


How  
Augmented  
Reality  
is making  
Real Estate  
Developers  
Smarter





## //1// AR in real estate development – the road to ubiquity

Cast your mind back to the early days of BIM. There was talk of the large chunks of money developers were saving. But now, with its ubiquity, it no longer makes sense to talk about 'savings' – BIM is as ordinary as bricks. But there's a new cool kid on the block – Augmented Reality. How can I put this...? There is no limb to go out on. There's death, there's taxes, and there's certainty that AR will adhere together the multitudinous moving parts of the full life cycle of development, management, and operations as surely as does mortar to bricks.

In real estate development, AR will become ubiquitous. But right now we're in the early days, talking about chunks of money.

### Step into AR

Early in the development cycle, there's the instant an idea pings into the architect's brain. Rough sketches become rough 3D. And with AR, rough 3D can become – in a matter of moments – a 100% scale model of the idea, on site, that we can walk around, and talk around – with colleagues. With some of the technology on the market right now, we can experience the new build right there geo-located in its real world environment. Augmented Reality is the cool cousin of Virtual Reality.

AKULAR visualization of a riverside residential development in Bratislava



## What's the difference for developers?

Developers are driving the takeup curve right now. They're finding use cases even before the architects are on board. In value engineering, for example. In a recent project, Boston Properties shaved a couple inches off the fins of a high rise. Visualizing the fins on the building on-site shaved an instant \$200K off the cost. With a few of those in the bag on a project, the reasoning behind a prediction of ubiquity becomes clear.



Boston Properties visualize fins of varying depths, reducing costs by \$220K

## Augmented conversations

Value engineering is only the start. AR is augmenting our conversations right through the project. We can ping ideas whole and unblemished into the minds of others. No tripping over those ever-so-slight miscommunications. The spade has not yet hit the dirt. But we have each seen the perspectives of others.

A better conversation means more pertinent ideas, and questions. A more direct line to a reshape of the plan, and a better building project shaped from unified perspectives.

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## //2// Cognitive Activity with Augmented Reality

NeuroInsight asked a test group to do several tasks using AR; others to use the non-AR equivalent. For example, looking through the IKEA catalog versus using the AR app to place furniture in their apartment; and using the AR version of Google Translate versus non-AR.

Steady State Topography brain-imaging technology measured the electrical activity in subjects' brains – indicating cognitive functions of attention, personal relevance, emotional response, and memory encoding.

### Visual and emotional intensity with AR

With AR, people had 1.9X more brain activity associated with emotional intensity and visual attention.

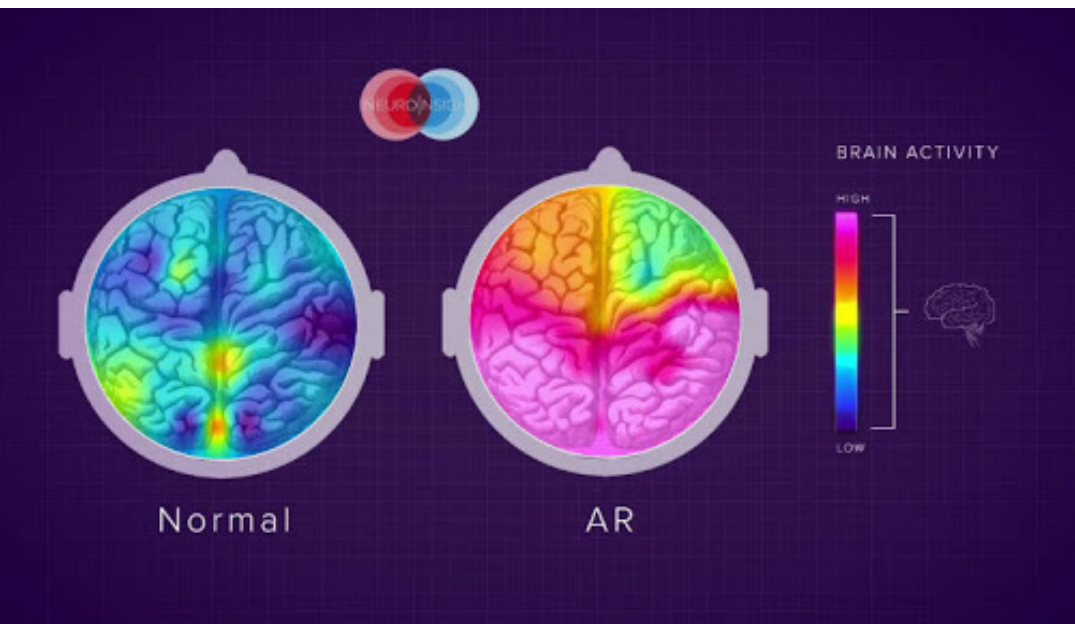


Image: Neuro-Insight

If you've experienced AR, you may find this intuitive. But put a figure on it – almost 2X – and we see the profound difference. Attention is everything in our age of information overload, and essential to success in any communication task. Attention also drives memory encoding.

