Architizer + chaos

The Future of Architectural Visualization

Architizer, in partnership with Chaos, is excited to share the results from a survey of architecture firms' visualization workflows and expectations for the future.

2023

This report covers the following questions:

How are architects producing visualizations? How are they using real-time rendering? How are they approaching the rise of artificial intelligence?

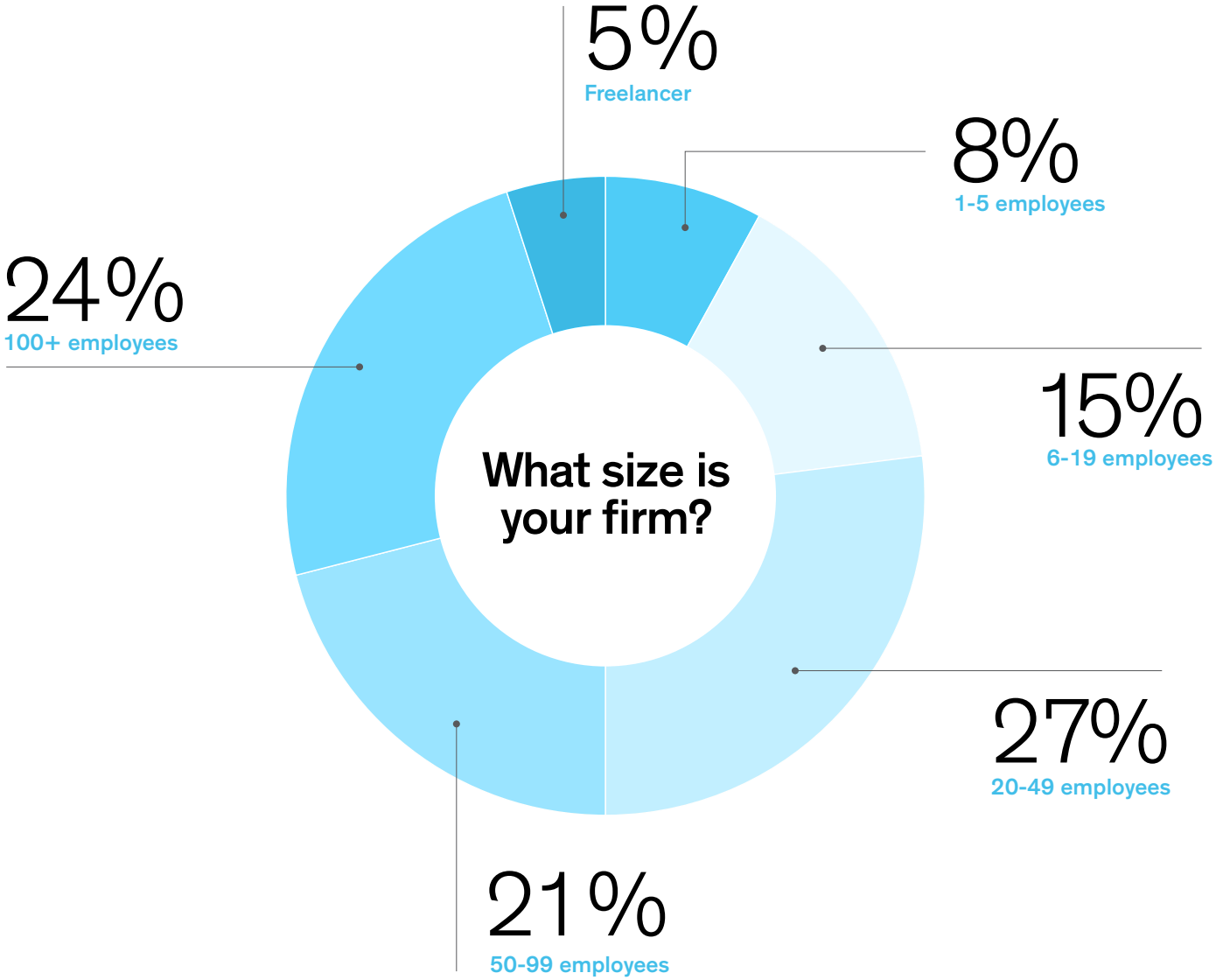
Key Learnings

Architizer recently conducted a survey of more than 2,000 design professionals to understand the present landscape and envision the future of architectural visualization. Here's what we found:

- Many architects have returned to the office after the pandemic, and a majority of architecture firms currently produce their visualizations in-house.
- Real-time rendering is a key part of most architects' workflows, citing time efficiencies, more dynamic design processes, and improved project communication.
- More than half of firms are already using AI for architectural visualizations, with more expecting to integrate it with their workflow in the near future.

About the Survey Respondents

The average survey participant worked in a design firm of 20-100+ employees practicing architecture, or a specialist discipline such as interior design, engineering, landscape architecture, and product design. Respondents' firms were overwhelmingly headquartered in the United States, although over a third had representation spread across numerous other countries around the world.



Respondents were shown to utilize real-time rendering nearly as much as conceptual and photorealistic visualization tools, and used architectural visualization fairly consistently across all project stages, including pitching, concept design, schematic design, and design development.

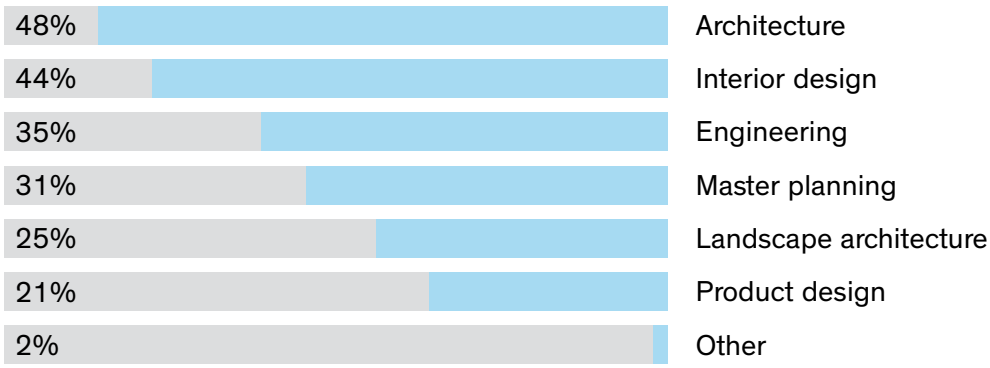
Respondents by country

Where is your firm headquarters located?	Percent
United States	73%
United Kingdom	3%
Australia	2%
Germany	2%
Canada	2%
China	1%
Brazil	1%
Colombia	1%
Italy	1%
France	1%

