

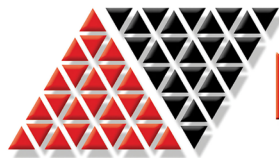
SIMULATION FOCUS

Conference Preview

CAASE 20

The Conference on Advancing Analysis & Simulation in Engineering
Virtual Conference • June 16th - 18th

Co-hosted by:



NAFEMS



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Join Us

Why You Should Attend CAASE20



Although many states are slowly easing some of the restrictions put in place to stem the spread of COVID-19, many parts of our lives are still on hold. Students aren't returning to school this year. There will be no pools to swim in this summer for many communities. Sports fans have had to get their live-sports fix watching Korean baseball and German soccer, played in eerily empty stadiums.

In-person technology conferences are also off the calendar for the foreseeable future, and nearly every major design and engineering conference has either been cancelled, postponed or transitioned to digital experiences. This virtual approach is likely to be the norm for quite some time, as large events as far out as November have been turned into online conferences.

The same is true for the Conference on Advancing Analysis & Simulation in Engineering (CAASE20) event June 16-18, co-presented by NAFEMS Americas and Digital Engineering. Originally created as a live event to be held in Indianapolis, the organizers at NAFEMS made the difficult decision to transition the conference to a virtual event. As it turns out, it was a wise move.

And the transition, although it happened very quickly, was successful. The event has more than 200 conference sessions and training sessions, and the vast majority of the presenters and keynotes originally scheduled for the event have pitched in to provide virtual versions of their presentations and speeches. That highlights the importance of these events. As we've seen from the content and attendance at other online industry events since the shutdown began, engineers and designers still want access to this type of high-level content and training, along with an opportunity to make personal and professional connections. That's critical, particularly in an environment that has been incredibly isolating in many ways.

As simulation becomes a more integral part of the design process, the challenges of democratization have become more apparent. Technology providers have responded by creating a variety of innovative ways to both enable simulation earlier in the design process, and provide greater access to simulation tools for non-experts across the value chain.

The importance of access has never been more apparent, as engineers, managers and clients alike have been

forced to adopt new technologies to enable remote design, simulation and collaboration. Design engineers are more tuned in than ever to discovering new and better ways to work.

To help facilitate this discovery, *DE* has teamed up with NAFEMS, the international association for the engineering modeling, analysis and simulation community. NAFEMS has a proven track record of bringing experts from industry, government and academia together at its NAFEMS World Congress and its regional events, including in the Americas. CAASE20 marks the third event (one live and two virtual) that *DE* and NAFEMS have created to showcase the latest advances in simulation.

CAASE20 will feature more than 240 conference presentations and training sessions. For simulation newbies, there's plenty of content directed at design engineers who are not simulation experts. In addition to the technical presentations, there are many that focus on the business benefits and challenges of simulation that can help you build a return-on-investment case for implementing simulation more fully into your product design and development process.

For veterans of the space, there is advanced training and content available to help improve your productivity and the quality of your simulation results. You can dive into the specifics of particular processes, such as fatigue analysis, composite finite element analysis (FEA), non-linear FEA, turbulence modeling or the physics involved in joints and connections, for example. We look forward to "seeing" you virtually at CAASE20. We will also provide live coverage of the event via Twitter (@DEeditor) and follow up with articles on DigitalEngineering247.com and in upcoming editions of *Digital Engineering*.

Please feel free to share your feedback about the CAASE20 conference, tell us what topics you'd like to cover and share how we can help you learn about the technologies that are transforming design engineering today. **DE**

Brian Albright

Editorial Director, *Digital Engineering*
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Welcome to CAASE20

The Conference on Advancing Analysis & Simulation in Engineering



It is our great pleasure to welcome you to CAASE20, the (now virtual) Conference on Advancing Analysis & Simulation in Engineering, which will be held June 16-18 online!

CAASE, which now represents a four-year effort, began as a discussion between *Digital Engineering (DE)* and NAFEMS to explore how they could better collaborate and support those working with engineering analysis and simulation. Based on the overwhelmingly positive feedback and support we have received over the years, it is clearly a partnership that is valued by both organizations and the community.

