



Platform White Paper
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Part 1 - Vision

ImmersiveOS vision is to enable a wide range of innovative digital interactive experiences on a city-scale that are open for participation to anyone with a mobile device. These new kind of experiences are not available today on other existing digital media platforms. The experiences may be causal, creative, collaborative, social, competitive or educational. They can be thought of as augmented reality apps. With Immersive, anyone with a mobile device can participate in engaging and fun mixed reality experiences from anywhere in the world.

In contrast to the current generation of proprietary augmented reality technologies and applications, ImmersiveOS vision is to focus on building an open and scalable platform for large-scale and potentially multi-day social mixed reality experiences on a city-level that anyone can participate using any mobile device.

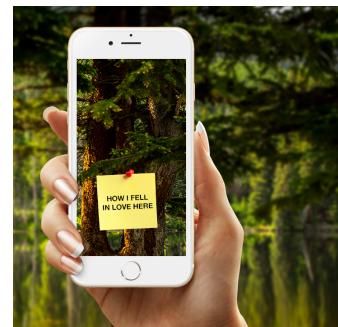
ImmersiveOS plans to develop several banner experiences that demonstrate the power and capabilities of the platform and to provide the core technology platform for 3rd-party publishers and developers to deliver their own augmented reality experiences and to make them available to a large global user-base.

ImmersiveOS is also designed with the next-generation of mobile personal computing devices such as smart glasses and direct brain interfaces in mind, and it will allow people to participate in mixed reality activities using these devices as soon as they gain mass adoption¹.

Mixed Reality Activities

The following section provides several concrete examples that illustrate the new kind of digital experiences that will be enabled by the platform for end-users.

USE CASE
Open the Immersive app and raise up your mobile phone to see a real-time 3D representation of the real buildings, trees and roads in your immediate surroundings based on your device's location and heading. Observe a post left by a person attached to a tree near you. Touch the post with your finger on your mobile device to read a story with text, images and videos. It was posted by someone who had something meaningful to say about their experience in this location.



¹ IDC research firm. [VR and AR headset shipments to hit 100 million units by 2021](#)

USE CASE

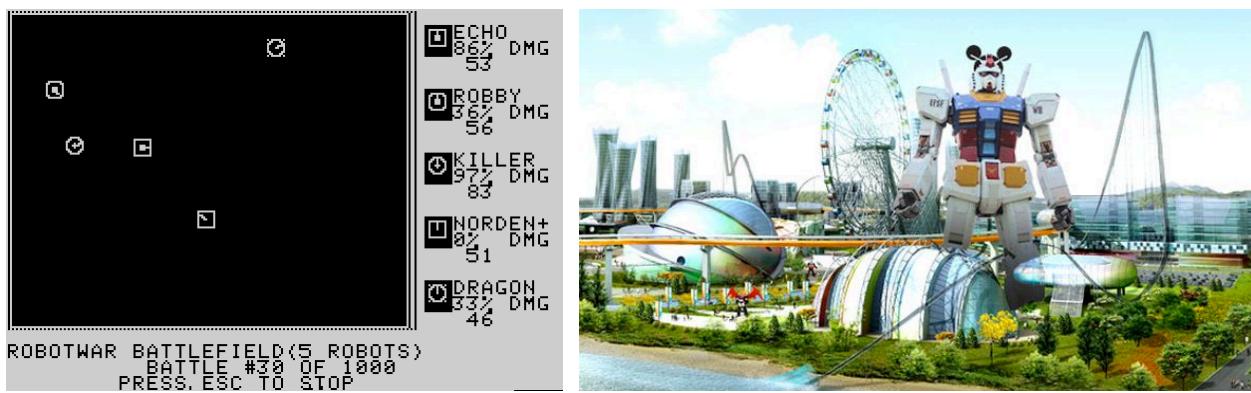
It is the Weekend. Open the Immersive app and swipe through a list of available mixed reality activities in your local neighborhood park. One of the activities - the weekend hero - starts soon and sounds like fun - it a quest to find a flag hidden somewhere in the park that requires you to interact with AI bots that roam the park and provide clues to players who answer their location-specific riddles and quizzes.



