



FEATURE

Augmenting the field service worker

Bidirectional insights unleash enterprise growth

Donald Brady, Barry Weiss, Eren Aksu, Sandy Mathews, and Jonathan Berman

A REPORT BY THE DELOITTE CENTER FOR INTEGRATED RESEARCH

Field service technicians have a unique and valuable vantage on a company's customers and products. Yet, much of what they perceive and do on the job isn't captured in a way that delivers the most value. Assistive technology offers a solution, creating an important link between field service data and the enterprise.

EVERY DAY, APPROXIMATELY 20 million field service workers¹ are spread across the globe, interacting closely with an organization's most important assets: its customers and products. Yet, most of what happens at that critical interface is disconnected from the core business. Even with the latest and greatest field service automation software and Internet of Things (IoT) sensor systems, management still often operates without a clear line of sight into how to improve financial and customer results because key situational data remains in the heads of individual field workers. And so, with each service call, companies can lose valuable information.

Assistive technology—the combination of augmented reality (AR), voice technology, artificial intelligence (AI), and IoT data—offers a solution with its ability to unlock real-time, hands-free information exchange to and from the field. This presents a valuable opportunity to seamlessly merge sensor and enterprise data with the observational data from skilled field workers. Thus, businesses can build more complete data stores that can lead to powerful results including: higher service quality, faster and more accurate documentation, smoother onboarding, more targeted marketing and sales offers, and more optimized product development.

The opportunity is no longer for early adopters or pioneers; however, today's fast followers can still reap benefits across the enterprise while differentiating themselves from competitors. Assistive technology solutions have matured extensively in recent years and are now in a phase

of rapid deployment. A 2018 survey found that AR use had increased by 15 percent in just one year within field service organizations, and now one in four are driving AR implementations.² By 2022, it's estimated that more than 50 percent of field service providers will offer a specialized digital customer experience that enables two-way interaction and workflow initiation across multiple channels.³

Solutions are readily available to help generate powerful operational and financial gains. In this paper, we will set a vision for the bidirectionally connected field service worker and describe the value this can offer to multiple business functions, including the field service organization itself and extending to customer service, engineering, human resources, marketing and sales, and beyond (figure 1). The examples we use will focus primarily on industrial business to business (B2B) companies, but based on our research, the concepts should prove valuable for a range of frontline workers, from field service technicians to customer service centers.