For those who are new to the NAFEMS community, we welcome you! Our mission is to provide knowledge, international collaboration and educational opportunities for the use and validation of engineering simulation.

NAFEMS, a not-for-profit organization established in 1983, is the only worldwide independent association dedicated to engineering modeling, analysis and simulation. Currently, there are more than 1,400 member organizations worldwide.

If you told us one year ago that CAASE20 would be a virtual event, we would have looked at you in disbelief. However, this is not the first time that CAASE has been a virtual event. Last year, *DE* and NAFEMS Americas hosted CAASE19, which was a one-day conference that featured presentations for some great minds representing: Jet Propulsion Laboratory (JPL), Embraer, Procter & Gamble, Ryobi Die Casting and Ford Motor Co. What may be even more surprising is that CAASE19 was not the first virtual event under our belts. The 2010 NAFEMS Americas Regional Conference was also a virtual conference. Thankfully, the technology available to us all has improved greatly since then!

Record Number of Innovative Contributions

The topics covered at CAASE20 address (nearly) every aspect of analysis and simulation, and were grouped into four main themes:

1. Simulation-Driven Design (of Physical Systems, Components & Products),
2. Implementing Simulation Governance
3. Advancing Manufacturing Processes & Additive Manufacturing, and
4. Addressing Business Strategies & Advanced Technologies

Once again, we received a record number of abstract submissions addressing each of these areas, and we could not be happier with the end result. CAASE20 attendees will have an opportunity to attend over 225 presentations highlighting innovative applications and best practices from some of the

leading minds in our industry.

In addition to nine NAFEMS-accredited training courses, we decided to expand the opportunity for attendees to gain additional learning opportunities. This resulted in the committee accepting an additional eight community-developed training courses and workshops.

Furthermore, CAASE20 attendees will be treated to six amazing keynote speakers:

- On Tuesday (June 16), Geoffrey Moore, author of “Crossing the Chasm” will discuss high-tech adoption in the 21st century. (See page 8.) We will also hear from Monica Schnitger on simulation in the enterprise. (See page 7.)
- On Wednesday (June 17), Marc Halpern, P.E., Ph.D. (Gartner), and Peter Langsten, Ph.D. (Predict Change), will share their research on the trends and expectations in collaborative engineering, the emergence of governance—particularly simulation governance—in industrial innovation, and best practices and recommendations. (See page 10.)
- On Thursday (June 18), CAASE20 attendees will have the opportunity to hear from Maria Klawe, Ph.D. (president of Harvey Mudd College), who will discuss the importance and value of boosting diversity in computer science and engineering. (See page 9.)

Exploring the Virtual World

More than anything else, our goal is to deliver the same amazing CAASE experience to you even though all of us will be joining remotely. If you're new to virtual conferences, we welcome you to visit nafems.org/caase20 to watch a brief tutorial video and download the preliminary agenda so you know what to expect.

On a slightly more personal note, I want to take a moment to acknowledge the CAASE20 sponsors. As we worked incredibly hard to transition this event into a virtual conference, it was the steadfast support of our sponsors that truly made this transition during incredibly uncertain times even possible. We thank you:

MSC Software, Siemens Digital Industries Software, Dassault Systèmes SIMULIA, Front End Analytics, Altair Engineering, ANSYS, Cadence, TotalCAE, ESTECO, Endurica, Volume Graphics, Wolf Star Technologies, VCOLLAB, RecurDyn, BETA CAE Systems, Kinetic Vision, ROCKY, nTopology, Penguin Computing, HBM Prentiss, Nextflow Software, RAMDO Solutions, and INTES. **DE**

