The Complexity of Future Product Development

Product design used to focus on beauty and utility. Going forward, designers will need to design experiences, and work with diverse teams

By Robert Grace
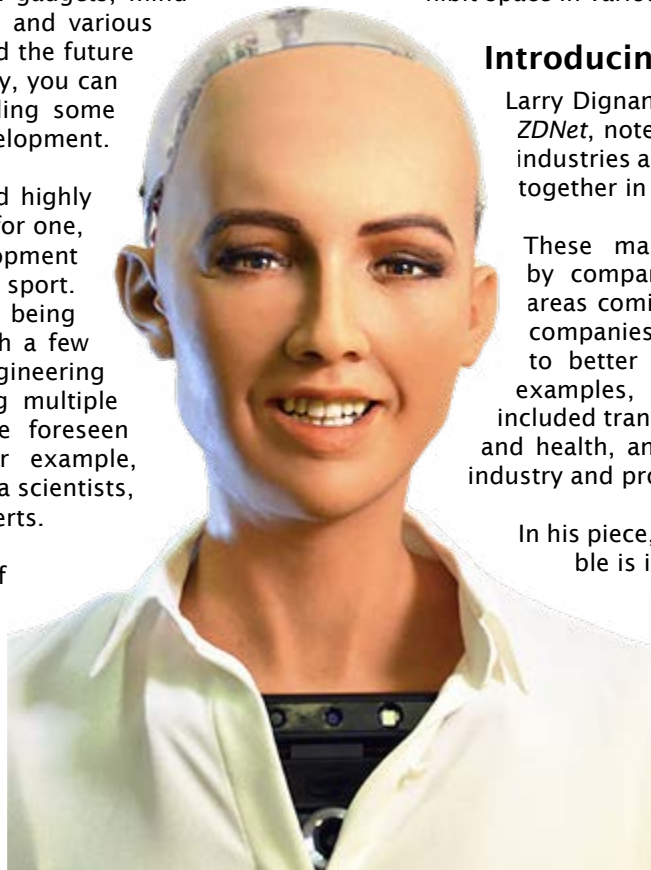
The massive CES consumer electronics trade show, held in Las Vegas each January, always provides a revealing glimpse into future technology trends. Most observers focus on the gee-whiz gadgets, mind-blowing televisions, cool robots, and various autonomous vehicles that portend the future of mobility. But if you look closely, you can discern other key trends, including some related to product design and development.

The emergence of interactive and highly integrated "smart" technologies, for one, is reinforcing how product development is becoming more of a team sport. This activity is moving beyond being the province of departments with a few individuals touting design and engineering degrees, to necessarily involving multiple disciplines that few might have foreseen just a decade ago. Think, for example, sociologists, anthropologists, data scientists, and artificial intelligence (AI) experts.

The advent of the Internet of Things (IoT)—that fast-expanding, sensor-driven universe of interconnected humans and devices—has opened the tap on Big Data, unleashing a tsunami of information on how customers (and which types of customers) purchase and use specific products. Going forward, to remain competitive, it will be vital for brands and their product development teams to know how to efficiently sort through, analyze, and act upon such information.

This provided one of the key, underlying themes during the

Jan. 8 to 11 CES 2019, where more than 4,500 exhibitors showcased the latest tech innovations to some 180,000 attendees across more than 2.9 million net square feet of exhibit space in various Las Vegas venues.

Introducing… 'Design Mashups'

Larry Dignan, editor-in-chief of tech magazine *ZDNet*, noted in a recent column how diverse industries and technologies are being blended together in what he terms "design mashups."

These mashups, he writes, "are created by companies with expertise in disparate areas coming together to collaborate. These companies are going for design collaborations to better digitize their businesses." Some examples, readily on display at CES 2019, included transportation and the IoT, computing and health, and artificial intelligence and every industry and product.

In his piece, Dignan notes how Procter & Gamble is introducing AI to kids' toothbrushes; how BMW's DesignWorks, working with outdoor clothing manufacturer The North Face, has developed a camper concept called Futurelight that incorporates new materials to protect people from the elements; and how technology distributor Avnet collaborated with Not Impossible Labs to create a device that enables the deaf to physically hear music via vibrations sent through wrist and ankle bands and vests.