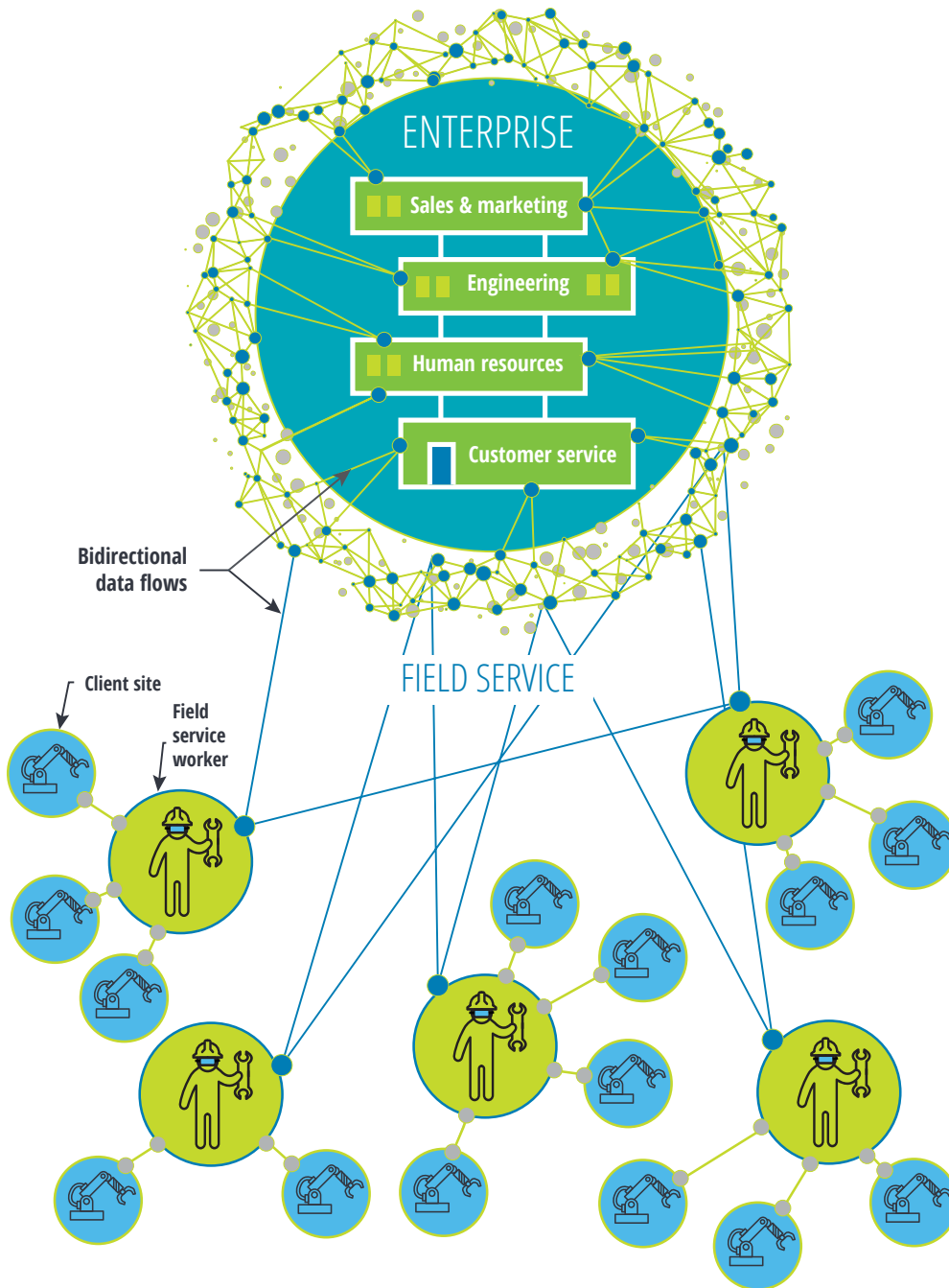
The time is now: A case study on the emerging assistive technology transformation

Digital transformation is fundamentally about getting work done in ways that were not possible before. Even today, while many field service workers may have moved their field notebook to a laptop or even a tablet, the work of information retrieval and documentation still frequently takes

FIGURE 1

Network effect of augmenting field workers

Assistive technology allows field workers to increase the data stores flowing to and from the client site and central enterprise functions. When the entire field service organization is outfitted with this technology, a network effect can occur. This opens up opportunity for new insights and value creation, both for the customer and the business.



Source: Deloitte analysis.

place away from the equipment being serviced. Estimates as recent as 2017 have found that 52 percent of service organizations were still capturing most job data manually, a time-consuming process rife with data lag and accuracy issues.⁴ Advances in assistive technology are making this way of working obsolete. AR, AI, and network speeds have improved considerably in recent years, and information can now be retrieved reliably and accurately via voice command, and then displayed within an individual's field of vision in real time. The information itself can even be tailored for the job and personalized for the individual field technician's level of need. All of this can happen within standardized or troubleshooting workflows that drive better documentation through voice-to-text, allowing more detailed and accurate data to be communicated back to the enterprise.

Few companies, if any, have realized the full potential this offers. However, early examples indicate the opportunity for enormous enterprise gains, both within the field service organization and extending to engineering, sales and marketing, human resources, and beyond. For example, consider a global turbine manufacturer. For just one of their turbine inspection processes, extensive measurement and documentation were needed. Technicians had been capturing this information through a manual process—moving between equipment measurement to their laptops for more than 50 different parts. This was not only time-intensive, but data entry errors were common and took even more time to correct. By moving to a hands-free interface, with a voice-to-text documentation system, this team measured a 20–30 percent time reduction for the inspection process. The operational benefits were so profound that the company began to expand the use of this capability to develop a training tool for new technicians to learn or practice new procedures, leading to improvements in their onboarding process and ongoing training. They also began developing a procedure tool that allowed each