Matthew Ladzinski
Vice President, Americas
NAFEMS

BY THE NUMBERS | CAASE

1 Virtual Conference
To serve the engineering simulation community

2 Hosts
Digital Engineering and NAFEMS

3 -day conference
June 16-18, 2020

4 Key Themes:

1. Simulation-Driven Design (of Physical Systems, Components & Products),
2. Implementing Simulation Governance
3. Advancing Manufacturing Processes & Additive Manufacturing, and
4. Addressing Business Strategies & Advanced Technologies

4 Memorable Keynotes

- Geoffrey Moore, Ph.D., author of "Crossing the Chasm" will discuss high-tech adoption in the 21st century.
- Monica Schnitger will discuss simulation in the modern enterprise.
- Marc Halpern (Gartner) and Peter Langsten (Predict Change) will share their research on the trends and expectations in collaborative engineering.
- Maria Klawe (president of Harvey Mudd College) will discuss the importance and value in boosting diversity in computer science and engineering.



Image courtesy of Thinkstock / kasto80

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23 incredible sponsors

54 sessions packed with innovative content

75+ tags to filter and search for what interests you

240+ presentations, courses and workshops





CAASE20 Conference Goes Virtual

The upcoming CAASE20 event (Conference on Advancing Analysis and Simulation in Engineering) kicks off June 16-18, for the first time completely online. The virtual event is expected to draw hundreds of attendees, while delivering a wide range of training and educational content that covers all facets of engineering analysis and simulation.

The independent, vendor-neutral conference is a joint partnership of NAFEMS, an international association for the engineering analysis community, and *Digital Engineering*. NAFEMS and *DE* previously co-hosted the successful CAASE18 event in Cleveland in 2018, as well as the one-day virtual CAASE19 event last year.

While the conference was originally planned to take place as a live event in Indianapolis, organizers decided early in the spring to transition to a virtual event in light of the global COVID-19 pandemic and the cancellation of large gatherings across the U.S. and around the world. Attendees and exhibitors alike found themselves working from home, in many cases accessing their simulation and design tools for the first time using mobile workstations, remote access solutions, cloud-based software and other technologies.

When announced that the conference would shift from a live to a virtual event, it was still unclear how the content would be affected. Fortunately, event organizers were able to rapidly pivot to a virtual platform, and the online event will be as packed with informative content as the live event in 2018.

CAASE20 is organized by a team of worldwide users across several industry sectors from the greater NAFEMS community, and the event highlights CAE-related technologies in a virtual, open-forum format. Attendees can discover and learn

about current trends, common themes and future issues. Case studies, best practices, up-and-coming technologies and advances on the horizon in analysis and simulation will all be featured in the three-day affair through various presentations, training courses and workshops.

The three-day virtual event will feature more than 240 presentations, courses and workshops, and 15 hours of free NAFEMS-accredited training courses. The conference also has lined up an impressive array of keynote speakers and received strong support from leading simulation technology vendors and solution providers.

The training program this year will include sessions on composite material simulation, post-processing of structural analyses, nonlinear analysis, dynamic FEA, generative design, fatigue analysis and other topics.

The four scheduled workshops include: “How to Get Started with Simulation Process and Data Management,” “Understanding a Generative Design Design Enabled Design Process Paradigm Shift,” “Simulations Reality: How Simulation Can Act Like a Vehicle Loan from Tony Soprano’s Jersey State Credit Union” and “Rubber Fatigue Analysis Using Load Reconstruction.”

Regular sessions will include insights from numerous simulation experts and end users. There will be multiple sessions from major end users like Ford Motor Co., Eli Lilly, Ryobi Die Casting, Ingersoll Rand, Rolls-Royce, Caterpillar, the Air Force Research Laboratory, NASA Glenn Research Center, John Deere, Underwriters Laboratories, and Fisher Controls,

For more details, visit nafems.org/caase20. **DE**

Disruption & Innovation

Opportunities abound as paradigms change.



Geoffrey Moore
Author
Crossing the Chasm

BY BRIAN ALBRIGHT

Innovative disruption is a fact of life for design engineers, given the push to more rapidly produce and iterate new designs. Simulation and design software vendors are also facing multiple disruptions with the advent of cloud-based software and flexible licensing models, as well as a push for a greater democratization of simulation systems.