Pokemon GO 2017 big new feature - raid battles. Immersive will enable developers to run similar and more engaging activities in every city park and on every weekend

USE CASE

You are a creative person who loves to experiment and tinker with stuff. Design an AI robot that competes on dominating your neighborhood park against robots built by others in the local weekly bot challenge activity. Other casual users in the location of the activity are able to observe the action using their mobile devices and the Immersive client app.



On the left - Robot wars in 1981. On the right - Park robot wars in 2017

USE CASE

Lift up your mobile phone and notice a community board up the street near you. Walk up to it to and check out the latest local announcements of events, happenings, garage sales and local businesses discounts in your area. One of the posts has a 20% discount coupon on brunch in a nearby restaurant. Touch it to pick up the discount and present it using the Immersive app at the restaurant to redeem it.

Mixed Reality Activities for Publishers

In addition to the examples detailed above, yet to be imagined immersive mixed reality activities can be built and deployed by 3rd party publishers on the platform.

ImmersiveOS is designed from the ground-up to provide a robust platform for this kind of location aware, mixed reality activities for creators, publishers and developers. The platform provides the infrastructure and core technical capabilities to enable publishers to focus on the interactive activity content, experience and flow by taking care of the complex underlying low-level technology and capabilities that are required to enable such activities on a global scale to a large number of users. For example, the next Pokemon-Go-like game can be built with the fraction of the cost and complexity on the platform by an independent game developer.

The following examples illustrate the kind of activities that publishers will be able to create and run on the platform.

USE CASE

Build a Pokemon-GO like game involving interaction with creatures, characters and users tournaments and deploy it globally.

USE CASE

Design and deploy AI-powered creatures at specific geo locations. Your AI creatures can interact with Immersive users by a conversational interface or perform tasks based on users commands, input and other real-time surrounding conditions such as time of day, weather and nearby buildings. Your creature behavior is fully programmable to perform actions such as telling a joke, strolling around in a given area, give a hug to a person or even more complex actions such as climb a building or give an object to a nearby user. These actions can also be part of the flow of activities you design such as quests, games or guided tours.

USE CASE

Create a social activity that enables a team of people to compete with each-other in a downtown area. Design your activity as a set of challenges in various downtown locations using the tools provided by the platform to publishers. Teams must overcome each challenge to move to the next one and the team that overcomes the last challenge first wins the quest and wins an award you provide. Your challenge may require users to interact with an AI entity you have designed as part of the quest, solve riddles presented by an entity that requires some knowledge about the a city location, find objects you placed in various locations, or perform group tasks that require collaboration between team members in mixed reality.

Create an educational activity that involves a team of students collaborating and competing in a local task that involves the stories and the history of a specific location.

This lets kids learn by active participation and exploration of their environment and gets them out to interact with their physical locality using their mobile devices.

USE CASE

Create a survival game for user-generated augmented reality autonomous entities that compete with each other in a city. Participants can build bots from parts you design and provide to them that include motors, weapons, radars and need to program their behavior based on real-time environmental input. Bots are deployed in a designated area and attempt to destroy each other using their capabilities. The player whose bot survives last wins an activity award you provide on the platform.

USE CASE

Design a flying chopper drone or a 2-wheel bot and make it available for use by users on the platform. The drone lets the user that owns it fly around various locations and view mixed reality activities in these locations from anywhere he's at. The bot lets the user drive around their mixed reality city and participate in activities while not being present in their immediate proximity in physical space.

USE CASE

Create a survival activity in which players compete on who will survive last over a designated period of time in a city area. Place mines, lava lakes, healing potions, and killer bots around the area. Users need to avoid the lava lakes and killer bots, can heal themselves by finding healing potions and need to be constantly on the go to survive but can't leave the activity designated area. Design weapons that players can obtain and use to cause damage to other player's avatars and to bots and to increase their survival and winning chances.

