



How technology benefits the customer experience

FEATURING RESEARCH FROM FORRESTER

The Impact Of Emerging Technology On
Digital Experiences

Technology impacts nearly every aspect of our lives—from a simple internet search to the way we work and interact with others. The rapid advancement of technology is also impacting the customer experience, with each advancement acting as a catalyst for the next. Emerging technologies such as Artificial Intelligence, Machine Learning, and the Internet of Things (IoT) are creating a tidal wave of change, giving rise to ever-increasing customer expectations of the level of service they receive.

Forrester interviewed more than 150 companies to understand how more than 50 technologies will evolve over the next five to 10 years and what the potential impact of these evolving technologies will have on the consumer. In this report, Forrester provides insights into how digital experiences will be integrated into the fabric of our lives, transforming how and what we do. This research will help professionals building digital experiences make smart technology decisions focused on what the technology can deliver and what consumers expect and will use.

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IT'S ALL ABOUT THE DATA

One of the findings that emerged from the Forrester research was that the future of digital experiences will be driven by data and context. For example, accelerating content delivery with faster loading times on any device and increasingly efficient AI will create a more streamlined customer experience. Interactions with automated services will become more natural, with machines mimicking human behavior. And using sensors within clothing, food packaging, and other products to collect reams of data will contribute to further personalizing every customer experience. These are just a few of the benefits Forrester predicts from emerging technologies.

MEETING YOUR NEEDS TODAY AND TOMORROW

Technology will continue to march forward. Business applications will need to be equipped to streamline the employee experience to ensure the focus remains on delivering excellent customer experiences rather than on employees continuously scrambling to learn new technologies. Your customer service software needs to be capable of managing your present-day workload, and flexible enough to evolve as your needs change in the future. Your omnichannel strategy needs to be able to support the engagement channels customers prefer today, and those that have yet to be invented in the future. Understanding that change is inevitable, your customer service software needs to provide a solid, stable foundation so agents can continue to work within a familiar experience.

TODAY'S SOLUTION FOR TOMORROW

Why wait five to 10 years to leverage “tomorrow’s technology” when you can get it today? Many of these digital experiences can be leveraged by brands today to create exceptional customer experiences. Microsoft Dynamics 365 Customer Service is here to help you deliver exceptional customer experiences anytime, anywhere.

For example, with Dynamics 365 Customer Service, you can:

- Provide omnichannel engagement with the ability to interact over the customer’s preferred digital channel. Couple this with the ability to view insights into the customer’s support journey and their complete customer profile, and you’re producing tailored experiences across all channels.
- Deliver proactive, personalized customer experiences through built-in AI and IoT technologies that help you better anticipate customer needs and fine-tune responses to achieve higher levels of customer satisfaction.
- Step up the level of support your customers receive through richer experiences such as remote assistance, co-browsing, and voice or video calls. You can also ensure customers receive connected, continuous support by giving agents a view into each customer’s service history, so customers are never asked to share the same information twice.

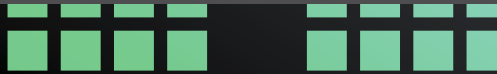
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The Impact Of Emerging Technology On Digital Experiences

How More Than 50 Emerging Technologies Will Impact Data And Experiences For Consumers

by Julie A. Ask, Kjell Carlsson, Ph.D., Jeffrey S. Hammond, Ian Jacobs, Fatemeh Khatibloo, Brandon Purcell, and Michael Facemire

February 24, 2020 | Updated: March 9, 2020



Why Read This Report

Forrester interviewed more than 150 companies across industries and technology categories to understand how more than 50 technologies will evolve over the next five to 10 years and assess their impact on consumer digital experiences. This research will help professionals building digital experiences to make smart technology decisions that are tuned to what the technology can reasonably deliver and what consumers expect and will use.

Key Takeaways

Digital Experiences Are Evolving

The capabilities of digital experiences change nearly daily as hardware and software advancements transform what is possible.

Dozens Of Emerging Technologies Will Advance Experiences

Dozens of technologies will make future experiences more conversational, immersive, and anticipatory. Advancements in computer vision, speech analytics, sensors, and identity will fuel these future digital experiences.

