



UNLEASH YOUR IMAGINATION:
DIVE INTO THE WORLD
OF METAVERSE PROGRAMMING!

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Xebia

Xebia is a pioneering IT consultancy company founded in the Netherlands in 2001, following 1 mission, 4 values and 4 business principles.

We consist of specialized, interlinked companies that closely cooperate to serve our customers on a worldwide scale. We offer our clients full-stack digital transformation services and solutions.

Our Mission: 'Authority'

We strive to be the Authority: as a company, in each of our service domains and as professionals.

This mission was defined in 2004 and has guided Xebia ever since to become the company it is today: 6500+ people with over 24+ offices globally.

Our mission can be translated into 4 tangible drivers:

- Become the no. 1 or 2 in each of our market domains
- Always perform the 9 on a scale of 10
- Authority is our Big Hairy Audacious Goal
- Be the best professional in a specific domain area.

When teaming up with Xebia, expect in-depth expertise based on an authentic, values-led and high-quality driven way of working that inspires all we do. We sometimes call ourselves "Mainstream Frontrunners". And it all starts with hiring the right people.

The only way we remain a leader of change is by continuously reinventing ourselves and transferring our knowledge. We force ourselves to keep innovating, driven by the desire to make a difference.

Xebia Group

It's your business. We accelerate it.



Revenue

FY 22 (Est) 400M USD



People

2023 6,500+ Professionals



Offices

The Netherlands, Germany, UK, Belgium, Denmark, Spain, India, Poland, Dubai, Vietnam, US, Canada, Australia, Singapore, Switzerland, and Colombia



Growth Strategy

Complementing our organic growth, Xebia is seeking other successful expert businesses in its key domains. Joining forces and together offering high-end digital transformation consultancy & build capability



Average YoY

Profitable and organic growth of 22% over the last 10 years, steep growth at 35-45% YoY in last years



Our Global Footprints
Offices

Mission	Values	Business Principles	Facts
> Authority	> People First > Sharing Knowledge > Quality Without Compromise > Customer Intimacy	> Responsibility > Entrepreneurship and Innovation > Sense of Urgency > Results	> Founded: 2001 > People: 6500+ > Revenue: 400M USD (FY22) > Regions: Americas, Continental Europe, UK, MEA & APAC (India, South-east Asia, ANZ)

Purpose

We create digital leaders and build resilient organizations at any scale. Our passion for people, technology and sharing knowledge makes us uniquely qualified to do so.



Transformation	Data	Cloud	Software Technology	Low Code	Microsoft Solutions
Program Management	Strategy and Data Transformation	Strategy and Cloud Migration	Software Architecture and Design	Low Code Platform Consulting	Azure Cloud Transformations
Agile Transformation and Consulting	Analytics Translation and Business intelligence	Cloud Native Infrastructures	Software Development (incl. Functional)	Low Code Architecture and Development	Cloud Native Software Development
Product Management, Architecture and Design	Data Science and AI	Cloud Health and Cost Optimizations	ISV product Co-Design and Engineering	Low Code Accelerators and Solutions	(Cloud) Application Modernization
DevOps and SRE	Data engineering, platforms, and architecture	Standard Components	Quality Assurance, Testing and Security	Appian, OutSystems, Salesforce and Mendix	Managed Services
	Data Standard Components and Solutions	Cloud Based Workplace Components	Managed Services	Managed Services	

Alliances (Technology and Industry)

Standard Solutions

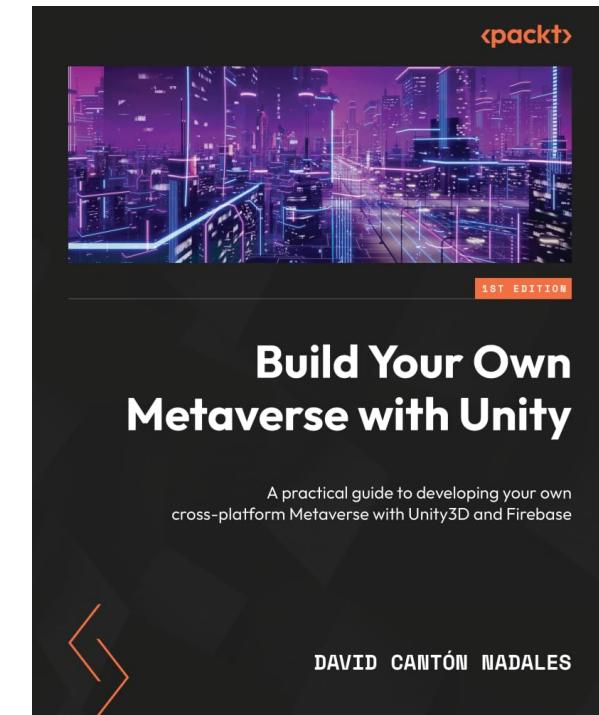
Academy

Thank you, David and Packt!

