

SOLUTION SELECTION MATRIX

Guidebook

2023

Connected Frontline Workforce

Connected Frontline Workforce

Guidebook | 2023

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Overview

Efforts to digitally enable the frontline industrial workforce have become increasingly common over the past several years. Our research shows that over half of industrial organizations globally have undertaken Connected Frontline Workforce (CFW) initiatives. CFW has become a strategic part of Industrial Transformation (IX) initiatives as manufacturers seek to solve critical labor shortages, skills gaps, and retention issues in frontline operations.

CFW-enabling technologies hold the promise of helping companies meet their frontline workforce challenges while optimizing operational performance across safety, quality, and productivity dimensions. However, industrial business and technology leaders must navigate the uncertain waters of the relatively immature and highly fragmented CFW Applications market to capture the opportunity fully.

LNS Research is a leader in defining the CFW paradigm, with our first research on the topic published in 2018. We've since had broad and deep engagement on CFW and the Future of Industrial Work with many technology vendors and industrial organizations. This CFW Applications Solution Selection Matrix (SSM) is based on our body of research and provides our point of view on this emerging and dynamic market. It's intended for industrial organizations to better understand CFW Applications as a technology category and to assist in identifying vendors offering viable solutions for digitally enabling a future-ready frontline workforce.

72%

of industrial organizations report that frontline workforce hiring and retention issues have negatively impacted operational performance.

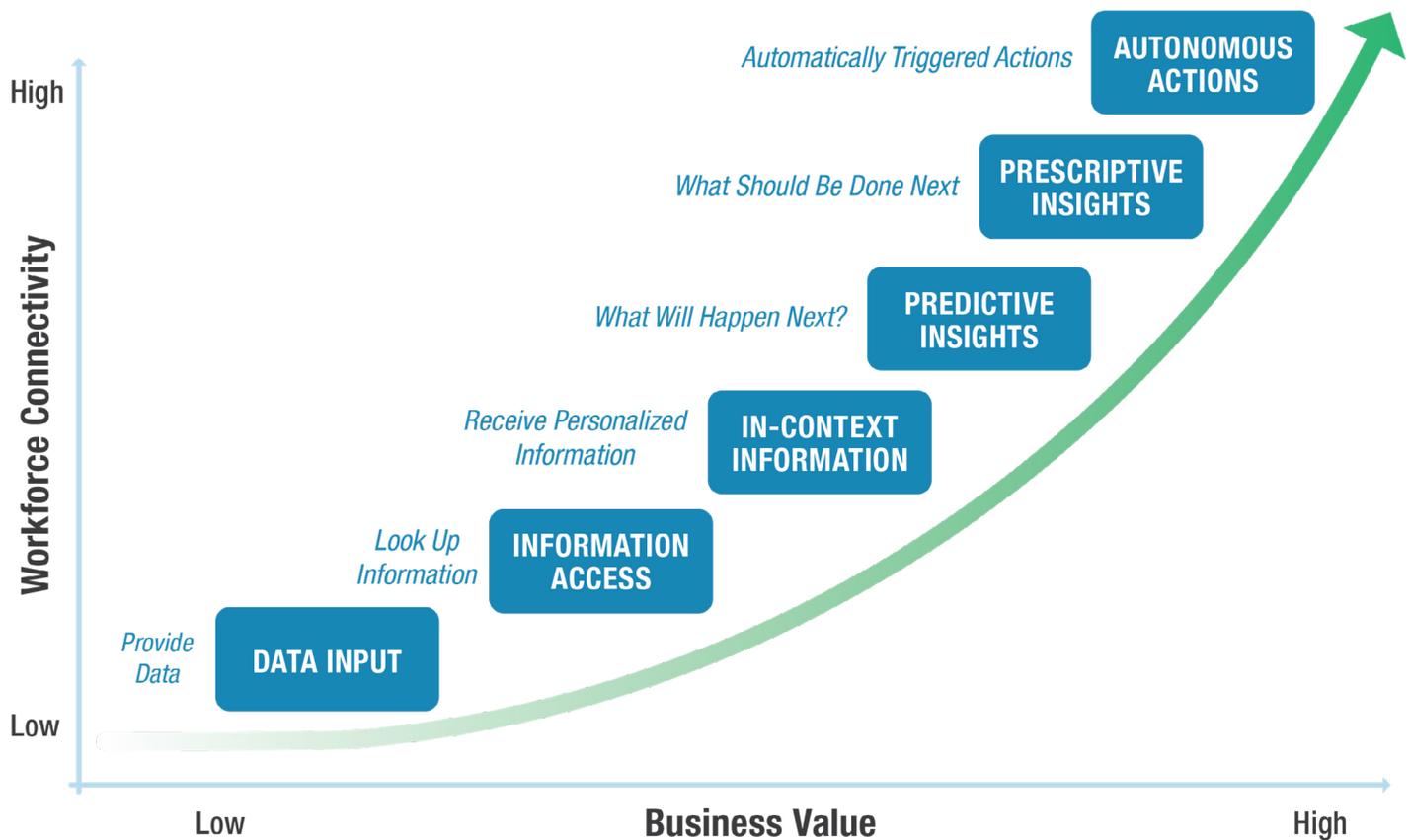
Definition of the CFW Applications Category

LNS Research defines Connected Frontline Workforce (CFW) Applications as commercially available, productized software applications that:

- Are designed for use by the frontline workforce in industrial operations, including production and maintenance employees.
- Augment human capabilities by enabling the multi-directional flow of data, digital content, information, insights, and actions to, from, and among workers and teams.
- Increase worker connectivity to and interaction with the overall operational management system and the work environment.
- Provide information in frontline operations to support better, faster decisions, real-time feedback and actions, and improved communication and collaboration.
- Deliver actionable insights for systematic improvement of how work is done, and to optimize operational performance.

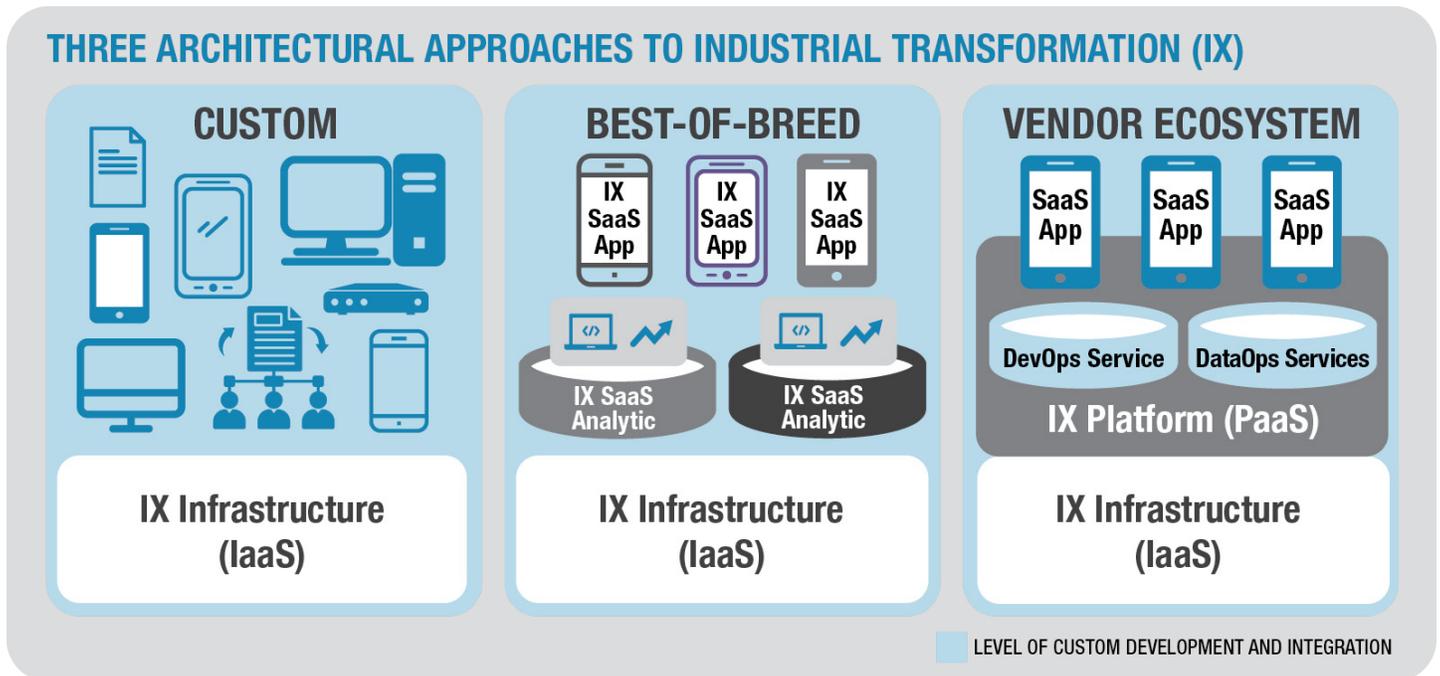
In essence, CFW Applications enable digital connectivity of the frontline workforce within operations greater than possible with traditional mobile applications. Figure 1 shows how this enhanced connectivity can enable greater business value through better support of work execution and actionable insights.

