



Unearthing operational excellence: maximizing mining with digital transformation

Empower your mining operations with Octave's connected, scalable solutions

EBOOK

Introduction

For thousands of years, the mining industry has evolved through innovation, continually finding new ways to extract greater value from mineral resources. Whether in search of fossil fuels, rare elements or precious metals, drilling the deep sea, boring massive tunnels, carving out open pits or moving mountains, mining has evolved and shaped our civilizations.

From the earliest mining operations to today's advanced facilities, health, safety and environmental risk management has remained a fundamental industry concern.

Mining operations present a range of hazards, from challenging working environments to the use of large, complex equipment. S&P Global Marketing Intelligence reported that according to Joanne Farrell — who was representing Rio Tinto as the group executive HSE and managing director Australia at the Minesafe International conference — the mining industry was about seven or eight years behind the oil, gas and chemical industries when it came to process safety at that time.

Accenture and the [World Economic Forum](#) argued that digital transformation initiatives embraced by the mining and metals industry over a ten-year period could result in an improvement in safety, with around 1,000 lives saved and 44,000 injuries avoided. This equates approximately to a 10% decrease in lives lost and a 20% decrease in injuries in the industry. These initiatives include automation, robotics and operational hardware, a digitally enabled workforce, integrated enterprise, platforms and ecosystems and next-generation analytics and decision support.



Mining is a multi-billion-dollar global industry critical to many other markets, such as technologies and electronics, construction and infrastructure and green energy resources. According to [GBC AG Investment Research](#), the global mining market was valued at USD 1641.67 billion in 2020. The mining industry continues to experience strong global demand, driven by the need for critical minerals, infrastructure development and the energy transition.

Accenture and the [World Economic Forum](#) also highlighted the economic, environmental and productivity benefits that digital transformation could generate for the mining industry over a ten-year period:

- More than \$425 billion (USD) of value for the industry, customers, society and environment
- Over \$320 billion (USD) of industry value, with a potential benefit of approximately \$190 billion (USD) for the mining sector and \$130 billion (USD) for the metals sector
- A reduction of 610 million tons of CO2 emissions, with an estimated value to society and environment of \$30 billion (USD)

[Deloitte](#) also proposed the value of the digital mine nerve center that brings together data across the mining value chain in multiple time-horizons, to improve planning, control and decision making, in order to optimize volume, cost and capital expenditure and to also improve safety.

Mining companies are looking to fast-track their digital transformation journey to manage new project ventures, remain competitive, reduce operational risks and address health, safety, environment and community (HSEC) concerns, maintain a social license to operate (SLO), decrease downtime, increase worker engagement and productivity and facilitate compliance with critical regulatory requirements. Octave can help your organization prepare for the future of mining. Whether you need to digitalize and transform operational systems and processes, accelerate initiatives, improve decision making, maximize leadership time in the field, help prevent fatalities and injuries, drive compliance to processes, optimize alarm management, protect your digital investments with state-of-the-art cybersecurity or build out a comprehensive digital twin, we are here to support your digital transformation journey, helping you adapt, innovate and stay ahead of what comes next.

"As an industry, we in mining have not focused or talked about process safety as much as we could or should have. We all need to lift the conversation and talk about process safety in terms of getting our people out of harm's way and preventing catastrophic events."

While digital technologies continue to reshape the industry, many mining companies still rely on fragmented information sources, including paper records, spreadsheets and standalone databases, for essential operational processes such as shift handovers. This can lead to miscommunication, mistakes, inefficiencies and major operational and safety risks — all of which can be avoided. Some of the common challenges by mining operators include:

- Deficient mobile technology or applications
- Detached real-time and process data from data historians, the CMMS, the DCS, EAM, PLC and SCADA systems
- Double handling of data
- Inadequate schedule adherence or compliance plan performance
- Insufficient leverage of the information collected in business value decision making

- Limited, singular add-on tools or point solutions that are costly and often incompatible with each other
- Missed opportunities to collect, store and structure more situational, qualitative and quantitative information
- Multiple data-entry systems for operations and HSE personnel
- Siloed information that's inaccessible to employees across the operation
- Slow and expensive methods for making changes that impede operational continuous improvement efforts
- Sluggish uptake of multiple systems for new employees

Based on our industry expertise and ongoing conversations with customers, we have identified three key business drivers accelerating digital transformation in the mining industry: employee safety and fatality prevention, workforce productivity and asset productivity.



