kyndryl

The Reality of Augmented Reality

Optimizing workplace efficiency with the Connected Worker

Dr. Tammy Higgins, Kyndryl Consult Partner

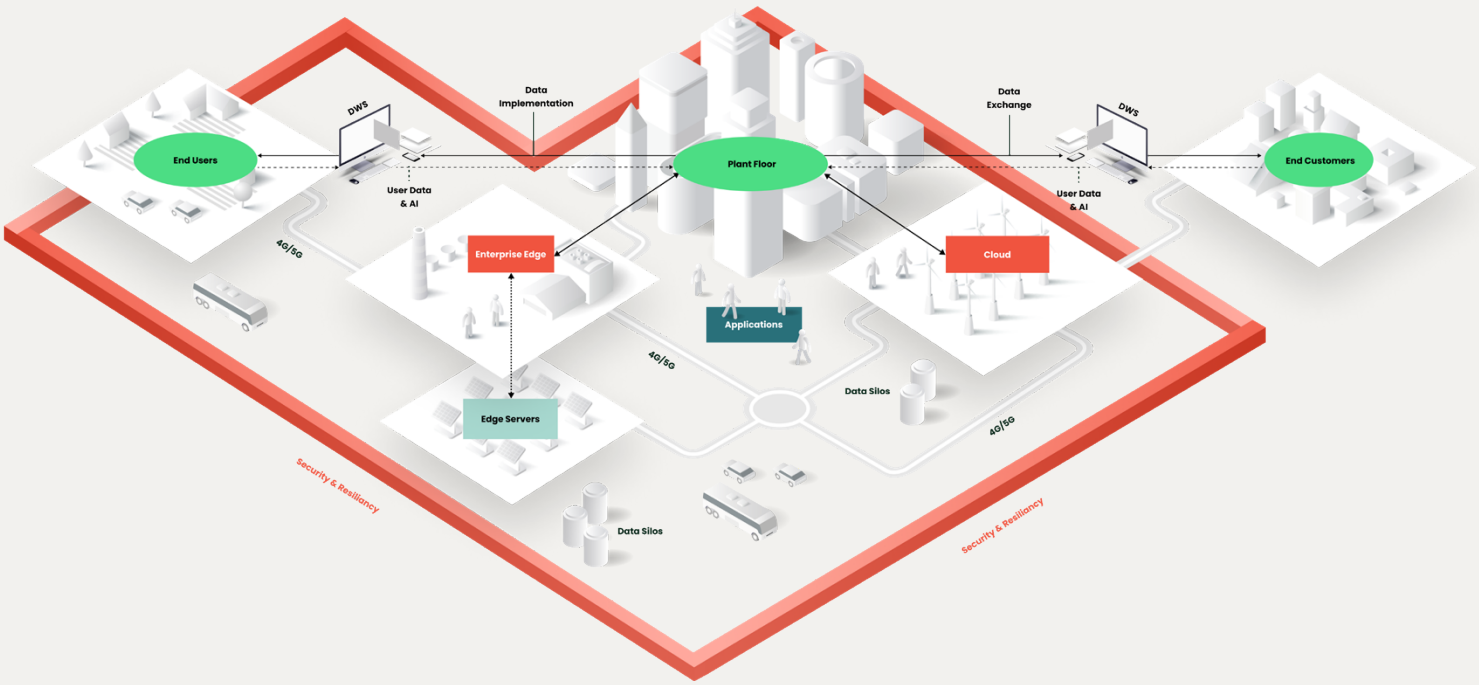
Contents

Executive Overview

Largely speaking, Augmented Reality (AR) devices available today are on their second generation or beyond. With feedback from early adopters, present-day users have the benefits of optimizations to productivity and comfort for workers using these devices. Improved network connectivity options such as Private Wireless 5G/LTE, also recently available, allow for access in what would have been near impossible conditions. Taken one step further, integration of these devices right into the workflow of ERPs systems, supply chain, and/or manufacturing execution systems (MES) present even more areas to improve operational efficiencies.

