



**Simulation Interoperability
Standards Organization**

"Simulation Interoperability & Reuse through Standards"

The Military's Metaverse

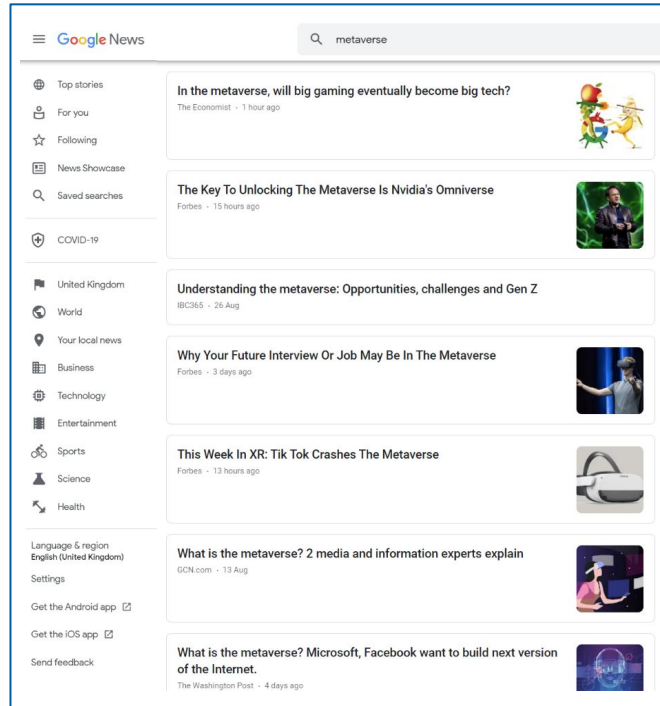
SIM-2021-Presentation-22 (SIMbrief)



Andy Fawkes, Thinke Company, UK



The Metaverse is all Over the News in 2021



Unity



Roblox



Microsoft



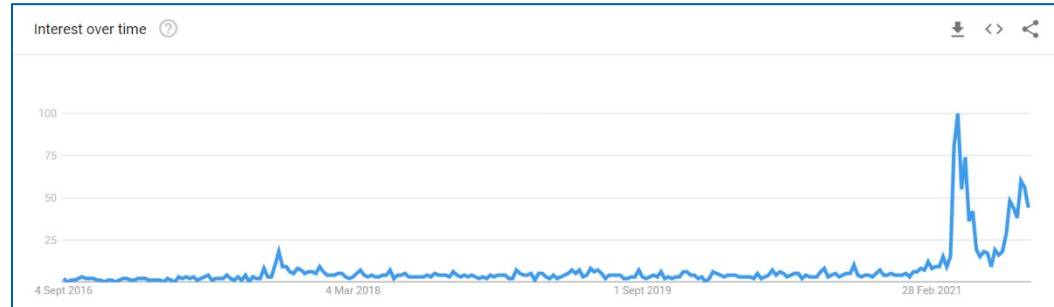
Facebook



Epic Games



Nvidia



Google Word Search



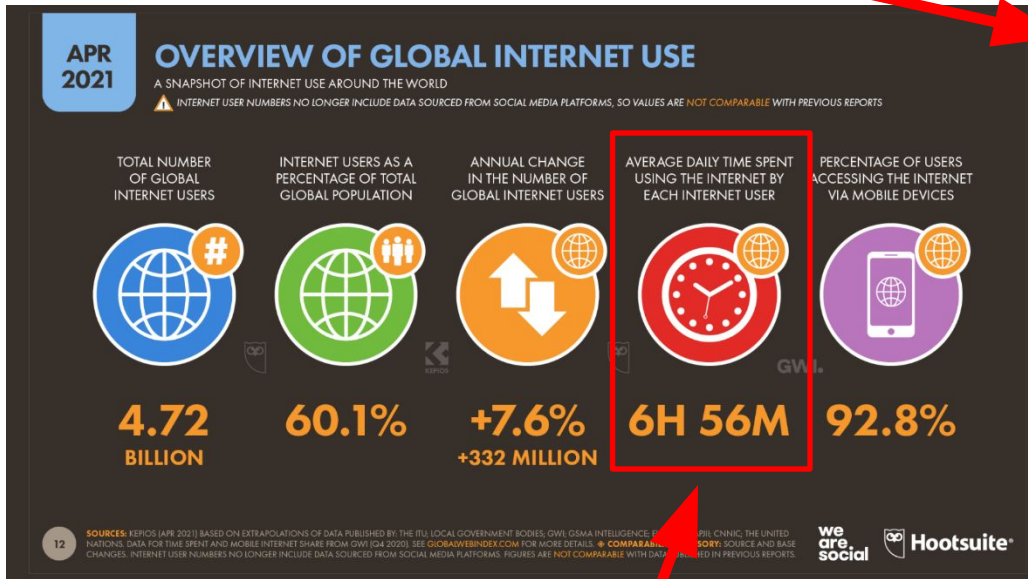
What is the Metaverse?