Employee safety and fatality prevention



Workforce productivity



Asset productivity

Customer spotlight

AGL Energy is one of Australia's leading integrated energy companies and the largest Australian Security Exchange (ASX) listed owner, operator and developer of renewable energy generation in the country. Its diverse power generation portfolio includes base, peaking and intermediate generation plants, spread across traditional thermal generation as well as renewable sources including hydro, wind, landfill gas, solar and biomass. The Loy Yang open cut brown coal mine in Victoria's Latrobe Valley, near Traralgon, is owned and operated by AGL Energy.

Customer challenges

The Loy Yang open cut brown coal mining operation uses four electric-powered bucket wheel dredgers that are 190 meters long and 50 meters high. Each one weighing around 5,000 tons and able to excavate 4,000 tons of coal an hour or over one ton of coal a second. The coal is taken from the mine to the Loy Yang Power Station by 15 kilometers of conveyors that carry the coal at speeds of 5.3 meters a second to an 80,000-tonne capacity bunker. The coal is crushed by rotary crushers that can handle 2,500 tons an hour each before it is delivered to the Loy Yang Power Station. During each shift, the daily directions and targets need to be conveyed to the operations staff indicating the requirements in terms of quantity and quality of the coal required. Information detailing the status and availability of the major equipment is also needed. At the end of each shift, reports are required to indicate if objectives were met, comparing planned to actual tonnage. AGL Energy's objectives were to streamline the provision of daily requirements and combine that data with actual achievements to evaluate shifts production levels.



Octave solution

The Loy Yang open cut brown coal mine uses the **Octave Tempo Operations Logbook (formerly j5 Operations Logbook)**, **Octave Tempo Shift Handover (formerly j5 Shift Handover)**, **Octave Tempo Work Instructions (formerly j5 Work Instructions)**, **Octave Tempo Operations Management (formerly j5 Operations Management Solutions)** mobile capabilities and **Tempo Operations Management** connector for the Aveva™ PI System™ throughout its operations along with Tempo Operations Management templates and reporting functionalities to meet AGL Energy's extensive requirements. PI System current and future planning data is connected to Tempo Operations Management to build the requirement details and the resulting shift production levels.

This combined data provides four reports for each shift:

- **Coal draw directive report:** Provides instructions to the dredger operators on the drawing positions for the shift, this data is also expanded on in the Tempo Operations Logbook.
- **Shift handover report:** Generated at the end of each shift, this is a standard Tempo Shift Handover report containing additional information including hazards, safety and planning issues.
- **Shift leaders report:** Generated at the end of each shift, this report compares planned and actual results, includes bunker levels, stocks at the start and end of shift, output and digging rates of individual dredgers and major events from PI Event Frames.

- **Shift production requirements report:** This report provides the tonnage required and the rate per hour, major events on the dredgers, digging priority instructions, quality of the coal and the bunkering strategy.

Tempo Operations Management is saving time by producing concise requirements and directions at the start of each shift and is making information available to the entire operations crew allowing for greater communication and direction within the group. The Tempo Operations Management connector for the Aveva™ PI System™ enables the powerful combination of human operations processes and procedures with real-time data and is exposing the planning data to a larger audience, improving the operations workflow. The provision of this data at the start and end of each shift enables a group approach to daily production and shift handover meetings.