Consider for a moment that one of the first-time exhibitors

Offering a slightly eerie peek into the future, Sophia (shown here) is a highly expressive, life-like robot that can carry on sophisticated conversations. Created at Hanson Robotics, Sophia is a sought-after speaker and has participated as a panel member in high-level conferences, discussing how robots and artificial intelligence will become part of our lives in the future. Sophia was awarded citizenship in Saudi Arabia as a show of support for technology. See her in action at www.hansonrobotics.com.
Courtesy of Hanson Robotics and Lorraine Justice

Dr. I.P. Park, president and chief technology officer of South Korea's LG Electronics, delivers a pre-show keynote address at CES 2019, with a robotic friend. In it, he offered his perspective on the evolving artificial intelligence landscape, while exploring how AI will impact the lives of consumers as well as nearly every major industry, from technology to health care, agriculture, transportation, engineering, and beyond. Courtesy of the Consumer Technology Association

at CES was John Deere—the agricultural equipment giant—at a consumer technology show. As Lane Arthur, Deere's director of digital solutions, told me while standing in the shadow of a massive, 16 foot-high combine at their booth: "Next, we'll be adding more AI to our equipment. As our machines get smarter, we want to increase the ability for us to talk to them and for them to talk to each other." Designing a tractor will never be the same again.

Justice Weighs In

I discussed these trends recently with Dr. Lorraine Justice, professor of industrial design and dean emeritus of the College of Art and Design at the Rochester Institute of Technology in Rochester, N.Y. Justice, who previously also headed the design schools at Georgia Tech and the Hong Kong Polytechnic, has just completed her second book, titled "The Future of Design: Global Product Innovation for a Complex World."

In Justice's new volume—which follows her 2011 book called "China's Design Revolution"—she lays out a roadmap for navigating global product innovation and development in the coming years.

While her book focuses on designers, many of her observations and prognostications, she acknowledges, apply equally to engineers and other members of the product development team.

The key word Justice keeps coming back to is "complexity." This increasing complexity, she notes, will affect everyone involved in the product development process. This will extend well beyond figuring out how to mold and fit together different components of a product. It will involve applying new technologies, gaining a deep understanding of customer desires and user requirements, appreciating global cultural factors, being sensitive to key sustainability requirements, and even weighing ethical considerations.

It will be all but impossible for any individual to get and stay up to speed with all the necessary aspects of future product development. She likens future product development to "a 3D chess game."

"Complexity," Justice suggests, "will come from shifting cultures and governments, speedier processes, and trying to plan for change in an ever-changing world. Design thinking, design reasoning, and visualization and communication techniques will likely be adopted, learned, and used by other disciplines. Designers may find themselves working with team members from different industry backgrounds who are aware of design processes and methodologies, enabling the team to move at a fast pace."

She acknowledges that huge improvements have been made in the past decade in getting design, engineering, and business leaders to work together. Even so, that trend will only intensify. And, Justice asserts, designers need to en-

Featured at ANTEC 2019!
Dr. Lorraine Justice will be the opening keynote speaker on March 21, the second day of the new INSIGHT sessions (bit.ly/ANTEC_Insight_Agenda) at SPE's upcoming 2019 ANTEC conference in Detroit. She will also participate in a panel discussion and joint Q&A session about future product development and sustainability with two other presenters.

Register or learn more at www.4spe.org/antec.

gage in the product development process even earlier than they have been, meaning they should be brought into the discussion when a company is even *considering* developing a new product.

Making Time for Reflection

All parties will need to pause to do more reflection about the products they are creating and the future they wish to design for mankind and the planet. This can be challenging, she notes, given the relentless need for speed to market these days. Still, members of each discipline will need to recognize not only their strengths but also their weaknesses and where they lack key expertise.