Figure 1 - Connected Frontline Workforce Value Curve



CFW Applications within the LNS Research IX Reference Architecture

Figure 2 - IX Architectural Approaches



In 2020, LNS Research announced a new vision for how industrial organizations can most effectively leverage the value of digital technologies: The [Industrial Transformation \(IX\) Reference Architecture](#). Further, we asserted that manufacturers and other industrials must choose one of [three architectural paths in the pursuit of IX](#) and the development of an IX Architecture: "Custom," "Best-of-Breed," or "Vendor Ecosystem," as illustrated in Figure 2.

This SSM is most beneficial for industrial organizations actively considering or having opted for a "Best of Breed" strategy and are therefore looking to create a CFW Applications vendor selection list. However, because of the specialized nature of CFW Applications, organizations that have chosen a Custom or Vendor Ecosystem strategy are also likely to augment their portfolio with dedicated CFW Applications.

CFW Applications and the IX Reference Architecture

Figure 3 shows the LNS Research Industrial Transformation (IX) Reference Architecture framework, which consists of five main technology components, plus the Ecosystem, needed to fully enable IX initiatives. The components most essential to CFW Applications are highlighted: Applications & Analytics, Development Tools and Libraries, and Ecosystem.

The product evaluation criteria used in developing this SSM are focused on Applications & Analytics. We consider this to be the foundation of an effective CFW solution, along with underlying core platform capabilities, such as integrated development environments and workflow engines.

CFW Applications and the IX Reference Architecture

Figure 3 - IX Reference Architecture for Connected Frontline Workforce

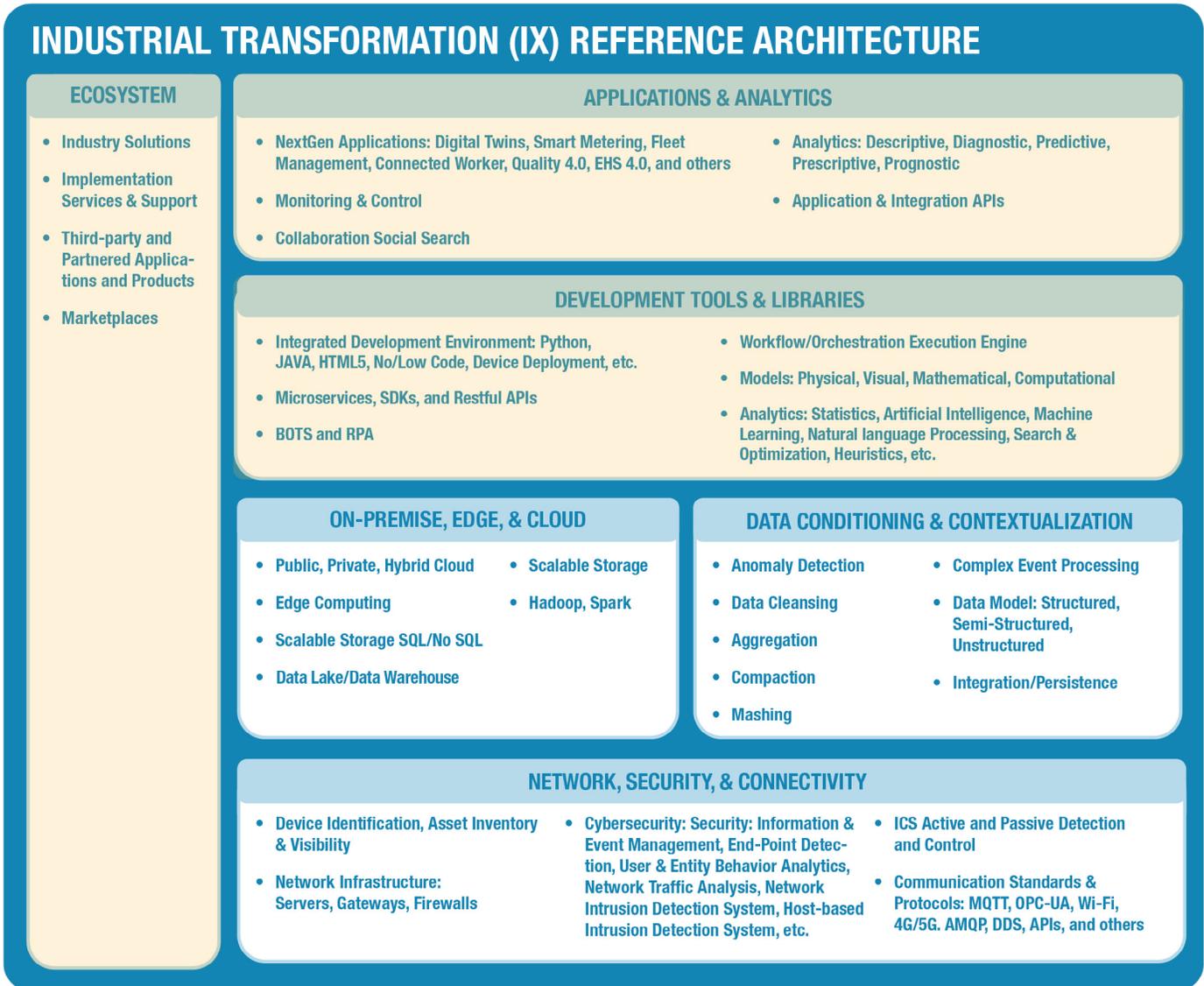
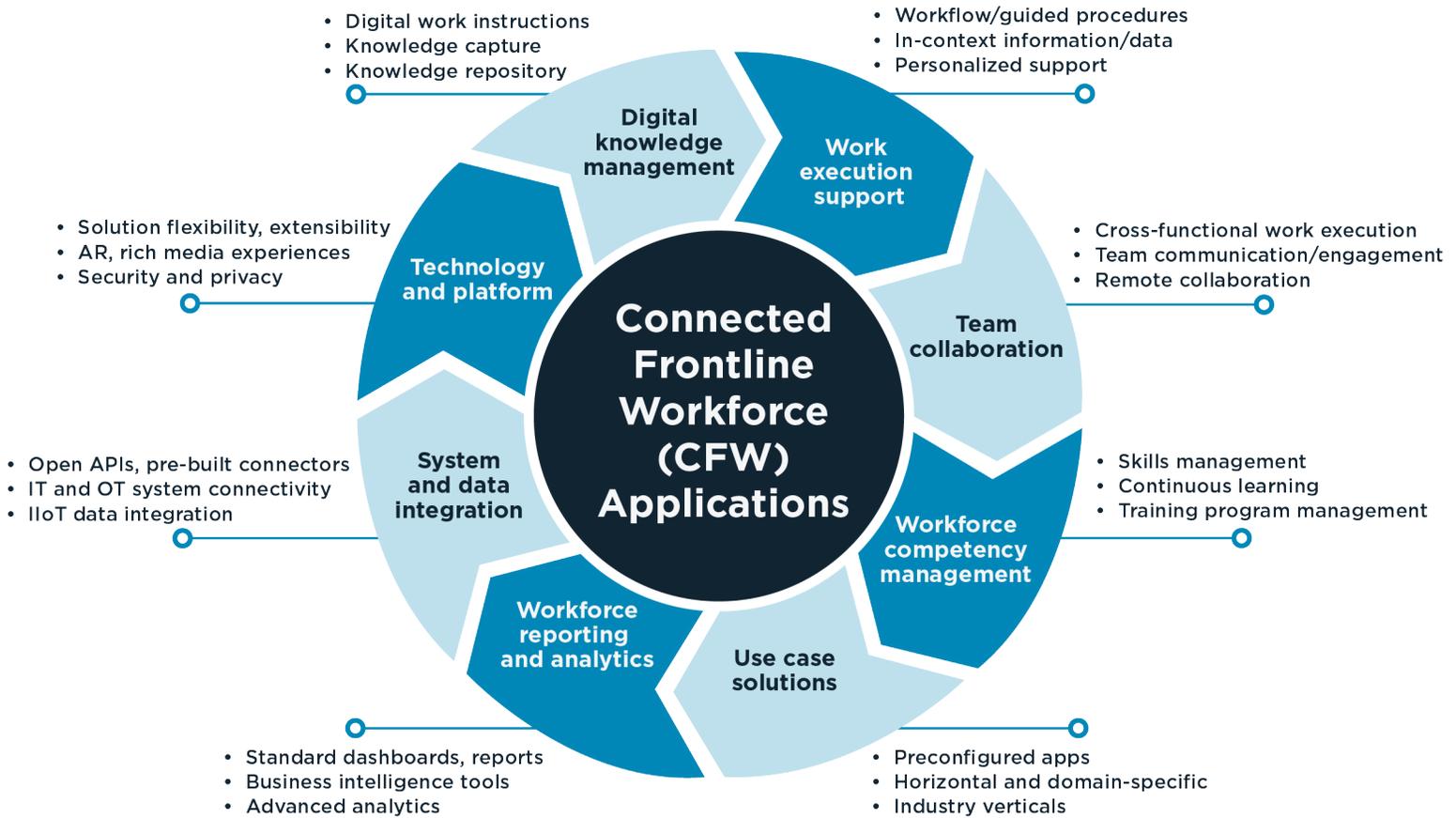


Figure 3 shows the LNS Research Industrial Transformation (IX) Reference Architecture framework. It consists of six main buckets of capabilities critical to capturing the full value of IX initiatives. The capabilities most essential to CFW Applications, highlighted in Figure 3, are Applications & Analytics, Development Tools & Libraries, and Ecosystem.

