



Why Automation *Fails to Scale* in Enterprise Manufacturing

Outlining six key reasons why scaling enterprise manufacturing can be challenging and the strategies for overcoming these challenges.

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INTRODUCTION

It's Been Six Decades — Where Are All The Robots?

While some industries have scaled automated manufacturing, enterprise scale robotic deployments in general manufacturing are sparse. Trends in industrial robot installations have changed little since the early days of robotic manufacturing. Most robots are on the main production lines of automotive and electronics OEMs. Although American engineers created the first robotic arm over sixty years ago, the International Federation of Robots (IFR) reported only 310,700 industrial robots were operating in the US in 2021. That is less than 10% of the world's industrial robots. Globally there is about one robot per one hundred humans in manufacturing.

Scarcity of automation at scale is not from a lack of interest or demand. The need for industrial automation is high in our post-COVID economy. Job vacancies in manufacturing have reached record numbers. Price inflation is aggressively reducing margins. Disruptions to global supply chains continue to highlight the necessity for localized resilience.

So why do companies fail to advance automation projects from proof of concept into production environments? In this white paper, we share strategies to overcome these six key reasons why manufacturers fail to scale automation at an enterprise level.



Six Strategies for Scaling Success

Automation starts with people:
How your team strategy determines successful scalability

Navigating the lighthouse factory fallacy:
An application-focused approach to scalable automation

Your highest ROI project is an automation nightmare:
How to accept defeat and find your dream application

Comprehensive information gathering:
The secret to future-proofing with a successful automation plan

Don't specify yourself into a dead end:
What to include and omit from your project specification

Interface fragmentation:
Solving automation's antiquated software epidemic

STRATEGIES

Automation starts with people: How your team strategy determines successful scalability

Corporations often build automation teams in non-ideal ways. Sometimes a team has the wrong skill sets, is buried too deep within an organization, or reports to the wrong organization. According to [Senior Leadership Teams: What It Takes to Make Them Great](#), 60% of what makes a team successful is the team design itself. 30% of success is from the launch of the team. The final 10% is from continuous support and skill development. This means that strategy determines 90% of a team's success before the first hire.

Because automation solves operations problems, an automation team should be deeply tied to the manufacturing operations organization within a corporation. Although an automation team can be successful as part of the engineering organization, this setup typically makes it more challenging to scale automation. The success or failure of automation is largely due to the efficiency of the team within each factory. Many automation projects fail because the project specification lacked critical process details that

should have come straight from the local team. Each facility needs a designated champion who understands automation.

Site champions need to report to the corporate automation organization. A site champion who reports to local facility management and not directly to the central automation organization will create silos that make it difficult to scale. Instead have them report indirectly to facility management but directly to a team that manages the facility's automation resources.

A steering committee is necessary to operate with speed. The committee should consist of leaders who are at the VP level or above. These leaders will meet as

frequently as necessary for everyone to feel engaged and accountable.

By combining a company-wide steering committee and a corporate automation team distributed across facilities, you can take a holistic approach to building your automation strategy. This helps avoid the trap of creating a factory-focused strategy, which makes it difficult to scale automation across the corporation.

STEERING COMMITTEES

COMMONLY INCLUDE LEADERS FROM THE FOLLOWING AREAS:

- MANUFACTURING OPERATIONS
- QUALITY AND VALIDATION
- ENVIRONMENTAL, HEALTH, AND SAFETY
- PRODUCT DEVELOPMENT AND ENGINEERING
- PACKAGING DEVELOPMENT AND ENGINEERING
- CORPORATE FINANCE
- CAPITAL EQUIPMENT PROCUREMENT
- INCOMING MATERIAL PROCUREMENT
- HUMAN RESOURCES AND PEOPLE OPERATIONS

60% of what makes a team successful is the team design itself. 30% of success is from the launch of the team. The final 10% is from continuous support and skill development. This means that strategy determines 90% of a team's success before the first hire.

Navigating the *lighthouse factory fallacy*: an application-focused approach to scalable automation

It is common for corporate leadership to push for the establishment of a lighthouse factory to serve as a blueprint for future facilities. The lighthouse factory pilots new technology which the company wants to deploy. This approach works best when a company is scaling by expansion rather than scaling across its existing footprint.

Scaling automation across existing facilities requires an application-focused approach. Instead of identifying facilities to deploy automation, build a comprehensive catalog of all automation opportunities company-wide. This approach helps identify common scalable applications between facilities. Next, establish a transparent model of internal communication. This helps communicate risks and challenges. Set aside upfront capital for prototype development. Build with repeatability in mind to create reusable mechanical and electrical designs (as well

as parameterized control software that can be reprogrammed for new parts). Without an application-focused approach, different sites may deploy different automation solutions to solve the same application. This results in redundant development costs and adds complexity from fragmentation. Fragmented solutions make it difficult to effectively train associates and to benchmark performance of equipment across factories for the same task. Cross-factory comparison allows your steering committee and executive leadership to identify which factories automate most effectively and where to invest future capital.

With a complete understanding of the breadth of automation opportunities across the corporation, as well as the related risks and complexities, create an action plan that prioritizes where to implement solutions.



Your highest ROI project is *an automation nightmare*: how to accept defeat and find your dream application

Lean manufacturing focuses on removing inefficiencies and waste, especially in tasks with high labor inputs. Production tasks which require high amounts of labor appear very attractive for automation due to the potential cost savings, but they may actually be poor candidates to start your company's automation strategy with. It might be technically complex for automation to achieve the required visual dexterity and acuity of humans. In other instances, successful implementation may require internal capabilities your organization has not yet built out.