### Memory encoding was 70% higher with AR

Here we see the lasting impact of AR visualization – people recall details with much more accuracy when AR is a part of the

experience. It's interesting to note that memory encoding has a strong correlation with decision making and purchase behavior. Simply put: when you have a better memory of it, you're more likely to buy it.



**AR Elicits a 'surprise' response in people's brains**

Users 'approach' after the surprise – their comments show they welcome the problem-solving capabilities of AR. Of course, AR is a new experience for many people, which contributes to the 'surprise' reaction. But while familiarity may somewhat diminish the surprise, it's likely to continue to a substantial degree as the technology evolves, employing new narrative and creative solutions and functionalities. AR can be very engaging.



**//3// Are real estate developers on board with AR?**

Many developers are not yet using AR. Let's dig into why...

Two essential ingredients of AR uptake are 'benefit' and 'usability'. Do we get great benefits? And is it easy to adopt and use? Seems pretty straightforward on the surface; but peel away the husks of these two simple-seeming concepts and there are nuts inside to crack.



## Is AR beneficial?

The answer is a simple yes: AR is tried and true right through the building lifecycle: architects are doing simple massing studies on-site; developers are visualizing alternatives; sales and leasing are showing decor options; contractors are 'x-raying' the floor to see where wiring lies...AR is on-site what-you-see-is-what-you-get visualization for the built environment.

But pure benefit doesn't necessarily translate into broad-scale adoption. The kernel is in these questions: Beyond the innovator developers, does the industry perceive AR as beneficial? And how beneficial? Good enough to down tools right now, and download the app?

I'll have a go at answering those questions in a moment...

## Is AR usable?

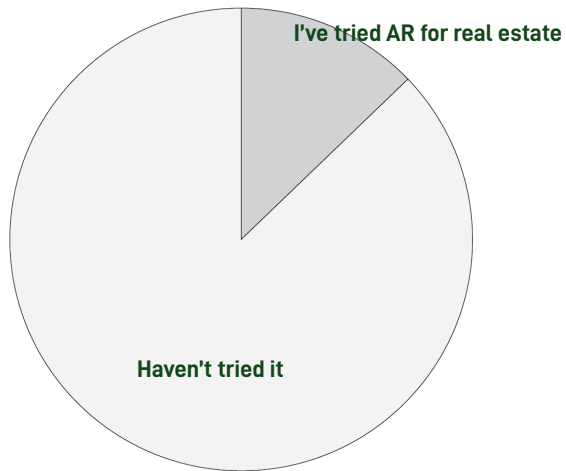
A mere few years ago AR was the preserve of dedicated technologists who'd spend days souping up Revit models with 3D gaming engines. But AR Proptechs have progressed. Now, anyone from the biggest developer to the one wo/man band can subscribe online, upload a 3D model, and after a few minutes processing time, see the model in AR on their phone.

So with that box checked, this is about perceptions again: Do developers perceive the technology as a potentially handy tool that will jigsaw into their work processes? If they don't, many will be thinking 'hassle'. And who needs more of that...

I talked to 23 developers about this. I didn't pick them from Akular's client list – they're all on board, so they wouldn't be representative. My aim here is to delve into people's perceptions right across the industry, and see if I can unpick any snags on the developers' road to seizing the advantages in AR.

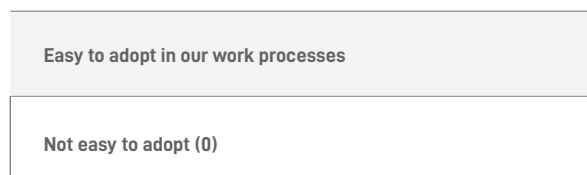
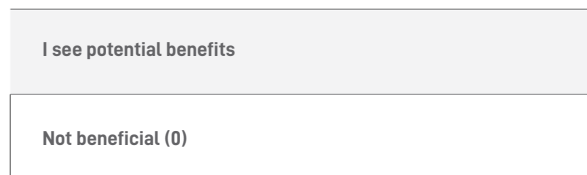
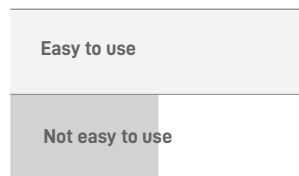


Q1. Have you given an AR app a whirl? (note: this is Augmented Reality for Real Estate – I'm Not talking about Virtual Reality here!)