Use Forrester's Moments Index To Make Smart Digital Experience Portfolio Decisions

Don't guess which interaction modes your customers will use. Forrester's Moments Index quantifies consumers' progression from adopting to preferring interaction modes such as chat for voice.

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by [Julie A. Ask](#), [Kjell Carlsson, Ph.D.](#), [Jeffrey S. Hammond](#), [Ian Jacobs](#), [Fatemeh Khatibloo](#), [Brandon Purcell](#), and [Michael Facemire](#)

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Related Research Documents

[Audio: The State Of Extended Reality \(XR\) in 2019](#)

[Forrester's Moments Index](#)

[The Future Of Digital Experiences](#)

[Mobile Commerce In 2030](#)



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The State Of Digital Experiences Is A Fast-Moving Puck

Forrester interviewed more than 150 companies across industries and technology categories to understand how more than 50 technologies will evolve over the next five to 10 years — and from that assess their impact on consumer digital experiences. It's fun to dream, but we wanted to realistically assess what digital experiences will be like in 10 years by understanding how the individual components or technologies that fuel them will evolve. Our goal is to help digital business professionals “skate to where the puck is going to be.”¹

EMERGING TECHNOLOGIES WILL IMPROVE DIGITAL EXPERIENCES ON EVERY DIMENSION

Digital experiences amaze today, but their future integration into every aspect of our lives will leave even Baby Boomers forgetting what life purely offline was like. Consumers will see, sense, and experience the evolution of digital experiences in five core ways. Emerging technologies will:

1. **Accelerate experiences and reduce latency.** A host of emerging technologies such as 5G will speed content delivery to and from connected devices. Meanwhile, faster CPUs, GPUs, and the family of artificial intelligence (AI) will allow more complex tasks to happen locally on devices. Tasks like text or image recognition that historically depended on the cloud will happen on devices or within networks.
2. **Help machines mimic human behavior.** Today's human-machine interaction via text, voice, and even gesture is not novel. But a host of emerging technologies combined with context will help machines do a better job of understanding our intent — what we need or mean — through natural language interactions. They will also generate more human-like responses through word choice, tone, emotion, physical action, and more.
3. **Allow experiences to be more immersive and invisible.** Digital experiences will run the gamut from invisible (i.e., present but not visible) to fully immersive (i.e., completely virtual). For example, sensors will watch over homes and notify the fire department if the need arises. On the flip side, immersive experiences will enhance physical-world experiences with digital media. Smartphones have facilitated early augmented reality (AR) and virtual reality (VR) experiences for consumers, but consumer adoption is nascent — even within media or video games on dedicated handsets — beyond Pokémon Go.
4. **Personalize experiences with context and insights.** The evolution of computer vision, speech analytics, sensors, and decentralized digital identity, coupled with faster networks, microprocessors, and artificial intelligence, will mean more contextual experiences for the end user. Our devices will see, hear, and smell what we do. And decentralized but trusted identity solutions that the consumer manages directly will allow unprecedented combinations of those insights. In the future, a smart watch will tell a user, for example, that they are having an allergic reaction to a medication rather than telling them their blood oxygen level is low, their heart rate is high, or it is time to take their next round of meds.

5. **Proactively offer experiences blended from brands within our ecosystems.** Connected devices will leverage their smarts and become the connective tissue of the local user ecosystem. Brands will proactively suggest and inspire users to do things they didn't even ask about. Mobile devices will play dual roles — as both a user interface device and a user control and identity device. Digital services will dynamically assemble content, information, and other services based on immediate context to streamline task flow. Very little of this is done at the urging of users; they instead empower digital ecosystems to either make decisions for them or offer them solution choices. Devices within local user ecosystems react differently based on who and what is nearby.²

EXPERIENCES WILL BECOME MORE NATURAL AND IMMERSIVE UNTIL WE DON'T NEED THEM

Consumers' primary engagement with digital experiences today is via a touchscreen or keyboard and mouse. The graphical user interface (GUI) has evolved over time — as have best practices in user interface design. But fundamentally, the GUI interaction mode still places a heavy cognitive burden on consumers by forcing them to navigate menus, construct “if then” logic, and fill out forms. Future digital experiences will lift this load first through conversations and immersions and then by anticipating customer needs (see Figure 1). These dimensions are neither mutually exclusive nor collectively exhaustive. They are simply the ones we view as most impactful. In 10 years:

- › **Conversations between humans and machines will be more natural.** The construct, tone, and sound of machine-originated conversations will feel more natural. Conversations will be embedded in more multimodal experiences and will be able to handle more complex questions. Improvements in microphones will pick up speech in noisier environments.³ More importantly, conversations will move beyond the words or sentences uttered; they will tap into context to develop a more nuanced understanding of consumers' intent, using both current context and prior conversations or other information stored as part of the consumer's identity.