The presentation and demonstrations were inspired by the book, "Build Your Own Metaverse with Unity" by David Canton Nadales, published by Packt Publishing in 2023.

Learn more: <https://www.packtpub.com/product/build-your-own-metaverse-with-unity>

Code Repository: <https://github.com/PacktPublishing/Build-Your-Own-Metaverse-with-Unity>



Goals for this Session

- Define the term "Metaverse"
- Understand the technologies used to build a Metaverse
- Give participants a taste of Metaverse programming
- Present a path forward to learn more about Metaverse programming



Metaverse Topics

- What is a Metaverse?
- Technologies
- Architecture
- Development Tools
- Building a 3D World
- Characters
- Social Features and Blockchain
- Demo and QA Sessions Interspersed Throughout



What is a Metaverse?

A Metaverse is a virtual, interconnected universe or digital space where people can interact, socialize, work, play, and create using avatars, often facilitated by advanced technologies like virtual reality, augmented reality, and blockchain. It aims to merge physical and digital realities into a seamless, immersive, shared experience.

Metaverse History

- Early Concepts (1980s-1990s): the term "metaverse" was first coined by Neal Stephenson
- Virtual Worlds and Online Gaming (Late 1990s-2000s): rise of virtual worlds and massively multiplayer online games (MMOs)
- Advancements in VR and AR (2010s): significant advancements in VR and augmented reality (AR) technology
- Corporate Interest and the Modern Metaverse (Late 2010s-2020s): major tech companies began investing heavily in the concept
- Blockchain and Decentralization (2020s): integration of blockchain technology introduced a decentralized model for the metaverse
- Ongoing Development and Future Prospects: the metaverse is currently in an evolving stage

Metaverse Technologies

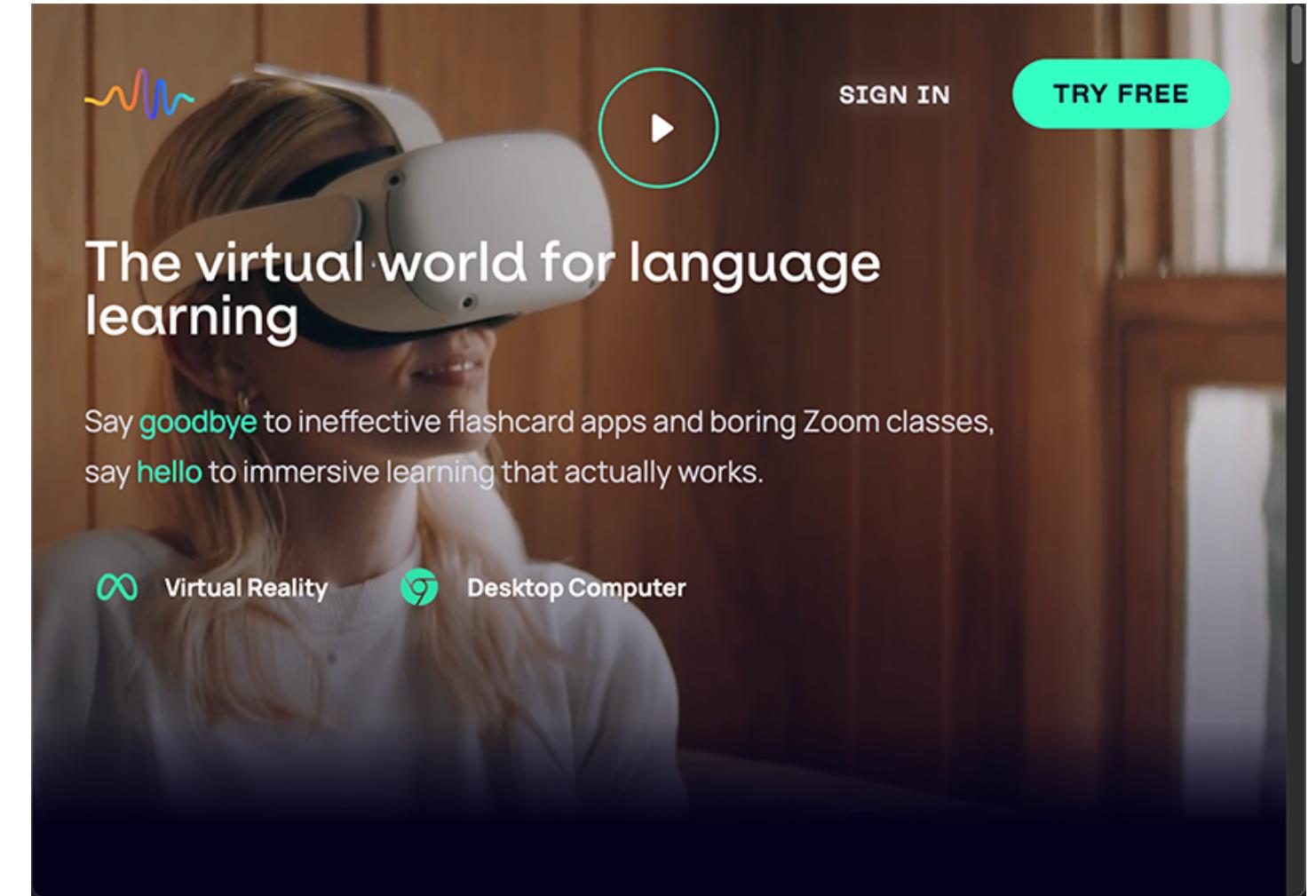
- Extended Reality (XR) - user experience in a metaverse
 - ▶ Virtual Reality (VR) - a 100% virtual world
 - ▶ Augmented Reality (AR) - blends a virtual world with the physical world
 - ▶ Mixed Reality (MR) - combines both virtual and augmented reality
- Blockchain - records transactions in a metaverse
- Services
 - ▶ Cloud - provides compute and storage resources to the metaverse
 - ▶ Artificial Intelligence (AI) - provides non-player character intelligence and other services
 - ▶ Internet of Things (IoT) - connects the physical world to the metaverse

