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# the view

**Design transformed**

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## Design transformed

**Today's innovation can become tomorrow's necessity, and so it is proving with the progress of innovative design technologies in architecture and specification. Reynaers has surveyed over 100 architectural professionals to gain a view of the current state of play for technology's impact on work practices, client relationships and building design - not only that, but to look to the future of architectural design and how the industry is laying the groundwork today.**

A century ago, the telephone would have seemed a rather daunting invention. Fast-forward to 2017 and not only are mobile phones commonplace, but we're accustomed to interactive digital experiences in all elements of our life from ordering food to making bank transfers or video-calling our families. We use apps to perform all manner of functions, both in a personal and professional capacity.

It appears that with new mass-market technologies and services, most people will first experience them as a novelty - they're fun partly because they're suddenly possible. When professional industries latch on to these innovations, it can change the way they work and how we live. Where would on-the-ground sales teams be without iPads, and where would journalism be without Twitter? Technology changes not only how professionals do things but also what they do, because it opens up previously unthought-of possibilities.

Putting pencil to paper will likely never be replaced entirely by architects, but computer-aided design (CAD) is now a normal part of many architects' working lives. The spread of building information modelling (BIM) has been part of this evolution, with the more recent introduction of virtual reality (VR) taking things one step further.

VR has hit the market in the gaming industry with the Oculus Rift virtual reality headset, released in 2016, opening up new ways of experiencing alternative universes and first-person gaming. But what does the future hold as this technology is adopted across multiple industries? In particular, can it transform the way we design and plan buildings?

### Adopting innovation

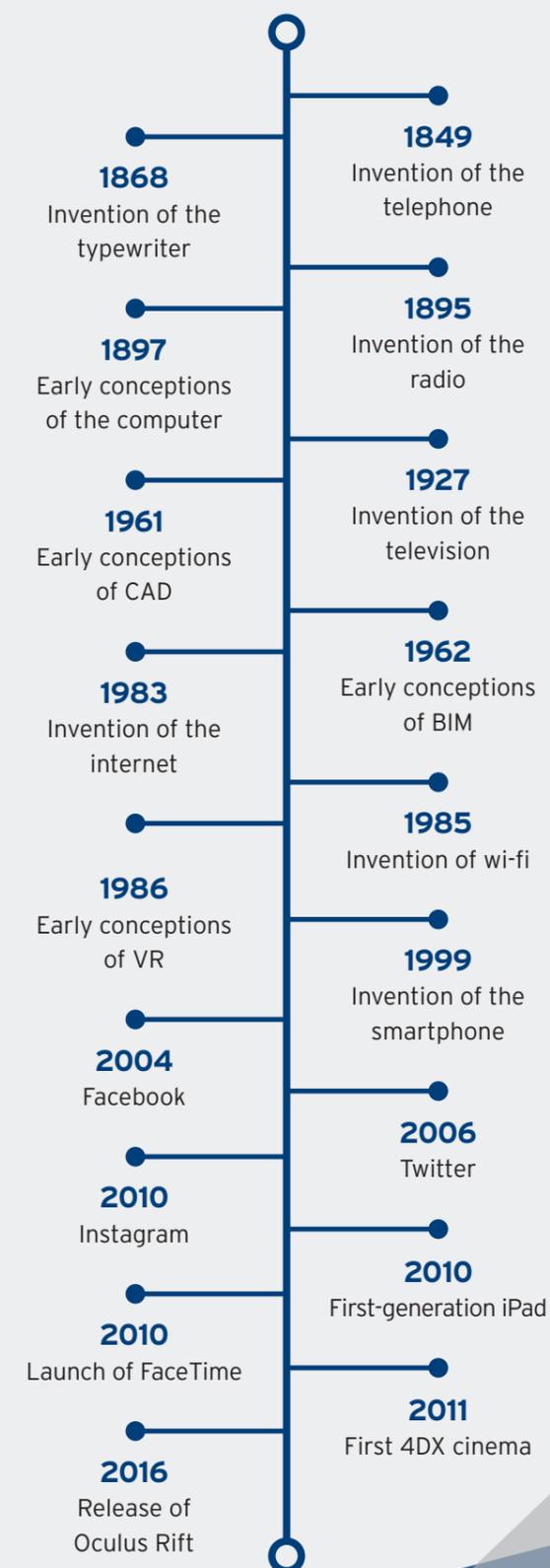
Looking at how advances in technology have changed architectural practices in the past few decades, it was CAD that first replaced the drawing board and allowed architects to create precise 2D illustrations and technical 3D models using computers. This gave them the ability to create and manipulate design concepts with greater ease and efficiency than ever before.