...a simple pie with a small portion who've test run AR technology for Real Estate

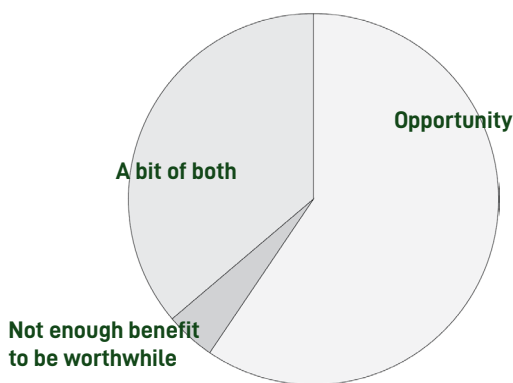
Q2. If you answered 'yes' to Q1, how was the AR you tried out?



Those who have used it see the benefits, and that it's easy to adopt. Though there are interesting insights relating to this in a later question: I ask those who haven't used AR of their expectations.

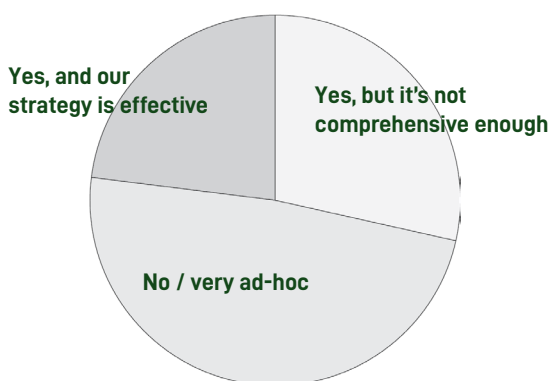
The message for AR Proptechs is: make it easy to use! ...and make sure developers know you've improved usability. We also see here that the number of users is small – is AR the issue, or is this more about technology adoption generally among real estate developers...?

*Q3. Broadly, do you see Proptech as opportunity or as not yet bringing the benefits?*



Lots are open to the opportunities in Proptech – we're not talking to technophobes here. So how does this translate into an organized effort to harvest the benefits...?

*Q4. Do you have a company strategy on assessing and adopting new technologies?*

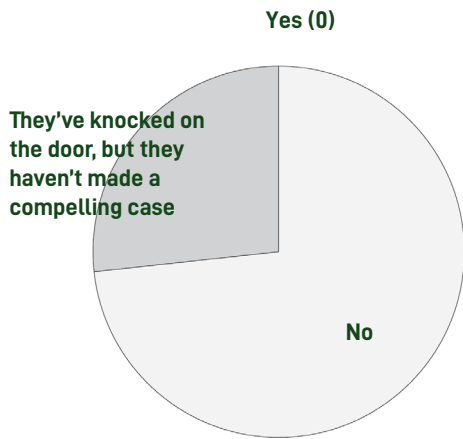




Some discrepancy here: lots of developers see the opportunities in PropTech, but many of these don't have a solid technology adoption strategy. All of those who have explored AR have some sort of strategy. It seems fair to surmise that an in-house technology analyst would be up to date on the state of play, and championing the benefits to the developer.

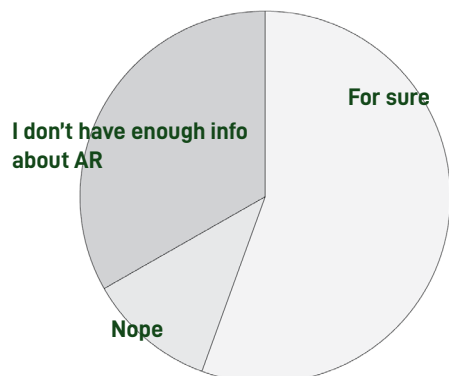
This is not to let the AR PropTechs off the hook. My sense is that for the most part, they simply haven't got the word out effectively. Let's see...

