

# Hype Cycle for Frontline Worker Technologies, 2023

Published 4 August 2023 - ID G00790915 - 116 min read

By Analyst(s): Rafael Benitez

Initiatives: [Digital Workplace Infrastructure and IT Operations](#)

Organizations increasingly demand modernized workflows and boosted connectivity for frontline workers. I&O leaders should evaluate the technologies in this Hype Cycle to engage frontline workers; improve safety, retention and performance; and optimize their processes.

## Analysis

### What You Need to Know

In the wake of the COVID-19 pandemic, Gartner has seen organizations continue to support frontline workers in distinctly different ways compared to the prepandemic period, as workflows and processes changed. Today, frontline workers continue to perform new tasks, often alone. These recently developed ways of working have matured into new best practices, and most will remain moving forward. For example, frontline workers who were not fully qualified to complete a given task were occasionally assisted by remote experts when performing tasks, diagnoses and inspections due to travel restrictions. As travel restrictions have been lifted, many organizations have moved to a virtual-first and remote-first paradigm to realize operational efficiency and improve business outcomes.

To continue to optimize efficiency, safety, employee experience and connectivity for frontline workers, organizations must deploy mobile and remote enabling technology, including wearable technologies. These technologies transform the workflows in which frontline workers participate. Typically, this involves:

- Leveraging various digital tools and data management techniques to improve and connect frontline workers with co-workers, company, and physical and virtual surroundings
- Improving decision accuracy, productivity and first-time resolution — and therefore overall quality
- Empowering workers and supervisors to schedule their time and perform tasks more effectively and in a more satisfying way, thus improving employee experience
- Reducing the time and effort required to complete tasks
- Amplifying the experience and skill of centralized experts by connecting them to many less-skilled remote service workers and task workers
- Capturing workflow best practices and proliferating this knowledge for reuse in training and auditing
- Increasing safety and well-being

Gartner predicts that up to 70% of new mobility investments over the next three to five years will be for frontline workers.

For more information about how peer infrastructure and operations (I&O) leaders view the technologies aligned with this Hype Cycle, see [Infographic: 2023 Technology Adoption Roadmap for Infrastructure and Operations](#).

## The Hype Cycle

Frontline workers make up the biggest portion of the workforce, estimated at 2.8 billion and approximately 80% of all workers on a global basis, and can be further segmented into service workers and task workers:

- **Service workers** primarily spend their time performing client-facing activities. They typically represent the “face” of an organization to customers. Some examples are a delivery driver, a retail store associate or a nurse.
- **Task workers** primarily spend their time performing operational activities. They typically represent the “heart” of an organization. Some examples are a shipping and receiving associate in a warehouse or equipment operators in a manufacturing plant.

Many organizations with a large number of frontline workers operate in regions experiencing increasing problems to retain and recruit frontline workers. In some industries, this is further complicated by large numbers of frontline workers nearing retirement. Effective use of technology to train and support new frontline workers is an important part of addressing onboarding, retainment and recruitment challenges.

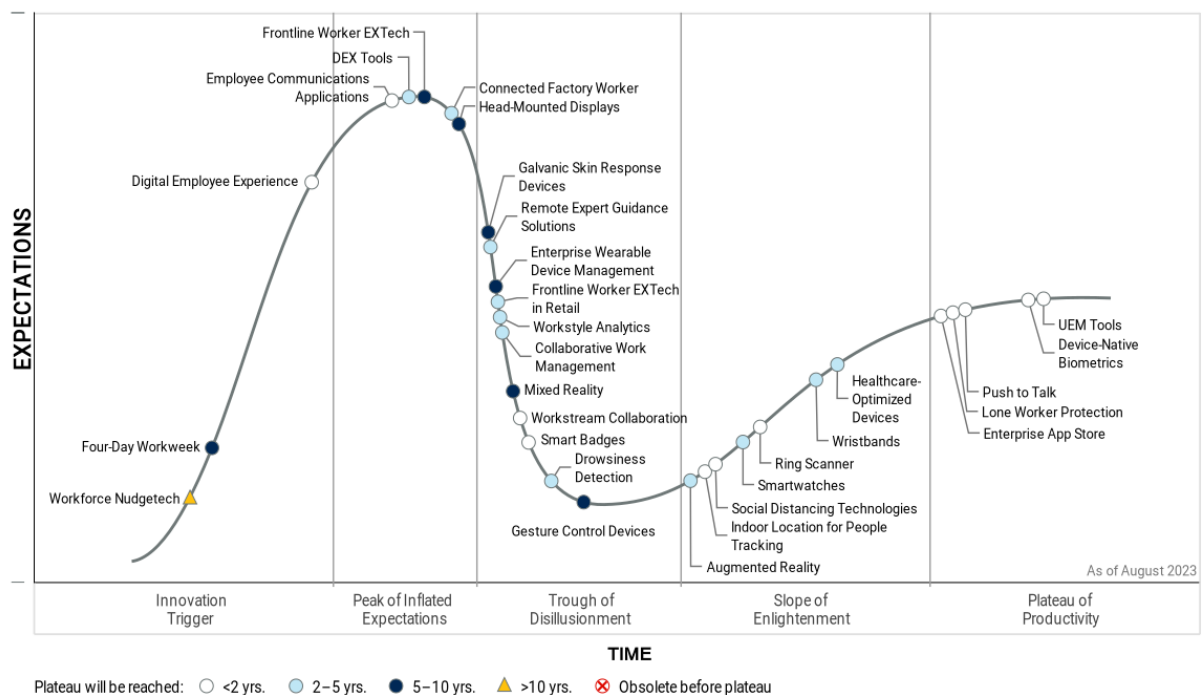
Today, large amounts of data are collected by Internet of Things (IoT) sensors, analyzed in the cloud and delivered in the form of informational reports via dashboards. Frontline workers are able to use this information to improve overall business value and deliver on corporate digital transformation strategies. Increasingly, sensor data analysis is based on machine learning (ML); feeding back this information filtered and sorted, with actions prioritized, is further driving mobile devices and handheld computers into the hands of frontline workers.

Technology vendors are focusing on frontline workers as a growth segment, developing frontline-friendly features into products and services originally designed for office workers. Such features include improved support for shared (shift-based) devices, and identity and access management and team communication tailored for the needs of the frontline worker. All frontline workers share a core set of basic communication and collaboration needs, but they also participate in well-defined workflows specific to their role, industry, department, task and responsibility that have role-specific requirements or limitations. Frontline workflows demand extensive configurability from supporting business apps, services and hardware to ensure a safe and productive working environment.

This Hype Cycle contains technologies designed primarily for task workers, but it also includes some technologies designed for service workers, such as employee communications applications, biometric authentication methods, lone worker protection and unified endpoint management (UEM) tools.

**Figure 1. Hype Cycle for Frontline Worker Technologies, 2023**

## Hype Cycle for Frontline Worker Technologies, 2023



## The Priority Matrix

As an increasing number of frontline workers that perform lone work are outfitted with technology to digitally connect them, there has been an increased focus on capabilities to ensure their health and safety and better support their work.

Throughout the pandemic, interest grew in technologies that enable hands-free experiences to reduce spreading pathogens among frontline teams. Examples of these include data entry and control (speech-based), wireless access control (such as badges and tags), hands-free UX, and biometrics changing from fingerprint readers to facial recognition. Continued use of these technologies is expected to persist as they provide benefits beyond personal healthcare protection.

Workstream collaboration (business messaging/chat), remote expert guidance with video, workstyle analytics and indoor location for people tracking are increasingly critical technologies for frontline workers. In two to five years, remote expert guidance solutions will allow some service workers to achieve a wider range of capabilities and employment of frontline workers with less experience (supported remotely by experts), increase first-time resolution, and move from traditional classroom-based training to more on-the-job training. Task workers can also see immediate benefits from employee augmentation through the use of wearables such as smartwatches, head-mounted displays and augmented reality. Head-mounted displays specifically moved backwards in position this year because in Gartner's view the hardware has not improved to the extent necessary to start a pattern of sustained adoption.

Three technologies have a transformational benefit rating for frontline workers this year:

- **Connected factory workers** have improved performance and workflows for frontline workers.
- **Frontline worker EXTech in retail** delivers unique experiences tailored specifically for frontline workers in retail to promote engagement, community, recognition and well-being.
- **Digital employee experience** focuses on improving employee digital dexterity, helps to achieve personal and organizational goals, and builds team unity.

New additions to this Hype Cycle report of high benefit in the Priority Matrix include the four-day workweek, workforce nudgetech, DEX tools and frontline worker EXTech.

**Table 1: Priority Matrix for Frontline Worker Technologies, 2023**

(Enlarged table in Appendix)

| Benefit<br>↓     | Years to Mainstream Adoption   |  |   |                         |
|------------------|--|--|---|-------------------------|
|                  | Less Than 2 Years<br>↓   | 2 - 5 Years<br>↓   | 5 - 10 Years<br>↓   | More Than 10 Years<br>↓ |
| Transformational | Digital Employee Experience  | Connected Factory Worker<br>Frontline Worker<br>EXTech in Retail   |   |                         |
| High             | Employee Communications Applications<br>Indoor Location for People Tracking<br>Lone Worker Protection<br>Smart Badges<br>Social Distancing Technologies<br>UEM Tools<br>Workstream Collaboration | Augmented Reality<br>Collaborative Work Management<br>DEX Tools<br>Drowsiness Detection<br>Healthcare-Optimized Devices<br>Remote Expert Guidance Solutions<br>Workstyle Analytics | Four-Day Workweek<br>Frontline Worker<br>EXTech<br>Head-Mounted Displays<br>Mixed Reality | Workforce Nudgetech     |
| Moderate         | Device-Native Biometrics<br>Enterprise App Store<br>Push to Talk<br>Ring Scanner   | Smartwatches<br>Wristbands   | Galvanic Skin Response Devices<br>Gesture Control Devices                                 |                         |
| Low              |  |  | Enterprise Wearable Device Management   |                         |

Source: Gartner (August 2023)

## Off the Hype Cycle

Gamification has been retired from this Hype Cycle, as the technology is mature.

## On the Rise

### Workforce Nudgetech

Analysis By: Rania Stewart

**Benefit Rating:** High

**Market Penetration:** Less than 1% of target audience

**Maturity:** Embryonic

#### Definition:

Workforce nudge technology (nudgetech) is a form of AI-enabled choice architecture designed to elicit behaviors aimed at accelerating targeted positive outcomes at the individual, team and/or organizational level. Nudgetech incorporates behavioral economic principles, hyperpersonalized through AI. Nudges come with the freedom of choice and are often based on worker behavior data, including workstyle analytics.

#### Why This Is Important

Nudgetech can be transformative in its potential to enable high-impact behavioral change, often with low-effort investment by the individual. Nudgetech is seeing traction in leading-edge people development, personal productivity and employee experience applications. Use-case relevancy continues to grow and expand, particularly where desired behaviors are not immediate or certain (requiring greater interpretation, judgment and agency of choice, hence benefiting from nudge guidance).

#### Business Impact

Nudgetech uses technology to drive small, beneficial changes that are good for employees, managers and the organization. These small changes are designed to effectively compound to scale toward a greater impact on the desired behavioral outcome. And yet these outcomes can be positive, net neutral or even inadvertently negative. Without AI-enabled feedback loops, nudges can backfire and become mass-scale “sludge,” deterring progress.

#### Drivers

- Personalized guidance is invaluable to change, learning and improvement initiatives at every level (individual, team, department, organization). It is simultaneously difficult to scale, due to the combination of required subject matter expertise and contextual knowledge required of the individual and their team/organization.

- The 2022 Gartner Digital Worker Experience Survey found that 26% of workers consider themselves to be either novice or have developing knowledge of the digital technology used for work. Fifty-five percent of these workers struggle to find information or data needed to do their job and 43% admit to having made the wrong decisions due to lack of awareness.
- This scalability challenge drives the value proposition of nudgetech to close the behavioral gap from where you are today to where you ideally want to be tomorrow. The most concentrated workforce-targeted use-case applications observed to date include enabling the following outcomes — agile culture and adaptive teams, inclusion and belonging, manager and leader effectiveness, proficiency with digital tools, security-conscious culture, and well-being and personal effectiveness.

## Obstacles

- **Lack of definition:** Nudgetech is not yet sufficiently far along to have a commonly accepted definition.
- **Filter the nudge noise:** A nudge is not a reminder or a notification by itself. Those are common delivery mechanisms that are often, understandably, referred to as “nudges,” but lack the systematic rigor of nudge technology.
- **Is it really AI-enabled?:** This can be difficult to uncover, in that the behavioral economics of nudge technology will likely present as more static, decision-tree logic. This should be complemented by AI-driven feedback loops, where the system learns which nudges work better for which people (completion rates) and outcomes (impact tracking).
- **“Sludge” vs. nudge:** Employees may develop “nudge fatigue” from too many nudges or ineffectual or inappropriate nudges that ultimately deter progress.
- **Choice is key:** If there’s no option to pass, it is not a nudge, but rather a prescriptive action, which is less effective at sustainable behavioral change.

## User Recommendations

- **Prioritize which organizational outcomes may benefit the most from nudge technology.** The ideal fit would be an outcome theme that enables you to start small, with easy but potentially high-impact outcomes (see [Create Self-Sustaining Culture Hacks by Applying Nudging Techniques](#)).



- **Experiment selectively with isolated proofs of concept within your own organization.** Depending on available in-house skills and expertise, it may be an option to pursue this as an internal build. Many larger organizations have the requisite data science capability. If yours does not, consider contracting with an organizational psychologist or related firm to create the nudge library.
- **Encourage bidirectional discussions with prospective or existing vendors.** How do you encourage select prospective vendors (or even current ones) to consider the pros and cons of investing in nudgetech? You ask them. You put it on their radar. You encourage bidirectional discussions.

## Sample Vendors

Beamery; BetterUp; Digital Attitude; Humu; Perceptyx (Cultivate); Workday (Peakon)

## Gartner Recommended Reading

[Establish a Security-Conscious Culture Using Behavioral Economics](#)

[How to Use Behavioral Economics to Drive Adoption and Save Money in Your Organization](#)

## Four-Day Workweek

Analysis By: Emily Rose McRae

**Benefit Rating:** High

**Market Penetration:** 1% to 5% of target audience

**Maturity:** Adolescent

### Definition:

The four-day workweek is a flexibility offering that involves a reduced number of days for employees to work. It can be a reduced number of hours (i.e., 32 hours in four days) or a condensed workweek with the same number of hours in a reduced set of days (i.e., 40 hours in four days). Four-day workweek initiatives have been launched to increase flexibility offerings for both frontline workers and location-agnostic workers in various industries and geographies.

## Why This Is Important

With an employee base that is frustrated by poor work-life balance and more accustomed to flexible working patterns, organizations are considering different ways to remain competitive and meet employee expectations. When faced with either a 10% raise at one company or a four-day workweek, 63% of candidates responding to the 2022 Gartner Candidate Survey Dashboard said they would choose the organization offering lower pay to access the four-day workweek.

## Business Impact

- **Solutions to employee retention and burnout.** Our recent four-day workweek experiment reported a 65% reduction in the number of sick days. Moreover, 71% of employees reported lower levels of burnout, and the likelihood that an employee will quit the organization declined by 57%.
- **Substantive increases in employee productivity.** For industries and markets with strong pressure on efficiency and productivity, four-day workweeks are currently serving as key performance differentiators.

## Drivers

- **Pressure for greater efficiency and productivity.** Ongoing supply chain shortages, inflation and talent shortages are forcing all organizations to do more with less. The striking productivity returns from four-day workweek pilots make implementing a four-day workweek an appealing proposition for executive leaders who need dramatic productivity improvements.
- **Talent shortage.** Well-publicized and acutely felt talent shortages are making any opportunity to increase attraction and reduce attrition worthy of at least a serious discussion. When faced with either a 10% raise at one company or an innovative benefit at another company such as a four-day workweek (for the same pay as a five-day workweek), 63% of candidates we surveyed said they would choose the organization offering 10% lower pay but that offers the four-day workweek as an innovative benefit.
- **Fear of being left behind.** Many executives do not believe their organizations could possibly implement a four-day workweek, but they remember thinking the same thing about remote work and being proven very wrong by necessity. Employee preferences for ever-increasing flexibility act as a driving force for executive interest, even in the absence of a world-changing event.
- **Employee demand for flexibility.** Employers mandating rigid work arrangements are facing a significant risk to an organization's employee hiring, engagement, performance, well-being and retention strategies. They are looking to the four-day workweek as an alternative way of delivering flexibility to employees.
- **Reduced costs due to accidents, insurance and safety risks.** Four-day workweek trials have shown that in supply chain and construction, the four-day workweek with reduced hours significantly reduces the rate of employee accidents and injuries. This saves time lost to accidents, insurance costs due to higher rates of injury and reputational damage that can occur if a workplace is known for being unsafe.