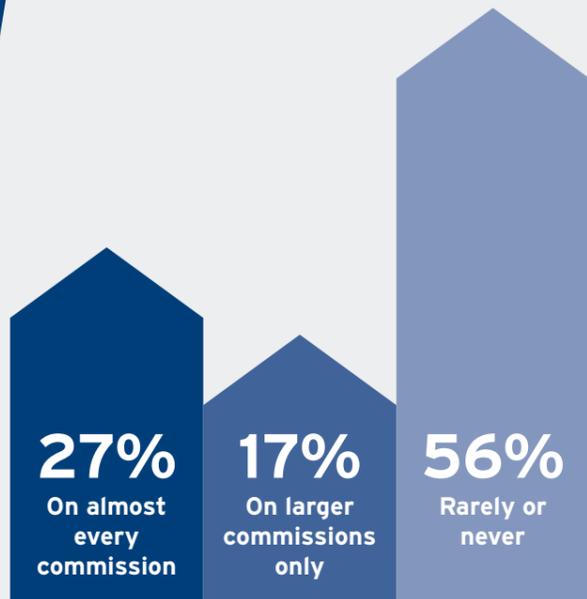
While its conception was around the same time in the 1960s, it took much longer for BIM to be refined and widely adopted within the last decade. In theory at least, BIM allows the whole construction team to work from a virtual model of a building, test out alterations and innovations, then decide on an approach that can be consistently followed by all involved.

At present, use is largely confined to Level 1 BIM, generally consisting of a mix of three-dimensional design with two-dimensional detailing and production information. The UK Government, however, has set Level 2 BIM as the target for public sector work, meaning a step up to involve design information shared in a common format in order for different members of the construction team to combine data to test out ideas and designs. Few professionals, if any, are yet at Level 3, in which all disciplines collaborate on a single, shared project model that they may access and modify.

Reynaers has found that, of the architects surveyed, only 44% regularly use BIM at any level. For those who are inexperienced with BIM, issues are predominantly the cost of integration, the time required to learn, and a lack of training and support. For the minority, however, BIM is an already well-adopted practice that encourages speed, efficiency and accuracy as well as better co-ordination between disciplines and teams.

### Technology timeline





**How often do you use BIM?**

BIM is an example of how technology may adapt. It was designed to help collaboration among the construction team but also allows a client to gain a better grasp of what their building will look like, in particular if they are less than familiar with interpreting 2D drawings.

BIM is well understood as a concept, even if still not implemented to its fullest extent. The industry is already looking beyond the capabilities of BIM to overcome the challenge of translating a small-scale representation into something that will accurately portray how the finished project will actually look and feel.

## Transcending dimensions

Virtual reality (VR) is one of the more recent innovations to arrive on the scene that may go some way to addressing the challenges faced by architects. The technology is in its early stages as a means of both further developing design practices and allowing stakeholders to experience a building before the plans have even been finalised. Donning a pair of goggles and taking a virtual tour through a potential building may seem like science fiction - or something of a gimmick - but as with all technological innovations familiarity can, and will, breed acceptance.

VR will also, no doubt, eventually be put to use by architects in ways not at present envisaged, just as were earlier innovations. If we look to earlier experiences of digital innovation we can see that after a period of hesitation or inaccessibility, such innovations can suddenly become easier to operate, cheaper to buy and, eventually, second nature to use. Will this soon happen to VR?

Already ahead of this trend, Reynaers has created a virtual reality facility, Avalon, at its Belgian headquarters to showcase what the immersive technology can do. Using the facility, early concepts can be mapped out and 3D models viewed up close to explore technical issues, design variants and user experiences. Beneficial not only to firms wanting to impress clients with a cutting-edge service, it's a practical process that combines a series of complex files in order to give a holistic understanding of a project across all levels.

With VR, 3D models can be converted to high-quality, navigable scenes for the evaluation of designs, materials and lighting. These can be explored and altered at different levels, from the base building structure to a fully furnished representation. Unsure of the curtain walling system specified, or think that a staircase could be better placed elsewhere? Switch between multiple options and see before your eyes how different options will look when built.

