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16. Abstract

Extended reality (XR) is a collection of technological modalities that have increasingly grown and expanded over several decades. The technology's growth and expansion has given way to new and novel use cases across an array of practical applications. XR is a unifying term that describes existing technologies such as augmented reality (AR), virtual reality (VR), and mixed reality (MR), and is expected to describe similar future technologies in this area. Several industries are applying various aspects of XR into training and daily operational tasks. Yet, there is a general lack of data-based evidence that significantly supports XR's use as an effective training modality in trade-specific and adult learning applications. Beyond the science of knowledge transfer, airlines are looking to regulatory authorities to approve and certify the use of this technology in flight attendant training, among others. Work is underway to develop such guidance for regulators, as is scientific research to understand if there are any quantifiable benefits or value in incorporating this technology into the classroom or workflow. Research in these areas is needed the most. Each area requires the input, cooperation, and collaboration from an array of knowledge reservoirs among industry, academia, and government to understand the best application of this technology in Advanced Qualification Programs and traditional Part 121 N and O training approaches. The future of XR in training and operational job tasks is broad. There is also potential for positive outcomes in other areas such as passenger education, integration with emerging technologies and trends, and cabin safety research.

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# Extended Reality in Cabin Safety

## A Practical Approach to Implementation

Presented to: WATS 2024

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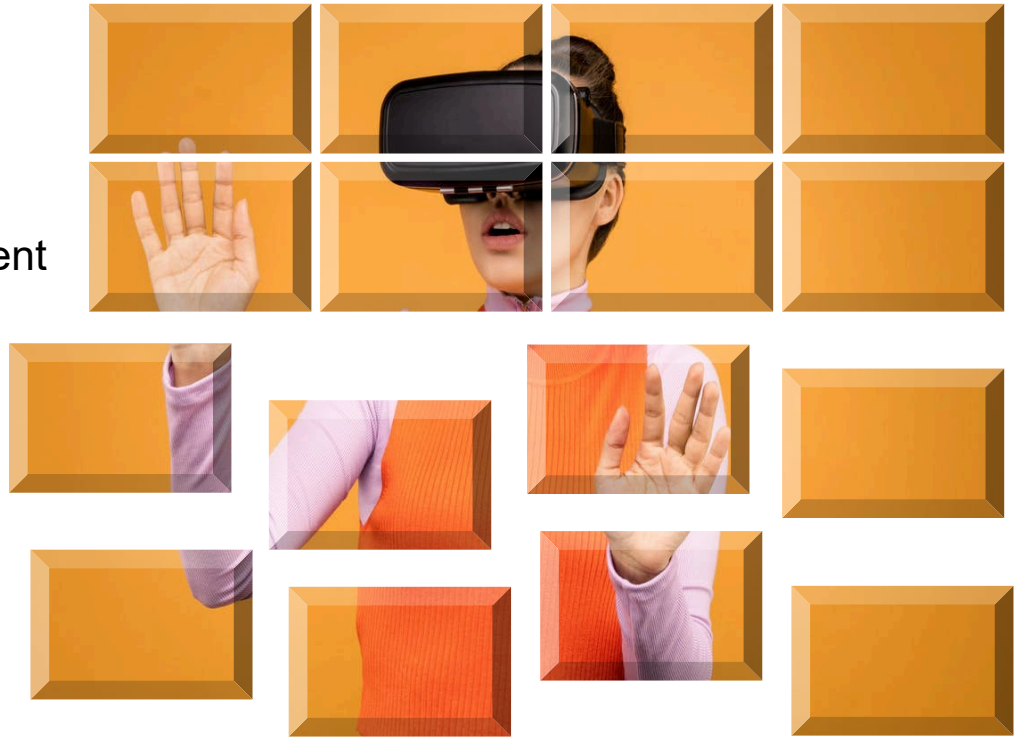
Federal Aviation Administration

# Overview

- XR background
- Problem
- Current work and application
- Future

# Introduction

- **eXtended Reality (XR)**
  - Umbrella term referring to current (and future) technologies:
    - Virtual Reality (VR)
    - Augmented Reality (AR)
    - Mixed Reality (MR)



# How long ago are XR's roots?

- 2000s
- 1980s
- 1940s
- 1830s

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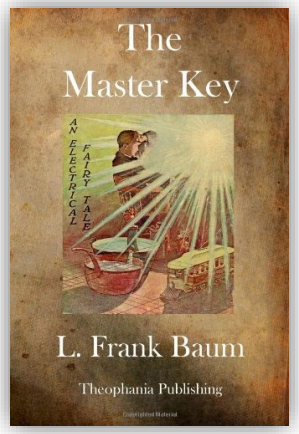
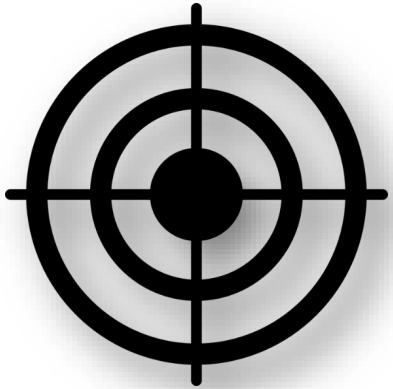
# XR Types: VR Evolution

