rayven

How to add Industry 4.0 technology + custom IoT applications to your offering:

A Complete Guide for Solution Providers.

Discover the challenge and the opportunity, how to select and work with platform providers, as well as the potential applications and benefits for both you and your customers.

What's inside.

Setting the scene.

In the rapidly evolving industrial landscape, digitalization is now *the* key driver of growth and productivity - and has been for some time.

This isn't news, revelatory, or even interesting; so why aren't industrial businesses significantly further down the digital transformation path than they are when it comes to incorporating Industry 3.0 and 4.0 technologies?

Commonly, it comes down to a lack of understanding about what can be achieved and how, insufficient access to expertise, the user-friendliness and flexibility of the technologies involved, as well as the perceived upfront costs and timelines.

Enter integrated data, AI + IoT platforms.

There is a raft of new SaaS-based technologies in the mould of many of the now commoditised business technologies that we use every day which remove the above challenges and open pathways for existing suppliers (and new market entrants) to develop the applications that industrial businesses need to transform operations, simply.

In this guide we explore the opportunity, what's involved, and how to get started with developing custom IoT solutions and industrial applications (if that sounds scary, stick with us - it really doesn't have to be).

Common industrial sector digital transformation hurdles:

Lack of understanding

How can the technology be used in my business? What is the output and likely benefit? Where is best to start?

Insufficient access to expertise

What technologies do I need? Who are the best companies in the field? Will I add risk or disrupt operations?

Answer:

Custom applications built on integrated data, AI + IoT platforms by existing suppliers.

Not user-friendly or flexible enough

Do these technologies integrate with our existing OT and IT? Do my end-users need to code? Can the applications be tailored to fit our precise needs?

Upfront costs + timeline

Do I need to buy all-new stacks? Will this take years and large upfront investments to implement? Will the ongoing fees cancel any measurable ROI?

The challenge + opportunity.

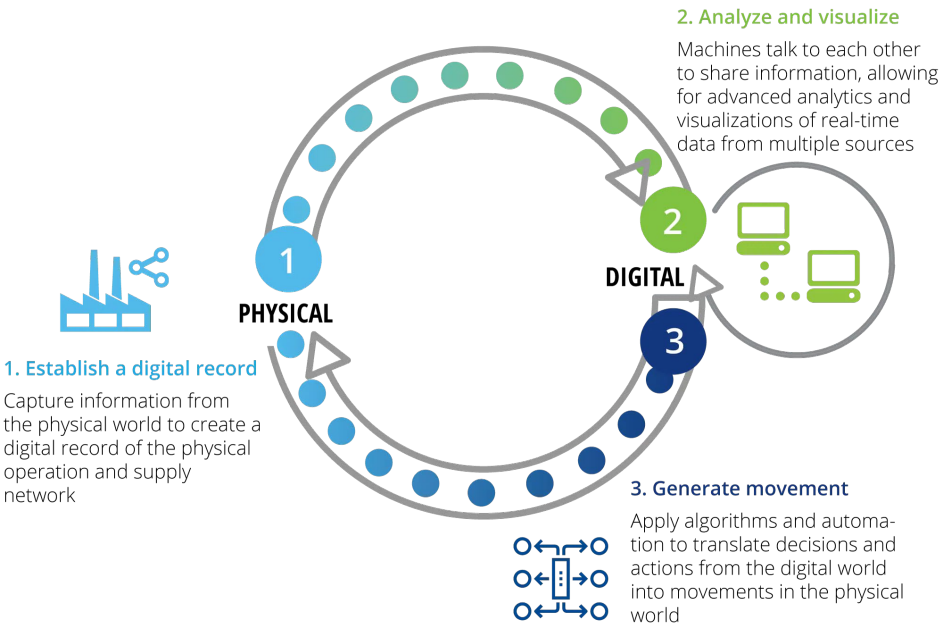
Industrial suppliers with huge amounts of knowledge in their sectors are at risk because of the evolution and commoditisation of Industry 3.0 and Industry 4.0 technologies, as well as the broader growth of AI and data science disciplines.

