VIEWPOINT

Executive Summary: What You'll Learn

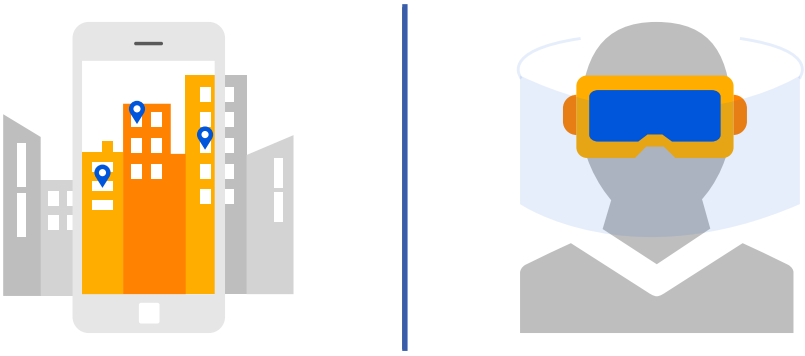
- How does virtual reality technology apply to CRE?
- The difference between virtual and augmented reality - and why it matters
- How VR is being used in CRE today - from project development to design/construction, leasing and sales, and property management
- The impact on CRE in years to come
- How much does VR technology cost to implement?

Virtual Reality Technology Nears the Tipping Point to Disrupt Commercial Real Estate

Touring seemingly endless lists of properties searching for the right fit for a new corporate headquarters will soon be a relic of the past. Virtual and augmented reality technology is closing in on a tipping point that will bring it into every executive suite and commercial real estate office - replacing in-person tours with virtual experiences.

Goldman Sachs Research is predicting that the VR/AR industry will become an $80 billion dollar marketplace by 2025, with much of that will be geared towards real estate purposes.[2] At the same time, a 2019 Deloitte survey found that nearly half (45 percent) of surveyed commercial real estate investors felt augmented and virtual reality should be a priority for commercial real estate companies.[1] Before long, we'll all be using tablets or goggle-type eyewear to "walk through" office space - whether down the street or around the world. We will use view interactive images that make it easy to understand and visualize any physical space -- without actually needing to be there.

Augmented Reality (AR) vs. Virtual Reality (VR)



And that's not all. Virtual and augmented reality is changing the ways in which real estate is designed, constructed, marketed, fitted-out and used.

The tech that started out in video games like Pokemon Go and apps like Ikea Place is being tailored for use in commercial real estate. Tenants will be able to explore properties from every angle and visualize spaces that do not yet exist, or are being repositioned for specific needs.

The entire search process and subsequent fit-out design and construction will soon be faster, easier, and more interactive thanks to virtual and augmented reality technology.

What are Virtual and Augmented Reality?

Virtual reality may sound like an invention of a science-fiction movie, but it is a very real and practical application of technology for everyday business needs.

To begin with, augmented reality and virtual reality are two different sides of the same coin. They both offer virtual ways to experience space, but use slightly different tools and technology.

Augmented Reality (AR) uses technology to supplement a real-world experience. By looking through special glasses or using the camera function on a hand-held device, you view an image of the real world with additional digital images or details layered on top. Examples of augmented reality include Pokemon Go, the IKEA Place app, and the now-defunct Google Glass.

Virtual Reality (VR) presents a fully-immersive digital experience that users explore wearing goggles. Currently there are two main types of V.R. experiences:

1. **Spherical or Cylindrical Panoramic Images/Videos**
   This technology uses a series of predetermined camera locations (or along the path of a moving video camera), allowing the user to look in any direction. It works well if the property already exists, is photo-ready, and for short-term or one-time projects that only need to depict the property in its current state.

2. **Virtual, Immersive Model (Real-Time 3-D)**
   A simulated environment is created using photorealistic game-engine technology. This approach is ideal for properties that don't yet exist or are not completed to give prospective buyers or tenants the ability to view and select various finishes and amenities.

   Studies show that most people can't visualize what an empty space can look like when built out, nor can they look at a 2D floor plan and develop an accurate 3D mental image of the design. Virtual reality is a huge opportunity for technology to help clients understand and accurately visualize the many choices to be made about property selection, finishes, lighting, amenities, furnishings, and decor.