## Obstacles

- **Change fatigue.** Many organizations feel it is too soon to implement a four-day workweek after such major changes to the workforce from the COVID-19 pandemic.
- **Leader buy-in.** Some leaders are skeptical of ways of working that differ from what is familiar to them.
- **Productivity.** Despite study results to the contrary, some leaders are concerned that four-day workweeks would harm productivity ( [The Results Are In: The U.K.'s Four-Day Week Pilot](#), Autonomy).
- **Coverage and business continuity.** When operations require full coverage and maintaining operations, organizations may need to increase headcount so they can implement a four-day workweek without risking coverage.
- **Regulatory barriers.** Regulations, laws and/or union agreements may make implementing a four-day workweek challenging for some organizations.
- **Risk of employee burnout.** For organizations that cannot implement a reduced workweek for regulatory reasons, a condensed workweek will increase the possibility of overwork, burnout and injury in the workforce.

## User Recommendations

- Provide a potential alternative to hybrid for leaders who are not comfortable with remote work and want their knowledge workers back in the office. With changing employee expectations, they may be willing to trade off remote work with one more day per week of personal time.
- Set the organization up for long-term success by implementing a gradual four-day workweek program, moving from a five-day workweek to four-and-a-half days before four. This will combat change fatigue.
- Assess your current workforce to decide whether a reduced or condensed workweek would be best for your workforce without disruption.
- Anticipate the executive board's concerns about implementation and propose this as a business decision that aligns with company goals, rather than an HR initiative. Use the program as a solution that helps achieve organizationwide goals.

## Digital Employee Experience

**Analysis By:** Lane Severson, Tori Paulman

**Benefit Rating:** Transformational

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Emerging

**Definition:**

Digital employee experience (DEX) is a discipline that focuses on how technology affects the overall employee experience (EX). With work becoming increasingly dependent on digital technologies, organizations must embrace experience-focused methods, such as personas, journey mapping, measurement and listening, to deliver an experience that boosts digital dexterity and personal growth, builds team unity, and helps employees achieve organizational goals.

**Why This Is Important**

Employees spend more of their time working digitally than ever before; the digital experience affects the overall employee experience. Digital experiences make up most employee experiences, but 66% of employees experience moderate to high digital friction when using technology. On an average, employees must use 11 applications to do their work, with 36% using 11 to 25, and 5% using more than 26.

**Business Impact**

A holistic, coordinated approach to DEX across IT and with non-IT partners can minimize digital friction and maximize workforce digital dexterity and well-being. IT teams delivering great DEX improve their organization's talent retention, team effectiveness and process efficiencies, and adopt new ways of working. DEX significantly impacts a workers's intent to stay, with 82%, who believe they work with modern technology and engaged IT staff, intending to stay and/or grow within their organizations, compared to only 58% who do not.

## Drivers

- Companies look for every advantage to attract and retain talent. Organizations must go beyond providing modern technology and services to deliver digital experiences that meet a diverse set of employees where they are in their digital workplace maturity and alignment with digital workplace ambitions.
- As foundational digital workplace technology is standardized across organizations, IT leaders are looking to provide differentiation by the way they facilitate the customization of tools to roles and processes in the organization.
- Persona, journey mapping, user experience (UX) design and design thinking are being used to ensure technology investments have a positive impact on both DEX and EX.
- Business leaders are increasingly looking for guidance on how technology can help address key strategic concerns around employee productivity, engagement experience, well-being and skills development, as well as organizational alignment.
- IT leaders are increasingly investing in DEX tools that collect and combine qualitative measurement (employee feedback) with quantitative measurement (performance, stability and use) of technology, and leverage automation and employee engagement to improve DEX.

## Obstacles

- Building a business case for DEX is difficult. Common measures are subjective and benefits can't be directly attributed to DEX initiatives.
- Cost to acquire, implement and integrate technologies to improve DEX.
- DEX requires shifting from activity- and service-based to new experience- and value-based measures of success.
- The human-centric nature of DEX may not be appreciated by technology-centric IT leadership and staff.
- Low-maturity organizations may not be ready for DEX, because their focus remains on basic IT operations concepts (for example, IT service management [ITSM], endpoint management and technical debt reduction).
- Clients often cite lack of IT leader and staff skills to pivot focus toward experience development. Most organizations still do not see this as a part of their remit.
- Because DEX and EX are directly linked, if IT and HR (who owns EX) are not collaborating, success in improving either will be impaired.
- Organizations facing staffing reductions may not have the resources to invest in DEX leadership, staffing or technology.

## User Recommendations

- Make the digital workplace the central point of coordination for all DEX activities.
- Align key partners in EX, HR and facilities, along with business leaders, by expanding the employee value proposition (EVP) to include DEX.
- Focus DEX initiatives by creating employee personas and prioritizing high-impact roles first. These may include revenue generating roles, customer service or product development.
- Identify key moments in an employee journey such as “the first day at work” or “return to the office” to improve, as opposed to attempting to change, the entire onboarding process.
- Combine personas and journey mapping to catalyze identification and reduction of digital friction points.
- Combine objective data from DEX, or other monitoring and management tools, with subjective data from employee listening and voice of the employee programs to guide DEX initiatives.

## Gartner Recommended Reading

[Deliver Peak Digital Employee Experience Excellence in 4 Steps](#)

[Tool: Digital Employee Experience Journey Maps](#)

[Innovation Insight for the Digital Employee Experience](#)



## At the Peak

### Employee Communications Applications

Analysis By: Mike Gotta

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Adolescent

#### Definition:

Employee communications applications (ECAs) enable organizations to manage the planning, creation, personalization, delivery and analysis of internal communications (IC). These technologies also encourage feedback via polls, surveys, chat and comments. ECA solutions contribute to a broad strategy to improve employee experience and engagement, including for frontline workers.

#### Why This Is Important

Effective IC affects employee experience in a variety of ways. When done well, employees are more aware of what's going on in terms of strategic and operational activities, and gain a better understanding of what's being asked of them and how they add value. ECA technology underpins these efforts, providing communicators with governance over how communications are created, distributed and experienced. ECA enables employees feedback to management and analytics for ECA sponsors to assess value.

#### Business Impact

ECA helps organizations reach their entire workforce, including highly mobile workers or those with limited digital interfaces. ECA tools provide communicators (those in formal roles and responsible for certain types of messaging) the means to plan, manage and analyze communication efforts. Employee value of ECA is based on personalized, relevant and contextual communications, along with the opportunity to provide feedback and gain access to key applications (e.g., payroll, benefits and shifts).

#### Drivers

- ECAs are deployed to address employee experience and engagement needs. They are part of a collection of digital workplace applications that build connectedness and organizational alignment.

- Leadership teams have recognized the need for more effective frontline worker communications to address productivity and retention needs. Technology enablement for frontline workers is driving the use of workforce superapps.
- Dissatisfaction with email and legacy intranets is encouraging exploration of modern ECA tools designed for multichannel and multidevice experiences (including digital signage).
- ECA capabilities are broadly available, making them easy to procure but at some risk. Vendors have different levels of completeness and buyers have varying levels of maturity when defining needs. With major vendors (such as Microsoft) in the space, IT organizations are taking a greater role in the evaluation and selection process.
- ECA is expanding to include guided experiences that nudge employees to opportunities where they participate in programs related to ERGs, well-being and career matters. Expansion into communities and live events is progressing.
- Interest in generative AI and ChatGPT are encouraging ECA vendors to innovate either by helping in the creation phase of internal communications, or in ways that affect the employee experience by making it easier to navigate and consume the most relevant information needed.
- ECA tools are often used by IC teams working with HR, executives and internal marketing groups. However, for frontline workers, decisions are often driven by operational leaders in cooperation with IC groups. The divergence in frontline and office workers in terms of requirements and digital employee experience needs can lead to multiple solutions.
- ECA analytics creates workforce insights that appeal to other stakeholders, such as those involved in talent, voice of the employee or operational improvements.

## Obstacles

- Business value from ECA is hard to prove. Measurements may not have enough “hard data” to satisfy sponsors who may be reluctant to rely on qualitative data combined with tool usage reports.
- Diversity of ECA vendor offerings makes it critical to establish selection criteria related to personas, editorial and campaign management, channels, integrations and analytics. The effort requires collaboration across multiple stakeholders including IT.

- Emergence of generative AI/ChatGPT in ECA will focus on communicators first, a small audience. Until vendors extend AI-enablement to employee experiences, higher-value impacts will take time.
- The ECA market is in transition. Capabilities are common in intranet packaged solution providers and mega-suite vendors such as Microsoft and ServiceNow. ECA for frontline workers are evolving into frontline superapps and work hubs. Such dynamics creates tension between short- and long-term decisions. Conservative firms may wait until the market settles down.

## User Recommendations

- Take a programmatic approach by identifying use cases, worker segments, channels, content types, goals, integrations, access and analytics, by working with stakeholders focused on employee experience, engagement and frontline workers.
- Augment ECA vendor selection criteria by including subjective qualities, such as usability, digital employee experience and options to capture staff feedback.
- Ensure ECA analytics are well-defined, as measuring communications effectiveness is key to identifying business value.
- Ensure operational readiness by taking advantage of vendor options like strategy, proof of concept (POC), administrative training. Execute pilots to assess impact and expand use. Address governance by defining content and administration frameworks to ensure consistency and quality.
- Connect efforts and engage stakeholders to select and deploy ECA technology by involving those in related areas, such as digital workplace, intranets, frontline workers and business continuity.

## Sample Vendors

Beekeeper; Firstup; LumApps; Microsoft; Poppulo; Staffbase; Unily; Workvivo; YOOBIC; Zipline

## Gartner Recommended Reading

[Modernize Employee Communications to Improve Digital Experiences and Workforce Engagement](#)

[Market Guide for Employee Communications Applications](#)

## Tool: Employee Communications Applications Vendor and Product Data

### Market Guide for Intranet Packaged Solutions

#### DEX Tools

**Analysis By:** Dan Wilson, Autumn Stanish, Stuart Downes, Tom Cipolla

**Benefit Rating:** High

**Market Penetration:** 20% to 50% of target audience

**Maturity:** Early mainstream

#### Definition:

Digital employee experience (DEX) tools help IT leaders measure and continuously improve the performance and employee sentiment toward company-provided technology. Near-real-time processing of aggregated data from endpoints, applications, employee sentiment and organizational context surfaces actionable insights and drives self-healing automation, optimized support and employee engagement. Insights and self-healing can also enhance IT support.

#### Why This Is Important

Accelerated digital workplace investment has highlighted gaps in objective measurement and continuous improvement of DEX. Client interest in DEX has steadily increased since the start of 2021. Primary use cases focus on tactical and technology issues however mature digital workplaces are expanding to include more strategic use cases. Their cross-functional DEX strategy directly targets reduced IT overhead and improved DEX as a way to retain and attract top talent.

#### Business Impact

DEX tools shift focus from technology management to more business value-added work. Specific impacts include:

- Fewer IT issues that disrupt and impede employee productivity.
- Reduced IT overhead through automation.
- Improved endpoint configuration and patch compliance.

- Better balance of objective and subjective success measures, including technology adoption, performance and employee sentiment.
- IT becoming more proactive and human-centric.
- Increased ability to retain talent.

## Drivers

- DEX is a major influencer of the overall employee experience.
- Organizations are increasingly dependent on technology to perform their work.
- Employees are suffering in silence by living with or working around issues rather than reporting issues to IT.
- IT leaders seek broader measurement and management capabilities as internally focused activity KPIs have proven incomplete.
- IT administrators are looking for better visibility into how hybrid workers' devices are performing.
- Employee sentiment toward technology cannot be measured effectively with periodic or transactional surveys alone. Feedback must also include how employees feel about and engage with specific devices or apps, and how technology changes impact their work.
- Service desk and other IT support analysts require faster access to device configuration and performance data to offset an increase in support interaction volumes and wait times.
- Increasing threat of cyberattacks demands faster identification and remediation of configuration issues and missing patches.
- Increased focus on sustainable IT is promoting consumption- and performance-based device life cycles in place of refreshing devices on a schedule.
- AI and machine learning have significantly increased the value and capability of SaaS-based DEX tools.

## Obstacles

- Legacy culture that does not trust the tool's insights or sees automation as a threat.
- SaaS- or cloud-averse organizations will be limited to less capable on-premises offerings.
- Low-maturity IT support or end-user computing (EUC) organizations may not be ready for DEX tools.
- An "ignorance is bliss" mindset fearing that a sudden unveiling of the massive volume issues will make IT leadership look bad.
- The cost to acquire, implement and integrate new tools.
- Insufficient staffing levels or skills required to operate a DEX tool.
- Failure to adjust IT staff rewards and recognition to promote new behaviors and DEX tool adoption.
- The need to account for legislative, regulatory, industry or labor union limits on data collection and use.
- The lack of maturity and feature parity among representative and similar tools including common APIs for integration.
- Smaller organizations have limited options given that many DEX tools target larger enterprises.

## User Recommendations

In its third year on the Hype Cycle, DEX tools have reached the Peak of Inflated Expectations. Market penetration and maturity have also advanced. Organizations that have not invested in DEX tools should:

- Build a broader team by collaborating with business and IT peers to define IT and non-IT use cases.
- Ensure the business case focuses on objective and measurable impacts by minimizing reliance on vendor-provided ROI templates.
- Choose a DEX tool that best fits your needs and budget by using the [Market Guide for DEX Tools](#).

- Assign dedicated ownership and allocate dedicated resources to deploy and drive DEX tool adoption and ROI. Resources can be reallocated from IT support roles as proactive automation reduces support volumes.
- Incentivize new behaviors by adapting IT performance measures to focus more on outcomes than activities.
- Avoid diminishing returns by adding features and use cases as the team and DEX tool matures.

## Sample Vendors

1E; ControlUp Technologies; HP Inc.; Ivanti; Lakeside Software; Nanoheal; Nexthink; Riverbed Technology; Tanium; VMware

## Gartner Recommended Reading

[How to Successfully Deploy a DEX Tool](#)

[Market Guide for DEX Tools](#)

[Employee Enablement Is Key to Digital Workplace Services Leaders' Survival](#)

## Frontline Worker EXTech

Analysis By: Ranadip Chandra, Sam Grinter

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

### Definition:

Frontline worker EXTech is an approach that delivers distinctive employee experiences to frontline workers by unifying a collection of applications that promote staff engagement and a sense of community. Applications typically include administrative support, recognition, well-being, internal communications and personal development processes. These apps are primarily designed for use via smartphones and tablets with digital signage sometimes complementing the approach.

## Why This Is Important

Organizations in verticals like retail, healthcare, manufacturing and logistics have many more frontline workers than desk-based workers. Globally, Gartner estimates that there are 2.8 billion frontline workers — more than twice the number of desk-based workers. Despite this, technology initiatives have often focused solely on desk-based workers. Delivering technology focused on addressing this unmet need is a significant opportunity for improving the experience of this underserved section.

## Business Impact

- Frontline jobs come under extreme stress and burnout. Positive experience in day-to-day business applications would remove stress and improve retention.
- Quick access to training or standard operating procedures for broken equipment is very beneficial for logistics and manufacturing industries.
- Frontline worker EXTech represents an opportunity to aggregate 10+ different applications these workers engage with daily and replace clunky homegrown portals.

## Drivers

A common driver of investment in frontline worker EXTech has been the mismatched job openings and hire rates. According to the [U.S. Department of Labor — Bureau of Labor Statistics April 2023 report](#), the number of job openings stands at 9.9 million, but the number of hires stands at 6.2 million, indicating retention is a key driver for organizational sustainability.

Drivers in individual application categories used by frontline workers are:

- Workforce management core administration: Significant changes in work for many frontline roles. This trend increases the importance of dynamic task management to frontline workers.
- Benefits and recognition platforms: These applications enable frontline workers to receive rewards that are easily redeemable while someone is on the road and facilitate immediate acknowledgments of co-workers across teams without complex workflows.
- Well-being/experience for frontline workers: These applications track health through wearables or offer stress reduction for employees dealing with a high volume of customers directly.



- Employee communication applications (ECA): Include internal communication channels for organizational communications and are often better designed to meet the needs of frontline workers than mainstream consumer-based communication platforms. These channels also integrate with schedules and include the ability to create communities with common interests or work.
- Learning platforms for frontline workers: Retail and hospitality frontline workers are increasingly leveraging dedicated frontline worker learning solutions to read job-specific learning bytes.
- Superapps: Some organizations are piloting with front-end platforms for employees that consolidate multiple application services such as payment and help desk allowing for new miniapps to be built in a composable way. These apps provide both the work and life needs of frontline workers by allowing them to pick and choose which miniapps they use when they need them.

## Obstacles

- Similar to workforce management technology, frontline worker experience initiative suffers from a lack of ownership at the vertical or horizontal executive levels. Some initial projects led by application leaders are maturing from the early adoption stage, but most are stand-alone deployments led by the head of the department or line of business.
- In some industries, for safety reasons, frontline workers are prohibited from using mobile applications for the entire length of the shift.
- The solutions need to prove the nontracking of time and data during off-shift hours to build greater trust.
- The discipline of providing compelling frontline worker experience needs a combination of many different applications from different markets and/or often vertical-specific products, making it difficult to navigate the market or recommend best practices for deploying and managing the portfolio.
- Many industry-specific applications prove to be important for the frontline worker in the short term, but adoption and usage decrease over time due to a lack of improvements.

