DARABASE

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Immersive Cities Manifesto

The Immersive City
Creativity & Control

Abstract

- Our digital lives are shifting from flat 2D screens to a more spatial web, with digital content layered on the physical world. Today this is through Augmented Reality on mobile phones, but billions of dollars are being spent on smart-glasses technology to reinvent our digital lives.
- The world is becoming the canvas for digital content. Just like today with signage, outdoor advertising and property based content, cities need to put in place the controls to manage and monetise this fast evolving trend.
- Cities have been mapped for centuries, but the latest 3D scanning, digital twins and visual positioning system technology is reinventing how companies are controlling and commercialising the built environment. Cities need to understand this and seize the opportunities and mitigate the risks that this new digital ecosystem creates.
- Cities can drive significant value through harnessing this immersive digital future:
    - engage in the **Creator Economy** by enabling their environments to become digital playgrounds. Engage citizens and visitors with a range of immersive experiences such as tourist trails, public art installations and city-wide games;
    - drive efficiencies and **save costs** through using spatial and digital twins to visualise future developments, drive engagement around planning decisions and deliver smart and cognitive city solutions;
    - create **new revenue** streams by controlling and commercialising immersive content and advertising in the public realm, worth up to **$150 billion** based on current industry projections
- By claiming, controlling and commercialising **Property Digital Rights**, cities and property owners can unlock significant incremental value. These rights manage the digital content displayed in physical locations as well as how a physical location is manifested inside a virtual environment - e.g. metaverse or game.
- Cities and property owners can take simple and low cost steps today to learn more and be an active player in how this multi billion dollar digital future will evolve.

The Immersive Future

Over 1.4 billion people use AR on their mobile phones every month, that's a third of the 4.3 billion smartphone users globally. Whilst social filters and selfie lenses have driven early usage, increasingly this technology is augmenting places not faces. Computer vision and other types of Artificial Intelligence (AI) are revolutionising how devices "see" and interpret the world, accelerating AR use cases and the technology required to create useful, entertaining and informative digital experiences layered on the world around us.

Digital maps are evolving quickly and to such a degree that they really aren't maps anymore. These geospatial platforms and tools now allow anyone to create digital content and display it on the world - in cities, in parks, on public buildings, on private properties, on roads and intersections. And since AR is a new medium as opposed to a technology, it can be used to deliver any type of content or experience; for directions, signage, reviews, tourism, arts and culture, outdoor advertising, retail media, even graffiti...

Controls and Consents

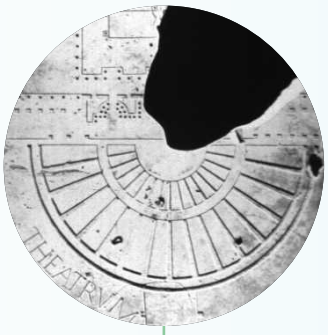
If we look at how these use cases are delivered physically today, most are controlled and regulated in some part by the cities themselves. Public bodies determine where signage should be placed, what public art to place in parks, whether to allow outdoor media on busy roads, whether planning consent is given for billboards and screens on private properties or stores, where events can take place, and what type of commercial messaging can be displayed.

Broadly the same laws and regulations apply to digital content displayed on a property as to physical content, especially where the message is commercial in nature. Cities need to consider how they will control and commercialise immersive content in their locations as they do the physical versions today. Just because technology companies enable it, doesn't mean that the municipality shouldn't help control it, for the good of the city and its citizens.

Since billions of people use AR on their mobiles today, this is already important. In the near future our digital devices will become ever more wearable, with smart glasses becoming the main method through which we interact digitally and spatially. At that point it becomes imperative that city-scale controls are implemented in a centralised and platform agnostic way across all operating systems, devices, networks and use cases.

Maps - Ancient and Modern

Back in the year 203 BC, the Forma Urbis Romae map of Rome was created, carved on an entire internal wall inside the Tempio Pace Parete building. It captured every architectural asset and detail of the ancient city, from public monuments to internal rooms and staircases, and is the first known detailed plan of a city.



203 BC

Since then there has been a rich history in the mapping of cities and towns, including Leonardo de Vinci's plan of Imola in c. 1473 and John Rocque's famous Map of London, published in 1747. The governing, conquering and mapping of cities and the rights and regulations controlling these locations have been tightly linked for centuries. In many instances, national mapping bodies are seen to have strategic importance at a country level and are government controlled, such as the Ordnance Survey in the UK and the United States Geological Survey.