*Q5. Have Augmented Reality technology companies provided you with information on the benefits of AR for real estate businesses?*



...above, we asked those who have used AR whether they believed it was beneficial; but not the others. So:

*Q6. Do you perceive Augmented Reality as potentially beneficial for your business?*



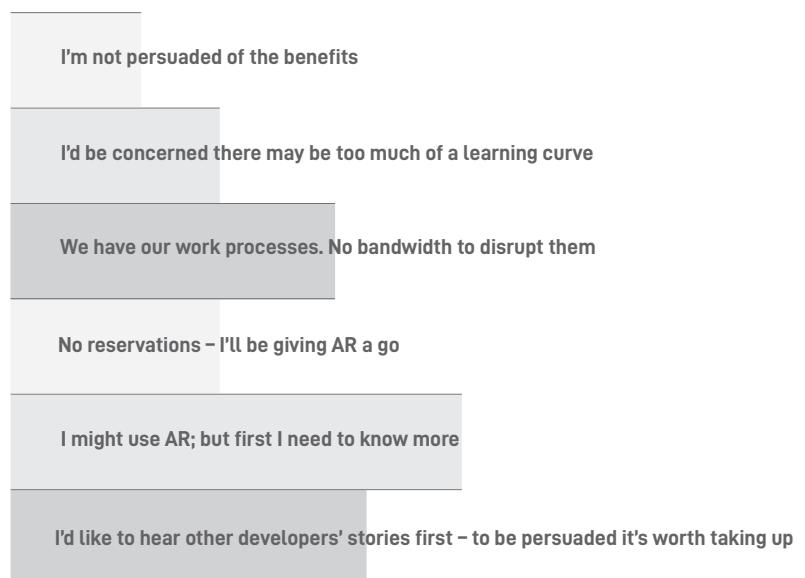
*Q7. Which of the following would you see as applications of AR in real estate?*



**(P.S. They're all relevant. But I'm interested to know which ones you would've seen as relevant without the implied info within the question!)**

It seems AR companies are all but invisible; and when their heads do appear above the parapet, it's only for a beady-eyed glance around – then they cut and run. In fact, developers are ahead of the AR companies here – many who haven't heard from AR companies see the technology as potentially useful. So what's holding them back...

*Q8. What reservations would you have about adopting Augmented Reality*



So developers are keen to learn more. And the comment about work processes is interesting – all those who have used AR said it's no problem to integrate. This is something for AR companies to get across: AR is the oil to the cogs of current processes – there is no disruption. And the last point about other developers hopping aboard first is interesting – let's consider that...



## //4// Are developers natural technology adopters?

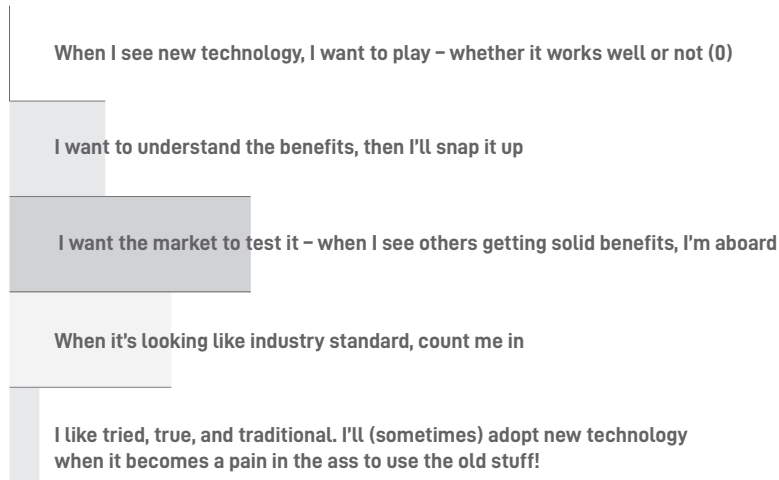
The adoption rate of technologies is not simply about the availability of the technology. It's also about the propensity of the market to take it up. It's a self-reinforcing thing: the more companies take it up, the more it's the accepted and essential norm, and in turn, still more take it up.

In Automotive, Financial, Pharmaceuticals, Education, Healthcare, and Financial Services technological innovation is ingrained. But traditionally, in Real Estate, new technology has been more of an add-on. My sense is that this is changing – with the growth of a tech-friendly mindset; evermore user friendly, highly beneficial technologies; and more real estate developers not only adopting new technologies, but investing in proptechs.

A sense of the 'inevitability' of technology will help drive takeup. As, of course, will a belief that the impact is positive. [KPMG found](#) that a colossal 97% of real estate developers believe digital and technological innovation will impact their business, with 73% seeing it as an opportunity. The term 'Technology Innovation' can of course apply very broadly – this is not just about AR: self-driving cars may impact our work timetables – since we can work en route, and so perhaps live farther from the office, which may mean more building projects outside cities; IoT and artificial intelligence may bring predictive maintenance; the shared ledgers of blockchain introduce cost savings and better decision-making to the leasing process; and new building materials, construction robotics, and an increasingly modular building system – with 'lego' bricks built off site, delivered just-in-time, and assembled by robots supervised by humans – transform the construction site into something resembling the factory assembly line.