Accelerate your digital transformation journey to operational excellence with Octave

Accelerate continuous improvement at scale with a connected, enterprise-ready digital transformation strategy.

Strengthen safety, workforce performance and asset productivity, giving your business a clearer competitive edge.

Octave solutions turn disconnected information into actionable insights across systems and data sources.

By connecting and contextualizing data, Octave helps organization reduce duplication, improve efficiency, minimize downtime and support compliance.

In this eBook, see how Octave helps bring your operational excellence roadmap to life, one step at a time.



Step 1

Digitalize operational processes, procedures and permits

Creating a strong operations management data ecosystem by digitalizing operational processes, procedures and permits is an important step in advancing digital transformation. Critical asset, situational, qualitative and quantitative information should be captured, structured and stored digitally and more importantly, organized and made available to support safety-critical operational processes.

Octave Tempo Operations Management (formerly j5 Operations Management Solutions) can take your shift, operator rounds, personnel, safety, maintenance and process information and make it visible and viable to users across the entire organization. This on-premise, or SaaS, solution is designed to foster greater communication, coordination, transparency and knowledge transfer between teams for improved safety and productivity, reduced operational risk and a more empowered workforce. Tempo Operations Management offers a unique, straightforward digitalization approach with its spreadsheet-like configuration environment. This distinctive yet familiar low-code/no-code approach enables personnel to quickly manage changes without requiring expensive and slow vendor and IT services. It accelerates continuous operational improvement ensuring information collection and sharing stays current and aligned with operations. This makes Tempo Operations Management a quick-time-to-value investment, with high flexibility and a lower cost of ownership.

Reinforcing this first step with an industry-leading knowledge management suite designed to improve human performance through digital tools and connected process industry solutions is critical.

Octave Tempo Operating Procedures (formerly AcceleratorKMS) is an industry-leading solution that accelerates the digital transformation of paper-based, high-risk operational procedures and work processes. It enables organizations to manage, govern and distribute the up-to-date critical operational content that field workers require to keep operations running and learn faster.

Tempo Operating Procedures is a purpose-built knowledge management system for critical operational content. The digital system includes procedure lifecycle management (PLCM), a connected worker platform (CWP), a learner experience platform (LXP) and a component content management system (CCMS). The combined capabilities help address critical operational challenges faced by workplaces around the world. The system delivers an integrated digital content ecosystem in an intuitive, easy-to-use solution designed to simplify complexity.

Step 1

“The implementation of Tempo Operations Management across the water control function has given greater visibility of ongoing issues and given us a consistent and accountable shift handover tool.”

Ant Tyler

systems operations compliance manager,
Thames Water, U.K.

Proven business outcomes:

These are quantitative benefits that were reported by surveyed Tempo Operations Management customers:

30-50% Enhanced situation awareness

30-50% More accurate shift handovers

20-50% Increased asset availability

20-50% Better workforce productivity

20-50% Improved regulatory compliance

10-50% Reduced maintenance costs

Step 2

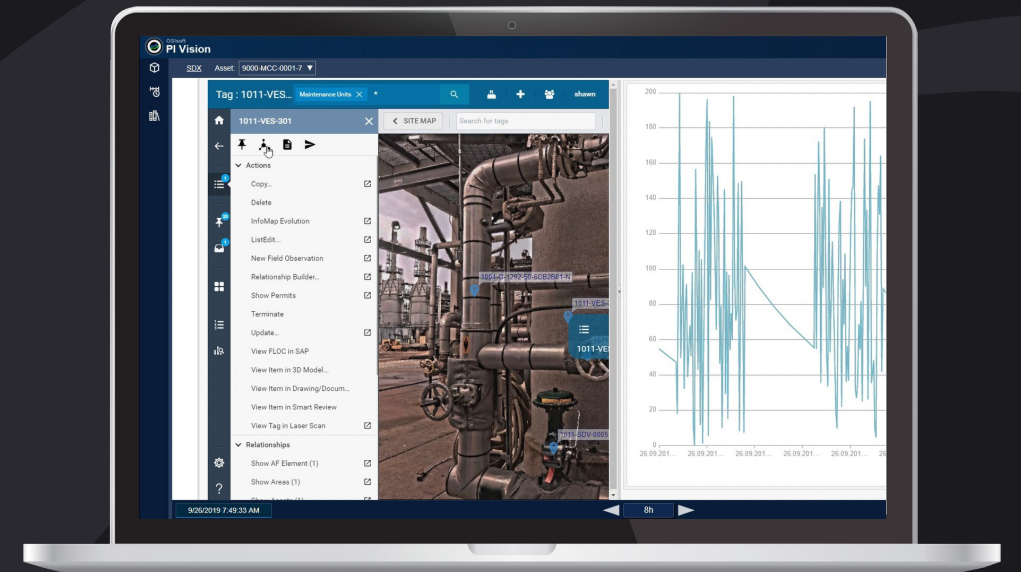
Connect operational data

Organizations must connect critical information and records across disconnected systems and formats by digitally linking them to operational processes, procedures, permits and data. This helps reduce operational risk, improve efficiency, minimize downtime, eliminate value leaks and meet compliance.

With **Octave Tempo Alarm Management** (formerly PAS AlarmManagement) you can easily implement industry-wide best practices to streamline and improve your alarm systems and operator effectiveness.

Octave Tempo Control Loop Performance (formerly PAS ControlWizard) and **Octave Tempo Control Loop Tuning** (formerly PAS TuneWizard) work together to monitor, assess and tune your control loops to ensure optimal performance, robust control and improve overall safety and reliability. **Octave Tempo Boundary Analytics** (formerly PAS InBound) helps you create a master database of operational limits ensuring alignment across all sources of record and analyzes performance against those limits. **Octave Tempo Safety System Performance** (formerly PAS IPL Assurance) provides visibility into your independent protection layers (IPL), making it easier to ensure your operations are safe to run. The **Octave Tempo Control System Effectiveness** (formerly PAS PlantState Integrity) platform is interoperable with Tempo Operations Management, adding further value to organizations investing in a digital transformation roadmap guided by Octave.

Companies can enhance information connection and interoperability by aggregating operational data and enabling a digital thread framework with **Octave InConcert** (formerly HxGN SDx2). This digital information solution is designed to capture, organize and link large volumes of information in context and provides web-based access to authorized personnel. As a cloud-native, SaaS solution, it can be adopted by any facility without introducing new software or investments in IT infrastructure. InConcert is CFIHOS-compliant and consolidates and unifies operations maintenance, safety, engineering and real-time data. InConcert can be connected to Octave technology such as Tempo Operations Management and third-party industrial data sources such as Aspen InfoPlus.21®, IBMMaximo®, SAP® Plant Maintenance (PM) and the Aveva™ PI System™ to provide a consolidated, role and context-relevant view of information.



Step 2

“To me it’s completely game-changing to have all this information readily available on one screen. This is the first time an end user can go to one place and get all the operations, maintenance, engineering and process data they need to do their duties. By having all this information readily available in a digital twin, I believe this is an industry first for the oil and gas industry, where it has been difficult to monitor remote assets and equipment in dangerous areas.”

President and CEO

Oil and gas company, USA

Proven business outcomes

60%

improvement



Contact Energy (New Zealand)

60% alarm rate improvements by adjusting alarm setpoints, deadbands, delay times and improving control logic and 65% reduction in long-standing “stale” alarms, contributing to improvement of operators’ alarm-related workload

70%

savings



Oil and gas company (USA)