1747

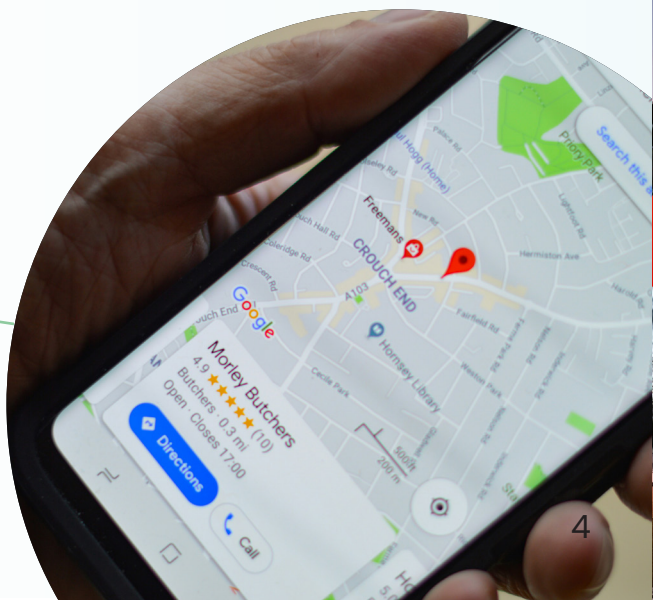
How and where content and signage is displayed in cities has also been historically controlled by governments and municipalities. Whether placed in the public realm (roads, parks etc.) or on private property, planning permission is normally required for street furniture, signs, billboards and screens. These controls aim to create a safe, uncluttered and pleasant city for its residents and visitors.

How cities are mapped has been a central pillar of the digital revolution. From the computing foothills of the 1960s, paper maps began to be digitised and manipulated. In the 1980s the concept of Geographic Information Systems (GIS) was introduced, allowing more complex spatial data to be layered onto maps, to be analysed and modelled. With the internet, Global Positioning Systems (GPS) and aerial and satellite imagery, digital maps have developed massively and are now an essential tool in the pockets of billions of people globally, used daily on their smartphones.

1923

2000

2025



Digital maps continue to evolve, as technology shifts from 2D screens to the 3D spatial web. Large technology companies who already have an established digital mapping business (Google, Apple, Meta, Microsoft, Snap, Niantic…) are now investing billions of dollars to build new types of maps to more accurately locate a user and place digital content on the physical world using Visual Positioning Systems (VPS). Whereas GPS uses satellites in space to triangulate a device's position to within an accuracy of metres and a compass to determine heading, VPS determines a device's location and heading by using AI based computer vision to recognise and triangulate key visual features as seen by the camera of a mobile device, such as the outlines of buildings or street furniture, giving centimetre level accuracy with much less potential interference.

VPS technologies create and leverage a digital and spatial twin of a city, effectively a new 3D map, and enable a new "skin" to be overlaid on the world in augmented reality (AR) with content convincingly layered into our physical environment. By using complex computer algorithms we can now make it appear that digital assets are interacting with the real world, even appearing to go behind or on top of physical structures.

Historically the distinctions between map makers, map users and the subsequent controls leveraged by governments and cities was clear. This is no longer the case. Some VPS platforms are also now being commercially packaged and made available to service providers and third party developers. Platforms such as Google's Geospatial API and Niantic's Lightship Platform (the tech behind Pokémon GO) blur the boundaries between these traditional roles and remove the historical and regulated controls for cities and property owners.

Opportunities and Risks

Cities and governments have responsibilities to ensure the city's economic health. They must also ensure public safety, protect property rights and as we move forward, regulate digital content. The evolving digital landscape creates a number of opportunities and risks for cities and property owners which must be proactively considered.

There are a number of health and safety concerns as cities become the canvas for our digital lives. Though disputed, reports state that at the height of the Pokémon GO craze, unsafe gaming was responsible for 256 deaths and 150,000 traffic accidents. It has never been easier to place AR content on buildings for all to see. Cities and property owners need to be aware of and protect themselves from virtual graffiti and unsolicited content, taking control and action digitally in the same way they do physically.

New Revenue

Location-based digital content represents a low cost, wholly incremental revenue opportunity for cities as well as creating new ways of driving citizen engagement.

Last year traditional outdoor media spend globally was $38 billion. A recent PwC report revealed that in the UK 46% of the media value goes back into the community through the provision of public services, infrastructure and community and employee initiatives. AR advertising is already worth $5.2 billion p.a., around 15% the size of traditional outdoor media. But digital advertising in mobile applications is worth $336 billion. As the audience and engagement shifts from 2D mobile to 3D spatial, these ad dollars will follow. So in time one could argue that the potential value to cities and communities from the AR advertising layered in their locations will be over $150 billion p.a. Currently cities will see none of this value as technology firms commercialise the world in isolation. In addition cities have the potential to enable immersive advertising in their own locations, receiving a direct and incremental revenue stream with no capital cost.

