

GUIDE

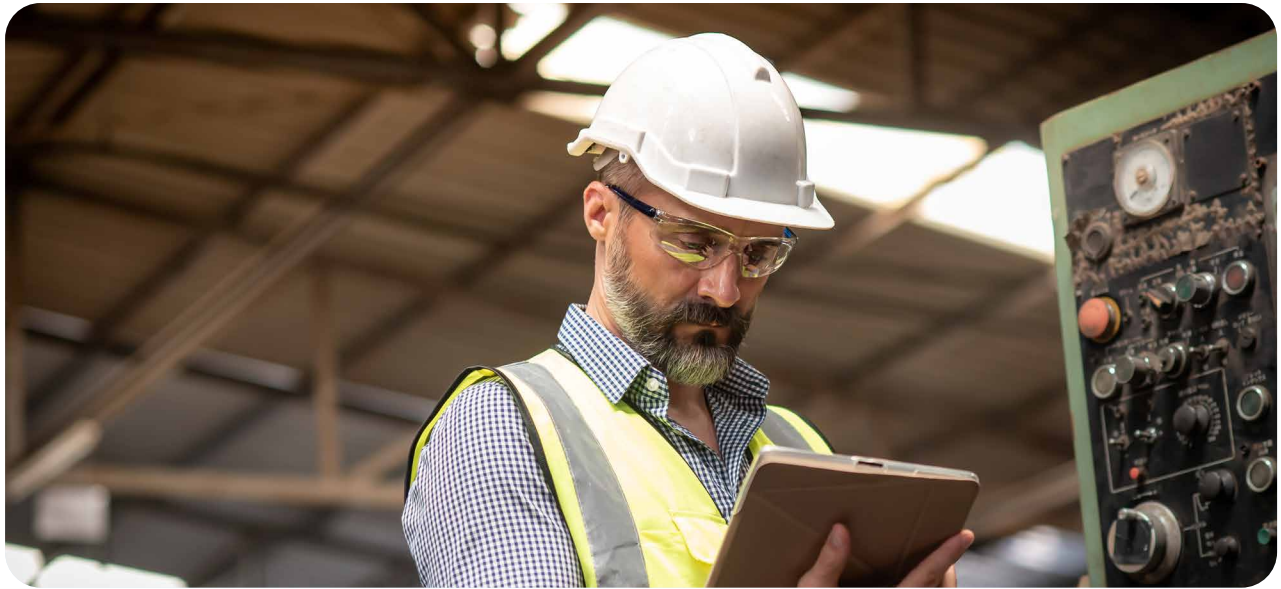
A Manufacturer's Guide to Data



www.parsec-corp.com
sales@parsec-corp.com
+ 1 (714) 996 5302

5515 E. La Palma Ave
No. 110
Anaheim, California 92807

| | |
|-----------|--------------------------------------------------------|
| 3 | Introduction |
| 4 | Types of Data |
| 4 | Source Data |
| 4 | Processed Data |
| 4 | Derived Data |
| 6 | Building Your Backend |
| 7 | Collection |
| 8 | Storage |
| 9 | Integration |
| 9 | Access & Security |
| 10 | Putting Data to Work |
| 10 | Predictive Maintenance |
| 10 | Improved Quality Control |
| 11 | Demand Forecasting and Supply Chain Improvement |
| 11 | Production Optimization |
| 12 | Onward to Optimization |
| 13 | ABOUT PARSEC |



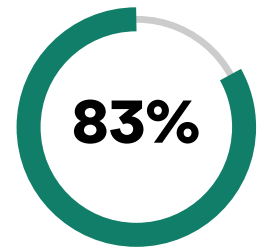
Introduction

[Industry 4.0](#) has been reshaping manufacturing for years. While companies are at various stages of their [digital transformation](#) journeys, those who have completed initial projects report [overwhelmingly positive results](#). The majority (83%) rate the outcomes of their investments as “good” or “excellent.”

It's a heartening statistic for manufacturers; it means that the promises of technology-driven improvements are coming to fruition for many, and a new era of operational efficiency may be within reach. And it is—but the transformation can't happen overnight. The work, it turns out, isn't done when you pick a platform; it's only beginning.

Getting “good” or “excellent” results takes continued commitment to experimenting, adapting, and embracing new ways of thinking. It also takes a deep understanding of how connected systems actually work, and the processes by which they turn operational data into actionable intelligence. It's that deeper understanding of connected operations that we aim to explore in this guide.

What better place to start than with the foundation of all connected systems: data.



rate outcomes of their investments as “good” or “excellent”



Types of Data

On its own, “data” is a somewhat vague term. It is a term that can encompass equipment performance as easily as the efficacy of a workflow or the movement of raw materials. At the most basic level, however, businesses can begin to categorize data by how processed it is.