technician to customize the procedure step that worked best for them.⁵

Other companies have experienced similar benefits. An aerospace company was able to assemble a wing 35 percent faster and saw a 90 percent increase in quality compared to those using 2D drawings and documentation.⁶ A semiconductor equipment manufacturer reduced the time needed for a complex equipment acceptance phase involving multiple technicians by 20 percent.⁷ Perhaps even more compelling, in a small experiment, two groups of equally skilled trainees were asked to complete a 65-step procedure; one group was enabled with AR headsets. The AR headset-enabled group saw an 88 percent reduction in error rates as compared to the paper-based group, also completing the activity in half the time that it took an expert.⁸

How augmented field service builds value across enterprise functions

With real-time, hands-free information sharing between the field and enterprise, businesses can lay the foundation for ongoing improvement. In the following sections, we'll look at how this can improve field service, customer service, human resources, product engineering, and marketing and sales.

FIELD SERVICE

A 2017 field service survey found that the top two concerns of service organizations are ensuring their workforce operates at maximum efficiency, followed by meeting increasing customer expectations.⁹ Yet, the disconnected and often cumbersome systems for capturing and accessing field knowledge often make it difficult for field workers to complete jobs at the highest level of quality while capturing information efficiently, much like what was illustrated in the turbine case above.

Assistive technologies allow field organizations to drive compliance through all types of service scenarios, weaving in an exchange of job status data, equipment condition, customer data, and records of safety and compliance into the workflows. Data can be captured through visual records, real-time sensor data, or voice-to-text data capture. Critical information can be automatically delivered to the field tech in context when it matters most. With this, many companies have been able to measure meaningful results through improved fix rates, compliance, and efficiency. For example, Porsche recently rolled out an AR solution for diagnostics in North America, which they claimed shortened service resolution time by 40 percent.¹⁰

HOW ASSISTIVE TECH CAN TRANSFORM THE FIELD SERVICE FUNCTION

Key takeaway: Real-time information flow between the enterprise and field can unlock productivity gains and drive customer satisfaction.

Where to start: Make two lists: one, the key pieces of insight you could gather by being on every field call, every day; and two, the key ways in which you could help by being on every field call, every day. These can be used to drive augmented workflow development.

With more time, field service efforts can be shifted from low-value admin to higher value customer relationship development activities. In fact, it's been shown that best-in-class field service organizations using AR can perform 25 percent better on customer satisfaction metrics.¹¹ With more data—such as root failure cause, process step verification, and out-of-spec parameters—organizations can begin to automate continuous improvement by unlocking a new level of insight into machine and workforce performance.

CUSTOMER SERVICE

The objective of both the field and customer service organizations is to keep the equipment running at optimal levels, while meeting ever-increasing customer demands.¹² Assistive technology provides key opportunities that can improve a customer service center's ability to act as the connective tissue between customers, deploy the field service technician, and manage escalations.

HOW ASSISTIVE TECH CAN TRANSFORM THE CUSTOMER SERVICE FUNCTION

Key takeaway: Real-time information flows enable the service organization to deliver high touch responsiveness at scale.

Where to start: Identify the top 10 frequently occurring issues that customers can triage/service themselves with virtual supervision.

Connected systems can help in the transfer of information from customer intake to deployment of the field service worker. In the event that field technicians need to visit a site, assistive technologies can create the link back to the customer and the customer service organization through three key areas of opportunity: real-time job status, clearer knowledge transfer during service escalations, and guided solutions for faster resolution. Real-time status management can be enabled by tracking progress through the job, automatically sending notifications if the job is running long, and triggering automated scheduling adjustments. In addition, workflow tracking can be leveraged for smoother, faster pickup by escalation teams by delivering a clear record of what has been tried. Solutions can also be quickly delivered back to the field by previously inaccessible subject matter experts through tools like “see what I see” and/or augmentation of the field of view. The result is generally accelerated problem resolution and a positive halo effect created by a smooth

process that customer service teams can easily communicate with the customer. In all of these cases, the real-time visibility made possible through augmented workflows is designed to reduce the effort for the customer and the customer service organization, clearing a low-cost path from transactional support to advocacy transformation.