"Engineers may consider many of the issues that concern designers to be soft issues. But the risks are real," and such factors must be closely considered, going forward, Justice suggests. For example, how many developers of cell phones, social media sites or electronic games might ever have considered a few years ago how their products one day could be deemed to be intentionally addictive technologies? What might be the legal and social ramifications?

Designers tend to be closest to the human interface, meaning they often are best suited to help troubleshoot and assess future risk factors. This extends as well to issues of sustainability and the environment, to include material choice in product development, and eventual end-of-life product disposal. For these reasons, future product development teams may also need to include ethicists, she says.

This will make user research (and effective analysis of customer-related Big Data) all that more vital.

"Evaluating products and services in the past was simple, if not always satisfactory," Justice writes in her new book. "Either the boss or the marketing director would make the final decision.

Growing Impact of User Research

"Today, user research is vital to help understand what product or service is most appealing to a target customer. User research will increase throughout the design process in the future in order to learn about what is successful and help the design team to mitigate risk of an inappropriate

Set in the bucolic countryside outside of Venice, the H-Farm SpA Italy describes itself as a hub combining innovation, entrepreneurship, and education, and offering guidance to leading companies on how to navigate the coming digital revolution. More such centers like these are needed, says Justice. Courtesy of H-Farm and Lorraine Justice

Augmented reality and virtual reality are reshaping how we envision and create new products. Here, an enthusiastic attendee at the recent CES 2019 show in Las Vegas gets a taste of the technology. Courtesy of the Consumer Technology Association

have been "the first in the world to adopt a model that brings together investments, business consultancy, and digitally augmented educational programs all into one place." Its customers include such firms as Adidas, Braun, Disney, Electrolux, LG, Lilly, and Nestle. More such initiatives are needed, according to Justice.

"Designing for all the senses—in real as well as virtual environments—will become more important for future solutions. Designers may also be designing for product-to-product experiences as well as product-to-human experiences." All involved in the product development process "may need training to learn to work with complex teams, adapt to new forms of design research, and learn new software and technologies."

product design. User research methodology will become more adaptable to different cultures as global sales increase. We may also see an increase in reliable databases that can make decision-making much easier."

With so much attention on software, computer technologies, and data analysis, Justice states: "I hope that the best of design skills will not be lost in our transition to a new design era. I believe we will still need to design beautiful, intriguing, useful, and tactile things, maybe not in the amounts we have had before because of sustainability and the taxed ecosystem of our planet."

However, she says, future designers and engineers alike will need to greatly broaden their education and research skills if they are to design for the new technologies that will be embedded in our spaces, products, and experiences.

For their part, Justice adds, engineers would do well to do more training in the area of humanities, or anything to do with human needs. They need to understand the design process, and to learn more about user research and related information gathering.

Leveraging New Innovation Models

Facilities exist to further this type of learning, such as the H-Farm SpA Italy, near Venice. Founded in 2005, H-Farm (www.h-farm.com) describes itself as the hub that combines innovation, entrepreneurship, and education.

Justice says the group invites businesses to come explore human-use guides for new technologies. H-Farm claims to

"The field of design is just getting started," she writes in the book. "There will be more design specialties coming as the interfaces between humans and machines, or machines and machines, expand into visual, verbal, gestural, and sensory commands. Graphic designers, interface designers, interior designers, and product designers, for instance, will be able to choose an area of virtual reality to focus on, thus becoming more specialized in those particular skills."

Prepare for greater complexity in the product development processes of tomorrow. But prepare also for a thrilling ride. Justice concludes her new book by stating: "I recommend that companies and organizations make no small plans in relation to design. The future is design, and the future needs your attention and engagement."

ABOUT THE AUTHOR

Robert Grace is a writer, editor and marketing communications professional who has been active in B2B journalism since 1980. He was founding editor of and worked for 25 years at *Plastics News*, serving as editorial director, associate publisher and conference director. He was managing editor of *Plastics Engineering* from July 2016 through October 2017, and is now btoh editor of SPE's *Journal of Blow Molding* and directing content strategy for SPE. He runs his own firm, RC Grace LLC, in Daytona Beach, FL., and can be contacted at bob@rcgrace.com.