Mixed Reality Activities for Local Businesses

Many local businesses main marketing goal is to bring foot traffic through their front door. ImmersiveOS provides several opportunities for local businesses to promote their services in a non-intrusive manner to potential customers who are in their proximity and bring these people to their business. The platform will make it easy for local business to locate and contact 3rd party activity developers who run activities available for sponsorships in their area.

USE CASE

A local businesses sponsors free activities on the platform. For example, a local restaurant may offer a discount on lunch for participants of an activity in its area. The discount can be redeemed once users finish participating in the activity using the Immersive App.

USE CASE

A local businesses places a commercial post in a community board to advertise its on-going deals and specials. The platform will make it easy for these businesses to locate high-trafficked community boards and to create compelling and non-intrusive advertising posts on these boards.

USE CASE

A local business places a permanent billboard that advertises its current sales in their physical business address. The billboard is visible to all users in its proximity. The platform will provide the tools needed to make it easy and effortless for the business to place and set the content of their billboards.

Mixed Reality Activities for Brands

National and global brands may sponsor high-profile activities by providing the ImmersiveToken award to activity participants or winners (see crypto-economy section below).

Using the tools provided by the platform, they can find an activity that is compelling to the demographic they are interested in promoting the brand to. For example, a weekend park bot survival challenge will attract audience that is interested in gadgets and innovative new consumer electronics products. An activity that involves covering a large park area by foot will attract an audience that is interested in fitness, community and a healthy lifestyle.

The platform is going to provide brands with tools to allow them to locate highly-popular activities in metro areas that they are interested in creating brand awareness at, and will connect 3rd party activity developers with such brands.

Part 2 - Business Model

A marketplace for AR activities, items and ads

Immersive core business model is to establish add grow a vibrant digital economy in augmented reality that will benefit all the platform's stake-holders: end-users, independent activity publishers, creators, local businesses and brands, and core platform developers. To achieve this goal, ImmersiveOS introduces a new crypto-coin called ImmersiveToken.

- The token is used for any transfer of value on the platform between entities. The digital economy is established by users using the token to purchase premium features, smart objects such as bots, drones and billboards from creators and to freely trade objects and entities with each other on the platform.
- Users use the token for participation in premium activities and experiences built by 3rd party publishers and creators on the platform.
- 3rd-party developers use the token to pay for the ImmersiveOS runtime services that enable them to create, run and mange their activities on the platform. The token will be exclusively used by these developers to pay for platform services.
- 3rd-party publishers use the token to award users for participation and achievements in their activities.
- Sponsorship of activity awards and participation fees by local businesses and brands will be in the form of token award. For example, a local business may

provide a premium activity for free by covering the participation fee for users and brands may provide token awards to activity participants and winners.

- Commercial posts and billboards positioned in specific areas will be purchasable by local businesses or brands exclusively using the token.
- A group of neighbors commission an artist they like to make their neighborhood look nicer in mixed reality.
- Users award creators and artists for creative constructs that augment physical reality with the token on a voluntary basis. For example - award a creator that decorated your whole street with statues and colorful building facades. This is design to encourage creators to augment the building outlines and streets with visual creative expressions.



Ian Cheng - Emissaries. Today's cutting-edge virtual reality art projects are on Twitch and in museums, With Immersive, you will experience them after sunset in your park and may show your approbation in a form of ImmersiveToken contribution directly to the artist on the platform.

Today, creators of augmented reality objects and entities, users who have obtained virtual objects and entities via achievements or via paid purchases are not able to fully own their creations as they are governed by an opaque and arbitrary market controlled by the activity publisher.

Immersive plans to create and operate an open and transparent market for Immersive reality entities, objects and rights to place objects in a specific geo location or to perform an operation on an existing object in a specific location. For example, a right to moderate a community bulletin board in a high-traffic location or the right to place a billboard on the building's wall above a store front in augmented reality. In this open market, creators and users will be able to freely buy, sell or trade these rights using ImmersiveToken.