- **“computer-generated universe that their computers draw on their goggles and pump into their earphones ... an imaginary place known as the Metaverse”**
 - Neal Stephenson, author of the 1992 science fiction novel Snow Crash
- **“A concept of a future iteration of the Internet, made up of persistent, shared, 3D virtual spaces linked into a perceived virtual universe”**
 - Wikipedia
- **“An expansive network of persistent, real-time rendered 3D worlds and simulations that support continuity of identity, objects, data, and entitlements, and can be experienced synchronously by an effectively unlimited number of users, each with an individual sense of presence’**
 - Matthew Ball, former Amazon strategist, now futurist and venture capitalist
- **“An Internet that we will live in rather than look at”** (me)





The Internet & Gaming already dominate our waking lives



<https://datareportal.com/reports/digital-2021-april-global-statshot>

TechRepublic

8 hours and 27 minutes. That's how long the average gamer plays each week

by Veronica Combs in Innovation on March 10, 2021, 6:04 AM PST

Binge gaming is up 13% over last year with some age groups playing six hours at a stretch, a worldwide survey finds.



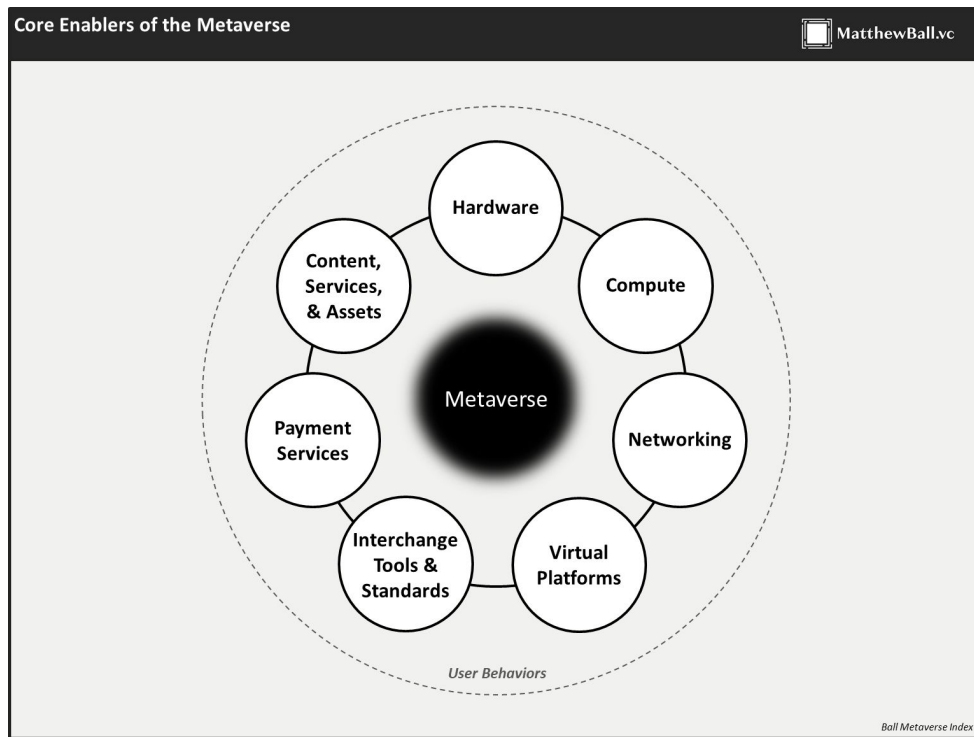
Image: iStockphoto/gorodenkoff



Metaverse Convergence and Core Enablers

- **Convergence**

- Computing
- Software
- AI and automation
- Data and Analytics
- Networking
- XR
- Sensors & Haptics
- Digital Twins
- Blockchains
- Gaming
- Standards