## User Recommendations

- Evaluate solutions based on their ability to work uninterrupted for hours in the background and provide significant value in little interaction time. Many frontline workers would only access the application between time-consuming tasks.
- Set a criterion that any solution that “needs more than two minutes to complete a moderate complexity use case” or “takes more than five clicks/form parameters” should not be considered.
- Analyze the employee engagement metrics filtered to identify the specific figure for frontline workers. Establish frontline worker engagement as a key metric for the success of the employee experience strategy of the organization.
- Balance the content of frontline EXTech applications between critical tasks and communications with well-being and DEI announcements.
- Explore how frontline worker EXTech can coexist with applications that meet more stringent needs, such as clinical collaboration or purpose-built tools for certain operational work.

## Sample Vendors

Blink; DaysToHappy; Flip; Headspace; Perkbox; Site Diary; SparkPlug; Workstream; Wyzetalk; YOOBIC

## Gartner Recommended Reading

[Quick Answer: How Does a Superapp Benefit the Digital Employee Experience?](#)

[How Organizations Are Taking Action to Increase Frontline Flexibility](#)

[Presentation Materials: The Future of Frontline Work](#)

## Connected Factory Worker

Analysis By: Simon Jacobson

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

**Definition:**

Connected factory workers leverage digital tools and data management techniques to improve and integrate their interactions with both physical and virtual surroundings. This improves decision accuracy, proliferates knowledge and reduces variability — improving engagement, satisfaction and retention.

**Why This Is Important**

Digitization in factories is intensifying while operational know-how fades. Factory workers struggle to embed new technologies into their daily work, negatively impacting the broadening of core skills and building digital fluency eases labor constraints.

Manufacturers are investing in their factory workforces. The solution is as much a technology construct that changes how factory workers access information and knowledge to work differently as it's a change management exercise in workforce development, behavioral shifts and integrated continuous improvement.

**Business Impact**

Frontline workers are indispensable and the convergence of technology innovation and investment in their experience is critical for improving engagement, satisfaction, and retention:

- Increasing operational excellence, flexibility and quality of outputs by continuous learning but also context specific operations to limit deviations from standard procedures.
- Ensuring safe but challenging working conditions to improve work motivation and retention and to open up prospects for career development.
- Extension of standard work procedures for more efficient use of resources, but also appropriate social behavior in communication with colleagues and supervisors.
- Greater, intangible returns appear when initiatives are part of a formal workforce development strategy.

## Drivers

- Labor availability and up-to-date skills are constraints. Meanwhile, smart manufacturing is a net job creator and demand for capable frontline workers is soaring. Organizations seek a factory workforce that can seamlessly operate between the virtual and physical worlds.
- Generational gaps in factories can impact technology acceptance. New workers are tech-savvy but lack access to best practices and know-how. Tenured workers have detailed process knowledge and digital savvy as consumers — the tools supporting them on the job have to evolve.
- The nature of work in factories is being (re)designed, digitized and improved, impacting total productivity and peer-to-peer communication — not to mention job families and role profiles.
- Growth in vendor solutions to provide frontline workers the right information available contextualized at the moment of need.

## Obstacles

- Accepting operational excellence as “good enough” ROI when the impact and benefits are often intangible.
- Curating relevant datasets across existing technologies, manual and undocumented knowledge, and informal know-how from tenured workers. In parallel, the risk of information overload when moving away from manual tasks could be burdensome versus aiding.
- Involving workers in the solution design and implementation process helps set demand and adoption.
- Learning and development evolution, from classroom and episodic to experiential and continual, is nascent.
- Patience with AI: Although attractive for decision support, curating the knowledge that provides guidance, ensuring IP is protected, and an ethical stance are all critical. Mishaps can impact recommendations, pay or career advancement and lessen trust.
- Underinvesting in governance: Providing workers with tools to build their own experiences or redefine standard work eliminates time and effort. Yet, shadow IT and anarchy arise without dedicated operational excellence/continuous improvement teams to manage common requirements and risks.

## User Recommendations

- Strike a balance between digital enablement and cultivating future competencies by framing your initiative as part of a broader manufacturing workforce development program.
- Consider architecture over applications. This will limit point solutions and the complexity of managing multiple vendors. This includes a focus on pulling in data from other transactional systems such as MES as means to link production data with employee-led improvement opportunities.
- Invest in upgrading learning and development (L&D) programs to ensure that skills development matches technology capabilities.
- Make your focus the creation of a “data-driven” culture in manufacturing operations by diligently avoiding a scenario where employee creativity and ingenuity is stifled.
- Prepare to balance governance and flexibility during implementation by having clarity on where enterprise standards must give way to local ways of working.

## Sample Vendors

4Industry; Covalent Networks; L2L; Microsoft; Operations1; Poka; QAD Redzone; SAI Global; SwipeGuide; Zaptic

## Gartner Recommended Reading

[Innovation Insight for the Connected Factory Worker](#)

[How to Take a Life Cycle Approach to Developing the Connected Factory Worker](#)

[Future of Work Trends: 5 Trends Shaping the Future of Frontline Workers](#)

[Supply Chain Executive Report: Developing the Supply Chain Professional of 2025](#)

## Head-Mounted Displays

Analysis By: Evan Brown, Tuong Nguyen

Benefit Rating: High

Market Penetration: Less than 1% of target audience

Maturity: Adolescent

**Definition:**

Head-mounted displays (HMDs) are small displays or projection technology integrated into head-worn devices for augmented reality, mixed reality and virtual reality. They are worn, or mounted, on or near the face, allowing the wearer to see the optics at a viewing distance ideal for either complete immersion or information at a glance. Additionally, certain aspects of the visual content supplied by HMDs is contextual, providing various visual cues based on the wearer's current state.

**Why This Is Important**

HMDs are uniquely positioned to provide new opportunities utilizing augmented reality (AR), virtual reality (VR) and mixed reality (MR) technologies. HMDs do exist on a spectrum of other mobile computing and display options, such as smartphones and tablets, and complement them. But, they provide a previously unavailable hands-free experience that is especially beneficial in capital-equipment-intensive industries, as well as a level of immersion whose full benefit is still being explored.

**Business Impact**

HMDs open new ways to interact with the physical and digital world. Enterprises will use AR HMDs for improved guidance, inspection and assistance. VR HMDs will initially succeed in gaming and education, though enterprises will eventually derive significant value in training, design and collaboration use cases. While MR HMDs will take longer to mature, unique implementations, such as the visualization of architectural fit and digital-to-physical interaction, will streamline complex scenarios.

## Drivers

- Apple's (rumored) HMD plans currently have limited impact on the pace and trajectory of the market, but will likely renew attention and accelerate adoption as the launch date draws near and applications are announced.
- Performance improvements to all-in-one VR HMDs are overcoming the need for additional hardware, and decreasing accessibility and usability barriers which limit current adoption.
- Technological advancement across the spectrum of HMDs, along with adjacent display, optics, computer vision, natural language, rendering, graphics, interface technologies and form factor improvements, have made experiences significantly more immersive. Additionally, as the technology improves, HMDs will be offered at more reasonable price points, which is necessary for widespread adoption.
- Continued investment into HMDs is planting the seed for a burgeoning software and hardware ecosystem that will help to promote enterprise adoption with improved deployment, management and integration opportunities.
- Increased desire and expectation for remote work opportunities is leading enterprises to experiment with new and novel solutions capable of emulating in-person experiences or expanding remote work possibilities.
- Initial hype surrounding the metaverse spurred significant interest and investment into the development and adoption of HMDs.
- Further development and deployment of software, particularly entertainment and gaming solutions, among new and established distribution platforms is providing increased incentive for adoption.
- Exploration of new educational opportunities is leading universities and other educational institutions to explore HMD implementations.
- Normalization of public recording via regular smartphone use and exposure will potentially reduce the cultural stigma of previous HMD attempts.

## Obstacles

- Tech limitations create interoperability, social, ergonomic and battery challenges.
- Cost, form factor, usability and accessibility are hindrances, while motion sickness and eye strain remains unsolved.
- Association with, and declining interest in, the metaverse will hamper adoption.
- Key vendors failed expectations. The U.S. Army reduced purchase of and demanded improvements to Microsoft's HoloLens. Meta dropped the price of Quest Pro and Google discontinued Glass Enterprise Edition.
- Lack of a "killer app" and use case, as well as, an ecosystem of off-the-shelf enterprise software.
- Software development mostly focuses on solving inconveniences or nonexistent challenges.
- Lacking a large installed base, few are willing to significantly experiment in this space.
- Recession concerns reduce willingness to try expensive, early-stage technology.
- High-quality immersive experiences require space that many may not have.
- Single- and purpose-built devices have limited adoption potential.



## User Recommendations

- Adopt tactically as most devices are purpose-built with unpredictable support and release cycles. Successful implementations focus on one specific use case as technological limitations limit multipurpose, widespread adoption.
- Ensure appropriate hardware choice. AR can be utilized for extended periods but is not fully immersive with lighting impacting visibility. VR provides a more in-depth experience but users need to limit their time in VR due to barriers around user interfaces and experience.
- Evaluate AR/MR HMDs for situations where the user's hands are occupied or when the user needs information while moving — for example, remote guidance with telestration.
- Evaluate VR HMDs as an alternative to highly specialized or high-cost, real-world scenarios.
- Track growing ROI by monitoring advancements such as improvements in display, battery life, comfort and cost. Applicable off-the-shelf software has the future potential to significantly reduce the barrier for entry, particularly for VR.

## Sample Vendors

HTC; Magic Leap; Meta; Microsoft; Nreal; PICO; RealWear; Sony Interactive Entertainment; Valve; Vuzix

## Gartner Recommended Reading

[Emerging Technologies: Find Success With Head-Mounted Displays Despite Modest Market Growth Expectations](#)

[Emerging Technologies: The Future of the Metaverse](#)

[Emerging Tech: Three MEMS Technologies Will Enhance Metaverse User Experiences](#)

[Forecast Analysis: Semiconductors and Electronics, Worldwide](#)

[Emerging Tech: Venture Capital Growth Insights for Head-Mounted Display Technologies](#)

## Sliding into the Trough

### Galvanic Skin Response Devices

Analysis By: Anshul Gupta, Roberta Cozza

**Benefit Rating:** Moderate

**Market Penetration:** 1% to 5% of target audience

**Maturity:** Emerging

#### Definition:

A galvanic skin response (GSR) device is used to measure electrical conductivity of the skin to help understand a user's physiological and psychological condition. The electrophysiological signal is generated by the sweat glands. Sweat may cause measurable variations in conductivity and resistance, though vascular dilatation and constriction may also contribute.

#### Why This Is Important

GSR devices can be used to measure a human's response to emotionally arousing content (video, audio, image), products, physical objects, odors and services. GSR devices can be used to measure mental states such as stress, drowsiness and engagement. GSR has become an integral technology of market research and neuromarketing platforms. Use cases include emotion detection, clinical research and treatment, and usability and marketing research.

#### Business Impact

GSR device use cases and applications are in the areas of emotion tracking, healthcare, treating patients and assistive care. For example, it can be used to measure effectiveness of a marketing advertisement as shopping decisions are made at a subconscious level. Using GSR, preferences and decisions can be analyzed to improve offerings and identify target segments. GSR devices can be used in healthcare to treat patients suffering from trauma, depression, phobias or mental health problems.

#### Drivers

- Unlike electroencephalography (EEG), electrocardiography (ECG), electromyography (EMG) or heart rate variability (HVR) sensors, GSR sensors can be integrated into small wearables with wireless sensors. This enables GSR to be used in natural, nonsitting positions, raising its usability and use cases.

- GSR devices' inexpensive sensors and ease for visual inspection make them preferable over other competing technologies.
- Use cases of GSR sensor-equipped devices are growing. They are used by emergency responders, personnel in public transportation, professional athletes, marketing professionals and healthcare providers, for example.
- GSR-equipped devices will find metaverse as a new emerging segment to enable human emotion tracking.

## Obstacles

- Use cases for GSR devices in isolation are limited. Their potential and accuracy improves when used in combination with other biometric technologies. Multimodal sensor technology required to implement use cases adds to cost and impacts size expectations in the case of smart wearable devices.
- GSR signals are generated with latency, which varies within and between individuals. Events must be of longer duration. Various events cause emotional response, making it difficult to identify which event caused a response.
- GSR can be used in healthcare, but its usability is limited to gaining an understanding of the physiological processes occurring in the human body to get better visibility into health concerns. GSR can't act as a therapy to better cope with health concerns.
- Despite the growing benefits of wearables, their use at the workplace is often seen as invasive. Employees may see GSR technology as an invasion of their privacy; employers will need to be very cautious in using GSR devices.

## User Recommendations

- Raise accuracy and effectiveness of your solution to measure human emotions, monitor stress levels and treat patients by using GSR along with other biometric sensors or computer vision technology.
- Use GSR-enabled wearables to observe and analyze stress, fatigue levels and performance among public safety employees, such as law enforcement officers, emergency workers and firefighters.

## Gartner Recommended Reading

[Competitive Landscape: Emotion AI Technologies](#)

## Technology Opportunity Prism: Emotion AI Technologies

### Elevate Your Influence Goals With Emotion AI

#### Remote Expert Guidance Solutions

Analysis By: Rafael Benitez

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

#### Definition:

Remote expert guidance (REG) provides a two-way flow of information and communication between an expert at any location and workers in the field, through mobile computing and wearable devices. Using a device camera, centralized experts receive a live view of the field worker's environment and the task being performed. The expert provides verbal guidance and visual cues that overlay the remote worker's display. REG tools can record sessions for training, post-task audit and performance analysis.

#### Why This Is Important

As organizations seek digital transformation for frontline and field personnel working remotely or independently, and as communications and augmented reality technologies have improved and become less costly, the use of REG solutions has grown in relevance. Once the domain of specialized workers, REG tools have now been pulled into routine activities such as end-user IT support, surveys, inspections, audits, maintenance, repair, training and directional guidance for lone workers.

#### Business Impact

REG benefits these industries:

- Medical devices
- Healthcare
- Transportation
- Utility companies

- Manufacturing
- Insurance
- Automotive
- Construction
- Education

REG is beneficial for use cases where availability of experts in labor markets is limited, and where existing experts could use it to support less-experienced field workers with specialized and complex tasks. REG offers live support for field workers conducting specialized work, lone work or delicate, hazardous work in remote or limited-capacity locations.

## Drivers

- The impact of REG solutions grows whenever fewer experts can participate in field activities due to labor constraints or the organization's desire to reduce costs by using fewer highly skilled staff in the field.
- REG solutions help organizations manage labor shortages and HR issues in the field more effectively.
- In field use cases, REG solutions help avoid errors, decrease the time needed to complete tasks, and allow critical tasks once done by on-site expert staff to be done by workers with less experience.
- Reducing travel cost when less-skilled employees on (or close to) the location can perform the task supported by a remote expert.
- Increasing operational efficiency by projecting the knowledge of few centralized experts to many geographically distant or remote locations.
- Providing higher levels of service, and delivering support and resolution of incidents more quickly, to complex equipment that is critical to the operation of a business (aircraft, medical imaging equipment, cellular towers, large construction equipment, etc.).
- Increasing safety by having remote experts watching over the shoulder of on-site personnel and reducing time spent in hazardous situations.

- Providing end customers with a customer support option that may speed time to resolution and increase satisfaction (for example, an ISP guiding a customer to properly connect cables on a residential router).
- Increasing the percentage of organizations relying on wearable devices to guide remote business processes, such as inspections due to occupancy and social distancing regulations.

## Obstacles

- General remote control and support tools can offer some of the features of an REG solution, such as basic screen markup to assist support activities, with less complexity and potentially less cost.
- Gartner considers the market for general remote support tools separately from REG, which is still viewed by many buyers as a product with a finite set of use cases. This has hindered mass adoption of REG for commodity support and remote collaboration use cases.
- Many organizations tie the use of REG tools to the need for wearable devices, despite the majority of REG tools being consumed on standard smartphone and tablet hardware.
- REG requires on-site personnel (or customers receiving support) to have sufficient and reliable data networking bandwidth, which may not be available in some locations.

## User Recommendations

- Explore REG solutions to overcome challenges with use cases that cannot be met adequately by existing remote control and support solutions.
- Adopt REG technology to capture and reuse live session recordings and associated metadata for training and development.
- Seek REG functionality to support specific device hardware (such as HMDs) that is not supported by less specialized, remote support tools.
- Seek opportunities to integrate AI with REG tools to provide specialized support for tasks such as inspections with less involvement from the remote expert. For example, this may include highlighting things to check the field of view, or identifying things that shouldn't be there or are incorrectly placed.

## Sample Vendors

Delta Cygni Labs; Fujitsu; Help Lightning; Librestream; OverIT; PTC; SightCall; TeamViewer; Viewpoint Systems

## Gartner Recommended Reading

[The Future of Frontline Work](#)

[The Future of Frontline Work: Hyperaugmented Humans](#)

## Enterprise Wearable Device Management

Analysis By: Tom Cipolla

**Benefit Rating:** Low

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Early mainstream

### Definition:

Enterprise wearable device management tools help IT centrally monitor, update and configure wearable devices, such as head-mounted displays (HMDs), augmented reality (AR) or virtual reality (VR) headsets, smartwatches and other body-worn sensors. These tools are most commonly used by digital workplace teams and can stand alone or exist as a subset of management capabilities within unified endpoint management (UEM) tools.