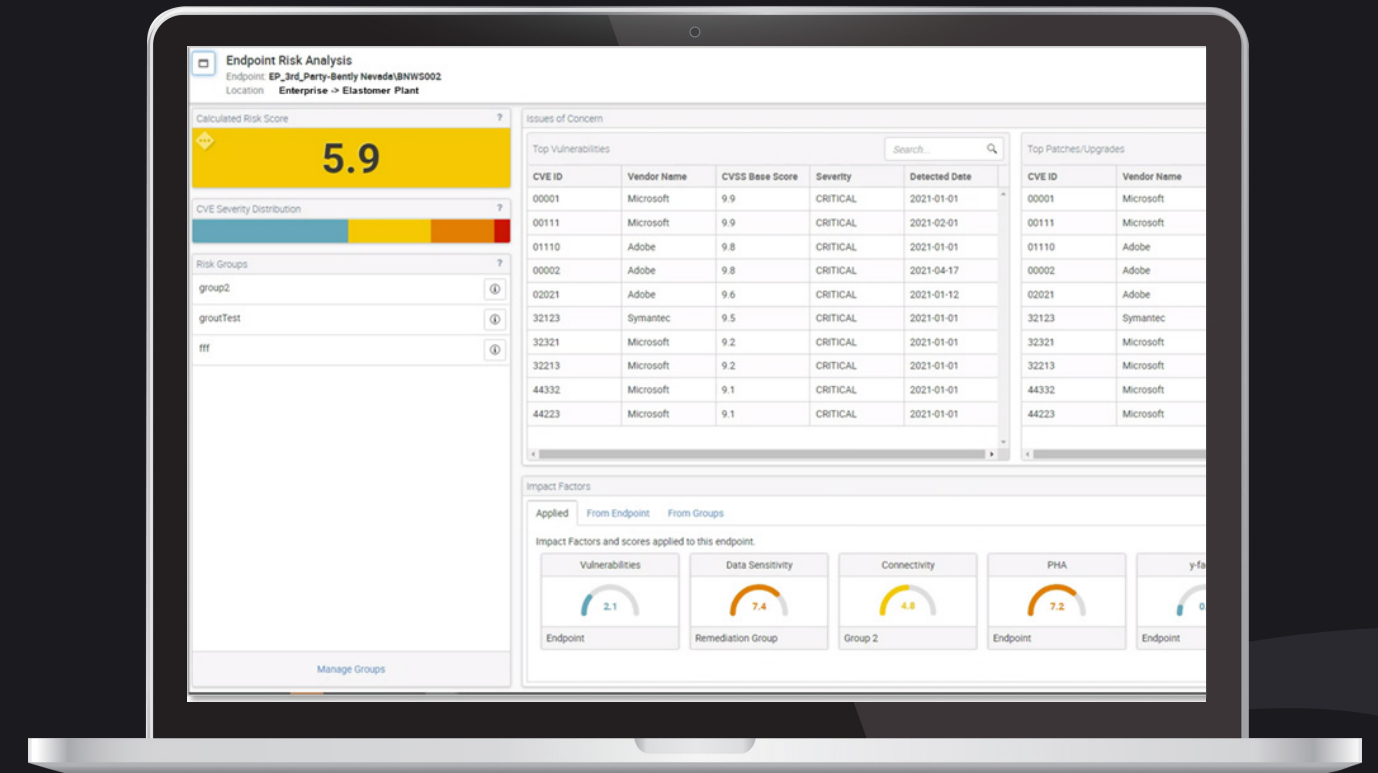
70% productivity savings in documentation and completion of inspections and 95% saving in time retrieving and searching for quality evidence post inspection

Step 3

Protect your digital investments

Keeping your operations running safely, smoothly and protected from cyber threats is vital to preventing unnecessary interruptions. There is no shortage of reports or news outlets raising the alarm on cybersecurity awareness. The **ARC Advisory Group** reported that "many industrial operations remain at risk of costly, disruptive cyber incidents." ARC analysts recommended that "all industrial companies consider software such as **Octave Cyber Integrity** (formerly PAS Cyber Integrity) as a foundational element of a defense-in-depth cybersecurity strategy."

