AUGMENTED REALITY IN THE URBAN CONTEXT: A BLURRED FRONTIER

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INTRODUCTION

One of the most significant and momentous features of architectural avant-garde of the last 20 years is the proliferation of representational media.

Digital technologies — computer and computer-controlled machines — have pervaded all aspects of life, delivering sustained and accelerated rates of societal and economic evolution. Digital technologies will incontrovertibly be one of the key drivers of innovation of architecture and consequently the built environment in the 21st century.

Human-machine combinations routinely outperform supercomputers and super-humans. Computer and robots are making humans better. In the long term future it seems entirely plausible that an Artificial Intelligence will dominate and more pragmatically, in the near future there is an exhilaratingly vast amount of symbiotic work with which to engage. In other words, we are in the Intelligence Augmentation phase of human evolution.

In the past, architecture was historically concerned with religion. In more recent times, architecture has been about sustainability and technology. And will the future be about the digital technologies?

There's a lot of talk about the smart cities of the future. It's important to see in a realistic city setting how some of these technologies could become part of the way we operate with and within information-enriched urban environments.

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Explosive innovation as well as the adoption of new technologies and rich sources of data are changing the cities in which we live, work, and play.

Cities are always in transformation, since they are living systems. In a sense that they are open self-organizing that interact with their surroundings. These systems are maintained by flows of information, energy and matter.

Augmented Reality and Virtual Reality technologies have existed for some decades now. Although they have only definitely been on the market in recent years, they have already dictated new ways of living and relating to one another. As the world will never have less technology and will change faster and faster thanks to it, certainly the architectural profession will also undergo major changes, gaining new horizons and challenges. Therefore, it is necessary to understand the scope of these changes and challenges in the city. With this goal, this paper examines the influence of the augmented reality in the urban context. To do so, it selects and analyses case studies, in order to support a critical analysis and comparison. This study leads to reflections about the implications of these technologies on the nature of the city in the future.

WHAT IS THE IMPORTANCE OF PHYSICAL SPACE FOR A POPULATION THAT IS INCREASINGLY MOBILE?

Our cities have always evolved towards the necessity of mobility.

In a time of increasing digitalization, it will become increasingly common in the future that we will not have to leave the house anymore to do everyday life activities like work, leisure or shopping. Through increasingly intelligent computer technology, we will be able to conduct everything from our private home, letting the virtual world define our social interaction and perception. Of course the question is: what happens to actual physical space and the concept of the public?

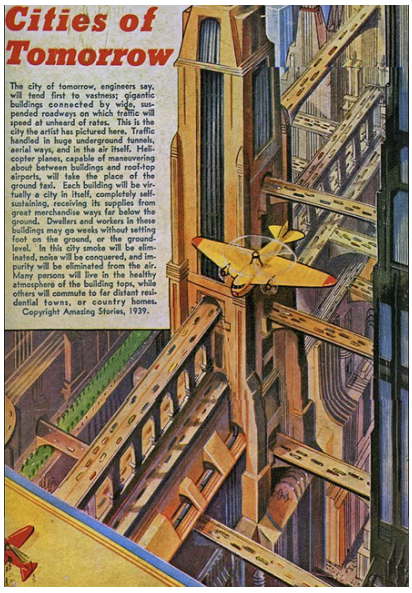

Fig. 1. Amazing Stories by Julian Krupa, 1939

The city of tomorrow, engineers say, will tend first to vastness; gigantic buildings connected by wide, suspended roadways on which traffic will speed at unheard of rates[1].

In 1939, the artist Julian Krupa shared his vision of the «Cities of Tomorrow», published in «Amazing Stories», one of the first science-fiction magazines. «The city of tomorrow, Amazing Stories prophesied, would consist of an idyllic, vertically stratified urbanscape in which dwellers and workers […] may go weeks without setting foot on the ground, or the ground level»[2].

This image appeared on the back cover of the August 1939 issue of «Amazing Stories». According to the caption, tomorrow's city would be characterized by vastness, by traffic that would move «at unheard of rates», and by salubrity: «smoke will be eliminated, noise will be conquered, and impurity eliminated from the air. Many persons will live in the healthy atmosphere of the building tops, while others will commute to far distant residential towns, or country homes». The description and the rendering betray close acquaintance with the exhibits presented at the New York World's Fair in the same year.

What is «mobility» and what is it for? This figurative meaning is related to the more literal sense of mobility as freedom for movement across physical space.

There is a new meaning to mobility, since mobile technologies are having a huge impact on our society.

If before being mobile meant a physical act to move from point A to point B, today we only need internet access to be connected to the world. Smartphones may be changing how people interact with each other and changing their expectations for social interaction. The social interaction is not in the real world, but in the virtual world.

Today, when we speak of being «mobile», we refer to the myriad technologies that allow us to remain in constant contact with each other regardless of where we are. For today's mobile citizens, place matters very little; it is an obstacle that technology painlessly overcomes, with our ever-present smartphones telling us always where we are, what's around us, and, thanks to GPS, how to get where we are going.