### Why This Is Important

Wearable devices have gained a permanent place in enhancing frontline worker roles in field, logistics, medical and other vertical-industry-specific and highly specialized applications. The prevalence of hybrid work models has opened new use cases for wearable devices, although IT leaders' demand for wearable-specific management remains modest, in line with the adoption of wearable devices as workers' primary device.

## Business Impact

Benefits of enterprise wearable device management capabilities mirror other endpoints that UEM tools manage — ability to deliver consistent configuration and support, at scale. Although these devices can be configured and managed manually or with OEM tools, there is a significant labor investment required to do so. The data that can be gathered from devices when managed in a modern UEM tool can support better investment and planning decisions on hardware, and assist with use-case identification.

## Drivers

- Remote learning has driven increased adoption of HMDs that require management and support. Use cases include remote learning for highly specialized curricula (e.g., medical student anatomy and dissection labs).
- HMD and AR/VR use cases are also used to simulate dangerous or expensive activities (flight simulators, disarming explosives, space travel and military). Organizations deploying these devices have strict security requirements that must be maintained to protect intellectual property and trade secrets.
- Ensuring the health and safety of lone workers and heavy-machinery operators, or those performing other dangerous activities is driving demand for wearables that can track vital signs.
- Android-based wearables have been managed with UEM tools for business-only or industrial use cases, but that is expanding as employees demand better balance of work and life.
- Enterprise use of traditionally consumer-focused devices is increasing.
- Interest in enterprise use cases involving the metaverse will increase demand for enterprise wearables.
- An increase in cyberattacks on all operating systems has increased pressures to effectively manage, patch and secure all connected devices.
- As more wearable devices are developed and introduced to the market, organizations are turning to enterprise wearable device management tools to discover new or unmanaged devices connected to company-managed networks and devices. This enables decisions around enrolling those devices in management or using network segmentation or other security policies to prohibit access and minimize risk.



## Obstacles

- The breadth and depth of wearable support varies highly between UEM tools.
- Some wearable devices offer limited management capabilities, even with OEM tools.
- The inability to discover unmanaged wearable devices will limit the ability to manage and secure them.
- Many IT leaders are unaware of the risks that unmanaged wearable devices can pose.
- Increased regulation to protect employee privacy may complicate the use and management of wearables.
- IT teams that struggle to manage standard mobile and PC endpoints generally lack the awareness, skill and priority to address nonstandard devices.
- HMD's can be uncomfortable to wear and may be disorienting to sensitive groups, resulting in headaches and other physical discomfort. Additionally, they can alienate individuals with visual impairments.

## User Recommendations

- Set realistic expectations regarding the management capabilities of wearables, which significantly lag when compared with management support for mainstream devices.
- Source enterprise wearable device management from existing endpoint management vendors, and avoid proprietary tools when possible.
- Seek to utilize tools that you already own, against best-in-class proprietary solutions. Determine feature gaps and analyze them carefully.
- Evaluate the viability of managing and supporting wearables as a key element of decisions concerning sourcing wearable hardware and prior to embarking on a wearable strategy. Select devices that are verified to integrate with UEM tools to provide basic visibility and monitoring capabilities.

## Sample Vendors

42Gears; Augmate; BlackBerry; IBM; Ivanti; ManageEngine; Matrix42; Meta; Microsoft; VMware

## Gartner Recommended Reading

[Market Definition and Methodology: Wearable Electronic Devices](#)

[Emerging Technologies: The Future of the Metaverse](#)

[Emerging Tech: Display Technologies Revolutionizing Portals to the Metaverse](#)

## Frontline Worker EXTech in Retail

Analysis By: Kelsie Marian, Max Hammond

**Benefit Rating:** Transformational

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Adolescent

### Definition:

Frontline worker EXTech delivers distinctive employee experiences to retail frontline store workers by unifying a collection of applications that promote staff engagement and a sense of community. Applications typically include internal communications, administrative support, recognition, well-being and personal development processes. These apps are primarily designed for use via smartphones and tablets.

### Why This Is Important

The need to attract, retain and communicate effectively with high-quality in-store frontline retail workers in challenging labor markets continues to drive a substantial interest in optimizing frontline EXTech. These solutions seek to increase adoption, engagement and performance via recommendations, nudges, mindfulness, wellness and connecting workers to one another. Frontline worker EXTech represents an opportunity to aggregate a multitude of different applications store associates engage with daily.

## Business Impact

Frontline EXTech solutions support frontline digital workplace experiences in retail stores and drive motivation, engagement and contribute to business outcomes leading to a more agile culture fostering competitive differentiation. They help improve the employer value proposition by matching the EX with the brand characteristics and ambitions. In the near future, these solutions will include elements of generative AI that could transform store associate experiences. Hence, the benefit rating has been upgraded from “high” to “transformational.”

## Drivers

- Relatively high ongoing attrition of frontline workers in retail store environments, particularly over the last 24 months in QSR.
- High churn, alongside significant operational and cultural redesign initiatives currently in flight in the majority of Tier 1 retail environments, have pushed this technology past the Peak of Inflated Expectations.
- Incorporation of Generative AI into frontline solutions could transform associate experiences through a variety of aspects, i.e., through increased and ongoing coaching, learning and selling support as these language models learn the way people interact and work on the job each day.
- This profile will reach the Plateau of Productivity within the next three years as retailers reconfigure store environments, and develop new roles and responsibilities for store associates.

Drivers of frontline EXTech also include the need to:

- Enable frontline store associates to take ownership of the execution of store-operations decisions to execute unified retail commerce, such as order picking or replenishment through store IoT solutions and mobile task management.
- Prepare store associates to support rich, immersive, in-store customer experiences by providing access to internal training solutions and/or customer-facing tools that are experienced-learning-based, for example, via virtual or mixed reality.
- Improve the well-being/experience of frontline workers: These applications track health through wearables or offer guided meditation or stress reduction for employees dealing with a high volume of customers directly.

- Increase employees' attachment to the organization by connecting them to others through real-time communication, which will also improve the customer experience.
- Provide easy access to learning: Retail and QSR workers do not find sufficient time to access the standard learning and development applications. They are increasingly leveraging dedicated frontline worker learning and/or microlearning to read job-specific, relevant learning bytes.

## Obstacles

- There is currently no comprehensive EX "platform" that meets the needs of all worker types and work patterns in the major industry sectors across all employee size segments and geographies. Despite robust development efforts by many providers, one is not likely to emerge in the next five years, so organizations will need to deploy multiple EX solutions to meet their requirements.
- EX usually has multiple stakeholders, with HR, corporate communications, digital workplace leaders and operations all expecting to drive (or at least influence) solution design and deployment. This can cause difficulties in gaining consensus on the issues and outcomes.
- The market has become increasingly crowded, with digital workplaces, cloud HCM suites, HR service management, frontline communications, modern intranet and specialist vendors all positioning their offerings as "Employee Experience Platforms" for retail. This has increased market confusion in terms of which solution is the best fit for a given use case.

## User Recommendations

- Assess each solution's underlying philosophy and design approach to determine its cultural and contextual fit, as no existing solution currently addresses all worker types and work patterns. For example, prioritizing solutions that offer retail-specific capabilities.
- Adopt an employee-centric culture and mindset because EXTech's success is more reliant on that than technology. Any solution, even one that applies the latest techniques, won't overcome cultural resistance.
- Structure EXTech deployments so employees can quickly see the personal, team and organizational benefits.
- Use leading design practices, such as personas and employee journey mapping, to ensure the solution actually improves interaction quality. Link this to improvements in the customer experience.
- Evaluate EXTech tools for requirements specific to frontline in-store retail workers (for example, in-store execution and immersive store needs versus corporate headquarters, warehouse, or others) to cultivate a deeper relationship between the retail organization and frontline store workers.

## Sample Vendors

Beekeeper; Blink; Flip; Headspace; Perkbox; WorkJam

## Gartner Recommended Reading

[Market Guide for Retail Workforce Management Applications](#)

[5 Best Practices to Attract and Retain Excellent Retail Store Associates](#)

## Workstyle Analytics

Analysis By: Lane Severson, Helen Poitevin, Matt Cain, David Pidsley

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

**Definition:**

Workstyle analytics (WSA) is a technology category that derives insights from employees' digital footprints and data. These footprints combined with this data offer insights as to how digital work gets done, and they help organizations improve personal and team effectiveness, application and device proficiencies, while processing performance within the constraints of responsible data use.

**Why This Is Important**

Most organizations do not collect data on or are unable to effectively measure the impact of their investments in digital workplace technology. With WSA, digital workplace leaders can justify the additional investment required to scale new technologies and improve personal and team effectiveness, often using behavioral science. Gartner predicts that, by 2026, artificial intelligence (AI)-enabled WSA will be essential to delivering a modern digital employee experience.

**Business Impact**

WSA capabilities include the collection, analysis and reporting of data, coupled with next-best actions. WSA provides insights into how employee workstyles, digital tools, processes and skills affect business effectiveness. This is essential to driving technology utilization and adoption, as well as identifying productivity inhibitors. WSA capabilities are provided by multiple technology solution markets, including productivity monitoring tools, digital adoption platforms and workplace analytics.

## Drivers

- Continued investment in digital workplace technologies requires IT leaders to provide insights on the impact of investment and ROI.
- Digital transformation requires visibility into the technologies that employees depend on, and how well they can use technology to improve work and productivity.
- Budget and cost pressures are driving organizations to get more from their strategic technology investments. This includes reducing the use (and cost) of nonstrategic technology and driving greater adoption of strategic technologies.
- Remote work has changed managers' ability to promote collaborative behaviors and patterns, as they could in the office. The patterns themselves have also changed to be less time-bound, requiring leaders to adjust accordingly.
- Organizations are also looking for workplace experience data to improve the return to the office by helping those struggling with remote work and for insights into potential employee engagement and well-being issues.
- IT leaders are looking for data to baseline and measure the improvement of the stability, availability and performance of the devices and systems they deliver, especially as changes are made.
- Research shows that establishing hybrid work policies and norms is critical to attracting and retaining talent. WSA tools can help discover patterns of how workers interact using digital tools. This visibility is critical to have, while defining the policies and norms.

## Obstacles

- WSA capabilities often span several departments in larger organizations, which complicates sourcing processes.
- There is limited data literacy in the management population. Many people leaders are unable to describe the metrics they'd want to use to identify signs of well-being or productivity.
- Unionized workers or legal/regulatory limitations on data collection due to privacy concerns can be obstacles.
- Workers often fear employers will misuse data for employee surveillance.
- The cost and complexity of aggregating data and insights across multiple WSA tools and multiple worker segments, and the difficulty in discerning the difference between correlation and causation can be obstacles.
- Paying too much attention to experience scores and benchmarking inside analytics tools can misclassify efforts, due to algorithms that lack context or sophistication.
- There can be a delta between what organizations want from WSA and what can actually be done with the data collected.

## User Recommendations

WSA has passed the Peak of Inflated Expectations as more organizations use WSA to:

- Ensure policy and legal compliance by partnering with HR and legal. Make sure that assumptions and conclusions are reviewed by analytics professionals.
- Avoid tool sprawl by reviewing existing capabilities in the current portfolio of services that have elements of WSA and understand vendor direction before buying new.
- Minimize risk by training managers on appropriate use before granting access and ensure that employees understand the intent and use of WSA.
- Avoid irrelevant comparisons to other companies by using tool-provided experience scores to baseline and measure your progress.
- Ensure that WSA can drive specific business outcomes, such as promoting worker digital dexterity, and WSA can be adapted to a wide variety of personas and use cases.



## Sample Vendors

ActivTrak; Humanyze; Microsoft; Prodoscore; Scalable; Temporal; WalkMe; Worklytics; WhatFix; Userlane

## Gartner Recommended Reading

[Innovation Insight: Workstyle Analytics](#)

[Getting Value From Measuring Employee Experience, Productivity and Well-Being](#)

[Employee Monitoring and Privacy Laws: What Organizations Can Do?](#)

[Quick Answer: How to Communicate Employee Monitoring to Your Workforce as a Tech CEO](#)

[How to Derive Value From Employee Productivity Monitoring Technologies](#)

[Market Guide for DEX Tools](#)

[Predicts 2023: Build the Digital Day of Tomorrow](#)

## Collaborative Work Management

Analysis By: Nikos Drakos

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

### Definition:

Collaborative work management (CWM) tools provide task-driven workspaces to enable business users to plan, coordinate and automate their work. They combine task, project, workflow and automation capabilities, with discussions, content publishing, reporting, analytics and dashboards.

## Why This Is Important

CWM empowers business users to plan, coordinate, manage and optimize common repeatable work activities and processes. CWM fills a gap between free-form collaboration and business/custom applications. CWM tools play a role in accelerating business-led democratized delivery, which is a key ingredient of digital transformation.

## Business Impact

CWM improves activity coordination in a transparent and agile manner. It empowers business users to plan, execute, coordinate, optimize, and increasingly, automate day-to-day work. It makes work visible for all stakeholders and ensures delivery within timelines, budgets or resources.

## Drivers

- **Remote and hybrid work.** There is a rise in interest in CWM, consistent with the increase in remote and hybrid work. In-person meetings and conversational channels lack focus and context, and are not enough to provide clarity and alignment. CWM tools are a natural complement to workstream collaboration, visual collaboration tools and meeting solutions.
- **Rising customer demand for a variety of work use cases.** Buyers are recognizing the relevance of CWM and related modeling tools such as collaborative workflow applications in supporting work processes that are collaborative by nature but may not justify purchasing or building new applications. CWM tools empower business users to plan, execute and automate work in scenarios that include everyday projects, case tracking, service operations, product management, strategic operations, goal tracking and work scheduling.
- **Interest from vendors in adjacent markets.** Vendors are entering this market from adjacent markets. These include project management, workstream collaboration, work hub/cloud office suites, employee communications, frontline worker applications, low-code development tools and business applications. Vendors are recognizing an opportunity to position their products as solutions that appeal to a much broader user base.
- **Demand generation tactics.** Vendors are trying to gain market share with freemium products that target business users and small teams directly. They are also trying to tap into departmental budgets with prebuilt work templates such as for marketing work management, objectives and key results (OKR), or intake management. One consequence of this use-case-specific vendor push is that many organizations end up purchasing more than one product, each deployed in a narrow business domain.

## Obstacles

- **No enterprise role for steering large-scale deployments successfully.** CWM solutions are often introduced by end users or via small departmental deployments. There is a need for a leadership role to guide broader use that is aligned with business goals, along with guidelines and practices.
- **Lack of experience with governance at scale.** Business users are effectively using CWM tools to build applications for modeling or automating work. This has implications for roles and responsibilities in quality control, data management, release management, maintenance and long-term support.
- **Culture attitudes and skills readiness.** Some business teams/groups are not accustomed to working transparently or do not welcome more autonomy.
- **Vendor and product risk.** Some vendors are relatively small in a market that is changing rapidly where large platform vendors have yet to enter the market. Buyers face a higher vendor and product risk than in more mature markets.

## User Recommendations

- Identify and prioritize relevant use cases by focusing on business-led projects and specific business operations, and by identifying stakeholders, participants, work patterns and business context to ensure business alignment.
- Audit current use of CWM tools to find pockets of tactical use and to understand business relevance and impact. Begin to rationalize choices and iterate by testing products and analyzing vendor risk and employee readiness with targeted deployments to ensure that use-case-specific needs are addressed.
- As usage increases, prepare for the long haul by establishing roles, support structures and governance principles to ensure consistency, quality and best practice diffusion across different work activities.

## Sample Vendors

Adobe; Airtable; Asana; ClickUp; monday.com; Smartsheet; Wrike

## Gartner Recommended Reading

[Market Guide for Collaborative Work Management](#)

[Quick Answer: How Can the Digital Workplace Drive More Visibility Into How Work Gets Done?](#)

## Forecast Analysis: Social and Collaboration Software in the Workplace, Worldwide

### Quick Answer: How Can We Use Microsoft 365 to Support Collaborative Work Management?

### Quick Answer: What Collaboration Skills Are Necessary for New Ways of Working?

#### **Mixed Reality**

**Analysis By:** Tuong Nguyen, Marty Resnick

**Benefit Rating:** High

**Market Penetration:** Less than 1% of target audience

**Maturity:** Adolescent

#### **Definition:**

Mixed reality (MR) is the merging of real and virtual worlds, where physical and graphical objects appear to interact and integrate naturally. MR, in concept, is a single technology. However, MR includes an underlying group of technologies encompassing the spectrum of immersive displays and interactive systems that spans from the digitization of real environments to augmented reality (AR) and virtual reality (VR).

#### **Why This Is Important**

MR enhances the user's surroundings with real-time, relevant, interesting and/or actionable information, but adds a layer of sophistication through advanced, contextual understanding of the scene and situation. This makes MR (as a digital filter) more dynamic, relevant and immersive, creating a more seamless experience or interface between the digital and physical world. For example, an AI Avatar walking around furniture rather than through furniture or walls.

#### **Business Impact**

Today, MR capabilities focus on optimizing "hands busy" work environments, such as maintenance and repair. Over time, MR will expand to include experiences that can visually enhance everyday objects. New business models will emerge, which will change how customers buy products using MR or how they conduct operations by visually connecting the user's view of the real world with their data-driven virtual world counterparts. For example, rapid prototyping and testing of products and marketing

## Drivers

- Growth and maturity of underlying technologies, such as computer vision, scanning technologies, geopose, AR Cloud, mapping, modeling, head-mounted displays, edge processing and high-bandwidth, low-latency networks, and generative AI, are making MR experiences more viable.
- Metaverse hype (especially for the spatial computing aspects) has also provided positive momentum on MR.
- Cross-pollination benefits digital twins for support, design and collaboration purposes, and MR as a 3D visualization and interaction tool.