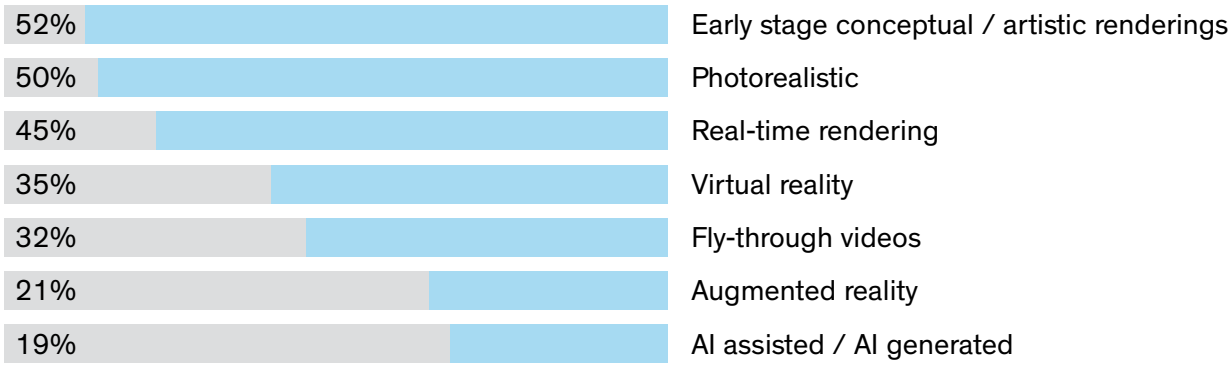
Argentina	11	1%
Austria	11	1%
India	9	0%
Belgium	7	0%
Mexico	7	0%
Bahrain	6	0%
France, Metropolitan	6	0%
Singapore	6	0%
Bosnia and Herzegovina	5	0%
Denmark	5	0%
Japan	5	0%
Netherlands	5	0%
Peru	5	0%
Aruba	4	0%
Bangladesh	4	0%
Belarus	4	0%
British Virgin Islands	4	0%
Burma	4	0%
Burundi	4	0%
Cocos (Keeling) Islands	4	0%
Ecuador	4	0%
Nigeria	4	0%
Slovakia	4	0%
Switzerland	4	0%
Turkey	4	0%
Barbados	3	0%
Bouvet Island	3	0%
Cameroon	3	0%
Chile	3	0%
Christmas Island	3	0%
Congo, Republic of the	3	0%
Egypt	3	0%
Georgia	3	0%
Greece	3	0%
Hungary	3	0%
Pakistan	3	0%
Romania	3	0%
Saudi Arabia	3	0%
Taiwan	3	0%
Bermuda	2	0%
Bolivia	2	0%
Botswana	2	0%
Bulgaria	2	0%
Burkina Faso	2	0%
Cape Verde	2	0%
Central African Republic	2	0%
Costa Rica	2	0%
Cuba	2	0%
Finland	2	0%
Heard Island & McDonald Islands	2	0%
Honduras	2	0%
Hong Kong	2	0%
Indonesia	2	0%
Iran	2	0%
Israel	2	0%
Jordan	2	0%
Korea, South	2	0%
Kosovo	2	0%
Lebanon	2	0%
Luxembourg	2	0%
New Zealand	2	0%
Panama	2	0%
Philippines	2	0%
Puerto Rico	2	0%
Russia	2	0%
Spain	2	0%
United Arab Emirates	2	0%
Vietnam	2	0%
Virgin Islands	2	0%
Bahamas, The	1	0%
Benin	1	0%
British Indian Ocean Territory	1	0%
Cambodia	1	0%
Congo, Democratic Republic of the	1	0%
Curacao	1	0%
Czech Republic	1	0%
Djibouti	1	0%
Dominica	1	0%
El Salvador	1	0%
Falkland Islands	1	0%
French Southern & Antarctic Lands	1	0%
Gabon	1	0%
Ghana	1	0%
Guadeloupe	1	0%
Guyana	1	0%
Haiti	1	0%
Holy See (Vatican City)	1	0%
Iceland	1	0%
Isle of Man	1	0%
Jamaica	1	0%
Kuwait	1	0%
Laos	1	0%
Lesotho	1	0%
Liechtenstein	1	0%
Malaysia	1	0%
Marshall Islands	1	0%
Martinique	1	0%
Mauritania	1	0%
Moldova	1	0%
Mongolia	1	0%
Morocco	1	0%
Nepal	1	0%
Norfolk Island	1	0%
Norway	1	0%
Poland	1	0%
Portugal	1	0%
Rwanda	1	0%
Sierra Leone	1	0%
South Africa	1	0%
South Georgia and the Islands	1	0%
South Sudan	1	0%
Sudan	1	0%
Thailand	1	0%
Tunisia	1	0%
Uganda	1	0%
Uruguay	1	0%

* The majority of respondents came from the US, but we had respondents from more than 70 countries.

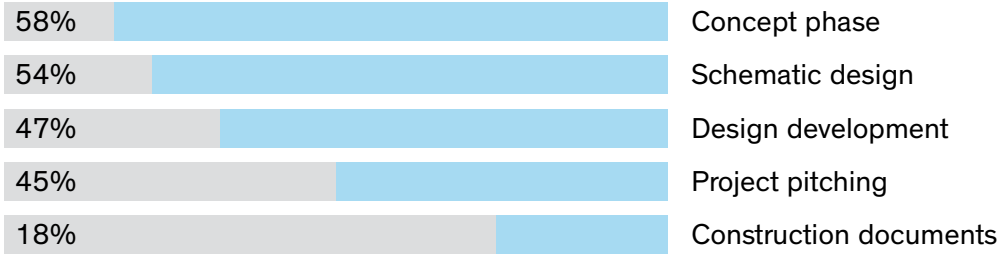
What types of work does your firm specialize in?



What forms of architectural visualization does your firm utilize?



At what stages of the design process do you utilize visualizations?



