

v i r t i

Applications of AI in Medical Education

Kurt Kratchman, CEO

Using AI and XR technologies for immersive learning and training
in healthcare education



Using AI and XR technologies for immersive learning and training in healthcare

Contents:

- The Pace of Change and Disruption: Moore's Law and Kurzweil's Singularity
- Overview of Immersive Medical Systems
- A Brief History of VR in Hospitals
- Most impactful use of VR in Hospitals
- Research
- Traditional vs Immersive Training
- Definitions: VR, MR, AR, AI
- Capabilities
- Use Cases

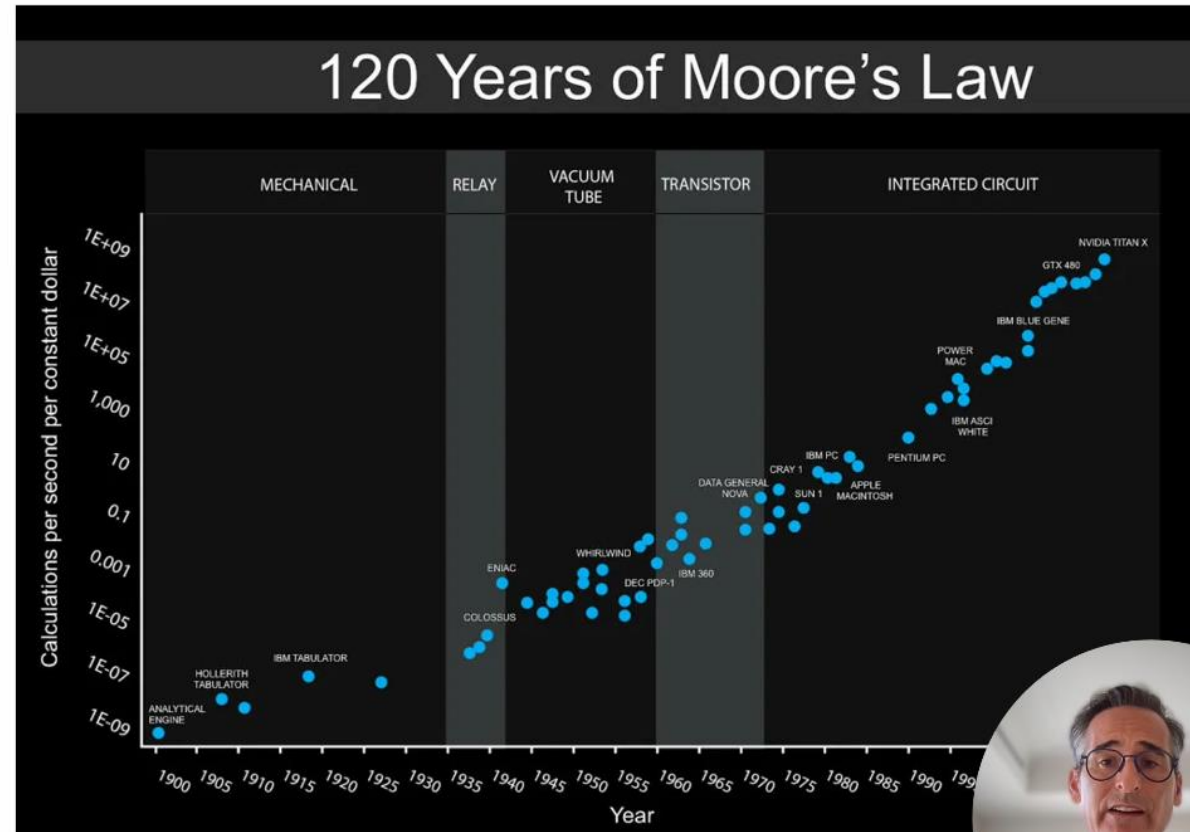


Overview: Moore's Law and the Pace of Change

- Moore's law is the observation that the number of transistors in an integrated circuit (IC) doubles about every two years. Moore's law is an observation and projection of a historical trend. Rather than a law of physics, it is an empirical relationship linked to gains from experience in production.
- What do you think this means to XR headsets and the future of wearables?

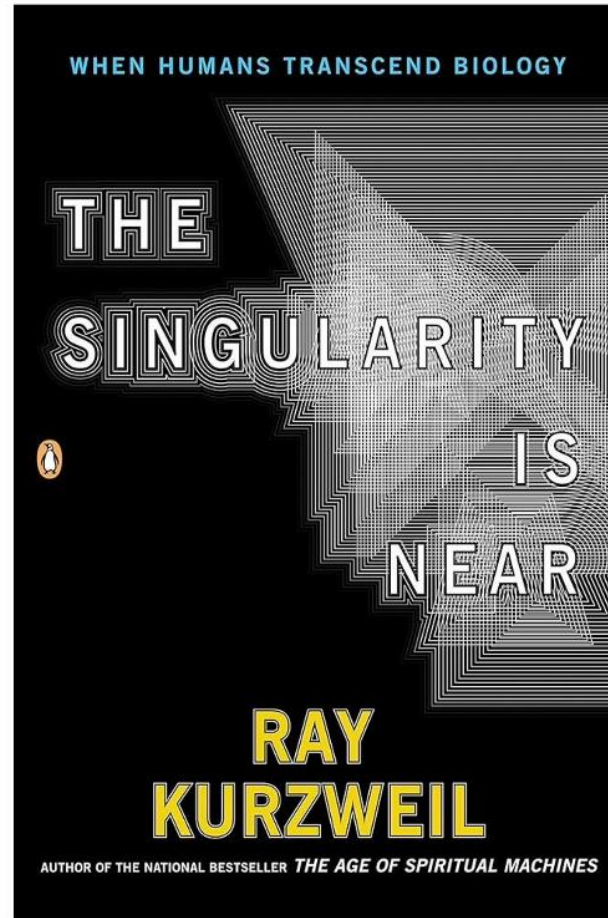
<https://ourworldindata.org/moores-law>

<https://longnow.org/seminars/O2005/sep/23/kurzweils-law/>

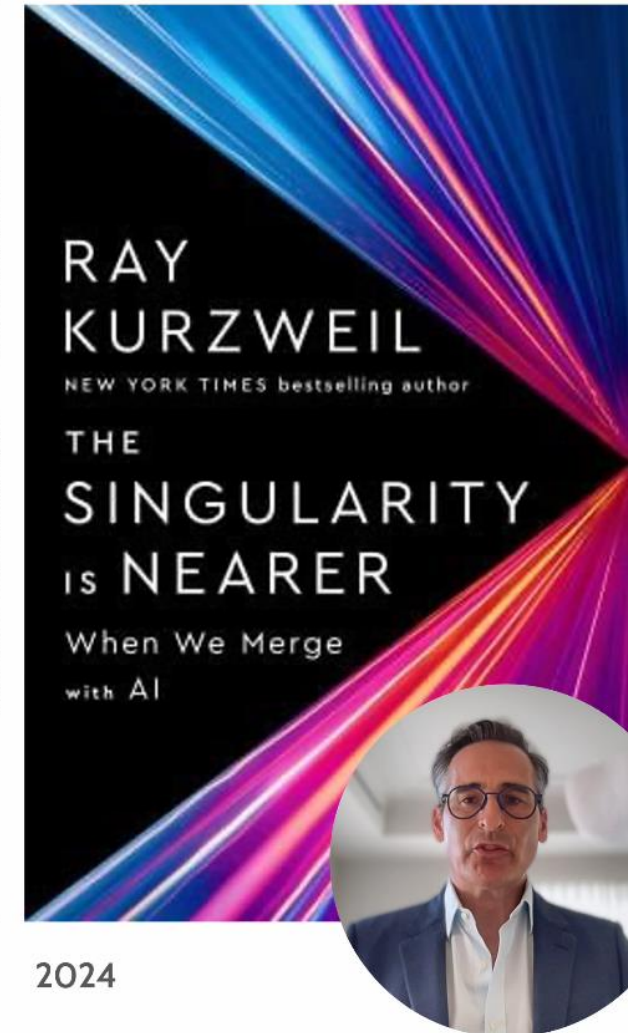


Overview: Ray Kurzweil and Singularity

Kurzweil describes his law of accelerating returns which predicts an exponential increase in technologies like computers, genetics, nanotechnology, robotics, and artificial intelligence. Once the singularity has been reached, Kurzweil says that machine intelligence will be infinitely more powerful than all human intelligence combined. The singularity is also the point at which machines' intelligence and humans would merge



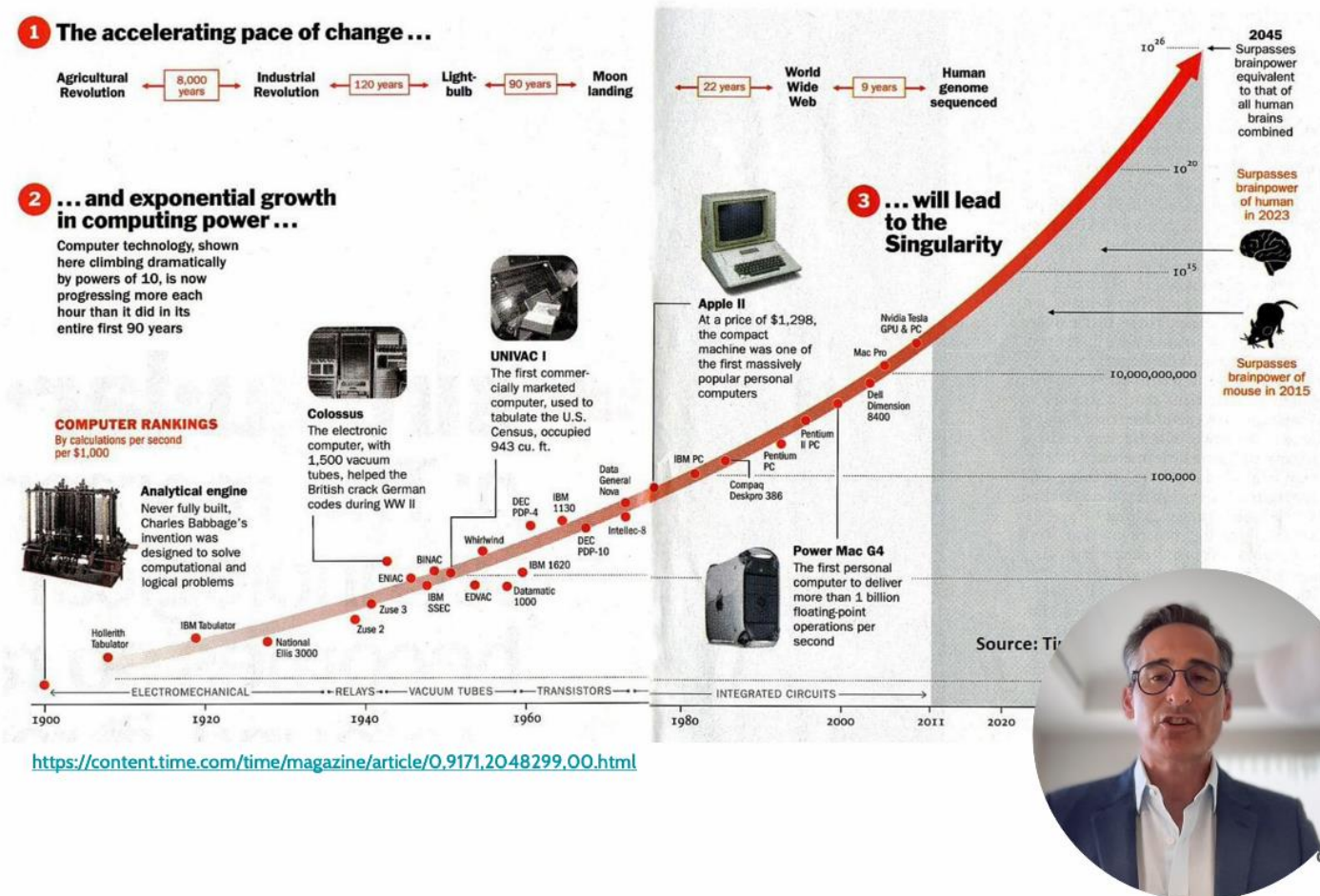
2005



2024

Overview: Ray Kurzweil and Singularity

- During the singularity, Kurzweil predicts that "human life will be irreversibly transformed" and that humans will transcend the "limitations of our biological bodies and brain"
- "I set the date for the Singularity—representing a profound and disruptive transformation in human capability—as 2045"



Overview: Immersive Medical Systems – Overall Status and Opportunity

- Current technologies and concepts are founded on more than 30 years of research and development
- Recent changes in cost and access make clinical VR systems affordable
- Immersive Systems provide new methods to address and manage difficult problems in healthcare
- After years of study and use by early adopters, validated systems are poised to move to the mainstream
- On the horizon: enhanced, ubiquitous, informative, and integrated.