Still, developers' natural affinity to technology remains an important driver...

*Q9. What's your response to new technologies generally?*

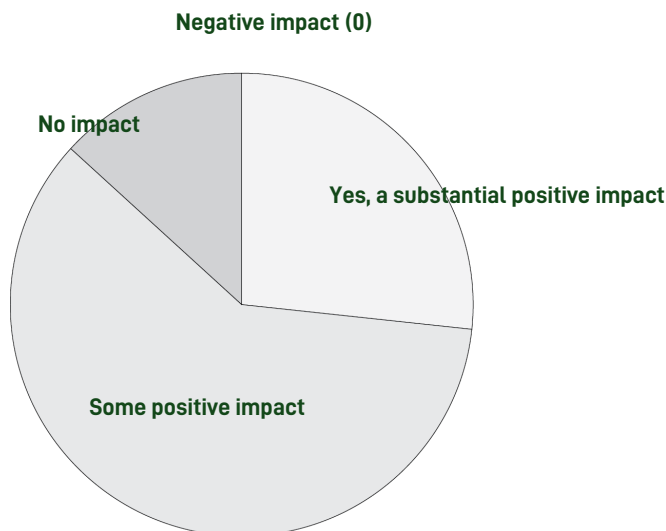


A lot of people want to see others on board first – reinforcing the similar point about AR specifically, in Q8. So what's the answer?

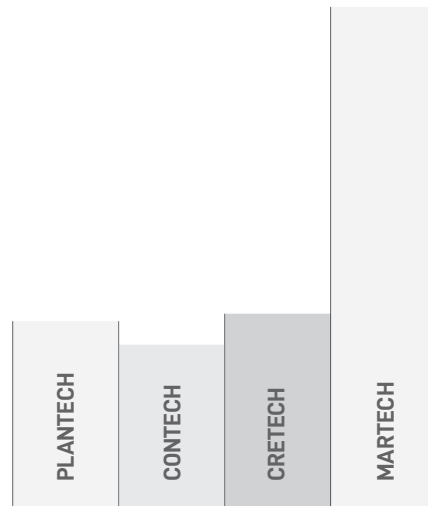
The responsibility for driving adoption is in the hands of the AR proptechs, regardless of the fact that developers see technology adoption as inevitable and beneficial. This is about getting the tech to people in the first two segments, giving them the concierge treatment, and transforming them into references ambassadors, so the chat at conferences is "Hey did you give 'xyz technology' a go? – Pretty good. Here..." [takes out phone]

Let's dig a bit more. We've seen there is a general sense of opportunity; but I'd like to nail down the actual experience developers have had. When it comes time to act, this often flicks the yes/no switch...

*Q10. Has technology (proptech) had an impact on the bottom line in your business?*



*Q11. Which technology categories have had the biggest positive bottom-line impacts in your business?*



Clearly the marketing department is streets ahead of planning and construction. But there's no shortage of potential in planning and construction technologies. What's take-up going to look like...



**//5// How quickly will the real estate industry take up AR?**

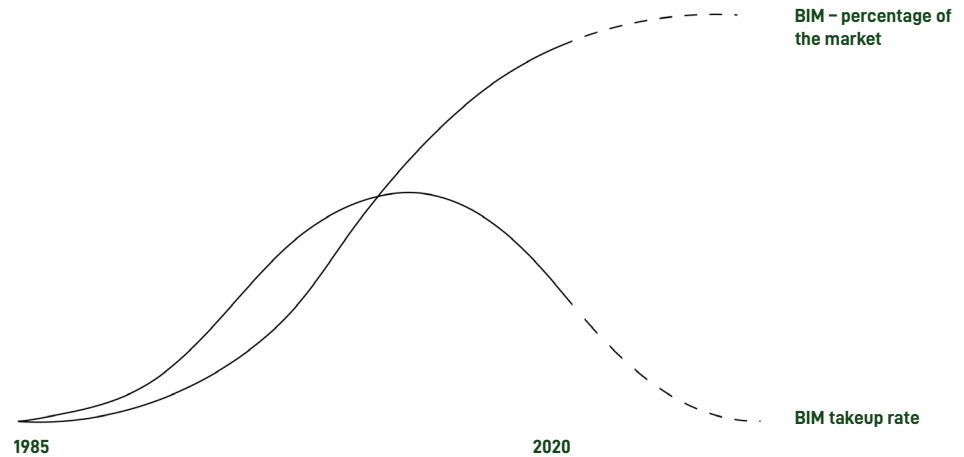
### **Will AR in real estate match the growth of AR in other industries?**

