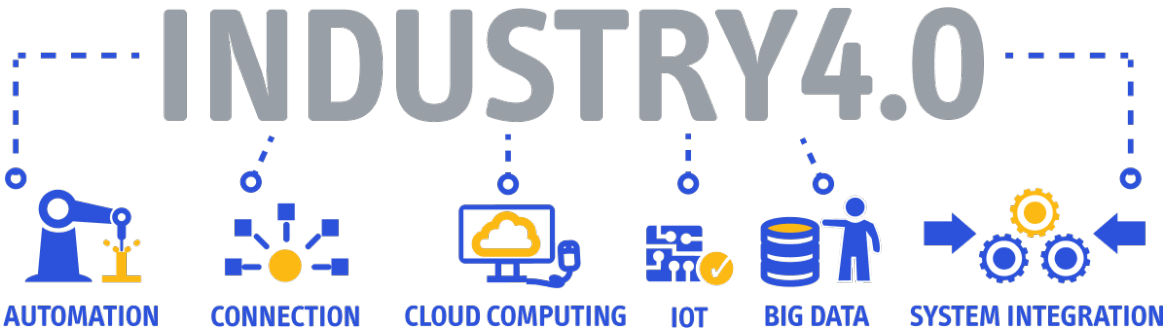
GOARC

# Safety 4.0® White Paper

# Table of Content

1. industry 4.0 ..... 3
2. The Impact of Industry 4.0 ..... 3
3. Work safety in Industry 4.0 ..... 3
4. The safety assurence gap – from knowing to doing ..... 4
5. Safety 4.0 – personalized, dynamic and contextual ..... 4
6. Human and Organizational Performance (HOP) ..... 5
7. The safe connected worker ..... 5
8. GOARC Safety 4.0 platform ..... 6
9. Summary ..... 6

## 1. Industry 4.0©




Industry 4.0© has transformed manufacturing, bridging the physical and digital world by incorporating IoT, cloud computing and cyber-physical systems. Industry 4.0© leverages interconnectivity and intelligent networking to enable faster, more flexible, more efficient processes by integrating smart technologies such as sensors, automation, machine learning, and Big Data analysis.

## 2. Impact of Industry 4.0 – Improved processes and risk management

Industry 4.0 technology has enabled a more holistic and better-connected ecosystem for manufacturing and supply chain management companies. Intelligent networking provides an increased information flow with end-to-end information streams, with the added value of smarter, data-driven decision making, increased productivity, and industrial growth.

Advanced analytics provide data-driven insights on systems and operations, with the capability to predict problems and mitigate risks. With IoT sensors, preventive maintenance is automated and streamlined. Manufacturers can pivot from preventive maintenance to predictive maintenance - collecting Big Data from sensors in factories and products to detect warning signs of expensive failures before they occur.

Although awareness and concern for worker health and safety has evolved and improved alongside Industry 4.0 technologies and capabilities, organizations continue to rely on traditional siloed systems, basing safety management and methodologies on static procedures rather than dynamic safety prevention solutions.

## 3. Work Safety in Industry 4.0

Industry 4.0 smart technologies enable companies to enhance worker safety. Technology-driven safety approaches based on interconnectivity and preventive management require a change in perception with a focus on proactivity, shared learning, responsibility, and engagement. This new generation of safety methodologies strives to make safety an integral part of the workplace and company objectives, facilitating real-time protection of people and critical assets.

## 4. The Safety Assurance Gap – From Knowing to Doing

One of the main safety challenges facing global organizations today is safety assurance - verifying that all employees are doing the right thing, 24/7, across the global organization. Awareness and theoretical knowledge are not where safety problems lie.

The challenge facing organizations is to translate knowledge into concrete actions – to assure the performance of thousands of everyday safety actions across global operations and thousands of workers. The gap between knowing what needs to be done and getting it done is the *safety assurance gap*. Studies indicate that human error is a direct or indirect factor in 90% of all industrial accidents. Yet organizations today lack the power to track, analyze, predict and help change human behavior.