<https://vhil.stanford.edu/people/walter-greenleaf>
<https://greenleafmed.com/>



<https://ivrha.org/>



<https://virtualmedicine.org/>

Overview: Clinical AR/VR Systems Have Impact



Facilitate Cognitive Engagement

Promote Adherence

Active Involvement:
XR Systems provide users with
immersive experiences that maximize
cognitive engagement

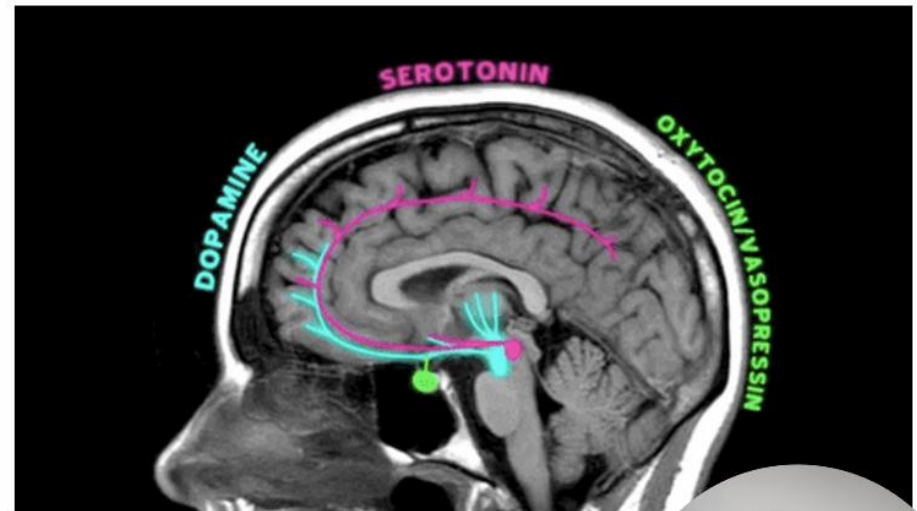


<https://vhil.stanford.edu/people/walter-greenleaf>
<https://greenleafmed.com/>



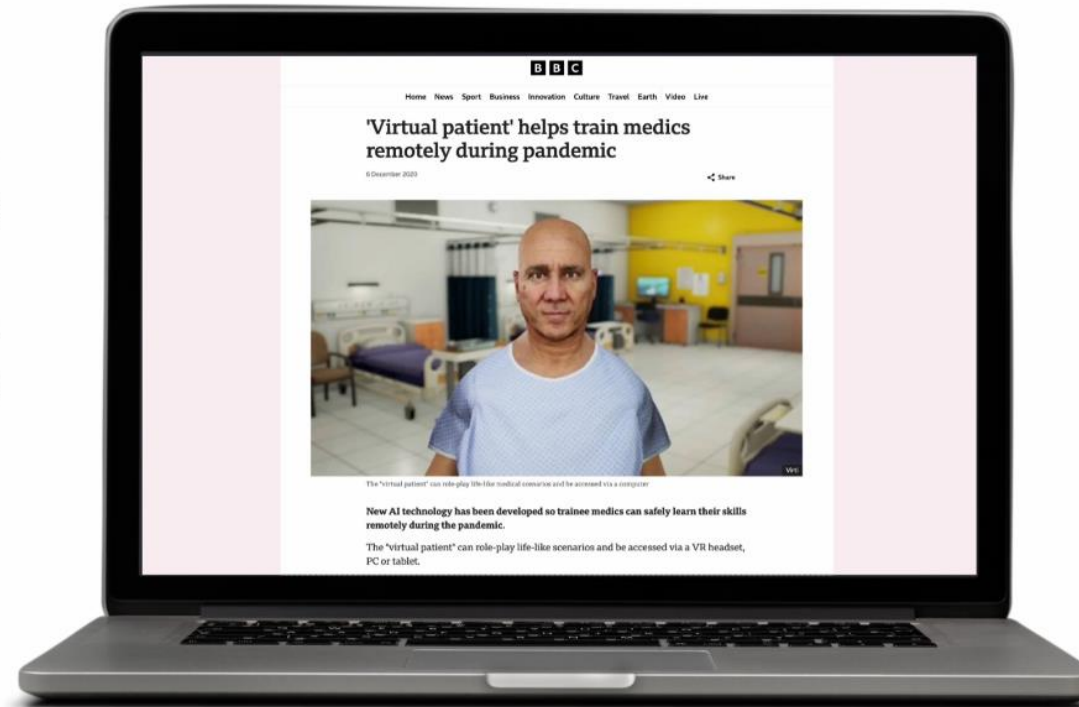
The Neuroscience of How VR/AR Systems Support Clinical Care

- Immersive systems support training and improve clinical care by taking advantage of the way our brain's learning and reward systems function
- VA/AR systems can:
 - a. Activate neuroplastic change via reward systems
 - b. Shorten the reward feedback loop – show progress
 - c. Leverage minor neuron systems
 - d. Provide insight and perspective by changing time, space, and point of view
 - e. Create experiences with emotional impact
 - f. Evaluate in a robust, objective, and functional manner



Immersive Medical Systems are currently used for

- Functional Training
- Objective Assessments
- Improved Interventions
- Facilitated Adherence
- Distributed Care Delivery
- Prevention and Wellness
- Facilitate Research



<https://www.bbc.com/news/uk-england-bristol-55202237>



Overview: Most Impactful Use Cases

Most impactful uses of VR in hospitals include:

- Training and Education
- Exposure Therapy
- Medical Imaging
- PTSD Treatment
- Pain Management
- Physical Therapy
- Vision Training
- Pre-Surgical Visualization
- Operating Workflows
- Soft Skills and Communication

Exposure Therapy: Phobias

- Panic disorder
- Social anxiety disorder
- Obsessive-compulsive disorder (OCD)
- Posttraumatic stress disorder (PTSD)
- Generalized anxiety disorder
- Traumatic brain injury

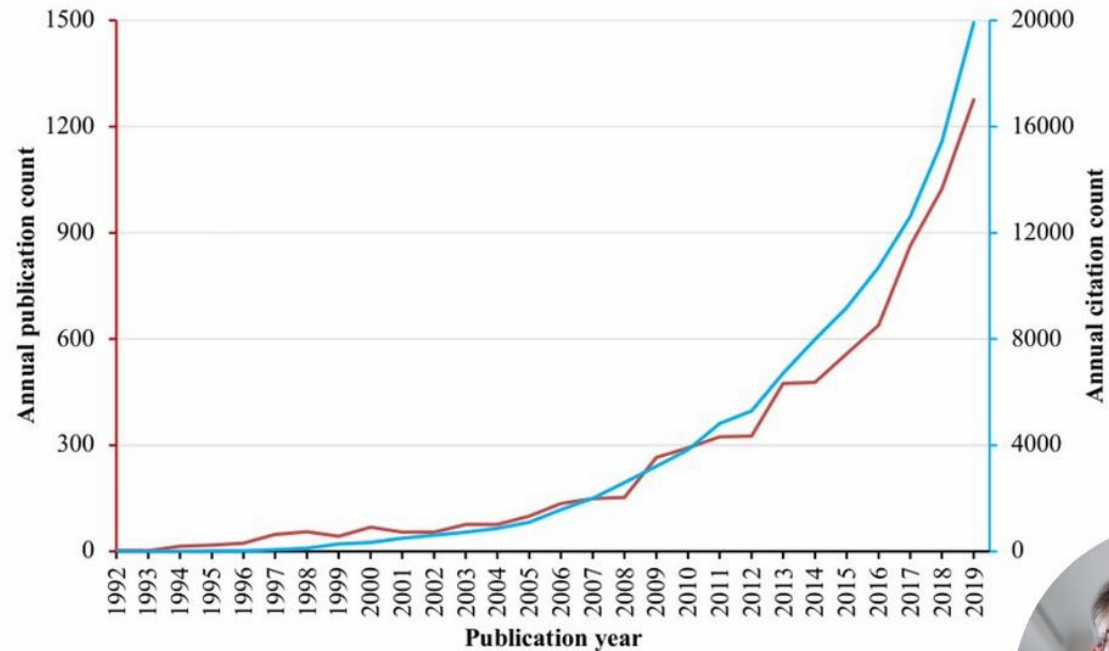


Overview: Research

Journal of Medical Internet Research

“Virtual and Augmented Reality Application in Medicine: Analysis of the Scientific Literature”

- Results: The analysis was based on data from 8399 papers. Major research themes were diagnostic and surgical procedures, as well as rehabilitation. Commonly studied medical conditions were pain, stroke, anxiety, depression, fear, cancer, and neurodegenerative disorders. Overall, contributions to the literature were globally distributed with heaviest contributions from the United States and United Kingdom. Studies from more clinically related research areas such as surgery, psychology, neurosciences, and rehabilitation had higher average numbers of citations than studies from computer sciences and engineering.
- Conclusions: The conducted bibliometric analysis unequivocally reveals the versatile emerging applications of VR and AR in medicine. With the further maturation of the technology and improved accessibility in countries where VR and AR research is strong, we expect it to have a marked impact on clinical practice and in the life of patients.



<https://www.jmir.org/2021/2/e25499/>



Overview: ChatGPT, MCATs, LSATs and GMAT Exams

ChatGPT Passes US Medical Licensing Exam Without Clinician Input

ChatGPT achieved 60 percent accuracy on the US Medical Licensing Exam, indicating its potential in advancing artificial intelligence-assisted medical education.