- **Source data:** This is data that has not changed since its recording (think raw timesheets, transaction records, or unit counts). If you were a historian, source data would be your “primary document.” It’s a snapshot of what happened without any explanation, contextualization, or even reconciliation.
- **Processed data:** This is data that has been altered from its point of origin to enhance accessibility but does not illustrate anything that isn’t present in the source data (think aggregated, reconciled, normalized, illustrated, or summarized records). If you were a historian, a transcription or translation might be your “processed data;” it contains the same information as the primary document, but it’s now in a format that’s easier to read.
- **Derived data:** This is data that results from combining multiple raw (or processed) records (think performance metrics, customer behavior analytics, or defect rates). If you were a historian, you might use a scholarly study of economic trends over time in different regions—that’s a derived data source. The numbers within it were created by analyzing and contextualizing data from other sources.

Manufacturers may also find it valuable to think about data as being divided along functional lines, bucketing metrics based on the area of the enterprise most likely to use them.

| <i>Data Type</i> | <i>Purpose</i> | <i>Examples</i> |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operational | Provides insight into how a production line is running to ensure leaders understand how different areas of the business connect to one another, guiding more informed decisions. | <ul style="list-style-type: none"> • OEE • Maintenance records • Production schedules • Cycle times |
| Quality | Illustrates the consistency and reliability of production process to help manufacturers get ahead of quality concerns and address them in a timely manner. | <ul style="list-style-type: none"> • Defect rates • Inspection results • Yield vs. throughput • Unit specifications |
| Supply Chain | Shows how up- and downstream variables affect operations, helping teams avoid production and shipping delays, adjust to materials shortages, and forecast potential supply chain disruptions. | <ul style="list-style-type: none"> • Inventory tracking • Storage insights • Supplier performance • Logistics information |
| Customer | Provides valuable context about customer histories to show how facility operations may affect buyers and guide service teams toward timely resolutions. | <ul style="list-style-type: none"> • Buyer feedback • Fulfillment preferences • Purchasing behaviors • Order histories |

Each of these data types provides a glimpse into its own segment of the manufacturing lifecycle, from sourcing and fulfillment to fabrication, storage, shipping, and beyond. It is worth noting, though, that the above is an overview of the most common uses for each data source/set. Depending on their needs, manufacturers may use these metrics in a wide variety of ways.



Building Your Backend

Amid all the industry buzz about the impact and value of digital transformation, the more challenging details of the process have sometimes gotten lost. Yes, a connected facility can simplify operational decision-making once it's up and running—but that doesn't mean connecting the facility or maintaining the investment is simple. It takes careful planning, a willingness to adjust, and a commitment to continuous improvement, not just of your operations but of the system itself.

Data management is a key element of this journey, though it's often overlooked. Effective data management plans—like any project roadmap—outline key processes that guide data collection, maintenance, storage, access, and more. The goal? To ensure you're harnessing the full value of your investments in connected monitoring.

While the details of the plan will vary based on business needs, many manufacturers find success when their data management strategy focuses on four key pillars:



COLLECTION



STORAGE



INTEGRATION

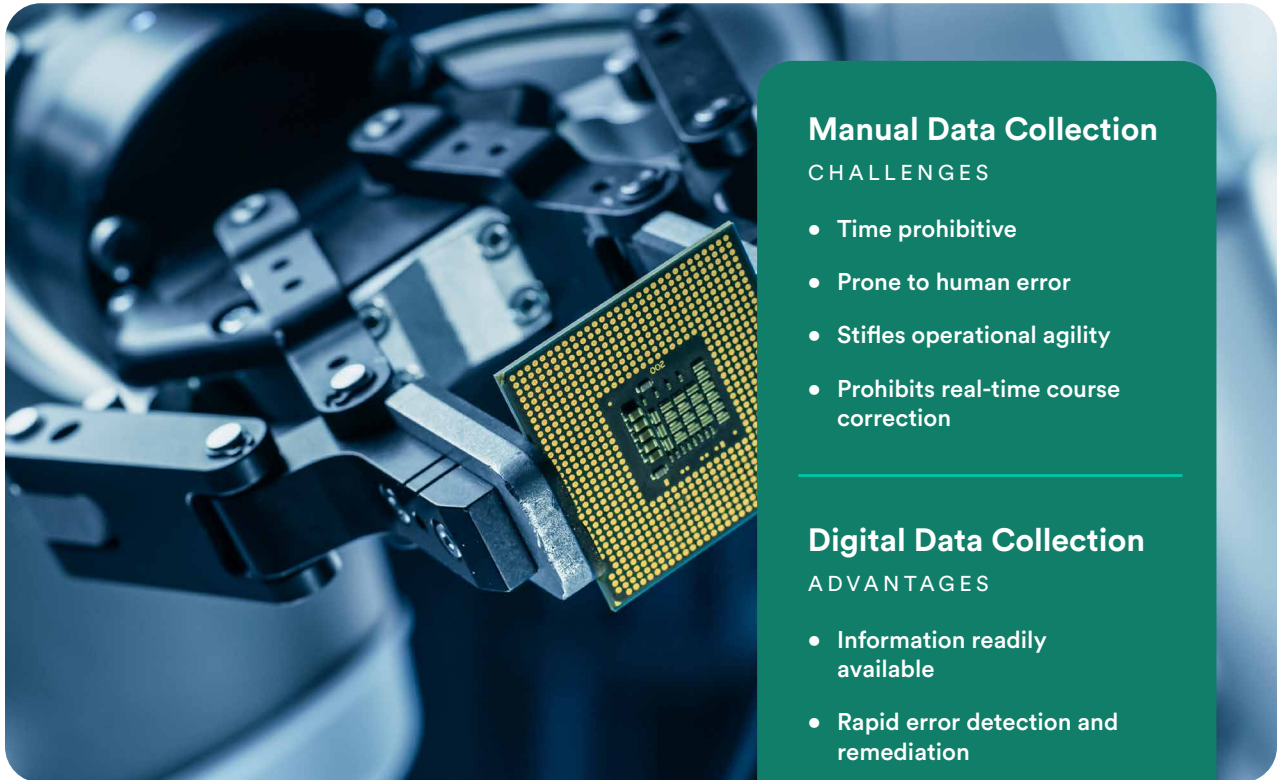


ACCESS & SECURITY

Collection

To use data, facilities need to be able to capture it. Historically, this has been a manual process. The problem is that manual collection takes time, is prone to human error, stifles operational agility, and prohibits real-time course correction.

Now, there are instances—even today—where human-captured insights remain entirely viable. However, investing in [Industrial Internet of Things \(IIoT\)](#) and smart devices is a common first step for manufacturers honing their data management plans. These connected devices can be installed on equipment (even legacy models), turning each machine into a node in the system, streamlining the collection of data sets already in use, and making new, more precise measures readily available. With this new intelligence, businesses set themselves up for rapid error detection and remediation, streamlined regulatory compliance, expanded operational visibility, and more.



Manual Data Collection

CHALLENGES

- Time prohibitive
- Prone to human error
- Stifles operational agility
- Prohibits real-time course correction

Digital Data Collection

ADVANTAGES

- Information readily available
- Rapid error detection and remediation
- Streamlined regulatory compliance
- Expanded visibility

Storage

OK, so you’ve collected your information. Now, you need somewhere to store it, and you need to make sure the storage system you build can scale. [Planning for this growth](#) has to start on day one. To that end, it can be helpful to understand the data storage models that are available, alongside their strengths and weaknesses.

| Storage/Processing | | Data Architecture | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--|
| On-premises <ul style="list-style-type: none"> • Servers located on physical premises • Low-latency processing/retrieval • Harder to scale; limited by physical footprint and hardware specifications • More up-front investment in physical equipment | Hierarchical <ul style="list-style-type: none"> • Represented in a “tree” format • Uses simple “parent/child” relationships to organize information • Well-suited to complex systems with large amounts of data • More efficient processing and navigation | | |
| Cloud <ul style="list-style-type: none"> • Servers located in data center(s) • Considerations pertaining to network speed/accessibility • Highly scalable • Lower investment (renting capacity rather than buying servers) | Relational <ul style="list-style-type: none"> • Represented in a table format • Groups information based on shared variables and links related groups • Easy to scale but often has more latency than other options | | |
| Hybrid <ul style="list-style-type: none"> • Some servers on premises; others in data center(s) • Middle ground between scalability/speed of cloud/on-prem • Must manage two types of systems | Network <ul style="list-style-type: none"> • Represented in a modified tree format • Uses parent/child relationships but allows for the child to have multiple parents • Improved retrieval and access speed • Relatively inflexible and limited scalability | | |

Manufacturers should also consider how they will safeguard their systems from losses or failures. Investing in a backup and disaster recovery (BDR) system—which automatically duplicates and saves enterprise records to a secondary location—can help businesses get up and running faster should weather, operational, or other incidents impact storage functionality.

Integration

A significant portion of enterprise digitalization efforts—both industrial and in corporate offices—has happened ad-hoc, with different departments and teams investing in systems and solutions that work for them. That’s all well and good, but the key to smart operations is holistic, comprehensive insight.

This process is twofold: create a centralized repository to store new raw, processed, and derived data from the connected system, and develop a plan to [move existing records into the database](#). Existing records may be things like physical documents that need to be digitized, or digital records that remain locked in outdated systems.

