Innovation in action: exploring the route to the Metaverse

How we're preparing for a virtual world

What is the Metaverse?

The Metaverse has the potential to revolutionise the way we connect, live, work, learn, create and play, becoming the foundation of our digitally enhanced lives. In theory, the Metaverse could be the successor to the internet as we know it.

But what is it? Leading theorist, Matthew Ball, created a definition that's widely agreed upon: "The Metaverse is a persistent, synchronous, virtual space where people can interact with one another in real time and where both planned and spontaneous events occur that bridge the gap between the virtual and real world".

This can be further broken down into the following key Metaverse characteristics:

- persistent and always on
- experienced live and in real-time
- capable of hosting any size of audience
- supporting a fully functioning digital economy
- spanning an infinite number of platforms
- blending the virtual digital and real-world physical realms
- allowing digital assets to be owned and carried across platforms
- hosting infinite experiences with content created by a wide range of contributors
- but, above all, delivering a single user identity used across all experiences provided on a decentralised platform that supports operator interoperability.

The success of the Metaverse depends on interoperability and unification

There's no single driving force behind the evolution of the Metaverse – this is both a huge advantage and, potentially, its biggest weakness.

The Metaverse will be developed collectively by individuals, brands, technology companies, organisations and governments. They'll all bring different skills and strands of innovation, but success depends upon them achieving interoperability - the technical ability of platforms to 'talk' to each and work together that will drive seamless movement across worlds. The result must be a single 'universe', and this will require the convergence of many separate tools, platforms, services and spaces, all underpinned by shared infrastructure, standards and protocols.

Without this interoperability, multiple metaverses will spring up, existing independently of one another - and it's unlikely the user will be able to move effortlessly between them.

Key components of the Metaverse

Experience
The content users engage with, for example, games, shopping, social networks and live music.

Interface
Hardware for access, ranging from VR headsets and AR smart glasses to future technologies like haptics.

Discovery
Systems that enable users to search, find and discover experiences, for example, curation, stores, ratings and agents.

Creators
Tools and platforms used to create and monetise experiences, for example, design tools, animation systems and monetisation technologies.

Engines
Software platforms that blend virtual objects into the real-world 3D space and computing into real-world objects, for example, AI-supported 3D engines and spatial mapping.

Universality
A new ecosystem that provides a permissionless, distributed and democratic structure, using edge compute, AI agents, microservices, blockchain and NFT technologies.

Infrastructure
The digital technologies to support Metaverse needs, for example, telecommunications networks, cloud computing, semiconductors, and material science.

What does the Metaverse need to become a reality?

A crucial step towards existence will be the development of fundamental building blocks. These will form the foundations of a Metaverse where a user can hold a single identity, own digital goods, and engage in shared experiences across all operators and worlds. There are three primary focus areas:

1. An agreed structure with standards and governance

- Open standards and protocols with net neutrality and self-governance at the core will be essential to encourage the creation of diverse and inclusive experiences and discourage restrictive 'walled gardens'.

- An ethics code and a governance structure that's potentially decentralised and open to everyone to own, supported by verified user identity.

- A robust way to prove ownership of digital assets, using blockchain and Non-Fungible Tokens (NFTs).

2. A technological foundation

- Shared spaces created on cloud platforms capable of supporting millions of users in the same world at the same time. This capability is some way off.

- Cloud rendering architectures that use cloud-computing facilities to provide high-quality Metaverse experiences that are beyond the capabilities of the individual's device. This could support high-resolution rendered scenes with AI textures, ray tracing and atmospheric effects.

- High-bandwidth, low-latency mobile networks capable of presenting high-quality Extended Reality (XR) Metaverse experiences.

- Spatial computing to track, control and synchronise the movements and interactions of objects in both the physical and digital worlds, enabling services that use a 'digital twin'.

- Geospatial mapping and anchors that enable multiple users to view digital content in the same physical location, so digital assets can virtually exist in the real-world.

3. Enabling technologies

- Cross-platform 3D engines that render the 3D presentation of the Metaverse.

- Virtual world platforms that provide the framework to support multiple interlinked worlds.

- XR that enables the Metaverse to exist in Virtual Reality (VR) and Augmented Reality (AR) worlds.

- Wearables that include low-cost, high-quality AR and VR headsets, to enable people to effortlessly engage with virtual and extended reality Metaverse experiences.

How close is the Metaverse?

The Metaverse will gradually emerge from the individual efforts of companies, organisations, and governments so, in its early stages of development, a single unified Metaverse is unlikely.

