Practice of Geography Research and Teaching in the Metaverse

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What is a Metaverse? ("Beyond the universe")

- "A massively scaled and interoperable network of real-time rendered 3D virtual worlds that can be experienced synchronously and persistently by an effectively unlimited number of users with an individual sense of presence, and with continuity of data, such as identity, history, entitlements, objects, communications, and payments." (Ball 2022)
- "a massive virtual environment parallel to the physical world, in which users interact through digital avatars" (Neal Stephenson 1992)

Metaverse, XR, and Digital cartography

- "a virtual environment blending physical and digital, facilitated by the convergence between the Internet and Web technologies, and Extended Reality (XR)", "In the metaverse, all individual users own their respective avatars, in analogy to the user's physical self, to experience an alternate life in a virtuality that is a metaphor of the user's real worlds." (Lee et al. 2021)
- "XR integrates digital and physical to various degrees, e.g., augmented reality (AR), mixed reality (MR), and virtual reality (VR)" (Milgram et al. 1995)
- Examples: SecondLife, Minecraft, Pokemon Go, VR Chat, Super Mario AR, etc.

Brief History of Metaverse (1/2) (Shariq Ahmed, CSULB Metaverse Convening 2023)

- 1838 Binocular vision: Sir Charles Wheatstone, stereoscopes
- 1956 First VR machine: Morton Helig, Sensorama (bike riding simulation, 3D video+audio+scents+vibrating chair)
- 1970s MIT: Aspen Movie Map (virtual tour, video+audio+graphics)
- 1990s 3D technologies in gaming: Sega VR-1
- 1992 Neal Stephenson: Snow Crash (SF novel), the term "Metaverse"
- 1998 Sportsvision: overlay of a yellow yard marker over live NFL video
- 2003 Second Life: virtual spaces for real estate, currency, etc.

Brief History of Metaverse (2/2) (Shariq Ahmed, CSULB Metaverse Convening 2023)

- 2010 Palmer Luckey: Oculus Rift VR headset
- 2014 Oculus VR under Facebook Sony, Samsung, Google Glass, Cardboard



- 2016 Microsoft HoloLens (MR), Pokemon GO
- 2020 Apple iPhone's Lidar functions (light detection and ranging), Apple AR & MR headsets coming up
- 2021 Facebook renamed as Meta
- Later 2023 (expected) Apple XR headsets to replace smart phones

Immersive Technologies at CSULB Classes (Shariq Ahmed, CSULB Metaverse Convening 2023)

- Biomedical Engineering capstone course in the Metaverse (partnership with Victory XR: digital contents and assets)
- CHHS courses actively using AR/VR (clinical applications, NURS and Physical Therapy)
- CHHS and Engineering faculty collaborating on using AR/VR on human movement
- KNES: exploring gaming
- ATS workshops on AR/VR/360 Video Technology (I-Space)
- CSU-wide Common Interest Group on XR (<u>https://calstateinnovate.org/</u>)
- CSULB Metaverse Interest Group: launching Fall 2023

AR Resources at CSULB

- "Getting Started with Augmented Reality on the if Learning Spaces Coordinator, <u>tolu.noah@csulb.ed</u>
- Pedagogical Consultations

• "I am available for 1:1 and small group pedagogic ideas further, reviewing/practicing skills, planning w courses, co-creating course resources, and much mo you are interested!"

Upcoming Workshops

- "I will be facilitating the following workshops in th posted soon. You can register for any workshops of in
- May 4: <u>QR Codes 101: What, Why, & How?</u>

• May 11: <u>Enhancing Your Workflow & Productivity</u> the iPad")



Geography and Metaverse

- The metaverse does not have to exist in a fully virtual world or come to fruition only once the world has reached its peak exploitation by corporations. It will exist on any platform the end-user has at their disposal
 - phones, tablets, desktop PCs, or VR headsets, VR glasses, etc.
- "The Metaverse itself is primarily the spatialization of our online activities. For this reason, a technology concerned with the analysis of space is a natural and productive fit." (Jeran Miller 2022)
 - Site selection in the metaverse, metaverse design, research of virtual geography itself (i.e., a <u>heat map</u>)
- User can create their own content in the metaverse
 - <u>Horizon Worlds</u> (<u>Meta</u> 2021): the users (US and Canadian Meta Quest 2 users) are encouraged for content creation and monetization

Metaverse And GIS (Mapscaping 2023)