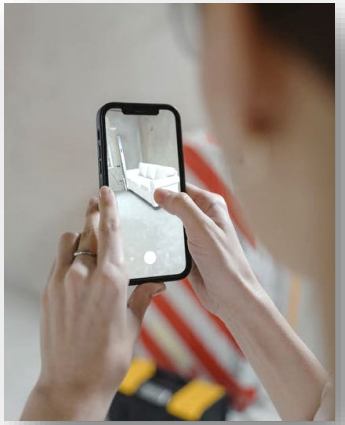
# XR Types: AR Evolution




1901

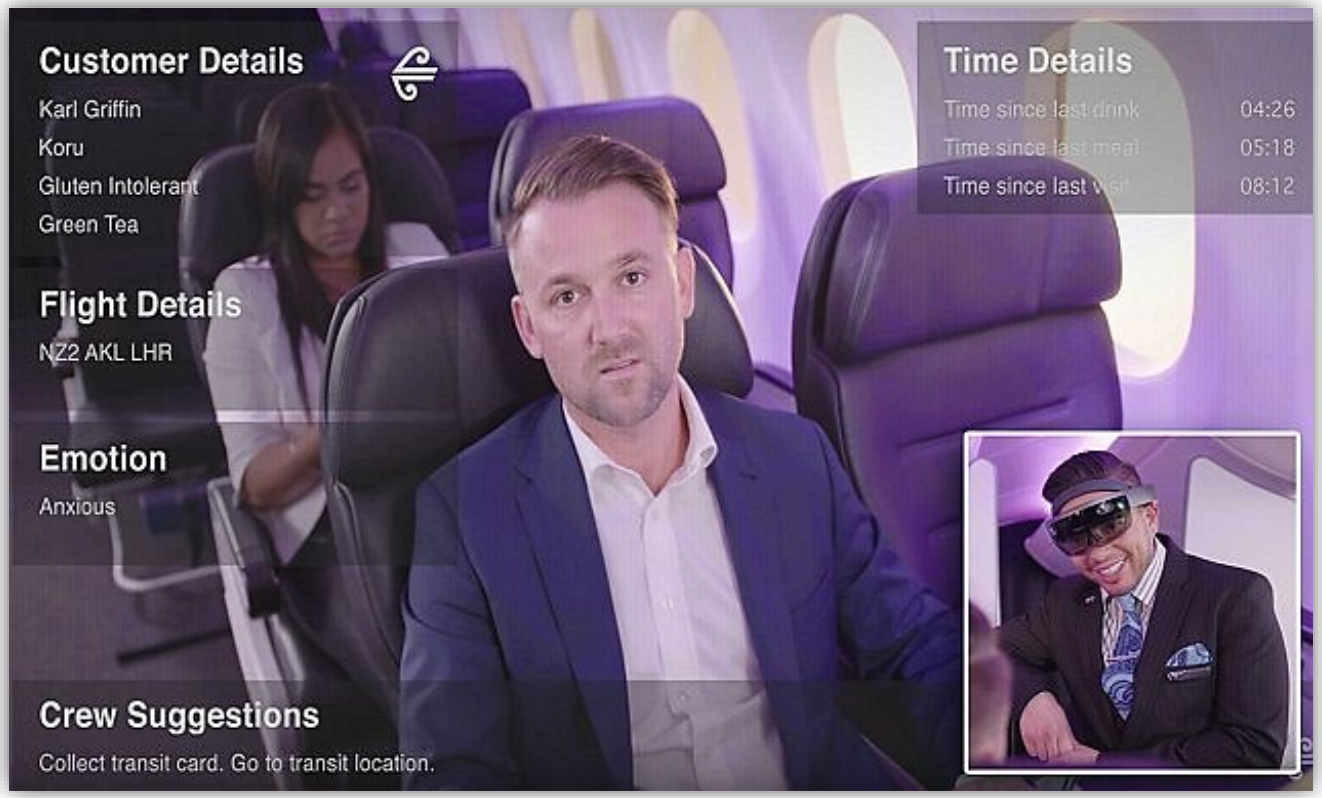


1918



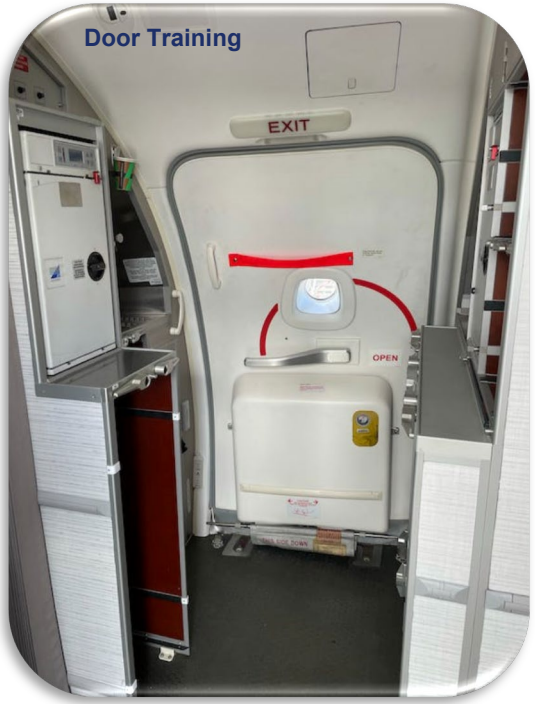
Today

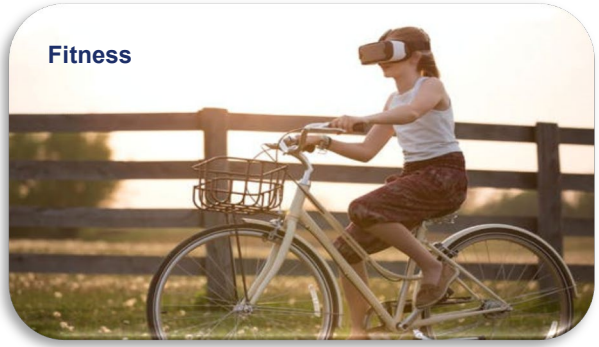
# MR




Credit: Daily Mail, Air New Zealand

# XR Technology Use

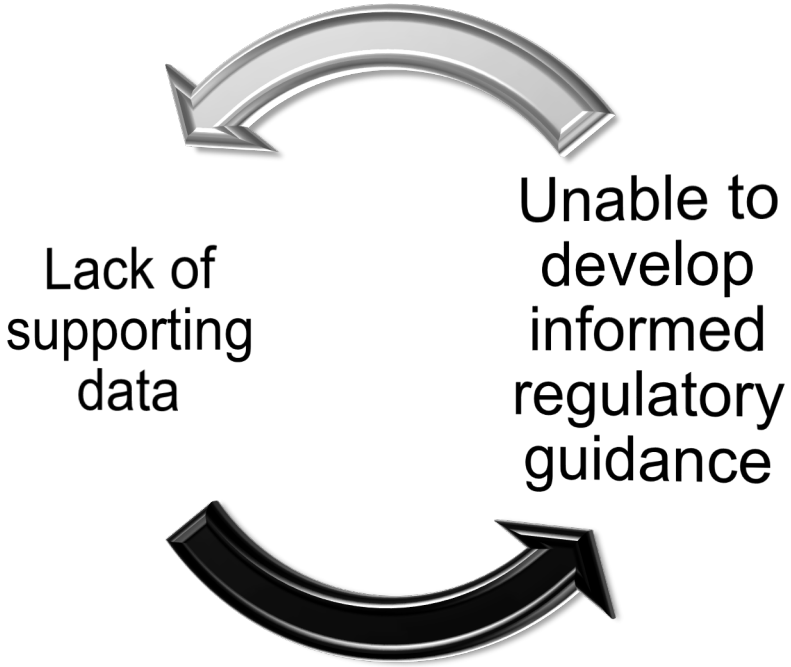


# Current Use Cases

- **Laparoscopic surgery study**
  - Brain overload is an important issue (Frederiksen et al., 2020)
- **PTSD clinical intervention**
  - Effective over imagined exposure therapy (Comer, 2016)
- **Rehabilitation**
  - Significant improvement in mobility (Cano Porras et al., 2018; Mirelman et al., 2016)
- **Familiarization**
  - Flight attendant supplemental

# Problem


Unable to develop informed regulatory guidance
Lack of supporting data

# Current Work and Application

- **ICAO Ad Hoc Working Group on Cabin Crew Digital Learning**
- **AQP/N&O and XR outlook**
- **“What’s in it for me?”**
  - Uncertain: A call to action

# Future Research Areas

- **Cabin crewmembers**
  - Training (initial, recurrent, TTT, calibration, etc.)
  - Effective hiring models?
- **Cabin safety**
  - Egress and evacuations
  - Passenger education
  - Emerging technologies