Conversational interfaces will also tap into computer vision for context, such as to gauge emotions or to “see” what is happening. Conversations will facilitate a more natural control of devices or information like internet searches. In the near term, this family of technologies will enable service providers in finance, healthcare, and education to scale coaching. Longer term, the interpretation of conversations will evolve into products like diagnostic tools in healthcare for heart disease or Alzheimer's.⁴

- › **Extended reality experiences will be lighter, faster, and more stable.** Immersive experiences will become more utilitarian and realistic, albeit still digital. Smaller, more efficient chipsets and improved optics — combined with faster networks — will enable immersive experiences on standalone headsets without clunky handheld controllers. With the evolution and democratization of developer tools and lower-cost content creation, consumers will find a host of extended reality (XR) experiences, whether they are playing games, consuming the news, shopping, or learning to play the piano. Experiences will feel more realistic, with both gesture and voice control: Imagine

putting on a pair of sunglasses to have a tennis lesson with Roger Federer! Employers will still use XR for training and remote assistance, but they will also expand to real-time process management and monitoring.⁵

- › **Brands will better anticipate customer needs and take action.** The notion of anticipating needs does not mean that one entity, such as a physical or virtual robot owned by a large tech company, will be a personal or intelligent assistant. Brands (and their technology) will know their best customers well enough to: 1) dynamically assemble the content and services their customers need based on context and deep insights; 2) make suggestions for actions a customer could or should take; and 3) act on behalf of their customers in some scenarios.

In 10 years, not only will more data be available through sensors, speech analytics, and computer vision, but faster networks and more powerful processing units on devices will allow brands to build insights locally. Healthcare companies already anticipate patient needs and make suggestions for vaccinations, appointments, and prescription renewals. For years, Google has suggested that consumers depart earlier if traffic is bad. In the future, a retail sales associate may intercept a frustrated in-store consumer (tagged as frustrated by computer vision) and help before the customer walks out. An airline may rebook ground transportation and hotels when a flight is delayed.⁶

FIGURE 1 Even Today, There Are Glimpses Of Future Experiences

Anticipatory experiences
<p>Example future use cases include:</p> <ol style="list-style-type: none"> 1. Offer coaching in moments throughout the day to help consumers make better health and financial situations. 2. Mitigate the need to go into apps or websites to take care of redundant tasks, such as paying bills, purchasing replenishment goods, scheduling transportation, and making appointments. 3. Act as a virtual assistant — initially asking for confirmation to act on consumers' behalf to make purchases or schedule appointments but eventually taking on some of these tasks.
<p>Top emerging technologies impacting the advance of this are:</p> <ul style="list-style-type: none"> • Artificial intelligence, CPUs/GPUs, 5G, deep neural networks, digital identity (evolution), machine learning, networks, sensors, and speech analytics.
Conversational interfaces
<p>Example future use cases include:</p> <ol style="list-style-type: none"> 1. Handle more complex tasks. Conversations will be more natural and multimodal in that they will combine screens or images within a conversational context. More complex tasks, such as selecting a seat on an airplane, will use both. Consumers will also insert images or videos into conversations — i.e., “Show me more shirts like this.” 2. Make use of voice biometrics to verify purchases in lieu of a signature to remove friction from commerce or control of home devices. 3. Integrate and enable more immersive experiences. Today, virtual reality experiences depend primarily on buttons or handheld devices (e.g., gaming sessions), but less so on gestures or voice, to control or navigate experiences. 4. Control more devices directly. Some experts expect antennas to be the most numerous type of sensor, as they will be embedded in so many electronic devices. If a consumer turns her head to look at a lamp and says, “Turn on,” the lamp will turn on, not the dehumidifier.
<p>Top emerging technologies impacting the advance of this are:</p> <ul style="list-style-type: none"> • Antennas, artificial intelligence, deep neural networks, machine learning, 5G networks, facial recognition, image analytics, and speech analytics.