This technology does not, and at present cannot, replace BIM, but instead revolutionises planning phases. Who could have conceived, while developing CAD in its infancy 50 years ago, that it would be possible to walk around and experience something that doesn't exist? Not only that, but to be able to modify the design there and then?

## Revolutionary realisation

Reynaers has found that architects are already favourably disposed to using VR, however, few have yet had the chance to engage with it. Only 36% of respondents had used it, however, their comments suggest that any caution felt by the inexperienced is misplaced as VR can become an essential aid to their work.

While some highlighted minor gripes such as that goggles can be cumbersome, virtual reality has already proved its worth: "We have made use of VR to present the experience of visitors to and participation in a multi-media monument - it won us a competition", one professional said. "We use it for client presentations which let them walk through their facility - it's very gimmicky but our clients love it", said another.

When asked for their views - even if not personally familiar with VR - on what it should be used for in building design, most understand its role in offering second-to-none project visualisation, in particular for clients' benefit. Numerous professionals believed that VR allows them to present ideas and options to clients, and allows designers to refine internal spaces.

**"VR will provide compelling experiences of the completed building before it gets to site, explaining interior spaces to end users and getting around the age-old issue of 'I didn't think it would look like that'"**

One respondent suggested that VR would enable "the whole team including clients and stakeholders to understand the spaces in the inherent way that the architect does", and another said that it would "give all persons connected with any building the opportunity to experience it in full, prior to making fundamental design decisions".

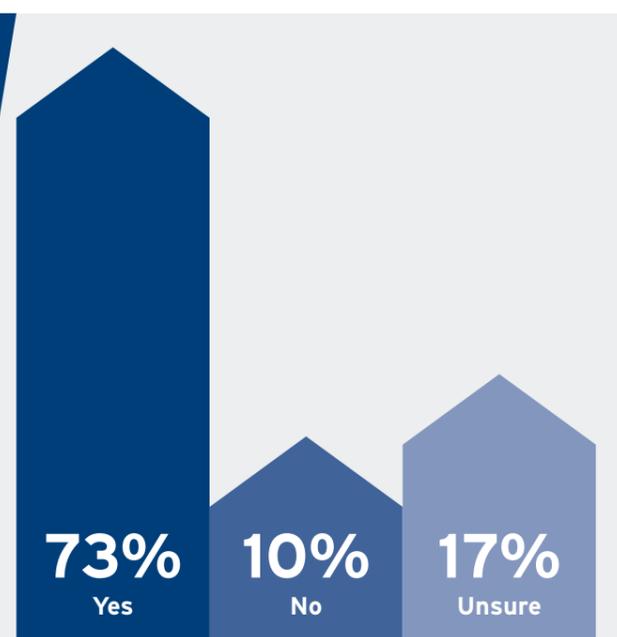
It was also well-understood that VR helps avoid conflicts and costs that arise from misunderstandings. As one respondent put it: "No matter how many computer models you produce, domestic clients in particular can't grasp the 3D nature of them. Virtual reality would reduce changes at construction stage".

Another responded that VR could be used for "providing compelling experiences of the completed building before it gets to site, explaining interior spaces to end-users and getting around the age-old issue of 'I didn't think it would look like that'".



There was also interest in using VR to present proposals to planners and members of the public where large-scale formal consultation was required. Indeed one answer suggested VR would be “vital in a world where even builders cannot read drawings”.

Architects felt clients would grasp virtual reality and accept it as a way to ‘experience’ and then improve designs, with 73% of respondents agreeing with this proposition and just 10% disagreeing.

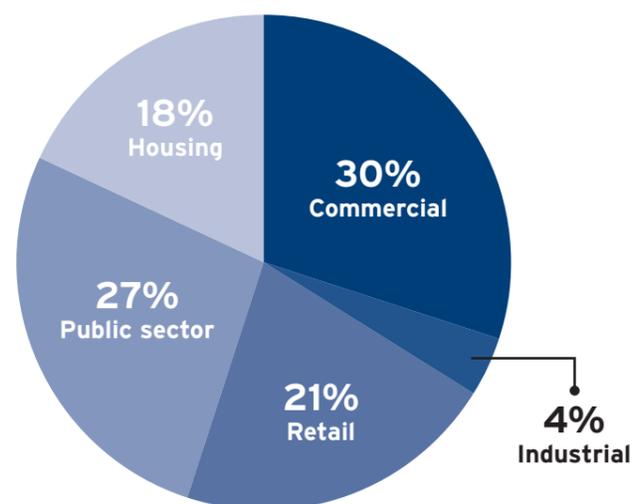


**Do you think your clients would grasp virtual reality and accept it as a way to ‘experience’ and then improve designs?**

Attention to VR centres primarily on how it will help clients to understand better their buildings’ appearance, avoiding complaints or costly changes caused when results are not as expected. In other words, the technology is still at a stage where it will most help consumers. In time, we hope that the benefits to architects will follow.

