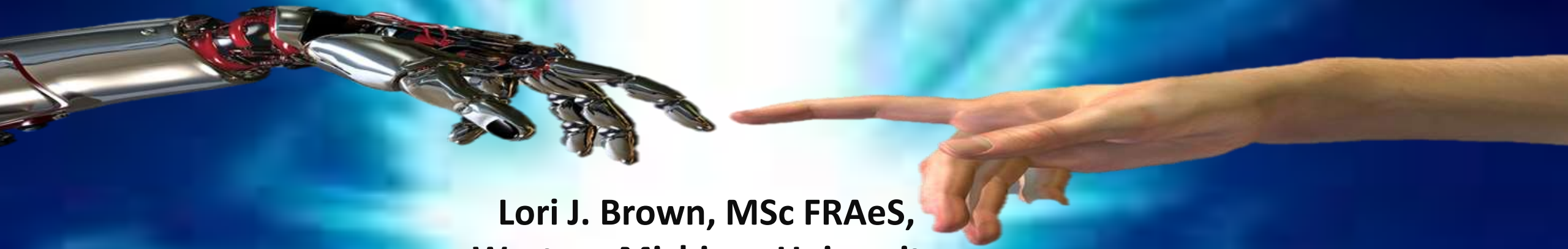
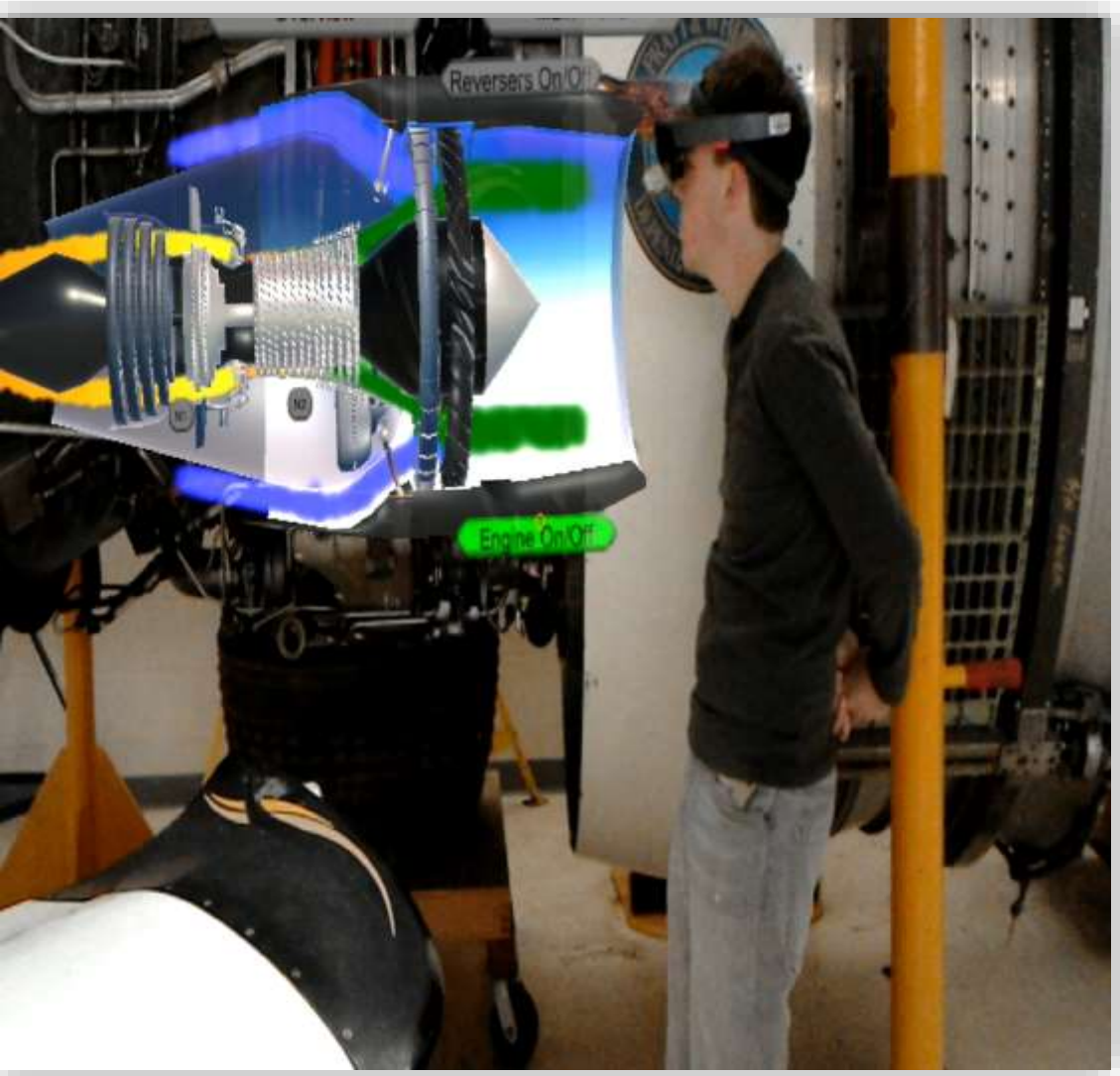
# Assessing Holographic learning objectives: The Future Reality of Aviation Assessment