FIGURE 1 Even Today, There Are Glimpses Of Future Experiences (Cont.)

Extended reality
<p>Example future use cases include:</p> <ol style="list-style-type: none"> 1. Providing more instruction to consumers virtually. Consumers may get physical therapy, coaching, or instruction in a more natural, virtual environment that includes real-time feedback on motion from sensors or speech. 2. Personalizing an environment with an overlay via a connected headset. Personalization may be content, wayfinding, or services. 3. Delivering more immersive gaming and media experiences. Rather than watching the presidential debates on TV, consumers can be in the audience virtually and participate in real time. 4. Enabling more “try before you buy” shopping experiences. We’ve already seen this with furniture, apparel, and appliances, but imagine a future where this applies to travel (including space), hotel rooms, museums, and more. 5. The contextual provisioning of operational and real-time data, overlaid on durable assets like production lines and machines in a manufacturing facility.
<p>Top emerging technologies impacting the advance of this are:</p> <ul style="list-style-type: none"> • Battery tech, computational photography, computer vision, development platforms, optics, networks (all types), sensors, natural language processing, and speech analytics.

THREE CORE DATA ELEMENTS WILL ENABLE DIGITAL EXPERIENCES

Data to provide context and insights that allow brands to better serve consumers in both the physical and digital worlds will continue to grow in amount and variety. However, government regulations will push to give consumers more transparency and control (see Figure 2). Consumers will forego a degree of privacy for the convenience and delight of these experiences, but brands should not expect unfettered access. In the absence of indeterminate regulation, Forrester has identified three core categories of data that will impact digital experiences.

1. **Unstructured data.** In 2030, vision and voice will be native parts of digital experiences. Users will expect all digital interactions to respond to visual cues or gestures, vocal commands, and other sounds as naturally as any animal with eyes and ears. The “cocktail party problem” will be a distant memory, and devices will understand and respond to crowds of people.⁷ Machines will be able to detect information like medical conditions from voice or image abnormalities that humans can’t.

Machines will respond with synthesized voice, embellished with emotion and intent, that will be indistinguishable from a human voice. However, no one will confuse these for interactions with a human, as there will only be incremental improvements in the ability of these systems to mimic the human-like intelligence that allows us to have fully free-form, unscripted conversations. Earlier concerns over privacy will diminish as customers and organizations embrace the convenience and value of computer vision and speech recognition. Efforts to regulate the technology will flounder, with significant social implications such as law enforcement in authoritarian countries choosing who to track or even employers monitoring their employees for selected behaviors and attitudes.⁸

2. **Sensors.** Over the next 10 years, sensors will become smaller, less expensive to produce, and more energy efficient. They will continue to move beyond today's silicon version to edible, paper, and plastic forms. Fundamentally, this progression will alter the economics of sensors so that they become increasingly pervasive. They will appear in every piece of clothing, tablet, food packaging, or device sold — not just premium products.⁹ Energy efficiency will, in part, be driven by data collection that is event triggered rather than periodic. For example, a mechanical vibration will wake up the sensor, which will close an electromagnetic switch so that the sensor collects data.
3. **Digital identity.** Digital identity will become: 1) trusted, portable, and verifiable — our digital identity will be as robust as our government-issued passport; 2) fine-grained and use-case-centric — if the bartender just needs to know your age, that is all he will see; 3) decentralized — a network of providers, rather than a single entity, will support identity; 4) user-centric — you can share a subset of your fitness data from a wearable with a healthcare provider but block it entirely from ad networks; and 5) useful and based on a sound business model — one that doesn't depend purely on advertising or that obscures data usage. All entities in the ecosystem should perceive value, and privacy shouldn't be a privilege of the wealthy alone.¹⁰