ChatGPT passes exams from law and business schools

By Samantha Murphy Kelly, CNN Business
4 minute read · Updated 1:35 PM EST, Thu January 26, 2023



Would Chat GPT3 Get a Wharton MBA? A Prediction Based on Its Performance in the Operations Management Course

by Christian Terwiesch (terwiesch@wharton.upenn.edu)

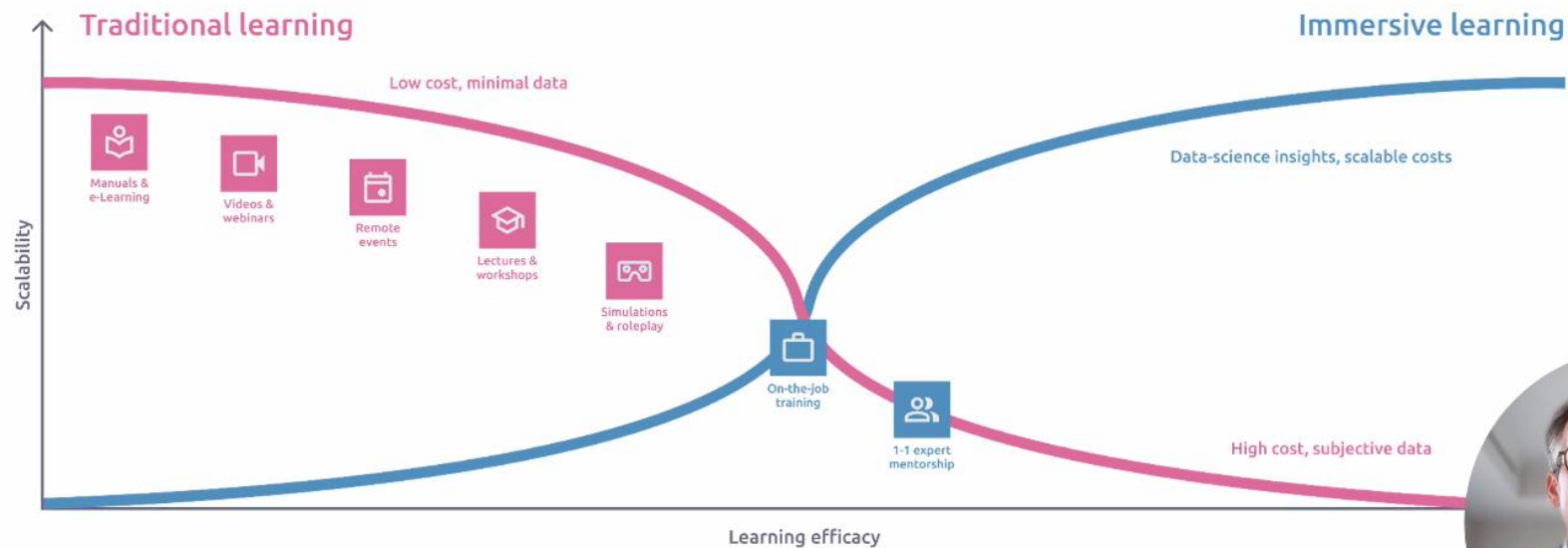
ABSTRACT

OpenAI's Chat GPT3 has shown a remarkable ability to automate some of the skills of highly compensated knowledge workers in general and specifically the knowledge workers in the jobs held by MBA graduates including analysts, managers, and consultants. Chat GPT3 has demonstrated the capability of performing professional tasks such as writing software code and preparing legal documents. The purpose of this paper is to document how Chat GPT3 performed on the final exam of a typical MBA core course, Operations Management. Exam questions were uploaded as used in a final exam setting and then graded. The "academic performance" of Chat GPT3 can be summarized as follows. First, it does an amazing job at basic operations management and process analysis questions including those that are based on case studies. Not only are the answers correct, but the explanations are excellent. Second, Chat GPT3 at times makes surprising mistakes in relatively simple calculations at the level of 6th grade Math. These mistakes can be massive in magnitude. Third,



Traditional vs. Immersive Learning

Conventional training methods have limitations in terms of scalability and objective data, which can result in inadequately prepared employees.



Healthcare Education Pain Points

Access to healthcare education and training is unequal and largely dependent on factors such as resources and geography

For the workforce

Stress



\$20bn
Errors

For patients

Safety



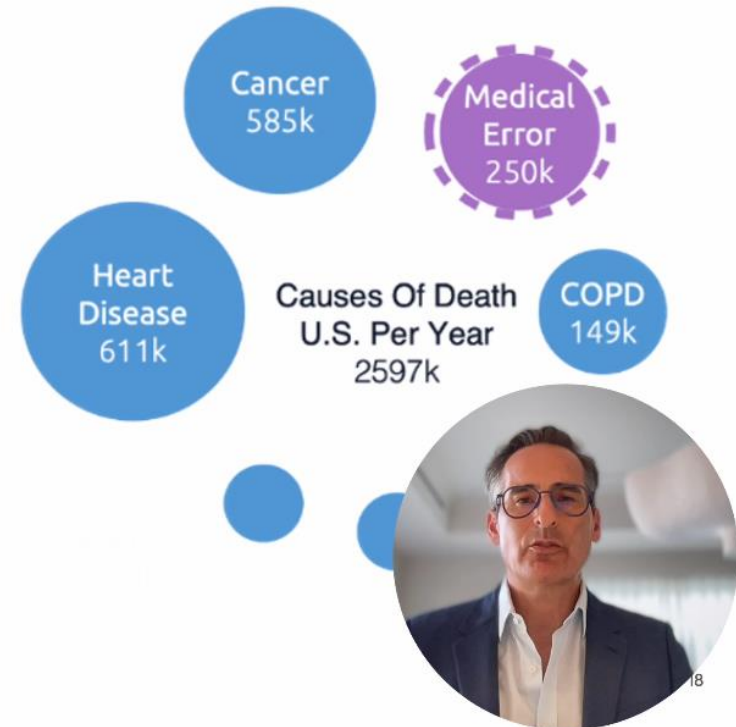
250k
Deaths

For organizations

Cost



\$2.7bn
Training

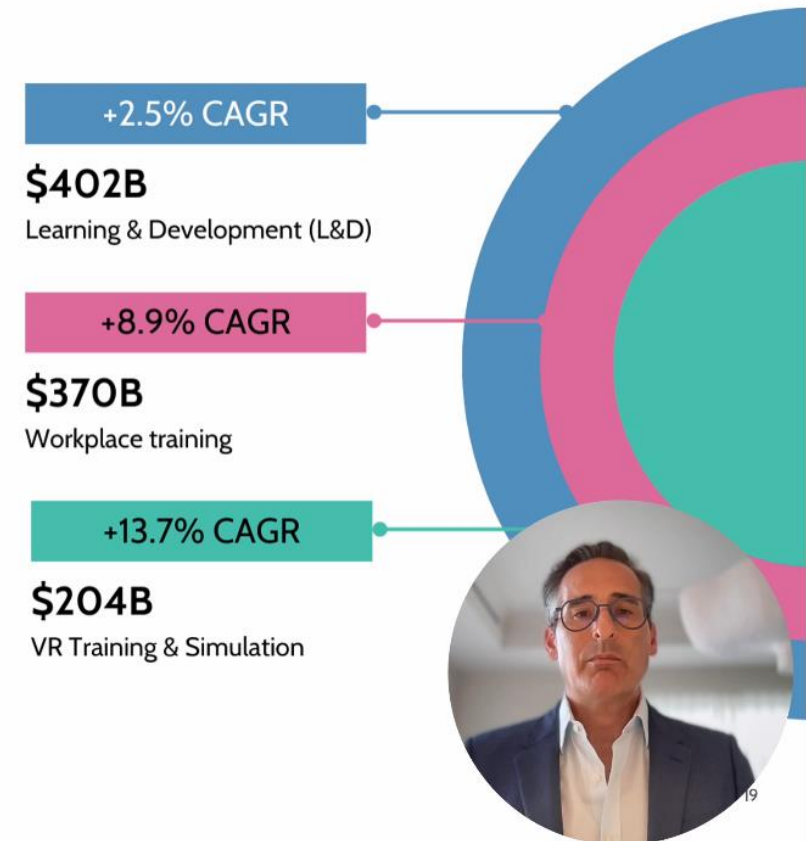


Mainstream: Healthcare and Beyond

This presents a significant market opportunity to disrupt the way healthcare and enterprises develop their workforce.

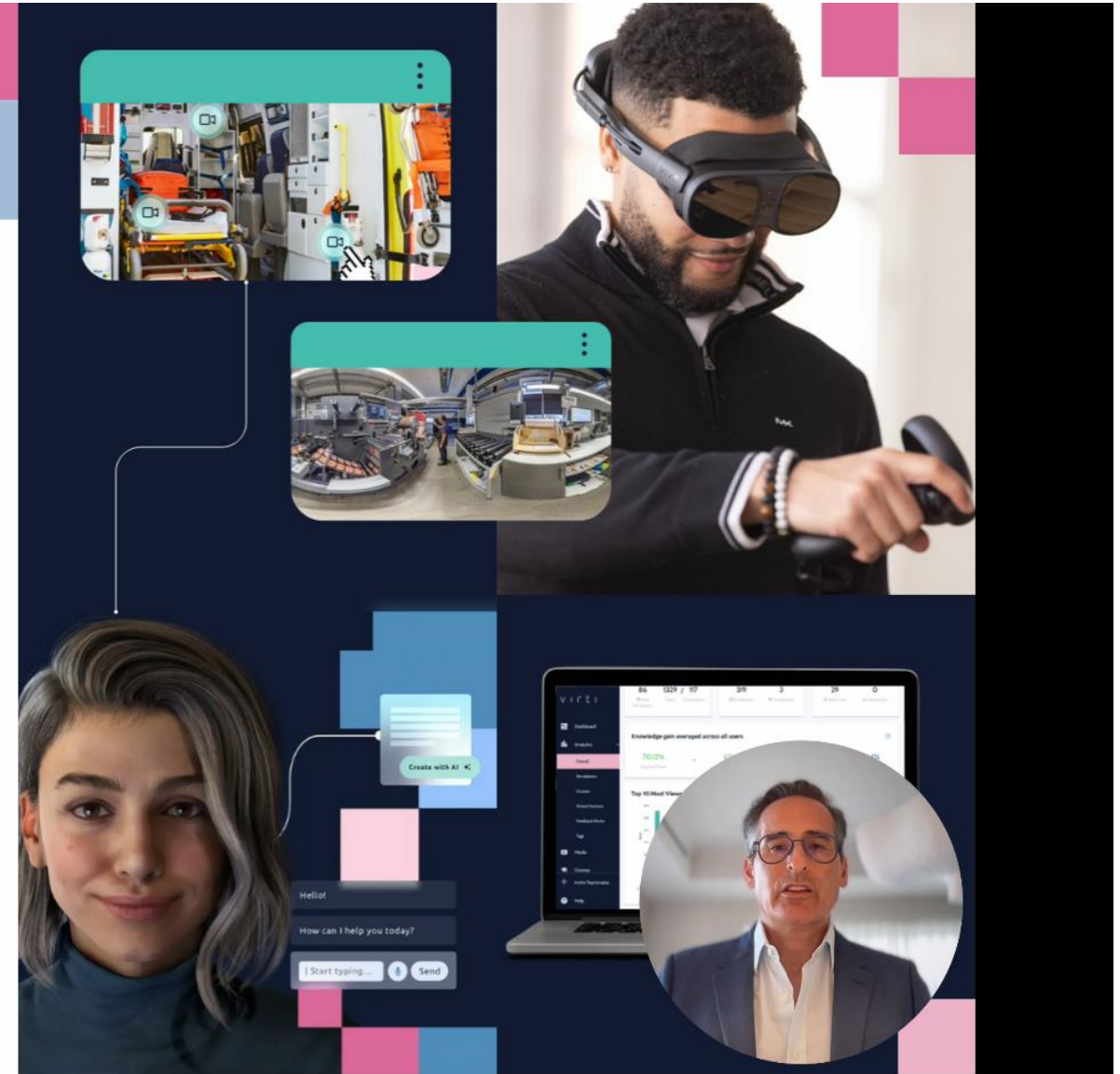
- The global virtual training and simulation market is projected to triple to \$602B by 2027.
- 1 in 4 large companies plan to, or already use virtual learning (i.e., Walmart, UPS).
- 79% of corporate L&D professionals expect to spend more on digital learning.
- 92% of businesses use some form of learning/training software (40% of Fortune 500).
- Global VR Healthcare Market Forecast \$11B by 2028. CAGR: 2021-2028 38.3%.