The State of Architectural Visualization: Fast Paced and Widely Practiced

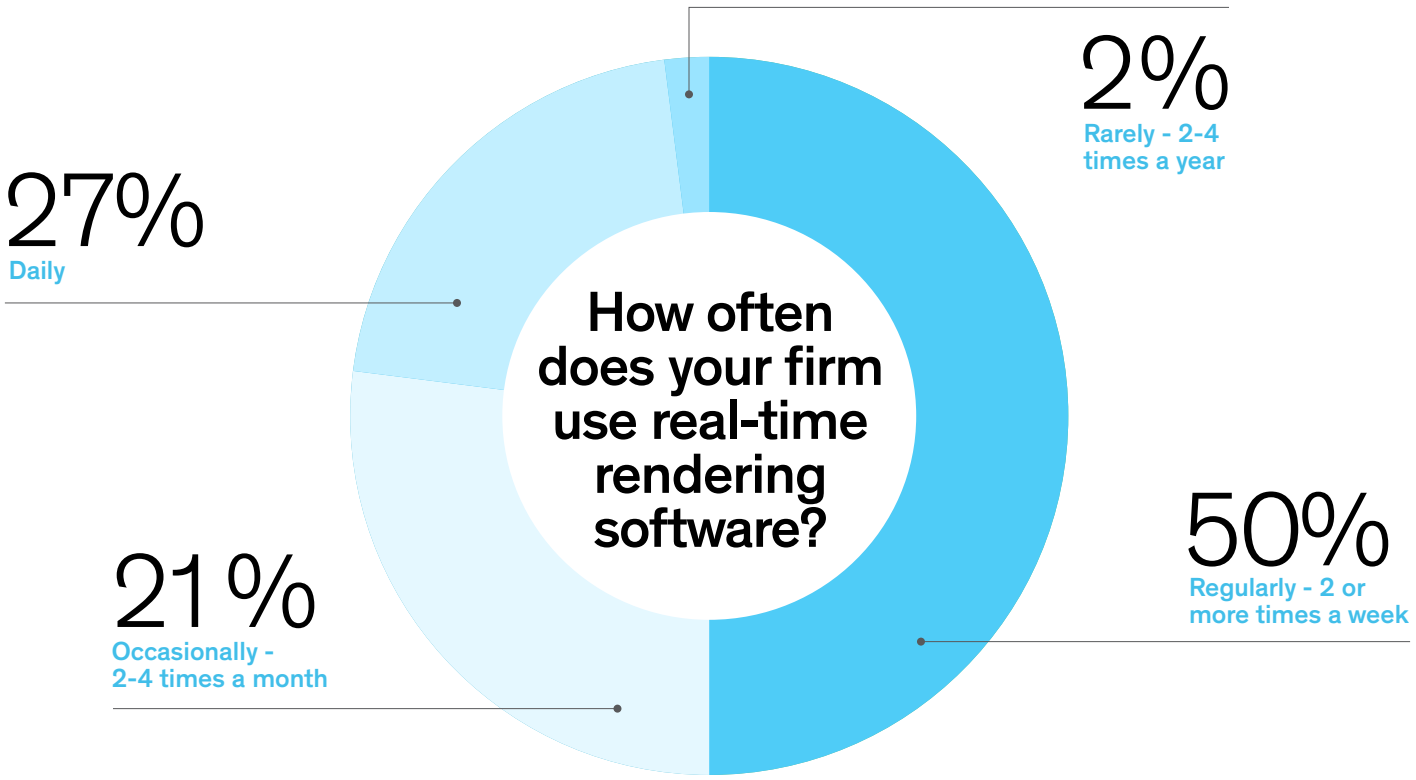
Real-time rendering is an essential part of most architect's workflows

One of the most telling survey results was more than 75% of respondents indicating they use real-time rendering daily or at least twice per week. This was consistent across firm size, with a striking similarity of twice or more per week use ranging across the smallest firms to the largest. These numbers confirm the prevalence of real-time rendering in the everyday workflow of many architects, and indicate that the technology is well established in the industry.

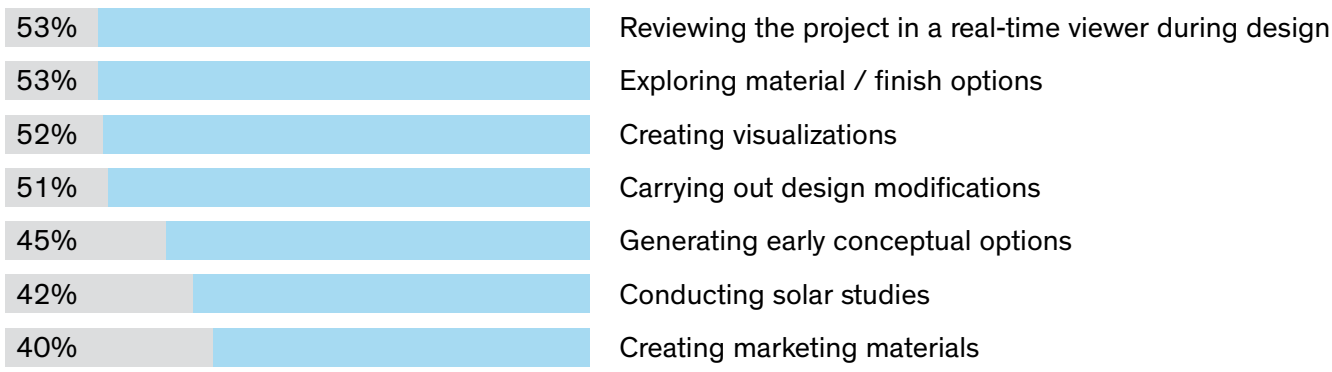
Interestingly, freelancers were nearly twice as likely than any other firm size to practice real-time rendering on a daily basis. This might suggest a nimbleness towards technological adoption among solo practitioners, or it might simply reflect that multi-person firms can divide different types of work across different people. Either way, the prevalence of real-time rendering is a noticeable change from the days of waiting for an image to finish rendering before evaluating it.

> **It is now possible for professional real-time software to be harnessed across a wide range of hardware, from workstations to laptops.**

This trend is likely due to a general shift in the expectations of clients, who now expect multiple design options to be presented with a high level of polish from the outset of a project. It is also indicative of increasing ease-of-use and compatibility. While rendering plug-ins have been available to architects for many years, it is now possible for professional real-time software to be harnessed across a wide range of hardware, from workstations to laptops. As a consequence, renderings can be produced more efficiently than ever.



What are your primary uses for real-time rendering software?



