

Real-time data management fuels Industry 4.0 growth





Real-time data is the fuel that powers Industry 4.0. The challenge for many organisations is getting that data under control.

Industrial companies of all types are trying to do more with a uniquely valuable resource: their data. The use of smart, network-connected assets – from production machines to products operating in the field – has driven an exponential growth in the data available to most organisations, creating opportunities to transform many aspects of their operations. Data-driven, decision-making and control can support industrial operations in multiple ways: revealing the root causes of quality and reliability issues, identifying sources of waste and inefficiency and improving the flexibility and responsiveness of processes.

Before they can access these benefits however, companies need to get their data under control. They need systems and management processes that ensure data is complete, correct, consistent, accessible and secure.



And they need to ensure that those systems adapt as requirements change and equipment is modified, upgraded or replaced.

The real-time challenge

Achieving such objectives in industrial environments is particularly challenging, due to the nature of the assets involved and of the data they generate. Specific challenges include:

- **Volume** - industrial equipment can generate time-series data at high speeds, up to hundreds or thousands of items per second. That can place significant demands on network bandwidth and storage infrastructure.
- **Variety** - most industrial environments use a wide range of equipment from different manufacturers. Different assets may produce data at a variety of rates, using a range of protocols and standards. To get a full picture of process conditions, an organisation will have to manage a combination of structured data, such as readings from sensors and machines, and unstructured data, such as maintenance records or operator notes.
- **Quality** - not all data is good data. Even fully automated systems can suffer recording outages or spurious readings. Internal clocks can drift out of synchronisation. Manually updated records can be inconsistent or incomplete.
- **Distribution** - industrial assets may be widely dispersed, operating in different facilities, regions or countries and connected to a variety of networks. Within the same organisation, responsibility for the collection of data may fall to different functions and business units.

Data management strategy

When companies begin to explore the use of advanced analytics, machine learning and other emerging techniques, they may find solutions for these challenges on a case-by-case basis. That's a perfectly good approach when the objective is to test the potential of a new approach or deliver a quick solution to a pressing business issue.

As they ramp up and roll out these systems however, organisations need a more robust, scalable and sustainable approach. That requires an effective data management strategy. Here are eight factors to take into consideration:

1. Start from the business case

The existence of data doesn't necessarily make it valuable. Attempting to capture and store every piece of data generated by an asset can add needless cost and complexity. An effective data management strategy starts with a clear definition of the organisation's business needs. If improving process uptime and reliability is a priority, for example, then it is important to understand which assets are critical for the process, and which data might be useful in predicting or preventing failures.

2. Create a single source of truth

The whole organisation should be working from the same data. Inconsistent, duplicated or out-of-date information drives up management costs and erodes the value of analytical efforts. To avoid these problems, the organisation should have an agreed master location for each part of its data. This might not be a single, giant database. In many cases, it is more sensible to store operational data in a distributed architecture, holding high volumes of raw data close to the point of generation and permitting access by other systems and analytical tools as required.