The market for virtual reality technology has been more widely-adopted than augmented reality due to the popularity of virtual reality video games and the military's use of VR for training simulations. As a result, the costs for creating, distributing an viewing VR content are rapidly declining.

How AR/VR Works for Commercial Real Estate

A virtual or augmented reality model of a commercial real estate property begins with physical information about the space. This may include:

- PDF of the floor plan
- Photos of the space
- Measurements
- CAD file or BIM file
- Other imagery could include photogrammetry and LIDAR using special cameras, drones or, for larger areas such as a campus or city, fixed wing aircraft.

Using all of this information, engineers and graphic artists work together to create a realistic model of the space. Depending on the type and quality of data that is put into the model, users will have the ability to:

- dynamically change the environment (such as moving walls or changing windows, furniture, finishes)
- change the time of day to illustrate lighting or shadow studies
- experience embedded audio and video or even live television feeds
- communicate via text or video chat

How Will Virtual Reality Impact the CRE Market?

Cresa's **David Stella**, vice president in the company's consulting group, explained the potential for virtual reality to be a disruptor for the CRE industry in this way:

"The last ten to fifteen years, 3D modeling has been the industry baseline in terms of deliverables. The next level will be virtual or augmented reality.

The potential impact of VR models on commercial real estate begins in the earliest days of project development and pre-construction, and continues through design and construction management, leasing and/or sales, and can later function as an asset, property and facilities management tool.

"With 3D modeling, we produce it, manipulate it, and present it to the client. The benefit of XR [a blanket term for virtual, augmented, and other reality technologies] is that we produce the model, and then the client can manipulate it. That creates engagement and another level of connection to the space."

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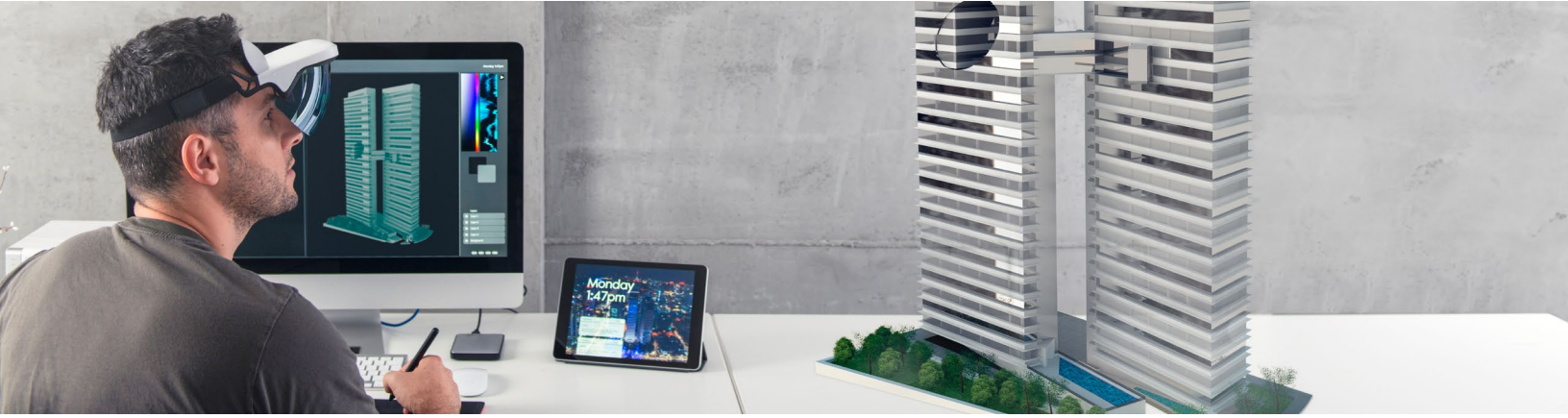
Planning, Development, and Pre-Construction

Virtual reality can accelerate the planning and development process, make it easier to market buildings before they have been built, and generate potential cost savings for redevelopment or new projects.



Wearing VR goggles, users can “see” a development in its planned location before construction has broken ground. The technology can also illustrate an entire new building concept in the place where an existing building is to be torn down or renovated. By incorporating property data sets into the model, you can also simulate the project’s potential impact on foot traffic, area real estate sales, and other factors.

Models can also help make planning meetings or economic development agency initiatives more accessible and efficient by enabling real-time changes by any stakeholders.