What is a Metaverse used for?

- Commonly, people think of a metaverse as a virtual world for gaming
- But the metaverse can be used for many other purposes
 - ▶ Education & Training
 - ▶ Design & Engineering
 - ▶ Project Collaboration
 - ▶ And more...

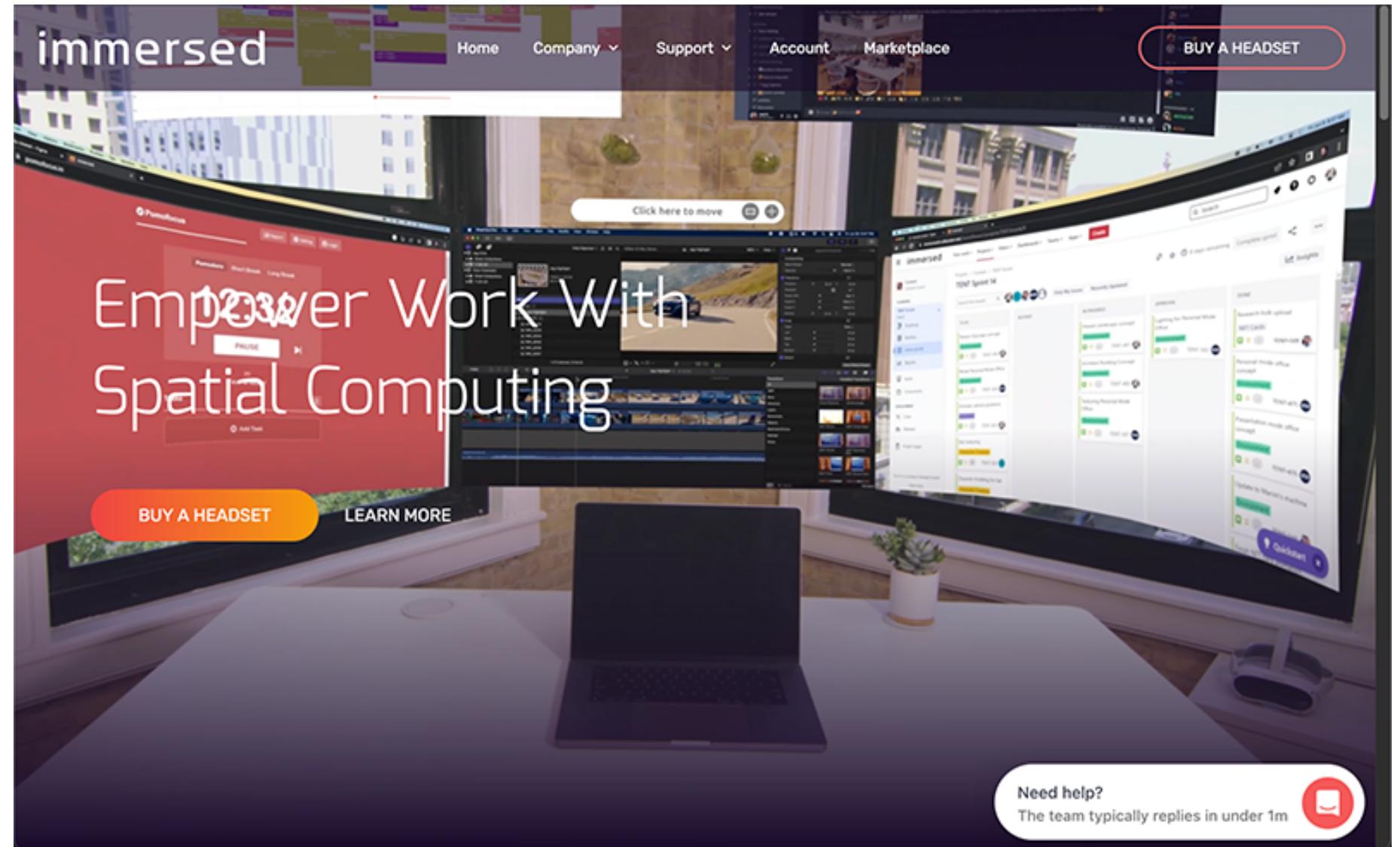
Learn a Foreign Language

- Immerse - <https://www.immerse.com/>
- Provides a very immersive virtual reality environment for learning a foreign language
- Supports multiple real person characters and AI driven non-player characters
- Users can interact with the characters and the environment
- For example, an live instructor character teaches a lesson and provides an immersive practical experience to practice what is learned through verbal and objec interacton



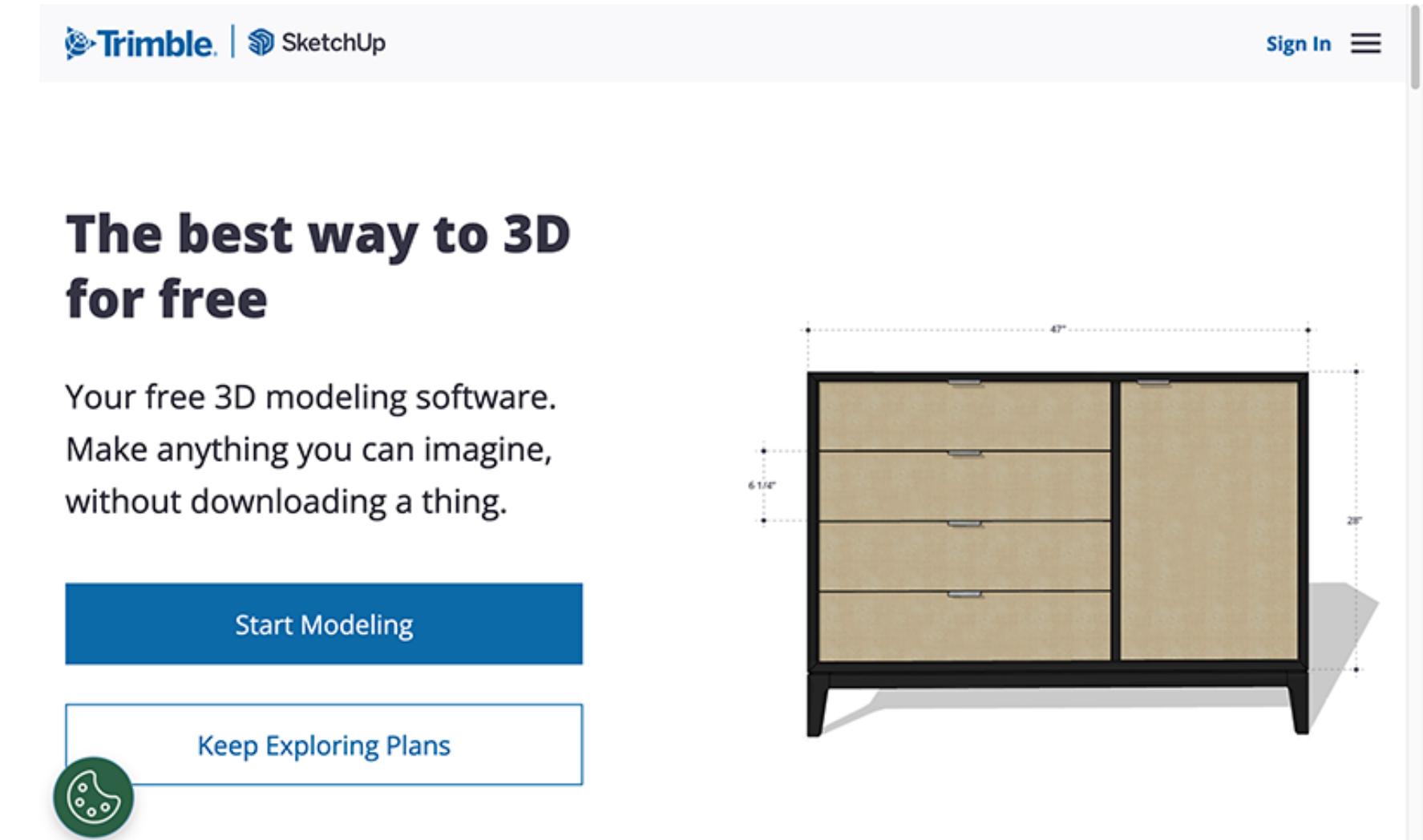
Augmented Reality Workspace

- Immersed - <https://immersed.com/>
- Provides an augmented reality (AR) workspace that enhances the physical workspace with virtual displays
- Combines the physical world with the virtual world
- The AR reality combines the physical objects and the internal state of the component with the virtual world



Engineering and Collaboration

- SketchUp - <https://www.sketchup.com/>
- SketchUp is a 3D modeling software that can be used for a wide range of applications, including architecture, interior design, engineering, and more
- Enables users to create 3D models using a variety of tools and techniques
- SketchUp Viewer for VR enables users to view and interact with their models in mixed reality, allowing them to explore their designs from a first-person perspective



Q&A



Questions?