Access & security

Data is useless if it’s just sitting in storage; people need to be able to use it. That’s where the software investments you make really start to shine. Comprehensive [manufacturing execution systems \(MES\)](#)—like [TrakSYS™](#)—bring data-based decision-making to every level of your operation.

These systems should also include safeguards to ensure that only the right people have access to the right types of data. [Role-based access controls](#) (RBAC) can help IT/OT managers simplify access management by assigning permissions based on an individual user’s title and responsibilities. This ensures teams have access to the information they need while simultaneously safeguarding your network against bad actors.

Putting Data to Work

Robust, accurate, and timely data provides teams with a wealth of raw information. However, figuring out what to do with their new insights can feel daunting. The possible applications and focus areas are endless, so where should manufacturers start?



Predictive maintenance

Maintaining equipment is challenging for facilities of any size. Unexpected downtime caused by equipment failures can lead to missed production deadlines, material losses, scheduling conflicts, and beyond.

By leveraging [predictive maintenance](#), manufacturers can collect real-time data on variables like equipment temperature and vibration levels, and identify anomalous performance. Using [AI and ML models](#) with connected IoT devices, companies can further enable maintenance techs to address the issues as they arise, companies can further enable maintenance techs to address the issues as they arise.

In short, predictive maintenance can help reduce overall spending by optimizing spare parts ordering, streamlining wrench time, and extending equipment lifespans.



Improved quality control

Automating quality management has become a key focus for industries like pharmaceuticals and food and beverage. By utilizing an [MES-backed quality management solution](#), these businesses gain insight into scrap and defect levels, root-cause analysis, raw material performance, comprehensive batch records, and more.

Capitalizing on this information, plant managers can work with their production teams to create the highest-quality goods possible—without breaking the bank. Similarly, improved quality control can help improve relationships with customers and mitigate the damage when larger issues arise. For example, traceability programs (which track products from raw material to delivery) can help manufacturers identify affected shipments and ensure recipients are notified quickly.



Demand forecasting and supply chain improvement

Supply chain issues can be incredibly frustrating, especially as manufacturers look to recover from the large-scale disruptions of the early 2020s. Staying on top of production and distribution includes monitoring everything from material availability to sales data and shipping logistics. Using up- and downstream supply chain data as well as market trends and demand insights, analytics systems can help manufacturers stay agile amid these uncertainties.

Additionally, supply chain analytics can help manufacturers assess the performance of their suppliers and delivery partners. This can help leaders identify issues within their larger ecosystem and work to ensure that other partner bottlenecks aren't turning into operational losses.



Production optimization

Demand shifts. Equipment breakdowns happen. Trends change, as do customer expectations. This is where solutions like algorithmic production scheduling (APS) come into play.

Production scheduling tools give teams the flexibility they need to respond and meet production deadlines. Utilizing internal and market datasets—like asset availability, on-hand inventory, existing orders, material availability, and customer histories—APS helps teams set production priorities and optimize their schedules in real-time. This helps ensure every order is shipped on time and with everything the customer wanted.

This is by no means an exhaustive list of the ways manufacturers can use their data to improve operations—but it can be a helpful starting guide.

Onward To Optimization

In its own way, data is like energy. Energy resources surround us and can be used to reach innumerable ends—they just need to be given direction. Solar energy is captured by panels and transferred to indoor and outdoor lighting; thermal energy is used to heat our homes and boil water for tea; kinetic energy is harnessed from windmills, hydroelectric turbines, and more to generate electricity—and it's also what allows us to toss around a baseball or football with ease.

In much the same way, the data generated by modern businesses—be they in manufacturing or otherwise—is a resource ripe for direction and application. As businesses gain a better understanding of the types of data they are capturing, they can begin putting that information to use to empower their teams, operations, and greater supply chain ecosystem.

While the road to digital transformation will vary from business to business, there will always be a fundamental commonality: data is integral to the process.

To learn more about how TrakSYS can help manufacturers achieve their [digital transformation goals](#) and position them for the next stages of data-driven operations, [contact us today](#).

About Parsec

Utilizing their 30 years of experience in manufacturing, Parsec created TrakSYS: a best-in-class operations management software application and solution platform designed to significantly improve manufacturing operations. TrakSYS aggregates data from multiple sources to deliver real-time, actionable intelligence that helps manufacturers reduce production costs, decrease lead time, and improve profitability. TrakSYS is deployed at thousands of factories in more than 140 different countries.



TrakSYS is a trademark of Parsec Automation Corp.
©2024 Parsec Automation Corp. All rights reserved.

[Parsec Automation Corp.](#)
[TrakSYS MES Platform \(parsec-corp.com\)](#)