This open market is designed to encourage the creator community to build compelling AI entities and objects and to provide users with the comfort to purchase them as they can always trade or sell them later on the platform and are not stuck with them once they do not wish to use them anymore. There are several on-going early-stage projects that aim to provide such a market for online gaming platforms but Immersive plans to build this market directly into the core of the platform and to provide both robust content creation and deployment tools and a robust viewing and interaction experience. This tight vertical-integration ensures a better user-experience and increases the success chances for this new crypto economy market model.

Blockchain technology is well suited to implement this business model because it provides a solution for building a large-scale economic system based on shared interests and values, that anyone in the world can participate in with very low transaction fees.

Use of blockchain technology to implement this business model does not mean that real-time rendering or interactive use of the platform will be slowed down in any way.

The ImmersiveToken transactions will be performed asynchronously and should not interfere in any way with interaction with Immersive activities by end-users and product design decisions can make these transactions instantaneous in many cases.

For example, a user may instantly join a premium activity that requires a token participation fee and in the case of fraud he will be kicked out of the activity after just few minutes². A user may instantly buy drone and start using it on the platform but he will lose it in case of transaction fraud after just few minutes of free usage.

Part 3 - Product

This section provides an overview of the main products and services that are going to be provided by the platform. These products and services are designed to provide the capabilities and features required to deliver a great user experience for the different platform stake-holders in a robust and scalable way and to make it simple for them to get on the platform and adopt it.

Immersive Mobile Client Apps

People interact with immersive mixed reality activities using client apps for their native mobile platform of choice. The ImmersiveOS core dev team plans to develop client apps for the most popular mobile platforms such as Android and iOS.

The client app uses data obtained from the ImmersiveOS cloud APIs to provide the following main capabilities.

² 1 Achieving a very high level of security by confirming a transaction after 12 blocks takes about 3 minutes today on the Ethereum network.

- Render in real-time the mixed reality scene viewable from the user's current location with smooth, 60 frames per second animations on the mobile device's screen
- Capture and send location signals from the user's device to determine his location, heading and elevation in mixed reality
- Provide the user interface that enables the user to perform mixed reality actions such as participating in activities, interacting with AI entities and with other users' avatars in his proximity
- Capture and process user touch input on mixed reality objects. For example, request from the ImmersiveOS the content of a community board post when the user touches it on a board with his finger
- Provide conversational interface to converse with AI entities in mixed reality
- Present the user with a list of available activities for participation and information about each activity in his proximity
- Authenticate the user for participation in an activity and update user data based on the activity the user is currently participating in. For example, update user health in a survival activity
- Enable the user to perform ImmersiveToken transactions using ImmersiveToken such as providing a participation fee for a premium activity or for buying owned items from publishers or from other users and redeeming activity participation or winning awards

Immersive Studio App

One of the primary goals of the platform is to build the OS runtime that enables publishers to create and run interactive mixed-reality activities. The core dev team is going to develop several open free activities that demonstrate the power and potential of the platform but most AI entities, object and activities will come from 3rd party publishers and the developers community. To simplify activities development by 3rd party developers, the platform will include a desktop studio app that will provide the following main capabilities:

- Create, set the content, deploy and manage a mixed reality activity in one or more world locations
- Set an activity participation fee and participation and achievements awards in ImmersiveToken
- Create, program and test AI Entities behavior and appearance before deploying them to activities or offering them for sale to users
- Create user-obtainable objects and test their behavior and appearance before adding them to an activity or offering them for sale to users on the platform
- Set the rules for the spawning of AI entities and objects in a managed activity

- Update a deployed activity data - updated data modifies a deployed activity behavior in near real-time for its participants
- Deploy new AI entities and new objects in a running managed activity at a specific location
- Communicate with users who currently participate in an activity using a one-to-one and one-to-many text and voice service
- Get near real-time status from running managed activities such as the number of participants, their location and their progress using an activity dashboard feature

Immersive Web Hooks for Publishers

The platform is going to provide a specification for web hooks that can be deployed by publishers to receive real-time data about their deployed activities and to provide optional custom behavior for their running activities.

