When you’re surrounded by emerging and evolving technologies, it can be difficult to determine which developments will be impactful and which are overhyped. To help you see the future more clearly, eight representatives of CAD software development companies discuss their picks for which trends to watch.
The Top CAD Technology Trends of 2020

Which developments are having the biggest impact now — and will shape the CAD environment in the coming months?

The digital design world is never static. New software and hardware capabilities, workflows, and technological developments are continually entering the scene, in AEC firms and product development companies alike. Distinguishing between the truly impactful developments and the merely novel ones can help you make wiser decisions about investing your resources and preparing for changes.

Here, we’ve collected input from eight CAD software market insiders representing a variety of developers, including Bentley Systems, Bricsys, Graebert, GRAPHISOFT, PTC, Siemens Digital Industries Software, and Vectorworks. Our hope is that their insights and predictions will help you understand how CAD and related technologies are reshaping the competitive landscape, right now and in the months to come.

Model-Based Definition Makes a Mark

“2020 will see designers looking to do more with real-time simulation, generative design, and augmented reality (AR)/internet of things (IoT). This takes place in the larger context of model-based definition,” said Brian Thompson, divisional vice-president, general manager, CAD Segment, PTC. “Once companies move in that direction, they begin to think, ‘Why not look as well at new technologies to improve design practices?’”

Paul Brown, senior marketing director, NX Product Engineering Software, Siemens Digital Industries Software, predicted an evolution from model-based definition to the model-based enterprise. “The use of 3D annotation to help describe designs has been around for a long time, and has really had a relatively slow adoption rate. One of the biggest reasons for this is everyone focused on the front end: adding annotation to describe a design. The idea of replacing the traditional 2D drawing with a 3D model with annotation became the focus, and the value proposition was hard to see; numerous analyst studies have shown that the time savings in just shifting from drawing-based to model-based [design] were negligible.

“Now we are starting to see people ask, ‘What can I do with this data?’ which is leading to a shift of emphasis from creation to consumption,” Brown continued. “This will continue to gain
momentum because as more people invest in building comprehensive digital twins of their products, the obvious next step is leveraging that data downstream across the enterprise and the supply chain — that is where the real value lies. The change has to come from the system’s ability to consume the data and not rely on manual input, with multiple disciplines being able to see the information served to them in the way they need it — which doesn’t always relate to the initial designer view of how to define things like tolerance. This move to model-based enterprise is exciting because it really begins to deliver return on investment based on the digital twin.”

**Digital Twins and the IoT Impact Design**

“Requirements for immersive visualization and analytics visibility are exploding,” said Adam Klatzkin, vice-president of business development for iTwin Services, Bentley Systems. “While BIM [building information modeling] has been used for several years to provide extra information and visualizations for 2D paper-based deliverables, we are seeing more and more projects that are model based and are implementing digital twins. Digital twins will have increasingly broad application in advanced design environments, in which a fully functioning digital model is developed, allowing it to be improved by analyzing different design choices right up to the project phase, with a more evolved approach compared to conventional approaches. The innovation [lies] in not having only a static design that represents a clearly defined phase, but a model that evolves over time during construction and into operations.”

PTC’s Thompson said, “I said last year that I expected the IoT [internet of things] to proliferate throughout the enterprise. Now it’s becoming real for product designers. Major stakeholders want those smart, connected functionalities built into the product from the start, and designers are starting to take the insights from that data and use those insights to iterate.”

**2D Remains Relevant, Sees Gains in Efficiency**

The need to produce 2D documentation directly remains strong, noted Heidi Hewett, BricsCAD product owner at Bricsys, even though we have the ability today to produce associative 2D documentation from our 3D models. Hewett believes that a “renaissance” in 2D CAD workflows is under way. “2D CAD has stayed the same for decades,” she observed. “We believe that the process for creating 2D documentation doesn’t need to remain archaic and stagnant. We intend to deliver increased software usability and automation for the repetitive tasks that consume the majority of the 2D drafter’s time. ... The search for greater productivity and reduced costs will drive the market, regardless of design paradigm.”