Introduction

Most of the focus of Industry 4.0 revolves around integrating information technology and operational technology with near-real-time connectivity in the factory to provide actionable intelligence to decision-makers. Connecting the worker to this data in near-real-time can help to improve many aspects of the work done of the manufacturing floor, and is an area of growth. However, Industry 4.0 relies heavily on automation and has been intimidating workers on factory shop floors. Frost & Sullivan envisions a futuristic scenario of the next big thing—Industry 5.0, which will bring empowered humans back to the shop floor.[4] Protecting and improving the safety, health, and productivity of workers is also paramount for companies as they face post-pandemic challenges of acute skilled labor shortages, strains on supply chain management, global inflation, and rising medical costs.[13]



A few Connected Worker use cases:

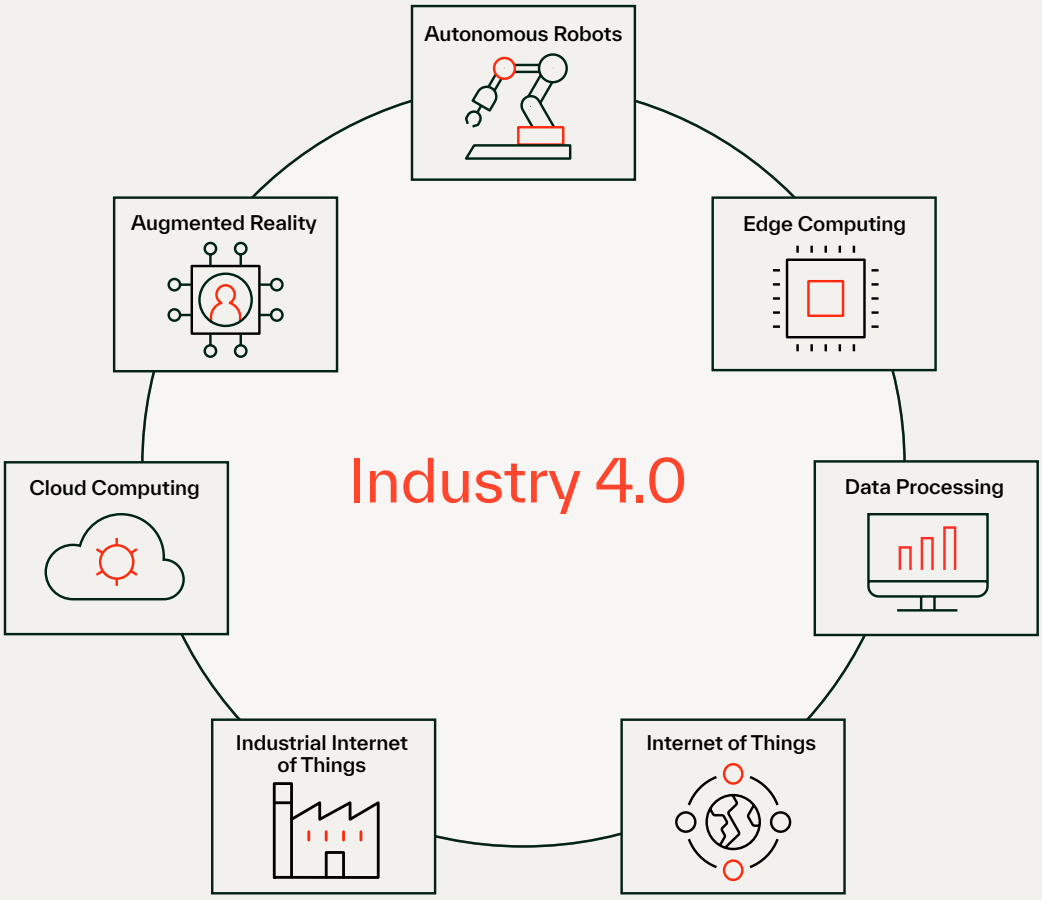
Automotive – Line workers using wearable devices on the manufacturing shop floor can overlay digital images for what they should be seeing against what is actually present. In addition, maintenance workers could use wearable devices to reach out to a subject matter expert at a different facility and have them see exactly what work is to be performed and reduce the time to repair with efficient collaboration. And, at the dealership facility, maintenance repair techs can reach out again, to remote experts for efficient use of troubleshooting time to return repaired automobiles to their customers sooner.