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Metaverse Architecture

- Virtual Space Design - creation of immersive environments
- User Interaction - how users will interact with the environment
- Immersivity and Realism - how real and engaging the environment is
- Interoperability - interconnected spaces and the ability to move between environments
- Sustainability and Scalability - long lasting virtual structures and no degradation of performance as usage grows
- Ethics and Privacy - consider data security and the psychological impacts of spending time in virtual spaces

Metaverse Development Tools

- Unity - game engine for creating 3D worlds, this is only one example of a game engine
- Blender - 3D modeling and animation, a free open source tool
- Camera and Lightbox - create 3D models from real world objects
- Phone cameras and DSLR-type cameras can be used
- Lightboxes prevent shadows and provide consistent lighting for the object
- Commonly, turntables are used to rotate the object within the lightboxes while taking pictures



Metaverse Data Services

- There are many data services that can be used to support a metaverse. Here are some examples.
- Firebase - provide authentication and database services
- Photon Engine - support multiplayer games
- ChainSafe - add Web3 functionality
- MetaMask - cryptocurrency wallet



Metaverse User Devices

- Computing Device - computer, tablet, or phone
- GamePad - movement in a 3D world on the computer
- Microsoft Hololens - Microsoft's Mixed Reality headset for interacting in a 3D world
- Meta Quest 3 - Meta's Mixed Reality headset for interacting in a 3D world
- Apple Vision Pro - Apple's Mixed Reality headset for interacting in a 3D world



Metaverse Extended Reality

- Metaverses are built in a 3D virtual world which may contain some 2D elements
- The virtual world is built with game engines such as Unity
- The virtual world is populated with 3D models created from tools such as Blender
- Real world objects can be scanned and converted into 3D models using tools such as Camera and Lightbox
- Creating real world objects is called photogrammetry
- A login form is an example of a 2D element accessed in the 3D world

Metaverse Extended Reality: Photogrammetry

- Metaverses may include real world objects that are scanned and converted into 3D models
- Real world models are created using a Camera, Lightbox, and Blender
- Creating real world objects using these tools is called photogrammetry
- Photogrammetry is the science of making measurements from photographs, especially for recovering the exact positions of surface points
- For more information: <https://en.wikipedia.org/wiki/Photogrammetry>

Metaverse Characters

- Characters are the people who interact in the metaverse
- Represented by 3D models known as avatars
- Can be real players or non-player characters (NPCs)
- Generally, multiverses support multiple real players
- NPCs are controlled by artificial intelligence (AI)
- Characters interact with each other in various ways such as voice and text chat
- Characters can be customized by the user
- Blockchain transactions between users and the world is supported by Non-Fungible Tokens (NFTs)