No-one is suggesting that industrial businesses aren't going to need the parts, machinery or physical hardware that keep operations running, but what we are seeing is that novel technologies are changing the spaces where they operate and that purchasing decisions are increasingly influenced by the ability of these assets to deliver measurable improvements and actionable insights. What's needed is data.

Data lies at the heart of transformation, playing a pivotal role in helping businesses meet their escalating environmental, efficiency, and productivity goals. Real-time data interpretation and insight dissemination to personnel and connected machinery not only enables businesses to optimise in the moment, but also provides the data sets upon which machine learning, automation, and AI rely to achieve even more.

Delivering on this is complicated and, as previously mentioned, many industrial businesses lack the understanding and expertise to make use of these technologies themselves. They are, therefore, relying on their suppliers to guide them.

The physical-digital-physical loop:



Source: Deloitte Center for Integrated Research.

As these sorts of technologies become more commonplace, suppliers that are able to deliver on the complete end-to-end vision and make incorporating these technologies simpler are going to win-out over those that can only deliver on a single piece of the puzzle. **Few businesses, however, are in a position to suddenly become software developers overnight - fortunately, they don't need to be**.

Continued overleaf.

As much as these new technologies are being created to help industrial businesses do more, they're doing the same for suppliers, also.

This means that if your business provide the parts, machinery, and sensors that an industrial customer needs, it is now also possible for them to use an integrated data, AI + IoT platform (or work with the technology company directly) to create the white-labelled applications needed to make sense of the telemetry and data generated by them, whilst also adding Industry 4.0 capabilities, all without writing a single line of code.

The software opportunity.

Incorporating software and delivering custom applications isn't just a way of future-proofing your business, it unlocks a number of benefits for suppliers:

- **Expand your value proposition:** By bundling software solutions with hardware, you significantly expand your value proposition. Software allows you to provide comprehensive, end-to-end solutions that go beyond the capabilities of hardware alone, creating a clear differentiation in the market that increases customer loyalty, retention, and improves lifetime revenue.

- **Unlock the potential of data:** The industrial Internet of Things (IoT) has given rise to vast amounts of data that can be used to drive efficiencies, reduce costs, and create new business models. However, without the right software, it's almost impossible for businesses to leverage this data effectively. Building custom applications on an integrated data, AI + IoT platform delivers the capabilities and tools needed to turn data (from anywhere and everywhere) into valuable, actionable insights in one move.

- **Drive revenue growth + diversification:** Bundling software with hardware presents a significant opportunity for revenue growth. Software, particularly SaaS-based models, provides a steady stream of recurring revenue which is not only beneficial for suppliers, but spreads the cost of solution build for customers over its lifetime. Moreover, as software can often be updated and improved without changing the hardware, this allows for additional upselling and cross-selling opportunities.

- **Enhance customer satisfaction:** Providing software solutions can also lead to improved customer satisfaction. It helps customers maximise the return on their investment in hardware by making it easier for them to extract, interpret, and act on the data your sensors collect. In turn, this can lead to better outcomes for their businesses, strengthening their relationship with you.

- **Lock-in effect:** If your software delivers significant value for the customer, it can lead to a lock-in effect. This means that your customer is less likely to move away from your business and will continue to purchase the products that you are currently already servicing them with.

The market opportunity.

There are a large number of reports and studies that demonstrate the market opportunity. Below, we've included those, as well as some additional findings that demonstrate the challenges and benefits for businesses, both supplier and customer.