**Lori J. Brown, MSc FRAeS,**
**Western Michigan University**
**College of Aviation**

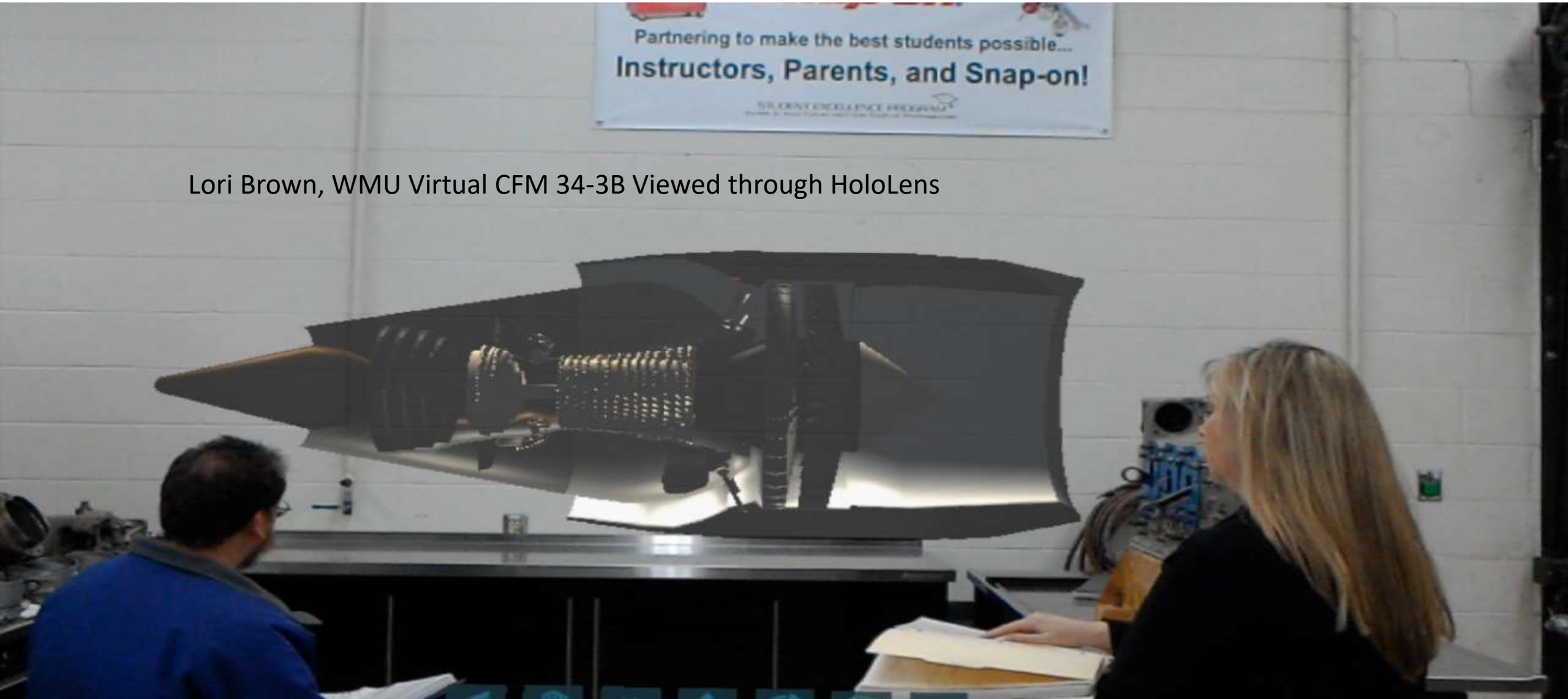
# Integrating Holographic 3D learning objectives into Education and Assessment