Oil and Gas – Line workers in industrial settings—whether expansive outdoor areas or on remote rigs—can use devices rated for work in hazardous area 1/21 or CSA Class I, II, III Division 1. Again, bringing the power of remote eyes to the local hands for increased efficiency of the tasks at hand.

Infrastructure and Technology – The use of Mixed Reality devices in our own Kyndryl data center operations aid in audit, safety, and integration to our infrastructure software services platform for improved operational efficiencies. Using digital overlays to provide cable plant visibility will help shorten time to troubleshoot or make quicker changes. These devices also provide the remote assistant feature where subject matter experts at another facility can see and provide guidance for uncommon tasks.

These use cases showcase just a few of the areas Kyndryl teams are helping customers put these technologies to work. Kyndryl can assist our customers on their journey no matter where they are starting from. We can help with creation, or co-creation with our Vital team. And take a project through the lifecycle of consulting, assessment, project scope, design and implementation, including wrapping the steady state in Kyndryl managed service offerings.

Industry 4.0 main technologies



Enabling technologies of Industry 4.0 and the view to Industry 5.0

There are nine enabling technologies of Industry 4.0, which are considered the pillars of the fourth industrial revolution:[8]

- Autonomous Robot
- Simulation
- Horizontal and Vertical Integration
- Internet of Things (IoT)
- Big Data Analytics
- Augmented Reality
- Additive Manufacturing (AM)
- Cyber Security
- Cloud Computing

The Fourth Industrial Revolution, also known as Industry 4.0 originated in 2011 from a project in the high-tech strategy of the German government.[6] The intersection of these technologies on the manufacturing floor led to the term Smart Factory for initiatives that capture the data (IoT), analyze or make sense of the data (Big Data), use cloud resources (Cloud Computing) for flexibility and scalability, integrate to manufacturing systems data and applications (Systems Integration) and then in real time using all of this information to support 3-D printing, Autonomous Robots and Augmented Reality, all wrapped in continually diligent Operational Technology (OT) security processes.

This is consistent with the definition of Industry 4.0 made by McKinsey as “the next phase in the digitization of the manufacturing sector, driven by four disruptions: the astonishing rise in data volumes, computational power, and connectivity, especially new low-power wide-area networks; the emergence of analytics and business-intelligence capabilities; new forms of human-machine interaction such as touch interfaces and augmented-reality systems; and improvements in transferring digital instructions to the physical world, such as advanced robotics and 3- D printing”. [11,16]

The European Commission (EC) officially defined the concept of Industry 5.0 in January 2021 which presented a systematic approach in the context of technological and methodological improvements.[2] It establishes a synergy between the main technological drivers and societal development in Industry 5.0, and six major categories are identified, including:[8]

- Human–machine interaction
- Bio-inspired technologies and smart materials
- Digital twins and simulation
- Big data analytics
- Artificial intelligence
- Energy efficiency
- Renewable energies

Industry 5.0 is a human-centric solution. It puts the wellbeing of the workers at the heart of the production process and uses new technologies to create wellbeing beyond jobs and growth while respecting the production constraints of the planet [1]. In the past, an industrial revolution was driven by transformative technological advances which led to fundamental changes in how the industry functions. Like its predecessors, Industry 4.0 is technology-driven. In contrast, Industry 5.0 is value-driven.