This solution provides significant benefits such as: discovering and automatically maintaining a complete inventory of OT assets and enabling workflows and documentation for vulnerability remediations and compliance with ISA/IEC 62443, ISO 27001/2, NERC-CIP, NIST and the NIS Directive, as well as other standards and regulations, accelerating recovery with backups of critical control system data and supporting in-depth forensic analysis. ARC Advisory Group also noted that the solution's capabilities support the execution of critical tasks in the "secure systems" and "incident management" processes identified in its "industrial/OT cybersecurity maturity model." This includes capabilities for maintaining asset inventories, managing vulnerabilities, detecting unexpected system changes and gaining clear visibility into system security risks.



Step 3

“In industrial facilities, you typically find an array of proprietary ICS that are difficult to inventory, which subsequently makes monitoring for change and vulnerabilities a security challenge. As these systems have direct authority over process safety and production, there is unaddressed cybersecurity risk within a facility environment. Octave has architected its software to cover these systems, and its customers have testified to Octave’s effectiveness in reducing security risk.”

Vikrant Gandhi

industry director, Frost & Sullivan, USA

Proven business outcomes

Capture a holistic view of your asset inventory – gain visibility into industrial assets from Purdue Level 3.5 to 0.

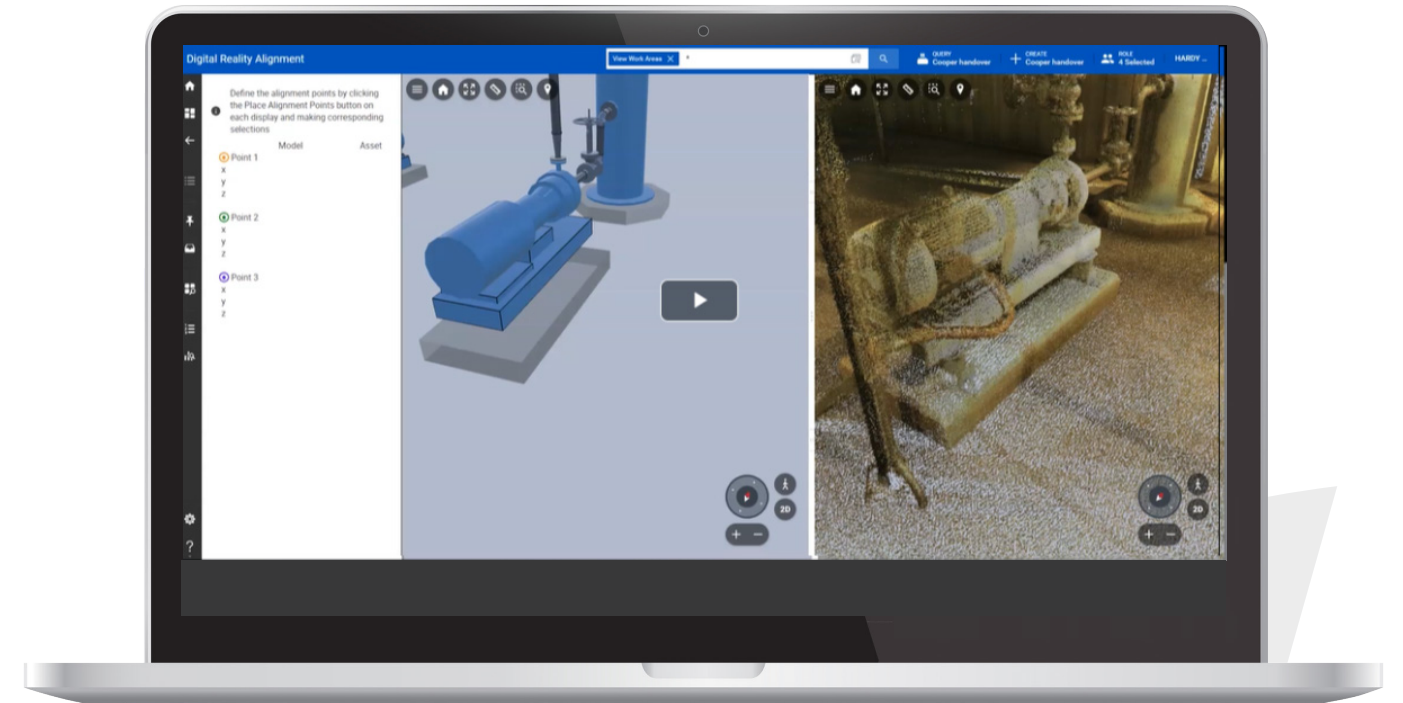
View risk in context – identify, evaluate and prioritize OT cybersecurity risk across multiple domains.