Our lives are increasingly mobile. In the last ten years we have been part of a phenomenal evolution that's changed the way we engage not just with each other, but also with our surroundings. Mobile is ingrained within our lives, though device penetration and data usage are still on the up.

[1] UPTON, 1998: 176.
[2] UPTON, 1998: 176.

HOW DOES VISUAL REPRESENTATION AFFECT OUR EXPERIENCE OF THE CITY?

We have been expanding the human consciousness by integrating robotic consciousness into the social fabric.

To begin, it is important to define a few terms: Augmented Reality is interactive and occurs in real time, conceived in three dimensions, its processing combines virtual elements with the physical environment. Virtual Reality is a means of sensory experience that occurs through an operational system in which the user gets very close to the sense of truthfulness of some environment or situation.

Both technologies provide a close connection with the architecture and the built environment at large, bringing new tools that expand the spatial sensations of those who experience them.

More and more, Augmented Reality is being used as a tool that allows, among many other uses, a multifaceted intervention and artistic manifestation in urban space. The lack of a specific legal framework on the use of Augmented Reality (AR) in public--private spaces makes unlimited the potential for interventions.

The ability to overlay different realities makes it possible to create georeferenced comments, metaphors, political messages and create dialogues in public spaces between different types of actors. AR is a relatively recent phenomenon and as such, its development and democratization are dependent on the one side on technological evolution and on the other side on what is produced, develops and distributes the different types of software that is creating AR content. As of 2009 there has been a growing interest in AR associated with the mass adoption of smartphones. This new situation has made RA an emerging medium of communication of major relevance. The ubiquity of smartphones and the growing public familiarity with the AR application is having a tangible impact on how content is created and presented. Also in its expansion to different cultural contexts has produced social phenomena with the development of games based on the use of AR such as the Pokémon Go produced by Niantic. For the urban space the AR has been affirmed not only as a consistent means of communication, but also as a means of interpretation as in the case of access to invisible memories or the discovery of possibly georeferenced architectural passages, and/or sociabilities in contexts differentiated from urbanistic layers, that make up the contemporaneity of the city.

According to Biermann AR is the «first step in the evolution of better tools of expression that democratizes the tools of public media production. If successful, this and other types of digital takeovers can ultimately yield the traditional modes of public commercial advertising obsolete, equalize the power structure of representation, and allow the citizen to define his own media consumption»[3].

[3] BIERMANN & SEILER, 2011: 3.

In practice, these concepts and understandings have produced a very wide range of experimentation and development of projects that can mark us the much that there is to do in the field of RA.

Central to these developments are questions of the relationship between technological resources and their use, both from the point of view of the ethical dimension and their practical use. The cases described briefly below and which have urban space as the scenario and object of interaction account for the complexity of the issues at hand.

Virtual reality, on the other hand, has not yet reached a full mainstream. However it already covers several fields that also come to influence our lives. Here it is worth mentioning Keiichi Matsuda's film, a designer who is experiencing the use of virtual reality in his projects, which gives us a fascinating example of how this technology contributes to our experience of the city.

Keiichi Matsuda through his *Hyper-Reality* project demonstrates a «new, provocative and kaleidoscopic vision of the future, where physical and virtual realities have merged, and the city is saturated with media»[4]. Here we forget the futuristic idea of flying cars polluting our vision and what we see are various virtual devices that are not only present in our vision but also interfere with our daily life — guiding us all the time and practically training the human being. A bit scary, but not so far away from what we've experienced with smartphones and other technology systems.

Fig. 2. Hyper-Reality by Keiichi Matsuda, 2016

[4] WINSTON, 2016.

Hyper-Reality is a concept film by Keiichi Matsuda. It presents a provocative and kaleidoscopic new vision of the future, where physical and virtual realities have merged, and the city is saturated in media. It is the latest work in an ongoing research-by-design project by Keiichi Matsuda.

«Our physical and virtual realities are becoming increasingly intertwined. Technologies such as VR, augmented reality, wearables, and the internet of things are pointing to a world where technology will envelop every aspect of our lives», states Matsuda[5].

Raymond Kurzweil (inventor and futurist of the United States) states that by 2040 people will spend more time immersed in virtual reality than actually said[6]. What looks like a scary sentence can also mean an era in which all people can live the way they want through technology. While this reality crawls, it is possible to imagine future conflicts and benefits that it will bring us and it is up to the architect to join other disciplines to know how to position to ensure once again the quality of space, whether real or virtual, that we live.

Through these examples it is possible to have a small sample of what the future holds for us. New ways of relating to urban space and socially, instant travel to other realities and cultures. How are architects prepared to deal with this? Think of physical spaces that can house a virtual life, buildings that can have completely different functions in the same volume, cities that can house different realities instantly in the same space. How do you design places that can address real and virtual lives?

Since architecture will no longer depend on a specific construction, design freedom may reach levels previously unimaginable, limited only by the potential of programmers and technology of the time. Since the projected environments will be virtual, the material resources will no longer be exploited and even floating buildings will be possible, creativity will guarantee everything. The future is just beginning, one more time.