Assistive technologies can also play a role for the customer, as they can be packaged for distribution to the customer's onsite staff to support the collection, organization, and distribution of knowledge to the service organization. Before a field tech is even sent, smart systems can push simple, guided solutions back to the customer, creating self-servicing opportunities. In cases where the customer can't address the issue, the streamlined information-sharing can create a ripple effect, resulting in a faster response and potentially reducing truck rolls.

HUMAN RESOURCES

By 2021, the United States is expected to have a shortage of 2 million field service workers, likely putting enormous pressure on HR and service organizations to more efficiently capture knowledge and rapidly onboard new workers.¹³ Compounding this challenge is that training and knowledge capture today often means workers are out of the field, which can be a drag on an already expensive and in-demand workforce.

TRANSFORMING THE HUMAN RESOURCES FUNCTION

Key takeaway: Learning can be integrated into the day-to-day service workflow, automatically delivered in a highly personalized way, which can increase utilization and improve service revenue.

Where to start: Within the top 10 field service procedures, identify the key tasks where new field techs often need help.

Through more seamless information capture and guided in-field training, assistive technologies can provide clear benefits. Organizations using AR for training have seen reductions of half the amount of time it usually takes to onboard new workers.¹⁴ In addition, assistive solutions have been shown to reduce the time and effort creating accurate technical documents by 60 percent, by helping to ease the strain in collecting valuable knowledge from experienced workers without taking them off the job.¹⁵

By delivering training that is highly contextual, bespoke, and instantly useful at the point of work via assistive technologies, the line between work and learning is effectively erased. It becomes an on-demand part of the standard, but customizable workflow. Using AI and personalization to tailor the steps can help with adoption and can also promote advancement as technicians grow their skill level. For example, a brand-new field tech may need more step-by-step guidance within the workflow than a very experienced senior field tech—if the information is too high level, the new tech will likely not find it valuable. However, if the information is too detailed, the senior tech could find it overly administrative and micromanaging. By knowing who the field tech is, the AI can present information through a hands-free interface at the point of need, tailored to the experience level of the field service tech. So, instead of a calendar-based training schedule, this transformation can support organizations in delivering real-time training as needed—be it through prerecorded modules, dialing in a remote expert, or automatically guiding the users through the detailed step-by-step workflows. All of this holds the potential to deliver more efficient onboarding, training, and better optimization of each tech's time in the field.

PRODUCT ENGINEERING

Sensorization of machinery has improved the understanding of product use and function, but engineering teams still often lack the site-specific

configuration and customer-usage information that can be critical when making product innovation decisions. For example, they often don't know how each customer's machines have been modified after factory shipment and maintained, which makes it difficult to improve the performance of the installed base. What's more, information that comes back via field reports often captures little more than a single numerical entry, "pass" or "machine adjusted to standard," instead of detailing what parameters were adjusted to make the fix, and how difficult and time-consuming the process was. Missing these signals can result in large-scale fixes, costing millions of dollars and brand reputation.

With paths to resolution charted and documented in real time, the knowledge base becomes more robust, helping to enable an automated continuous improvement loop at scalable cost. The field tech's contextual awareness enables correlation between multiple sources of data that can help systematically bring this information from thousands of points in the field back to product innovation functions. With richer site-specific data captured via the augmented workflow, the field service team can help accelerate engineering toward equipment designs that are optimized for better service resolution. This could come either via designing machines for easier access to frequently serviced parts, or by triggering low-cost predictive fixes or self-healing.

TRANSFORMING THE PRODUCT INNOVATION FUNCTION

Key takeaway: Systematically capturing baseline data on the as-maintained performance of equipment can drive customer-demanded product innovation.

Where to start: Build simple data collection directly into field maintenance workflows that captures necessary adjustments to meet tolerance.

Leveraging assistive technologies to tightly align field and product innovation teams can serve as the foundation to transition toward business models built around higher revenue, higher-margin outcome-based solutions, and reduced technician-to-machine ratio.