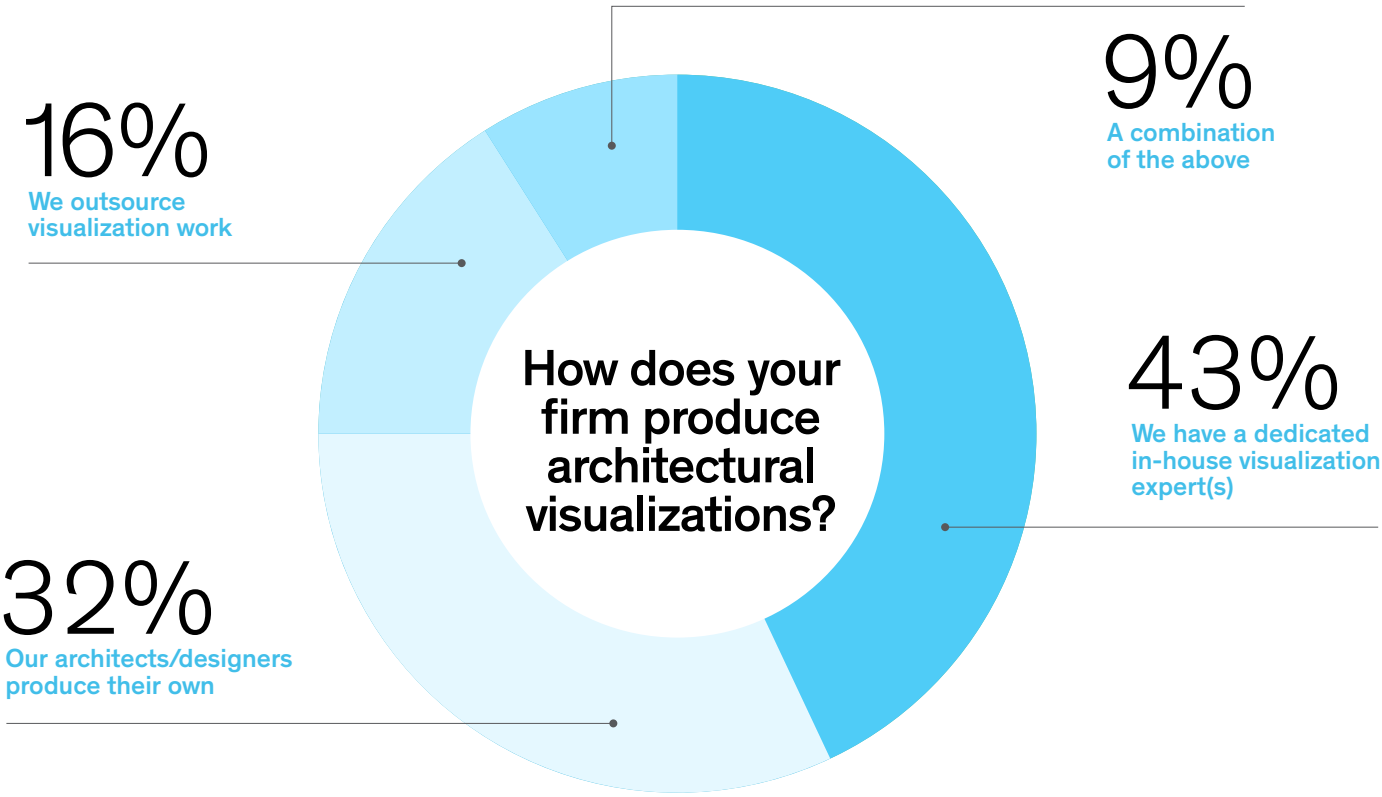
A majority of firms produce architectural visualizations in-house

There was a notable lack of outsourcing visualization work among respondents. Over 75% indicated they produce visualizations with either a dedicated, in-house expert or that their designers produce their own visualizations. While the balance of these two methods varied depending on the number of a firm's employees, there was a significant amount of both reported at every level of staff size.

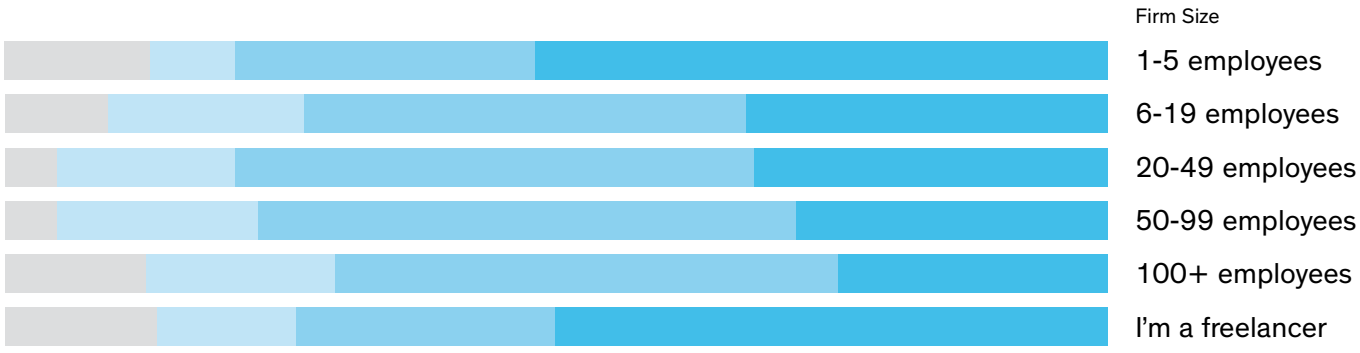
> **[Survey responses indicate that] a basic fluency in creating quality visualizations, including real-time rendering, is necessary for any architect.**

Of the relatively small amount of outsourcing that was reported, the bulk of it was from the middle tiers of firm size, perhaps suggesting a resource squeeze for firms that aren't very large or very small. Freelancers and very small firms of 1 to 5 employees were far more likely than larger firms to have their designers produce their own visualizations. However, even among larger firms, at least 25% or more required designers produce their own visualizations, suggesting a basic fluency in creating quality visualizations, including real-time rendering, is necessary for any architect.

188 design professionals (8.8% of all respondents) responded that they use a combination in-house and outsourced services for architectural visualization.



How does your firm produce architectural visualizations?