The product evaluation criteria used in developing this SSM are focused on Applications & Analytics. We consider this to be the foundation of an effective CFW solution, along with underlying core platform capabilities, such as integrated development environments and workflow engines.

Ideally, a properly selected CFW Application helps companies meet their frontline workforce challenges while optimizing operational performance across safety, quality, and productivity dimensions. CFW Application key capabilities, visually represented in Figure 4, provide the evaluation criteria for products and solution offerings.

Figure 4 - CFW Applications Key Capabilities

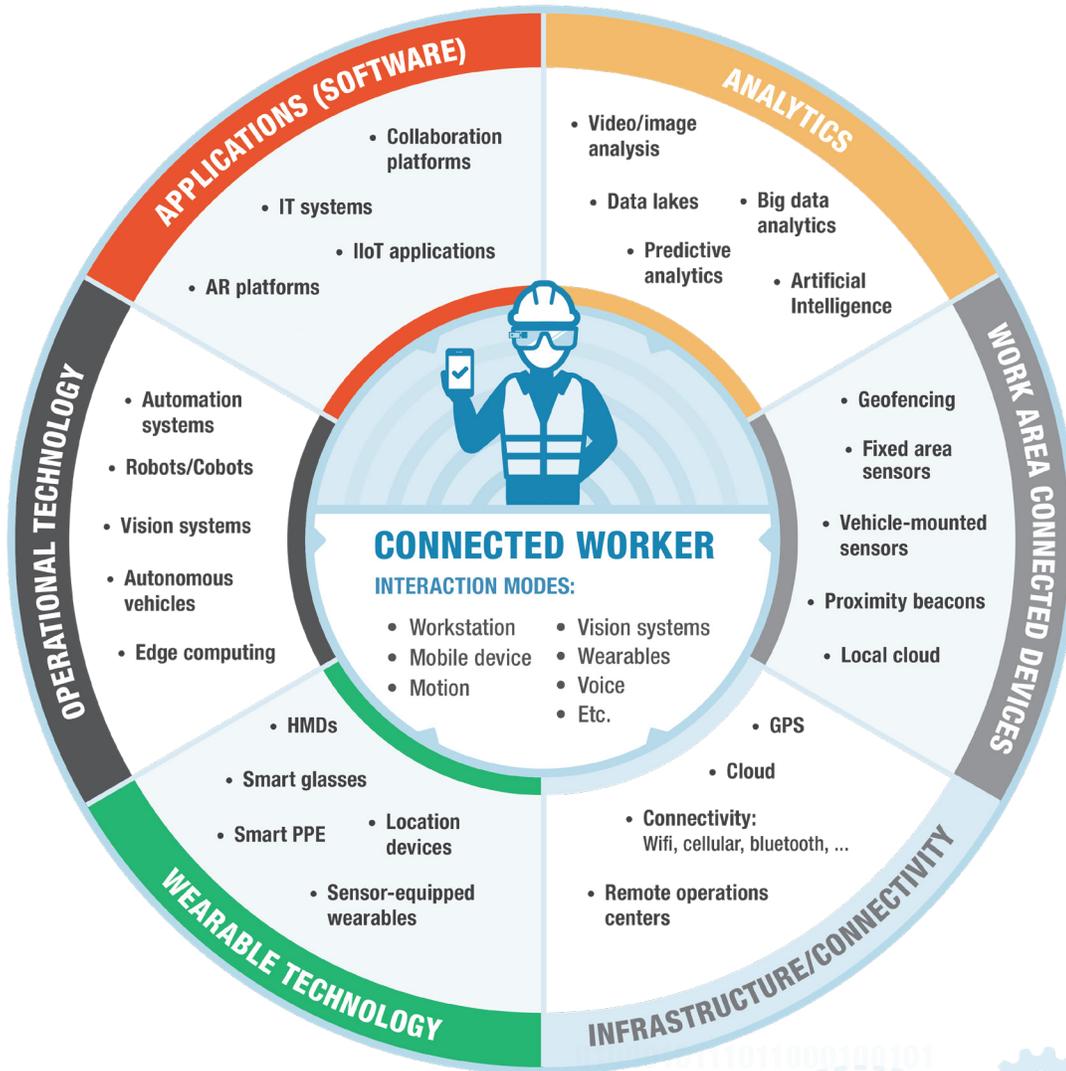


CFW Solution Enabling Technologies

This SSM focuses on the software applications that serve as the backbone of a total CFW solution, including essential data management and analytics capabilities. While CFW Applications are the core enabler, a complete solution often requires the integration of additional technologies. This will vary based on the use case, the operating environment, and the existing technology landscape.

Figure 5 illustrates typical complementary technologies needed for a total CFW solution. In most cases, this will involve some combination of user interface devices, connectivity/infrastructure, integration with operational technology systems, wearable technology, and work area smart connected devices. Examples include handheld mobile devices, head-mounted displays, IIoT smart connected devices, location/geo-positioning technologies, and advanced analytics, including Artificial Intelligence (AI) and Machine Learning (ML), Augmented Reality (AR), and Virtual Reality (VR).

Figure 5 - CFW Technology Solution Enablers



Evaluation Methodology

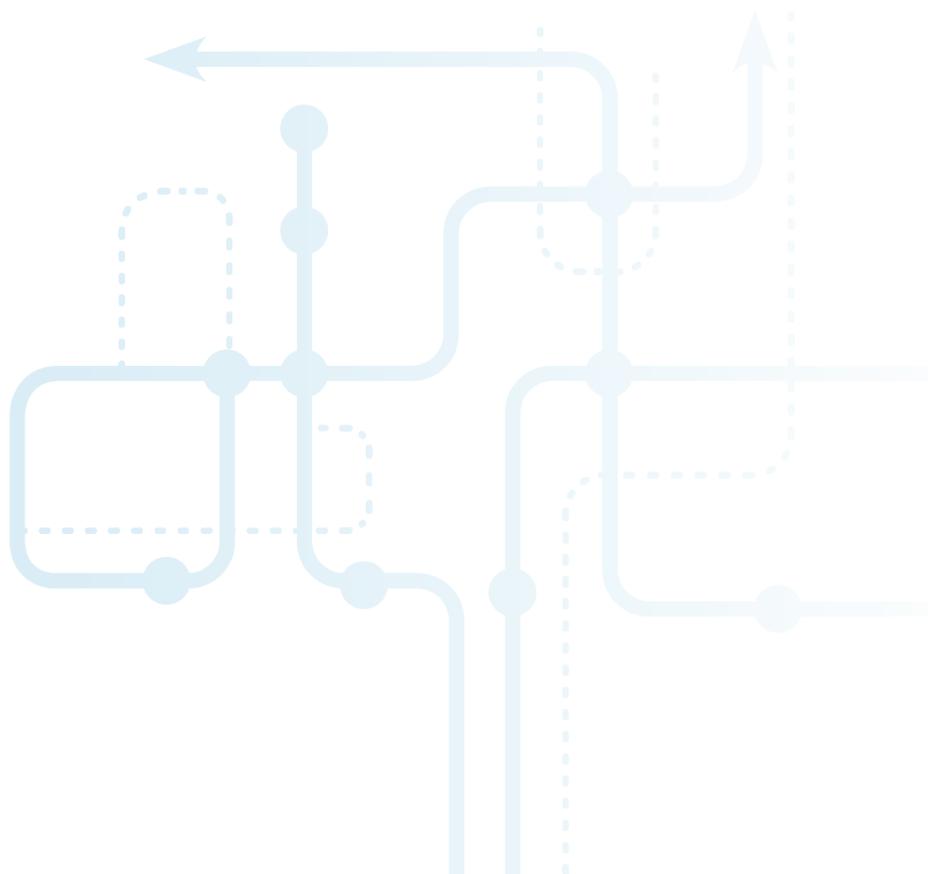
The LNS Research approach to selecting vendors for evaluation in a technology category SSM begins with establishing a set of inclusion and exclusion criteria to screen potential vendors. Based on market knowledge and initial screening, a survey is sent to selected vendors to gather data regarding their products and participation in the CFW Applications space. Survey data is supplemented with information obtained from vendor briefings. We also request and speak with customer references. Then, we use the available information to score each vendor according to our "LNS Research 3P Evaluation Model," covering Product, Potential, and Presence dimensions (the 3P methodology is explained in detail later on in the section titled "3P Evaluation of CFW Application Vendors").

Scoring is based on:

1. 3P evaluation criteria (Product, Potential, and Presence)
2. Knowledge of the vendor, their products, and services
3. End-user customer feedback and reference discussions
4. LNS Research industry experience and judgment

LNS Research, in its sole discretion, determines which vendors are included in the SSM. This includes excluding vendors who, in our judgment, do not adequately meet the inclusion criteria, didn't respond to or complete the survey, or did not provide customer references.

Those vendors selected to be included in the CFW Applications SSM are given an opportunity to review their individual profiles for factual correctness prior to publication. LNS Research reserves the right to update the SSM and the individual vendor profiles at any time.



Vendor Selection and Inclusion Criteria

LNS Research developed inclusion and exclusion criteria consistent with our definition of the CFW Applications category. Vendors identified for potential inclusion in this SSM were screened according to these criteria.