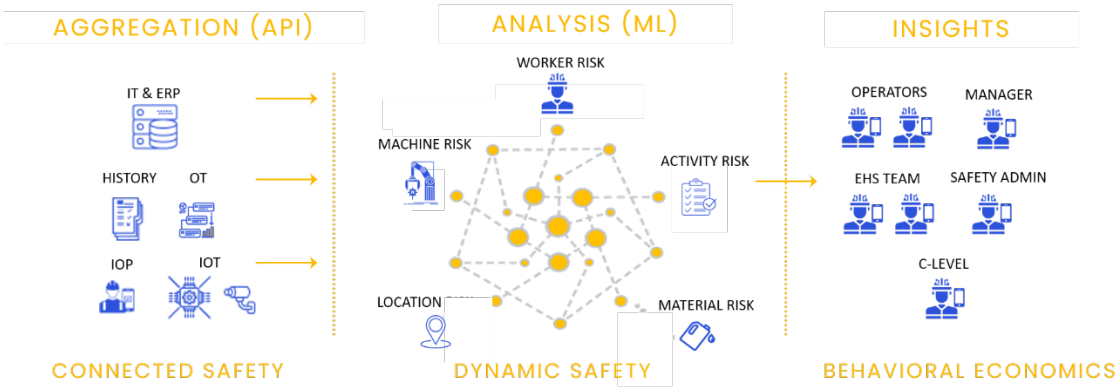
The foundation of the Safety 4.0 revolution is comprehensive system connectivity – within the organization and outside it – covering emergency devices, fire alarms, Operational Technology platforms, ERP systems, IIOT platforms, PPEs, tools, machines and much more. Safety 4.0 platforms leverage connectivity to integrate technologies and analyze massive amounts of data. Advanced analytical tools powered by artificial intelligence and machine learning generate new models for real-time risk analysis – prediction and prevention generated – to predict accidents and prevent human error.

Despite these advances, connected worker capabilities today are still limited, with no real-time video, images or data communication, and significant language barriers. The inability to convey real-time situational awareness makes it difficult for management to gain insights, follow up on paperwork, or maintain situational awareness of activities in remote locations.

Industry 4.0 safety technologies have yet to deliver tangible safety results and offer advanced safety methodologies on a technology platform. Existing solutions:

- Do not aggregate and analyze behavioral economics parameters to help change human behavior
- Lack the power to adapt to changing environments or situations in real time
- Are unable to aggregate safety data from cross-organizational sources, or analyze and predict risk
- Do not leverage artificial intelligence, machine learning, IIoT or smart analytics to consolidate and process safety data

## 5. Safety 4.0 – Personalized, dynamic and contextual




Safety 4.0 solutions apply Industry 4.0 technologies to focus on worker safety, accident prediction and prevention, based on cross-organizational connectivity and collaboration through the connected worker. While safety was once the exclusive concern of the Environmental Health and Safety (EHS) manager, it now incorporates all stakeholders: frontline workers, subcontractors, inspectors, operations managers and executive managers. Safety 4.0 connects person and machine, combines process and personal safety, breaks down informational silos and makes safety an integral part of everyone's routines and awareness.

Safety should be adjusted to the specific task, person and location in question, delivering mission-specific insights and alerts. Safety 4.0 technologies with predictive and prescriptive analytics, industrial IoT and machine learning will make safety personalized, dynamic and contextual. Dynamic safety helps organizations prioritize and conserve resources to increase operational efficiency. Contextual safety monitors the worker's physical environment and tasks in the field – machinery, personal protective equipment, and location – to ensure worker health and safety. Personalized safety uses analytics in context to respond to individual risks.

## 6. Human and Organizational Performance (HOP)

One of the approaches of safety methodologies is Human and Organizational Performance (HOP). Hop is a science-based approach to understanding how and why people make mistakes or errors, and what organizations or individuals can do about them. The underlying principle of HOP is that people make mistakes, yet standard hazard analysis tools typically do not identify the human factor. While traditional safety management tends to focus on post-incident error "fixing", HOP aims to reduce the likelihood and impact of human error and fix the system in which the error occurred, promoting communication, collaboration and shared learning within the organization. Property damage, injuries, illnesses, and even fatalities are more likely to occur in organizations that don't incorporate learning as a tool for safety improvement and engagement.

Safety 4.0 solutions apply advanced HOP methodologies on a technology platform, connecting worker and machine. Once disparate units, practices, guidelines and predictive insights are connected into one database and system, integrating safety cases, worker training history, team feedback, machine performance, task priorities, and organizational safety culture.

## 7. The Safe Connected Worker

**Connected workers** are at the center of the Industry 4.0 revolution; the Safety 4.0 revolution has **safe connected workers** at its core.

A safe connected worker has real-time, context-specific and actionable information based on personal data and the immediate physical environment. Mobile devices, sensors, asset-tracking, analytics and wearable technologies help the connected worker