## Obstacles

- **Content:** Digitization efforts have seeded the market with some content, but will need to be increased by orders of magnitude to make MR useful for the mass market.
- **Control:** MR adds a layer of control complexity over AR because it moves beyond a simple digital overlay. It includes active interaction with and of the digital aspects of a physical scene. For example, “touching” and “feeling” a digital object, or hearing a digital object coming from a distance or overhead. This also requires systems that are sufficiently sophisticated to understand the environment, context and the processes of a scene/situation.
- **Convenience:** Head-mounted displays (HMDs) are the primary device for MR experiences. They are both high priced and purpose built. Until there is better access to form factors that make these experiences seamless and valuable, this will be a hindrance. For example, handheld devices deliver a poor user experience for extended MR usage, and HMDs are both high priced and purpose built.

## User Recommendations

- Apply MR technology to enable new types of experiences and interactions involving 3D visualization and manipulation of digital objects in the real world. Use cases such as just-in-time checklists and remote support with simple telestration are better served with AR.
- Assess the tactical value of MR. While it may be the culmination of AR and VR technologies, MR will demonstrate more value in scenarios which benefit from physical interaction and manipulation where digital are aware of or need to interact with the physical environment. For example, fitting new surgical equipment into dimensional constraints of an operating room, or redesigning a public space.
- Evaluate ROI potential by focusing on a small number of pilots benchmarked against traditional, non-MR experiences as well as AR and VR experiences.
- Build in-house expertise for MR experiences by hiring developers with immersive skills (such as gaming engine, 3D modeling and UI design).

## Sample Vendors

Google; Magic Leap; Microsoft; Nreal; ThirdEye Gen; Viewpointssystem

## Gartner Recommended Reading

[Emerging Technologies: Tech Innovators in Augmented Reality — Spatial Web](#)

[Emerging Technologies: Tech Innovators in Augmented Reality — AR Cloud](#)

[Emerging Technologies: Find Success With Head-Mounted Displays Despite Modest Market Growth Expectations](#)

[Emerging Tech: Venture Capital Growth Insights for Head-Mounted Display Technologies](#)

[Emerging Technologies: The Future of the Metaverse](#)

## Workstream Collaboration

Analysis By: Mike Gotta

Benefit Rating: High

Market Penetration: More than 50% of target audience

**Maturity:** Mature mainstream

**Definition:**

Workstream collaboration (WSC) tools create a persistent, chat-based workspace, divided into channels. Tools integrate direct and group messaging, along with meeting capabilities, file sharing, alerts, activity streams, tasks, bots, search and other plug-ins. They also come with APIs for customized applications.

**Why This Is Important**

WSC combines channel-based chat with task, meetings, content and application plug-in capabilities, making it a foundation for work hubs and modern teamwork. WSC is broadly deployed to improve productivity, providing means for organizations to broadly leverage generative AI, large language models, and Generative AI (ChatGPT). Advanced use for process-driven, operational or external use cases are emerging as a solution pattern called “collaborative workflow automation.” WSC tools inadequately support frontline workers today.

**Business Impact**

WSC is a core technology for digital workplace work hubs, often integrated with a variety of apps including visual collaboration and collaborative work management. By reducing digital friction, teams can work more productively to reduce cycle times. WCS tools acts as a policy control point for security, compliance, and overall governance. WCS can be used for a variety of work related to project, service and support, sales, and marketing activities. WSC tools are also used as chat-based “water coolers” to help team unity.

## Drivers

- The shift to hybrid working and requirements for effective teamwork when workers are dispersed makes WSC tools a focal point for integration of other tools, such as visual collaboration, into a digital workplace work hub.
- WSC tools form the core for work governance efforts, because they provide a centralized experience for organizations to satisfy communication, information-sharing and work management needs, while enabling IT to centralize policy, security and compliance controls.
- WSC is becoming the launch point for new classes of collaboration experiences that are tightly coupled with teamwork. Examples include visual collaboration apps and collaborative workflow automation (CWA).
- WSC vendors are delivering generative AI/ChatGPT capabilities into their products. AI will help employees summarize chat streams, find information, auto-create posts and discover hidden expertise and experts.
- WSC expectations increasingly include requirements for more-complex work scenarios beyond everyday productivity. Desires for WSC to better support low-code no-code features and the ability to compose business components into the team experience are beginning to emerge as organizations explore CWA use cases.



## Obstacles

- WSC tools are primarily designed for everyday productivity. However, some WSC vendors are shifting to address process, operational and frontline scenarios. If organizations deploy multiple tools without clear business value, the result may be increased costs and IT management complexity.
- Vendors are not collaborating on message interoperability. The use of multiple tools can create “chat silos” and lead to tool sprawl. Third-party vendors use public APIs to exchange messages between tools and can raise risk concerns.
- Frontline workers have not adopted WSC tools to the same extent as office workers.
- Employees struggle to socialize in WCS tools. “Water cooler” chat channels may not be easily discovered or sustained, making it difficult for staff to informally network with peers they work with.
- Low-code and no-code development in WSC are still emerging in terms of ease of use and output capabilities. Proprietary approaches can increase lock-in to the platform.

## User Recommendations

- Assume incumbent suite vendors (Microsoft or Google) address everyday productivity needs for WSC use. Remain open to adding WSC tools for process-driven, role-based and operational business scenarios based on business use case and value. Consider frontline workers’ needs as being “stretch goals” for WSC vendors.
- Prioritize internal communications, use of influencer networks, analytics, training, and best practice communities to help employees effectively use WCS tools.
- As team managers define the structure for how teams collaborate using WCS, make sure there is a high priority placed on intentional collaboration practices and etiquettes. This includes tactics to reduce “noise.” Generative AI will require additional governance and peer learning for effective use.
- Assess emergence of new capabilities related to superapps, CWA, generative AI, and low-code no-code thoroughly since new technologies, development practices, work hubs, and mobile experiences can present change management and risk issues.

## Sample Vendors

Alibaba Group; Coolfire Solutions; Matternost; Microsoft; Rocket.Chat; Salesforce (Slack); Symphony

## Gartner Recommended Reading

[Innovation Insight for Collaborative Workflow Automation](#)

[Forecast Analysis: Social and Collaboration Software in the Workplace, Worldwide](#)

[Quick Answer: How Will AI in Microsoft 365 Copilot Impact the Workplace?](#)

[Quick Answer: How Can Digital Workplace Promote Employee Strong and Weak Ties?](#)

[Quick Answer: How Does a Superapp Benefit the Digital Employee Experience?](#)

## Smart Badges

Analysis By: Tracy Tsai

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Adolescent

### Definition:

Smart badges are miniaturized integrated circuit cards in a device form factor that have built-in sensors and the ability to transmit data wirelessly. Sensor examples are infrared sensors, accelerometers and microphones. Unlike access management smart cards, smart badges are devices that provide advanced features in addition to access management — such as location-based contextual services and analytics — to improve workplace communication, operational efficiency and employee performance.

## Why This Is Important

Smart badges are increasingly important to empower workers with greater capabilities to perform and achieve business goals. For example, real-time location tracking, contextualized data transmission and intuitive interaction enhance user experiences and operation agility. Enterprises invest in technologies strategically to innovate the digital workplace, and smart badges can serve multiple functions to improve frontline workers' productivity and safety and enable digital transformation.

## Business Impact

To help improve the digital workplace, smart badges:

- Automate the tasks of collecting and analyzing information about the workers and their surroundings for efficient operations.
- Enhance workers' safety by detecting presence and events such as a sudden fall or entry into a restricted or dangerous zone and by quickly locating workers and guiding them to building exits.
- Augment workers with analysis of multiple contexts in real time to make decisions.

## Drivers

Smart badges worn by employees in the workplace have become an important information point about employees, their surrounding environment and status in the workflow process. The following major drivers are moving smart badges toward the Trough of Disillusionment:

- Enterprises' digital workplace initiatives to augment workers with better capabilities, such as insights or timely instructions to support their decisions and execute their jobs more effectively.
- Enterprises streamlining digital workflows to improve operation efficiency, such as automatic identification and validation of things/people, as well as authentication. Examples include contactless operations for retail point of sale (POS) systems to identify workers in close proximity and security authentication for single sign-on within organizations for access.
- Emergency management by tracking and alerting the nearest available staff on where to go when urgent help is needed via programmable buttons and two-way communication.

- Ensuring employees' safety, such as monitoring fall sensors to detect workers' operational safety, avoiding collision in forklifts or providing panic buttons.
- Improving the effectiveness of communication with event attendees, visitors or workers by sending relevant content, instructions or notifications. Electronic ink technologies and RFID allow information to be transmitted on smart badges' displays with customizable content.
- Enhancing digital workers' user experiences by recording employee/customer conversations and converting speech to text to evaluate staff performance or for compliance monitoring. For example, law enforcement employees wear smart badges with voice recorders to record and convert conversations into the system; some have camera badges to validate identification.
- Maturity of the technology solutions, such as electronic ink, RFID, indoor positioning systems, Near Field Communication, low-power GPS, Wi-Fi sniffers, Bluetooth low energy, long-range wide-area network (LoRaWan) time difference of arrival (TDoA) and sensors.

## Obstacles

- The mobile phone is a vital alternative despite being bigger and the battery power draining faster.
- Employees' privacy is a concern. Smart badges constantly collect information about workers' status, raising concerns around privacy intrusion, potentially reducing workers' morale and/or creating resistance toward smart badges.
- Complexity of integrating multiple technologies is a challenge for IT leaders based on different use cases and requirements. There is no "one size fits all" solution in the market.
- Fragmented technology solutions — such as sensors, form factors and software applications — may require customization to meet enterprises' business requirements, thereby increasing the cost.
- Strong justification for investment and measurable business benefits are often required.
- Many office workers now abandon badges and use smartphones. leaving smart badges more limited to front-line workers or customer-facing service staff.

## User Recommendations

- Work with line of business (LOB) leaders to identify which of their issues or tasks can be streamlined or assisted by apps on smart badges.
- Explain to employees how their individual identity is being masked to protect their privacy, and what kind of anonymous information is collected and used when implementing smart badges.
- Co-create the solutions with multiple technology providers by providing mutual benefits, such as helping providers to build business domain understanding in return for joint development.

## Sample Vendors

Boni Global; Group Dynamics; HID Global; Humanyze; Kontakt.io; rf IDEAS; SmartConnect; Soloinsight; SoloProtect; Zebra Technologies

## Gartner Recommended Reading

[A Human-Centric Workplace Framework for the Future of Work](#)

[How Emerging Technology for Smarter Office Spaces Will Impact Your Workforce](#)

[Critical Capabilities for Indoor Location Services](#)

[Market Guide for Event Technology Platforms](#)

## Drowsiness Detection

Analysis By: Rafael Benitez

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

**Definition:**

Drowsiness detection uses various technologies to determine whether a person is starting to experience fatigue and risks falling asleep while operating a vehicle or heavy and potentially dangerous equipment, or while performing vital tasks that require full concentration. The most common technologies assess heart rate, head position, eyelid closure, eye-gaze direction, attentiveness, blink rate and duration, pupil dilation, steering pattern, brain activity, skin conductance, and muscle activity.

**Why This Is Important**

Drowsiness detection can prevent accidents that could damage property and injure, or even kill, people. The relevant technology capabilities have matured significantly, resulting in fewer false positives. AI methods, such as machine learning, are increasingly used by vendors to help calibrate solutions. There is potential for use of drowsiness detection technology to be mandated by regulatory authorities, especially in jurisdictions with a track record of sensitivity to safety.

**Business Impact**

Drowsiness detection is highly relevant to organizations in the transportation and logistics industries that, for example, employ truck, bus and delivery drivers. By helping to reduce accidents, it reduces operating costs (in relation to liability and insurance) and improves a business's reputation.

**Drivers**

- There is increasing interest in drowsiness detection among organizations with employees who operate trains, buses, airplanes and heavy equipment. These organizations are keen to deploy technology that can prevent or reduce the probability of accidents.
- Some passenger vehicles already have drowsiness detection technology fitted as standard. These include vehicles from major manufacturers such as Ford (Driver Alert System), Mercedes-Benz (ATTENTION ASSIST), Nissan (Driver Attention Alert) and Volvo (Driver Alert Control).

## Obstacles

- Historically, false positives generated by drowsiness detection devices have been an issue, but devices are getting more accurate.
- Some of the technologies used may be perceived as intrusive, such as when they require a component to be worn on the body.
- There is still no recognized standard for drowsiness detection, and the accuracy of technologies varies greatly.
- Few vendors have extensive track records in this new technology.

## User Recommendations

Organizations whose employees or partners operate vehicles (such as buses, trucks, trains and aircraft) or dangerous and heavy equipment (such as construction equipment) on a large scale should:

- Investigate drowsiness detection technology as a means of reducing accidents, including fatal ones, among their employees, as well as among customers and third parties.
- Pilot solutions for at least three months prior to wider adoption, as there is a learning curve and fine tuning may be required to adequately assess individual drivers' alertness.
- Some technology providers in this market have extended their products to detect "distraction" (e.g., when someone is using a mobile phone while operating a vehicle or machine), and safety compliance (e.g., whether a seatbelt is being worn). Select vendors that offer more than drowsiness detection if their other safety assistance capabilities could benefit your organization.
- Use these technologies to optimize shift patterns.

## Sample Vendors

BMW Group; Cippa; Ford Motor Co.; Fujitsu; Mercedes-Benz; Seeing Machines; The Bosch Group; Volvo Group

## Gesture Control Devices

Analysis By: Roberta Cozza

**Benefit Rating:** Moderate

**Market Penetration:** 1% to 5% of target audience

**Maturity:** Emerging

**Definition:**

Gesture control devices are either dedicated wearables, or devices held in proximity to the user, that can capture body (hand, arm, head) movements, face gestures and microgestures. Gestures with specific semantic content can be interpreted by devices and software applications to enhance the human-machine interface (HMI), humanize AI avatars and understand behaviors using gesture analytics.

**Why This Is Important**

Increasing diversity of smart devices means that many will not have the traditional design suitable for touchscreens and keyboards. Additionally, trends like smart spaces mean that HMIs will be increasingly multimodal and contextual. Growing interest in immersive virtual environments for remote collaboration and experiences (i.e., metaverse), and interaction in digital and virtual worlds via AI avatars, will see more research on development of effective gesture recognition and analytics solutions.

**Business Impact**

Application vendors in productivity software, gaming, virtual reality (VR) and augmented reality (AR) simulations, smart spaces, automotive and robotics, and simulation and training around industrial machinery use gesture control devices to improve competency and enhance usability and safety. When delivering dedicated gesture control devices, key considerations are wearability, accuracy, ergonomics and connectivity. Predefined gesture sets must be intuitive, and as simple as possible, to reduce learning curve and respond to real deployment and usability challenges.



## Drivers

- With the UI paradigm evolving, gesture control is becoming a key capability in multimodal interactions for smart spaces and immersive environments. The trend toward immersive remote collaboration and the metaverse will spur more interest in gesture recognition. Companies such as Movella are producing gesture-sensing devices for various purposes, from professional athlete analysis to drone control.
- The growing trend of AI and generative AI around training and content creation via use of AI avatars will also increase interest in natural gesture recognition and control, to render more humanized gestures for avatars in virtual and digital work environments and situations
- One of the long-term impacts of the COVID-19 pandemic is more touchless interactions around interactive kiosks, public touchscreen/surfaces, elevators, vending machines, office and factory premises, and sign-in displays in medical settings. These use cases are accelerating the use of gesture recognition as an embedded capability in a number of user and worker settings.
- Gesture control devices have diverse form factors such as electromyography (EMG) armbands, straps or gloves. For example, prosthetic hands use EMG signals for gesture recognition and control.
- Gesture control devices remain a key accessory in VR and AR simulations to enhance users' immersive experiences. They are used in VR simulation environments, for rehabilitation and surgery in healthcare, and in sport sciences to understand and train professional athletes or for remote training/assistance.

## Obstacles

- The market for gesture control devices remains niche, driven mainly by customized solutions and interest from only specific verticals such as education, medical, gaming and manufacturing.
- The delivery of gesture recognition is not limited to gesture control devices. Gesture recognition is also delivered through alternative methods such as markerless detection of gestures via camera with computer vision.
- Gesture control devices generally have a high learning curve, requiring users to memorize predefined gestures.
- Depending on specific environments, alternative technologies such as voice UIs can easily replace triggering actions or gesture commands.

## User Recommendations

- Assess whether the pain point for a worker or customer is better addressed by a customized gesture control device or if other technologies featured in existing devices via cameras or voice UIs would deliver more user value.
- Invest or partner to include intelligence and analytics in your gesture control devices and solutions. Go beyond just gesture “control” to recognition, inference, prediction and understanding of user status from gestures to create more analytics value.