Inclusion Criteria

The universe of CFW solution vendors is large and diverse in terms of vendor characteristics, product scope, and go-to-market strategy. There are many niche players and point solution providers outside the realm of CFW Applications as defined by LNS Research. Vendors identified for potential inclusion in this SSM were screened using the following inclusion criteria:

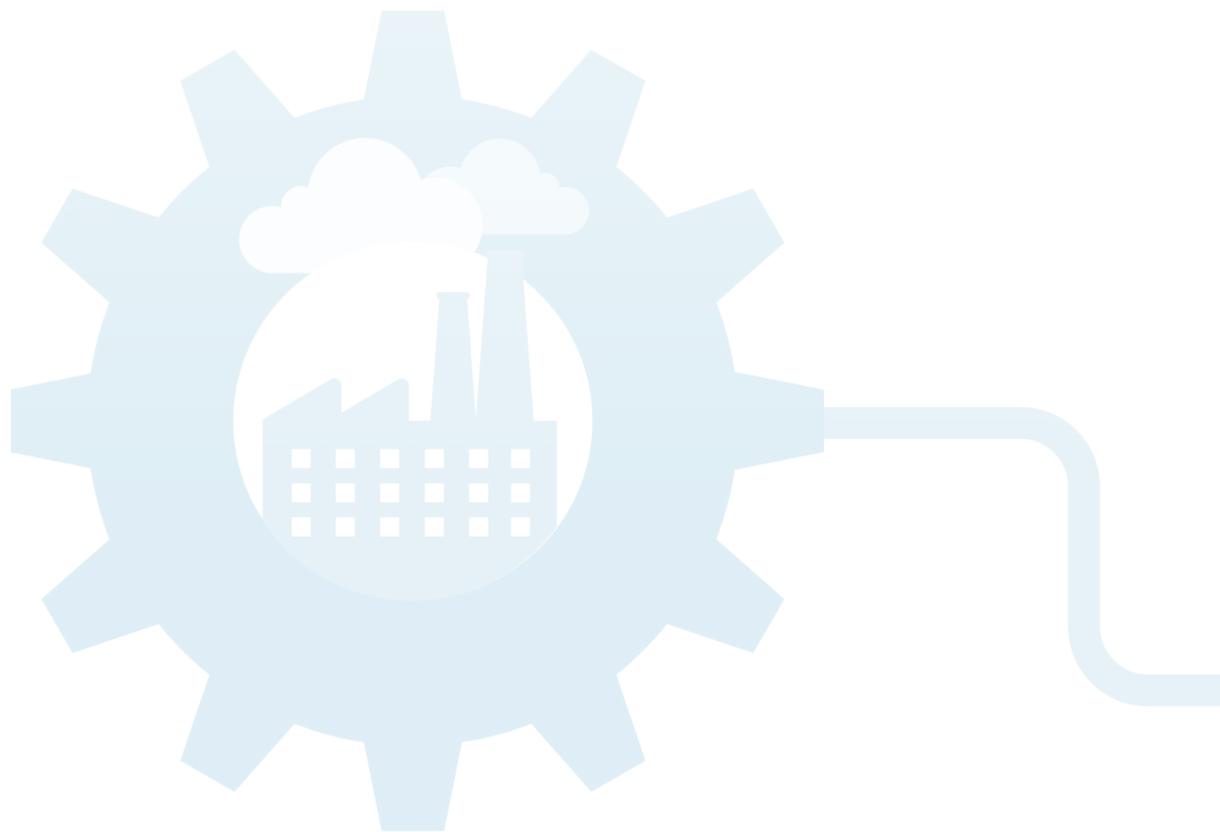
- Commercially available, licensable software-based product offering designed for use by and to directly support the industrial frontline workforce, including but not limited to production and maintenance users.
- Dedicated go-to-market focus on and an established presence in at least one of the following major manufacturing/industrial sectors: discrete, process/infrastructure, and batch/hybrid.
- Proven capability to provide customers with a complete solution to deliver on the vendor's value proposition. Solutions may be delivered through in-house product and service offerings, complemented by established partnerships.
- Application functionality to support a broad range of use cases across frontline operations, such as production/assembly, quality inspection, maintenance, safety, warehouse, and field service, with the capability to flexibly meet new and changing use case requirements.
- Leverages digital technologies, such as IIoT sensor data, geospatial information, advanced analytics, including AI and ML, and AR/VR, to enable connectivity of frontline workers to and among multiple elements of the operational management system, including people, assets, IT, and OT systems, and the work environment.



Exclusion Criteria

To help ensure only vendors with product offerings consistent with the LNS Research definition of the CFW Applications space were considered, LNS Research excluded these types of product offerings:

- Basic mobile apps not incorporating innovative use of digital technologies to increase worker and workforce connectivity and support.
- Devices/Hardware (e.g., wearables, Bluetooth beacons, sensors, and PPE) unless complementary to a vendor's CFW Application offering.
- Point solutions focusing on isolated use case solutions, either domain-specific (e.g., shutdown/turnaround) or cross-functional (e.g., micro-training).
- Solutions with the main utility of preventing people from being exposed to hazards (e.g., drones, remote inspection vehicles, and remote operations centers).
- Generic platforms and toolkits without productized CFW functionality, even if such products can be used to develop CFW Applications (e.g., workflow engines, analytics tools, generic collaboration tools, and no-code development platforms).



Vendors Included

LNS Research identified 14 vendors for inclusion in the 2023 CFW Applications Solution Selection Matrix (SSM). These vendors substantially fit our inclusion criteria and, in our judgment, represent significant market players, both established and emerging. Given how dynamic and nascent the CFW Applications space is, it's not feasible for this to be an exhaustive vendor list. However, we believe this set of vendors corresponds well to current and emerging market leaders in the CFW Applications space and provides insight to industrial organizations considering a CFW Applications vendor selection process.

The 14 vendors included in the SSM are:

- **Augmentir:** startup gaining market traction with a product leveraging digital technologies, including AI, to deliver differentiated predictive capabilities and skills management to optimize individual and operational performance.
- **Corvex:** startup with an innovative digital engagement platform that leverages behavioral economics to gauge risk and workforce sentiment as a basis for driving safety and operational improvements.
- **Guardhat:** pioneer in smart wearables offering a platform featuring IIoT/edge data management capability and robust applications for real-time safety and operational risk management.
- **Honeywell:** global industrial automation and software company with a CFW solution focused on workforce productivity, including mobile digitized rounds, on-demand access to information, and knowledge transfer support.
- **Innovaptive:** established vendor offering a connected worker platform and applications supporting maintenance and operations processes in asset-intensive industrial companies, previously focused on companies running SAP applications.
- **L2L:** fast-growing provider of operations-wide applications that empower the frontline workforce and provide data and insights to drive continuous operational improvement.



- **Librestream:** a well-established technology vendor that was a forerunner in AR-enabled remote expert collaboration solutions, which has since evolved into a broader CFW solution with an extensive global industrial customer base.
- **Parsable:** well-established player in the CFW Applications market offering a cross-functional process execution and team collaboration platform, including workflows and procedures.
- **Poka:** well-established vendor in the CFW Applications space supporting cross-functional work execution in frontline operations with strengths in skills management and training.
- **PTC:** a large global industrial software vendor with a CFW product offering based on a hybrid of the Vuforia AR platform and the ThingWorx IIoT platform, including advanced analytics.
- **QAD Redzone:** fast-growing start-up with a product geared toward worker engagement and team collaboration; recently acquired by global mid-market ERP vendor QAD.
- **TeamViewer:** business unit of a large global IT and security management software company with deep AR-centric capabilities to support work execution, including remote expert collaboration.
- **Tulip:** a startup with a product offering positioned as a broad, flexible frontline operations platform with a large library of pre-configured applications supporting the frontline workforce.
- **Webalo:** a technology vendor focused on solutions to digitally enable and empower the frontline workforce with a flexible no-code platform to support work execution and team collaboration.

The SSM shows the relative position of each vendor based on the 3P Evaluation Model Methodology and provides individual vendor profiles with further commentary on our assessment.

Note: Honeywell selected to participate in a limited capacity in the SSM review process.

CFW Application Market Landscape

As an emerging market, the CFW Applications space is diverse, dynamic, and fragmented. Players range from early-stage start-ups backed by venture capital to publicly traded global tech giants. This relatively young space is evolving rapidly; the diversity of the vendors included in the SSM reflects that.