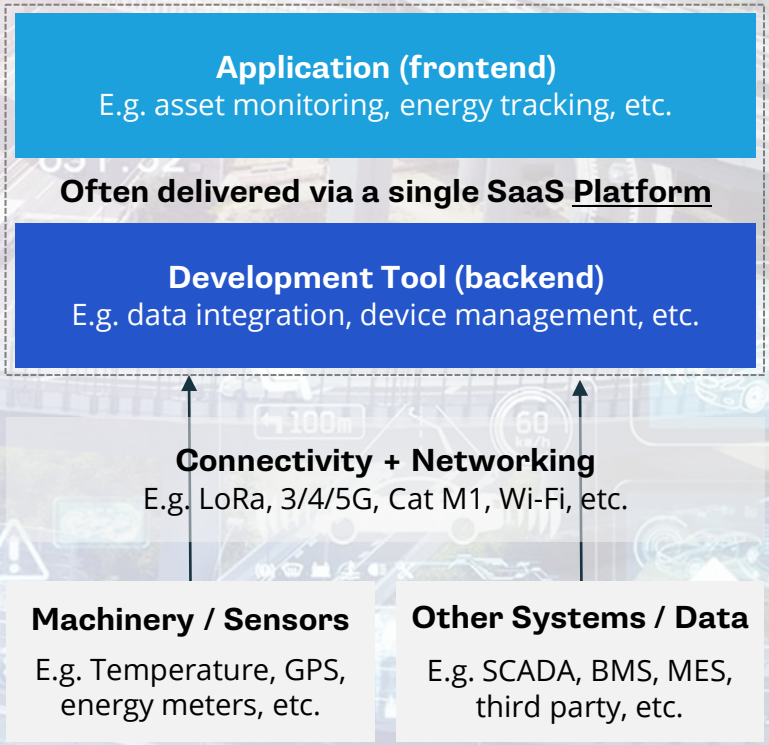
- The global industry 4.0 market size was valued at US$114.55bn in 2021 and is projected to grow from US$130.90bn in 2022 to US$377.30bn by 2029 (McKinsey: What are Industry 4.0, the Fourth Industrial Revolution, and 4IR).
- Thirty-percent of IoT projects fail in the proof-of-concept stage, mainly due to the lack of necessary skills for building custom applications (Microsoft via IDC: IoT Signals Report 2019).
- Companies that utilised syndicated applications saw a 20-25% reduction in development costs and time (McKinsey: Making IoT Technology Stack Up).
- The Industrial IoT market is expected to grow from US$77.3bn in 2020 to US$110.6bn by 2025 (MarketsandMarkets, Industrial IoT Market Report).
- Companies can achieve up to a 25% reduction in operating costs through IoT-driven efficiency improvements (GE Digital: How Industry & Smart Factories Drive Value with Lean Circular Economy Solutions).
- Companies that effectively apply IoT technologies can increase their revenues by 10% over three years (Boston Consulting Group: Beyond Predictive Maintenance).

The stack needed.

Suppliers typically already fulfil part of the technology stack needed to deliver end-to-end solutions, but not the whole piece, which typically consist of the following key components:

- **Sensors and devices:** These collect data from industrial equipment, machines, and the environment, measuring parameters such as temperature, pressure, vibration, and more. The need for them can be negated if you're using machinery and instrumentation with preexisting software that has these capabilities inbuilt, such as you commonly seen with industrial control and automation systems.
- **Connectivity and networking:** Various wired and wireless technologies facilitate communication and data exchange between devices, systems, and the cloud or on-premise infrastructure.
- **Development Tool (backend):** Software which is programmed to integrate data sources (sensors and devices, as well as with software and any other technologies that a business uses), analyse them in real-time, apply logic, and supports the creation of applications that end-users will interact with (see application below). Key to them is extreme interoperability so that it can integrate with all relevant data sources from systems, sources, devices and data feeds. Advanced systems will also include automation, machine learning and predictive analytics capabilities to deliver new insights and affect change to operations automatically (AI).
- **Application (frontend):** Dashboards and other visualization tools provide users with a clear, accessible view of real-time data, enabling them to monitor and control industrial processes. More sophisticated solutions and applications also provide users with tools and functionality that enable them to adjust machinery and tune performance remotely.

The full solution stack:



The different types of platforms.

The most critical component of the technology stack for a custom real-time data and industrial solution is the platform.

Platforms are typically SaaS-based and connect devices and systems, provide security, process data, deliver the platform for application development, add Industry 4.0 capabilities - or at least they can. That's because there are lots of different platforms with different capabilities that fit different uses.