That's why author and speaker Geoffrey Moore (www.geoffreyamoore.com) is such a good

choice to present one of the opening keynote sessions at the upcoming [CAASE20](#) (the Conference on Advancing Analysis & Simulation in Engineering) event, June 16-18, 2020.

Moore is the author of *Crossing the Chasm*, a best-selling book (most recently revised in 2014) focused on disruptive innovation and the "chasm" that exists between early adopters of new products and more widespread adoption. His most recent book is *Zone to Win: Organizing to Compete in an Age of Disruption* (2015). While his first book was focused on start-up companies, the most recent addresses the challenges large enterprises face when embracing disruptive innovations.

The Technology Adoption Lifecycle

According to Moore, there are four basic stages of adoption of new technology that can affect how a company markets new technology. The first stage involves early adopters. "They believe what you believe," Moore says. "They get what you are doing, they know it's early and they will have to do extra work, but they will buy in. They are fun to have as customers, because they are on your side of the table."

But once early adopters have embraced a product, that is when companies often face a chasm before reaching the rest of the market. How can you convince these other customers, who aren't "true believers," to get on the bandwagon?

"You target a niche of customers who are in pain," Moore says. "These

are the pragmatists. They can't solve their problems with conventional solutions, and they are under increasing pressure to improve. They look to technologies, and although they don't believe what you believe, they think they need what you have. They will take a chance even if they aren't 100% sure."

Next is what Moore calls the "bowling alley" stage, where companies move across adjacent niche markets. "The simulation market is likely what we call a 'bowling alley forever' market because it is so specialized and so technical," Moore says. "It's not a horizontal application for average people on the street, but there is clear value in specific markets."

The next phase is referred to as the "tornado," when customers begin adopting the technology just to play catch-up to the early adopters. "They may not believe what you believe, but they want what those companies have," Moore says. "That creates huge spikes in demand that drive market caps in technology sectors through the roof. All of a sudden, a huge amount of budget comes out of nowhere."

This phase is when the technology providers try to grab as much market share as possible to become dominant. After that comes the "main street" phase, when customers begin to need the solution in order to stay competitive.

"Each of these phases requires a different go-to-market strategy, a different set of positioning ideas, and that is key to crossing the chasm," Moore says.

According to Moore, engineers tend

to be biased to the front of the lifecycle because they are closest to these new innovations. "That's where it helps to have this framework," Moore says. "If you are butting your head against the wall trying to expand the market, you might be using the wrong play."

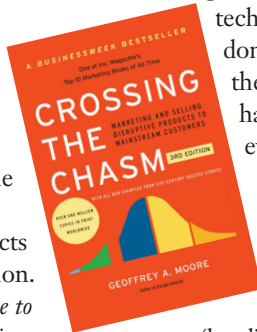
From Product-Focused to Consumer-Focused

The biggest change in the current market, Moore says, is that the product is no longer king. "Before, the company sold a product, and when the consumer bought it they owned it, and it was their problem to get value out of it," Moore says. "In the 21st Century, the customer has more choices, and consumer power has trumped product power, because there is more supply than demand. When the customer is the scarce ingredient, you have to design backward from the customer base."

This could be a critical notion as the simulation industry searches for ways to expand its footprint beyond specialist engineers. "It's not that simulation solutions weren't good enough," Moore says. "It's that use cases require more generalists to be able to interface with the technology. The power has to be in the hands of the many instead of the few."

The products that engineers design, and the software solutions that vendors are providing to those engineers, have to be designed from a user point of view. "Just dumbing it down doesn't work," Moore says. "You have to pay attention to use-case based design. The tool has to be designed in the context of a use case that will pay off that tool."

You can register for the event at the [CAASE20 website](#). **DE**



A New Engineering Paradigm

The abrupt shift to working from home presents an opportunity to rethink old design and simulation processes.