Figure 6 is a conceptual view of major sub-categories in the CFW Applications space. These categories illustrate the wide range of product and go-to-market strategies among vendors in the space. In reality, no bright lines are separating these categories, and there is a considerable and growing convergence of capabilities and enabling technology across them. The vendors included in this SSM tend to fall into four main categories:

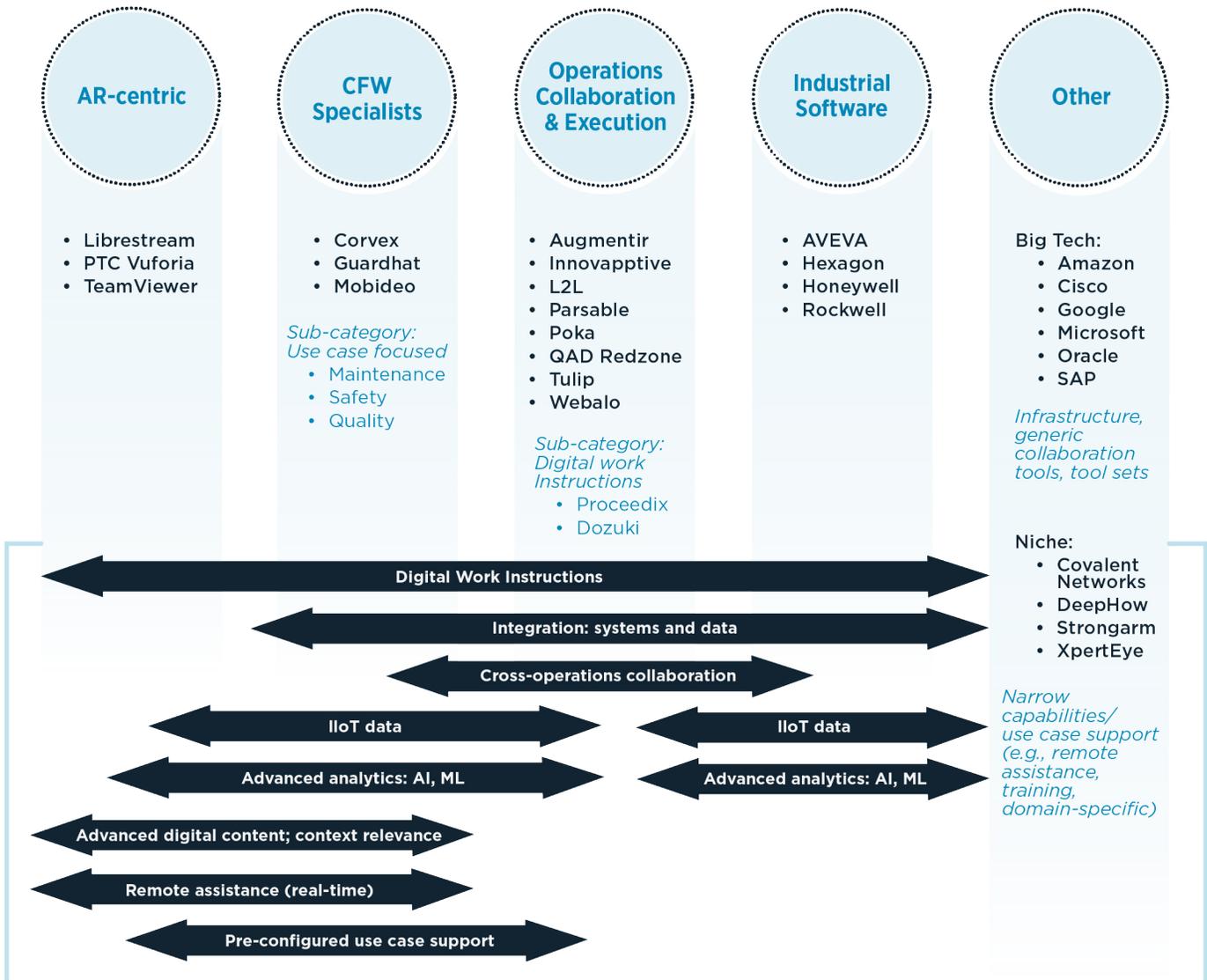
- **AR-centric:** leverage AR platforms to support work execution and real-time remote collaboration (e.g., Librestream, PTC, TeamViewer)
- **CFW Specialists:** support multiple use cases in a specific domain, such as safety and operational risk management (e.g., Corvex, Guardhat)
- **Operations Collaboration and Execution:** enable use cases across the value chain emphasizing cross-functional process execution and team collaboration. (e.g., Augmentir, Innovapptive, L2L, Parsable, Poka, QAD Redzone, Tulip, Webalo)
- **Industrial Software:** large global software vendors with diverse product portfolios that can support CFW scenarios (e.g., Honeywell)

Other types of technology vendors also can provide CFW capabilities to one extent or another. Industrial software companies, such as AVEVA, Hexagon, and Rockwell, have a variety of products that can enable CFW use cases, typically requiring significant customization and systems integration work. Also, these types of vendors frequently have go-to-market partnerships with specialized software providers, such as CFW Applications. Examples include AVEVA’s white label offering of Poka and the Rockwell-PTC partnership.

Likewise, various big enterprise technology players like SAP, Oracle, Amazon, and Cisco have products that can be used to build CFW solutions or enable the deployment of third-party CFW Applications, such as those included in this SSM Guide. Niche CFW solutions like ANVL and XpertEye exist in the market to meet specific use cases and are typically narrower in capabilities (e.g., remote assistance and training). It is important to note that the vendors listed in Figure 6 are for illustrative purposes only and represent selected players in the market and the general capabilities the various categories tend to offer.

Figure 6 - CFW Applications Market Landscape for Illustrative Purposes

CFW Application/Platform Market Landscape



3P Evaluation of CFW Application Vendors

LNS Research has developed a framework called the “LNS Research 3P Evaluation Model” to help qualitatively position vendors in a specific technology category. This model considers the dimensions of Product, Presence, and Potential in evaluating a vendor’s offering to the market in the relevant category. We applied this methodology to develop the CFW Applications Solution Selection Matrix (SSM).

Product

As previously stated, LNS Research evaluates product offerings in a specific technology category against the relevant components of the LNS Research IX Reference Architecture. In the case of CFW Applications, the main focus is on the most essential Applications & Analytics, Development Tools & Libraries, and Ecosystem components.

In our definition of the CFW Applications category, we view Applications & Analytics as a core solution enabler. This is reflected in the corresponding product evaluation criteria, which stress functional capabilities and platform technology features, including special or unique capabilities. The detailed CFW Applications product evaluation criteria are shown in Table 1.

Table 1 - CFW Applications Product Evaluation Criteria

CFW Applications: Product Evaluation Criteria	
Capability Functionality	Selected Vendor Highlights (1)
Functional Capabilities	
Digital knowledge management <ul style="list-style-type: none"> Digital work instructions Knowledge capture Central knowledge repository Content management/sharing 	Guardhat: embedded digital asset management system Webalo: author forms, digital work instructions, and SOPs Parsable: visually enhanced 2D digital work procedures
Work execution support <ul style="list-style-type: none"> Workflow/Guided procedures In-context information Personalized support Real-time data provision 	Augmentir: real-time personalized support of work Librestream: provision of IIoT data at point of work
Team collaboration and engagement <ul style="list-style-type: none"> Cross-functional work execution Team communication/problem-solving Remote collaboration Proactive engagement 	QAD Redzone: team collaboration and engagement Innovapptive: suite of frontline applications integrated with back-office systems (e.g., SAP ERP and IBM Maximo) Corvex: proactive engagement with application of behavioral economics

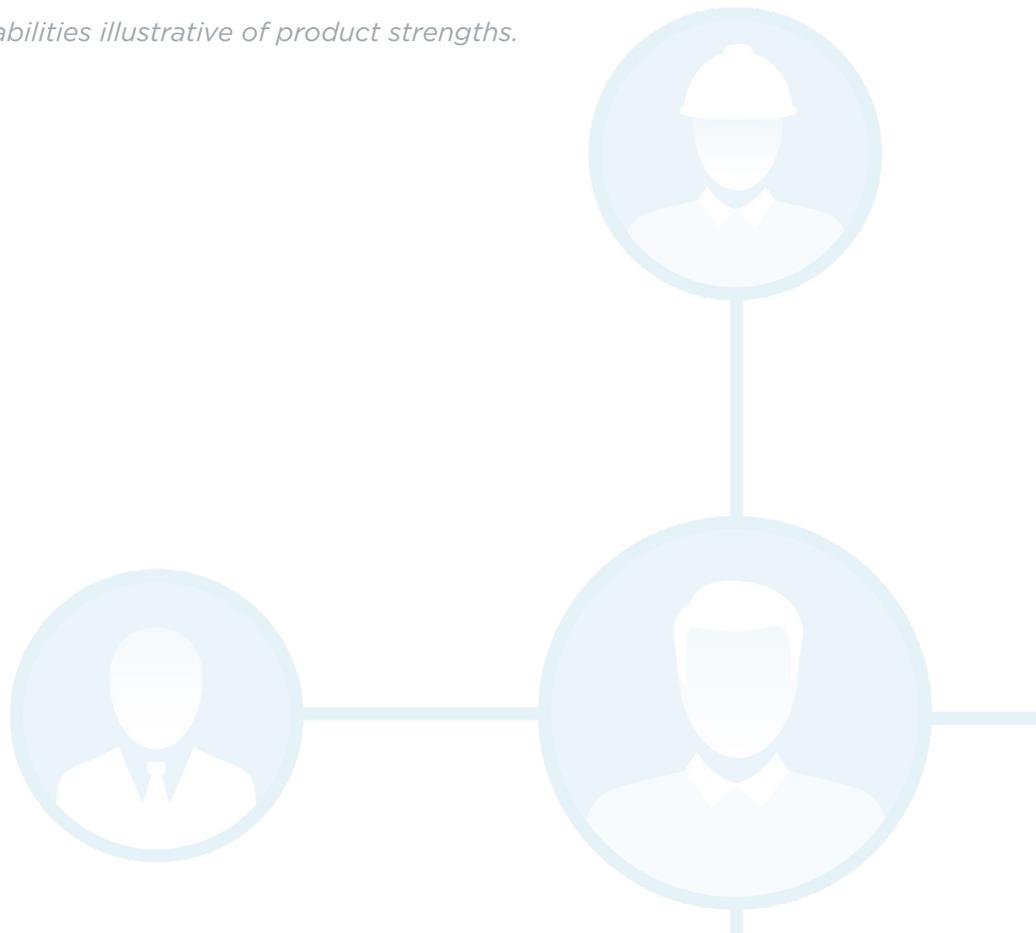
<p>Workforce competency management</p> <ul style="list-style-type: none"> • Skills management • Training program management • In-context continuous learning • Training content development 	<p>Augmentir: skills and work integration</p> <p>Poka: skills and training management</p>
<p>Use case solutions</p> <ul style="list-style-type: none"> • Cross functional • Domain-specific • Production/Manufacturing • Industry-specific 	<p>Tulip: large library of pre-configured use cases</p> <p>QAD Redzone: training, safety, quality, maintenance, problem-solving, and workforce development use cases</p> <p>Guardhat: real-time safety and risk management applications</p>
<p>Reporting and analytics</p> <ul style="list-style-type: none"> • Standard dashboards and reports • Business intelligence tools • Advanced analytics • Data management 	<p>Augmentir: embedded AI, predictive analytics</p> <p>TeamViewer: no-code AI analytics builder</p>
<p>Special or unique functional capabilities</p>	<p>Honeywell: connectivity to the broader Honeywell Portfolio (e.g., intelligent wearables hardware, operator simulation, and training solutions)</p> <p>L2L: pre-built solutions for discrete manufacturing shop floor operations</p>