# HOW CAN WE USE MIXED AND AUGMENTED REALITY TO ENHANCE AVIATION EDUCATION?




- Create Virtual Laboratories
- Bridge the gap between classroom and simulation
- Procedure Training
- Systems Training
- Familiarization
- Maintenance Training-Operations
- Hands Free Remote assistance
- Enhance Printed material

# Create Holographic Virtual Laboratories




Lori Brown, WMU Virtual CFM 34-3B Viewed through HoloLens

# Transferring procedures training from the simulator to the HoloLens


- Systems Integration
- Scenarios Procedures
- Practice malfunctions
- Assessments
- Brings the simulation into any learning space
- Hands on Practice
- Micro- simulations

Instructor can see what the student is doing on a computer and interact in real time from any location.  Students can participate with iPhone or projected onto classroom screen. Session is filmed for discussion.


# 3D Holograms in Industry Applications

(Newark Airport)

# AR Assessment Feedback Loop

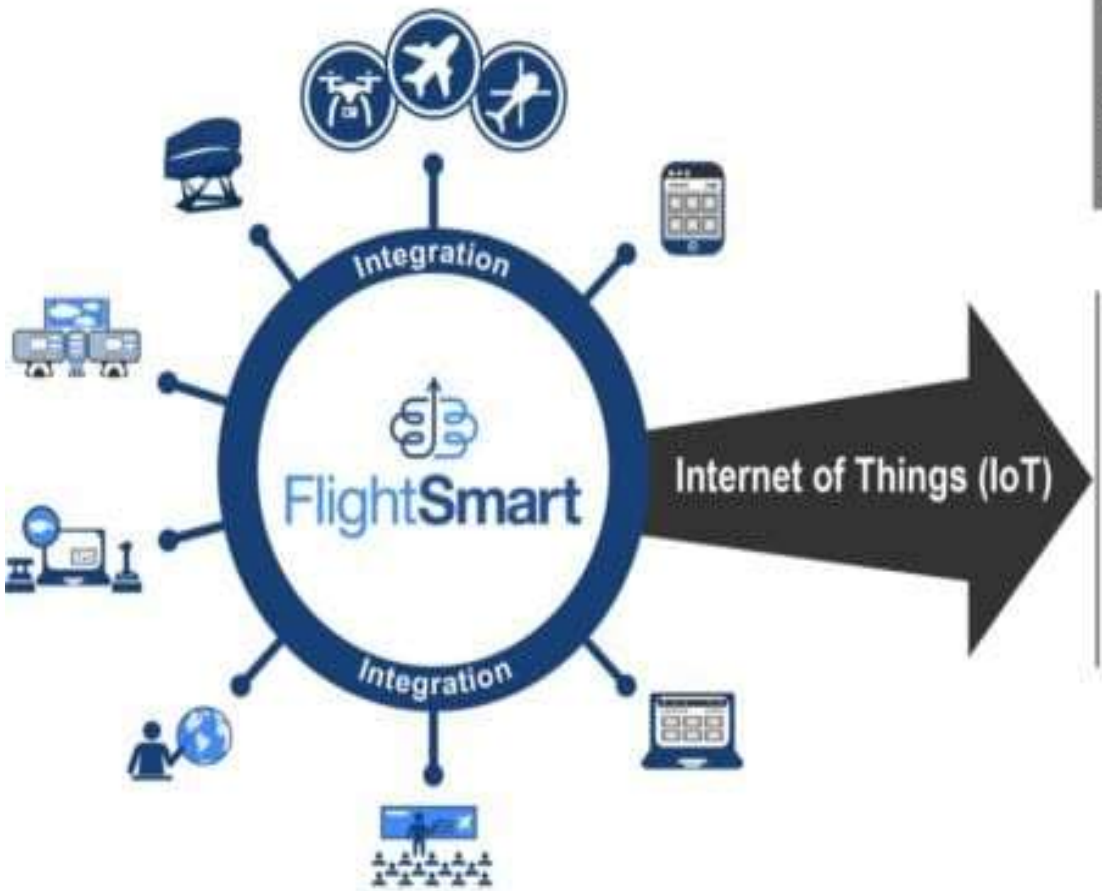
| Learning Objective | Examples of Aviation Related Assessment Activities | Examples of Appropriate Methodologies for Instruction and Assessment of Aviation Related Objectives |
|---|---|---|
| **Recall**<br>**Recognize**<br>**Identify** | Activities that require students to<br>o recall or recognize terms, facts, and concepts. | Objective test items such as fill-in-the-blank, drag and drop, matching, labeling, or multiple-choice questions can be achieved with written quizzes, hot spots or interactive electronic activities such as drag and drop tasks to match aircraft or system components with terms and definitions. |
| **Interpret**<br>**Classify**<br>**Compare** | Activities that require students to:<br>o classify, categorize, compare and contrast two or more theories, events, or processes. | This can include classroom discussion, papers or interpretation of schematics depending on the subject matter. For technical subjects, printed images or electronic depictions of aircraft schematics such as synoptic displays allow students to interpret system conditions, compare systems states, etc. Classification can be accomplished the labeling, matching or drag and drop activities. |