BY MONICA SCHNITGER

The world is a very different place today, compared to even just a few short weeks ago. We're all working hard to get our jobs and ourselves to a new normal standard of operations. But within today's trying-to-keep-the-ship-afloat crisis mode, there is a huge opportunity to move to a new and better way of working. The patterns and work processes we relied on for decades may not serve us when we can't get to the office or lab or factory floor. Now may be the perfect time to rethink old practices and redesign them to be more flexible and adaptable. Virtual everything? Maybe, maybe not — It's up to us to create work processes that leverage technologies that didn't exist when our old methods were first defined, and that we might not have been taking advantage of a few months ago.



Monica Schnitger
President
Schnitger Corp.

Engineering in the cloud has always been problematic. Some companies aren't (weren't?) ready for the potential risk inherent in letting key intellectual property go outside the firewall — but is that risk any higher than a bad or clueless actor who charges an infected cell phone via a data-carrying USB cable? Others were unconvinced about latency, save rates and other technical issues. Such issues are rapidly being addressed, and it's time to move forward where cloud design makes sense.

This sheltering in place has shown us we weren't ready: yes, there are CAD-in-the-cloud apps, but our parts and assemblies were stuck on servers behind firewalls. We could do CAD but not on work-in-progress parts because we couldn't get to the parts we needed. Until someone fixed that for us, working on existing designs was impossible, even with a second license to use CAD at home, or access to virtualized CAD or CAD in a browser. And don't even get started with underpowered home PCs (or Macs) running commercial CAD. Turns out our most significant issues with engineering in the cloud weren't technical issues; they were process issues.

What about simulation? It's always been accepting of remote resources, since many jobs were already running

in a cluster, grid, HPC center, super-computer or whatever infrastructure was available, regardless of where it was physically located. The opportunity now is so much bigger than "simulate in the cloud", and we need to take advantage before it slips away.

Design processes that relied upon up old-school simulation, replacing a bend-and-break test with a simulation just before release to production, only solved part of the problem. Simulation along the design process, to explore concepts before settling on a few for refinement leads to more innovative designs. Exploring concepts in greater detail can mean early rejection of ideas that shouldn't make it to downstream stages, saving time and resources.

To effectively do this is disruptive for many organizations. It may mean changing job definitions, giving designers more tools and training and having methods engineers define parameters and processes for others to follow. It also means changing the value placed on simulation within an enterprise.

When I first started exploring CAE, the accepted norm was "no one trusts the simulation except the person who ran it, everyone trusts the measurement except for the person who made it."

Expertise and an understanding of the shortcomings of each method meant there was distrust between disciplines. Fast forward to now, and test and simulation often work hand-in-hand.

This year's Conference on Advancing Analysis & Simulation in Engineering virtual event (June 16-18) will dive into these topics with new urgency. I'll give a presentation titled "Simulation in the Modern Enterprise," that will cover how to organize processes to use new technologies and ways of working. We'll look at how to manage simulation processes when we have newbies and experts collaborating on designs, the interaction of test and CAE, and how important governance is to make sure simulation is used to its full potential.

Join us! Online, from the comfort and safety of your home or office. **DE**

Monica Schnitger is president of Schnitger Corporation (schnitgercorp.com).

Send email about this commentary to de-editors@digitaleng.news.

You can read more about Monica Schnitger's CAASE20 Keynote here (<https://www.nafems.org/events/nafe2020/caase20/keynotes/schnitger/>), and register for the CAASE20 conference at <https://www.nafems.org/events/nafe2020/caase20/>.

Working in the Post-COVID World

As offices shutter, new doors open for remote collaboration, digital twins, and 3D printing.

BY KENNETH WONG

For the foreseeable future, COVID-19 and the changes it has prompted are here to stay. To address this, Marc Halpern from Gartner, and Peter Langsten from Predict Change will deliver a new CAASE20 keynote, making the case that “Simulation Governance is Key to Delivering Best-of-Class Products in the Age of COVID-19.”



Marc Halpern
Vice President
Gartner



Peter Langsten
Predict Change

Is it possible to implement “socially distant yet productive and collaborative design work”? The two presenters argue that, to make this happen, manufacturers must tackle a list of pressing priorities.