Office Test Fits

This is one area where VR/AR technology will have a truly transformative impact. Office test fit-outs are historically time- and labor-intensive processes that involve a lot of back-and-forth communication between multiple parties and rounds of design revisions - all of which contribute to cost increases and longer transaction times.

VR technology has opened the door for new interactive tools that can deliver complete, digital test-fits of spaces for potential tenants in real-time, online or on-site. This process helps companies better understand what their potential new space will look and feel like, and how their staff and workstations will fit into it. The end result is faster and more informed corporate real estate decision-making.

Design and Construction

Architects can use VR during initial design phases to test and evaluate different design ideas at full scale, and can more easily make design adjustments midway through development. They can add nuanced details around fixtures and fittings to create a better sense of the finished development and make for more informed design solutions.

Builders can lay construction models over what has already been built to determine where changes need to be made - before the building is complete. Any issues can be reviewed virtually by all stakeholders - from many remote locations - to better understand any problems and allow faster decision-making and resolution. In the same way, VR can also help expedite the approvals process and change order management.

Sale and/or Leasing

By immersing potential buyers or renters into a 360-degree visual experience of what a space could look like, virtual reality can create an emotional connection to a space that otherwise is difficult to establish.

This technology can present a more finished, personalized view of multiple spaces including layout preferences, finishes, exterior signage, furnishings, and other amenities. Virtual reality’s photo-realism can also allow users to zoom in on selling-point details of surfaces and lighting. The result can help potential owners or tenants imagine themselves working (or living) in the space.

Hidden building features such a state of-the-art HVAC system or an IoT energy management system could also be identified in a virtual reality model, along with details about related cost savings and green value.

VR models can be shared just as easily with clients located across town or across an ocean, which makes it easy to expand the geographic reach for a property and open the pool of potential tenants or buyers globally.

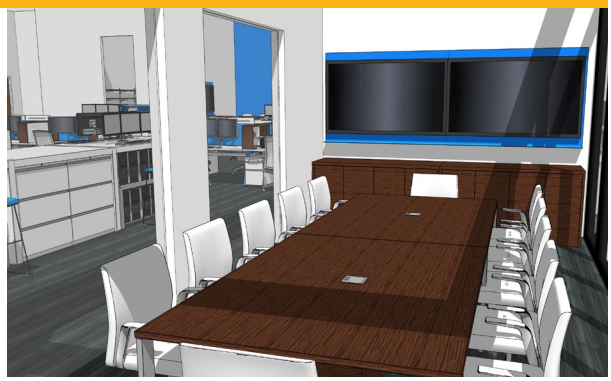
Some of the greatest potential for VR in commercial real estate is in expediting the sales or leasing process. Rather than planning days of visiting potential locations in-person, clients can view multiple spaces in a single, virtual “walk-through” without ever leaving their own office. Less time spent reviewing multiple spaces to find the right fit leads to faster decision-making, which helps compress transaction cycles, accelerate revenue, and reduce holding costs.

Property and Asset Management

Once construction is finished or a property is leased, a virtual reality model can continue to be used throughout a property’s life. The model can incorporate a wide range of property data, such as:

- Property and space availabilities
- Occupancies
- Maintenance requests or records
- Building operational data

Today, the cost of equipment and the technical expertise required to use it are still too high to make virtual reality widely applicable, however both will get cheaper as virtual reality grows more common.



While Building Information Modeling software like Revit is currently used to create a living model of a building, in the future this same level of structural and operational data - and more - will be consolidated within a highly-functional virtual reality model.

The Current Market and Costs for AR/VR

Today, the cost of equipment and the technical expertise required to use it are still too high to make virtual reality widely applicable, however both will get cheaper as virtual reality grows more common. The cost of virtual environments have already fallen significantly over the last three to five years.