Real-Time Rendering: A Revolutionary Change

Nearly half of architects are using real-time rendering to speed up projects

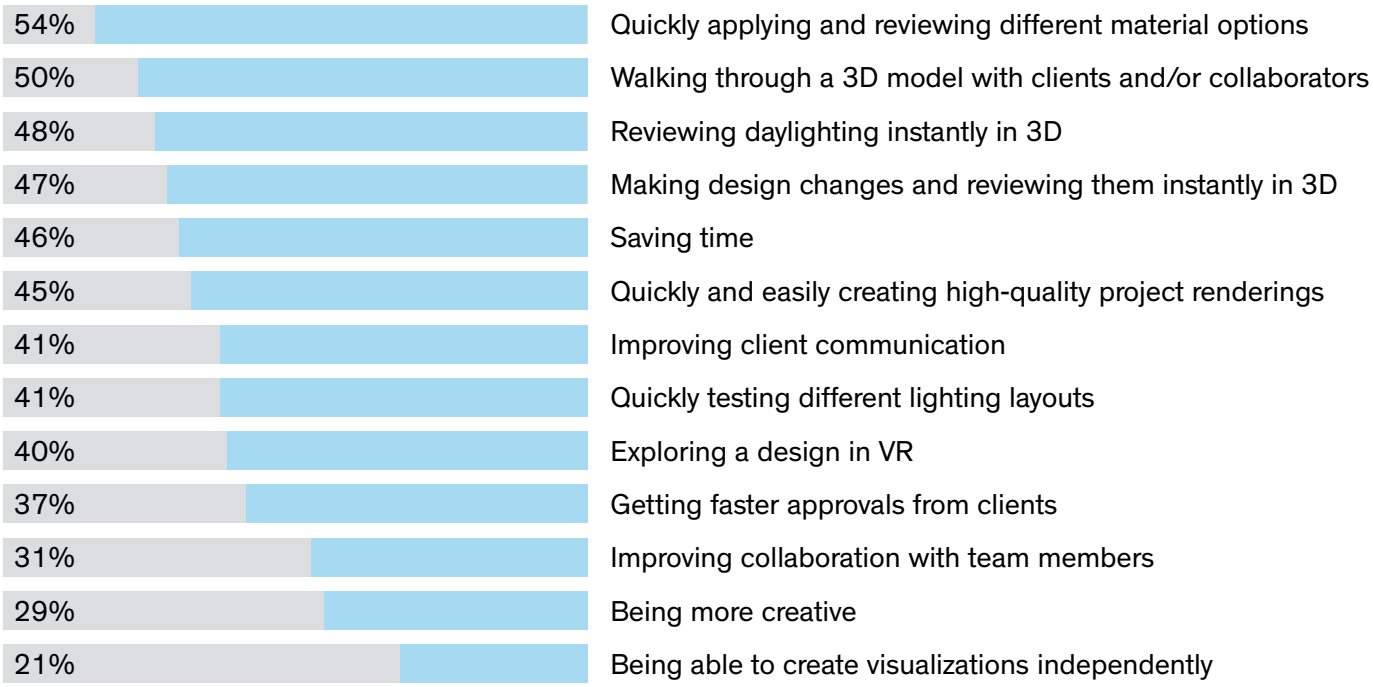
Among the advantages of real-time rendering cited, many respondents pointed to benefits that reduce the amount of time it takes to complete projects. 45.7% of respondents stated that saving time / speeding up the design process was a key benefit for them. Similarly, quickly applying and reviewing different material options (selected by 54.3% of respondents), walking through a model with clients or collaborators (50.1%), and reviewing daylighting instantly in 3D (47.9%) were all popular selections related to increased efficiency. Beyond simply speeding up the time it takes to view a rendering, these advantages suggest real-time rendering can shorten the time it takes to make the decisions needed to progress projects.

> **[The survey responses] suggest real-time rendering can shorten the time it takes to make the decisions needed to progress projects.**

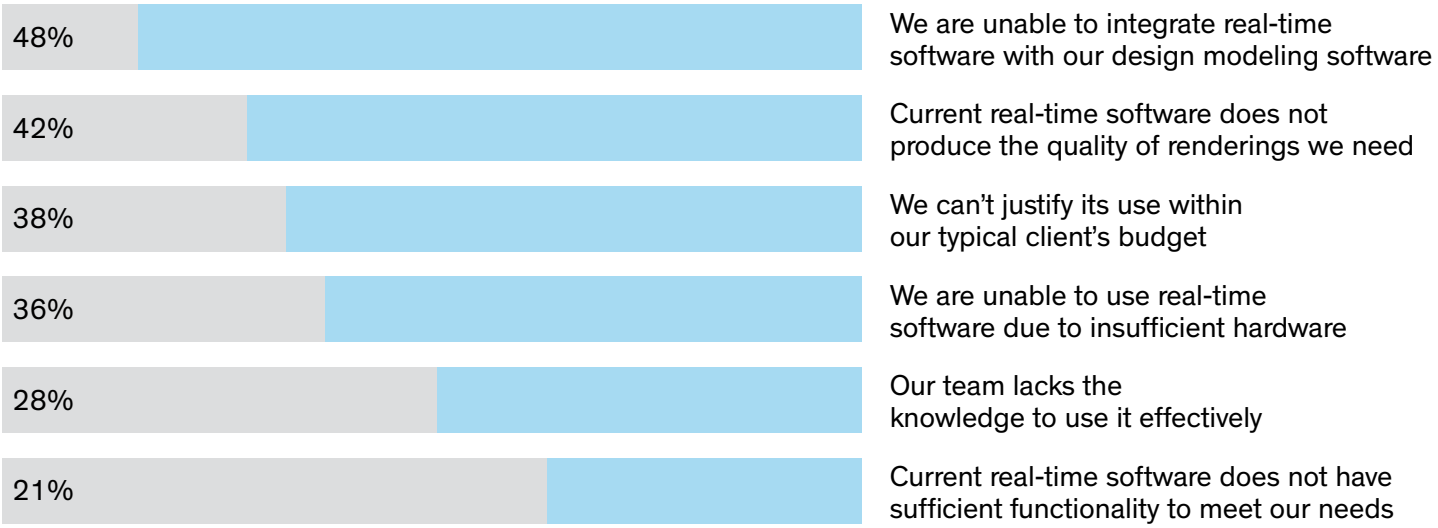
The 50% of architects that are utilizing real-time rendering daily may be ahead of the curve, but the rest of the pack seems eager to catch up, with nearly half of respondents stating that they're looking to invest more in real-time rendering in the next 12 months. Currently, design studios are also channeling investments towards architectural animations, photorealistic visualizations, and VR, with AI quickly rising in relevance.

In terms of challenges, nearly half (47.8%) of the respondents chose the lack of integration between real-time software and design modeling software as their biggest hurdle. However, leading industry software such as Enscape already integrates with key design applications, indicating that this challenge should diminish in the coming months and years.

What would you say are the main advantages of real-time rendering?