In the two-to-five-year timeframe, the Metaverse will organically evolve towards an open framework of connected and interoperable platforms, services and experiences that increasingly enhances our lives, as always-on augmented immersion becomes a reality.

Beyond ten years, we might expect the Metaverse to provide facilities to digitally enhance our complete perception of the real-world. At this point, it'll offer a shared, persistent virtual mirror of the real world that will revolutionise the way people connect, live, work, learn, create and play.

What's helping the Metaverse to develop?

Rising awareness and technological advances are bringing the Metaverse closer to reality, with three key drivers leading the way:

Driver #1 – growing demand from the public and gaming communities

Online gaming audiences will surpass 1.3 billion people by 2025, supported by a global gaming industry valued in 2021 at $178.2 billion. The pandemic boosted the uptake of massive, multiplayer worlds such as Fortnite and Roblox and their popularity continues to grow.

Gaming platforms like Fortnite are branching out into mass shared virtual events, such as live concerts and movie screenings, with one 2020 concert attracting over 27 million viewers. There's a distinct and growing appetite for shared virtual world experiences beyond gaming.

Driver #2 – warm welcomes from aggregators for community-created content

Innovation and creation are currently run as a meritocracy, with small creators getting recognition for their talent from large aggregators. Roblox, for example, operates a games marketplace that enables its user community to develop and sell games. This is enhancing the Roblox world and setting a precedent for suppliers and consumers to work together without intermediaries. In 2021, Roblox paid out over $500 million to creators who made purchasable items for in-game use.

Driver #3 – advances in hardware and software development

The 3D platforms used to create and render Metaverse spaces already exist in the form of 3D game engines such as Unreal and Unity. The use of these tools will greatly increase as new world experiences are created to populate the Metaverse. Likewise, personalised, digital avatars are increasing in realism and sophistication; already it's possible to create an avatar that can be used across 200 virtual worlds.

AR is developing fast, with wearable AR glasses becoming more affordable and manufacturers collaborating with mobile operators, Meta, Apple and Amazon. AR on mobile was boosted by pandemic shopping habits; 100 million AR users shopped via AR in May 2021.

Virtual goods, too, are a growing part of the emerging Metaverse. It's anticipated that digital goods will emerge first in the Metaverse before they are created for use in the real world. The virtual real estate market is also growing, where virtual assets are bought, and their ownership is recorded in a blockchain guarantee.

Our latest research into Metaverse-related technology

We intend to be ready for the Metaverse, equipped with innovative, effective technologies and solutions that'll support our customers in the virtual world. Here's a snapshot of the areas we're currently investigating:

Edge-cloud rendering services
Metaverse experiences that require high-quality photoreal AR will likely need to use cloud GPU compute facilities to render scenes to user devices.

Seamless 'cross-world' comms
Allowing groups to seamlessly communicate as they collectively move between individual virtual worlds and experiences.

Identity management services
Enabling a single unified digital identity and avatar that's tokenised and blockchain certified to be used across different Metaverse worlds.

Metaverse governance
Investigating how we can help police Metaverse worlds and experiences hosted on our own network servers and beyond.

Metaverse for BT / EE customer service
Developing Metaverse experience services for SMEs such as virtual store experience creation, hosting and management services.

'Guardian angel' support
Exploring a role for BT / EE to offer consumers support and guidance in exploring the Metaverse safely.

Metaverse event services
Supporting Metaverse-scale streamed events such as music concerts and big sports events.

Mobile networks optimised for the Metaverse
Low-latency mobile connectivity will become increasingly important for providing quality Metaverse experiences, particularly when edge-cloud rendering is used.

Metaverse advertising
A service that enables world builders to deliver location-based advertising for AR / VR Metaverse experiences.

Getting Metaverse-ready

When it arrives, our customers will inevitably use the Metaverse to learn, connect, socialise, create, work and play – and we'll be ready with the support, digital services and network facilities they need to thrive in this ground-breaking environment.

Our Metaverse strategy is currently focused on network optimisation, ensuring that EE's leading 5G network becomes the provider of choice for delivering Metaverse experiences that require high-bandwidth low-latency connectivity. We believe that low latency 5G mobile connectivity will become increasingly important for providing quality Metaverse experiences.

To support this and other projects, our applied research team is developing a Metaverse Testbed at our global research and development centre at Adastral Park. This will enable us to work with our technology partners and major customers to develop, test and trial future mixed reality Metaverse service applications on future network architectures.

We also recently joined the Metaverse Standards Forum, because we believe in developing an open standards-based framework for the benefit of all.

To find out more about our preparations for the Metaverse journey, keep checking our <u>Insights page</u> for updates on our evolving solutions.

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