The Catalyst to Remote Work Protocols

In NAFEMS’s April issue of Benchmark magazine (free download for members), Halpern and Langsten cowrote an article titled, “Overcoming COVID-19 Obstacles” (PP. 62-66). In it, the authors point out, “strict social distancing will be with us anywhere from 6 weeks to 1.5 years, depending on the country affected, recurrences of COVID-19, or any other virus effects.”

The virus outbreak “accelerates the adoption of technologies and initiatives that allow for working with social distancing as a priority. Remote design and engineering, digitalization, automation, plus adoption of machine learning and robotic process automation (RPA) encourage a more productive social distancing work environment,” they add.

Since the travel restrictions went into effect, some tech companies have begun offering their remote collaboration and cloud-hosted software at a deep discount or for free. PTC began offering free licenses of Vuforia Chalk (through August 31), an AR-based remote-assistance software. The company is also offering free use of its cloud-hosted CAD product Onshape to qualifying COVID-19-related projects. Similarly, Graebert offers its

browser-based DWG editor software ARES Kudo for free during the outbreak.

These initiatives are prompted no doubt by a desire to help sustain clients’ engineering projects. But they also hint at the collaboration software industry’s recognition of the unexpected opportunity for recruitment afforded by the crisis.

would allow for reduced presence of workers in R&D and testing labs, enabling as sufficient amount of social distancing and reduced design costs,” they propose.

The impact of the slowdown in manufacturing during the shutdown cannot be underestimated, but the crisis also opens



PTC’s Vuforia Chalk software, free to use during the COVID-19 lockdown (through August), points to new ways of collaboration and obtaining remote expert assistance. Image courtesy of PTC.

An Opening for Digital Twins

In their article, Halpern and Langsten made several recommendations, including replacing physical prototypes with simulation and optimizing manufacturing with simulation.

“If reliable simulations were conducted remotely, businesses could reduce the amount of testing—including prototype testing—required. This

would allow for reduced presence of workers in R&D and testing labs, enabling as sufficient amount of social distancing and reduced design costs,” they propose. According to Halpern and Langsten, “Simulating manufacturing operations offers insight into optimal placement, use, and scheduling of resources to ensure that the extent of human activities and the interactions of humans with other humans and their work environ-



Florida Polytechnic University laboratory technician Samuel de Oliveira uses a 3D printer to produce components for face shields. Image courtesy of Florida Polytechnic University.

ment remains safe from COVID-19 and OSHA (the US Occupational Safety and Health Administration) perspectives.”

3D Printing’s Time to Shine

On the eve of the crisis, witnessing the alarming PPE (personal protective equipment) shortage at hospitals, many tech firms, universities, maker communities, and creative individuals sprang into action. In many cases, the use of 3D printing turns out to be a quick and reliable way to kickstart production.

Examples of these include the AM (additive manufacturing) systems maker Stratasys’s initiative to print and distribute face shields; on-demand manufacturing service portal Fictiv’s launch of face shield production; the America Makes-led initiative to matchmake healthcare workers in need of PPE and those who can produce PPE; and more.

Halpern and Langsten also recommend expanded use of 3D printing to “[reduce] the degree of inter-depen-

dencies across people to produce and deliver things.” They point out, “users must learn technical aspects of designing parts for 3D printing along with overcoming the challenges of using different types of 3D printers.”

Shops are Closed; the Cloud is Open

The centerpiece of remote collaboration during the lockdown is the cloud, the ever-present virtual infrastructure in the public domain. Many regular team meetings have shifted from corporate boardrooms and conference rooms to Zoom, Skype, and WebEx, with participants signing on from their home offices and private residences. This has exposed the paradoxical nature of corporate VPNs (Virtual Private Networks). The security measure once deemed essential in corporate settings turn out to be a hurdle in many cases for employees working from home.

