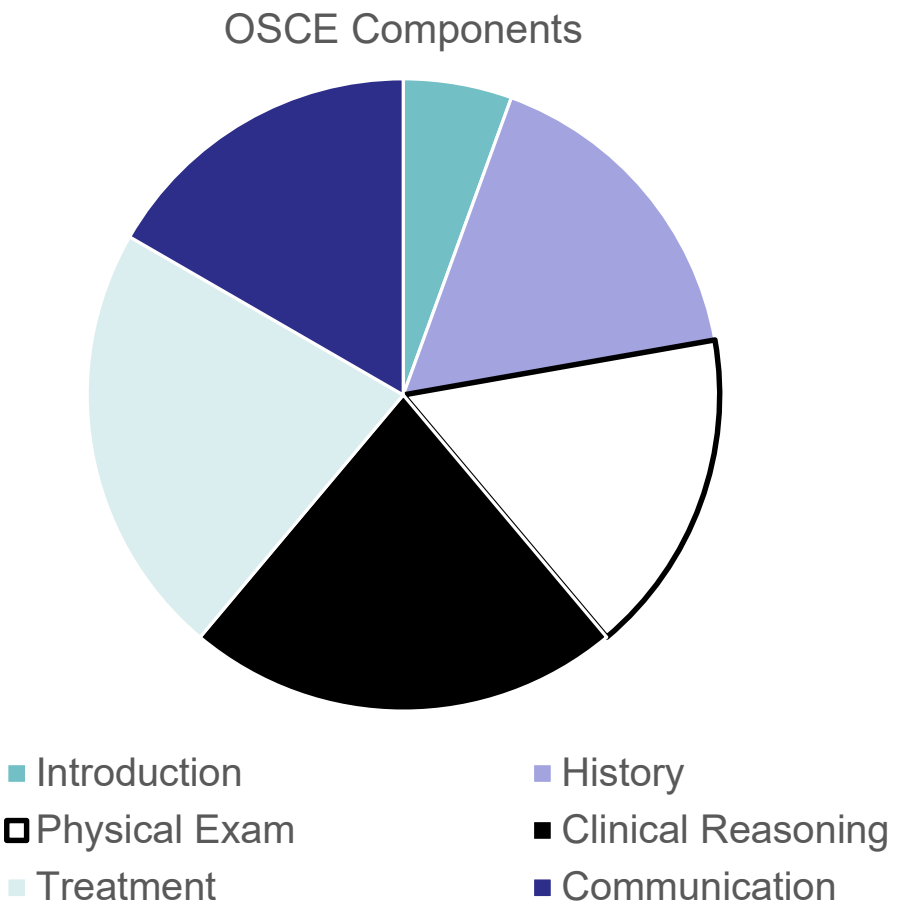
Based on Alex's symptoms and examination findings, a chest X-ray would be the most appropriate initial test. This will help us visualize his lu
pneumonia or collapsed lung.

Here are the instructions for performing a chest X-ray:

1. **Preparation:** Alex will need to remove any jewelry or metal objects that could interfere with the X-ray image. He should also wear a hosp
2. **Positioning:** Alex will be asked to stand or lie down on an X-ray table. The technician will guide him into the correct position, ensuring his