Broadly, platforms fit into the following categories:

Device Management Platforms

Focus on the core functionality of connecting, managing, and maintaining IoT devices. These platforms provide essential features such as device provisioning, firmware updates, diagnostics, and troubleshooting. Examples include: Arm Pelion Device Management, AWS IoT Device Management, and Microsoft Azure IoT Hub.

Connectivity and Network Platforms

Specialise in providing the infrastructure and services required to enable seamless communication between IoT devices and data processing systems. These platforms support multiple connectivity options and handle tasks like data mapping and network management. Examples include: Cisco Jasper Control Center, Sigfox Network, and The Things Network.

Data and Analytics Platforms

Focus on processing, storing, and analysing the data generated by IoT devices. These platforms provide capabilities like data ingestion, real-time data processing, data storage, and advanced analytics tools to uncover insights and support decision-making. Examples include: Google Cloud IoT Core, IBM Watson IoT Platform, and AWS IoT Analytics.

Application Enablement Platforms (AEP)

Provide a set of tools for building, deploying, and managing IoT applications. AEPs combine the features of device management, connectivity, and data analytics platforms, sometimes with additional capabilities like interface design and workflow management. Examples include: Siemens MindSphere and GE Predix.

Vertical-Specific Platforms

Cater to the unique needs and requirements of specific industries, such as smart agriculture, connected health, or smart cities. These platforms often provide industry-specific features, data models, and integrations. Examples include: ABB Ability for industrial automation, CropX for smart agriculture, and Philips HealthSuite for connected health.

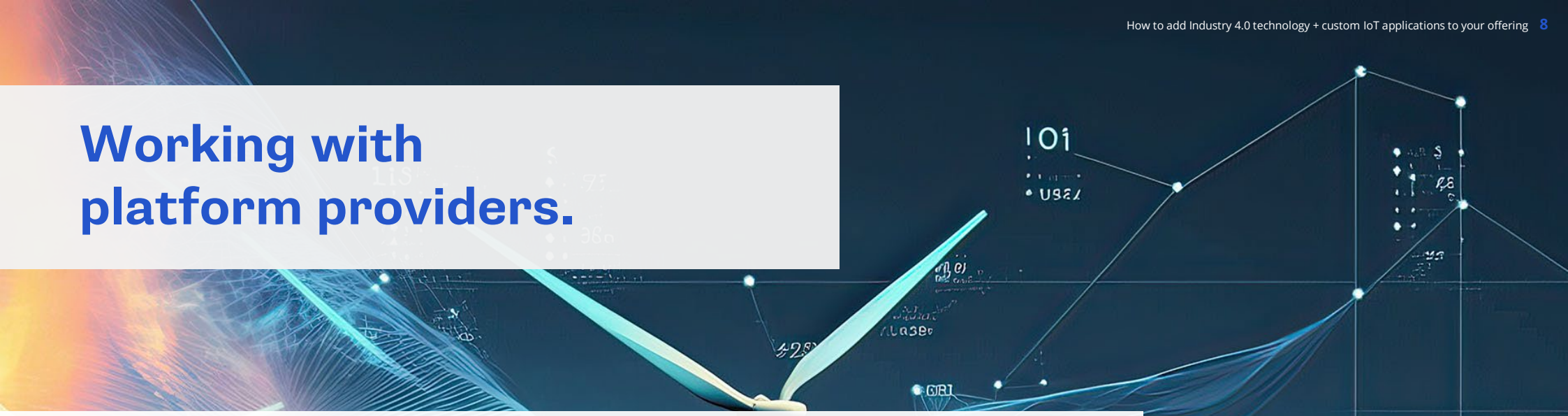
Integrated data, AI + IoT platforms

Combine all of the capabilities of an AEP and other platforms, but also includes the functionality that you would get in separate data platforms and AI platforms. These are ideal for businesses that wish to build comprehensive IoT solutions can deliver transformation and future growth. Examples include Rayven Dynamix, Losant, and C3.

Not all platforms and platform providers enable you to create custom applications that can be resold by suppliers. In fact, that list is relatively small.