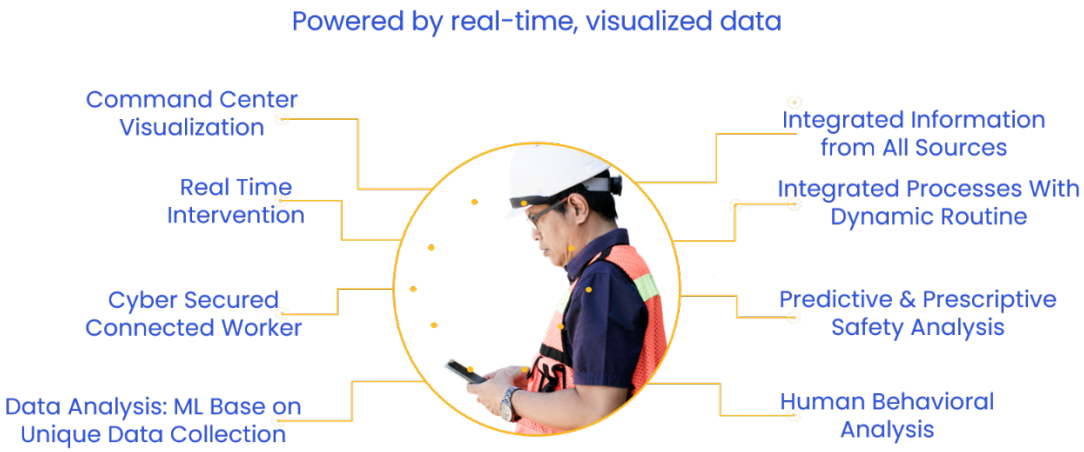
to execute daily industrial or field work activities more effectively. A safe connected worker wears a helmet equipped with sensors, communication equipment and alert management options. Data is sent to a central system or cloud for analysis and decisions are communicated back to the worker. Equipped with the right data at the right time, the connected worker's attention is constantly directed toward proactivity – as opposed to reactivity – focusing on valuable activities for continuous improvement.

Based on safety data analysed in real-time and leveraged to predict and prevent accidents, safe connected workers receive personalized guidance, training sessions, permits to work, alerts or AI-powered safety insights. They also take a proactive part in the feedback loop with visual reports and notifications.

## 8. GOARC Safety 4.0

GOARC has revolutionized the industrial safety domain, combining EHS and process safety on a worker-focused platform, with real-time reporting capabilities from workers in the field. GOARC's Safety 4.0 leverages Industry 4.0 technologies to protect workers by providing valuable and timely data on worker and task status.

Enhanced communication between the field and control room enables critical information flow and insights regarding potential hazards, accidents, and emergency situations. By bridging the communication gap and enabling fast, data-driven decision making, GOARC provides full operational and integrated risk management of assets and workers.



GOARC's Safety 4.0 features a real-time, centralized control center as a single source of truth for use by all teams on a dedicated, secure SaaS platform. Converging massive amounts of data from a wide range of sources, including internal organizational documentation, onsite feedback, ERP system, IoT sensors and external information databases, GOARC connects the dots between disparate units, best practices, guidelines and predictive insights.

Enhanced communication and connectivity between command center, maintenance, and operations provides a dynamic and predictive snapshot of the changing environment in real time, offering user-friendly insights and personalized safety recommendations and alerts anytime, anywhere onsite. Connected workers use a mobile app to report from the field, including video, images, and reports, with real-time push notifications and text message to all involved teams. The system offers full transparency and access at the enterprise level, automated workflows, and localization in 15 different languages.

GOARC 's integrative and reliable technology-based platform helps workers and managers avoid human error and mitigate risks in a multi-level approach:

**Connected safety**: End-to-end integration breaks down silos of information, connecting man and machine for enhanced personal and process safety. Personalized recommendations are tailored to individual employees, locations, material, machines, and activities.

**Predictive safety**: Preventative safety analysis identifies and tracks predictive metrics, providing relevant safety guidelines and delivering a powerful protection layer that is far more effective than retrospective, data-based safety analysis.

**Behavioral safety**: Safety administration connects EHS teams, management and workers to improve human behavior insights and promote training and learning for a safer, more engaged workforce.

**Dynamic safety**: An adaptive, personalized and contextual approach that delivers continuous situational awareness related to machines, workers, location, and activity. GOARC Safety 4.0 recognizes risks for personal safety and provides accident prevention recommendations in real time. The solution delivers automated alerts or shutdowns if

needed, blocking activities of workers and machines. GOARC takes into account ever-changing complex data and work environments, delivering dynamic data for dynamic safety.

## 9. Summary

Industry 4.0, characterized by the implementation of smart technologies to advance productivity, efficiency, and cost reduction, has also brought a shift in perspective that highlights the importance of prioritizing worker health and safety. However, leveraging the changes in technology to create a safe, connected workforce, mitigating risks while improving work processes, requires full integration and real-time connectivity between management, operations, and the individual worker. That is the goal of Safety 4.0.

The challenges of Safety 4.0 are the core of GOARC's Safety 4.0 solution – a unified, interconnected system that delivers technology-driven change to work culture and operations. GOARC Safety 4.0 supports multi-level protection of people and critical assets in real time, all the time.