Scores

- **Gemma 2 score: 75%**
- **Llama 3.1 score: 78.5%**



Scores

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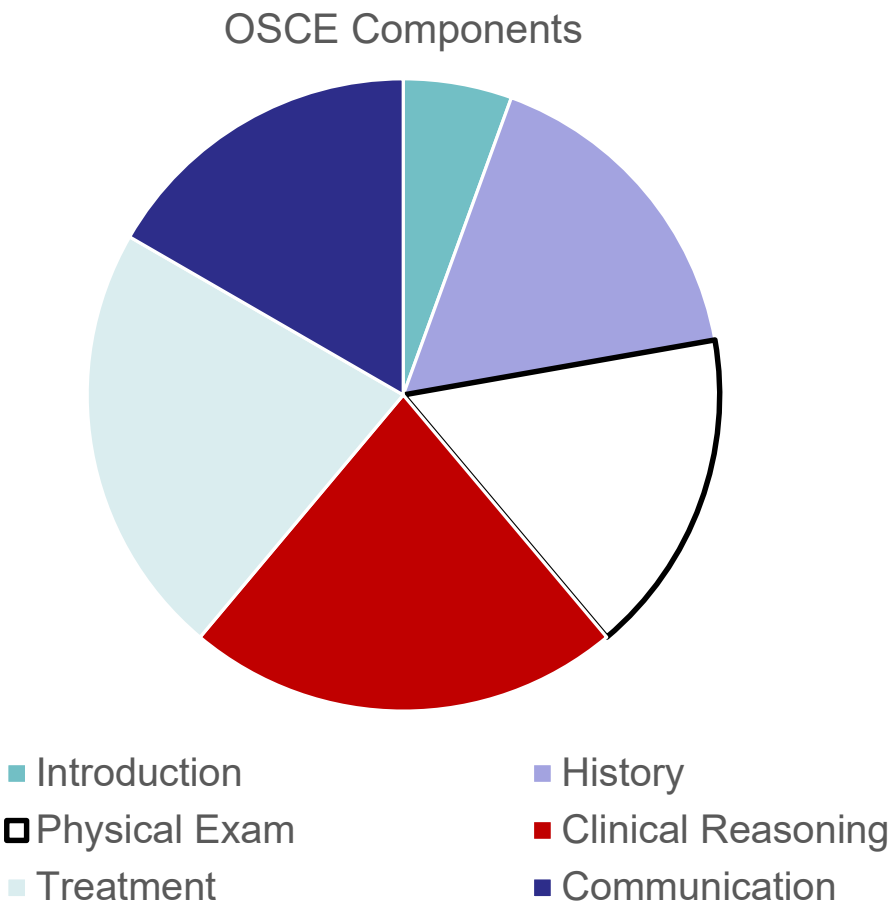
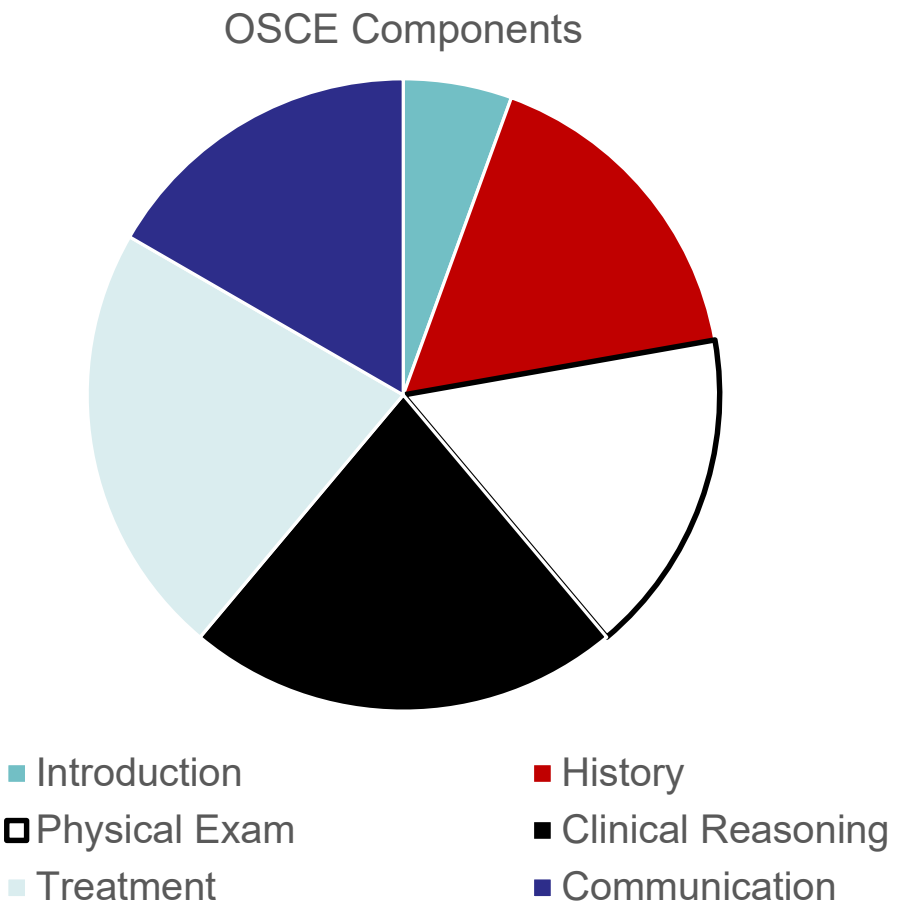