“Feedback from engineers and

designers shows mixed results on performance of engineering and design applications over a VPN. Sustained work beyond the immediate COVID-19 crisis requires greater compute power and network performance than that possible over a VPN. The cloud is the most practical and obvious source for that compute power, network bandwidth, and scalable storage,” observe Halpern and Langsten.

“Data security is also a priority—particularly for industries with regulations mandating data protection,” the authors add.

For certain IP-sensitive industries, such as military contractors, automotive, and aerospace, the current crisis is a dilemma. To facilitate engineers working from home, the firms may need to revise their security policies, or reengineer their IT frameworks. This blurs the line between private and professional equipment and raises new concerns over employers’ access to employees’ private data.

The authors conclude, “The post COVID-19 engineering environment will pose new demands on availability, integrity, usability of product data due to fundamental changes in the predictability of business operations, and requirements from product development, production and service activities.” **DE**

To register for CAASE20, go to www.nafems.org/caase20.

Boosting Diversity in Computer Science and Engineering

BY KENNETH WONG

Dr. Maria Klawe, President of Harvey Mudd College, thinks academia's usual "Prove to me you belong here" attitude for computer science and engineering majors is detrimental to diversity.

"The first year or two are what's known as weed-out courses. They're supposedly designed to identify the students who have the intellectual muscle to figure things out," said Klawe. That attitude is a legacy of "a time when we didn't need nearly as many technically skilled talents," she added. "We now do, and we will need more in the future."



Maria Klawe
President
Harvey Mudd College

This survival-of-the-fittest approach, Klawe pointed out, discourages women and people of color to go into specialized areas. "Think of two different approaches," Klawe said. "One instructor says, this is a technically challenging course; everyone will have difficulties; but everyone who works hard will do fine. Another says, this is a technically challenging course, and you'll find out if you belong in this field or not. The second way has been the cultural tradition. This has a disproportionate impact on underrepresented groups in engineering."

The Harvey Mudd Difference

At Harvey Mudd, women account for 50% of the student body, and they are 50% in nearly every major, Klawe estimated. Furthermore, about 50% of the graduates in computer science, engineering, and physics are women, Klawe verified.

By contrast, the national average for women in computer science is only about 14% to 18%, according to the resource portal [ComputerScience.org](https://www.computerscience.org). The portal also lists top 20 schools with most women graduates in computer science. Harvey Mudd is #10 on the latest

list for 2018.

"Women and men have no difference in their ability to understand technically challenging concepts," Klawe observed. "But how you teach influences how they learn." Figuring that out has been transformational for Harvey Mudd, she added.

Students today, Klawe said, are "more motivated by learning what they think will be important in tackling climate change or affordable healthcare, for example, than by learning abstract concepts."

Her recent conversation with [DeepMind](#), a leading AI technology firm, reinforces this notion. "The company has works aimed at theoretical advances in machine learning, and works to apply machine learning for social good," Klawe recalled. "They said women's participation in the social good projects far outweighs their participation in theoretical works."

Chances for Diversity in Automotive

According to the 2015 study titled "[Women at the wheel: Recruitment, retention, and advancement of women in the automotive industry](#)" by Deloitte and Automotive News, "While

women represent 47% of the total U.S. labor force, they comprise less than a third (24%) of the automotive workforce."

The automotive industry is now facing challenges in transforming itself to be less fossil fuel-reliant and more environment-friendly. Leading car makers are all developing hybrid models with this in mind. "Think about promoting these types of projects in recruitment to attract more women and increase diversity," Klawe advised.

When building project teams, Klawe suggested managers should avoid putting a single woman in a team. "In discussions, it often feels very isolated for the lone woman on the team," she pointed out. "In addition, providing female role models is incredibly important." To her, these measures are part of the strategy to increase diversity in engineering. At CAASE, Klawe is scheduled to give a talk titled, "Increasing diversity in the STEM workforce might be easier than you think."

To register for the conference and learn more about Klawe, please visit the [CAASE20 website](#). **DE**

Making the Case for **CAASE20** The Conference on Advancing Analysis & Simulation in Engineering

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