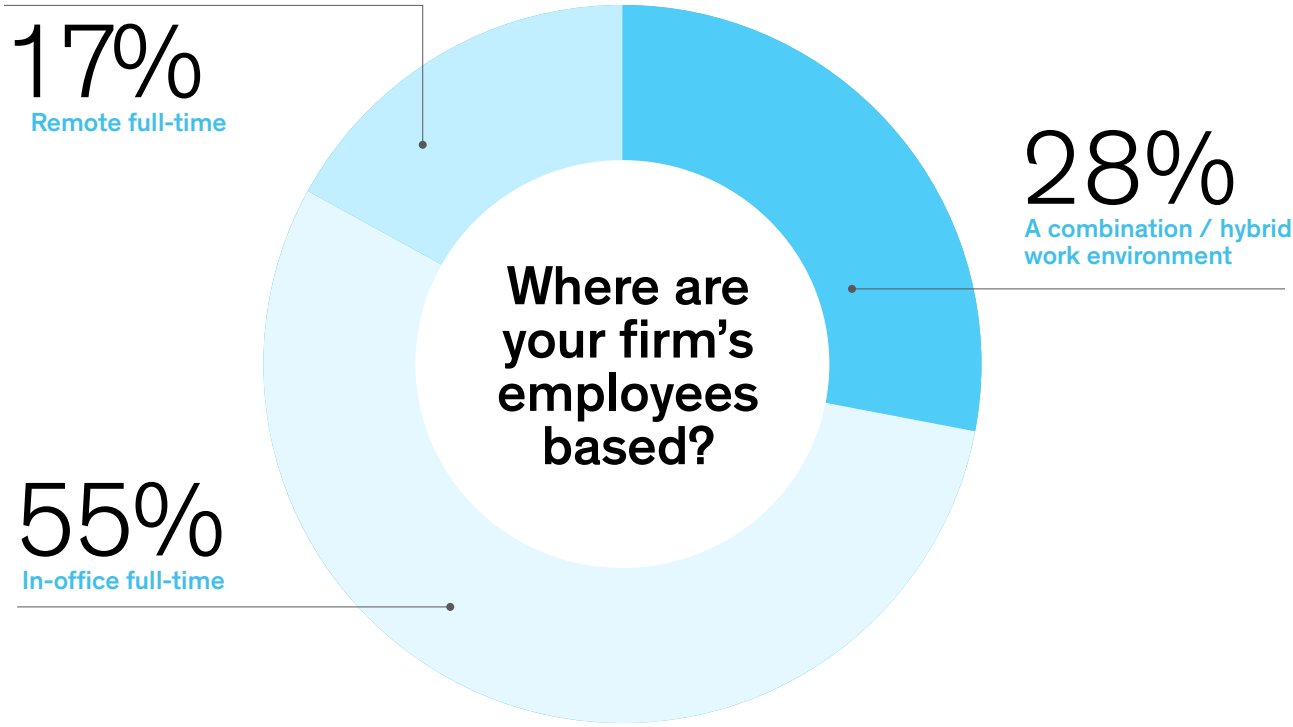


What is the biggest challenge you face with real-time rendering?



A return to the office could be catalyzing the adoption of new technology, including real-time rendering tools

Interestingly, 55% of respondents also noted their firm's employees were working in the office full-time, with an additional 28% in the office part-time. Compared to a 2020 survey in which 50% of architects said they were working remotely only since the COVID-19 outbreak, this correlation suggests architects have returned to the office in substantial numbers. This could be in part due to the unique benefits of an architecture office, where specialist hardware is more readily available, knowledge sharing between colleagues is more commonplace, and designers can conduct dynamic in-person meetings with clients and collaborators.



Artificial Intelligence: A Disruptor Catching On Quickly

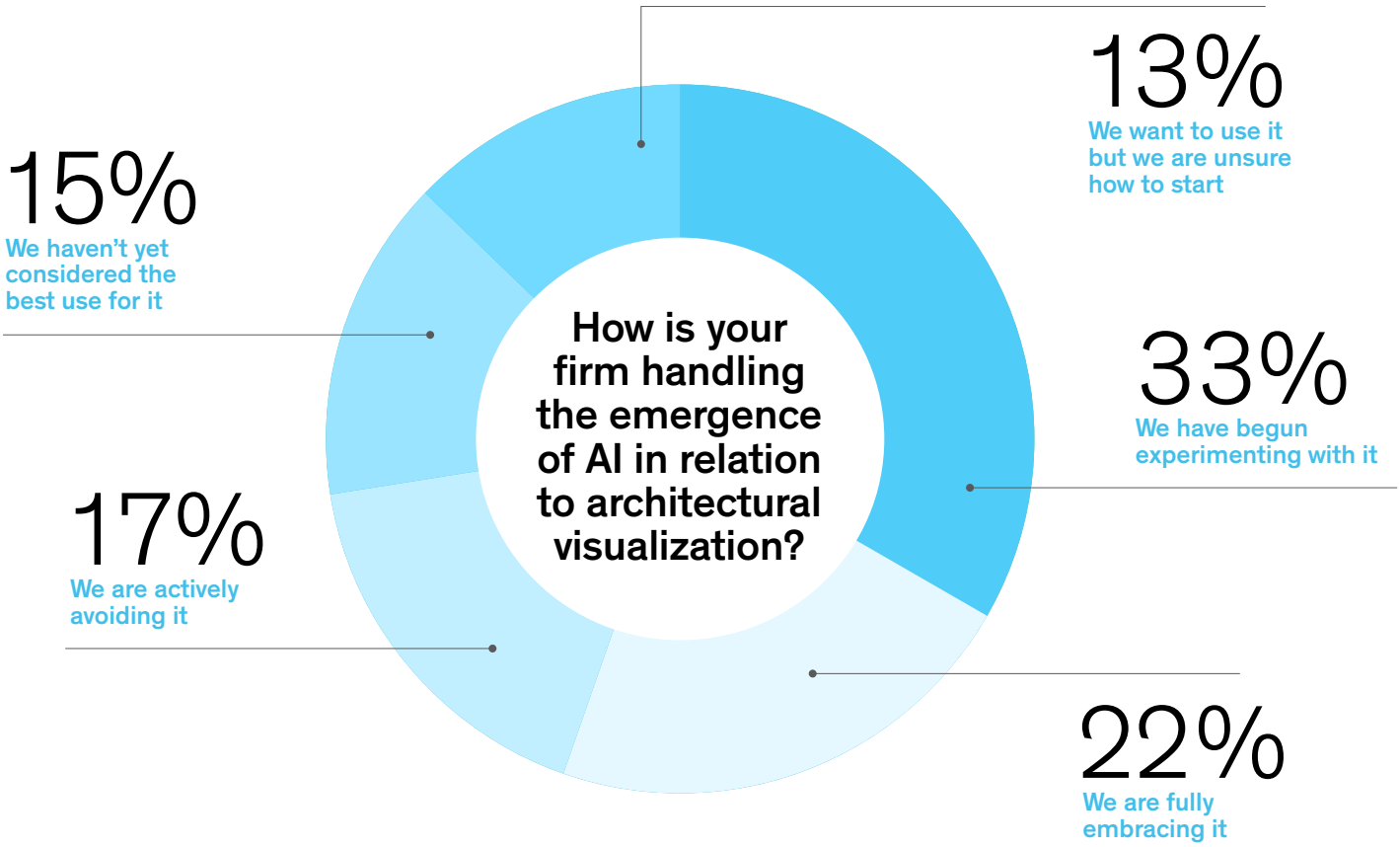
More than half of firms are already using AI to improve visualization

55% of respondents are either fully embracing AI (22%) or have begun experimenting with AI (33%) in relation to architectural visualization. Tracking with these results, 19% of respondents indicated they utilize AI to create AI-assisted or AI-generated visualizations. While that amount may not seem high, it's significant relative to just how recently AI visualization tools have become widely available, which in most cases is less than a year before this survey was administered.