Decrease mean time to recovery – ensure operational resiliency by having a complete backup and restore point.

Build, maintain and evolve a digital twin

A digital twin enables asset owner operators to build and maintain a connected information ecosystem across the asset lifecycle, allowing for a continuous journey of operational excellence. By deploying a comprehensive digital twin, complex data can be transformed into actionable information. This ultimate digital platform helps organizations unlock greater values and gain a competitive advantage made possible by using predictive and prescriptive analytics, artificial intelligence (AI), machine learning and automated decision-making across the value chain. It empowers the workforce with timely, data-driven insight into past performance, current operations and potential future conditions to improve situation awareness and decision-making.

Octave platforms connect safety-critical operations, processes, procedures and permits, alarm management methodology, maintenance work orders, real-time and historical process data, engineering schematics and technical documentation with 3D models, laser scans and cybersecurity safeguards to support a robust, enterprise wide digital twin. The result in a connected operational environment designed to help organizations scale across the asset lifecycle.



"Using the Octave technology, we built a 3D model of our plant that's so up-to-date, no one else has the equivalent in our industry. That's a definite competitive advantage, that somebody sitting at their desk can pull out engineering information instantly in a 3D visualization."

Alan Keith Chan

controls, information management and automation manager,
CNRL, Canada



About Octave InConcert

InConcert is Octave's next-level, cloud-native, SaaS solution for excellence in engineering and operations. Representing a significant update to [Octave InConcert Core](#) (formerly HxGN SDx), InConcert is part of Octave's mission to unleash intelligence at scale. InConcert is always on, intuitively simple, completely connected, infinitely scalable and innately intelligent.

Enriching work processes, InConcert advances a best-in-class set of core capabilities by seamlessly connecting to our powerful digital backbone. It unites critical data to form a digital thread that drives transparency, efficiency, productivity and informed decision-making while reducing risk and costs. InConcert's capabilities include:

- Asset lifecycle data and information management
- Document management and document control
- Design review and issue management

- Engineering change management
- Work packaging
- Asset modelling and visualization

Beyond traditional digital twins, InConcert and its powerful integrations give key stakeholders real-time access to the contextual data flowing across the asset lifecycle. By reimagining "business as usual," InConcert is a positive, disruptive force that eliminates unnecessary work cycles and processes.

InConcert is regularly updated to support connected, dynamic and data-centric work processes, helping stakeholders unlock greater value across industrial facilities, capital projects, asset fleets and enterprise operations. By connecting information and improving visibility, organizations can advance operational excellence, strengthen collaboration and accelerate digital transformation initiatives.



Connect

A digital twin is a dynamic digital depiction comprised of physical entity information. It is the single version of the truth unique to a user's perspective for a point in the lifecycle with many digital levels.



Think

Data is diffused seamlessly between the digital depiction and physical entity to enable co-existence. Then advanced technologies bring data, algorithms and context together.



Do

With this comes understanding, prediction and optimization for the physical entity to drive improved business outcomes.