Platform | Technology Features

<p>Solution agility/flexibility</p> <ul style="list-style-type: none"> • Workflow engine • Configurability • Extensibility • No-code/Low-code 	<p>Webalo: flexible no-code platform to build complex workflows</p>
<p>System and data integration</p> <ul style="list-style-type: none"> • Open APIs/SDKs • Pre-build connectors • IoT data integration • Data distribution 	<p>PTC: IIoT platform capabilities</p> <p>Tulip: computer vision to capture process data</p>
<p>Architecture/Deployment</p> <ul style="list-style-type: none"> • Flexible deployment • Connected and offline • Broad device support 	<p>PTC: cloud SaaS and on-premises deployment options</p>

<p>Augmented Reality</p> <ul style="list-style-type: none"> • AR platform • Augmented work instructions • AR experience authoring • AR-enabled remote assistance 	<p>Augmentir: AR-enriched digital work instructions</p> <p>PTC: AR platform, computer vision applications</p>
<p>Real-time remote collaboration</p> <ul style="list-style-type: none"> • Multiple participants • AR content overlays • Record sessions • Advanced capabilities 	<p>Librestream: remote assistance/collaboration</p>
<p>Security and Privacy</p> <ul style="list-style-type: none"> • Application security • Operational security • Product security • Privacy controls 	<p>L2L: security and compliance for sensitive data and regulated workloads</p>
<p>Special or unique platform/technology features</p>	<p>Innovaptive: Rapid Application and Configuration Engine (RACE)</p> <p>QAD Redzone: multi-language support to translate into user's native or preferred language</p>

(1) Selected highlights of vendor capabilities illustrative of product strengths.



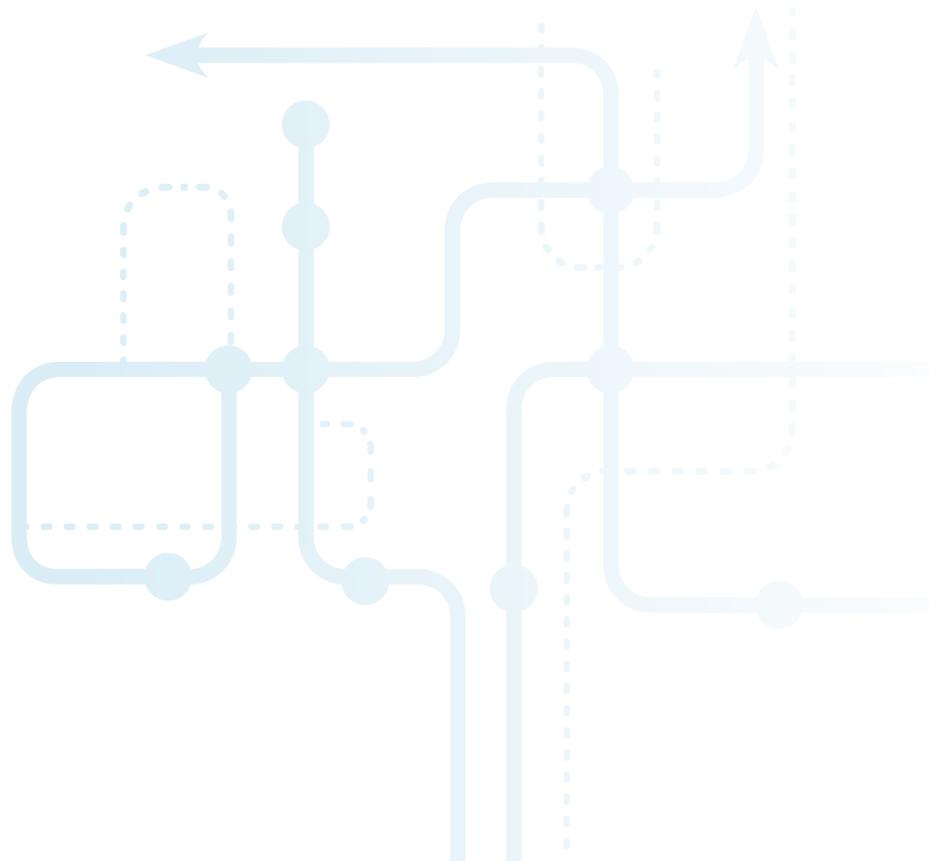
For each Vendor Profile, we use Harvey Balls to score the degree of product functionality or feature coverage, then determine an overall Product score from 1 through 6 based on the Product Definitions & Scale below.

Product Definitions and Scale

6. Market leading capabilities across the spectrum of key functionality as defined by LNS Research¹; proven success meeting all requirements in markets specifically targeted by vendor².
5. Robust spectrum of capabilities for applicable target markets. Few shortcomings that are recognized.
4. Broad though not complete spectrum of capabilities applicable to target markets.
3. Limited but sufficient capabilities applicable to a subset of target markets; lagging in product development and functionality.
2. Some gaps in functionality required to be addressed to fully meet target markets.
1. Newly launched minimal viable product and/or significant gaps in functionality required to be addressed to fully meet target market requirements.

¹Assessments are made against the most relevant capabilities of the LNS Research IX Reference Architecture. For example, Connected Frontline Workforce Applications vendors would be judged mainly against Applications & Analytics, Dev Tools, and Libraries capabilities.

²Target markets are the geographies and application areas specifically pursued by vendor. For example, vendors targeting only English-speaking markets will NOT be penalized for lack of two-byte character support.



Potential

LNS Research assesses the vendor's potential for growth in both the product and presence dimensions. Potential may be impacted by scale, focus, financial resources, market positioning strategies, the management team (especially for smaller companies), merger and acquisition plans, partnering strategy, and other relevant factors impacting the potential for further market penetration and business growth.

In the CFW Applications market, hundreds of vendors are seeking to carve out a niche. We have only included in this report companies that we believe have an opportunity for growth and long-term viability. Since this is a relatively immature market, some early-stage/start-up companies are included because we believe their focus and technology enable competitiveness.

Potential Definitions and Scale

6. Likely overall market leader (across many industries, geographies, and application areas); currently outpacing all competitors.
5. Among small set of likely overall market leaders evidenced by current leadership in target markets and proven record of innovation.
4. A likely leader in some targeted markets with growth potential to move up; could rise to leading position in specific markets.
3. Likely a significant player in target markets with defensible barriers to competition and growth prospects.
2. Likely a niche player in target markets with some known risks to future growth in product and presence.
1. Early-stage company with wide dispersion of potential long-term performance and/or a niche player with significant risks to future growth.



Presence

LNS Research develops a composite Presence score assessing a vendor’s market penetration vis-à-vis geographies, industries, and customer sizes served. The score factors both “capability to serve” and “proven success.”

- **Capability to Serve:** Focused (experienced in the specific domain) sales, service resources, and product enhancements to serve specific target markets. Service and technology partnerships also play a key role.
- **Proven Success:** Market success (installed base) in the markets served, including customer references.

An overall score from 1 through 6 is determined for each vendor based on the Presence Definitions & Scale that follows next.

Presence Definitions and Scale

6. Market leading sales, service³ and successful customers globally, in all relevant industries, and with companies of all sizes.
5. Robust sales and service capabilities and successful customers across all major geographies (North America, Western Europe, Middle East⁴ and industrialized Asia-Pacific), a range of industries and company sizes.
4. Broad-based sales, service, and successful customers across most major geographies (North America, Western Europe, and selected Middle East and Asia-Pacific countries), specific industries and/or companies of a specific size (SMB, for example).
3. Regional sales, service, and customer success in select major western geographies; select industries and sizes.
2. Sales, service, and customer success in limited market(s), industry, and company sizes.
1. Still in early stages of launching new product and/or company with a very limited group of customers.