Q&A

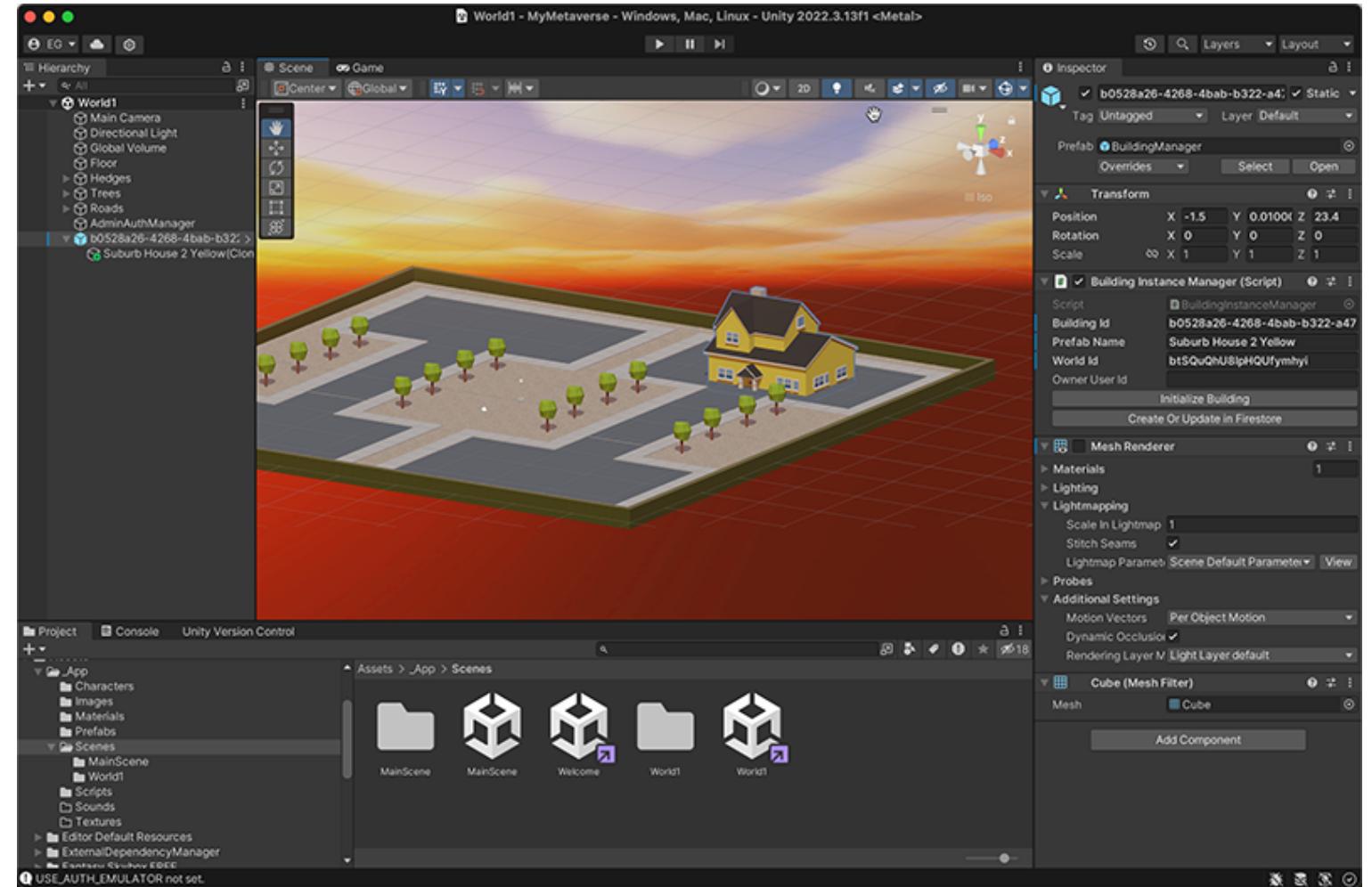


Questions?

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Build the 3D World

- Programmer creates the 3D world using the 3D editor in Unity
- While the programmer can create all 3D model, it is more common to use 3D models created by others
- Unity provides an Assets Store for buying and selling 3D models
- Custom models can be created with Blender or other 3D modeling tools
- C# scripting is used to program the 3D world



Metaverse Demo



Let's Explore Building a 3D World

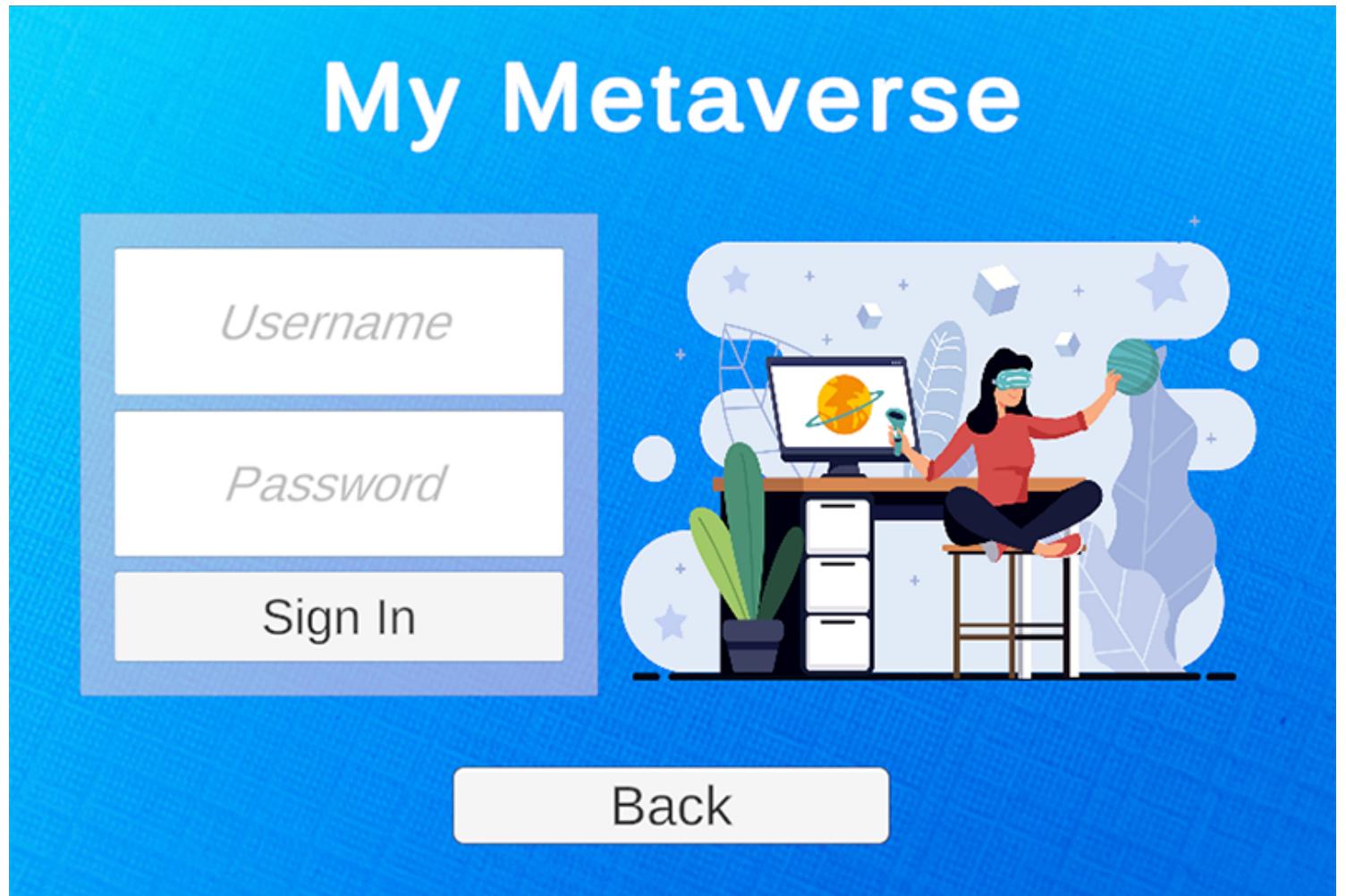
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Metaverse Data