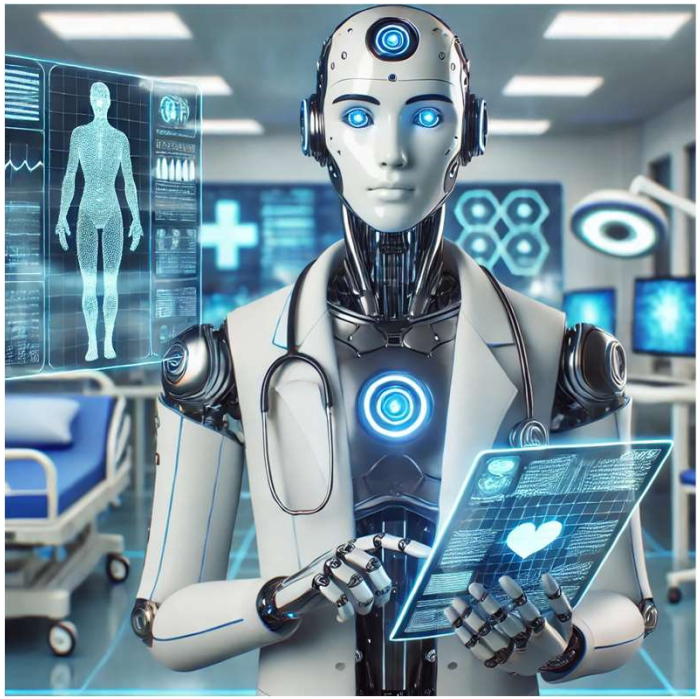
Scores

- **Cinderella story!**
- **Llama 3.1 score: 78.5%**



Lessons Learned

- **Lobotomy**
- **Prompt is EVERYthing**
- **ElMO must evolve in parallel with Moon to Mars**
- **Bias**



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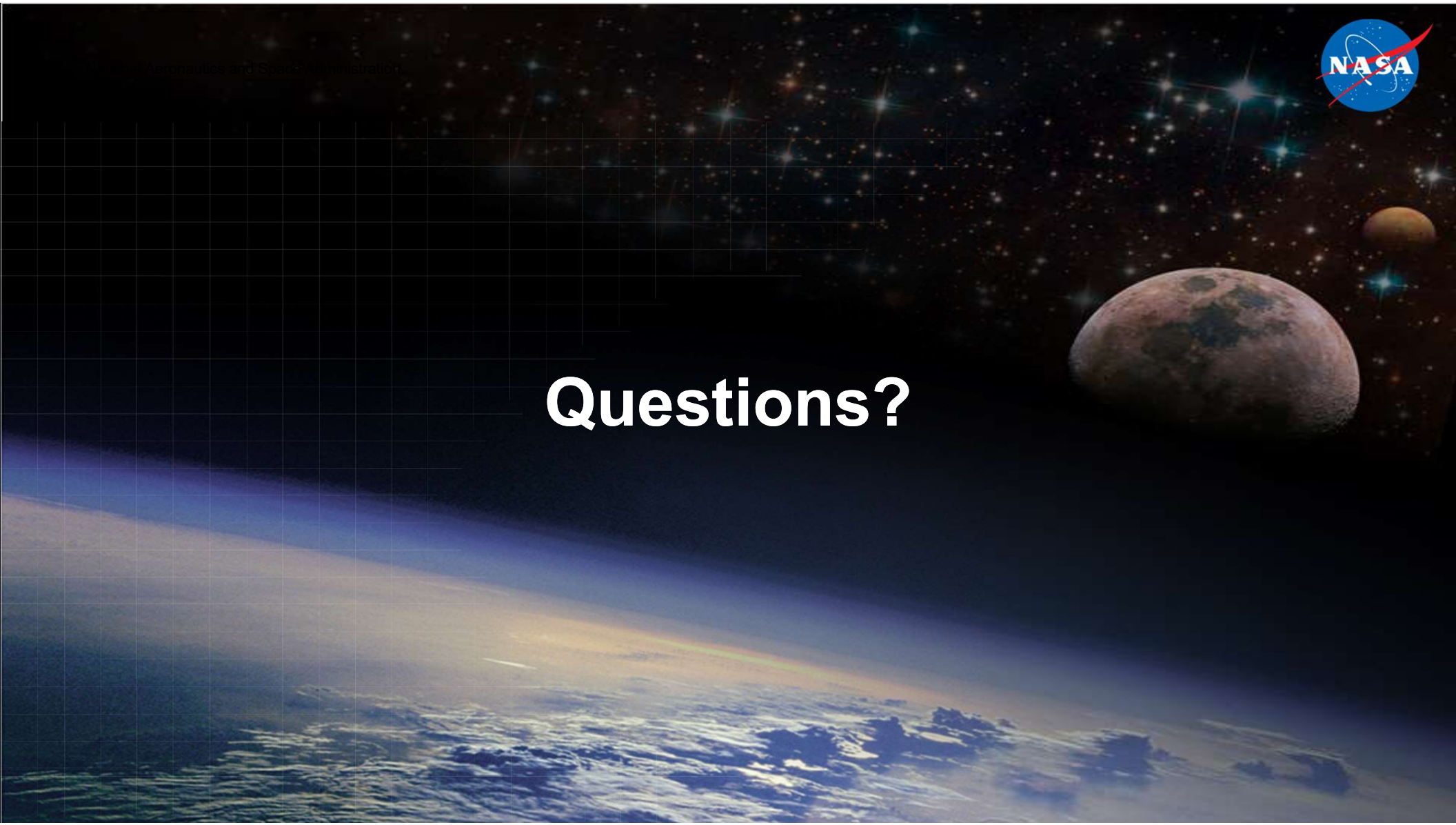
National Aeronautics and Space Administration
NASA
Questions?