Using web hooks developers can build web apps that provide near real-time information about their deployed activities and make these apps available on the web. For example, publishers can provide real-time leader-boards, announce activity winners, publish teams progress, and advertise his activities that are open for participation in various world locations.

To enable these capabilities, when web hooks are provided by a publisher for an activity, the core OS runtime calls the web hooks methods with near real-time activity state updates.

Immersive Dashboard for Local Businesses

The platform is going to provide a web-based dashboard for local businesses. The goal of the dashboard is to make it easy for local businesses to get on the platform and benefit from its features. The dashboard is going to provide these businesses with the following main features.

- See how many platform users are active in their business location proximity
- Purchase an advertising billboard on their place of business building
- Update sales and promotion on their deployed advertising billboards in mixed reality
- See which activates are planned by publishers in their business location proximity and allow them to sponsor activities which are open to sponsorships
- Sponsor premium activities participation fee or provide awards to activities that are running in the their business location proximity
- Confirm the eligibility of people to redeem discounts and promotions in the business location. For example, confirm the participation

Immersive Dashboard for Brands

Brands use the web dashboard to locate local highly popular activities that seek brand sponsorships in different world geo locations.

Listed activities includes information such as audience size and the likely demographic information of participants to assist brands in finding activities that are applicable for them for sponsorship.

The dashboard also enables to brands to sponsor an activity by providing the participation fee for up to a set number of users for paid activities and by providing the coin award to various activity achievements.