• Real-time Rendered, Synchronous, and Continuous

• The Internet of Things (IoT) consists of sensors that track and monitor events in real-time, which are then fed back into databases as real-time data for insights, and future processing

• The Metaverse and Digital Twins

• The capacity to visualize and impact one's understanding of an object and how it impacts space in its actual environment: provides additional options for decision-makers to make informed decisions

Data Standardization

- For the metaverse to work in GIS, interoperability is key
- <u>Open Geospatial Consortium (OGC)</u>: FAIR Findable, Accessible, Interoperable, and Reusable

The Metaverse Disrupts GIS

• Like the swiping disrupted the cell phone industry and revolutionized the way that everyday people utilized cell phones, it will revolutionize our way of using geospatial technology

Metaverse and GIS (Nickola 2022)

- Users do shop, socialize, play fantasy games, or work in the metaverse
- The metaverse isn't a single place with a central gateway. Rather, it's a
 panoply of experiences, each accessed separately and governed by its own
 company, creator, or decentralized collective of users.
 - Decentralized Autonomous Organization (DAO): an emerging form of legal structure that has no central governing body and whose members share a common goal to act in the best interest of the entity
 - Roblox, <u>Decentraland</u>, Meta's Horizon Worlds, The Sandbox, ZEPETO, games like Grand Theft Auto, and others
- Understanding of place in the metaverse—where we are, what we encounter there, and how we navigate in and around those places
 - Gaming, the third place (where people spend time outside work and home and socialize), work (classrooms, meetings, trainings, experiments, etc.)

Some statistics https://academyofanimatedart.com/virtual-reality-statistics/

- 54% said a robust, immersive metaverse would be part of daily life for millions of people by 2040 (Pew poll of tech leaders 2022)
- An estimated 64 million Americans used virtual reality in 2022 (Statista)
- 101.6 million people in the U.S. Americans use augmented reality (Statista)
- By 2025, the worldwide AR/VR gamer user base will increase to 216 million users (Global Newswire)
- Over 80% of manufacturers think VR will become mainstream (Statista)
- The global combined AR/VR/MR market is worth over \$28 billion (Statista)
- By 2028, the global AR/VR/MR market will explode to over \$252 billion (Statista)
- 45% of VR users are Gen-Z (ARtillery Intelligence)
- Millennials are twice as likely to purchase a VR headset (Forbes)
- The fastest growing VR market is Asia Pacific, but the largest VR market remains the U.S. (Mordor Intelligence)
- Over 23 million jobs will depend on VR by 2030 (PwC)

- 65% of consumers want to explore new places virtually (PwC)
- 52% of consumers want to attend virtual courses and training (PwC)
- VR learners were 4x faster to train than in-classroom learners (PwC)
- VR within the engineering industry can decrease model design time by 10% (Enterprise Apps Today)
- Healthcare is the VR segment with the highest projected CAGR (Compound annual growth rate) of 19.3% from 2022-2030
- 75% of the world's top brands have virtual reality projects underway (Hypergrid Business)
- 46% of companies are hiring people with skills related to the metaverse (PwC)
- 82% of executives expect metaverse plans to be part of their business activity within 3 years (PwC)
- The investment in VR was expected to multiply 21x over the past 4 years (Iberdrola)
- The number of virtual reality startups has by grown over 14% (Enterprise Apps Today)
- In 2022, there are over 950 VR startups in the United States (Enterprise Apps Today)

Metaverse & Reality

Peaceful Hill (Zepeto)



Room of Quiet Contemplation (National Museum of Korea)



Example Virtual Environment activities in my courses (SP2019, GEOG 482/582 & GISC 603)

GEOG 482/582 Advanced Digital Cartography & GIS Students wearing VR headsets mounting their phones



GISC 603 Cartographic Visualization Students wearing polarized glasses watching Geowall



Photos from Spring 2023 classes

GEOG 482/582



GISC 603



Easy Class Activity: Stereoscopic visualization using a VR headset

- Experience stereoscopic scenes (either 2D or 3D) through a SYTROS VR headset
 - 2023 Day at the Beach



Example Metaverse activities in my courses (SP2022, GEOG 482/582 & GISC 603)

- What are the relationships between 3D mapping or 3D visualization and the metaverse?
- How could 3D mapping or 3D visualization contribute to the creation and use of the metaverse?
- Play a couple of existing metaverse games based on 3D mapping.
 - See how 3D digital space is utilized in the game(s).
- If you don't want to play the games, please watch a few YouTube videos showing metaverse games.
- Then, write a brief scenario of a metaverse game you want to produce.
 - Assume that you have a dream team, including computer programmers, graphic designers, game music composers, marketers, etc.