³Presence is measured by a vendor’s capabilities to serve AND proven implementations. Vendors’ capabilities to serve are not measured by resources able to support a specific technology, not overall company capability.

⁴Middle East is a “major” geography for many process industries but not for discrete.

LNS Research CFW Applications Solution Selection Matrix

Connected Frontline Workforce Applications

SOLUTION SELECTION

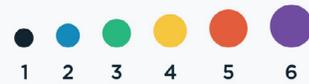
MATRIX



COMPANY SCORE (Product, Potential, Presence)

- Augmentir (5,4,3)
- Corvex (3,2,3)
- Guardhat (2,2,3)
- Honeywell (2,3,3)
- Innovapptive (3,4,4)
- L2L (3,3,3)
- Librestream (3,4,5)
- Parsable (3,3,4)
- Poka (3,4,4)
- PTC (4,4,5)
- QAD Redzone (4,5,4)
- TeamViewer (3,4,4)

COMPANY PRESENCE



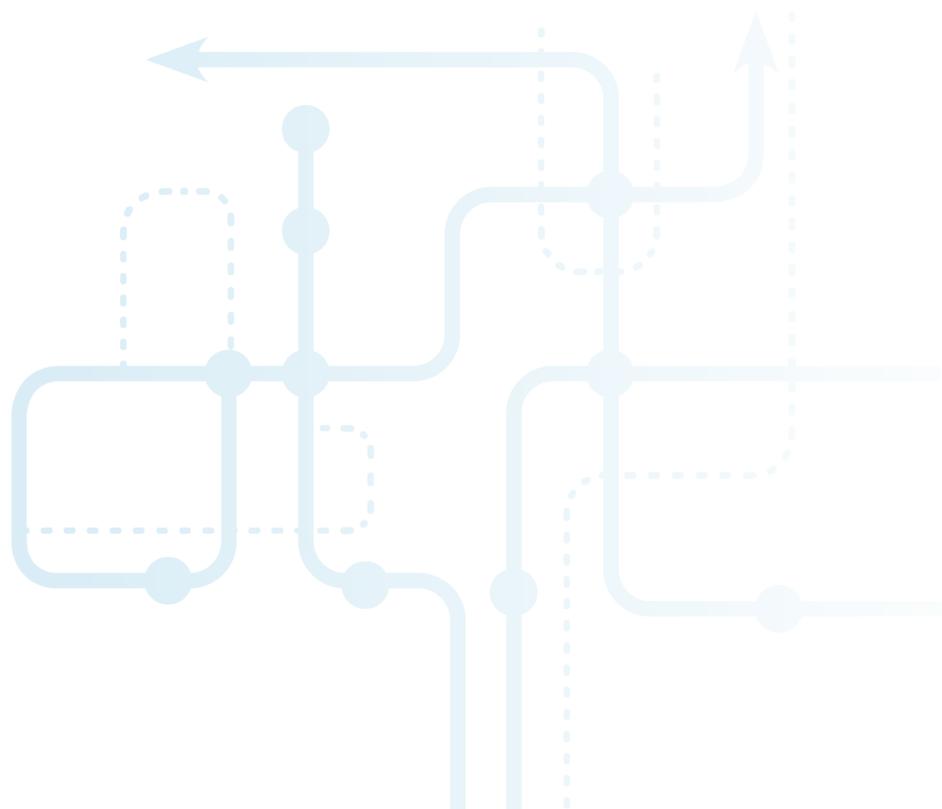
- Tulip (4,4,4)
- Webalo (3,3,3)

The CFW Applications Solution Selection Matrix (SSM) visually represents the included vendors' relative position based on application of the 3P Evaluation Model. The 3P evaluation scores are mapped into the SSM. The horizontal axis value is the Product score; the vertical axis value is the Potential score. The size of the bubble represents the Presence Score. The composite score reflects the potential for wide-scale enterprise deployment and value.

The CFW Applications SSM reflects our current view of the overall market landscape. It's a rapidly evolving market, as illustrated by the diversity of strengths among the vendors in the Front Runners category:

- **Augmentir** is a leader in the Product dimension with relatively comprehensive capabilities featuring AI-enabled real-time personalized work support and predictive analytics to optimize individual, team, and process performance.
- **QAD Redzone** is a leader in the Potential dimension with a record of exceptionally fast growth and customer success and is now well-positioned for additional growth after its acquisition by global ERP vendor, QAD.
- **PTC** has a well-established global presence which serves as a base for growth in the CFW Applications space, with strong Product and Potential positions based on its Vuforia AR platform and ThingWorx IIoT Platform product lines.
- **Tulip** has a well-balanced position for growth across Product, Potential, and Presence dimensions, with a large and expanding workforce and strong CFW capabilities enabled by its flexible frontline operations platform and applications library.

Detailed analysis and commentary on each of the 14 vendors included in this SSM can be found in each of the individual vendor profiles, compiled in the corresponding [CFW Applications SSM Vendor Compendium](#).



Connected Frontline Workforce (CFW) Market Observations

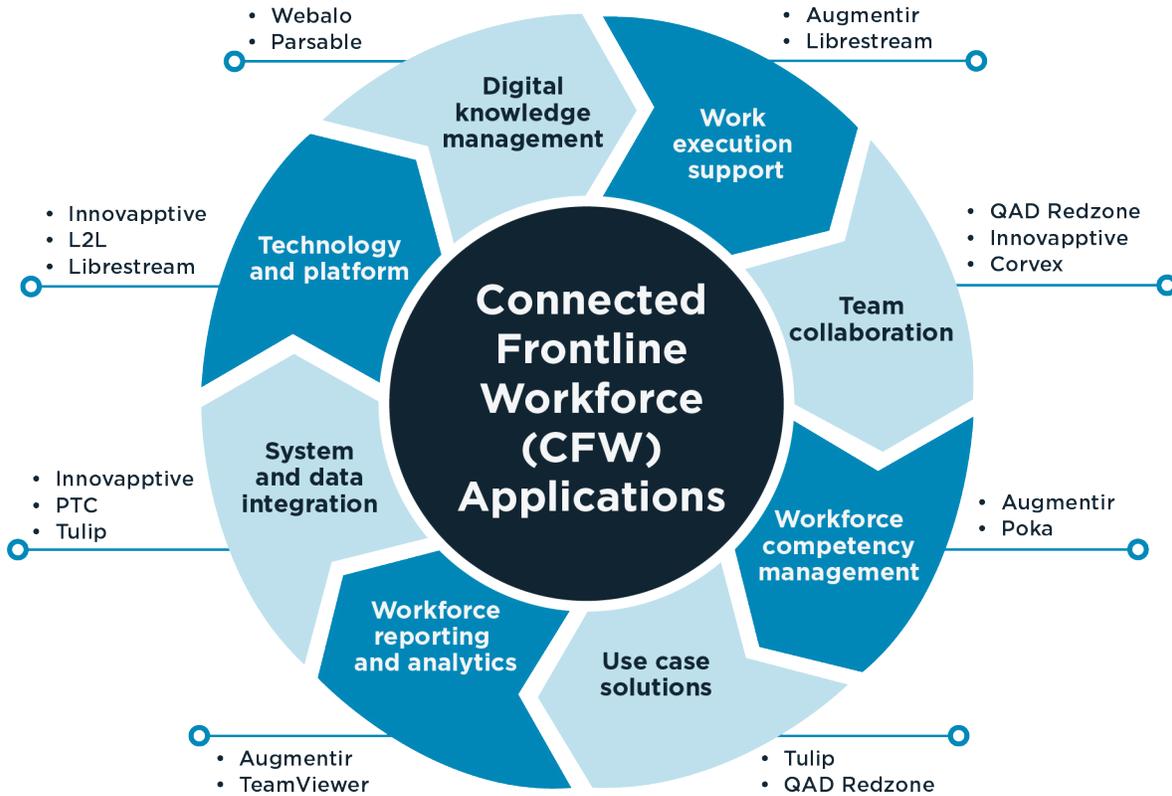
Industrial companies should consider several market observations regarding CFW Applications as they consider these technologies in their Industrial Transformation (IX) programs. These observations reflect the fragmented and dynamic nature of an early technology market.

- **Diversity of vendor commercial maturity.** As CFW Applications rapidly evolve, there's an open field for vendors to stake their claim. Viable contenders range from start-ups (e.g., Augmentir and Guardhat) to well-established global software vendors (e.g., PTC and Honeywell). There is no “standard” or “typical” vendor profile at this stage of market development; buyers should keep an open mind.
- **Wide range of solution approaches.** There is great variety in the product and solution offerings of the SSM vendor set in terms of key capabilities, productized use cases, and enabling technologies. For example, some offerings are based on an Augmented Reality (AR) platform (e.g., Librestream and PTC), while some emphasize a platform for cross-functional work execution and team collaboration (e.g., Corvex and QAD Redzone).
- **Market consolidation/M&A activity.** There has been much venture capital and private equity investment in the CFW Applications space and considerable merger and acquisition activity. Recent acquisition examples include Poka by global cloud-based enterprise software vendor IFS (expected by 3rd quarter 2023), Redzone by global enterprise software vendor QAD, and PTC by AR-platform provider RE’FLEKT. We expect this trend to continue and accelerate.