## Sample Vendors

CyberGlove Systems; MANUS; Movella; Noitom; Rokoko; StretchSense

## Gartner Recommended Reading

[Emerging Tech Impact Radar: Sensing Technologies and Applications](#)

## Climbing the Slope

### Augmented Reality

Analysis By: Tuong Nguyen

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Adolescent

#### Definition:

Augmented reality (AR) is the real-time use of information in the form of text, graphics, audio and other virtual enhancements integrated with real-world objects and presented using a mobile, head-mounted display (HMD) or projected graphics overlays. It is this “real world” element that differentiates AR from virtual reality. AR aims to enhance users’ interaction with the environment, rather than separating them from it.

#### Why This Is Important

AR is the next era of experience or interface that enhances the user’s surroundings with real-time, relevant, interesting and actionable information. Frontline workers in asset intensive industries (such as mining, engineering, construction, energy and utilities, logistics, manufacturing, healthcare) are currently showing the most benefit from this type of experience. Particularly using digital overlays that help employees do their job more efficiently, effectively and more safely.

#### Business Impact

Current technology is best suited for purpose-built and specialized solutions. As such, position and adoption speed for AR will vary greatly with vertical and industry; however, the benefits of AR include cost reduction and task efficiency and effectiveness. Current horizontal tasks seeing the most traction are procedural tasks, and situational video with telestration. Visual design and customer engagement are also seeing traction, but to a lesser extent due to technology and market limitations.

#### Drivers

- Growing interest in asset-intensive enterprises to improve employee safety, efficiency and effectiveness using AR for training and workflow improvement.

- AR software tools providing better integration and with more systems of record — enabling enterprise seamless interaction with existing systems (instead of managing individual applications).
- Evolving partnerships (improved ecosystem) of AR software and hardware; which are evolving into enterprise-ready and off-the-shelf solutions.

## Obstacles

- Turnkey solutions not available/viable, yet.
- Lack of appropriate digital content. AR is inherently digital, therefore, benefits organizations that are further along in their digitization journey.
- Limited accessibility: Current solutions are better described as AR-inspired solutions because these experiences contain elements of AR and offer limited, purpose-built capabilities; encapsulated within a stand-alone app, or for a specific task.
- Usability: New interface paradigms need to be created to handle interactions between physical and digital elements in 3D space. A mix of vocabularies of different interface modalities (speech, motion, touch, gesture and so forth) need to be defined and standardized to make AR interactions intuitive.
- Availability of form factors that make AR experiences seamless and valuable needs improvement. For example, handheld devices deliver a poor user experience for regular and extended AR usage; while the market for HMDs have few, purpose-built options.

## User Recommendations

- Select/clearly define your use cases. Set benchmarks against unaugmented solutions to understand risks and benefits and determine ROI.
- Set the business goals, requirements and measurements for your AR implementation before choosing a provider.
- Plan deployments around AR based on handheld devices (phones/tablets). HMDs have higher business value for all-day hands-busy tasks.

- Determine a clear intention for your deployment to ensure value. For enterprise, use AR as a tool to enhance employee job function for frontline workforce. This could include, delivering context-specific information when needed for field workers, better leveraging experts (using one-to-many video support) in plant and maintenance operations, or enhancing business processes via AR-based training and instruction.

## Sample Vendors

Augmentir; CGS; IrisCX; Librestream; OverIT; PTC; Scope AR; Taqtile; TeamViewer; Xerox

## Gartner Recommended Reading

[The Virtuous Circle of Collaboration With Augmented Reality in Field Service](#)

[Emerging Technologies: Tech Innovators in Augmented Reality – Augmentation and Spatial Interaction Layer](#)

[Emerging Technologies: Tech Innovators in Augmented Reality – AR Cloud](#)

[Emerging Technologies: Kick-Start Adoption With Essential Enterprise Augmented Reality Business Practices](#)

[Innovation Insight for Immersive Technologies in Frontline Working](#)

## Indoor Location for People Tracking

Analysis By: Tim Zimmerman, Annette Zimmermann

**Benefit Rating:** High

**Market Penetration:** 20% to 50% of target audience

**Maturity:** Early mainstream

### Definition:

Indoor location for people tracking is an umbrella of technologies dedicated to 2D and 3D tracking the location of human beings in an indoor context. The precision of these technologies can vary from a few meters to a few centimeters.

## Why This Is Important

Tracking people is important in a wide range of industrial, healthcare and personal security or safety situations. It poses different technical challenges depending on the position of the human body or the proximity of the tracking tag to the body. In addition, the energy used for communication may be absorbed or blocked, leading the application to “lose track” of a person if the right technology is not selected.

## Business Impact

Over 70% of enterprises looking to track assets also wanted to track people as part of a cohesive solution. From a safety standpoint, not being able to track people in dangerous situations or environments results in not only avoidable injuries but also loss of life. In certain geographies and industries, tracking people for safety reasons can be mandated by law.

## Drivers

- Safety and compliance for industrial environments including factories or plants where fumes, chemicals or temperatures create a safety risk, and construction sites for employee safety and anti-collision purposes (with equipment such as forklift trucks).
- Safety in healthcare pertaining to infants or the elderly, or hospitality workers who may not be aware when they are in a dangerous situation.
- Process optimization when employees are performing identified tasks such as tracking patients in hospital care workflows either in real time or geofenced for safety concerns. This can also apply to time and motion standards in manufacturing or other industries.

## Obstacles

- The biggest issue in people tracking continues to be privacy. People don't want to be arbitrarily tracked and want visibility on how the tracking data is used. In some countries, government councils may have to approve of such a solution and again in other situations, it may be illegal.
- Organizations must choose the right technology for the desired outcome. Some technologies cannot guarantee the location of the person being tracked 100% of the time.
- Cost, which may manifest itself as the cost of the tag (ranging between a few dollar cents for an RFID wristband to an over 100-dollar badge) or the cost of the infrastructure necessary to capture the information.

## User Recommendations

- Define the use case to ensure that the frequency of data collection and accuracy of the location meet the documented requirements. Vertical market solutions such as healthcare or construction may have industry-specific requirements or certifications.
- Consider additional use cases including data analytics or geofencing.
- Implement a center of excellence that reviews the limitations of differing radio frequencies, infrastructure implementation issues, form factor of tags, wristbands or lanyards that are needed to achieve the desired location, and battery life as well as competitive solutions.
- Deploy the correct technology because vendors may try to sell a solution that is applicable for assets but not for people tracking.
- Construct an ROI for any people tracking location investment since the cost of tags varies widely.
- Address pushback from workers' councils and unions by communicating a people-tracking project very openly and transparently, helping to loop in all stakeholders.

## Sample Vendors

AiRISTA Flow; CenTrak; HID Global; Litum Technologies; Midmark; Quuppa; Sonitor Technologies; Zebra Technologies

## Gartner Recommended Reading

[Magic Quadrant for Indoor Location Services](#)

[Critical Capabilities for Indoor Location Services](#)

[Market Guide for Indoor Location Application Platforms](#)

[Competitive Landscape: Indoor Mapping](#)

## Social Distancing Technologies

Analysis By: Nick Jones

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

### Definition:

Social distancing technologies help encourage individuals to maintain a safe distance from each other. Some of these technologies and solutions also provide contact tracing capabilities if an individual is discovered to be infected. Social distancing can be implemented in many ways, including via an app on a smartphone, as a feature of a location tracking system, via a dedicated wearable device or using observational tools such as video analytics.

### Why This Is Important

Social distancing is a tactical solution to reduce the impact of pandemics such as COVID-19. It can help organizations implement duty of care for employees when home or hybrid working is impractical and the business requires workers to be present in offices and factories. Social distancing, in combination with other precautionary measures such as masks, can help reduce the likelihood of infections spreading in the workplace. Contact tracing can help manage risks if infections do occur.



## Business Impact

Social distancing technology is one part of a multidimensional strategy that includes behavioral guidelines, new working practices, masks, infection testing, attestation, workplace sterilization and controlling visitor numbers. These tools are valuable when the organization cannot operate without on-premises staff or where there exist regulations or a legal duty of care to minimize the risks employees face.

## Drivers

- Some organizations — such as factories, warehouses, construction sites and process plants — cannot operate without on-site employees.
- Minimizing infection risk is, in some cases, a legal requirement — in addition to being good business practice and beneficial for employee relationships.
- Organizations want to provide tangible evidence to employees (and sometimes visitors) that they are concerned about their welfare.
- Without technological support, effective contact tracing is very difficult to implement.
- Some technologies can support other valuable anti-infection goals, such as encouraging regular hand washing.
- Social distancing technologies that track an individual's location can provide data for workplace and process restructuring to further reduce risk.
- Enhancements to Bluetooth distance measurement standards are planned in 2023, which will allow more precise measurement of proximity and enable better Bluetooth-based products in the future.

## Obstacles

- Most technologies have significant flaws related to distance measurement and will generate false positives and negatives.
- Some users will feel social distancing is an invasion of privacy because it involves location and behavior tracking.
- The cost can be significant — in some cases, hundreds of dollars per employee in addition to monthly service charges.
- In general, social distancing tools are more effective for use by employees rather than visitors, due to the overhead of administering loaner badges or devices and tying them to the identity of a visitor.
- Smartphone-based systems have significant technical limitations, unless used in conjunction with other technologies such as beacons.
- Some vendors and governments will deemphasize investment in social distancing technologies and abandon products now that the COVID-19 risk has decreased.

## User Recommendations

- Use social distancing technologies to manage infection risks for on-premises workers in the case of future pandemics because, despite limitations, these technologies can make organizations aware of infection risks.
- Explore dedicated proximity-warning devices, or equipment such as smart hard hats, modified to track proximity, to safeguard industrial, construction and blue-collar workers who may not carry smartphones in their normal work environment.
- Evaluate app-based solutions for staff in office-based environments to achieve the lowest possible total cost of ownership (TCO).

## Sample Vendors

AiRISTA; Estimote; Kontakt.io; ParkourSC; Quuppa; Radiant; Zebra Technologies

## Gartner Recommended Reading

[Magic Quadrant for Indoor Location Services](#)

## Smartwatches

Analysis By: Annette Zimmermann, Roberta Cozza

**Benefit Rating:** Moderate

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Adolescent

**Definition:**

A smartwatch is a wearable device that resembles a traditional watch. It serves as either a companion to a smartphone (for alerts, calls and voice commands) or a stand-alone smart device with Wi-Fi or cellular connectivity. Smartwatches must be able to transmit an electronic signal (for example, to control an external app or device), or transmit voice or biometric data from built-in sensors.

**Why This Is Important**

With smartwatches becoming a new hub of glanceable information and notifications, app development has gained a new dimension. Going forward, smartwatches will play an increasingly important role in employee health monitoring and wellness, enabled mainly by a “bring your own watch” approach.

**Business Impact**

Smartwatches impact day-to-day activities such as quick glanceable notifications, messaging and payments. Frontline workers and sales professionals benefit from safety via location tracking and productivity gains, respectively. Since the COVID-19 outbreak, several health apps have started to leverage their integration with third-party smartwatches, such as Apple Watch, to perform symptom monitoring — the Cardiogram app is an example.

**Drivers**

This technology has moved one position forward on the Hype Cycle, primarily driven by the following factors:

- Some smartwatches can detect a fall, triggering an automatic SOS call.
- This technology offers an alternative for organizations interested in people-tracking solutions but unable to deploy a product due to legal requirements.
- There is some interest from retailers looking to provide smartwatches to in-store staff in order to enable subtle notifications.

- Healthcare providers are exploring smartwatches for remote health monitoring including patient exercise, sleep and heart rates, especially after discharge from the hospital.
- Other use cases emerging in enterprises are voice-enabled note taking, task management and invoicing.
- Smartwatches can interface with software and apps to provide alerts and reminders about key customers.
- The introduction of embedded cellular connectivity has enabled more independence from smartphones and better access to glanceable data and microinteractions in situations when hands-free is critical.

## Obstacles

While this technology is already quite mature, its adoption in enterprises remains low due to the following factors:

- The most important obstacle remains cost. Leading smartwatch models from Apple and Samsung cost \$300 or more, which does not justify an occasional use scenario.
- Another important hurdle closely tied to the first one is the lack of must-have use cases and application for enterprises outside of health-related activities. Smartphones are not yet considered “a must-have device.”
- The small screen size makes smartwatches restrictive in use and therefore unable to replace smartphones.
- Use of smartwatches in organizations raises critical concerns around employees’ privacy and compliance with regulations, as wearables can potentially continue to collect a large amount of personal data (location, biomarkers and fitness/health information).
- Most smartwatch models are designed for the consumer market, and hence form factor and durability do not speak to industrial environments. There are some ruggedized models in the market but they tend to be more expensive.

## User Recommendations

- Provide smartwatches connected to personal mobile emergency monitoring services in order to ensure safety for lone workers (such as real estate agents or taxi drivers). There could be a business case where the smartwatch has a lone worker monitoring function, which also adds significant value to work processes.
- Use a smartwatch instead of a smartphone or an IT device, where possible, to increase employee performance or support compliance by enabling haptic alerts for geofencing or using the watch as an ID token for access control.
- Include smartwatches in your corporate policy for the use of personal mobile devices at work, because consumers who purchase smartwatches will want the convenience of wearing them for work as well.

## Sample Vendors

Apple; Google; Lenovo; Samsung Electronics

## Gartner Recommended Reading

[Emerging Tech: Critical Insights on Smartwatch Evolution](#)

[Emerging Tech Impact Radar: Personal Technologies](#)

## Ring Scanner

Analysis By: Rafael Benitez

Benefit Rating: Moderate

Market Penetration: 20% to 50% of target audience

Maturity: Mature mainstream

### Definition:

A ring scanner is a small form factor wearable bar code scanner that can be worn as a ring, strapped onto the top of one or two fingers of either hand. Its design and placement allows workers to simultaneously scan items while also freeing both their hands to handle materials or do other tasks. The imager in ring scanners uses laser or LED for illumination, and come with corded or cordless (Bluetooth) device connectivity options for handheld or mobile computers.

## Why This Is Important

Ring scanners enable hands-free operation, unlike traditional scan guns, leaving hands free to hold or move packages or materials during use to improve productivity. Recent developments in LED and low-power Bluetooth technology have improved scan capabilities and battery life significantly, and have opened up new opportunities for the technology.

## Business Impact

Impacts include:

- Ring scanner technology is highly relevant to organizations using handheld scanners in these industries and use cases – in **retail**, receiving of merchandise and inventory management; in **warehousing**, pick and pack, loading, and sorting; in **manufacturing**, inventory management and parts tracking; and in **transportation and logistics operations**, warehouse management.
- Organizations seek ring scanner technology for ease and speed of scanning, and productivity improvement especially when users need both hands to handle materials.

## Drivers

- Ring scanners can be used as the only scanning device, replacing conventional handheld scan guns, while increasing in multimodal use when combined with technologies like keyboard (worker can type without putting scanner down first, as is the case with handheld scanner), voice or head-mounted displays (HMDs)/smartglasses.

## Obstacles

Challenges with ring scanners include:

- The trade-off decision at acquisition time
- A simpler/less rich user interface (compared to scan guns) and
- Usually a shorter scan range.
- Most ring scanners are available with cordless Bluetooth or corded connectivity versions.

- Ring Scanners with Bluetooth connectivity are free from cables and can be perceived as more comfortable, and safer from cord snags, but on the downside, has shorter battery life, needs additional charging equipment for the ring scanner, and has Bluetooth pairing issues.
- Ring Scanners with corded connectivity are usually more reliable, until the cable fails from wear and tear. It can also leverage power from a bigger power source like a mobile computer clipped to a belt or strapped to an arm.

## User Recommendations

- Investigate/pilot ring scanners as tools that can potentially increase productivity and improve ergonomics at the same time when changing warehouse layout or logistics processes.
- Collect your performance requirements, especially the nearest and furthest decode range.
- Select ring scanners that support ambidextrous operation.

## Sample Vendors

Datalogic; Eurotech; Honeywell; Zebra Technologies

## Wristbands

Analysis By: Roberta Cozza

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

## Definition:

Wristbands are electronic devices that have band or bracelet designs, with or without displays. Wristbands have wireless connectivity and are used for collecting data about the wearer's physical activities, biometrics, health and fitness, and for other purposes, including, safety, access, location tracking, payments and data sharing. Examples of wristbands include the Fitbit Inspire or Garmin vivosmart series, at the higher end, and basic no display bands, at the lower end.

## Why This Is Important

Wristbands respond to people's increasing desire to improve well-being or monitor health. This trend accelerated with COVID-19 pandemic. Employers and workers have increased their attention to track health and wellness both at work and when working remotely. Wristbands with displays are also used to support on-the-go microinteractions, like messaging, or can be customized to support ad hoc tasks like authentication, tasks notification and building access, these are generally lower-end wristbands.

## Business Impact

Wristbands remain alternatives to smartwatches for some functionalities like location tracking or fall detection — they are lower priced and have longer battery life. Wristbands provide a way to engage employees and monitor performance and safety. Employers have become more focused on monitoring the wellness of employees and remote workers. Wristbands are not only used in corporate wellness solutions, but also used to improve employees authentication process or manage premises access.