| **Apply**<br>**Execute**<br>**Perform**<br>**Demonstrate** | Activities that require students to:<br>o use procedures, solve problems, or complete tasks. | Performance labs or assessments can utilize serious gaming, interactive 3D models experienced in VR, AR, MR or simulation to allow the student to practice, apply and demonstrate knowledge, skills and ability to execute checklists or implement procedures. Example include: Virtual Preflight, Cockpit Flows, Practice Quick Reference Handbook (QRH) malfunctions, Cabin safety check, aircraft familiarization and maintenance operations. |
| **Analyze** | Activities that require students to:<br>o determine how aircraft components, systems, crew and crew function together.<br>o troubleshot system malfunctions | Can include discussion, papers, projects or research. Examples include: accident investigations, case studies, papers or labs using written manuals, documents, serious gaming or video. |

# How can we assess serious gaming in aviation?


P3D Gaming Avatar Pilot

# Assess with Record of Aviation Game Play

- 1301:00 Student entered 3D interactive Cockpit and started the APU successfully.
- 1302:01 Student engaged engine 1 starter, added fuel at 22% N2 .
- 1302:10 N2 was not spooling up past 25% N2 due to failed ignitor.
- 1302:15 Student aborted the start with ‘incorrect’ quick reference handbook procedures.
- 1303:00 Student was asked to analyze the reason for the malfunction and justification for the incorrect start procedure.




Internet of Things (IoT)

FlightSmart Elements

| Grading | Why? & Remediation | Likelihood of Success & % Mastery | Adaptive Learning |
|---|---|---|---|
| • Evaluate each student against benchmarks | • Explain why student failed (e.g. "too late on rudder pedal")<br>• Recommend next steps ("focus on heading during landing") | • Reduce "over-training"<br>• Anticipate washouts | • Live in-flight intervention<br>• Personalized training plans (customized to each student)<br>• Expand to include data from entire ecosystem |