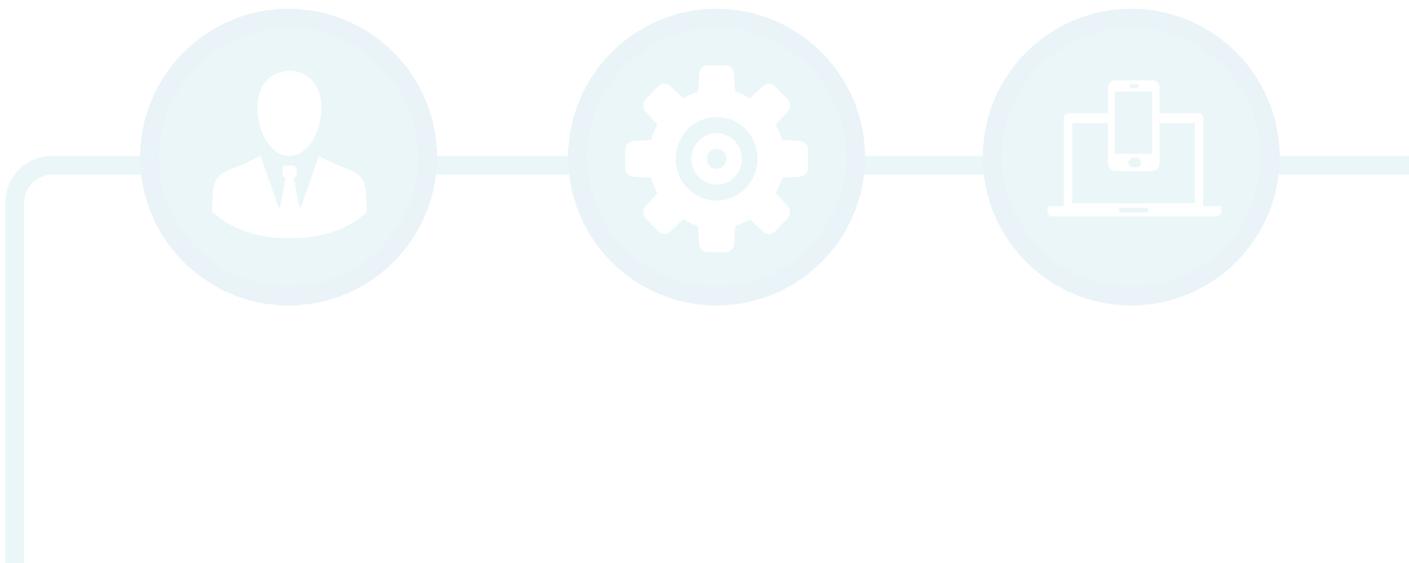
Today, there is no “one size fits all” solution, and the market is changing fast. Moving forward, we anticipate the likely emergence of a small number of CFW Application market leaders that offer a comprehensive enterprise solution coupled with the domain expertise and go-to-market resources to serve a large industrial footprint globally. There will also continue to be a place for specialist CFW solution providers that find success with a well-honed combination of industry and use case focus.

Our body of research and point of view is intended to support manufacturers during the CFW Application selection process. The detailed product evaluation provides functional capabilities and platform technology strengths within the individual vendor profiles and is graphically represented in Figure 7. This CFW Applications Solution Selection Matrix (SSM) gives industrial organizations a better understanding of the technology space for assessing and adopting vendor solutions to enable the workforce digitally.

Figure 7 - CFW Capabilities Illustrated by Vendor Strengths



This emerging and dynamic market provides a variety of CFW products and solution offerings and are key enablers to a future-ready frontline workforce. Manufacturers should consider each vendor’s strengths against the organization’s current state and long-term vision.



Bottom Line and Recommendations

When it comes to the frontline workforce, industrial organizations are at a crossroads. Traditional ways of hiring, training, and managing frontline teams are no longer efficient or effective. New approaches are needed to meet new challenges. Connected Frontline Workforce (CFW) initiatives have emerged as an essential means to achieve operational goals through the support, engagement, and empowerment of frontline teams.

Software solution selection is a complex undertaking that demands multi-level, multi-regional, cross-functional, and inter-departmental collaboration. There are many pitfalls and challenges throughout the selection process. Manufacturers should apply a proven methodology to make the right choice quickly and confidently to eliminate worries around alignment, time, cost, and risk in solution selection. We offer the following recommendations to help guide industrial organizations:

- 1. Don't confuse a CFW initiative with a technology project.** Any CFW initiative should be business-driven and integrated with overall IX efforts. CFW is about supporting, engaging, and empowering employees and teams on the frontline. Technology, including CFW Applications, is a necessary but insufficient component of this transformation. A cross-organization effort, including Operations, HR, IT, and digital teams, are also needed.
- 2. Start with the big picture of Industrial Transformation.** No amount of digital transformation and automation will eliminate the need for a capable and competent frontline workforce. Instead, IX creates new challenges in hiring, training, engagement, and retention. Step change transformation isn't possible without fully integrating people into operations; CFW won't be successful as an isolated initiative.
- 3. Focus on the Future of Industrial Work.** The need for CFW Applications is largely driven by the impact of demographic and technology shifts on the frontline workforce. The basic question is not how to digitally connect the workforce; it's how to adapt the total employee experience (including the use of technology) to the expectations of the next-gen workforce (e.g., how to be an employer of choice). CFW is part of that picture.
- 4. Strive for an enterprise CFW solution.** CFW Applications can support a wide range of use cases throughout operations and across the value chain. The ideal solution addresses today's problems locally while having the flexibility to extend and scale across the global enterprise. Solution selection should consider the mid to long-range business and technology roadmaps. Implementation of multiple-point solutions is likely to become unwieldy and unscalable soon.
- 5. Elevate CFW as a strategic business solution.** Fielding a future-ready frontline workforce is a strategic imperative. This presents the opportunity for competitive advantage and risk to the enterprise. How and what CFW Applications and solutions are selected and implemented will significantly impact the success of overall workforce initiatives. This should be reflected in strategic initiatives, executive sponsorship, and resources applied.

And finally, resist the temptation to take a DIY approach. Ask yourself, "What is our core competency? Are we in the software product development and support business?" Beware of sets of components and low-code/no-code platforms that are pitched as easy to develop and integrate but whose initial costs are only the tip of the iceberg in terms of TCO, degree of difficulty, and time to value. You will be on the hook to add your time and domain knowledge, which means lots of handholding.

Most importantly, don't let the challenges around CFW Applications solution selection prevent you from embarking on or accelerating your transformation journey. Step change improvement is possible, and LNS Research is here to help you along that path.

Methodology References

This Solution Selection Matrix is based on the following research:

1. Definition of IX Platforms as outlined in: IX Architectural Paths: Part Two of Three
Evaluating IX Platforms and IX Analytics & Applications
3. This definition was based on the IX Reference Architecture outlined here: Research Spotlight: *From the Industrial Internet of Things (IIoT) Platform to Industrial Transformation Reference Architecture*
3. Update on IIoT Market Dynamics: *Changing Dynamics of the IIoT Market*
3. LNS Research Vendor Evaluation Process highlighted here: *How LNS Research Evaluates Vendors in Technology Domains*

Vendor Profiles are a snapshot of the company's capabilities at a specific time based on the vendor's ability to deliver in this particular market, not its overall capabilities. Vendors regularly announce new product releases, roadmaps, acquisitions, partnerships, and updated strategies. LNS Research seeks to capture those announcements up to the time of publishing within the vendor's "Potential" score, as the actual impact on the market has not yet been realized.



Related Research on Connected Frontline Workforce

BLOG | [Exploring the AI Craze as the CFW Wave Gains Manufacturing Momentum →](#)

BLOG | [Why CFW Initiatives Fail: Overcoming 4 Critical Gaps to Accelerate Business Value →](#)

RESEARCH | [Connected Workforce: Enable a Competent, Agile Industrial Workforce →](#)

BLOG | [Connected Frontline Workforce Applications: Pushing the Frontiers of Industrial Transformation →](#)

EBOOK | [Enable Operational Agility with a Digitally Connected Workforce →](#)

EBOOK | [Connected Worker: Connecting People and Systems to Transform Frontline Operations →](#)

BLOG | [Introducing the Industrial Transformation \(IX\) Reference Architecture →](#)

RESEARCH | [IX Architectural Paths 1 of 3: Three Paths & Understanding IX Infrastructure →](#)

RESEARCH | [IX Architectural Paths 2 of 3: Evaluating IX Platforms and IX Applications & Analytics →](#)

RESEARCH | [IX Architectural Paths 3 of 3: Looking at IX Strategic Partners →](#)

RESEARCH | [Industrial Transformation: Architecture and Analytics Just the Beginning →](#)

RESEARCH | [Industrial Control Systems and Edge Computing: Enabling an Operational Architecture for Applications and Analytics →](#)

RESEARCH | [Avoiding Pilot Purgatory: How to Choose the Right Use Cases to Accelerate Industrial Transformation \(IX\) →](#)

RESEARCH | [Industrial Transformation Success: How to Secure Operations' Buy-in to Create Effective Leadership →](#)

RESEARCH | [IX Digital Readiness →](#)

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