## Drivers

- Increased use by healthcare organizations to provide holistic care through an accurate understanding of a patient's activity levels helps in early identification of health conditions, such as heart arrhythmia. Wristbands are increasingly including more sensors and capabilities, for example electrocardiogram to monitor heart health or electrodermal activity (EDA) tracking for stress levels. Wristband performance and activity tracking can also help shorten rehabilitation time.
- Wristbands enable touchless user interface (UI) for access, user authentication, payments and touchless access to shared devices/machines. The COVID-19 pandemic has accelerated and cemented the trend toward touchless interfaces for enhanced hygiene.
- Healthcare providers and insurance companies offer incentives for monitoring fitness and health data via wristbands.
- New sensors and artificial intelligence technology embedded in wristbands are boosting the attractiveness and usefulness of wristbands. Some of the latest improvements based on more accurate and new sensor technology are around vital signs analytics, and personalized advice and coaching. An increasing number of professional sport associations are using premium wristbands to improve athletes performance; frontline workers with high demand of physical strain and activity can also benefit from wristbands, which can monitor and improve their performance and fatigue levels.
- The evolution of dedicated chipset solutions is improving overall battery life and performance despite embedded sensors.
- Wristbands generally have lower average selling prices (ASPs) compared to alternatives like smartwatches. Another advantage of wristbands is their simpler UI and longer battery life.
- Fitness gyms and health and life insurance agencies use wristbands as a way to extend engagement by gathering data on exercise outside of the facility. Theme parks, resorts and entertainment venues use wristbands for user access, on-site purchases, customer engagement and pedestrian traffic analysis.

## Obstacles

- The growing appeal of smartwatches' broader capabilities. In addition, more value vendors enter the smartwatch market, increasing competition and accelerating decline in smartwatch ASPs. Even premium vendors like Apple and Samsung have been broadening their portfolios by offering low-cost versions of their smartwatches.
- Evolving smartwatch capabilities like cellular connectivity and integration of more sophisticated embedded sensors continue to improve smartwatch appeal as they offer much broader capabilities than wristbands. The addition of cellular connectivity makes the smartwatch a more flexible and to some extent productive independent wearable from the smartphones.

## User Recommendations

- Assess using wristbands in the enterprise instead of, or in addition to, corporate badges for access to buildings and information. They can also be used for receiving notifications from apps, incoming call or text alerts, enabling microinteractions in hands-free mode, increasing remote-worker safety by detecting falls, tracking location, and contacting help in an emergency.
- Explore wristbands as customized solutions to enforce touchless interactions with shared equipment or surfaces in the workplace in the wake of more stringent hygiene measures following the COVID-19 pandemic. Explore how the use of wristbands can also help manage employee flow in communal work areas via tracking.
- Address privacy and security concerns as wristbands can track and collect a wide range of sensitive physical and behavioral data like location or health data. Set strategies with HR and legal leaders to drive ethics standards and ongoing compliance with privacy regulations.

## Sample Vendors

Fitbit; Garmin; Innominds (Nymi); Xiaomi

## Gartner Recommended Reading

[Emerging Tech Impact Radar: Personal Technologies](#)

## Healthcare-Optimized Devices

Analysis By: Rafael Benitez, Gregg Pessin

**Benefit Rating:** High

**Market Penetration:** 20% to 50% of target audience

**Maturity:** Mature mainstream

**Definition:**

Healthcare-optimized devices are ruggedized, typically handheld or wearable, and include bar code scanning. They have cases and physical controls made from special materials, such as anti-microbial plastics that can be cleaned and sanitized with aggressive disinfectants and cleaning agents used in a clinical environment. Unique designs ensure there are no surface features that can harbor bacteria and that the device can be operated hands-free (that is, via voice control), or wearing gloves.

**Why This Is Important**

Handheld devices have been adopted in clinical care delivery workflows as organizations increase care team communication, availability to patients, productivity, and care quality. However, organizations often use high-end commercial off-the-shelf (COTS) devices that are more difficult to clean and disinfect in a clinically appropriate manner without degrading the exterior. They may not be sufficiently rugged, and may not have design elements allowing for hands-free or gloved operations, posing a risk.

**Business Impact**

Factors to consider:

- COTS devices have a lower purchase price and a service life of approximately three years.
- Healthcare-optimized devices have a higher purchase price, but a lower total cost of ownership (TCO) given that service life generally exceeds five years.
- Battery life in between charges is much longer than for a typical COTS device. A fully charged healthcare-optimized device can typically last a full 12-hour shift, and the exteriors don't degrade when cleaned and sanitized frequently. This allows personnel to keep them ready for clinical service.

## Drivers

- Electronic health record systems are critical to the operation of healthcare organizations. In order to reap the expected benefits around increased compliance, quality and productivity, staff are increasingly equipped with handheld computing devices. Healthcare-optimized devices are capable of acquiring, accessing and displaying patient information, verifying patient identities, and dispensing medication. They reduce overall operational cost by enabling mobile access to important technology-based clinical information services.
- Healthcare-optimized devices improve clinician engagement by providing clinically safe mobile access to information needed during their shift. By supporting “glomo” (glove motion — the ability to be used with protective gloves on), these devices eliminate the need to put on and take off protective gloves to effectively operate the device enhancing productivity.
- Healthcare-optimized devices include special security features (such as encryption) that support healthcare organizations’ requirement to stay in compliance with the U.S. Health Insurance Portability and Accountability Act (HIPAA) and similar patient privacy and security regulations. This provides clinical staff mobile access to technology-based clinical information services while minimizing compliance risk for the overall enterprise.

## Obstacles

- The initial acquisition cost for healthcare-optimized devices is higher than for equivalent COTS devices as the former offer the additional ruggedness, wearability, hands-free controls and other features that support a clinical environment.
- Healthcare-optimized devices are also not as readily available for purchase when compared to consumer-level devices. As this market has fewer vendors than the consumer device market, unique dependencies come into play. Examples are supply chain limitations and support-level constraints including delayed device software updates that can lengthen the interval between security patching cycles.
- In some cases, the base device that the healthcare-optimized device is built from may be several generations of technology behind current consumer-level devices. This may be a detractor for clinicians that are accustomed to the latest generation of personal mobile devices.

## User Recommendations

- Perform a TCO analysis, comparing healthcare-optimized devices to consumer devices outfitted with protective cases. Factor in long-term operation costs and efficiency differences.
- To support the TCO, pilot healthcare-optimized devices with small clinical teams that are technically adept. Capture as much feedback as possible about the features and usefulness of the devices in the clinical workspace. Pay close attention to cleaning and sanitation processes, time involved, chemical usage and other operational factors to support the decision process.
- Allow for some personal usage of employer-supplied devices in order to offset the use of employee-owned devices that will occur. Personal devices that are exposed to clinical environments will create the same clinical risk you are attempting to avoid by implementing healthcare-optimized devices. Prevent employees from reaching for their own phone by letting them text or place calls from their employer-provided healthcare-optimized device.

## Sample Vendors

Honeywell; Spectralink; Stryker; Zebra Technologies

## Gartner Recommended Reading

[Market Guide for Ruggedized Devices, Global](#)

## Entering the Plateau

### Enterprise App Store

Analysis By: Dan Wilson, Sunil Kumar, Tom Cipolla

**Benefit Rating:** Moderate

**Market Penetration:** More than 50% of target audience

**Maturity:** Mature mainstream

#### Definition:

An enterprise app store delivers a curated set of approved applications for employees to install and use on mobile devices and computers. It is commonly delivered as a stand-alone offering or as part of an endpoint management tool. Unlike public app stores, where publishers and independent software vendors (ISVs) list apps for consumers, an enterprise app store focuses on approved and custom-developed apps for a discrete audience.

#### Why This Is Important

IT leaders want to centralize and streamline how employees find and install public and custom-developed applications. The enterprise store commonly includes both PC and mobile apps, but also may include virtual and SaaS apps in the catalog. Usually hosted within the unified endpoint management (UEM) tool, this private store presents a curated set of apps for installation and can reinforce application security configurations.

#### Business Impact

An enterprise app store is commonplace in enterprise organizations as a way to distribute and/or allow self-service installation of mobile and PC apps. Although there are still a few third-party options, the use of an enterprise app store within a UEM is the most common. Overall value is achieved by offering employees a single, central place to find and install all approved and preconfigured applications for any device.

#### Drivers

- Consolidation of disparate endpoint management tools, teams and processes is enabling the use of a single app store hosted in the UEM rather than having a separate store per tool.

- Improved cyber hygiene requires reducing admin rights and increasingly delivering consistently configured apps from a central location.
- Employees want self-service apps instead of time-consuming request-and-queue processes.
- Organizations generally do not want custom apps in public app stores, but the diminished ability to sideload apps is requiring them to do so or attempt to use an enterprise app store.
- Google and Apple are being more stringent while reviewing applications to distribute custom apps with their app stores.
- Existing UEM tools that already manage apps on both employee- and organization-owned devices provide the best enterprise app store experience for internal use cases.
- OEM-specific purchasing programs are difficult to manage without an enterprise app store.
- Privacy concerns are causing employees to think twice about or completely reject any requirements to enroll a personal device in a UEM. This restricts the ability to deploy apps directly to the device, so hosting them in an enterprise app store is the only option.
- Enterprise app stores ensure that employees are downloading the correct version of protected applications (for example, mobile app management [MAM] wrapped apps).

## Obstacles

- Limited interest in stand-alone app management or MAM has led to many third-party, stand-alone vendors pivoting to new markets or being acquired.
- Organizations that are unable or unwilling to consolidate disparate endpoint management tools into a single UEM will be dependent on and have to maintain a separate app store for each platform.
- Cloud-averse organizations leveraging a traditional client management tool instead of a UEM will find limited capabilities within the CMT enterprise app store.

- The preference for lighter-weight management for personal devices (BYOD) is limited just to apps with company data and limits the ability to push apps to devices that require enrollment.
- Most enterprise app stores do not offer business case and cost approval workflows, PC and SaaS-based license procurement and assignment, or turnkey integration with IT service catalogs. This may limit adoption to just prelicensed applications or require a notification to separately execute the disparate processes.

## User Recommendations

The use of an enterprise app store is very common and is based on reliable, proven technology. Hype is approaching the Plateau of Productivity and may exit the Hype Cycle next year. IT leaders should:

- Use a UEM-based enterprise app store to host and deploy preapproved public and custom-developed apps and manage associated licenses for internal use cases.
- Use stand-alone app store or MAM functionality for use cases in which internal policy, privacy legislation and/or employee demands prohibit the use of UEM-native capability.
- Automate application delivery by defining required apps by use case or persona and defining these in UEM or app management tool policies.
- Reduce the impact of removing administrative rights by promoting the use of the enterprise app store for self-service.

## Sample Vendors

Appaloosa Store; Applivery; Digital.ai; HCLTech; IBM; Ivanti; Jamf; Microsoft; VMware

## Gartner Recommended Reading

[Accelerate Windows and Third-Party Application Patching](#)

[How to Maximize the Benefits of Windows Modern Management](#)

[Quick Answer: Securing Company Data on Unmanaged Endpoints](#)

[Quick Answer: Are UEM Tools Good Enough for macOS Management?](#)



## Lone Worker Protection

Analysis By: Rafael Benitez

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Mature mainstream

### Definition:

Lone worker protection (LWP) devices use technologies that help determine if a worker is experiencing an emergency and notify a service center, which assesses the situation and dispatches assistance if needed. Basic devices can be activated by pressing a button or pulling a cord. More advanced devices may include fall detection, lack-of-motion detection, sudden vertical movement detection, location awareness, voice communication and text messaging.

### Why This Is Important

LWP devices are becoming mainstream in certain industries to increase the safety of workers in potentially dangerous settings, during incident response work or at remote locations. In some industries and use cases, such as fire departments, usage of LWP is mandated.

### Business Impact

LWP technology is widely adopted to enhance worker safety and security within the following industries:

- Field service organizations (handling hazardous materials)
- Energy or gas mining and exploration
- Utility companies (gas, electric, solid waste)
- Construction
- Marine industries
- Healthcare (home health)
- Manufacturing (handling hazardous materials)

- Agriculture and farming
- Security and public safety

## Drivers

- Recent advancements in sensor technology, mobile network technology and coverage areas have made it possible to improve the battery life of LWP devices, reduce their size and weight, and have made some LWP devices accessible virtually anywhere on Earth.
- This is further accelerated by the introduction of narrowband Internet of Things (NB-IoT) and LTE-M options in mobile networks resulting in good coverage and long battery life.
- The COVID-19 pandemic increased the number of lone workers as part of the need for social distancing. Although there has been a partial reversal of this trend as restrictions have eased, organizations are expected to continue demanding this particular use case indefinitely.

## Obstacles

- LWP solutions — including devices, communication links, and back-end services need to work “all of the time” and with “no excuses.” Ideally, they should also work with one-handed operation and have the option to be activated covertly (without raising suspicion). These requirements are challenging due to network and form factor limitations.
- Overly complicated solutions that require Bluetooth tethering and multiple devices that have to be charged decrease the end-to-end availability of service-level targets and the likelihood of the end-to-end solution operating properly when a distress button is pushed.
- Bulky devices add weight and reduce comfort and ergonomics.
- Battery life may present significant limitations, especially in remote locations where electric power to recharge is unavailable.
- Reliable connectivity in very remote places may be challenging and/or costly to obtain (especially if not satellite-based).

## User Recommendations

- Seek products with simple designs that make operation as easy as possible, handy and always operable. A single-purpose device that is self-contained will always deliver a higher SLA than devices that depend on other devices or services being available to operate.
- Select LWP solutions that demonstrate the highest levels of dependability, as an undependable LWP solution is worse than not providing one at all.
- Leverage future products, as they become available, that are likely to include warnings for proximity to dangerous objects and to monitor for dehydration and stress. Some specific functionalities, such as “man down” and gas spectrometry, are already available in purpose-built smartphones and smartwatches.
- Mitigate battery life limitations with solar charging and vehicle charging, if possible.

## Sample Vendors

ECOM Instruments; Garmin; Globalstar; MSA Safety; Peoplesafe; SoloProtect; Sonim Technologies; Twig Com; ZOLEO

## Push to Talk

Analysis By: Rafael Benitez

Benefit Rating: Moderate

Market Penetration: 20% to 50% of target audience

Maturity: Mature mainstream

## Definition:

Push to talk (PTT) refers to applications or network-based services (cellular, Wi-Fi) allowing users to transmit their voice to other users with the push of a single button on modern handsets/smartphones/computers. Modern PPT concept is borrowed from legacy land mobile radio systems used by government, law enforcement and public safety. After speaking while pushing the button, other endpoints on a device's channel/frequency/group can hear what that person says until the button is released.

## Why This Is Important

Frontline worker use cases rely on apps on handheld computing devices such as smartphones that use data networks (Wi-Fi and cellular) for communications including PTT, audio broadcasts and messaging. Smartphones and apps can support PTT communications for specific business use cases, and allow organizations to consolidate devices for frontline workers, connect remote users and reduce costs.

## Business Impact

PTT is beneficial to these use cases:

- Coordination
- Command and control
- Urgently reaching individuals or groups of people simultaneously
- First responders (police/medical/fire)
- Security
- Transportation
- Dispatch
- Construction
- Manufacturing
- Hospitality

Advanced PTT systems offer telephony integration for dispatchers, control room operators and external users in channel-specific conversations, enabling members of a channel to communicate without disrupting other channels.

## Drivers

- Next-generation PTT solutions typically support dynamic channels (groups) based on location or role, or other factors which can be effected via APIs. These could be short-lived channels/groups to meet a specific task such as turning around an aircraft at a gate, or a semitruck (cargo vehicle) at a warehouse.
- Bots can also be part of a channel/group and listen in to perform tasks or execute actions based on the conversation (e.g., request an ambulance during first-aid incident responses).
- Organizations with established workflows that have relied on earlier generations of PTT technology desire upgrading to modern infrastructure, but continue to value hands-free use cases, using voice as they consider it the most effective way to communicate for these workflows.
- PTT enables device consolidation for frontline workers.

## Obstacles

- Traditional PTT can be very busy, “chatty” and intrusive, and has a user experience similar to walkie-talkie-style communication that can easily be overheard, with users waiting “in turn” to communicate. Next-generation PTT needs to overcome this user experience challenge and use very fine-grained, dynamically created and hierarchical channels and talk groups to showcase its value.
- Traditional PTT systems use radio frequency for transmission and also rely on dedicated endpoints. Next-generation PTT solutions need to continue to provide more transmission network compatibility options such as cellular, and IP networks (wireline, and wireless), and integrate into multipurpose handheld computing devices or wearable technology.

## User Recommendations

- Use PTT functionality on a mobile device to eliminate the need for a second device in scenarios where voice is used to coordinate the team activities.
- Seek compatible PTT accessories for mobile devices such as earpieces and handheld speakers/mics — if the mobile devices your organization already uses do not have dedicated PTT buttons. Accessory connectivity varies by vendor but includes wired 3.5 mm connectors with locking cams (to prevent unintended disconnections), and Bluetooth.
- Derive optimum value by using PTT when the groups are relatively small and communication isn't constant.
- Investigate if your current unified communications (UC) vendor offers PTT and evaluate it if they do — if your organization only requires entry-level or less challenging PTT use cases. This is because adjacent technology markets, such as UC (e.g., Microsoft Teams), are incorporating PTT-like capabilities into their products.