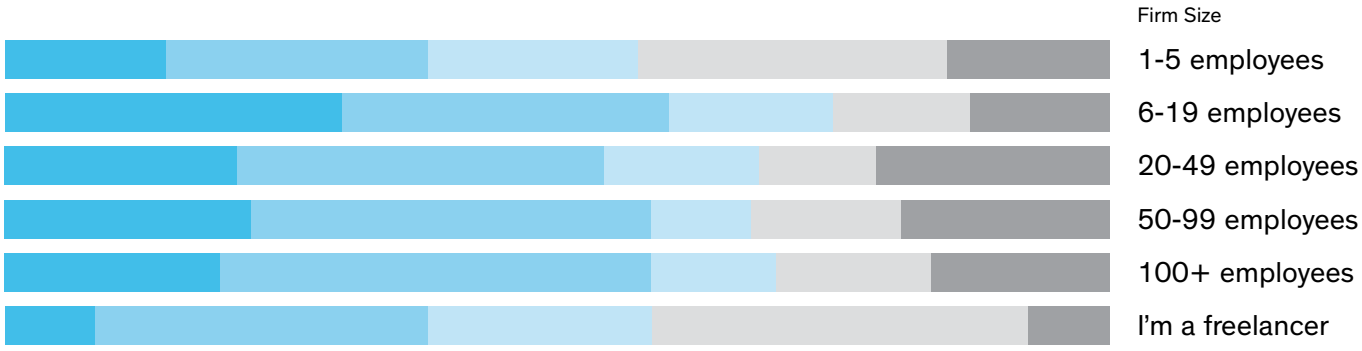
The 19% of respondents using AI to create architectural visualizations is even more remarkable compared to a nearly identical 20% of architects using augmented reality (AR) for the same purpose, since AR tools have already been on the market for several years. This could be due to the practicality or cost of using AR equipment or software, whereas many AI tools are relatively inexpensive and remarkably simple to use. Either way, by comparison, the use of AI among architects to assist with visualizations is taking off rapidly.

> **Larger architecture firms are fully embracing AI more quickly than smaller firms.**

While the percentage of respondents that have begun experimenting with AI is fairly consistent across firm size, larger architecture firms are fully embracing AI more quickly than smaller firms. This correlation could be a fairly straightforward issue of larger firms having more resources available for experimentation, although firm culture could also play a role. Small to medium size firms, for example, were notably more likely to say they're actively avoiding the adoption of AI than firms with 100+ employees.



How is your firm handling the emergence of AI in relation to architectural visualization?



The Future: Real-Time Rendering and Artificial Intelligence

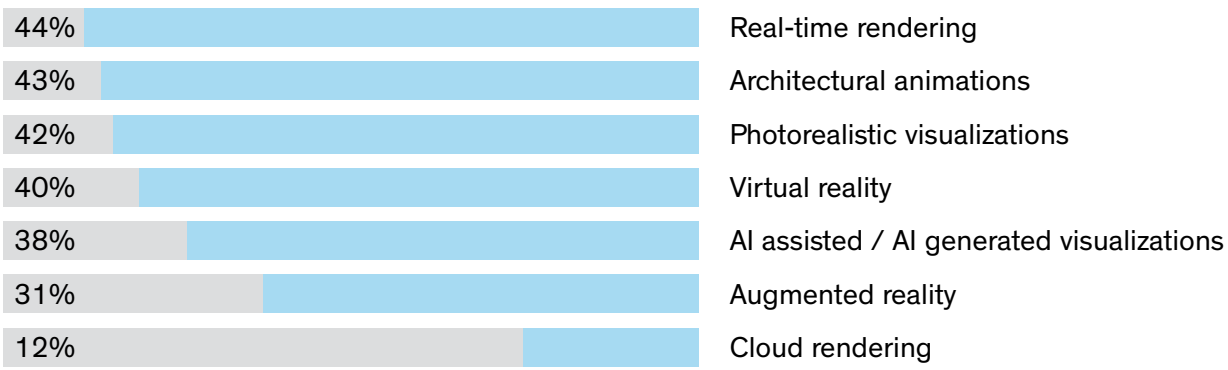
Real-time rendering and AI tools are likely to dominate architectural visualization workflows

A sense of AI's long-term role in the profession starts becoming apparent when architects' plans for it are compared to how they believe visualization can most benefit their workflows in the future. The fact that 37% of respondents intend to invest more in AI over the next year suggests it's more than just a temporary fad. Nearly 50% believe more intuitive and dynamic visualization tools will become available in the future, hinting at their expectations for AI in the coming months.

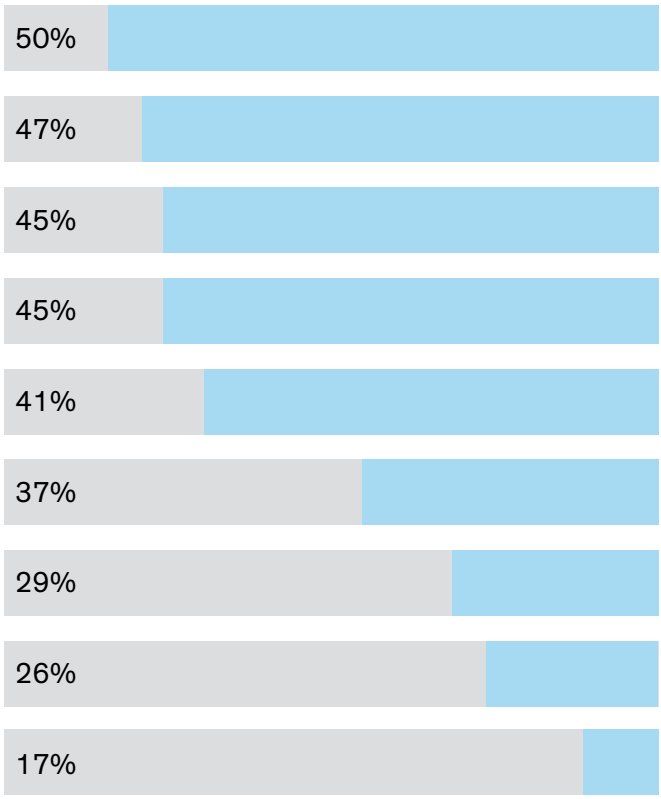
> **The fact that 37% of respondents intend to invest more in AI over the next year suggests it's more than just a temporary fad.**

This picture is complemented when compared with the data relating to how architects currently use real-time rendering tools. Two of the most popular advantages of real-time rendering — each with about 50% of the vote — were its ability to help with applying and reviewing material options, and for reviewing design changes instantly.

What is your firm looking to invest more in in the next 12 months?



How do you think visualization can most benefit architects' workflows in the future?