- User and world data can be stored in a database
- Cloud databases such as Firebase are good option to build a metaverse quickly
- Firebase is low cost, yet provides good support for rapid scaling
- Firebase provides a Unity SDK for easy integration
- Firebase SDK is divided up into packages such as Authentication, Document Database, and Storage
- Firebase is manages users, perform authentication, create/customize Unity Game Objects, etc.

Unity UI

- 2D form UI elements
- For example, before interacting with the 3D world, users can login and register new accounts with Unity UI
- Unity UI is created using the Unity Editor in 2D mode
- UI elements are created within a Canvas Game Object
- UI elements are connected to C# scripts to interact with data services such as Firebase
- UI elements can be customized to look and feel as desired
- A full metaverse is a combination of 2D and 3D user experiences



Metaverse Demo



Let's Explore Working with Data

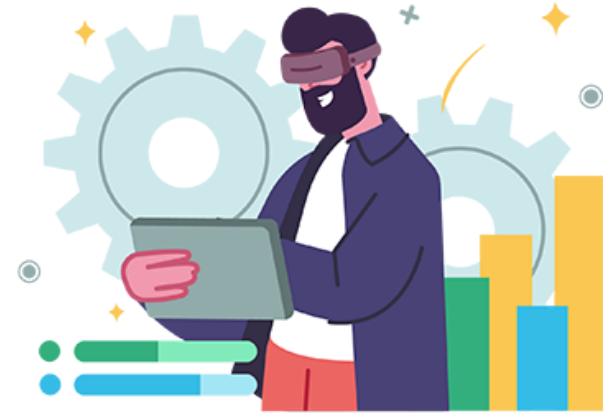
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Managing Characters

- To simplify character creation, they can be created using third-party tools
- One such tool is Adobe's Mixamo
- Mixamo provides an extensive library of 3D characters
- Using Mixamo's web-based tool, characters can be customized and downloaded in a variety of formats
- Characters may be imported into Unity, Blender, and other 3D tools