The extent to which VR will be beneficial, perhaps, will vary between sectors. When asked which sector stands to gain the most from innovations in technology, 30% said commercial, 27% public sector, 21% retail,

18% housing and 4% industrial. This makes sense, as commercial and public sector projects are, arguably, the areas in which there are the biggest budgets and the most freedom - and requirement - for pushing design boundaries continually further.



Across the board, the benefits of VR over other industry technologies are already appreciated by the majority of architects, who identified it as a visual experience that nothing else can compare to. As one respondent put it: “It’s the only time you will ever experience 1:1 scale before the building is built, and much more interactive than a piece of paper”.

**Unleashing design**

The construction industry keeps innovating and changing both the way that buildings are designed and the way that they are built. Due to this, Reynaers asked the professionals for examples of the most ground-breaking projects on which they’ve worked.

Given the range of large and small firms that replied, these varied considerably - from the University of East Anglia’s thatch-clad Passivhaus Enterprise Centre to a project using technology to reduce the cost of older people’s serviced accommodation while promoting residents’ social interaction and independence.

One architect had been called upon to devise a tower in Taiwan with both earthquake proofing and a cantilevered swimming pool, while others pointed out that even

small residential conversions have their challenges in creating designs that fit with adjacent buildings.

Technology is also enabling architects to design buildings freed from the previous constraints over what was possible. “The use of computers is allowing designers to create more curved and expressive projects with less regular forms,” said one respondent, while another suggested that “freeform buildings (such as those designed by the late Dame Zaha Hadid) will become more widespread and trickle down to housing”.

Alongside these new technologies and cultural shifts, there are naturally changes in the way buildings are designed. Passivhaus was cited by some architects as a coming trend that clients would increasingly require. Others mentioned a move to triple glazing for superior thermal insulation, more detailed analysis of building envelope performance, the need for higher thermal efficiency, and that “complex shapes can now be visualised and built using BIM technology”.

**“It’s the only time you will ever experience 1:1 scale before the building is built, and much more interactive than a piece of paper”**

Off-site manufacture was noted as a coming trend by some architects, with one saying “more prefabricated off-site construction is anticipated, for higher precision and quality as well as quicker construction programmes”. Technological advances are, as we’ve seen, allowing architects to think in new ways, but there is some concern that this leads to innovation for its own sake, rather than to better and more sustainable buildings.

Clearly, there is a balance to be struck, as some comments showed: “The building fabric is becoming more complex using more material. There is a move towards better-performing buildings although this does not always lead to improved aesthetics”.

As designs become more complex, follow less traditional forms and make innovations, the need to show these clearly to clients, planners and occupiers will surely grow.

**Experiencing Avalon**

Experts working at Avalon can take your design and transform it into a virtual representation, showing what it will feel like to live or work in the completed building. Concepts can be visualised, evaluated and adapted. Simulations are run to test ideas, and visualisations can be achieved at different levels such as airflow, mechanical, thermal performance and lighting. Configuration options for windows and doors may be studied and altered.

Different technologies are available - a headset, an individual experience; a 3D video, a more inclusive but less immersive option; or the virtual reality ‘cave’ itself. The latter option facilitates true collaboration and allows for a group of people to navigate and discuss the three-dimensional space together in order to understand better and improve upon the design.

Reynaers’ state-of-the-art facility forms an essential part of its Visitor Experience Centre in Duffel, Belgium. The interactive space allows visitors to get to know the Reynaers product range and see them in action through holographic projection technology, as well as taking virtual tours around projects in Avalon.

Is this the future of architecture? We think so - but one thing is certain: innovative design technologies will play an ever-increasing role in the visualisation of buildings, harnessing architects with greater power than ever before to redefine how structures are created, while making their work all the more accessible to clients and stakeholders by immersing them in the process from conception to completion.

For further information, please visit [www.reynaers.co.uk](http://www.reynaers.co.uk) or email [reynaersltd@reynaers.com](mailto:reynaersltd@reynaers.com).

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