Wilfried Graebert, founder and CEO of Graebert, also weighed in on the continuing importance of 2D. “When the first PLM, BIM, or GIS solutions emerged, many were claiming that 2D drawings would disappear,” Graebert recalled. “Twenty years later, there are still billions of DWG drawings circulating. The explanation is simple: These new 3D technologies have considerably increased the complexity of models and the quantity of information that they
are illustrating. Drawings are therefore still widely used to document these projects with a higher level of detail and in a comprehensive way. ... The further this complexity is increasing, the more we need drawings. This trend is further expanding with the SaaS transformation, as cloud is enabling a deeper integration between applications and better collaboration among users.”

Cloud CAD Reaches Tipping Point for Vendors, but Not Users

One of the most notable CAD industry developments in 2019 was the movement toward software-as-a-service (SaaS) delivery models. “I trust that the recent acquisition of Onshape by PTC will be remembered as an inflexion point,” said Wilfried Graebert. “We see now that most of the industry leaders are accelerating their SaaS transformation.

“Besides the competitive landscape, we have also seen in 2019 a maturation of the demand for cloud solutions,” he continued. “This trend is in particular very strong among the largest companies that can strongly benefit from the advantages in terms of collaboration. According to the IDC SaaSView 4Q18 survey (October 2018, 2,902 companies), a total of 72% of IT managers would give preference to a SaaS solution.

“The Subscription Economy Index (Zuora, October 2019) shows that SaaS companies have been growing three times faster in sales than the non-SaaS Software companies of the S&P 500 index,” Graebert reported.

“Still, another report from Synergy Research Group shows that the SaaS solutions currently represent a 15% market share, to be compared with 85% market share for traditional desktop software. CAD vendors can no longer wait to migrate to the cloud, but they also realize that it will most likely take more than 10 years before the number of cloud users [will outstrip] the number of traditional on-premises users. The challenge our industry is facing for the coming years will therefore be to maintain, in parallel, products for [both] desktop and cloud. The most successful companies will be the ones that can manage the complexity of such a hybrid ecosystem to conduct their transformation smoothly.”

Cloud-Powered Generative Design Sees Wider Adoption

“Businesses need to innovate to stay competitive, but they must do so with the same or fewer resources and still beat their competitors to market. To do this, they have to think differently about their design processes. Generative design can help,” said Thompson of PTC. “Customers also are now starting to benchmark technologies; that’s a sure sign that they are getting serious about adoption beyond the lab. We’ve all seen [that] the willingness to extend into the cloud to leverage high-performance compute is growing.”

Jon Hirschtick, executive vice-president and president of SaaS at PTC, predicted, “In 2020, we will see the emergence of cloud-native generative design tools that will significantly speed up the optimi-
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Tribulation of product designs across multiple parameters. These next-generation design tools will allow product development teams to simultaneously explore more iterations to optimize weight, strength, shape, materials, and cost.

**Design Gets Help from Machine Learning, Artificial Intelligence, Integration**

“From the Vectorworks point of view, we see greater adoption of artificial intelligence (AI) and machine learning (ML) techniques, and take that into account when developing design features and workflows based on advanced analytics,” said Vectorworks CEO Biplab Sarkar. “We also envision that the usage of modular designs and algorithms-aided design (AAD) will increase manyfold as our users perform offsite assembly of construction modules and explore design alternatives to optimize the designs,” he predicted.

Sarkar was not alone in emphasizing the rise of AI and ML in CAD applications. Brown from Siemens said, “The need to move the use of CAD technologies from being a passive solution capturing ideas, to a reactive tool that offers help and suggestions based on collective learning, is bringing applications of artificial intelligence and machine learning to the fore. [Helping] an engineer decide on the best solution takes the process beyond things like topology optimization and into generative engineering approaches, building off of past experience by maintaining creativity.”