It is easy to focus on solving the most iconic problem to become a hero. But doing so results in a long development time and a slow time to value. The best automation projects optimize scalability, effort, and time to value.

Your steering committee should define future requirements to guide your corporate automation team.

Comprehensive information gathering: the *secret to future-proofing* with a successful automation plan

A corporate automation team must appropriately convey how the business operates and ensure that the correct amount of flexibility is designed into solutions. Too often, automation engineers look at a project at face value, ignoring the future requirements that the equipment will need to be capable of handling. If a business tends to shift volume between sites, is onshoring, or frequently launches new products, an automation plan must accommodate for that.

Accounting for shifting business needs can be one of the harder tasks to get right. It typically results in additional costs that cannot be tied back to the current

requirements for production equipment. If proper care is not taken, a project may end up as a glorified paperweight instead of functional automation equipment, or end up overspending to engineer a solution that is far more flexible than is needed. As with many other portions of the automation process, this is a balancing act that requires a clear understanding of current and future business priorities and a clear communication of priorities to experts who can incorporate these considerations into automation solutions.

A steering committee should define future requirements to guide the corporate automation team. Hiring a system integrator before understanding the nuances of future requirements is a disservice to both the corporation and the integrator, who now must deliver what will either create scope creep and change-orders, or equipment that lacks the needed capability. This causes premature obsolescence as the product evolves or forces the product development teams to stay within restrictive boundaries. This lessens their ability to innovate because they need to be able to run the product on existing equipment.



Many automation projects are destined to fail from the start, due to specifications that lead to the dissatisfaction of all parties. This limits the opportunity to scale that application. At the same time, don't design into dead ends with restrictive specifications. Specifications should contain the detail of the process and the overarching deliverables of the project. For a scalable solution, delegate responsibility of comprehensive specification to expert partners. Leverage their expertise to deploy reliable and efficient automation.

Once a solution is specified, it's possible to end up with an expensive idea that doesn't solve the problem in the optimal way. Telling a systems integrator how to

Don't specify yourself into a dead end: *what to include and omit* from your project specification

create the solution may lead them to push for change orders. This drives up cost and lengthens the time to value, which leads to frustration for internal project leaders and systems integrators.

This may also allow partners to refuse accountability for failed projects. Ideas on how to solve the problem are important, but they should be shared in a collaborative working session and not as part of a specification. A properly written specification, combined with a collaborative working partnership with the appropriate experts, will result in successful projects that are well-positioned to scale.

Interface fragmentation: solving automation's antiquated software epidemic

In McKinsey's study of companies scaling or trying to scale robotic automation, 41% reported fragmentation of robot programming interfaces as a top challenge to success. CNC machine tools, programmable logic controllers (PLCs), vision systems, and robot arms have made few notable advancements to programming interfaces in the past decades. A myriad of industrial protocols makes communication between devices difficult. This leads to complicated workarounds or reliance on additional hardware for devices to work together. Technological stagnation is largely due to the mechanical focus of automation. The lack of standardization

41% OF COMPANIES

REPORTED FRAGMENTATION OF ROBOT INTERFACES AS A TOP CHALLENGE FOR SUCCESS.

in software and communication protocols are specific to both brand and region.

OEM software is an afterthought in automation technology. It exists because it is required, but it isn't considered a competitive advantage. Industrial robot teach pendants, for example, look like oversized graphing calculators from decades ago. People are in awe of the physical aspects of automation, while the software is convoluted and uninspired. In low mix environments, where automation is currently most prevalent, difficulty to deploy and program for new products is negligible. However, in the high-mix / low-volume environments which account for most of the global manufacturing industry, this is a major issue. Antiquated software impacts the end users' ability to maintain their equipment with optimal uptime and productivity.

It's hard to upskill teams when each person specializes in different software. Retaining skilled employees, who often specialize in a single software ecosystem or programming language, drives up



operating costs. Such experts are in high demand and are sought after by nearly all manufacturers. This leads to overpaying recurring compensation, as opposed to looking at the total cost of automation and then choosing a solution that can be supported without the need for specialized talent.

Right now the demand for automation dramatically outstrips the capacity of the automation and manufacturing industries to upskill or hire fast enough. Those who continue with traditional approaches to automation risk suffering like the companies impacted by Asian outsourcing in the 1970s. To compete and win on the global manufacturing playing field, it is crucial that we acknowledge what is holding the industry back. Some will point to the need for advanced hardware technology

to solve new applications like random part AI-based bin picking. However, for every new technology, the same resourcing constraint exists in the system integrator's and manufacturer's ability to successfully engineer, deploy, run, maintain, and scale automation.

This is our opportunity to shift to a software-first approach to automation, while still appreciating the mechanical complexity. This respect is critical to the industry's success. Software is only a component of the solution, not the sole solution for successful implementation. However, it is the defining factor that in many cases dramatically alters the cost, time to value, scalability, supportability, and maintainability of modern automation.

SUMMARY

How to *successfully scale automation* in enterprise manufacturing

Automation isn't easy. It's an iterative process that often requires failure in order to achieve success. That being said, we can gain a lot more from studying the successes of others than from repeating the failures they endured to get there.

In our Fail to Scale white paper series, we will further explore these six key strategies and share our insight on developing bulletproof solutions for scaling automation from concept to completion.

With decades of combined experience, READY has encountered and overcome our share of obstacles in automated manufacturing. We look forward to sharing the strategies we've developed for overcoming these obstacles and working together to improve the world's productivity and quality of life through automation.

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