It is important to highlight that Industry 5.0 should not be understood as a chronological continuation of, or an alternative to, Industry 4.0. We should view Industry 5.0 as a complement and extension of the features and benefits of Industry 4.0.[2] They will work together to balance global technological advances with societal needs.[17]

Xu, Lu, Vogel-Heuse, and Wang write that, "Industry 5.0 centers around three interconnected core values: human-centricity, sustainability and resilience."[17] Some have even taken Industry 5.0 one step further to suggest a more encompassing term, "Society 5.0," to expand beyond the manufacturing sector to solve social problems with the help of integration of physical and virtual spaces.[15] Skobelev and Borovik share that Society 5.0 is the society where the advanced IT technologies, IoT, robots, an artificial intelligence, and augmented reality (AR) are actively used in people's common life, in manufacturing, health care and other spheres of activity not for the progress, but for the benefit and convenience of each person.[15]

Augmented Reality, Wearables, and the Connected Worker

There are several categories of wearables. Some can be used for monitoring the workers' environment and provide better insights into potentially hazardous working conditions. They can also measure the physical attributes of the worker, e.g., monitoring for temperatures, or stressful or incorrect body movements, or alerting when workers enter areas where they do not hold the proper credentials to perform work.

Wearables can also be used for health monitoring, measuring pulmonary function and continuous glucose monitoring.[13] For our purposes, we will focus on the use of wearable devices that improve worker productivity through the use of Augmented Reality (AR) or assisted reality.

The use of Virtual Reality (VR), Augmented Reality (AR), and Wearable devices in manufacturing and other industries is not futuristic. As our customers continue their digital transformation journeys, these technologies in Extended Reality (XR) becomes a strategic and imperative part of their transformation. As a note: XR is an umbrella term that encompasses, Wearable Devices, Assisted Reality, Augmented Reality, Mixed Reality and Virtual Reality.

What is a Connected Worker? What are these devices? Deloitte has defined a connected worker as, “any person whose working life is changing due to digital and other technologies”.[3] In operations, you can certainly also imagine how, with the proper equipment and solutions, service people, factory staff and logistics staff can better perform their tasks if they have the information they need in front of their eyes and two free hands available to complete the task.[7] Results show smoother processes, fewer errors, and quicker time to diagnose and repair.

Workers benefit from AR or Wearable devices that facilitate flexible operations, and technical guidance through information transmission and virtualization.[14] Virtual training is also very important in creating a skilled workforce without risking the productivity of a running process or endangering a human worker.[12] And Augmented Reality can support complex assembly and maintenance operations even by workers with low levels of skills for conducting such intricate operations.[8]

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Features and benefits of Assisted Reality, Augmented Reality, Mixed Reality and Wearable Devices

Some of the common features of industrial-grade AR/MR headsets include accurate voice recognition, hands-free navigation, gesture recognition, large and flexible display, lightweight construction, comfortable fit, rugged design, and water- and dust-resistance.[9,13] And although similar in their offers, each headset or wearable is different in the use cases they can solve for.

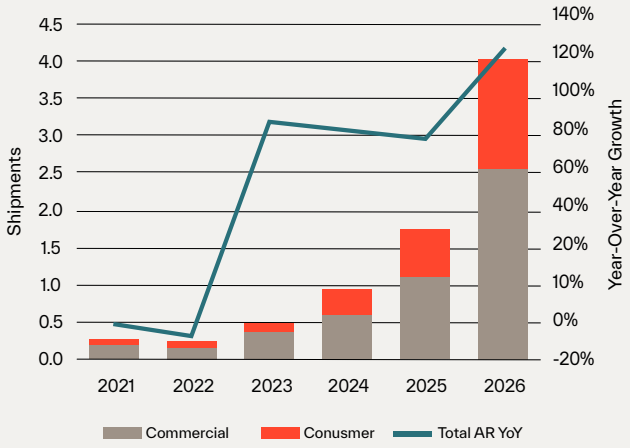
Each device, then, needs to be viewed in line with a task or activity. Where some could benefit from a holographic overlay, for example showing work instructions, some need full visibility with assisted directions from a remote expert, and others still could use documentation viewed using voice commands.