FIGURE 2 New Types Of Data Will Fuel New Digital Experiences

Decentralized digital identity models
<p>Example future use cases include:</p> <ol style="list-style-type: none"> 1. Applying health data to improve personal outcomes or sharing it more broadly for clinical trials. 2. Banks finding new business opportunities as attestation issuers. 3. Reducing fraud in membership organizations as far-ranging as the AARP (e.g., discounts for members) and trade unions (e.g., digital verification of skills or certification). 4. Streamlining employment and college applications — and possibly removing bias from the process — by verifying the facts that candidates present. 5. Removing friction from and adding security to online commerce processes. Usernames and passwords will disappear, while hundreds (if not thousands) of entities won't have to collect, store, and keep secure the personal information they have collected.
<p>Top emerging technologies impacting the advance of this are:</p> <ul style="list-style-type: none"> • Distributed ledger technology, digital wallets, and biometrics.
Sensors
<p>Example future use cases include:</p> <ol style="list-style-type: none"> 1. Establish food freshness (or lack thereof) via the presence of bacteria. Sensors will be on food packaging rather than use-by dates. Doing so will reduce food waste. 2. Monitor infrastructure, such as bridges and dams. A few years ago, California safety professionals evacuated 188,000 citizens because they were uncertain of the integrity of a dam. Similar scenarios would hold true for bridges and buildings to avoid collapse. 3. Continue to help consumers make smarter decisions by detecting the risk of sunburn, air quality, and more health-related issues. 4. Support automated transport systems, such as cars, shuttles, drones, and robotics.
<p>Top emerging technologies impacting the advance of this are:</p> <ul style="list-style-type: none"> • Biomedical sensors, microphones, paper or plastic sensors, event-driven sensors, personalized environmental sensors, and low-cost ultrasound transducers.

FIGURE 2 New Types Of Data Will Fuel New Digital Experiences (Cont.)

Unstructured data
<p>Example future use cases include:</p> <ol style="list-style-type: none"> 1. Tickets, as well as identification and payment credentials, will belong in museums. Consumers will move seamlessly into events, office buildings, buses, and more via biometric authentication. 2. Consumer electronics will respond to a near-infinite set of gestures and voice commands, adapting to the tone of voice and body language of the user. 3. Marketing will be reminiscent of <i>Minority Report</i>. Brands will tailor recommendations based on not just past purchases but also the consumer's physical appearance, most frequently used or worn products, and emotional response to previous suggestions. 4. Services will teach skills or guide consumers by visually monitoring what they do, suggesting actions, and responding to their questions along the way. Imagine a pottery student learning to use a wheel. 5. Services that manifest themselves as apps on headphones, smartphones, heads-up displays, and other devices will provide early detection of health conditions like strokes, heart disease, concussion, Alzheimer's, skin cancer, and mental health disorders using computer vision and by listening to the user's voice.
<p>Top emerging technologies impacting the advance of this are:</p> <ul style="list-style-type: none"> • 5G, artificial intelligence, AI chips, biometrics (facial recognition and voice), computer vision, data (training), deep learning, deep neural networks, edge computing, image and video recognition, machine learning, machine learning platforms, NLG, NLP, NLU, neural networks, optical sensors, speech analytics, and speech recognition.

Recommendations

Use Forrester's Moments Index To Guide Your DX Portfolio Strategy

Perfecting the mix in your digital experience (DX) portfolio requires a methodical, quantified approach to understanding how your customers use currently (and prefer to use) services on a host of devices, platforms, and channels. Forrester's mathematical-model-based [Moments Index](#) helps clients understand consumers' likelihood to use services in new digital interaction modes.¹¹ Our "POST" (people, objectives, strategy, and technology — in that order) methodology still applies. The Moments

Index is a first-step component of a broader set of tools and actions to understand how your customers use technology — the “people” component of the methodology. Professionals looking to test services in evolving interaction modes should:

- › **Begin with a customer experience strategy.** The foundation of a digital experience portfolio is a customer experience strategy. You must understand the needs of your customers and how you’ll serve those needs within the context of your brand promise.¹² Prioritize improving the moments that would drive the greatest customer and business benefits in current and future journeys.¹³ Next, map the content, services, and features you need to serve your customers in those moments.¹⁴ Then work with your digital experience counterparts to understand and plan technology or channel options to deliver them.
- › **Leverage Forrester’s POST methodology.** Smart device, platform, and channel decisions still hinge on methodically understanding your customers and how they use technology, articulating clear objectives, and creating a strategy (e.g., the content, services, features, and more from your customer experience strategy).¹⁵
- › **Use the Moments Index to gauge consumer propensity for using what you build.** Brands are spending money to build experiences that few consumers will use.¹⁶ In some cases, those are strategic choices. In others, they are blind bets. The Moments Index helps brands understand consumers’ progression from awareness to adoption, engagement, comfort with, and eventually preference for different interaction modes (e.g., chat, voice, extended reality) for increasingly complex tasks.¹⁷

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Supplemental Material

COMPANIES INTERVIEWED FOR THIS REPORT

We would like to thank the individuals from the following companies who generously gave their time during the research for this report.

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AiFi

AM Fitzgerald & Associates

Amazon

Amazon Pay

Arch Virtual

Assured Software

Beauty Ecology

Beyond Verbal

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Neurala
nixi1
Occipital
One Medical
OTOY
PayJoy
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Tapcart
Trax
Trov
ubisend
Unity
Upskill

Ushur

Walmart

Vertebrae

Woebot

ViSenze

WorldViz

Endnotes

- ¹ The famous quote by Wayne Gretzky is “Skate to where the puck is going to be, not where it has been.”
- ² See the Forrester report “[The Future Of Digital Experiences.](#)”
- ³ See the Forrester report “[The State Of Voice Assistants, 2018.](#)”
- ⁴ For example, Amazon Web Services is partnering with healthcare industry leaders to create HIPAA-compliant conversational interfaces that support virtual front door strategies. See the Forrester report “[How Amazon Plans To Reinvent Employee Wellness And Disrupt Healthcare.](#)”
- ⁵ See the Forrester report “[Audio: The State Of Extended Reality \(XR\) In 2019.](#)”
- ⁶ See the Forrester report “[Modernize Your Martech Stack For Moments.](#)”
- ⁷ The “cocktail party problem” is defined as the problem of perceiving speech in noisy social settings. Source: Mark A. Bee and Christophe Micheyl, “The ‘Cocktail Party Problem’: What Is It? How Can It Be Solved? And Why Should Animal Behaviorists Study It?” US National Library of Medicine National Institutes of Health, June 8, 2009 (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2692487/>).
- ⁸ For example, law enforcement and intelligence agencies in authoritarian countries, but even in most liberal countries, adopt computer vision (e.g., facial, gait, and body recognition), voice recognition (e.g., biometric identification on phone calls and interactions with smart devices), as well as other forms of machine-learning based tracking (based on the data exhaust of cell phone apps and wearables) to monitor populations of interest ranging from former felons, undocumented migrants, and repressed minorities to dissidents and political opponents. Another example is widespread monitoring — using vision, voice, text, and other data exhaust — of employees, particularly in the gig economy, initially to ensure compliance with safety and security. However, this broadens to a host of workplace-related use cases ranging from monitoring employees for attitude (in customer service) to productivity and likelihood of switching jobs. Source: Kjell Carlsson, Ph.D., senior analyst at Forrester.
- ⁹ See the Forrester report “[New Tech: Smart Packaging, Q4 2019.](#)”
- ¹⁰ In the future, privacy will change in two ways: 1) We’ll continue to choose convenience over privacy, and 2) companies will still try to monetize data. For more information around the future of privacy, see the Forrester report “[The Future Of Privacy: Personal Identity And Data Management.](#)”
- ¹¹ See the Forrester report, “[Forrester’s Moments Index.](#)”
- ¹² See the Forrester report “[Root Your CX Vision In Your Brand.](#)”
- ¹³ See the Forrester report “[Your Digital Experience Strategy Starts With A Customer Journey Map.](#)”
- ¹⁴ To learn more about this process, see the Forrester report “[The Seven Steps Of Highly Effective Journey Mapping.](#)”
- ¹⁵ See the Forrester report “[Getting Mobile Right With Mobility POST.](#)”

¹⁶ See the Forrester report “[Consumers Are Connected; Your Company Isn’t](#)” and see the Forrester report “[Consumers Are Connected; Companies Are Catching Up.](#)”

¹⁷ See the Forrester report “[Forrester’s Moments Index.](#)”

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