For basic solutions that are unlikely to scale or need to incorporate functionality beyond real-time monitoring, 'Data and Analytics Platforms' and 'AEPs' could fulfil your needs, with the former will require an advanced level of technical IT skills. For solutions that can do that basic element, but which are capable of scaling over time to incorporate automation, predictive analytics, and multi-source real-time data analysis, 'Vertical-Specific' and 'Integrated data, AI + IoT' platforms are the answer.

Working with platform providers.



If you are an industrial supplier looking to benefit from the potential of offering end-to-end solutions to your customers, then what you're effectively looking to develop with them are syndicated applications.

What exactly are syndicated applications?

Syndicated applications are pre-packaged, repeatable deployments of platforms with prebuilt components that are designed to fulfil common industrial use-cases, which can then be tailored to meet individual business' needs. In English: a supplier works with a platform provider (such as Rayven) to create software which they can deploy and customise to multiple customers, simply, potentially without them even knowing that the platform provider is involved.

For example, an IoT sensor manufacturer could work with a platform provider to create an easily-deployable, customisable SaaS application that delivers real-time analytics of asset performance and predict maintenance needs based on the data provided from its various sensors and other common industrial technologies, such as maintenance data stored in a data warehouse. They will work together to scope out the functionality that's needed, develop both the back and front-ends of the application, add their brand livery, and even sell (and deploy) it to their customers.

Due to the SaaS-based nature of the solution, the industrial supplier will never have to worry about the ongoing maintenance or technical support of the underlying platform - that's the responsibility of the platform provider - and opens up the potential for future development of the solution with the end customers, e.g. adding AI and automation capabilities to a simple real-time monitoring solution.

This approach minimises risk to both end customer and supplier, whilst also delivering a future-proofed offering.

Selecting a platform.

Choosing the right underlying platform technology is critical to success. As well as specific capabilities (as outlined below), consider the following factors when selecting your platform:

- **Compatibility:** Make sure the chosen technologies are compatible with existing infrastructure, processes, and systems.
- **Scalability:** Choose for technologies that can easily scale and which have all the functionality that you're likely to lead in the future (changing two years in can be a major headache!)
- **Flexibility:** Look for platforms that support a wide range of sensors, devices, and data formats to accommodate future changes in business requirements (such as adding new applications for additional use cases).
- **Speed of deployment:** Many projects fail because they take too long to develop. Selecting a highly-capable, easy-to-use platform is a straightforward way that you mitigate this problem, because it won't require coding or other time-consuming developmental work.

An advanced platform (that incorporates data platform, AI platform, and IoT platform technology in one) will provide a solid foundation for building, deploying, and managing your solutions and applications, while also ensuring seamless integration of real-time data access, machine learning, and artificial intelligence.

What to look for in a platform:

Scalability + flexibility: A platform should be able to scale and adapt to the changing needs of organisation, both in terms of the number of connected devices and the volume of data being processed. Look for platforms that offer:

- **Horizontal scalability:** allowing you to add more devices and data sources easily.
- **Vertical scalability:** enabling the platform to handle increased data processing requirements as needed.
- **All-in-one architecture:** meaning you don't need to add additional modules and features. Everything you need is native, available out-of-the-box, and ensures a seamless design (data is stored in one place).

Security + compliance: Ensuring the security and privacy of data and devices is paramount when implementing a solution. Key security and compliance features to look for include:

- **End-to-end encryption:** protecting data both at rest and in transit.
- **Role-based access control:** allowing you to define and manage user permissions.
- **Regular security updates and patches:** ensuring the platform stays up-to-date with the latest security best practices.
- **Compliance with industry-specific regulations:** such as GDPR or HIPAA.

Data integration + management: An advanced platform should provide seamless data integration capabilities, allowing you to collect, store, and analyse data from a wide variety of sources. Key data integration and management features include:

- **Support for multiple data formats and protocols:** enabling the platform to ingest data from various devices and systems.
- **Real-time data processing and analytics:** providing timely insights and enabling prompt decision-making.
- **Data storage and management options:** including cloud, on-premises, or hybrid storage solutions.