Tibor Szolnoki, leader of the Implementation Team at GRAPHISOFT, predicted improvements in store for architects: “There are many repetitive processes in the architectural profession, and ML has the potential to take over this part of the job. Such a technology can lead theoretically to drastic efficiency increases for architects, and it will potentially transform the architectural job itself. Large vendors and start-ups started to invest in this field a few years ago, first results are visible, but there is no breakthrough yet. This is not a
surprise, as this is a complex aspect of the field. It will end up being a matter of time, when these technologies will become dominant.”

Brown from Siemens expects to see a continued focus on mechanical and electrical systems integration. “With the ever-growing use of electronics and software as the basis for innovation, the integration of mechanical and electrical systems becomes more and more important. [MCAD and ECAD are specialist domains with unique requirements, and] the reality is each domain has a level of specialization; that means that the compromises needed to use a single design tool are going to restrict one [team or the other]. Close integration between disciplines is what will deliver the payback that companies need. Reducing errors that can be introduced by translation of information and supporting parallel processes that often involve a lot of iteration cycles and trade-offs is going to lead to closer ties between systems.”

**BIM Standardization Efforts Continue, New Platform Options Arise**

“BIM, as an innovation, has already crossed the chasm, and design teams have already adopted this approach. … Contractors, building owners, and developers are becoming more aware of the benefits of BIM, and starting to require BIM-based workflows even in the private sector,” noted Szolnoki from GRAPHISOFT. “The question is not whether it makes sense to do a building project either following the traditional approach or BIM, but [rather] how to do it following the most efficient BIM process. As we see, there are two different approaches to implementing BIM:

- Building Information Modeling. In the design phase, an intelligent building model should be built to streamline the architectural design workflow, by generating drawings, renderings, quantity takeoffs, etc. automatically.

- Building Information Management. To share design data in a digital, reusable form with stakeholders of the building project.”

Standardization is essential, Szolnoki believes. “As the primary goal of BIM is to share information with each other, this cannot happen without an agreement about data formats and data classifications, hence standardization is simply a must. The growing number of classification standards or the growing role of Building Smart in the industry clearly shows that the ability of passing over digital information in a structured way is the way to go.”

Szolnoki also predicts changes in the realm of platforms: “Many vendors are developing a platform to make sure that they can provide the backbone for BIM projects. There are plenty of different platform initiatives from large and small vendors alike, and this trend will be very strong in the CAD/BIM industry in 2020 as well.”

**Collaboration-Boosting Tools Grow in Importance**

“In terms of design, augmented reality (AR) is taking hold as a collaboration tool,” said PTC’s Thompson. “It’s proven hugely useful
in factory settings to make people more productive, but design engineers are finding the same to be true in their world. We’ve seen it just start to take off, and [we] expect real growth as designers use it to communicate their design concepts at scale, with anyone (including non-CAD users), at any time, with minimal friction.”

PTC’s Hirschtick predicted, “Increased costs will force American companies to set up manufacturing in other countries which do not have tariffs. This sudden shift will dramatically increase the demand for spontaneous collaboration through cloud-based product development tools that speed up communication between teams.”

**Companies Try New Approaches to Limit Security Threats**

“The fears around cybersecurity are continuing, and while larger companies can and do employ their own security teams, they have to look to their vendors … to do everything we can to protect them by eliminating as much potential risk as possible. This is one of the reasons that Siemens, along with companies like IBM and Cisco, have formed the Charter of Trust to set down guidelines we can work to,” said Siemens’s Brown.

Hirschtick from PTC predicted a change in perspectives: “In response to the growing threat of ransomware and viruses, more executives will trust their intellectual property [IP] security to cloud-based solutions over desktop-installed security software. Skeptics have historically been asking, How can we ever make the cloud secure enough for their CAD data? In 2020, that question will be flipped: How in the world can you ever have your IP securely stored on your desktop?”

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