Sources: Fortune Business Insights Desk, Accenture, PwC, Market Data Forecast



Immersive Learning Solutions

- Today's solutions range from bespoke to platform-based
- Content creation varies from custom engineering to user-friendly AI-assisted tools
- Cloud-based solutions run on any device, including mobile, web, and VR headsets
- Professionals and enterprises must prioritize privacy, security, and data rights
- Select consultants, companies, and platforms compliant with certifications like ISO 27001/9001, Cyber Essentials Plus, and SOC2, offering enterprise-grade security and privacy
- Governments have specialized compliance and procurement requirements that must be met (e.g. FedRAMP, SAM.gov)



Definitions

- Introduction and overview
- **Review definitions (what is it?)**
- Discuss use cases from the field (what is it capable of?)
- Establish relevance and importance

What is it? Definitions.

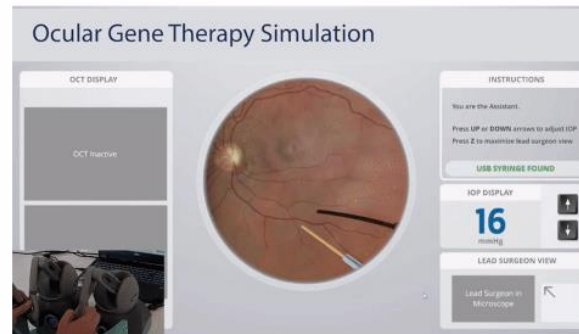
What is it capable of?

Why is it important?



Definitions: Virtual Reality

Virtual Reality (VR) is a computer-generated or 360 video environment with scenes and objects that appear to be real, making the user feel they are immersed in their surroundings. This environment is experienced through a device known as a Virtual Reality headset.



<https://fundamentalsurgery.com/>



<https://archvirtual.com/>



Virtual Reality – 360 Video/Interactive Video



360 video environment. Immersive Video.

This environment is experienced through a device known as a Virtual Reality headset filmed with 360 video cameras.



Insta360 X3 360 \$446



GoPro Max \$399



Insta360 Pro2 \$4999



Apple Vision Pro \$4000



PICO 4 \$475



HTC VIVE XR Elite \$1099



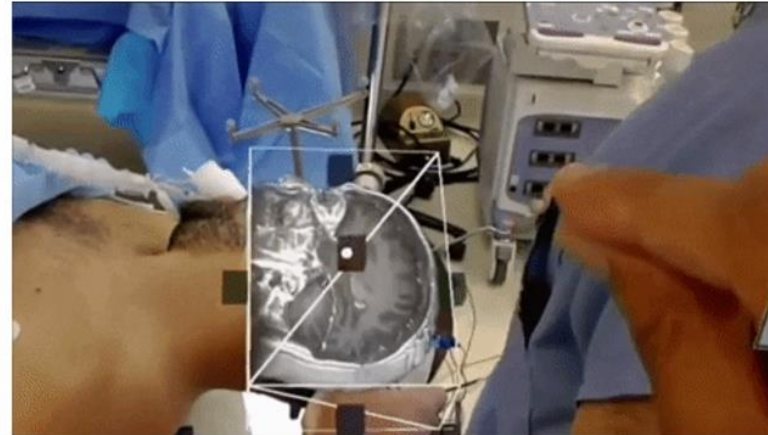
Meta Quest 3 \$495



Definitions: Augmented Reality (AR)

Augmented reality (AR) is an experience where designers enhance parts of users' physical world with computer-generated input.

Designers create inputs—ranging from sound to video, to graphics to GPS overlays, and more—in digital content which responds in real-time to changes in the user's environment, typically movement.



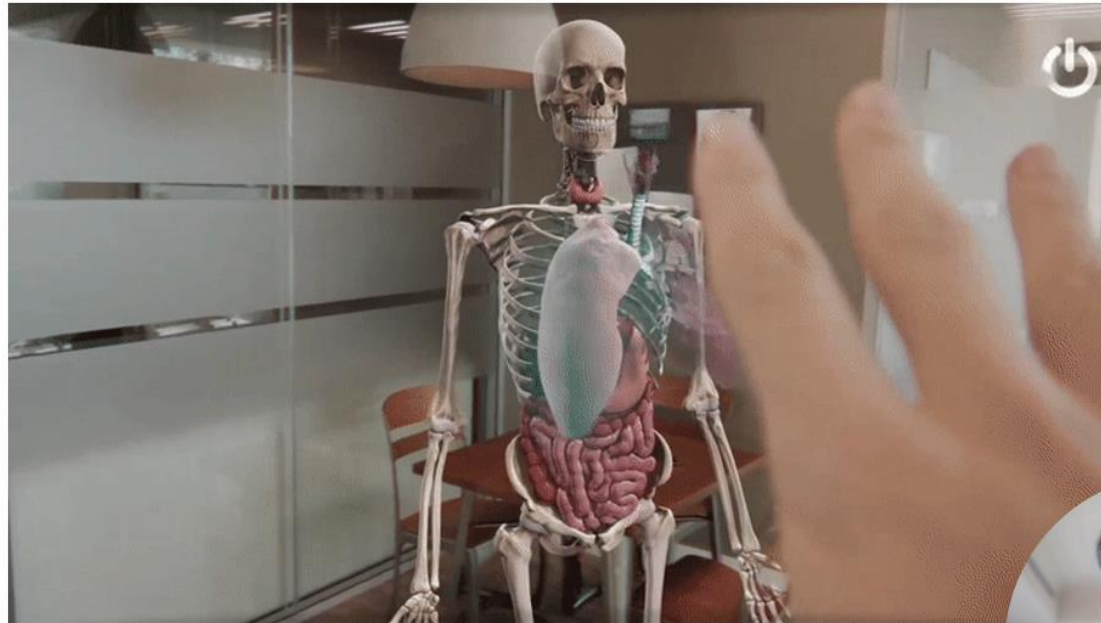
<https://hololens.reality.news/news/medical-software-maker-medivis-closes-2-3-million-funding-bring-hololens-surgical-platform-0193743/>



Definitions: Mixed Reality (MR)

Mixed reality (MR) is a term referring to all real-and-virtual combined environments and human-machine interactions generated by computer technology and wearables.

It includes representative forms such as augmented reality (AR) and virtual reality (VR) and the areas interpolated among them.

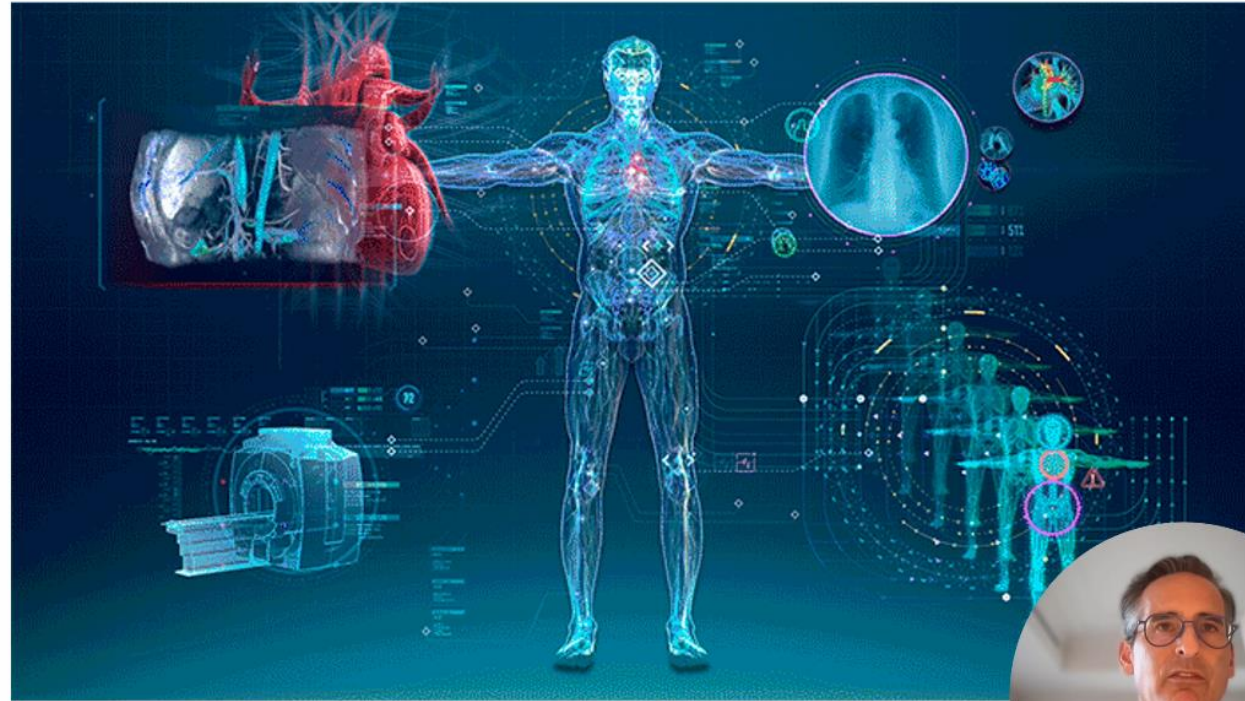


<https://3d4medical.com/>



Definitions: Artificial Intelligence (AI)

Artificial intelligence (AI), in its broadest sense, is intelligence exhibited by machines, particularly computer systems, as opposed to the natural intelligence of living beings. It is a field of research in computer science that develops and studies methods and software which enable machines to perceive their environment and uses learning and intelligence to take actions that maximize their chances of achieving defined goals.



<https://navan.ai/>



Definitions: Spatial Computing (SC)

- Spatial computing is an emerging technology that blends virtual experiences with the physical world, allowing for more natural and intuitive human-computer interactions
- It involves a range of technologies, including AI, extended reality (XR), the Internet of Things (IoT), Virtual Reality (VR) sensors, and computer vision
- When a headset becomes comfortable, VR/AR will be so obvious in hindsight.