3. Adopt and enforce clear naming conventions

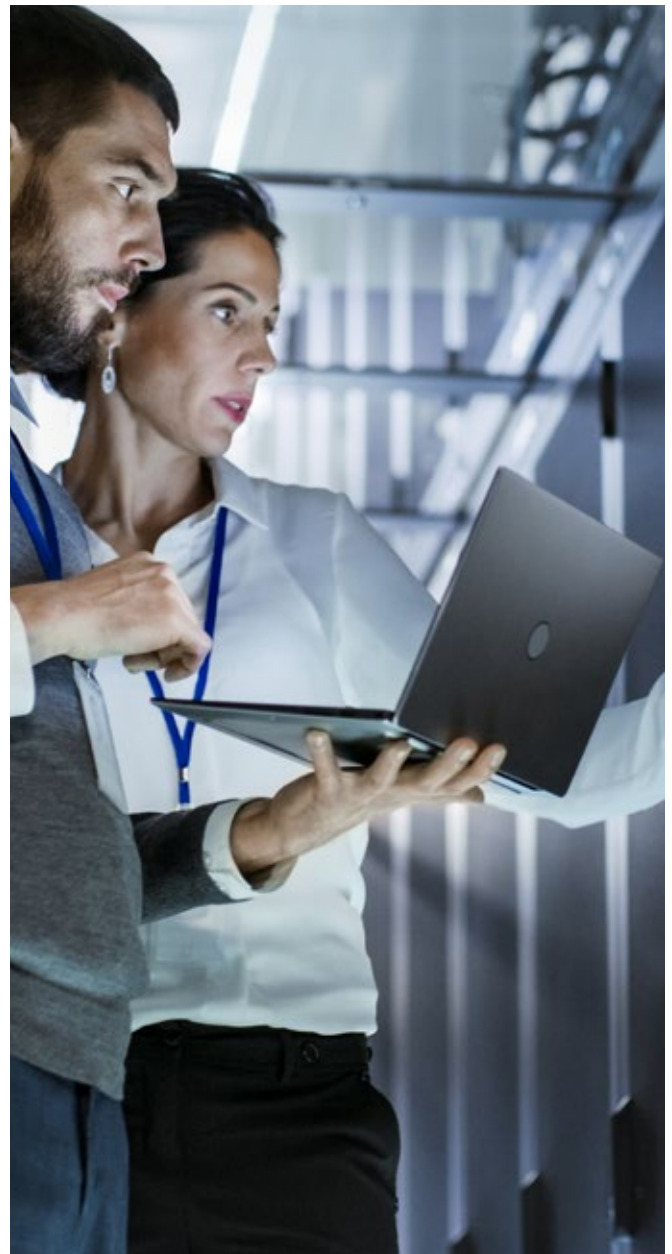
Data can't be used if it can't be identified. That requires a clear, consistent and rigorously-applied nomenclature. Despite efforts by various industry groups and standards organisations, there are no widely-adopted standards for data tagging in industrial environments, so it is up to organisations to create and document their own. As far as possible, those standards should follow the language and naming conventions already used in the business, so different operations or analysis teams can quickly and easily identify the data they need.

4. Understand the data you have

Few organisations build their data strategy from a clean sheet. They usually have a portfolio of existing equipment and a high volume of historical data. A robust audit of the current data environment will identify gaps, discrepancies and quality issues, allowing the development of strategies to fix those problems.

5. Manage governance and regulatory compliance

Industrial process data is commercially and legally sensitive. Decisions about the storage, communication and analysis of data must take those sensitivities into account. This may have implications on decisions about where data is held, how it is secured and how access permissions are granted. Governance issues should not become a barrier to the exploration of new analytics approaches, however. With suitable aggregation and anonymisation, it is often possible to draw valuable insights from data without exposing potentially sensitive information.





6. Adopt common standards

Either by accident or design, proprietary systems can lock up data, making access and integration difficult. Extracting data from existing assets that weren't designed to share it may require expensive, customised solutions. In the case of new investments or upgrades however, organisations should consider data access and communication at the specification stage. By selecting solutions that use well-known and widely adopted technologies, companies can greatly reduce future cost complexities associated with integrating new assets into their overall data architecture.

7. Define ownership and accountability

In some organisations, data is considered to be somebody else's problem. An operations team may make adjustments to the configuration of a machine (for example) without considering the effect of that change on the data it produces. That can lead to problems downstream, when analytical tools fail or historical records prove impossible to interpret. Ensuring that an asset continues to produce reliable, properly defined data should be the responsibility of a specific individual or team within the organisation.

Increasingly, responsibility for the data generated by assets may sit outside the boundaries of an organisation. Asset vendors may collect and store performance data as part of their ongoing support offerings. In these cases, owners need to think carefully about whether that data is valuable to them, and the technical and contractual considerations required to ensure access to it.

8. Plan for change

Industrial data architectures are never static. Assets change over time; business priorities evolve and new analytical approaches emerge. No organisation can predict its future data requirements with precision. Instead, companies need to put processes in place that allow their data architectures to grow and change in an orderly manner. Doing that involves establishing standards and processes for those changes, and building flexibility into systems and infrastructure wherever possible. The availability of cloud-based solutions for data storage and analytics has made this flexibility much easier to implement in recent years, allowing companies to add storage and processing capacity on demand.

How Capula can help

With more than 40 years of experience in the design, operation and support of industrial automation systems, Capula is the right partner to support your organisation on its Industry 4.0 journey.

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