MARKETING AND SALES

Customer intimacy today is typically built on a foundation of data-driven insight, yet marketing and sales of capital equipment often suffer from information gaps, particularly compared to their business-to-consumer (B2C) counterparts.¹⁶ Even with IoT enabling a better understanding of machine performance, there are two particularly lucrative areas where the field worker can collect data to help deliver better customer value: site workflow and equipment condition.

Being able to observe and easily document how the equipment is used, customer adherence to best practices, and the resulting equipment condition can help marketers and sales leaders identify ways for the customer to increase value from their equipment. By combining an understanding of *how* the machine is performing with *what* was done to result in the performance can create invaluable insight to drive the creation of new service offerings and cross-sell or upsell campaigns.

TRANSFORMING THE MARKETING AND SALES FUNCTIONS

Key takeaway: Create a closed loop that enables the field worker to easily collect information that shapes marketing/sales campaigns and provides context-aware reminders for field workers to notify customers of those opportunities.

Where to start: Define the pieces of customer insight that will inform a marketing campaign. Build those data collection points into the workflow of regular maintenance visits.

For example, the compactors at a major waste management company were sensorized to report back on pounds per square inch and operational effectiveness, but the marketing team found a unique opportunity when they received a condition analysis of the site equipment: It was often functional but beat up and dirty. The equipment was “working just fine,” but the marketing team was able to use this as an opportunity to market refurbished compactors at a relative cost saving to the replacements, with the message that renting from them would reflect better on their brand image.¹⁷ Sales teams were also alerted to competitive positions and opportunities to expand offerings at existing customers.



In another example, a major global energy company was having significant challenges with their equipment availability, maintenance costs, and repair backlog because the equipment was run till it failed before being taken offline for maintenance. With more robust data—from environmental factors to equipment load—they had a much clearer understanding of the necessary maintenance schedules. This, in turn, helped the company restructure its equipment and service contracts.

With new customer-centric offers in place, marketers and sales leaders can leverage the field tech’s trusted adviser position to activate the offers. The field techs’ knowledge of competitive positioning at the customer sites, and the contact information for key decision-makers and

influencers in the buying process can provide the information necessary to engage customers in a highly personalized, targeted, and sustainable way. The automated continuous improvement loop should be tied back to the field with reminders built into the service workflow. The hopeful result is higher levels of customer intimacy and touch delivered at a lower cost.

Assistive technologies in field service releases an untapped growth engine for the enterprise

The field service function, regardless of profit center status, is often an underleveraged source of earnings growth for companies. Assistive technology, utilized in real time by field service technicians every day and on every job, breaks down silos and integrates functions. Thus, insight can easily be captured and converted to action, informing critical customer-facing activities. The resulting smarter, faster, safer decision-making can drive operational gains, unlocking robust earnings potential from the service function.

To begin transforming your enterprise with assistive technology from the field organization out, it may be helpful to remember the following:

- The real power is in combining technologies like AR, AI, voice, and IoT (collectively called assistive technology). Using these technologies to structure and personalize workflows that prompt data capture from the field can unlock invaluable insights to be shared throughout the enterprise.
- Taking the time to create intuitive and personalized workflows can be key for adoption. If this effort creates another disconnected, cumbersome system, it will likely not garner the adoption required for successful results.

- Begin with a clear and simple use case, and scale from there.
- Create a cross-enterprise working team to ensure that the system is architected for scale and integration.

With assistive technology creating a critical link between field service and the enterprise, a major

step toward future-proofing the business can occur. The strategic shift from a labor-based to an outcomes-based model is accelerated; new revenue streams are enabled; stickiness of existing business can be improved. From AR to speech, assistive technology can help organizations outpace the competition by bringing the entire enterprise closer to the customer every day.