HOW DO WE EXPERIENCE PUBLIC SPACE AND EACH OTHER, IN THE AGE OF DIGITAL COMMUNICATIONS MEDIA?

The augmented reality is already beginning to capture the physical reality and the biggest proof of this is in the recent wave of people going on long walks, creating new friends and sharing new memories as they seek together for pokémons in the city. This is the phenomenon Pokémon Go, which has the impressive number of approximately 9.5 million daily users in the United States alone, and it's expanding worldwide.

Through the increased reality of the game, it is now possible for people to search for pokémons by breaking into the public space and knowing the architectural landmarks of each city that would never be seen in a video game or could even go unnoticed by the

[5] WINSTON, 2016.
[6] KURZWEIL, 2017: BR13.

daily rush. The game encourages and creates opportunities for the «pokémon trainers» to leave their homes for new experiences.

The CEO of Nintendo responsible for the success of the application suggests that when launching the game they had three ideas in mind for their users: exercises (the game is designed to get you up and moving to find new pokémons), look at the world with new eyes (since urban landmarks and historic places turn into gyms or pokémon centers) and social «breaking» (since people now organize group tours and other collective activities around the theme).

Within these topics it is worth noting especially how important buildings and public parks are being redefined and gaining new functions according to this new virtual world. An example would be a museum that was designed as an exhibition space, but which now also plays the role of a pokémon center in the imaginary of the people.

Pokémon Go is a world-wide phenomenon of mass use of RA and in this sense some problems have started to stand out, such as the trespassing of private property or the inadequacy of playing in certain public spaces. Such as the Holocaust Museum in Washington, DC, that asked players not to play inside the museum. In Sydney in the suburbs of Rhodes there is a confluence of PokéStops which causes hundreds of players to focus around a certain space and according to one of the residents the space is «in complete chaos with crowds of well over 1,000 per night. There is a massive level of noise after midnight, uncontrollable traffic, excessive rubbish, smokers, drunk people, people who are 'camping' on the site, and even people peddling mobile phone chargers»[7].

The concepts referred above, as well as applications geared towards urban spaces, however, correspond to what we might consider as a first period of AR, which had in common the fact that the initiatives are not subject to or are framed by evaluation processes with regard to its real usability. In other words, the relationship between the technological resources (equipment and applications themselves) and the experience lived by the users was not properly considered at both the design and the use stages.

Regardless of the field of application of AR, whether in the city, in museums, education, or other fields of application, your conceptual and software development process should follow very similar standards. The process of developing mobile applications in AR must be distinctively different from traditional mobile applications. Applications in AR have to take into account the surrounding physical space, as digital content appears superimposed and registered three-dimensional, given the illusion that these elements are part of our surrounding environment. In this sense, the conventional process of developing applications based on the design of wireframes, creating paper prototypes and testing clickable prototypes with users, cannot be applied in the same way. It is necessary to recreate a context similar to that of the final product that is to simulate the

[7] MCLAUGHLIN & HILL, 2016.

expanded content, but the actual video capture. The need to create robust prototypes causes them to increase or shorten development time and often this process is eliminated. As a consequence problems that could be identified earlier, only at the end of the process appear, when it is too late to make significant changes.

We are living in the era of smartphones, communication has never been so easy, with social media we're always connected to our friends and millions of other people, no matter where we are, at a very low cost we can easily exchange messages, get all sorts of notifications and share information like texts, pictures and videos, all we need is a smartphone with internet connection.

Mobile technologies also have a huge impact in people's social lives, people are getting more disconnected from the real world, they put their phones ahead of human interaction, it's getting harder to see people talking to each other in public places, they're always too busy with their mobile devices, checking notifications, sending messages or just sharing a new video. It's like an addiction, and it is kind of turning people into zombies.

CONCLUSION

The presented case studies were tested and applied in the urban context, proving what could and did change in our daily lives that allow augmented reality to have a new role in our urban context. They show us new ways of living, playing and working in our cities but releasing the idea that this technology is an utopia.

It is important not only to acknowledge the role that the AR has been progressively occupying as a communication resource in different social contexts, but also to take into account that its development implies at every moment the recomposition of the processes, with a view to intention with effective usability.

We are living in exciting times. This era has witnessed the birth of the intelligent machine and has placed it within an environment that once was the stuff of science fiction.

Following many thinkers before us we have dismantled the artificially constructed division between mind and body. Our selves remain, but as a complex set of relations between sensing, thinking, action and object; and a virtual world is as successful as a real world in providing the interplay and content we need to make these relations possible. What we think of as our selves turn out to be nothing more than artifacts of these integrated experiences; they are, after all, very simply creations of the interplay between mind and world; they are prostheses.

The question of how mind and world relate is ultimately a metaphysical one that may never be definitively resolved. But it is a question that nevertheless remains central to all epistemological and ontological debates, and upon which all solutions will finally depend.

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