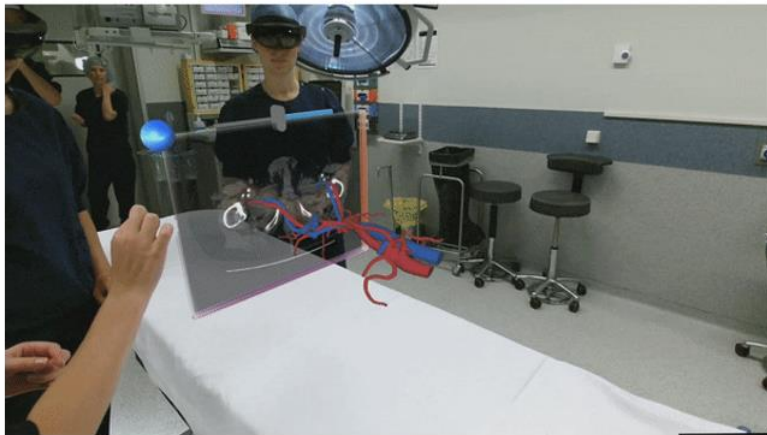
<https://medium.com/@a.salinas.mark/exploring-the-next-big-leap-in-xr-the-arrival-of-spatial-computing-718a3592ab80>



Definitions: XR is a catch all: for VR, AR, MR, AI, SC = XR

XR

<https://www.leidenlearninginnovation.org/stories/augmented-reality-app-leiden-medical-students-transplants/>



AI

Immersive Systems

<https://lavanya-37879.medium.com/the-future-of-care-ar-vr-technology-1d27d7107cd7>



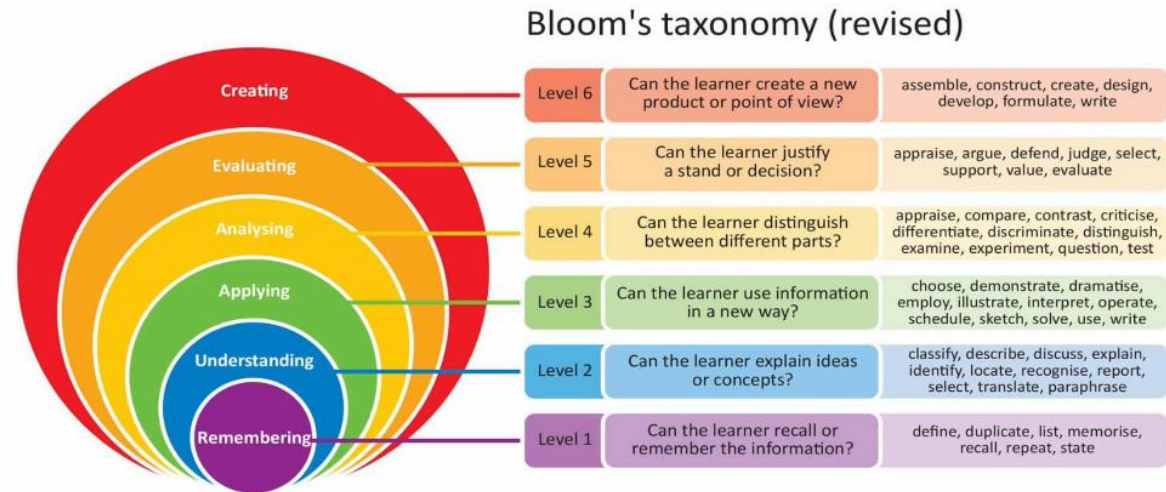
Spatial Computing

MXR = Medical XR



Pedagogical Framework: Bloom's Taxonomy

- In 1956, Benjamin Bloom with collaborators Max Englehart, Edward Furst, Walter Hill, and David Krathwohl published a framework for categorizing educational goals: Taxonomy of Educational Objectives. Familarly known as Bloom's Taxonomy, this framework has been applied by generations of K-12 teachers and college instructors in their teaching.
- The framework elaborated by Bloom and his collaborators consisted of six major categories: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation. The categories after Knowledge were presented as "skills and abilities," with the understanding that knowledge was the necessary precondition for putting these skills and abilities into practice.
- While each category contained subcategories, all lying along a continuum from simple to complex and concrete to abstract, the taxonomy is popularly remembered according to the six main categories.



Creating – Evaluating – Analyzing – Applying – Understanding – Remembering

XR: Create – Learn – Analyze – Scale

See – Learn – Do



XR Training Performance Data

Efficacy



Source: PwC VR Soft Skills Training Efficacy Study, 2020

Business Impact:

- Solves an important problem
- Efficiency
- Productivity
- Convenience
- Scale
- Affordability
- Knowledge Retention
- Skill Fade Reduction
- Innovation
- Confidence



230%

Increased in
knowledge
retention

92%

Increase in
confidence
applying skills

50%

Decrease in
onboarding
time

70%

Decrease in
employee
injury



XR Training Performance Data

VR learners were:

4x

faster to train than
in the classroom.

275%

more confident to apply
skills learned after training.

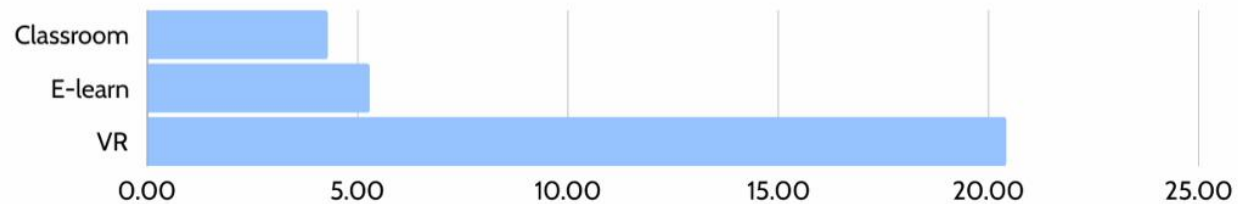
3.75x

more emotionally connected to
content than classroom learners.

4x

more focused than
e-learning peers.

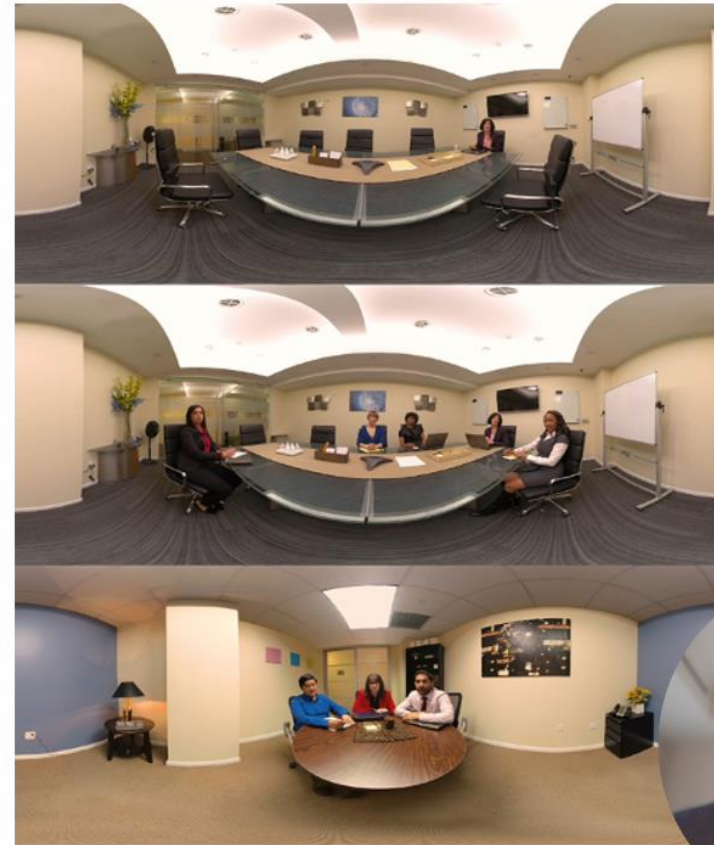
Average emotional connection felt to learning content:



XR for Empathy Training

Importance:

- Virtual reality allows users to feel emotions they could never otherwise feel in the real world. As much as people have the capability to empathize, they can't really walk in another person's shoes until they are immersed in that person's world, as themselves.
- VR allows people to experience exclusion, bias, and other situations in the first person, and it will drive them to change their own behavior based on that experience.



XR for Training with Repetition and Practice

Importance:

Virtual reality allows users to go through a simulation as many times as they like for no additional cost. If you want to practice solving a customer service problem with a real person, you need to pay for their time and they need to be able to come up with different responses every time – but AI-powered virtual humans can do that on the fly, every time, at almost zero marginal cost to the organization. And repetition and practice is one of the best ways to learn and drill skills.



Definitions

What is it? Definitions.

What is it capable of?

Why is it important?

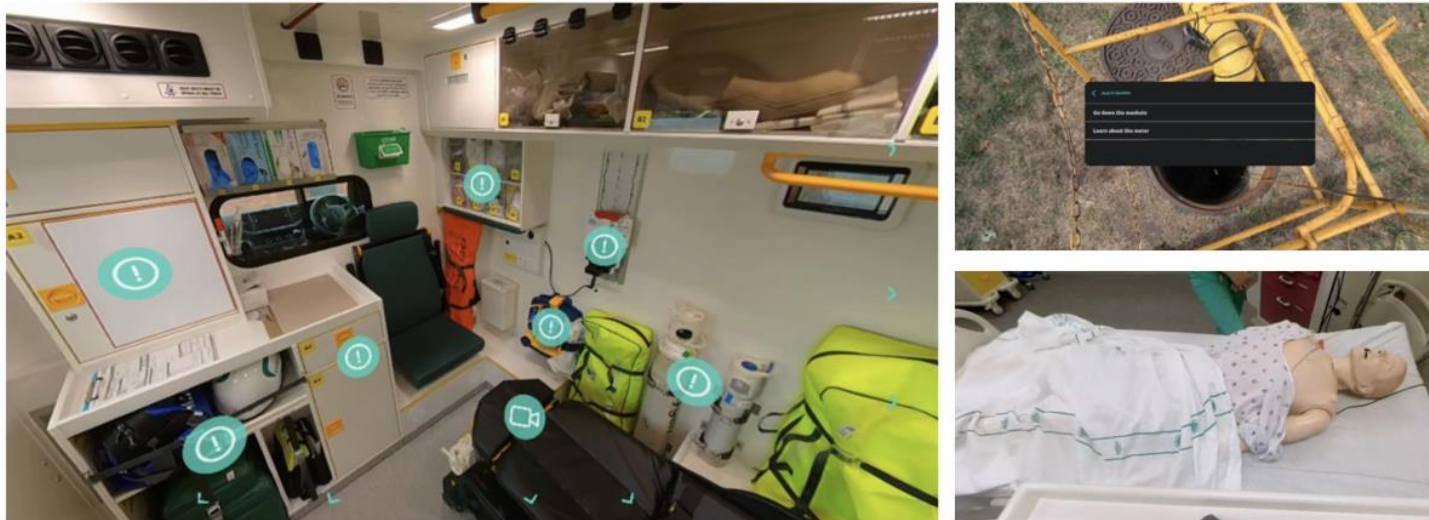
- Introduction and overview
- Review definitions (what is it?)
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System Design for Scale with Interactive Video

Today instructional designers can create unique, scenario-based learning content by uploading and recording video—either 360-degree or standard 2D—and enhancing it with interactivity, additional media, and questions.