Therefore, the choice of an appropriate connected worker solution depends on the proper assessment of several competing factors at the workplace, such as:[13]

- Desired business insights
- The nature of the work environment
- Safety risks and hazards
- Platform scalability
- Characteristics of assets and legacy equipment
- The need for predictive maintenance
- Network connectivity
- Visibility and transparency of processes
- Energy efficiency
- Skillset of existing workers and information technology (IT) staff
- Technology adoption barriers
- Information on technology validation and reliability
- Data ownership
- Privacy
- Security
- Pricing/subscription models

In the first half of 2022, two of the top headset makers were Microsoft and RealWear. However, the market is evolving and as we expand into conversations that will also include

Worldwide AR HEadset Forecast, 2022Q2



Source: IDC 2022

the Metaverse where technology giants like Meta are expanding their footprint in the consumer market. At present, most work done in the Metaverse is Virtual Reality (VR) and not AR or Wearables, but time and adoption outside of consumer technologies will determine the winners. According to IDC, they are anticipating plenty of growth as the market is forecast to have a 5-year compound annual growth rate (CAGR) of 70.3%, topping out at 4.1 million units by the end of 2026.[5]

After the assessment phase, and the deployment of Augmented Reality headsets and/or wearables, results have been documented in scholarly research which have shown their impact on the requirements of Industry 4.0 in two key areas: operational improvement and innovation. If we focus first on operations, and on maintenance activities, we can highlight the areas of improvement in predictive maintenance, remote maintenance, and self-service, through virtual instructions available via Augmented Reality (AR) and Wearable devices.[10]

If we look to innovation and design, we can see the promise of Industry 4.0 and Smart Factory deliverables using a Connected Worker improving design and innovation initiatives by improving information transfer from the digital to the physical world. By overlaying it in real-time in the worker's field-of-view, we can support new ways of doing work with opportunities limited only by our imagination. One desired output could be streamlining the development process, including prototyping, all being supported by teams that are globally dispersed and meeting in a virtual world.[14]

About Kyndryl – The Heart of Progress

At Kyndryl it is our passion to drive innovation. We have the unique ability to partner with manufacturers from start to finish on their journey to digitize and modernize operations to reduce the time it requires workers to complete operations and maintenance activities and increase worker safety. All this and more, made possible when people, processes and technology seamlessly work together.

Kyndryl provides proven technical expertise, capabilities, and blueprints to guide manufacturers through the challenge of modernizing their IT and OT environments and addressing the complexities of digitizing and modernizing their plant floor environment.

Currently, we're helping organizations across the Automotive and Oil & Gas industries to integrate wearable, Augmented Reality to enable workers, management and the company as a whole. We specialize in managing, and supporting the integration of wearable devices into existing workflows, ERP systems, supply chain, and/or MES, Data warehouse and IT support mechanisms.

Kyndryl can help you:

- Co-create a strategy and roadmap for your Industry 5.0 journey using Industry blueprints with the help of Kyndryl Vital, our transformational design team
- Provision software-defined and 5G-enabled edge services to build a "core-to-edge" solution with end-user device integration, cloud or edge-based application delivery, high-security options, automation, and innovative network services
- Leverage repeatable patterns to integrate heterogeneous systems into a common fabric with a converged IT-OT infrastructure and the benefits of better visibility and asset optimization
- Modernize IoT devices to enhance data collection and empower your enterprise through data analytics, AI, machine learning, and automation
- Adoption of 5G and private wireless

Kyndryl partners supporting Wearables, Augmented Reality include:

- Microsoft
- Nokia
- Service Now
- SAP
- RealWear

Alongside our partners, Kyndryl delivers private wireless connectivity that leads to business enablement and supports the objectives of digital transformation and to enable the near-real-time connectivity required by devices such as wearables. Kyndryl is committed to people, society and the planet, which aligns with the Industry 5.0 vision. As manufactures discover the potential of Industry 5.0, Kyndryl will be by our client's side helping to clearly articulate their desired future state and understand the challenges that need to be overcome to realize their vision.

Learn more

To learn more about how Kyndryl and DOW are working together to modernize mission-critical infrastructure visit https://www.kyndryl.com/us/en/customer-stories/interactive/dow-transformation.

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