Providing architects with more intuitive and dynamic tools for developing their designs

Giving more architects the ability to design, test, and review in 3D

Providing better ways for architects to work with clients and other stakeholders in the design process

Improving workflow efficiency by creating renderings faster, with fewer clicks

Constructing and interacting with virtual coordination mockups used by architects, engineers, and contractors

Using real-time rendering for immersive punch-listing of designs prior to construction

Enabling architects to conduct environmental studies earlier in the design process

Creating a design to operational digital twin workflow

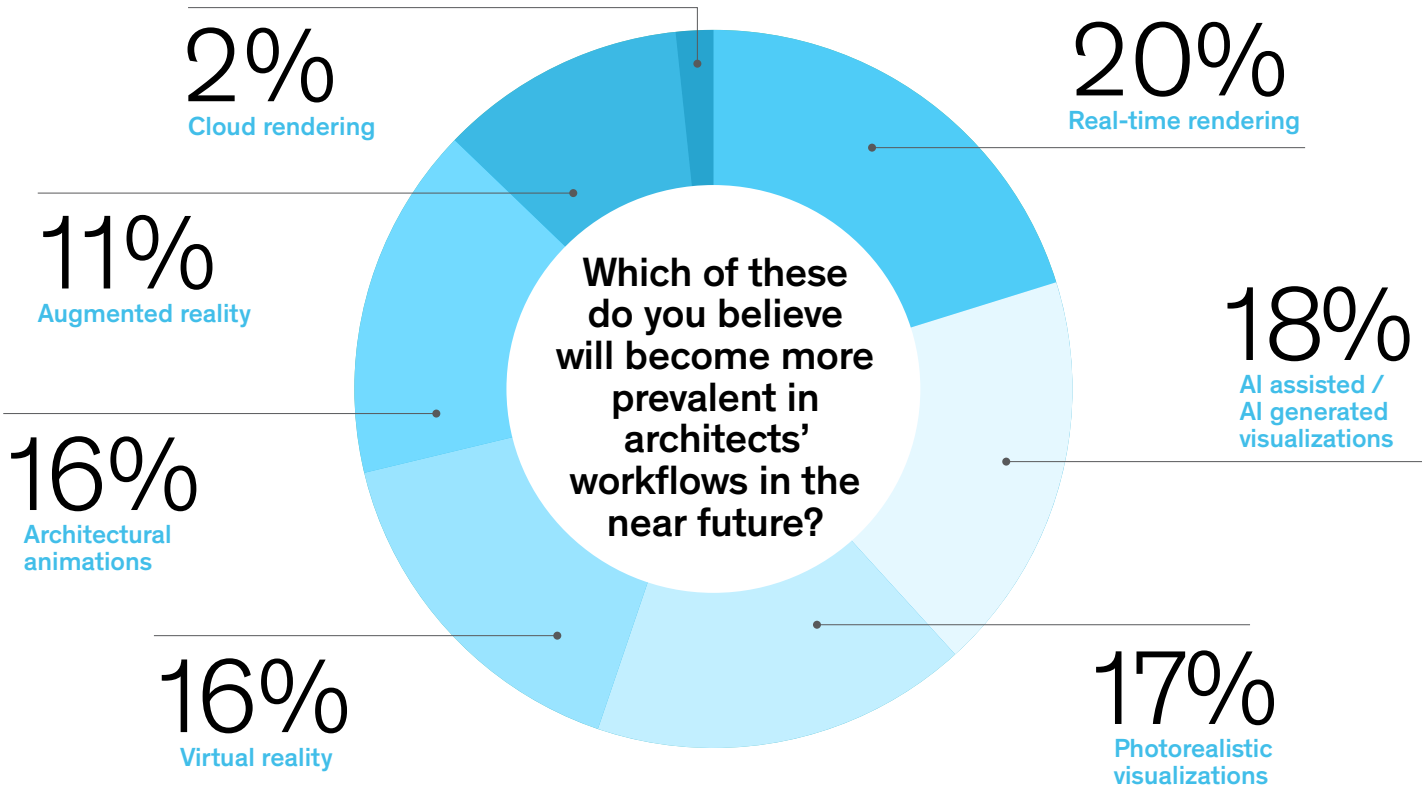
Enabling architects to create renderings from text prompts

AI experimentation is being embraced by larger architecture firms

Cross-referencing firm size with a question about the adoption of artificial intelligence (AI) showed that larger firms have been getting their employees accustomed to using AI more quickly than smaller firms. More than 30% of respondents from large firms with more than 100 employees stated that their firm was “actively embracing AI” in their workflow, compared with just 8% of respondents from small firms with 5 employees or less.

More broadly, AI-assisted visualizations were the second most popular response to what survey takers believe will become more prevalent in architects’ workflows in the future, right behind real-time rendering. Notably, other disruptive technologies appear less relevant, with virtual and augmented reality — still relatively new but no longer cutting-edge formats — coming in 4th and 6th place for this question, respectively.

Conversely, nearly a quarter of respondents are already fully embracing AI in architectural visualization and over half utilize real-time rendering to make design modifications. Analyzing these results relative to AI and real-time rendering tools currently available to architects points to one overwhelming conclusion about the future: that both real-time software and AI tools will increasingly become an industry-wide standard for architectural ideation.



Conclusion.

Two primary findings from the Future of Architectural Visualization survey reveal that real-time rendering is widely practiced and increasing in popularity, while the use of AI is rising at a rapid pace. The architecture profession is no stranger to the adoption of new technologies to communicate design ideas, but the concurrent ascendance of these two technologies in particular offers a study in both contrasts and compatibility.

The popularization of real-time rendering has been a long time coming, with advances in processing power helping design professionals to realize their concepts and design with more fluidity than ever before. As software has grown more sophisticated and improved hardware has become available, the segue of architects' workflows into a near-instant feedback loop between design and visualization is a natural and welcome transition.

> **“AI seems to have placed the design professions in the middle of a new technological revolution before they even knew it began.”**

In contrast to the steady adoption of real-time rendering over time, the speed with which AI has been embraced in the profession is astonishing. The sudden availability and massive attention paid to AI in general, combined with AI visualization tools' ease of use — unusual for a new technology — seems to have placed the design professions in the middle of a new technological revolution before they even knew it began.

The overlap of these two revolutions is remarkable, and the outcome appears clear: that both real-time rendering and AI will both play a vital role in the field of architectural visualization in the coming years, helping designers achieve even more efficiencies than we see today.

Architizer

About Chaos

Chaos develops 3D visualization technology for architecture, engineering, construction, product design, manufacturing, and media and entertainment.

With industry-leading software such as V-Ray, Enscape, and Corona, architects, artists, and designers can make use of intuitive and powerful workflows to quickly create the perfect imagery for their projects. In addition, our research and development are leading the way toward a truly comprehensive end-to-end visualization ecosystem to meet the evolving needs of our customers.

Headquartered in Karlsruhe, Germany, Chaos is one of the largest global 3D visualization companies, with more than 700 employees and offices worldwide.

About Architizer

Home to the world's largest community of architects online, Architizer's core mission is to celebrate the world's best architecture and the people that bring it to life.

Powered by continually evolving technologies, we serve architects with the inspiration and information they need to build better buildings, better cities, and a better world. We advocate for a more sustainable, resilient and ethically designed built environment.

We provide design professionals and building-product manufacturers with a global platform to promote their work through awards, competitions and engaging content.