The AR market across all industries was \$4.2 billion in 2017. By 2023, [Market and Markets](#) expect a near fifteen-fold increase (across all industries) – to \$60 billion. And still many people in real estate don't know quite what it is. "Oh yes – Virtual Reality – sure..." I've heard that more than once. With the tech adoption proclivity we've seen, it's a safe bet that AR in marketing, gaming, and other tech-ingrained industries, will outstep AR in real estate development. However, AR does have applications at the marketing stages in real estate – perhaps this will help drive AR adoption at the planning end.



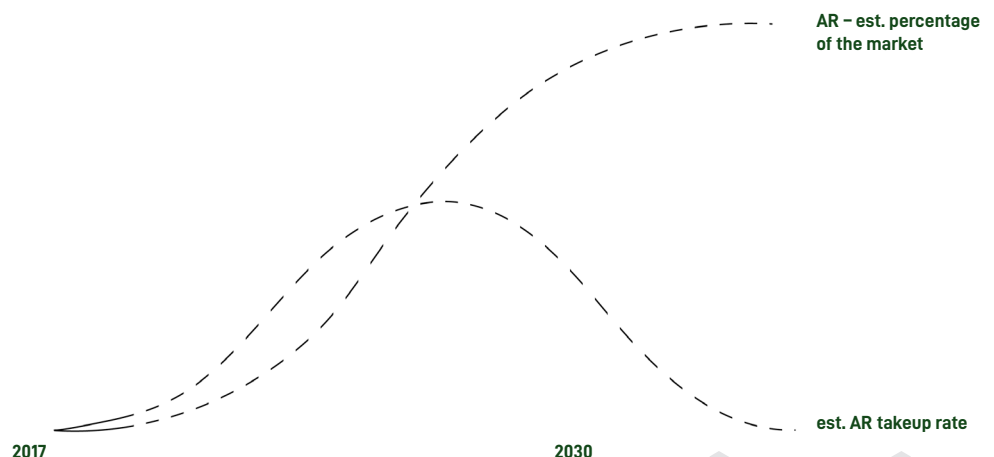
The leaders in real estate are demonstrating the utility of AR, they'll continue to explore, and many more use cases in real estate will be unearthed. This will help drive adoption among early adopters. But how about the rest of the pack? After all – BIM took some time...

## Will the AR takeup timescale be comparable with BIM takeup?



BIM took 34 years from zero to 78% – which on the face of it suggests 2050 to relative ubiquity of AR. But it seems reasonable to slash that figure: Attitudes to technology are different now – the mindset of 1985 is a foreign country. We're seeing real growth of company-wide digital and innovation strategies among developers; technologists now put usability first in building technology – very unlike last century; millennials are becoming decision makers; and in fact every generation is now a near-native technologist: just watch grandma Whatsapping pics of her Raspberry Pi...or her raspberry pie, at least.

A similar takeup trend compressed into between one third to one half of the timescale may be nearer the mark (estimated):



## A speculation

There is a further speculation on the tendency of Real Estate to lag in technology adoption as compared to marketing, gaming, health, and other industries. That is, the difference in physicality – the value is in the land and in the bricks and mortar – less so IP. This means that if developers are going to reap the benefits, the case for the bottom line impact needs to cut through, as does the risk of being left behind. And it may also mean that Augmented Reality can help lead the charge for other Proptech, because AR is clear-benefit technology, quite literally – by virtue of it being an app on a tablet – in the hands of decision makers.

So let's look at the impacts AR is having in development projects...



## //6// In what scenarios is AR enabling developers?

Let's go on a whistle-stop tour of projects we've developed and opportunities we're exploring with developers. In our conversations with developers in the years ahead, we'll doubtless unearth still more use cases...



An architect visualizes simple 1:1 masses on site, to enrich the analysis, and trigger more ideas as s/he experiences the space: walking around to view the model from different perspectives, discussing, iterating, seeing how the project impacts the skyline from a distance, and whether it blocks the view or casts shade onto neighboring buildings.



A design coordinator walks around an AR model of a hospital or a production space, pinpointing snags early, to ensure the building meets its practical needs.



An architect creates a detailed AR model to give better insights in a pitch, capturing the imagination of stakeholders – colleagues see and quickly understand the ins and outs of the project.



In a value analysis, a developer views different facades, materials, and other options in situ.