<https://www.matthewball.vc/all/forwardtothemetaverseprimer>



Some Metaverse Building Blocks

- **Facebook**

- *“maybe five or seven years from now, people will primarily think about us as a metaverse company, rather than a mobile internet company” July 21*
- Facebook/Oculus Horizon Workrooms launched Aug 21 - a VR workspace for teams to connect, collaborate and create

- **Roblox**

- Roblox allows users to program games and play games created by other users
- Roblox has a virtual currency called "Robux" and Aug 20 it had over 164m monthly active users, played by over half of US children aged under 16

- **Fortnite**

- Player count exceeded 350m by May 20
- 6–12m playing Fortnite daily in 2021
- In Dec 20, 15.3m concurrent players plus 3.4m viewers for a single in-game event

- **Second Life**

- A persistent virtual world with personalization and a working economy, launched 2003
- Up to 58,000 concurrent players in 2021

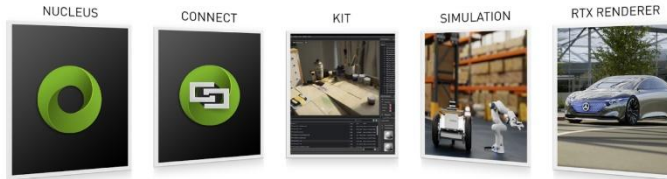
Wikipedia/The Verge/D Voyager



Metaverse Applied in Engineering

- **NVIDIA Omniverse**

- “Omniverse enables universal interoperability across different applications and 3D ecosystem vendors”



BMW Virtual Factory

- **Microsoft**

- “A convergence of the physical and digital worlds creating a new world of opportunity and transformative solutions ... We think of these solutions as metaverse apps.

Microsoft metaverse technology stack

Microsoft Mesh & HoloLens

Enable anyone across the planet to collaborate in mixed reality environments.

Microsoft Power Platform

Empower anyone within your organization to interact with and act on the data flowing through your environment. Build applications, dashboards, and intelligent chatbots that modernize workflows.

Azure AI & Autonomous Systems

Azure AI delivers breakthrough insights into all your data. Microsoft Project Bonsai provides a low-code approach to machine teaching and creating intelligent autonomous systems that learn and improve over time.

Azure Synapse Analytics

A comprehensive set of data services that work together to provide predictive analytics, the ability to analyze data across systems, and the ability to track the historical state of your environment.

Azure Maps

The location of things. Indoor private maps enable you to apply location and routing services to people and things in your private environment while keeping data locked down to your enterprise.

Azure Digital Twins

Simplify the creation of detailed, comprehensive digital models. Support for the Digital Twin Definition Language enables modeling of complex relationships between things and systems in your environment.

Azure IoT

Connect physical assets and run cloud intelligence directly on premises. Sense and monitor anything in your physical environment seamlessly and securely.

The physical world



USAF Capt Jack Thorpe's Early Military Metaverse? 1978



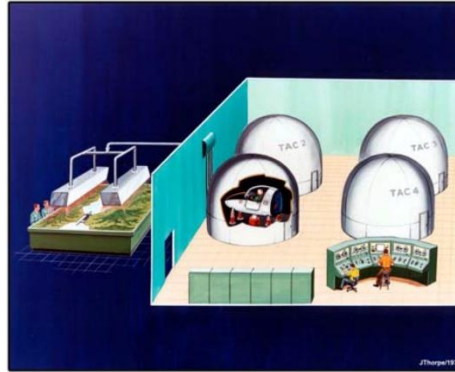
1

Enemy aggression
detected by
overhead sensor



2

Planning a response
using the holographic
electronic sand table



3

Air crews rehearse the
plan and planners
assess suitability



4

Mission execution with
real time observation

/ITSEC 2010 "Trends in Modelling, Simulation and Gaming: Personal observations about the past 30 years and speculating about the next 10" Jack Thorpe PhD