**Descriptive**
Explains what happened

**Diagnostic**
Explains why it happened

**Predictive**
Forecasts what might happen

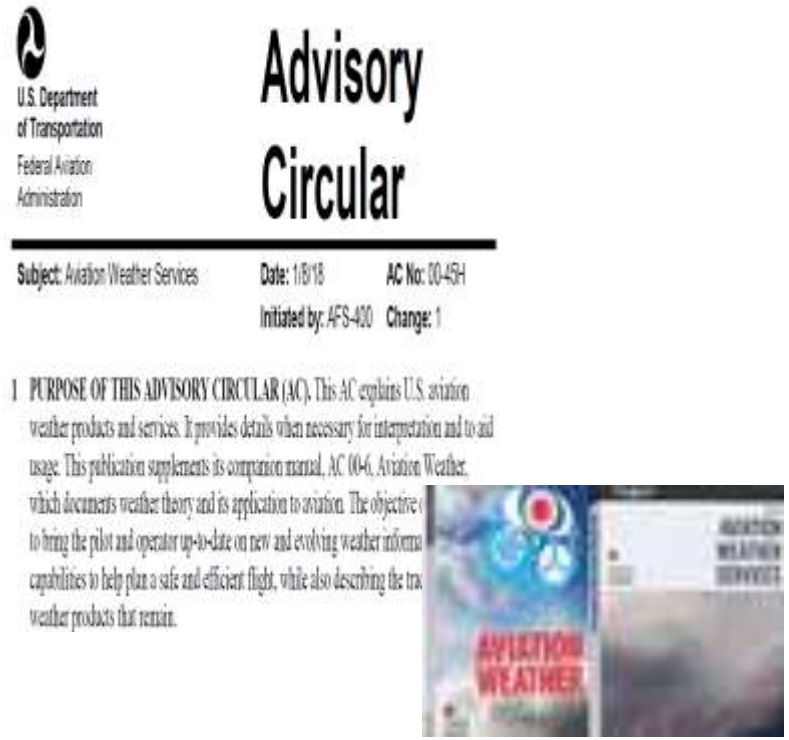
**Prescriptive**
Recommends an action based on the forecast

**4 Stages of Analytics**

Flight Safety International Adaptive Training Syllabus- Flight Smart

# AR Textbook for Aviation Weather

- Funded by the Federal Aviation Administration [FAA] Next Gen Weather Technology in the Cockpit Program
- Free Download from iTunes or Google Play- WeatherXplore APP