Predictive analytics, Machine Learning + AI integration: To harness the full potential of machine learning and AI in a solution, look for platforms that offer:

- **Built-in machine learning capabilities:** such as data pre-processing, model training, and evaluation.
- **Support for popular machine learning frameworks and libraries:** enabling you to leverage existing algorithms and tools.
- **Integration with external AI and machine learning services:** allowing you to incorporate cutting-edge technologies into your solution.

User interfaces + visualizations: A user-friendly interface and robust visualization capabilities are essential for making sense of the vast amounts of data generated by your solution. Look for platforms that offer:

- **Customizable dashboards:** allowing you to create tailored views of your data and KPIs.
- **Interactive data visualization tools:** such as charts, graphs, and maps, enabling you to explore and analyse your data more easily.
- **Mobile and web-based access:** ensuring you can monitor and manage your IoT solution from anywhere, at any time.

By considering these key features and capabilities when evaluating platforms, you can select one that meets the needs of your organisation and its customers.

Potential applications.

There are an almost infinite number of potential applications for the technology, fulfilling different use case and business-wide needs.

Often the key to success is alignment with a preexisting customer business objectives. By applying the technology to an already business-critical problem or goal, it's not only easier to get buy-in, but it gives the ability to use real-time data access, advanced analytics, and AI-driven automation to achieve previously unattainable results.

Potential industrial IoT use cases:

- **Predictive Maintenance -** Predictive maintenance is an essential application that helps businesses minimise downtime, reduce maintenance costs, and extend equipment life. By using real-time data from sensors, machine learning algorithms, and AI, IoT systems can identify potential equipment failures before they occur, allowing businesses to perform maintenance proactively and prevent unexpected breakdowns and production disruptions.
- **Real-time Asset Monitoring -** Real-time asset monitoring is a crucial application that enables businesses to track the performance, utilisation, and location of their assets. This provides valuable insights into asset health, helps optimise asset usage, and supports efficient maintenance planning. Moreover, real-time asset monitoring can help businesses identify potential issues early, preventing costly equipment failures and disruptions.
- **Environmental Monitoring -** Environmental monitoring is an important application that helps businesses monitor and manage various environmental parameters, such as air quality, water quality, noise levels, temperature, and humidity. This information can be used to ensure compliance with environmental regulations, improve workplace safety, and optimise processes to minimise environmental impact.
- **Safety -** IoT technologies can enhance workplace safety by monitoring hazardous conditions, detecting potential safety risks, and providing real-time alerts to workers and managers. By analysing data from sensors, cameras, and wearable devices, IoT systems can identify patterns and trends that indicate potential safety hazards, enabling businesses to take proactive measures to protect their employees and prevent accidents.
- **Smart Factories –** Industry 4.0 technology is transforming traditional factories into smart factories, where connected devices, real-time data analysis, and AI-driven automation enable more efficient and flexible production processes. By integrating these technologies, businesses can improve production planning, optimize resource usage, and enhance overall operational efficiency.
- **Inventory Management -** Efficient inventory management is critical for businesses to optimize their supply chain and minimise costs. Applications can help businesses track inventory levels in real-time, providing accurate and up-to-date information on stock levels, demand, and supply chain status. This enables businesses to make data-driven decisions regarding inventory management, reducing excess stock, and preventing stockouts.

- **Fleet Management –** Industry 4.0 technologies can be used to optimise fleet management by providing real-time data on vehicle location, fuel consumption, maintenance requirements, and driver behaviour. This information can help businesses optimize routes, reduce fuel costs, improve vehicle maintenance, and enhance driver safety.
- **Energy Management -** Effective energy management is crucial for industrial businesses seeking to reduce operational costs and minimise their environmental impact. Industry 4.0 technologies can help businesses monitor, control, and optimise their energy consumption by identifying inefficiencies and automating adjustments, enabling them to achieve significant energy savings and improve overall sustainability.
- **Quality Control -** Ensuring consistent product quality is a top priority for industrial businesses. Custom applications can help businesses to monitor production processes, detect deviations from quality standards, and automatically trigger corrective actions. By identifying and addressing quality issues early in the production process, businesses can minimise defects, reduce waste, and improve customer satisfaction.