Sustainability

As the number of people with smart glasses grows and the viewing of spatial content becomes more pervasive, there is an opportunity for spatial content and media to replace their physical counterparts, leading to cleaner and less cluttered environments and more sustainable cities. In a recent referendum in Geneva, Switzerland 48.1% of citizens voted to ban all outdoor media in the city due to environmental and social concerns and São Paolo in Brazil banned all outdoor media in 2007, replacing it with public art, community boards and trees, though they have allowed some advertising back in a controlled way since. Digital screens also require significant amounts of energy to run. Governments in Germany, Austria, France and Spain have all now mandated that digital advertising screens must be turned off in cities after 10pm in an effort to be more sustainable and to reduce light pollution. Through controlling immersive content and inventory, cities can create a better physical environment alongside a fair and equitable commercial model.

Placemaking, Livability and Citizen Services

Urban planning and development can use AR to visualise proposed developments and infrastructure projects in a real-world context, facilitating faster and better decision making and public engagement, as well as helping with planning and zoning decisions.

Citizens are also increasingly digital creators in their own right, and cities have an opportunity to be a facilitator of and stakeholder in a Creator Economy. For example, cities could run competitions for local independent game companies and developers to turn the city into an immersive playground or invite submissions for digital artworks to be displayed in public places and spaces. All the experiences can be created and used in both a digital twin of the city and its spatial twin, layered on the world.

AR wayfinding and points of interest can also be used to route tourists, visitors and residents to parts of the city that may be less busy or which are less well known and under-visited, supporting city initiatives as well as businesses in the local areas.

Integrating the spatial web with smart infrastructure and sensors is useful in visualising data and insights, such as real time traffic information and air quality, onto the physical city as well as in a digital twin. This can assist with city decisioning as well as create tools and guidance for citizens, such as navigation assistance and public health alerts, for example pollution alerts for asthma sufferers.

Thinking Bigger

But what about controlling the spatial city itself? Whilst, for example, Google has created 3D maps and meshes of many cities around the world, some cities are conspicuous by their digital 3D absence. Go to Google Earth and look at London in 3D and you'll see the Shard towering above the city. Look at Dubai however and the Burj Khalifa is as flat as the water next to it and is only captured as a 2D tile. The same can be said for many other major cities, especially in the Middle East, Africa and Asia. Whilst there is certainly financial and computational overhead for Google to 3D map, mesh and texture cities, one has to assume that some missing locations are due to a state or governmental intervention.

But for the spatial future to exist, technologies need these 3D maps and the VPS services they enable to accurately locate devices. This is not just for AR mobiles and smart-glasses but also for autonomous robotics and vehicles, drone-based deliveries and the like. In the same way that state-owned mapping has been licensed to private companies for decades, there is an opportunity for cities to create, control and commercialise their own 3D maps, digital twins and VPS services to companies looking to run location-based services.

So in addition to cities governing the spatial rights and rules, they might also work with partners to create and own their own spatial maps and VPS, packaged with the appropriate consent and content and licensed to technology and solution providers for potentially significant incremental revenues.

The Future of Cities

Following in the footsteps and no doubt inspired by notable city developments such as Dubai (UAE), Doha (Qatar) and Shenzhen (China), numerous new cities are being planned and developed. These high profile initiatives are often referred to as Giga-projects and the most renowned is Saudi Arabia's NEOM which is made up of multiple cities and developments including The LINE. These projects are futuristic by default and are leading the way in imagining, inventing and planning what is increasingly thought of as a Cognitive City - not just Smart, but through AI, able to react and "think" to create better outcomes in real time for the city and its citizens.

Immersive and spatial technologies are at the heart of this. It is said that, "AR is the future of AI and AI the future of AR". At a city scale, one cannot be considered without the other. For cities to react and grow to meet the changing needs and behaviours of their citizens, both must be considered, understood and trialled.

Next Steps for Fairer, Immersive Cities

So what about the millions of cities and towns who do not have the benefit of building afresh, from the ground up? What can and should be done now to start to "retrofit" spatial strategies and technologies across our historic, yet ever-changing built environments?

As AI and immersive technologies revolutionise how we live, work and play, Darabase is well positioned to advise on how cities, property companies and retailers transform to harness this digital future and commercial opportunity.

Beyond consultancy, we offer a range of technical tools and solutions to meet the primary needs of the cities and property owners in preparation for the spatial future.

Register the Property Digital Rights for properties and assets to claim the spatial rights and commercial potential. The registration and control of Property Digital Rights are at the heart of how location-based experiences will be managed, in both the physical and virtual worlds.

Control the city by setting rules and consents for what kinds of immersive content can be displayed in which locations, across both public and potentially private properties. As more and more digital content is layered on the world, how it is regulated and controlled will become increasingly critical. The Darabase Rules Engine can facilitate this for countries, cities, property companies, platforms, publishers and brands.

Visualise how the immersive city is developing in both a Digital Twin of the city and the Spatial Twin that overlays it.

Experiment and learn through projects and proof of concepts to see how citizens, tourists, retailers, artists, advertisers and the like can partner with the city for mutual benefit and to create a delightful, surprising and useful city that we all want to live in.