An issue in construction indicates a change is needed. The architect and contractor visualize change options, and discuss the implications – everybody's looking at the same models in situ.



A developer wants to give the county commissioner a better insight into a proposal. The insight and holistic experience with AR smoothes the approval process.



A developer promoting a project to the community visualizes the future site after building and landscaping, and enables people to experience solutions to objections.



A prefab manufacturer develops a custom app to enable buyers to visualize structures on-site before ordering.



A developer maps layers of piping, air con, and wiring in walls into an AR model, to coordinate MEP contractors.



Sales people show buyers different interior options; and demonstrate the benefits of passive housing with AR visualizations of air quality and heat exchange.



A redevelopment officer uses AR to give investors more tangible insights into projects, and to give citizens options and insights in a placemaking initiative – getting feedback, democratizing the process, and creating a more insightful sentiment analysis.



An urban planner visualizes traffic patterns in alternative scenarios.







A flooring supplier builds an app that enables customers to 'x-ray' the floor and see where the wiring lies, so they can easily pinpoint which tiles they need to pull up.



A facilities manager 'x-rays' the wall to locate a heating issue.



Firefighters use AR for guidance around a smoke-filled building; they more quickly locate key facilities.



A lessor visualizes occupancy patterns and footfall in a shopping complex, giving stores comprehensive insights into the potential benefits of a lease.



An interior designer walks through a model as part of the design analysis, and picks out things to brush up.



## //7// How developers see the value of AR, in dollars and hours

There are many developer stories to draw on. Efficiency is an oft-cited benefit, bringing dollars and hours to the fore.

Marek Skovajsa, President of Metropolitan Engineering, told my colleague he quite literally takes the budget and doubles it, to account for the inevitable mistakes and complexities along the way. As an example, often workers don't read plans sufficiently, or don't speak English. They might build a wall before the pipes go in – which then needs tearing down. There's a clear case for AR here, to visualize layers of work – and peel them away in AR so that multiple contractors in the space can easily see the context of their work, and be sure they're doing the job right. An associated future evolution is direction through AR – construction workers wearing AR glasses that – simplified example – highlight a building block; then highlight the place to put it.



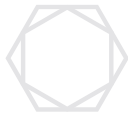


## //8// Better communication – the kernel of the AR benefit in real estate

Norouzia et al. tell us that architect-client communications have become trickier with the growing complexity of development projects. These issues have a significant impact on how buildings are designed, with a cause-effect between ambiguity within communications, and the stymieing of social benefits realized in the built environment.

The communication issues are both social and technical. Social fixes include such things as enabling the participation of all stakeholders at each stage of the design and development process. Technical, involve appropriate and easy to understand visualization techniques.

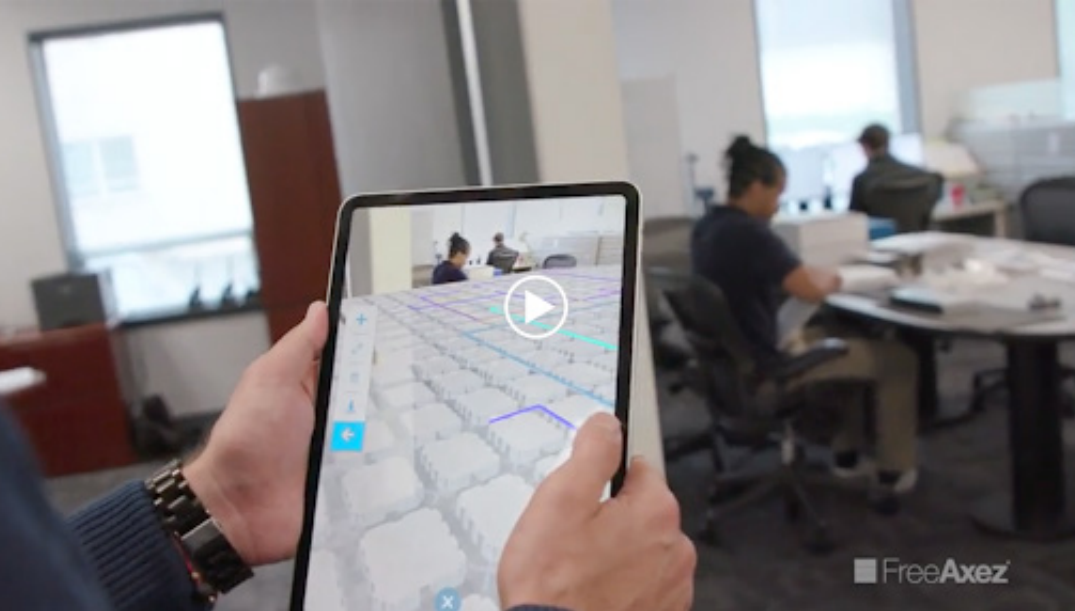
We can certainly second this. Our customers cite many different reasons for using AR – more effective decision making, quicker sales, limit the need for mockups... but always with the common thread of better, smoother communication: a life sized 3D digital model on site dispenses with ambiguity and nebulousness.