Real-world solutions built by Rayven, include:

- Aggregated risk profiling
- Asset real-time monitoring + condition monitoring
- Asset time-to-failure
- Asset utilisation tracking
- Building management
- Carbon + GHG tracking + accounting
- Cold chain + storage
- Compliance tracking
- Condition monitoring
- Continuous verification of controls
- Dust monitoring
- Energy efficiency + forecasting
- Energy load management
- Energy monitoring
- Energy tracing
- Environmental monitoring
- ESG monitoring + management
- Facility management
- Facility asset monitoring
- Farm monitoring
- Farming automation
- Fault + anomaly detection
- Fleet management
- Fleet health + predictive maintenance
- Fleet tracking + geofencing
- GHG accounting
- Greenhouse management
- HSEC monitoring
- HVAC monitoring + efficiency
- HVAC maintenance + energy efficiency
- Irrigation monitoring + optimisation
- Leak detection
- Light monitoring
- Load + haul
- Maintenance monitoring
- Noise monitoring
- Operator monitoring
- Pipeline monitoring
- Pollution monitoring
- Port monitoring
- Predictive maintenance
- Production optimisation
- Production monitoring
- Pump monitoring
- Quarry monitoring
- Real-time OEE
- Refrigeration monitoring
- Regulatory compliance
- Remote asset monitoring
- Resource + inventory management
- Risk monitoring + mitigation
- Road crash barrier monitoring
- Safety monitoring
- Shutdown management
- Site monitoring
- Site asset management
- Smart building management
- Solar analytics + maintenance
- Supply chain tracking
- Sustainability tracking + framework reporting
- Theft detection
- Utilisation + performance enhancement
- Vibration monitoring
- Waste tracking + reconciliation
- Water + irrigation monitoring
- Water condition monitoring
- Water management
- Water storage + demand forecasting
- Weather station monitoring
- Yellow goods maintenance
- Yellow goods monitoring + geofencing
- Yield optimisation.

Partner benefits + commercial models.

Partnering with a platform provider and adopting a syndicated software model enables suppliers to develop their own real-time data and Industry 4.0 solutions, simply.

Beyond that, however, there are additional benefits outside of the technology itself.

Platform companies will work with the supplier to provide insights and practical help with not just solution design and build, but with additional resources to deliver increased likelihood of successful uptake across existing and new customer segments.

These services can include assistance in application architecture, user interface design, and setting up the requisite data pipelines; through additional solution development and scaling services in-line with customer needs and expanding goals. This means that, as the demands of your end-users evolve, so too can your application, whether it's integrating additional use cases or implementing more sophisticated AI capabilities.

Key things to look for in a platform partner.

- Able to white-label solutions.
- Leverage customer services.
- Own the IP of what you build.
- Get support to develop, market + sell.
- Flexible commercial models.
- No software updates + maintenance.

Commercial models:

On-Sell
On-sell a jointly-created solution with the platform on your own.

Co-Sell
Co-sell a joint-solution together with the platform provider.

Referrers
Create a joint solution and exchange leads to optimise follow-up.

OEM
License the platform and build a white-labelled solution without support.

Additional support commonly available:

Training + Technical.
Access product training to become self-sufficient or simply learn how to run the technology.

Sales.
Access presales and go-to-market support. Get help with pitches, RFPs, or account growth.

Marketing.
Access marketing and thought leadership collateral. Undertake joint marketing activities.

Development.
Input on new feature development, including urgent requests for specific customer deployments.