According to the Counselors of Real Estate, a virtual model that would have cost a minimum of $2.00 to $3.00 per square foot three years ago can now be completed for $0.50 to $1.00 per square foot; while individual spaces in a building may be a low as $0.10 to $0.25 per square foot.[3]

While the overall costs are coming down, the ultimate cost of a model is flexible based on three primary factors:

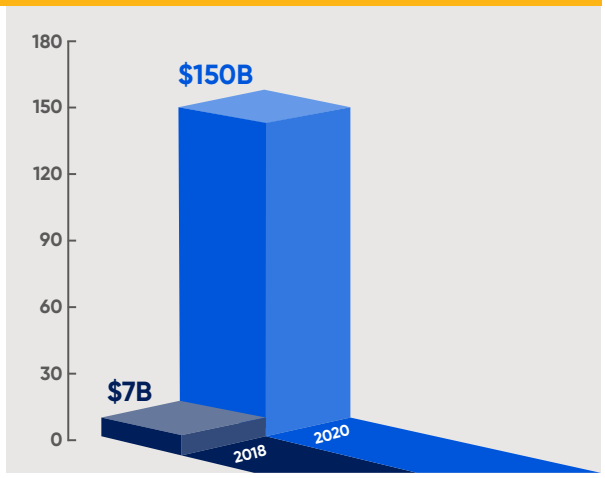
1. Inputs available (PDF, CAD, LIDAR capture, etc.)
2. Desired level of realism and detail (grayscale to photo-realism, actual furniture and artwork)
3. Delivery methods required (online, via mobile device, through a headset, or on a touch-screen kiosk)

Cresa's David Stella noted that the current costs of virtual reality technology means that its not yet accessible for every business. For the time being, a good fit for using a virtual reality model is likely to be tenants that:

- Are larger companies doing bigger projects that require more corporate buy-in and need more detailed information to help get their team on board
- Need two or more floors (25k sf per floor)
- Consider distance an issue, such as overseas clients

While cost is an important factor, it's also worth noting that the value virtual reality models deliver can offset some of those costs. VR models make it much easier and faster to build out many different sample rooms for comparison, enable greater design flexibility, and help prevent expensive change orders during construction.

Virtual reality technology is not likely to disappear; in fact, the VR hardware market is expected to grow nearly five times faster than the iPhone in the next three years to be worth $7 billion by 2018, and $150 billion by 2020.



The Future of Virtual Reality

Looking down the road to the future of virtual and augmented reality, not only will costs go down but the technology's capabilities will also continue to improve.

One area of potential growth is in the area of mixed reality, which is currently in its infancy. Mixed reality combines the best of virtual and augmented reality into a seamless experience; one in which users interact with digital and real-world objects while maintaining a presence in the physical world. For example, a potential retail tenant could walk into a mall wearing special glasses that allow them to see life-like, responsive virtual objects and data overlays, and to virtually change an existing store to a different operator and see the impact on foot traffic and sales for neighboring stores.[3]

In the future, it's expected that the growth of virtual and augmented reality technology will also deliver:

- More realistic and higher quality graphics
- The ability to take photos of an empty space and populate it with real-world furniture
- All-in-one project management tools that enable architects and tenants to fully design office space
- Virtual environments integrated with databases that allow someone to virtually walk through a downtown area, approach a building, and receive pop-up data about available properties and details

As with any new development or technology, those who learn to use it and integrate it into their process to the benefit of their clients will continue to grow and advance. Virtual reality technology is not likely to disappear; in fact, the VR hardware market is expected to grow nearly five times faster than the iPhone in the next three years to be worth $7 billion by 2018, and $150 billion by 2020.[3]

David Stella summarized his thoughts on virtual reality technology by saying:

"Modeling is the path to help clients understand space. In the past, we used tools like SketchUp and Revit. Now we're seeing a transition to VR. There are tools out now that will take a SketchUp model and translate it into a virtual reality model. I can load that model on a tablet, ship it off to a client across the country, and they can view and give me feedback on the space in real-time as I manipulate it and make changes. They can even move the model around themselves and view different parts of it.

While 3D modelling is the current minimum requirement, I think we'll see virtual and augmented reality become the next minimum requirement.

This technology engages the user at a much more intimate level, and it will continue to become easier, smarter, and more affordable. I can see it becoming ubiquitous."

Could your business benefit from these emerging virtual reality tools? Get in touch with Cresa Consulting's Workplace Intelligence group to learn more about the benefits of this exciting technology.

1. Deloitte, "2019 Commercial Real Estate Outlook: Agility is Key to Winning in the Digital Era," 2019.
2. Goldman Sachs, "Profiles in Innovation: Virtual and Augmented Reality; Understanding the Race for the Next Computing Platform," January 13, 2016.
3. The Counselors of Real Estate, "Virtual Technology: The Future is Now for the Commercial Real Estate Industry," Spring 2017