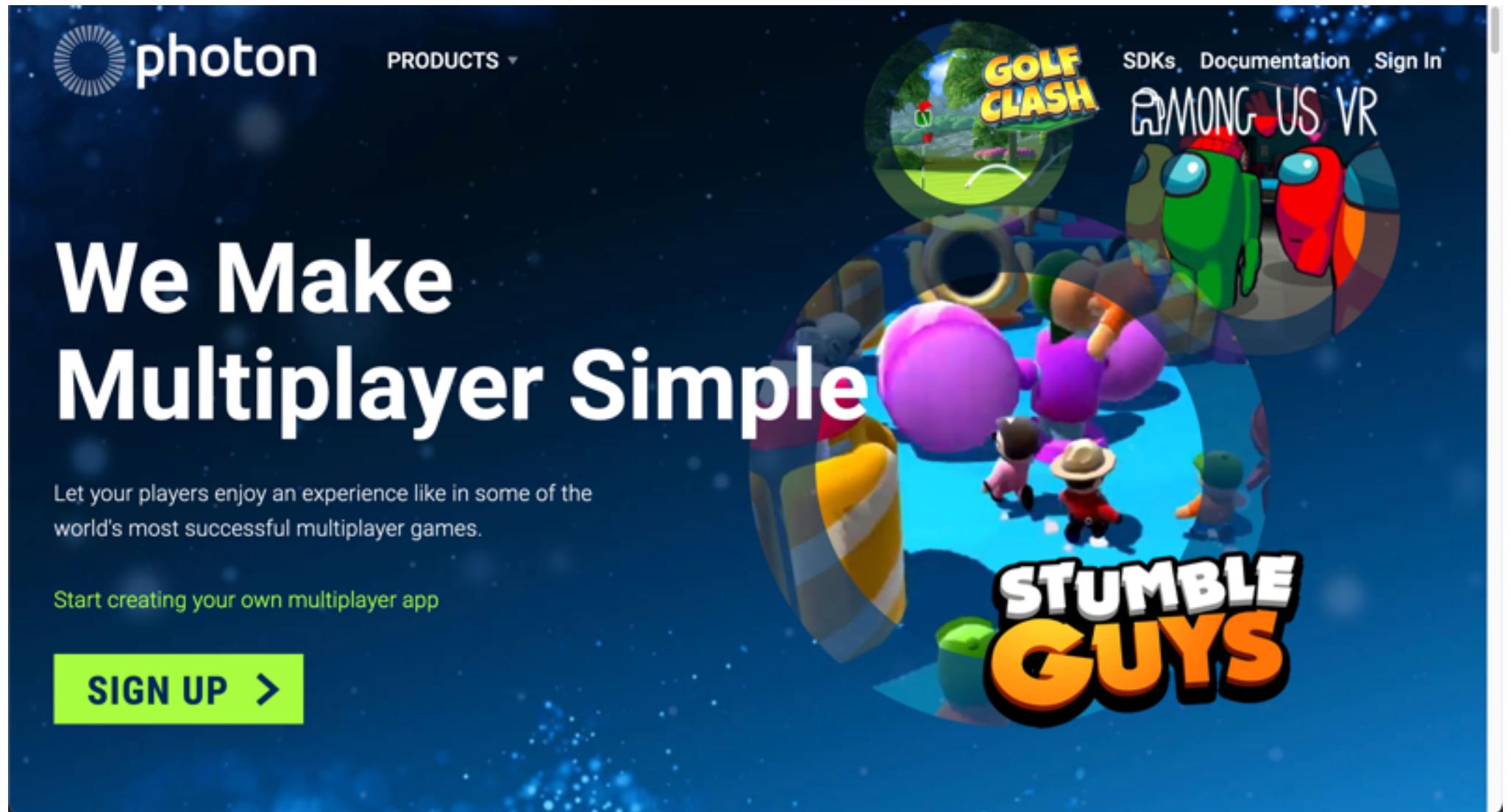
Social Features and Blockchain

- Multiplayer Room to support multiple Real Users
- Text and Voice Chat between Users
- Users Interact with Real People or AI
- Users can Customize Character Appearance
- Metaverse assets can be enhanced using Blockchain and NFTs
- Usage of NFTs within a Metaverse is common



Multiplayer

- Multiplayer is supported by Photon Engine
- Supports multiplayer communication between all users, both real and AI
- Enables communication via chat and voice
- Photon Engine is a cloud service and provides a Unity SDK for easy integration



Non-Fungible Tokens (NFTs)

- Fungible tokens are interchangeable and can be traded for one another
- Non-fungible tokens (NFTs) are unique and cannot be traded for one another
- Examples of Fungible Tokens
 - ▶ Cryptocurrencies such as Bitcoin and Ethereum
 - ▶ Stablecoins such as Tether and USD Coin
 - ▶ Security tokens such as stocks and bonds
- Commonly, NFTs are used to represent ownership of digital assets
- Examples of metaverses using NFTs include Decentraland and CryptoVoxels



NFT Technologies

- IPFS - InterPlanetary File System
- Goerli - Ethereum Testnet
- ChainSafe - SDK for adding Web3 functionality
- ChainStack - RPC Server to connect to the Ethereum Testnet
- Metamask - Ethereum Wallet



Metaverse Demo



Let's Explore NFTs in the Metaverse

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Metaverse Programming Next Steps

- Purchase a book on Metaverse programming, such as "Build Your Own Metaverse with Unity"
- Download, install, and start using Unity
- Utilize third-party 3D models in Unity
- Explore services for managing user data, blockchain transactions, and multiplayer support
- Use a Camera, Lightbox, and Blender, to create a 3D model from a real-world object
- Consider enhanced user interaction experience with gamepads and VR headsets



Q&A



Questions?

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Download the Code



github.com/cc-xebia-webinars/metaverse-webinar_01162024

slides and source code available

Thank you!



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