<https://www.virti.com>



System Design for Scale with Virtual Humans

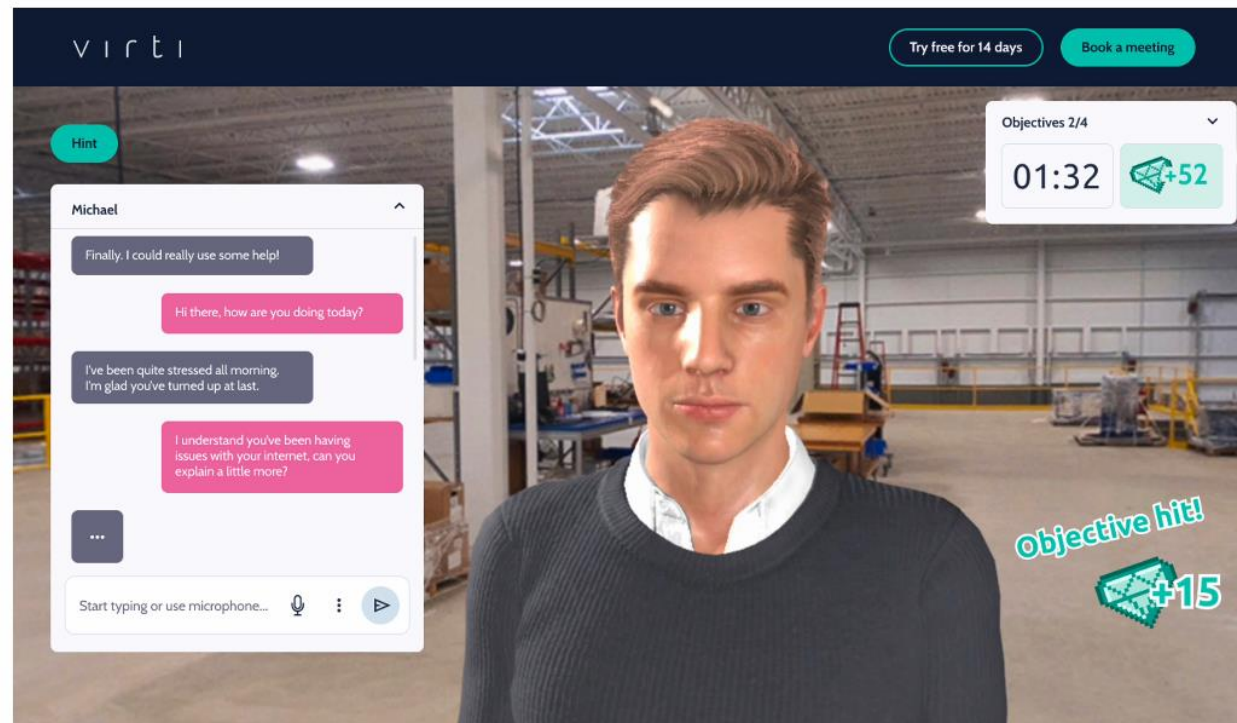
AI-assisted Virtual Humans enable trainers to design immersive role-playing scenarios with customizable learning objectives and personality traits. Leveraging advanced speech recognition, neural voices, animations, and conversational AI, these Virtual Humans deliver highly realistic and scalable training experiences.



Experiential Learning: Try a Virtual Human Now

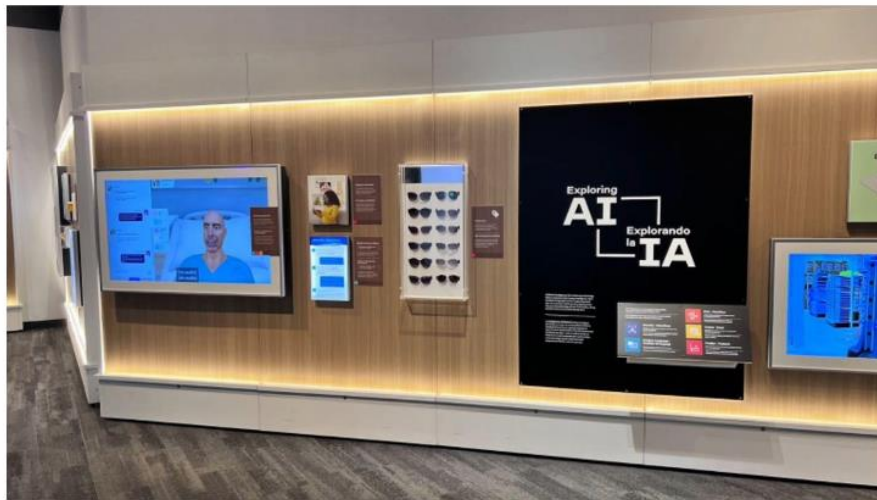
Choose a scenario and customize your Virtual Human.

<https://try.virti.com/>



Contextualizing AI

The Museum of Science, Boston, has a permanent exhibition exploring AI which includes *Virti in Healthcare* display



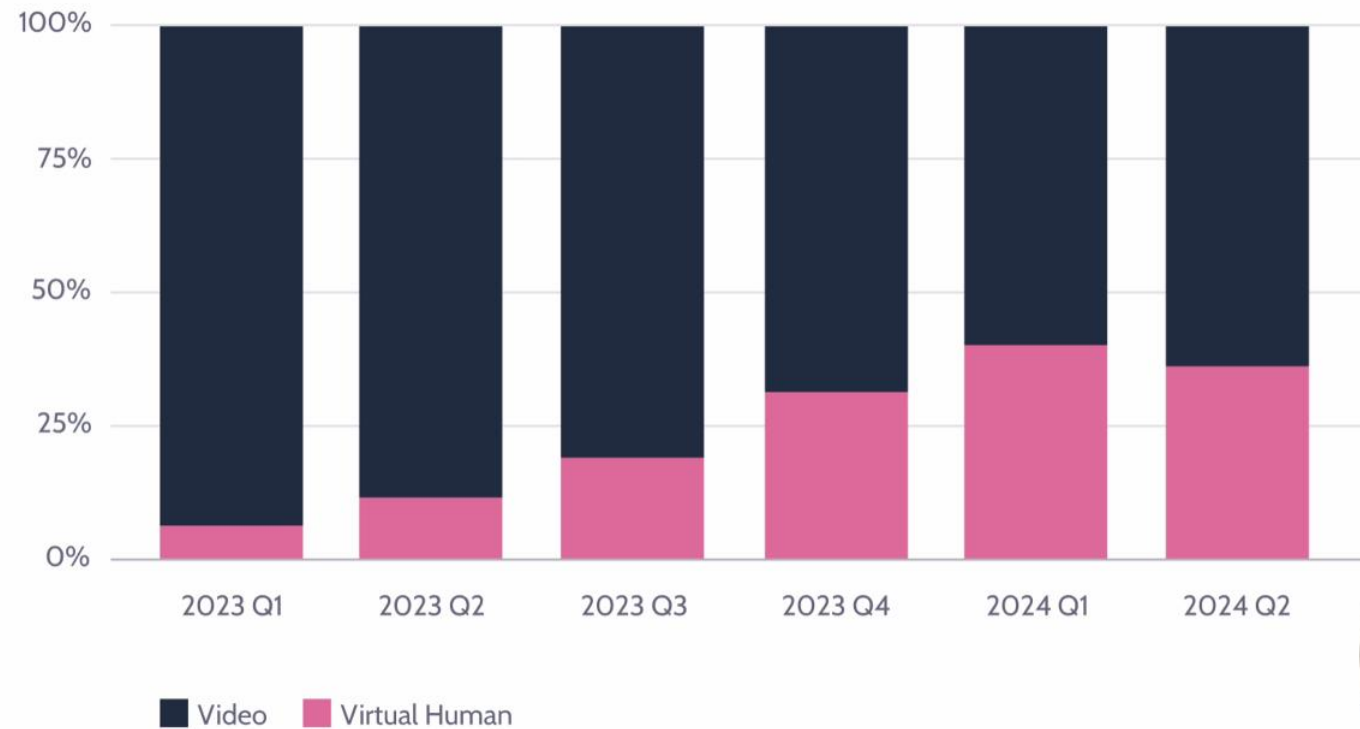
<https://www.mos.org/visit/exhibits/exploring-ai-making-invisible-visible>



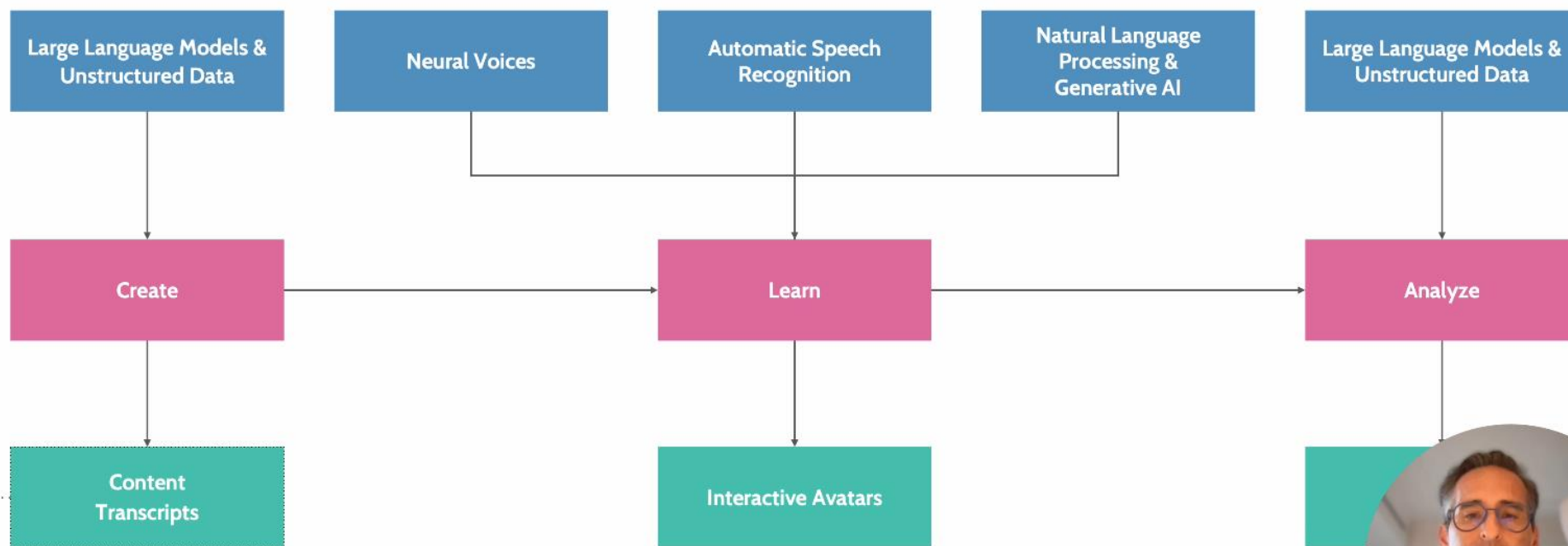
<https://www.mos.org/discover/topics/artificial-intelligence>



Trends in Virtual Human Adoption and 360 Video



Infrastructure: End-to-end Applied AI



Compliance and Accreditations

Compliance and accreditations for XR (Extended Reality) technologies can be crucial depending on the sector and region.