Achieve operational excellence in mining

Employee safety and fatality prevention: Risk mitigation and workforce accountability

Digitalizing and automating operational processes such as area and shift handovers, permitting and inspections enables an additional level of situation data to be collected and insights into workforce compliance and efficiency. These new insights help close operational gaps that create safety risks and help improve your operations to save time and money.

Workforce productivity: Decrease operating expenses (OpEx)

Optimized assets, reduced downtime, enhanced productivity and better safety compliance all contribute to lower OpEx and higher profitability. Technology is now allowing a larger percentage of the operational workforce to work remotely, which has been shown to increase employee engagement and happiness while reducing hazard exposure hours.

Asset productivity: Increase efficiency

Empower your workforce to make informed decisions in real-time with the information they need, when they need it, and where they need it — via desktop, laptop or mobile devices. With digitalized processes, the information you need is always accessible. There's no need to search for paperwork from a previous shift or track down a co-worker for answers while they're on break or away.



Employee safety and fatality prevention: Meet compliance

When you need clear, concise and up-to-date records for local, state or federal regulatory compliance requests and procedures, having your data locked in a paper trail can lead to unnecessary delays and misinformation. Digital records allow you to instantaneously deliver accurate and complete information to internal and external regulators.

Workforce productivity: Save time

From the office to the field, personnel can save hours each day with digital access to the right information at the right time. Instead of spending valuable time searching through paper documents or disconnected systems to access and manage critical operational information, personnel can focus on applying their expertise to optimize performance and improve operations.

Asset productivity: Reduce operational risk

Workforce safety is improved when you reduce the chances of human error due to reliance on physical paper, especially when it comes to equipment inspections and shift handovers. Digitalizing these processes ensures the right equipment and readings are inspected at the right time and assists employees in quickly highlighting when equipment is operating out of its specified ranges.

Octave delivers more than software. We bring the expertise and services needed to put your systems into action.

With deep industry experience, we help you deploy quickly, apply proven practices and resolve complex operational challenges.

Together, our software, expertise and services help you modernize and simplify operations, support your operators and deliver actionable information where it's needed, ensuring reliable, compliant performance.



Working with a trusted digital transformation partner

As your trusted digital transformation partner, we deliver solutions that support the full asset lifecycle, from design and engineering to operations and maintenance.

Backed by advanced technology and global expertise, we help you create solutions that improve today, scale for tomorrow and adapt to change.

Putting data to work to improve safety, efficiency, productivity and quality isn't just what we do—it's a commitment we share with you.



Our focus is on autonomy

Leveraging data to its fullest potential is the outcome we want – **moving beyond automation to autonomy**



Our commitment is to innovation

With a **strong focus on R&D and a history of innovation**, our technology leadership is clear



Our value is strategically vital

Efficiency, productivity and quality result in scalable sustainability – fewer resources, less waste and less pollution



Our stability is consistently proven

Supported by industry experience, customer partnerships and **deep technical expertise across global operations**

Intelligence at scale

Octave turns vast data into decisive action for diverse customers around the world. Our adaptive solutions unleash intelligence at scale - enabling smarter decisions, sharpening performance, elevating efficiency and amplifying our customers results at every step. Our solutions simplify complexity, helping customers to design, build, operate and protect people, property and assets. We work alongside our customers to optimize outcomes and take on challenges together.



Awarded solutions provider

Ranked no.1 over 13 consecutive years, across 5 different categories, recognized in 2019 by ARC Advisory Group



Global presence

More than 7,000 employees, across 45 countries



R&D focused

More than 19% of total revenue invested in 2022



Innovative

More than 40 registered patents around the world

About Octave

Octave is a leader in enterprise software, turning data into decisive action and intelligence into your edge. Our software solves for and simplifies complexity, from the design and build to operations and protection of people, property and assets – for any scope, at any scale. For decades, we've partnered with customers to sharpen performance, elevate efficiency and amplify results. From factory floors to entire cities, our solutions are tuned to scale up what's possible from day one onward.

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