## Sample Vendors

Instant Connect Software; Motorola Solutions; Orion Labs; Spirent Communications; Zebra Technologies; Zello

## Device-Native Biometrics

**Analysis By:** Ant Allan, Robertson Pimentel, James Hoover

**Benefit Rating:** Moderate

**Market Penetration:** More than 50% of target audience

**Maturity:** Mature mainstream

### Definition:

Device-native biometrics encompasses embedded technologies that enable the use of a person's unique morphological traits to provide credence in a claim to an identity established for interactive access to an organization's digital assets. The technologies, which ordinarily enable access to the device itself, are integrated with a mobile business app or a third-party authenticator app via a vendor software development kit (SDK) or with Fast IDentity Online (FIDO) authentication protocols.

## Why This Is Important

Digital identity depends on authentication that can provide credence in an identity claim, sufficient to bring account takeover risks within an organization's risk tolerance, ideally without adding unnecessary friction. Integrating device-native biometrics within authentication flows — typically as an alternative to a password or PIN — takes advantage of users' everyday familiarity with them to optimize user experience (UX).

*Note that this is distinct from someone's access to the device itself.*

## Business Impact

Identity and access management (IAM) and other cybersecurity leaders in many verticals and geographies can benefit from device-native biometrics, which can:

- Be adopted in a wide range of use cases for employee and customer authentication.
- Be used alone or as an element of multifactor authentication (MFA).
- Enable passwordless authentication to avoid the risks and frustration that passwords generate.
- Optimize UX.

## Drivers

- Device-native biometrics are ubiquitous in smartphones and widely available in other endpoint devices, including face and fingerprint modes in Windows Hello for Business (WHfB) in Windows 10 and 11.
- Organizations become increasingly interested in and have successfully deployed passwordless authentication by integrating device-native biometrics are integrated in (1) customer-facing mobile apps, especially in banking, (2) mobile authenticator apps providing general-purpose passwordless MFA for employees and customers, and (3) Fast IDentity Online (FIDO) authentication protocols, especially FIDO2 generally and passkeys specifically.
- Organizations' imperatives to improve employee and customer experience (EX/CX) within a total experience strategy increase interest in optimizing UX for both employee and customer authentication.
- Device-native biometrics may ease compliance with privacy mandates in comparison with third-party biometrics.

## Obstacles

- Some people view biometrics as creepy or otherwise objectionable, due to a variety of concerns, such as: the risk of their biometric data being exposed or used in nefarious ways; the fear of being spied on, especially given the use of biometrics in surveillance; demographic bias and potential discrimination; and religious, cultural and civil rights objections.
- An attacker might use a presentation attack (e.g., using a picture of the target's face). The resistance of device-native biometrics to such attacks is often unknown to relying parties.
- Many implementations, such as WHfB, offer a nonbiometric alternative to biometric authentication by default (typically a PIN), which cannot provide the same credence or accountability.
- Availability, usability and reliability vary across devices, supported modes, populations and use cases, leading to inconsistent UX.
- Matching thresholds are set by device vendors, likely favoring UX over security.
- There is a lack of control over enrollment (WHfB is a notable exception).

## User Recommendations

- Optimize authentication UX or enhance trust by exploiting device-native biometrics across a wide range of use cases, especially for “everyday” authentication, as an alternative to passwords and PINs.
- Drive acceptance by being open and transparent about how the technology is used, and engaging in outreach to address people's concerns.
- While device-native biometrics give people exclusive control over their biometric data, do not neglect broader privacy concerns and any regulatory due diligence requirements that may apply.
- Bear in mind that the organization typically has no control over enrollment, matching thresholds, and so on, limiting the security benefits. (Some implementations, like WHfB, can partly mitigate these limitations.)
- Evaluate the use of third-party biometrics or other alternatives for higher-risk interactions, to provide device-independent authentication, to reflect the diversity of and personal preferences among the target population, and so on.



## Sample Vendors

Apple; Google; HTC; Microsoft; Samsung

## Gartner Recommended Reading

[Innovation Insight for Biometric Authentication](#)

[Market Guide for User Authentication](#)

[Innovation Insight for Many Flavors of Authentication Token](#)

## UEM Tools

Analysis By: Tom Cipolla, Dan Wilson, Craig Fisler, Sunil Kumar

Benefit Rating: High

Market Penetration: More than 50% of target audience

Maturity: Mature mainstream

### Definition:

Unified endpoint management (UEM) tools provide agent-based and agentless management of endpoint devices running Windows, Google Android, Chrome OS, Linux, Apple macOS, iPadOS and iOS. UEM tools apply data protection, device configuration and usage policies using telemetry from identities, apps, connectivity and devices. They also integrate with identity, security and remote access tools to support zero trust.

### Why This Is Important

UEM simplifies endpoint management by consolidating disparate tools and streamlining processes across devices and operating systems. UEM has expanded beyond management to offer deeper integration with identity, security and remote access VPN tooling to support a zero-trust security model. Leading UEM tools also use intelligence to drive automation, reduce IT overhead and improve the digital employee experience (DEX) through rich data collection and insights.

### Business Impact

UEM tools can streamline and improve endpoint management. Specific impacts include:

- Location-agnostic endpoint management and patching.

- Reduced total cost of ownership (TCO) by simplifying device management and support processes.
- Better security hygiene through consistent application of configuration and data security across all platforms.
- User-centric management across their corporate-managed and bring-your-own-device (BYOD) endpoints.

## Drivers

- Supporting hybrid workers requires tools that extend beyond a single platform or requires devices to be on a specific network to function.
- IT looks to simplify and streamline endpoint deployment, management and patching to enable provisioning of new devices for remote employees and reduce security risk through consistent controls and configuration management.
- Increasing emphasis on improving DEX requires greater visibility into endpoint performance, reliability and consistency. Advanced UEM tools offer this through broader use of analytics and automation.
- Consolidation of disparate endpoint support teams, tools, processes and definitions of success into a centralized endpoint management framework supports efficiency efforts and the transition to higher business-valued work.
- Increased cyberattacks demand faster patch deployment and improved configuration management control and compliance.

## Obstacles

- Legacy organization models where the responsibility for mobile and PC management, remote access, and security is distributed across several IT teams.
- Insufficient skills or resources to adopt new tools or practices.
- Heavy reliance on antiquated and ineffective high-touch practices of the past, such as monolithic imaging.
- Cost concerns for the small number of organizations that do not have an endpoint management tool.
- Organizations with many Active Directory Group Policy Objects (GPOs) that have little awareness of what each does will struggle to rationalize and migrate to configuration service provider (CSP) profiles.
- Highly complex environments with multiple Active Directory forests or domains, and/or autonomous subsidiaries or business units may struggle with the centralized nature of UEM tools.
- Fragile environments with a significant amount of technical debt, including legacy operating systems or applications that depend on unsupported browsers, runtime environments or plug-ins.

## User Recommendations

UEM has advanced toward the Plateau of Productivity as the tools mature and adoption has become mainstream. Most organizations have successfully adapted processes and refocused IT staff on simplifying and modernizing endpoint management. I&O leaders should:

- Improve endpoint posture and security, and ease operations by consolidating PC, macOS and mobile management into a single UEM.
- Review IT policies and procedures to identify and eliminate unnecessary references to or dependence on mobile device management (MDM), client management tools (CMT) or location-specific technologies. This will help avoid common inertia, limitations and excuses related to something being against policy.
- Upskill or replace IT engineers and support staff to increase the use of UEM, modern management and automation capabilities.

## Gartner Recommended Reading

[How to Maximize the Benefits of Windows Modern Management](#)

[Accelerate Windows and Third-Party Application Patching](#)

[How to Implement Continuous Endpoint Engineering: An Agile Approach for the Digital Workplace](#)

[Consolidate Endpoint Management Teams, Tools and Strategies to Reduce Cost and Optimize Operations](#)

## Appendixes

See the previous Hype Cycle: [Hype Cycle for Frontline Worker Technologies, 2022](#)

## Hype Cycle Phases, Benefit Ratings and Maturity Levels

**Table 2: Hype Cycle Phases**

(Enlarged table in Appendix)

| <i>Phase</i> ↓                       | <i>Definition</i> ↓  |
|--------------------------------------|--|
| <i>Innovation Trigger</i>            | A breakthrough, public demonstration, product launch or other event generates significant media and industry interest.   |
| <i>Peak of Inflated Expectations</i> | During this phase of overenthusiasm and unrealistic projections, a flurry of well-publicized activity by technology leaders results in some successes, but more failures, as the innovation is pushed to its limits. The only enterprises making money are conference organizers and content publishers.   |
| <i>Trough of Disillusionment</i>     | Because the innovation does not live up to its overinflated expectations, it rapidly becomes unfashionable. Media interest wanes, except for a few cautionary tales.   |
| <i>Slope of Enlightenment</i>        | Focused experimentation and solid hard work by an increasingly diverse range of organizations lead to a true understanding of the innovation's applicability, risks and benefits. Commercial off-the-shelf methodologies and tools ease the development process.   |
| <i>Plateau of Productivity</i>       | The real-world benefits of the innovation are demonstrated and accepted. Tools and methodologies are increasingly stable as they enter their second and third generations. Growing numbers of organizations feel comfortable with the reduced level of risk; the rapid growth phase of adoption begins. Approximately 20% of the technology's target audience has adopted or is adopting the technology as it enters this phase. |
| <i>Years to Mainstream Adoption</i>  | The time required for the innovation to reach the Plateau of Productivity.   |

Source: Gartner (August 2023)

Table 3: Benefit Ratings

| Benefit Rating ↓ | Definition ↓  |
|------------------|---|
| Transformational | Enables new ways of doing business across industries that will result in major shifts in industry dynamics  |
| High             | Enables new ways of performing horizontal or vertical processes that will result in significantly increased revenue or cost savings for an enterprise |
| Moderate         | Provides incremental improvements to established processes that will result in increased revenue or cost savings for an enterprise                    |
| Low              | Slightly improves processes (for example, improved user experience) that will be difficult to translate into increased revenue or cost savings        |
|                  |   |

Source: Gartner (August 2023)

**Table 4: Maturity Levels**

(Enlarged table in Appendix)

| <i>Maturity Levels</i> ↓ | <i>Status</i> ↓  | <i>Products/Vendors</i> ↓                            |
|--------------------------|--|--|
| <i>Embryonic</i>         | In labs  | None   |
| <i>Emerging</i>          | Commercialization by vendors<br>Pilots and deployments by industry leaders                 | First generation<br>High price<br>Much customization |
| <i>Adolescent</i>        | Maturing technology capabilities and process understanding<br>Uptake beyond early adopters | Second generation<br>Less customization              |
| <i>Early mainstream</i>  | Proven technology<br>Vendors, technology and adoption rapidly evolving                     | Third generation<br>More out-of-box methodologies    |
| <i>Mature mainstream</i> | Robust technology<br>Not much evolution in vendors or technology                           | Several dominant vendors                             |
| <i>Legacy</i>            | Not appropriate for new developments<br>Cost of migration constrains replacement           | Maintenance revenue focus                            |
| <i>Obsolete</i>          | Rarely used  | Used/resale market only                              |

Source: Gartner (August 2023)

**Document Revision History**[Hype Cycle for Frontline Worker Technologies, 2022 - 8 June 2022](#)[Hype Cycle for Frontline Worker Technologies, 2021 - 6 July 2021](#)[Hype Cycle for Frontline Worker Technologies, 2020 - 7 July 2020](#)[Hype Cycle for Frontline Worker Technologies, 2019 - 31 July 2019](#)[Hype Cycle for Frontline Worker Technologies, 2018 - 5 November 2018](#)**Recommended by the Author**

Some documents may not be available as part of your current Gartner subscription.

[Understanding Gartner's Hype Cycles](#)[Tool: Create Your Own Hype Cycle With Gartner's Hype Cycle Builder](#)[Cool Vendors in Manufacturing Operations, 2022](#)[The Future of Frontline Work](#)

© 2023 Gartner, Inc. and/or its affiliates. All rights reserved. Gartner is a registered trademark of Gartner, Inc. and its affiliates. This publication may not be reproduced or distributed in any form without Gartner's prior written permission. It consists of the opinions of Gartner's research organization, which should not be construed as statements of fact. While the information contained in this publication has been obtained from sources believed to be reliable, Gartner disclaims all warranties as to the accuracy, completeness or adequacy of such information. Although Gartner research may address legal and financial issues, Gartner does not provide legal or investment advice and its research should not be construed or used as such. Your access and use of this publication are governed by [Gartner's Usage Policy](#). Gartner prides itself on its reputation for independence and objectivity. Its research is produced independently by its research organization without input or influence from any third party. For further information, see "[Guiding Principles on Independence and Objectivity](#)." Gartner research may not be used as input into or for the training or development of generative artificial intelligence, machine learning, algorithms, software, or related technologies.



Table 1: Priority Matrix for Frontline Worker Technologies, 2023

| <i>Benefit</i>   | <i>Years to Mainstream Adoption</i>  |  |  |                             |
|------------------|--|--|--|-----------------------------|
| ↓                | <i>Less Than 2 Years</i> ↓   | <i>2 - 5 Years</i> ↓   | <i>5 - 10 Years</i> ↓  | <i>More Than 10 Years</i> ↓ |
| Transformational | Digital Employee Experience  | Connected Factory Worker<br>Frontline Worker EXTech in Retail  |  |                             |
| High             | Employee Communications Applications<br>Indoor Location for People Tracking<br>Lone Worker Protection<br>Smart Badges<br>Social Distancing Technologies<br>UEM Tools<br>Workstream Collaboration | Augmented Reality<br>Collaborative Work Management<br>DEX Tools<br>Drowsiness Detection<br>Healthcare-Optimized Devices<br>Remote Expert Guidance Solutions<br>Workstyle Analytics | Four-Day Workweek<br>Frontline Worker EXTech<br>Head-Mounted Displays<br>Mixed Reality | Workforce Nudgetech         |
| Moderate         | Device-Native Biometrics<br>Enterprise App Store<br>Push to Talk<br>Ring Scanner   | Smartwatches<br>Wristbands   | Galvanic Skin Response Devices<br>Gesture Control Devices                              |                             |
| Low              |  |  | Enterprise Wearable Device Management  |                             |

| Benefit | Years to Mainstream Adoption |               |                |                      |
|---------|------------------------------|---------------|----------------|----------------------|
| ↓       | Less Than 2 Years ↓          | 2 - 5 Years ↓ | 5 - 10 Years ↓ | More Than 10 Years ↓ |

Source: Gartner (August 2023)

Table 2: Hype Cycle Phases

| Phase ↓                              | Definition ↓   |
|--------------------------------------|--|
| <i>Innovation Trigger</i>            | A breakthrough, public demonstration, product launch or other event generates significant media and industry interest.   |
| <i>Peak of Inflated Expectations</i> | During this phase of overenthusiasm and unrealistic projections, a flurry of well-publicized activity by technology leaders results in some successes, but more failures, as the innovation is pushed to its limits. The only enterprises making money are conference organizers and content publishers.   |
| <i>Trough of Disillusionment</i>     | Because the innovation does not live up to its overinflated expectations, it rapidly becomes unfashionable. Media interest wanes, except for a few cautionary tales.   |
| <i>Slope of Enlightenment</i>        | Focused experimentation and solid hard work by an increasingly diverse range of organizations lead to a true understanding of the innovation's applicability, risks and benefits. Commercial off-the-shelf methodologies and tools ease the development process.   |
| <i>Plateau of Productivity</i>       | The real-world benefits of the innovation are demonstrated and accepted. Tools and methodologies are increasingly stable as they enter their second and third generations. Growing numbers of organizations feel comfortable with the reduced level of risk; the rapid growth phase of adoption begins. Approximately 20% of the technology's target audience has adopted or is adopting the technology as it enters this phase. |
| <i>Years to Mainstream Adoption</i>  | The time required for the innovation to reach the Plateau of Productivity.   |

Phase ↓

Definition ↓

Source: Gartner (August 2023)

Table 3: Benefit Ratings

| Benefit Rating ↓ | Definition ↓  |
|------------------|---|
| Transformational | Enables new ways of doing business across industries that will result in major shifts in industry dynamics  |
| High             | Enables new ways of performing horizontal or vertical processes that will result in significantly increased revenue or cost savings for an enterprise |
| Moderate         | Provides incremental improvements to established processes that will result in increased revenue or cost savings for an enterprise                    |
| Low              | Slightly improves processes (for example, improved user experience) that will be difficult to translate into increased revenue or cost savings        |

Source: Gartner (August 2023)

Table 4: Maturity Levels

| Maturity Levels ↓ | Status ↓   | Products/Vendors ↓                                   |
|-------------------|--|--|
| Embryonic         | In labs  | None   |
| Emerging          | Commercialization by vendors<br>Pilots and deployments by industry leaders                 | First generation<br>High price<br>Much customization |
| Adolescent        | Maturing technology capabilities and process understanding<br>Uptake beyond early adopters | Second generation<br>Less customization              |
| Early mainstream  | Proven technology<br>Vendors, technology and adoption rapidly evolving                     | Third generation<br>More out-of-box methodologies    |
| Mature mainstream | Robust technology<br>Not much evolution in vendors or technology                           | Several dominant vendors                             |
| Legacy            | Not appropriate for new developments<br>Cost of migration constrains replacement           | Maintenance revenue focus                            |
| Obsolete          | Rarely used  | Used/resale market only                              |

Source: Gartner (August 2023)