Endnotes

1. Mordor Intelligence, *Field service management (FSM) market - growth, trends, and forecast (2020–2025)*, accessed December 23, 2019.
2. Ibid.
3. ClickSoftware, “Gartner magic quadrant for field service management 2019,” April 18, 2019; Jim Robinson, *Magic quadrant for field service management 2019*, Gartner, April 16, 2019.
4. Emily Stanford (Salesforce), “3 stats that will have you rethinking how you do field service,” *Field Technologies Online*, August 1, 2017.
5. Conversations by the authors with company personnel.
6. Ibid.
7. Ibid.
8. Ibid.
9. *Field Technologies Magazine*, “Field service shared struggles,” November 28, 2017.
10. Brian Albright, “Augmented reality: The future of field service,” *Field Technologies Magazine*, February 21, 2019.
11. Tom Paquin, *How the best-in-class use augmented reality for superior service management*, Aberdeen, August 2018.
12. Amanda Davis, “Combating the ‘Amazon effect’ to close the gap between customer experiences and expectations,” *CustomerThink*, November 7, 2019.
13. ServicePower, “How a future shortage in service technicians is changing field service management,” blog, August 1, 2019.
14. Forrester, *The Total Economic Impact™ of PTC Vuforia: Cost savings and business benefits enabled by industrial augmented reality*, PTC, July 2019.
15. Ibid.
16. Jennifer Cannon, “B2B marketers look to match B2C in level of customer experience,” *MarTech Today*, October 21, 2019.
17. Conversations by the authors with company personnel.

Acknowledgments

The authors would like to thank **Siri Anderson** for her support in the research and writing of this piece. They would also like to thank the many industry and functional thought leaders from Deloitte whose expertise contributed to this piece: **Andy Haas, Mike Syed, Kevin Prendeville, Eric Kaese, Stephen Lancaster-Hall, Harry Datwani, and Brenna Sniderman.**

About the authors

Donald Brady | donaldbrady@deloitte.com

Donald Brady is a principal in Deloitte Digital, focused on delivering human-centric solutions to clients using Web, mobile, and emerging interfaces such as voice and augmented-, mixed-, virtual reality. Acting as an “intrapreneur,” Brady has led many of Deloitte Digital’s early efforts around emerging technologies and brings teams of designers and engineers to solve client challenges. His leadership as vice president of business development and strategy and director of the board at Übermind helped it become the leading mobile agency in the US, resulting in its acquisition by Deloitte in January 2012.

Barry Weiss | baweiss@deloitte.com

Barry Weiss is a managing director within Deloitte Digital that helps clients transform and digitize their service operations. He brings more than 25 years of operations, consulting, and technology deployment experience to his clients. Today, Weiss focuses on helping clients drive business value through field service transformation. Weiss is a regular speaker at field service events like Field Service USA. Prior to joining Deloitte, Weiss ran the customer success team at ServicePower and had his own field service consulting firm, Group Seven Consulting, that worked with companies like Comcast, Time Warner, Cox Communications, and US Food Service to transform their service operations. In the early days of his career, Weiss was a production superintendent for Anheuser Busch in St. Louis. Weiss holds an MBA from the University of Michigan and a bachelor of science in fermentation science from the University of California at Davis.

Eren Aksu | eraksu@deloitte.com

Eren Aksu is a VR filmmaker and entrepreneur. He has in-depth knowledge of the augmented reality and virtual reality industries, helping companies build custom content solutions and pipelines for these new mediums. Aksu speaks regularly about frontier technologies around the world, and has helped produce and direct multiple AR/VR experiences that have been featured at festivals such as Sundance, Tribeca, SXSW, Sheffield Docfest, SIFF X, and IDFA. He was named one of 10 aspiring VR filmmakers by Oculus, for their inaugural “Oculus VR for Good” program. He most recently served as incubation/innovation lead for Deloitte’s Digital Reality practice in the US, working closely with Deloitte’s CIO and CTO in determining the direction of digital reality for enterprise.

Sandy Mathews | samathews@deloitte.com

Sandy Mathews is a leader in Deloitte Digital’s Digital Reality practice, where she is focused on emerging technology including XR, AI, and IoT based solutions. She has more than 20 years of experience working in startup environments and Fortune 500 companies. Mathews works with clients to transform their organizations by designing and delivering scalable virtual reality, augmented reality, and mixed reality solutions. She is experienced in application design, operations transformation, go-to-market strategy design and implementation, and digital reality. Mathews has previously worked at Microsoft, where she supported the company’s digital transformation strategy for enterprise customers. She also worked on the HoloLens engineering team as a strategist. She has an MBA from Southern Methodist University and received a bachelor of business administration in journalism and marketing from Baylor University.