- Data Privacy and Security
- Health and Safety Standards
- Accessibility Standards
- Industry Specific Certifications
- Quality Assurance
- Educational and Training Standards



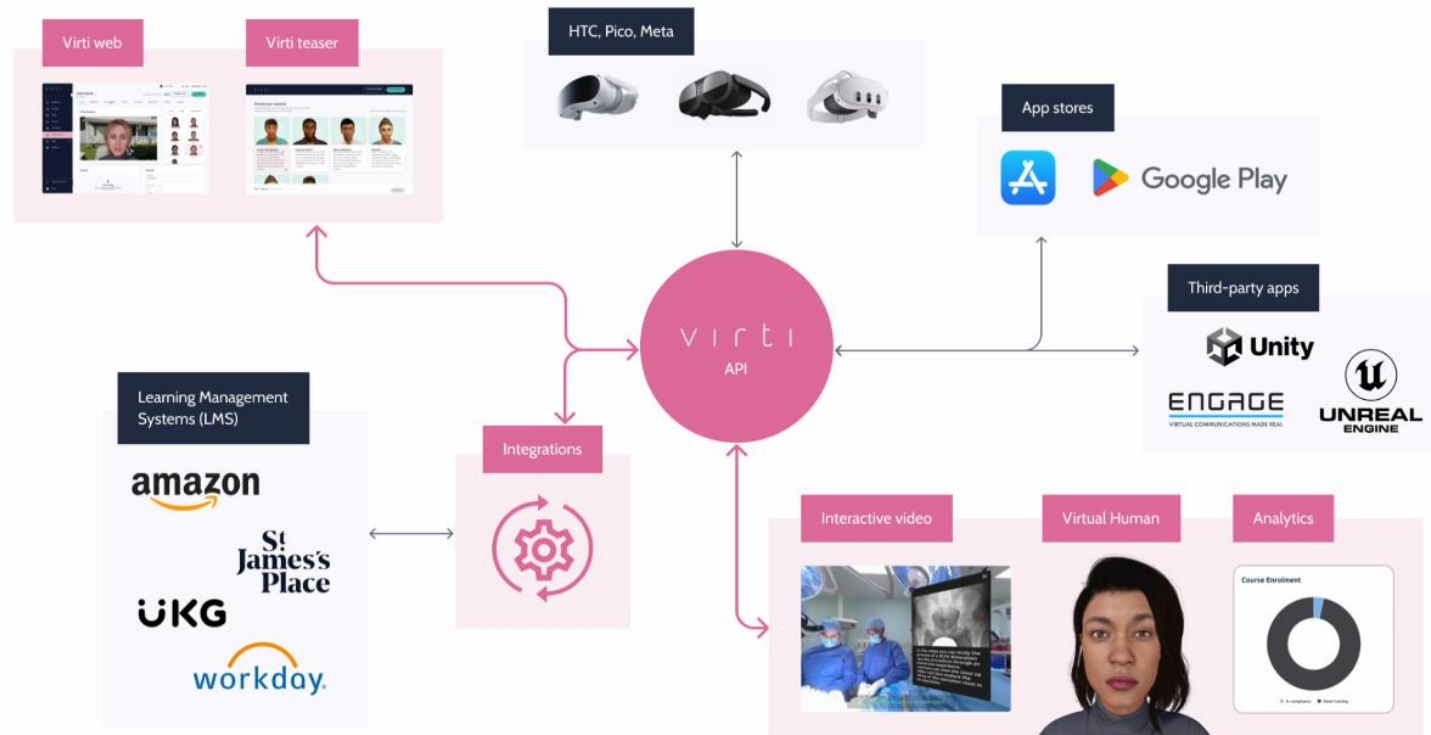
FedRAMP



ecovadis



API-first Ecosystem



Service-agnostic implementations

Virti API

Large Language Models

Automatic Speech
Recognition & Neural
Voices

Natural Language
Processing &
Generative AI

Avatars & Animation



ElevenLabs



DEEPGRAM



All AI integrations within the API should be implemented as service-agnostic to be easily changed or complemented with additional services where feasible. The API powers all client apps, including mobile, web, and VR headsets.

Systems should be designed to support all leading large language models for various tasks, including content creation, conversational chats, and analytics. Customers can use unstructured and private data for in-context training to tailor scenarios to specific objectives and values.

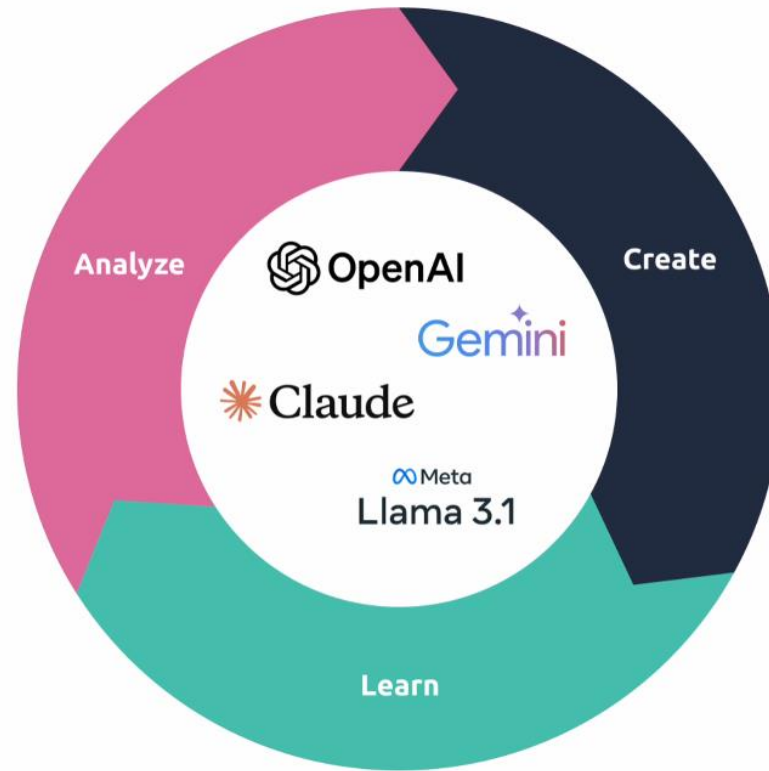
Advanced Automated Speech Recognition models and neural text-to-speech voices with emotions lets out users interact with Virtual Humans in 20+ languages.

You want to design and use systems with control, transparency, and fidelity in mind. To this end, it is best to blend Natural Language Processing and Generative AI to enable tracking of required objectives and to always generate a natural-sounding response from the avatar.

The latest 3D generation avatars to training visual fidelity sync.



Engagement Flywheel



Infrastructure: Enterprise-Grade Privacy, AI, and Data Security

VR in Hospital Systems and any Enterprise Environment must address Privacy, AI, and Data Security. The following policies have been reviewed and accepted by our government and global enterprise customers.

- Fully isolated data at a region of your choice (major cloud infrastructure provider of your choice, e.g., AWS)
- Dedicated server resources to support any number of concurrent users
- Custom SLAs (Service Level Agreements)
- Custom LMS integration and Single Sign-on

When using OpenAI via Microsoft Azure, all your data including prompts, completions, and uploads:

- are NOT available to other customers or OpenAI.
- are NOT used to train or improve any Microsoft or OpenAI models.
- are NOT used for automatically improving Azure OpenAI models for your use in your resource (The models are stateless unless you explicitly fine-tune models with your training data).
- Your fine-tuned Azure OpenAI models are available exclusively for your use.

The Azure OpenAI Service is fully controlled by Microsoft; Microsoft hosts the OpenAI models in Microsoft's Azure environment and the Service does NOT interact with any services operated by OpenAI (e.g. ChatGPT, or the OpenAI API).



Priorities and Planned Initiatives for the Next 12 Months

UX Audit

Full audit of User Experience across all platform areas, but mainly focusing on the web app and the creation and analytics tools.

Retrieval-Augmented Generation (RAG)

Building secure document upload, data extraction, and transformation pipelines for unstructured data usage across the Virti platform.

Trial Improvements

Following the UX audit, we're making several improvements to the trial onboarding to ensure we don't need as much hand-holding to convert trials to contracts, especially in anticipation of a bigger pipeline.

LLM-based Assessment

Implement a pure LLM-based solution for intents and behavior-based assessments.

Cloud Streaming

Developing cloud-based GPU streaming capabilities for high-quality, GPU-accelerated graphics on web and mobile platforms.

SaaS Payments and Licenses

Streamlining SaaS payments and license management to simplify user experience and improve operational efficiency.



Priorities and Planned Initiatives for the Next 12 Months

Public API

Exposing our GraphQL-powered API for robust data workflows or custom integration with existing apps on any platform, such as custom Learning Management Systems or Metaverse applications.

Additional Support for Large Language Models

Integrating additional state-of-the-art models like Claude 3, Gemini 1.5, and open-source models for behavior and skills analysis, coaching reports, and analytics.

Session-based Distribution

Generating session tokens for Virti usage without a full user account, sending completion data back to any endpoint for easy integration with existing courses and learning environments.

Content Marketplace

Enabling content creators to create and sell content directly via the Virti platform on a revenue share basis.

LMS Integrations

We aim to be able to integrate Virti with any LMS, including Single Sign-On and user accounts, as well as completion and performance data sharing for logged-in or session-based users.

More Realistic Avatars

Investing in efficient and high-quality character creation pipelines, including neural voice generation, body motion support, and AI-driven animation and lip sync.



Priorities and Planned Initiatives for the Next 12 Months

Metaverse Integration

Collaborating in a multiplayer VR environment with teacher-led sessions and role-based learning with avatars. Creating digital twin clones of natural environments using volumetric scans.

Digital Twins

Adapting the platform to support complex or large hard skills simulations. Using volumetric capture for environments. Embeddable 3D models with custom interactions. Using Virti for assessments of third-party data.

AR and Pass-Through on Latest Headsets

Exploring AR and pass-through capabilities on the latest headsets to enhance immersive training and provide a seamless blend of virtual and real-world interactions.

Performance Tracking

Collecting more performance data using eye tracking, facial recognition, sentiment analysis, and biometrics, with powerful audio analytics to detect confidence and speaker ratings.



Definitions

What is it? Definitions.

What is it capable of?

Why is it important?

- Introduction and overview
- Review definitions (what is it?)
- **Discuss use cases from the field (what is it capable of?)**
- Establish relevance and importance



Global XR Use Cases: Training & Education

HTC VIVE Medical VR team is dedicated to making a difference in healthcare using XR Technologies.