Part 4 - technology

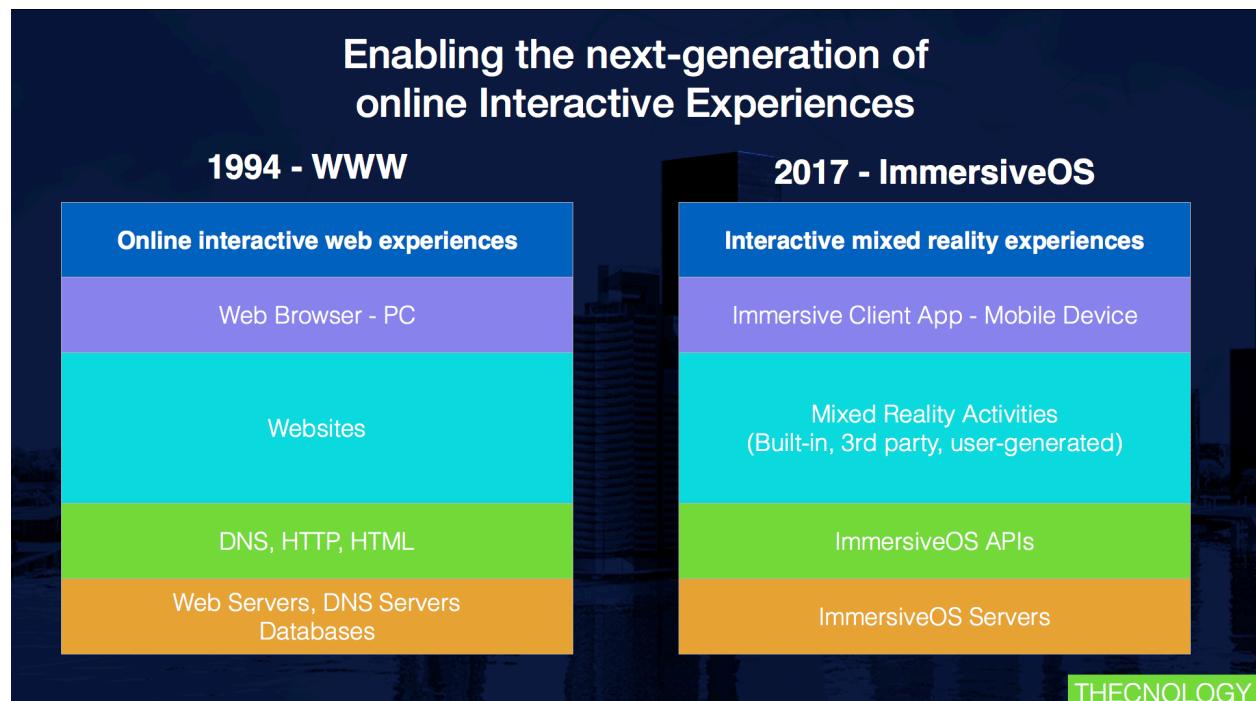
Challenges and Opportunities

Building a city-scale engaging and persistent mixed reality environment with people, avatars, virtual constructs, smart objects, rich-media posts and AI entities that is rendered in near real-time on mobile devices by a large number of concurrent users is a tough technical challenge that requires non-trivial resources and effort. It has never been done before by anyone. That said, advances in mobile devices capabilities, mobile Internet connectivity and cloud computing makes the project feasible for a nimble and agile product and software development team.

The following section provides a high-level overview of the nature and scope of the technology we intend to build to address these challenges and turn the dream of an open mixed reality platform powered by blockchain technology into a reality.

Architectural Overview

It is useful to compare the ImmersiveOS architecture to the more familiar architecture of the World Wide Web. The World Wide Web was designed to enable interactive web experiences using a web browsing client app over the Internet utilizing the core Internet protocols and standards. The ImmersiveOS architecture is designed to enable next-generation mixed reality activities experienced on mobile devices over the Internet utilizing modern core Internet protocols.

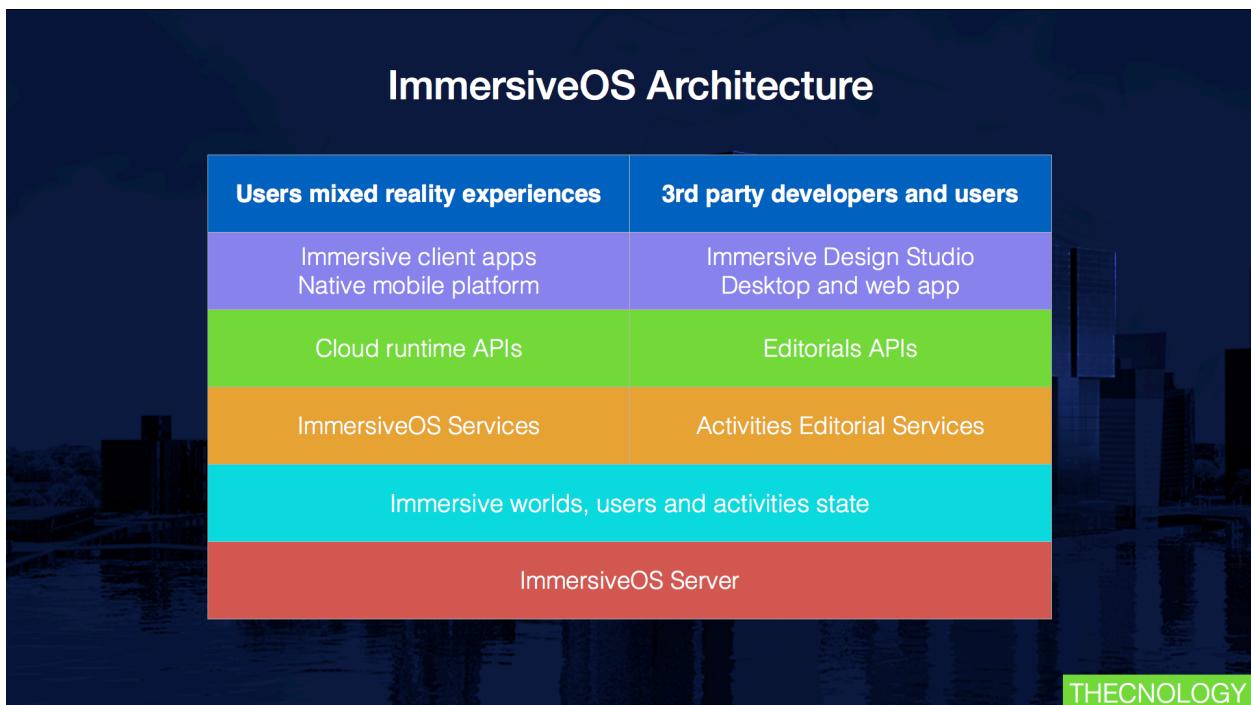


ImmersiveOS is deployed and runs on Immersive cloud servers hardware similar to how web application are deployed today on web servers hardware.