Jonathan Berman

Jonathan Berman, a former leader in Deloitte's Digital Reality group, has 25 years of innovation and growth strategy experience in consulting, operating, and entrepreneurial roles. He has deep experience developing and deploying intelligent interfaces from working with global leaders such as GE, Siemens, Airbus, Kone, and Applied Materials. As a strategist, Berman has led multiple projects that span all aspects of digital transformation, including commercial excellence, manufacturing 4.0, and the future of work. He has an MBA from the Darden School of Business, University of Virginia and a BA in economics from Vassar College.

Contact us

Our insights can help you take advantage of change. If you're looking for fresh ideas to address your challenges, we should talk.

Practice leadership

Donald Brady

Digital Reality leader | Principal, Deloitte Consulting LLP
+1 206 716 6631 | donaldbrady@deloitte.com

Barry Weiss

Field Service leader | Managing director, Deloitte Consulting LLP
+1 415 786 9446 | baweiss@deloitte.com

Eren Aksu

Manager, Deloitte Consulting LLP
+1 310 497 8743 | eraksu@deloitte.com

Sandy Mathews

Senior manager | Deloitte Consulting LLP
+1 206 716 7181 | samathews@deloitte.com

About the Deloitte Center for Integrated Research

Deloitte's Center for Integrated Research focuses on developing fresh perspectives on critical business issues that cut across industries and functions, from the rapid change of emerging technologies to the consistent factor of human behavior. We look at transformative topics in new ways, delivering new thinking in a variety of formats, such as research articles, short videos, in-person workshops, and online courses.

Connect

To learn more about the vision of the Center for Integrated Research, its solutions, thought leadership, and events, please visit www.deloitte.com/us/cir.

Digital Reality

Digital Reality represents the next digital transformation. It changes how we engage with technology, through augmented, virtual, and mixed reality, 360-degree video, and immersive experiences that are at once intuitive and data-rich, and which put the human user at the center of design. Read more on Deloitte.com.

Deloitte.

Insights

Sign up for Deloitte Insights updates at www.deloitte.com/insights.



Follow @DeloitteInsight

Deloitte Insights contributors

Editorial: Rithu Mariam Thomas, Aparna Prusty, Anya George Tharakan, and Nairita Gangopadhyay

Creative: Kevin Weier and Anoop K R

Promotion: Ankana Chakraborty

Cover artwork: Gordon Studer

About Deloitte Insights

Deloitte Insights publishes original articles, reports and periodicals that provide insights for businesses, the public sector and NGOs. Our goal is to draw upon research and experience from throughout our professional services organization, and that of coauthors in academia and business, to advance the conversation on a broad spectrum of topics of interest to executives and government leaders.

Deloitte Insights is an imprint of Deloitte Development LLC.

About this publication

This publication contains general information only, and none of Deloitte Touche Tohmatsu Limited, its member firms, or its and their affiliates are, by means of this publication, rendering accounting, business, financial, investment, legal, tax, or other professional advice or services. This publication is not a substitute for such professional advice or services, nor should it be used as a basis for any decision or action that may affect your finances or your business. Before making any decision or taking any action that may affect your finances or your business, you should consult a qualified professional adviser.

None of Deloitte Touche Tohmatsu Limited, its member firms, or its and their respective affiliates shall be responsible for any loss whatsoever sustained by any person who relies on this publication.

About Deloitte

Deloitte refers to one or more of Deloitte Touche Tohmatsu Limited, a UK private company limited by guarantee ("DTTL"), its network of member firms, and their related entities. DTTL and each of its member firms are legally separate and independent entities. DTTL (also referred to as "Deloitte Global") does not provide services to clients. In the United States, Deloitte refers to one or more of the US member firms of DTTL, their related entities that operate using the "Deloitte" name in the United States and their respective affiliates. Certain services may not be available to attest clients under the rules and regulations of public accounting. Please see www.deloitte.com/about to learn more about our global network of member firms.