Students' scenarios (SP2022)

: 2/3 students played Metaverse games, 1/3 watched YouTube videos

GEOG 482/582

- "3D space for games"
- *"international monuments in the cultural and art scene"*
- "simulation of being a student"
- *""travel" to different parks easily and would have optional tasks to complete*
- "a virtual geocaching game"
- "a game where you can fish"
- "a scavenger hunt kind of game"
- *"a game revolving around military aviation"*
- *"visit cities designed by others and play the games designed for the cities"*

• *"a game to mitigate bicycle crashes"*

- a 3-page proposal of "a paint-onthe-wall game"
- *"a game set in a real-world location using augmented reality"*
- *"an undersea adventure with friends"*
- "survival-in-nature game"
- *"plant as many native species to save the planet"*
- *"an open-world RPG game like an anime I have watched"*
- "a smash 'em up game involving Toho monsters"
- "a Star Wars space game"
- "a game of Sci-fi/Horror"

GISC 603

- *"simulations for police officers' training"*
- "simulation games for trains"
- *"a magical worm hole"*
- "different sports moments in one game"
- "a world based on tanks"
- "a backpacking game"
- "chance to meet those same heroes and heroines throughout the world!"
- *"a world around the Track-Citybased game like Ready Player One"*
- *"a game of fish and other aquatic friends"*
- "mapping and completing a maze"

Example Metaverse activities in my courses (SP2023, @I-Space Powerwall & 360° Theatre)



Ethics in the Metaverse (CSULB Metaverse Convening 2023)

- Behavioral ethics in the metaverse
 - Do not harm, show respect/concern/empathy, tolerance, privacy, truth
- Ethical design of metaverse components
 - Data security, privacy, bodily autonomy, ethical handling of biometric and physiological data
- Ethical implementation of metaverse platforms
 - Accessibility, digital divide, respect for privacy, copyright, ways to opt out for bystanders

Asked Genie, the ChatGPT app...

Genie, what is a metaverse? (5 sec.)

what is a metaverse?

A metaverse is a virtual world that exists in a simulated environment, often accessed through the internet. It is a shared, persistent, and interactive virtual space where users can interact with each other and with the environment. It is a virtual world that is created and maintained by its users, and can be used for a variety of activities, such as gaming, socializing, and commerce.

Not Satisfied?

Genie, what is metaverse? (32 sec.)

() what is metaverse?

Metaverse is a virtual world that is created by a computer network. It is a shared, persistent, and interactive virtual world that can be accessed by multiple users. It is a virtual world that is created by a computer network and is accessible to multiple users. It is a virtual world that is created by a computer network and is accessible to multiple users. It is a virtual world that is created by a computer network and is accessible to multiple users. It is a virtual world that is created by a computer network and is accessible to multiple users. It is a virtual world that is created by a computer network and is accessible to multiple users. It is a virtual world that is created by a computer network and is accessible to multiple users. It is a virtual world that is created by a computer network and is accessible to multiple users. It is a virtual world that is created by a computer network and is accessible to multiple users. It is a virtual world that is created by a computer network and is accessible to multiple users. It is a virtual world that is created by a computer network and is accessible to multiple users. It is a virtual world that is created by a computer network and is accessible to multiple users. It is a virtual world that is created by a computer network and is accessible to multiple users. It is a virtual world that is created by a computer network and is accessible to multiple users. It is a virtual world that is created by a computer network and is accessible to multiple users. It is a virtual world that is created by a computer network and is accessible to multiple users. It is a virtual world that is created by a computer network and is accessible to multiple users. It is a virtual world that is created by a computer network and is accessible to multiple users. It is a virtual world that is created by a computer network and is accessible to multiple users. It is a virtual world that is created by a computer network and is accessible to multiple users. It is a virtual world that is created by a computer network and is accessible to multiple users. It is a virtual world that is created by a computer network and is accessible to multiple users. It is a virtual world that is created by a computer network and is accessible to multiple users. It is a virtual world that is created by a computer network and is accessible to multiple users. It is a virtual world that is created by a

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Repeated a sentence 40 times and stopped

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- Stephenson, N. (1992). Snowcrash. London: ROC.
- <u>CSULB resource list</u>

Q/A

A geography tour at I-Space (lower level, Library)? How about 5/12 after faculty meeting?

Thank You!

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