Live – Virtual – Constructive Interoperability

US Navy/SIMNET 1990 Battle Force In-Port Training

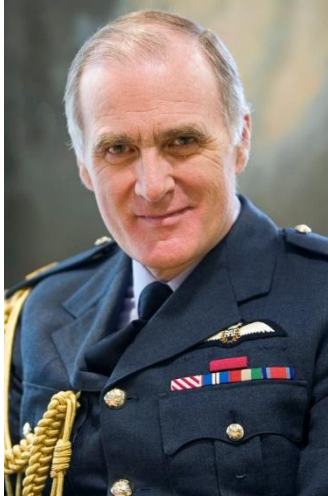


British Army/Cubic 2021 “Synthetic Wrap”





Top Cover for the Military Metaverse



UK Chief of
Defence Staff
Sir Jock Stirrup
2007

... and we can see emerging the fusing of synthetic and real world environments such that it would make increasingly difficult to distinguish between training carried out in simulation and the real thing



US Army
MG Maria Gervais
2020

... our goal is to establish a common synthetic environment, where live, virtual and constructive training can be converged through common standards, common data, common terrain and an open architecture



The Military (LVC) Metaverse Vision?

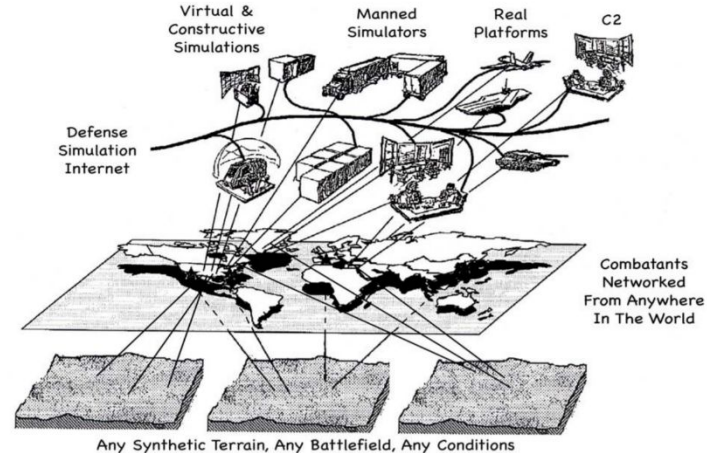
Collins Aerospace





A Military Metaverse?

“Persistent secure networked interoperable live, virtual and constructive simulations, synchronized with multi-domain operational systems and enterprise-wide digital twins of equipments, platforms, infrastructure and personnel and the wider human and natural world.”



*SIMNET's 1980s Vision
Jack Thorpe PhD*



How should the Military respond to the Metaverse?

- *The Metaverse may not in time be what we currently envisage, but it reflects a clear direction of travel, so:*
- Do Nothing?
- Monitor wider Metaverse standard developments and exploit as necessary?
- Promote its own Military standards to the wider Metaverse community?
- Develop and deploy its own “Military Metaverse” within the wider Metaverse?



Some Metaverse Standards Developments

- Nvidia's Omniverse uses Disney's Pixar open source **Universal Scene Description (USD)** file format
- Epic Game's **Twinmotion** platform can be used to import models from BIM and CAD programs
- **Cesium** is an open platform for exploiting 3D geospatial data using the **3D Tiles** open standard
- **Discord** allows developers to plug directly into their communications platform of 150m users
- The **Unity Distribution Portal** enables developers to create a single build of their app for distribution and management across all mobile app stores
- A range of other Metaverse related standards and interchange formats including: **OpenXR**, **WebXR**, **WASM**, **Tivoli Cloud**, **XRE**, **VRM**, **WebGPU**, **Dat**, and **IPFS**
- *I cannot find **HLA/DIS** linked to the Metaverse*
- The **Digital Twin Consortium** comprises industry, government, and academia founded "to accelerate the development, adoption, interoperability, and security of digital twins and enabling technologies"
- There is a real danger that like the Internet, **walled gardens** such as **IoT** and **Facebook** will appear



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QUESTIONS