 VIVE MEDICAL



Global XR Use Cases: Training & Education



 VIVE MEDICAL

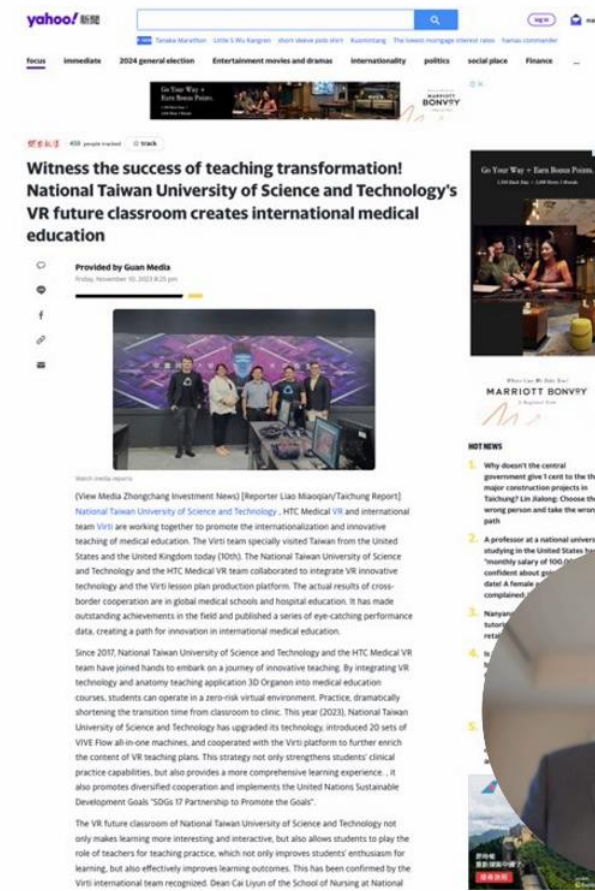
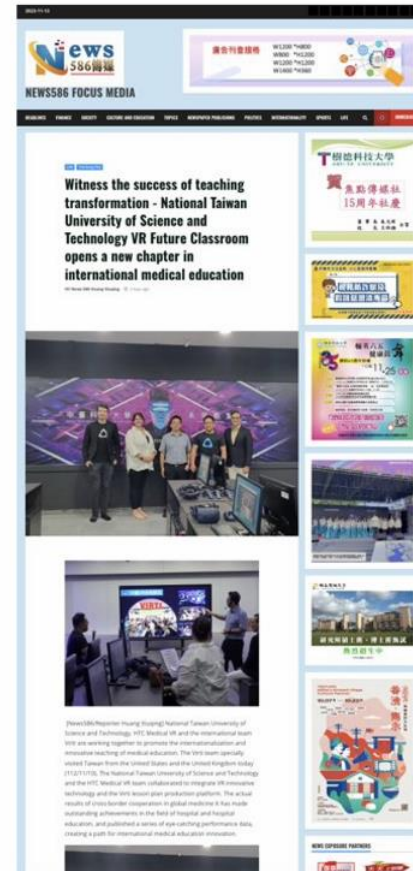


Training & Education

Witness the success of teaching transformation - National Taiwan University of Science and Technology VR Future Classroom opens a new chapter in international medical education

Hil News 586 Huang Xiuqing
<https://news.586.com.tw/2023/11/511923/>

Central Taiwan University –
Taichung 臺中



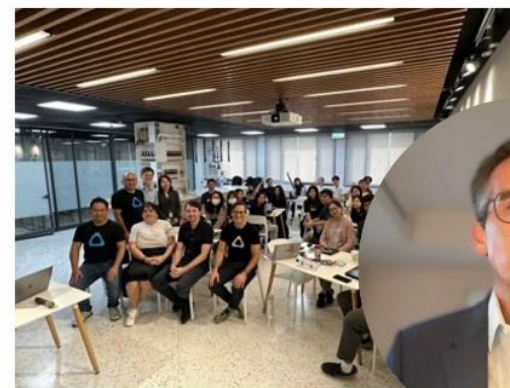
Training & Education

“Train the Trainer” – Nursing Schools



Training & Education

“Train the Trainer” – Food Safety Training



Training & Education



Taipei Medical University and National Defense Center – Taipei 臺北



Training & Education

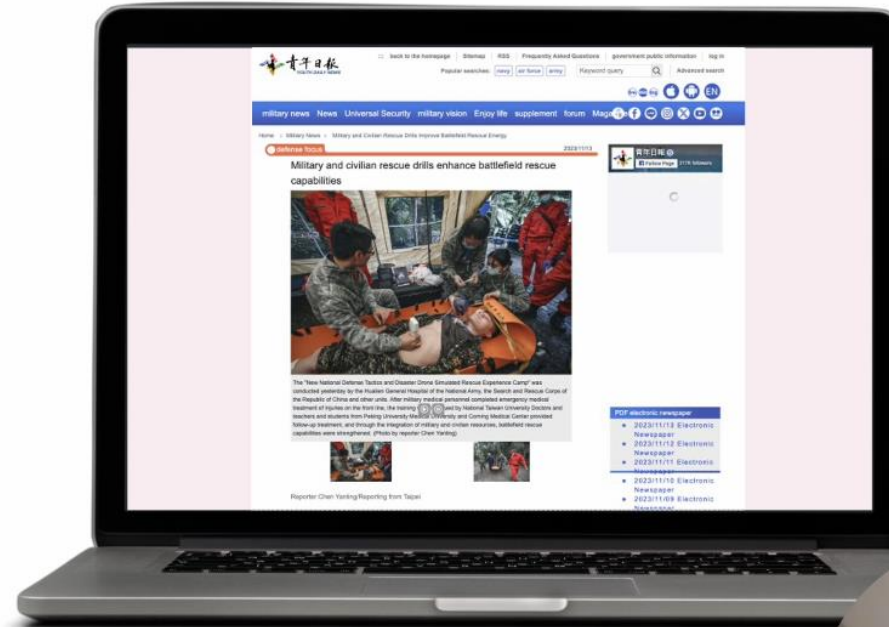
Taipei Medical University and National Defense Center
– Taipei 臺北

Military and civilian rescue drills enhance battlefield rescue capabilities

Reporter Chen Yanling/Reporting from Taipei

<https://www.ydn.com.tw/news/newsInsidePage?chapterID=1629199>

In order to strengthen battlefield rescue capabilities, the Health and Welfare Sustainable Development Association yesterday held the “National Defense New Tactics and Disaster Drone Simulation Rescue Experience Camp”, inviting the National Army Hualien General Hospital, the Search and Rescue Corps of the Republic of China, National Taiwan University Hospital, and Taipei Medical University Elites from industry, government, academia, research, and civilians, including the University School of Nursing and the New Taipei City Fire Department, jointly participated to conduct practical drills and discussions on the stages of initial battlefield treatment, injury classification, and medical evacuation.



AI-Powered Virtual Human Workshops

Medical University Workshops creating AI-powered Avatars that speak in 20 languages, including Mandarin.

Results: Doctors and teaching faculty increased productivity 10x-100x with Virtual Human based cases.



In 2023 the HTC VIVE Medical VR Team **trained over 3000 medical professionals** in Taiwan through workshops, resulting in the creation of thousands of simulations



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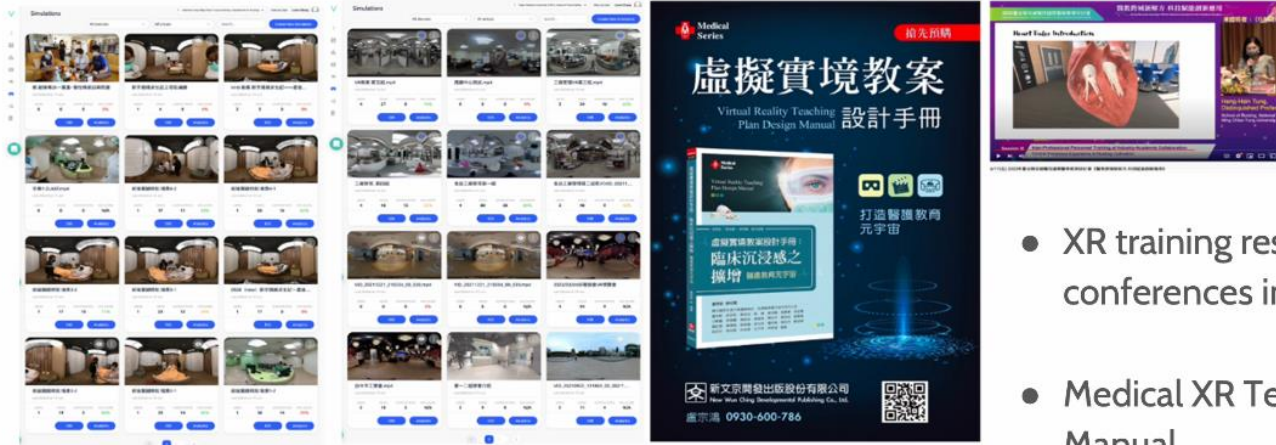
- Advanced cardiac life support (ACLS)
- Extracorporeal membrane oxygenation (ECMO)
- Targeted temperature management
- Da Vinci surgical training
- Hospice care
- COVID team-based care training
- Difficult conversations for patients with cancer
- Peritoneal dialysis
- Hemodialysis
- Managing violence and aggression in the emergency room
- Soft skills communication training between patients, nurses and doctors



Training & Education: Internships

NYCU College of Nursing approves use of VR for nursing internship credits

- NYCU utilizes XR training for their nursing internship, which consists of 508 hours of training following XR workshops. This amounts to 50% of the total accredited training requirement of 1,016 hours.
- **Results: time and cost savings, improved satisfaction, greater knowledge retention, and higher quality of learning.**



- XR training research presented at medical conferences in APAC
- Medical XR Teaching Plan Design Manual



Challenges and Solutions that Impact XR Progress

| | | | | |
|-----------|---------------------|--|--|--|
| Challenge | Content creation | Talent/training education | Return on investment (ROI) | Regulation/policy ethics, governance |
| Solution | Choose no-code tool | Implement workshops Identify champion | Demonstrate financial benefits of solution | Align policies such as USR, government projects and more |

| | | | | |
|-----------|---------------------------|---|---|---|
| Challenge | Evidence and trust | Reimburse/incentives | Privacy and data security | Technological infrastructure |
| Solution | Support academic research | Publish papers, offer grants and sell simulations | Select secure hardware and software with ISO certifications | Utilize trusted device and high quality content |



Students perform medical interviews with an AI “patient”



Today, UTMB has been running simulations for medical, nursing, and respiratory care students, among others.

One simulation includes a medical interview with “Mike White”– an avatar powered by generative artificial intelligence (AI). It speaks in 20 different languages and can be made to look like any ethnicity, gender, or background for which the curriculum calls.

There’s also a physical examination component. Students are required to check vital signs, such as measuring the patient’s blood pressure, taking their temperature, listening to their heart and lungs – and even conducting a capillary refill – during the simulation. Interpersonal training – demonstrating good bedside manners – is as important as asking the right questions.

All of this solves a logistical challenge for the School of Nursing. With 120 students per semester, they have limited capacity to conduct role-play simulations. Previously, the students might have had one chance to conduct a medical interview with a standardized patient. With virtual reality, they can run through the simulation many times over.



Medical XR Training & Education: University of Texas Medical Branch



The impact

5 participating colleges

Accessibility and convenience to simulated
clinical experience

1000's of students
trained



Medical XR Training & Education: NHS

The Problem

Foundation medical trainees need onboarding and familiarization into new settings every four months. Significant staff and learner burden to enable the onboarding cycle reduces the time available for patient care and core responsibilities.

The Solution

Customer created an onboarding course, in partnership with learners, with progressive knowledge, skills, behavior learning interventions. Knowledge checks and challenges to assure progress and performance.

The Outcome

- Onboarding time reduced from 8 hours to 1 hour
- Hospital staff induction time reduced to 0
- Learner satisfaction NPS>90%



In the not too distant future



<https://www.youtube.com/watch?v=ohvA55iN3-Y>
<https://www.tim.it/>