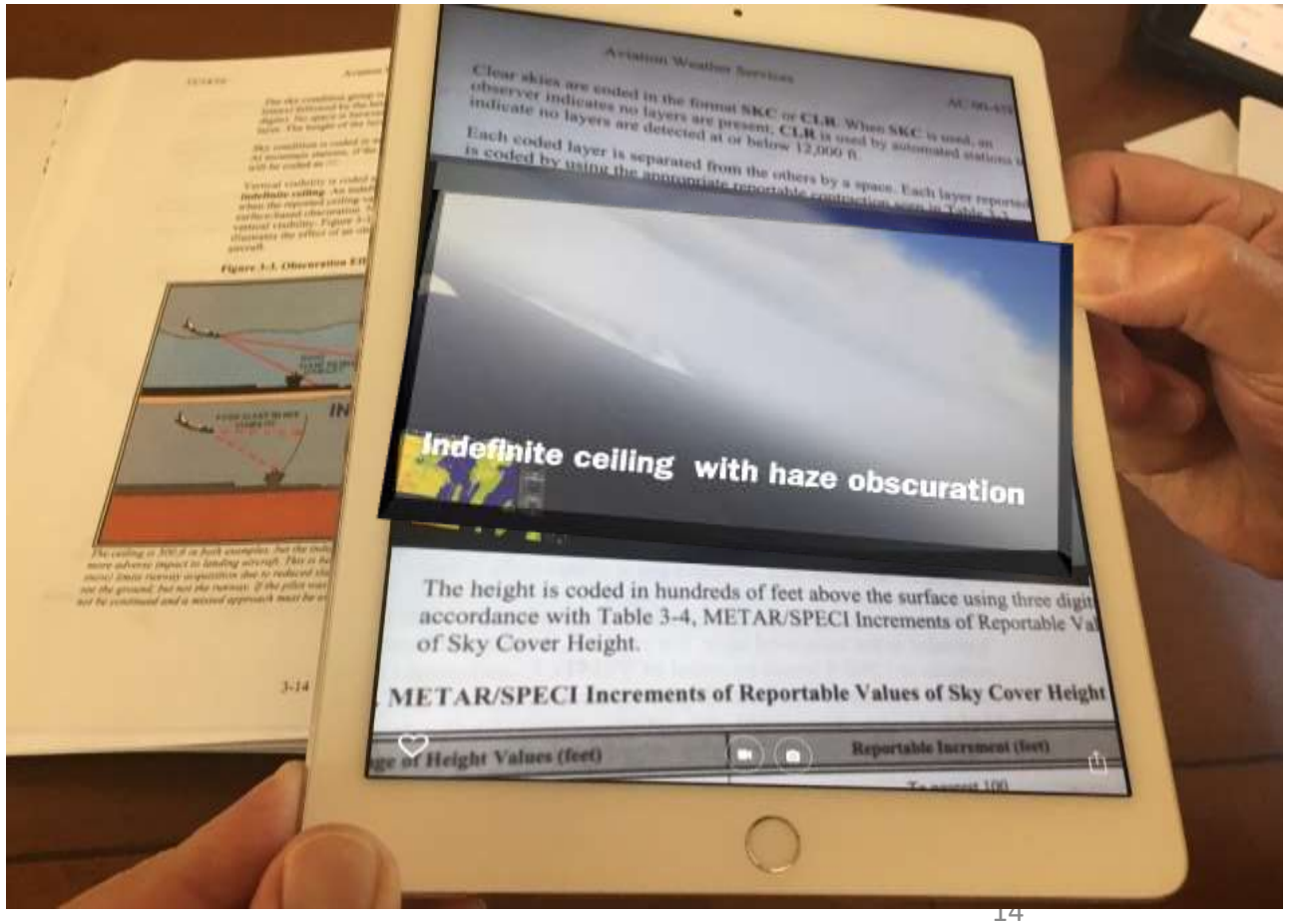


U.S. Department of Transportation
Federal Aviation Administration

**Advisory Circular**

**Subject:** Aviation Weather Services **Date:** 1/8/18 **AC No:** 00-45H
**Initiated by:** AFS-400 **Change:** 1

1 PURPOSE OF THIS ADVISORY CIRCULAR (AC). This AC explains U.S. aviation weather products and services. It provides details when necessary for interpretation and to aid usage. This publication supplements its companion manual, AC 00-6, Aviation Weather, which documents weather theory and its application to aviation. The objective
to bring the pilot and operator up-to-date on new and evolving weather informa
capabilities to help plan a safe and efficient flight, while also describing the tra
weather products that remain.