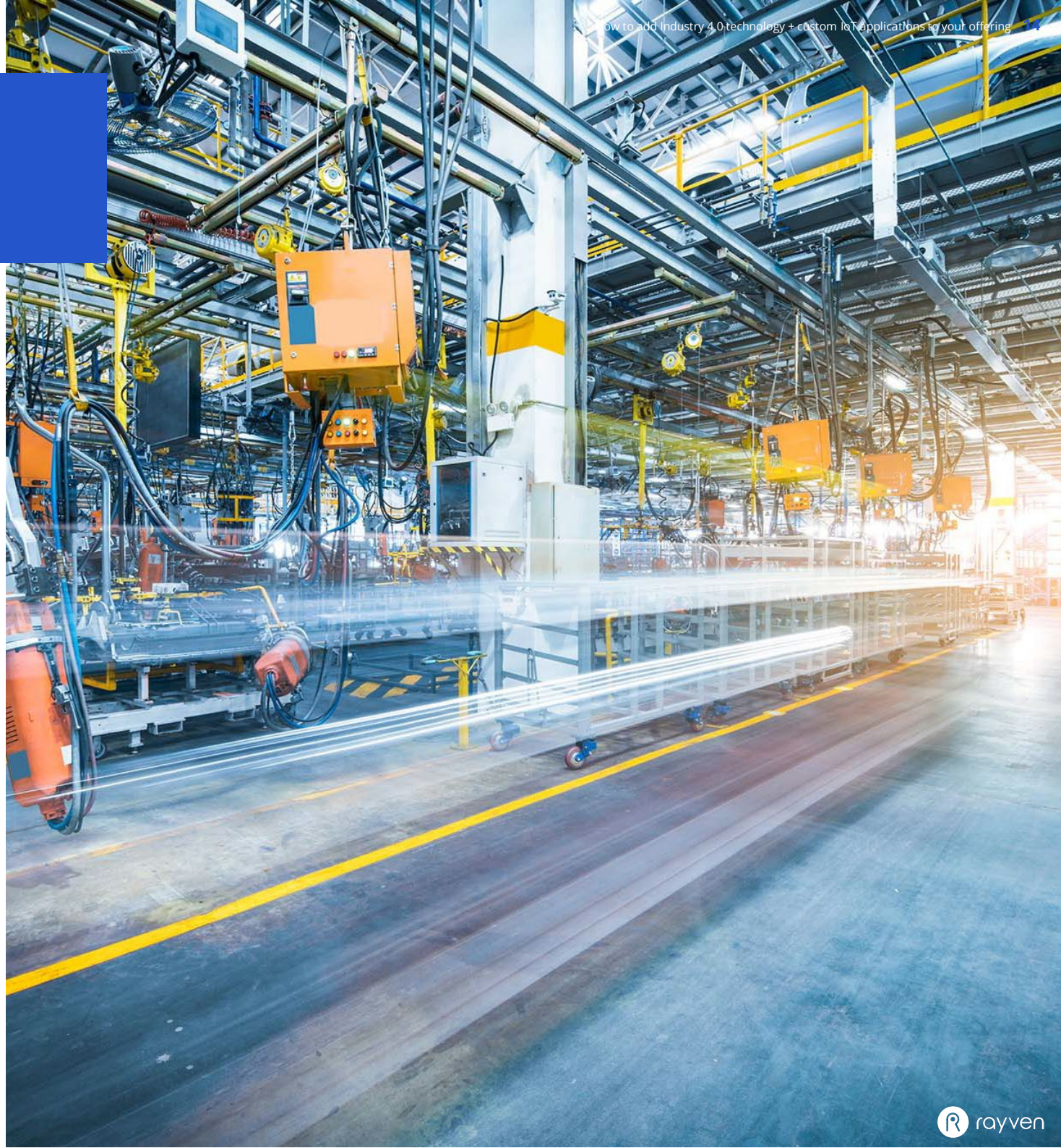
In conclusion.

Providing custom applications offers industrial suppliers significant new opportunities. Not only can you do more for your customers, you are helping to future-proof your existing offering and adding new revenue streams, too.

There are new technologies and businesses in-market who are ready to help industrial suppliers create the syndicated applications that they and their customers need, helping them to deliver on the true, practical potential of Industry 4.0 technology.

We would encourage businesses to explore the potential benefits of working with Rayven, so that they can understand the opportunity and how they can go about creating their own applications which deliver real-time data access, automation, and AI capabilities.

Begin your journey today and unlock the full potential of these powerful technologies. Visit: **rayven.io** for more information and help on how to get started.



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