## //9// Success story: AR in Operations and Maintenance – the attitude of an industry leader

An innovator mindset is key to fixing communication issues, and to evolving the industry. One notable innovator in O&M is FreeAxez – they make raised flooring with an underlying grid for cable management. AR serves as a live 'x-ray' through the floor, to see precisely where the cables lie – so there's no hunting for the cable or connection you need: see through the floor, then raise the right floor tile.





The FreeAxez application came from a simple openness to ideas.

Earl Geertens, CEO at FreeAxez wanted to explore AR, and he hit on this idea. It's the precise technology-leader attitude that is driving change, and benefiting those who drive it.

Right now, many AR applications are only a twinkle in the eye. We can use AR to X-ray walls; to help fitout teams compare blueprints with as-is reality, before closing out the design; to show furnishing options; to explore 3D moodboards; to immerse ourselves in analytics; to sell advertising space on facades. The only limit is the imagination.



**//10// The kind of people we want to be is the kind of city we should design** (Pedro Aibeo)

Pedro Aibeo is a leading exponent of architectural democracy. As he tells us, democracy impacts architecture; and architecture impacts democracy. Here are some questions we can ask to help evolve architecture and democracy:



		Characteristics of Architecture		
		Acquisition, Design, and construction	Building operations	Recycling and renovation
Characteristics of Democracy	Civil Rights & Liberties, and Social Equality	What ADC processes can improve social equality and civil rights and liberties?	What building operations can promote social equality and civil rights and liberties?	What recycling/renovation strategies and materials promote social equality and civil rights and liberties?
		What civil rights and liberties promote good ADC?	What civil rights and liberties promote good building operations?	What civil rights and liberties promote the recycling/renovation of buildings?
	Informed citizens	What ADC processes can improve access to information?	What building operations promote access to information?	What recycling/renovation strategies and materials promote access to info?
		What information access promotes good ADC?	What information access promotes good building operations?	What info access promotes the recycling/renovation of buildings?
	Participation	What ADC processes can promote participation?	What building operations promote participation?	What recycling/renovation strategies and materials promote participation?
		What participation methods promote good ADC?	What participation methods promote good building operations?	What participation methods promote the recycling/renovation of buildings?

An example of the interplay – if we ask what Renovation Strategies promote Participation, the answer may be coworking and cohousing.

And for Democratic Participation in ADC we might promote the idea of citizen proposals plus architects' expertise, voting on issues, on structures, and on amenities.

## How AR can help democratize the built environment

With AR, the community will be at the heart of the development project. Someone thinks there should be a public amenity down the road – they pop the idea onto a map, others can comment or vote, experts weigh in, the city corporation receives the data, and makes decisions.

Stakeholders and the community can experience proposed developments in AR, see project details, timeline, comments, and changes to planning – and join local events and discussion groups. The developer can draw on the community as a resource for ideas, reduce the potential costs of objections, and gain the reputation of the innovator. The outcome for society is a better, more democratic living environment, and a healthy sense of community.





## //11// Concluding thoughts

AR is the internet for the real world – and the bridge between the real and the digital. Industry-wise, we can see AR in layers – the Entertainment layer; Communications; Health & Wellness; Energy & Water; Mobility; and the Built Environment. In years and decades to come, we'll interact with, share, and shape our physical environment like we do the digital world.



Image: Magic Leap

Forming our built environment will be a democratic project, bringing a better quality of life through the environments we build, and through the communication and processes of reimagining and reshaping our environment.

For developers, small, mid-sized, and large, there are very specific opportunities right through the life cycle of development: the benefits in communication, design decisions, giving stakeholders insights and getting them on board, allocation of time and materials, through to presenting interior options and furnishing.

The leaders are hopping aboard. If you're not ready yet, I suggest keeping yourself informed on AR developments. There'll be a time



the curve rises at a rate that'll spur you to join us.

Any sufficiently advanced technology is indistinguishable from magic. AR isn't quite magic; but the near-real experience of a development right there, when we know there isn't one, does feel a little like magic. Give it a look.