# Recent advancements in hand and eye tracking with AI Chip

# Add remote collaboration with multiple avatars

# Can we collaborate globally in the same Holographic educational experience?

# What about Holoportation?

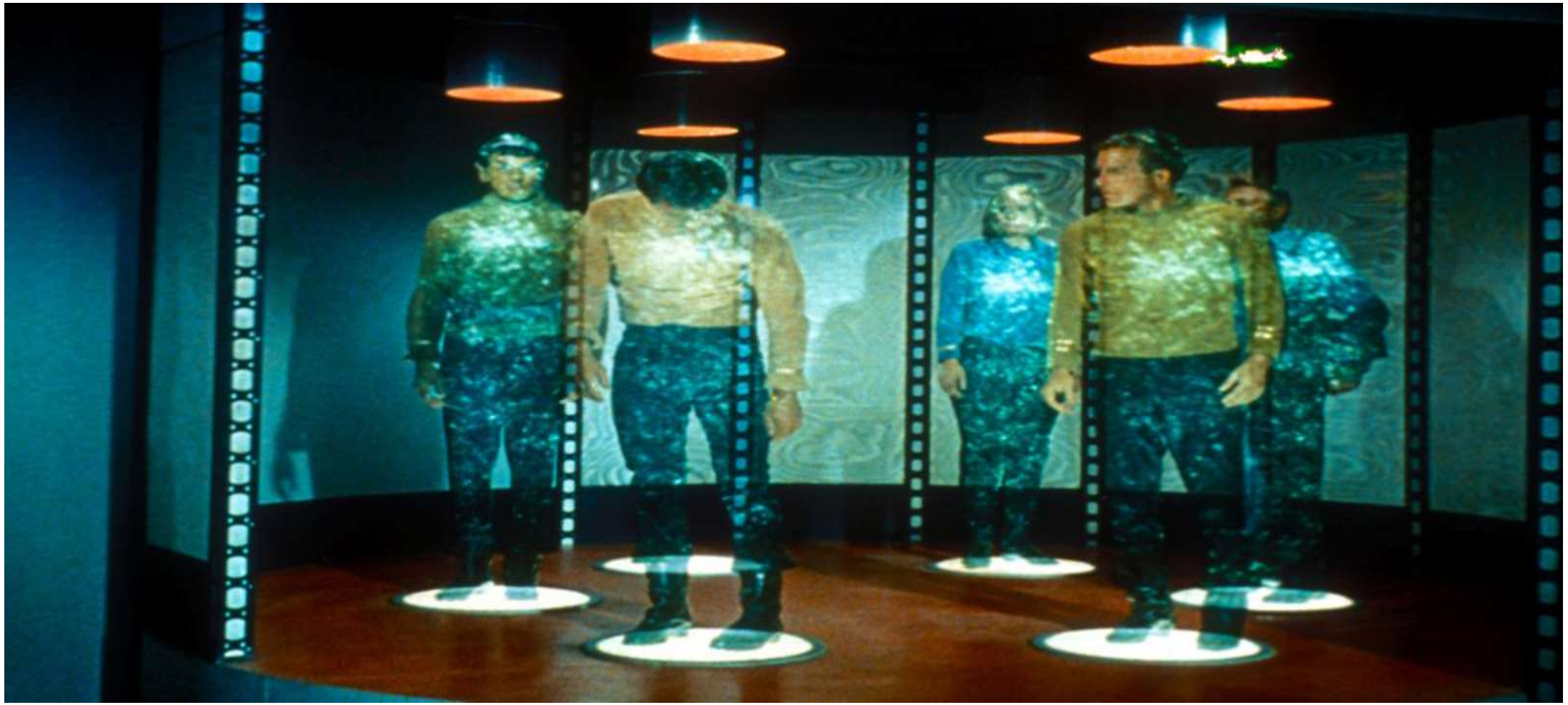
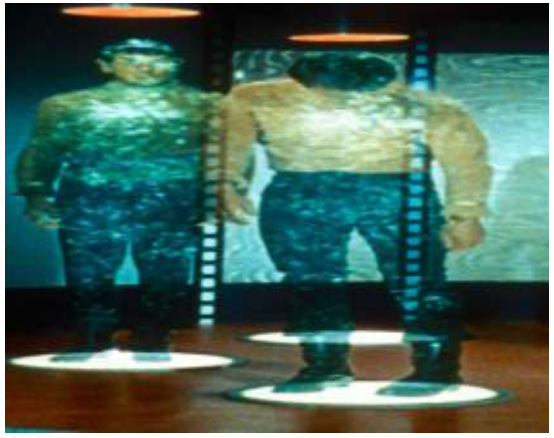
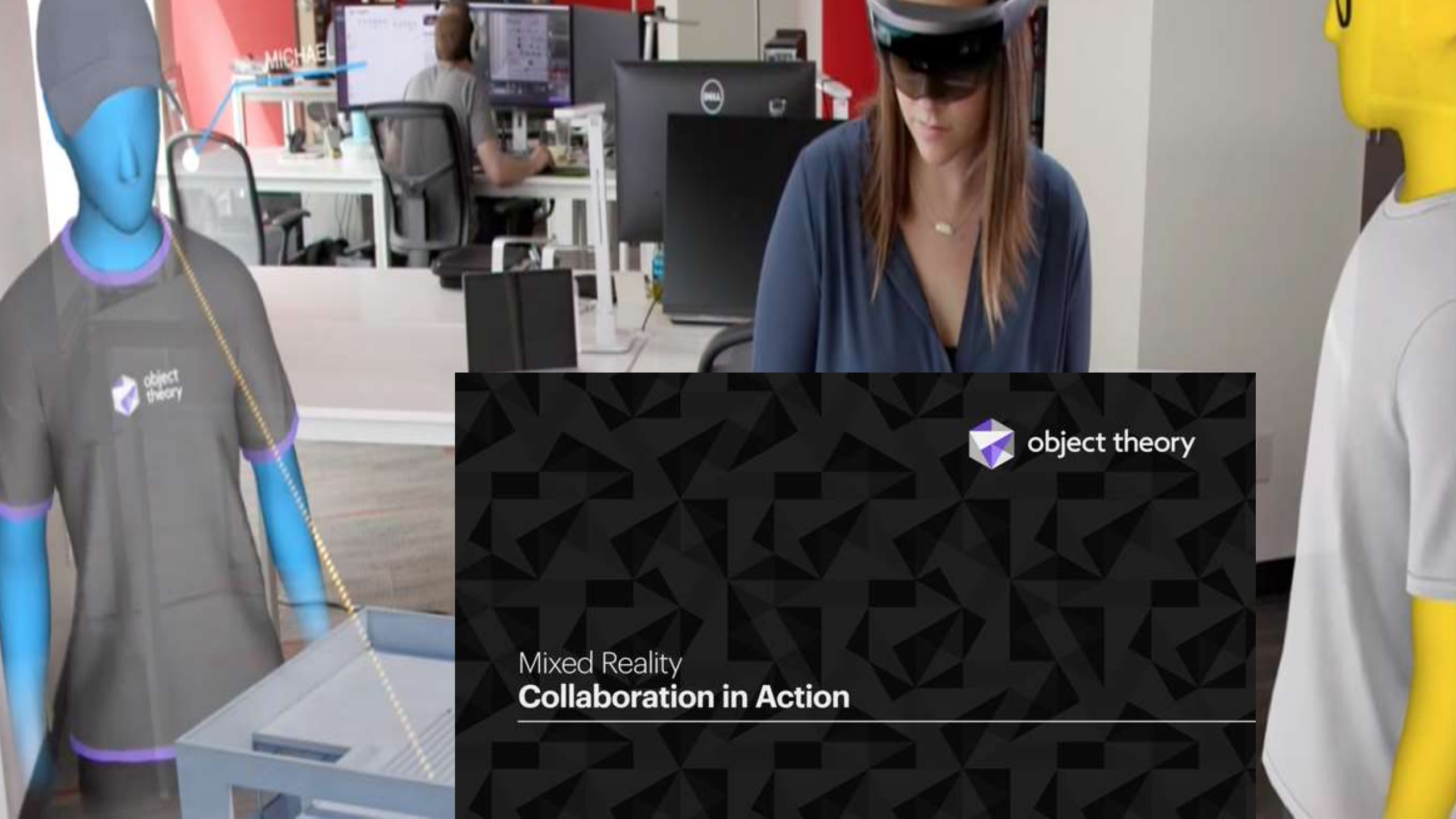


Image Credit: Paramount


We can Bridge the gap between fantasy and reality in education with Holographic  simulations and collaborative platforms.



# New applications and technologies allow us to put the pieces together


object theory
object theory
Mixed Reality
Collaboration in Action

# The Future of Collaboration- Collective Computing

# Current Research
# FAA PEGASAS COE

## Augmented Weather Interfaces Project 33
## Funded by the Federal Aviation Administration [FAA] Next Gen Weather Technology in the Cockpit Program

Michael Dorneich and Eliot Winer, Iowa State University

Lori Brown and Geoff Whitehurst, Western Michigan University

# Augmented Weather Interfaces Project 33

- Create and optimize 3D Cloud models for use with appropriate augmented realty devices such as: WeatherXplore Application, Microsoft HoloLens, immersive headsets and Prism 2 collaborative platform.
- Evaluate the feasibility of 3D learning objects on a collaborative AR platforms such as Spatial and  PRISM software.

The best way to predict the future is to invent it.  It is a good time to start inventing.

Join me on this journey
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