The OS runtime exposes a set of APIs that are used by client apps to enable people to participate in built-in, 3rd-party published and user-generated immersive activities. The APIs are provided using an Immersive OS server.

Immersive activities are equivalent to web sites in the WWW architecture. In the WWW architecture web application servers utilize data stores such as relational databases for persistent files across user stateless interactive sessions. In Immersive, the world, avatars and activities state is equivalent to the web data and is stored on cloud storage systems and in Immersive OS servers memory to enable fast real-time world evolution.

Core OS Architecture



Immersive OS Servers

An Immersive OS server runs a mixed reality simulation in a geo area that includes one or more started activities. The shard is defined by a well-defined geo area outlined by a geo-fence. For example - Manhattan, London or LA. This design is required to deliver the core OS experience on a global basis in a scalable way and to deliver activities and world updates in up to 60 frames per second for all connected users in near real-time.

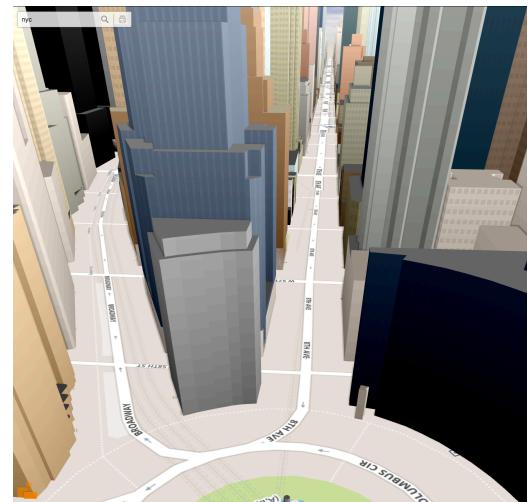
The design decision to split world regions between different servers is necessary for a gradual rollout of Immersive worlds until all of the earth's inhabited areas are covered

by world servers and Immersive achieves its goals of being a world-wide mixed reality simulation.

This design also allows the core dev team to focus on one geo shard and a set of primary activities as a pilot scenario before rolling-out additional servers to cover additional world regions. Over time, we plan is to conduct a gradual roll out of servers for each of the worlds major metropolitan areas.

Server Configuration

Each server is configured with a specified earth geo-fenced area. On initialization, the server generates the map of the area from pre-processed mapping data. This data is created in a pre-processing phase based on open geo entities databases such as [OpenStreetMap](#). It involves converting geo data such as walls, ceilings, roads and waterways to a uniform polygonal-based representation. In addition, the server executes each installed activity initialization code. This initialization code can add AI entities, objects and constructs in pre-specified or random geo locations inside the server's managed geo area.



Manhattan buildings, parks and ground geo data used to bootstrap an Immersive Reality Server

Part 5 - Product Development Plan

Development Grants, White Paper and Live Website

6/20/2017

- Website and white paper finalized and project announced.
- ImmersiveToken development grants issued to core dev team members and to contributors.

ImmersiveToken Presale

7/1/2017 - 9/1/2017

Core Dev Team Buildup

7/1/2017 - 1/1/2018

- Hiring of key dev team members. Additional development grants.

Manhattan 2.0 Milestone

7/1/2018

- First world server goes online covering the Manhattan geo area.
- Local stories activity - rich media posts and community boards in the Manhattan area.
- Client App for Android and iOS mobile platforms.

Newera Milestone

11/1/2018

- Quest weekend activities in NYC parks.
- 3rd party developers tools and API.
- First activity by a 3rd party publisher goes live on the platform

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