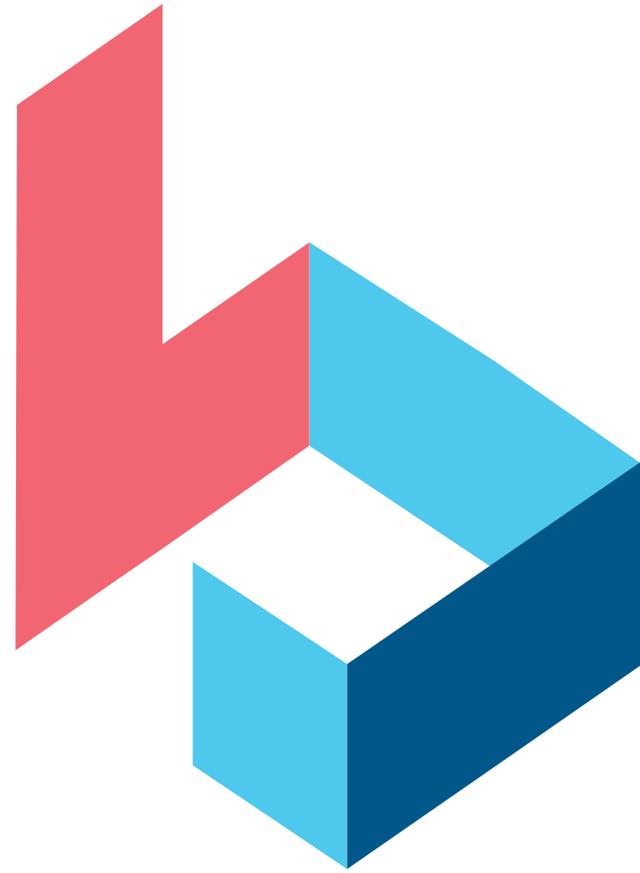




WHITEPAPER

Making the IIoT promise real



Enable digital manufacturing by connecting the dots on the factory floor

The Industrial Internet of Things (IIoT) is disrupting manufacturing—and that opens up real opportunities for early adopters looking for a competitive edge. However, while most business leaders recognize the potential of IIoT, they often struggle with how to put it to work. Here are the steps you can take to ensure success.

- Determine specific ways that IIoT can best serve your company's business strategy
- Identify key use cases and use agile methodology to rapidly test feasibility and impact
- Institute the right technology, data, and analytics infrastructure. Reimagine end-to-end processes for system interoperability, data management, speed, and scalability as your firm's IIoT initiative matures
- Put robust security and data privacy safeguards in place to minimize risk
- Get your company ready with a change management strategy
- Develop a resource management strategy to support ongoing operations, system maintenance, and upgrades early in the design phase

IIoT is developing fast—and ignoring it is not an option if you want to beat the competition. Priority one is determining how IIoT can improve your business strategy. Then you can choose some use cases and develop proofs of concept (PoC) to validate your hypotheses. Be prepared to experiment in an agile way to learn what works and what doesn't.

IIoT: A revolution in the making

IIoT is rapidly transforming manufacturing. Advances in sensors, communications, data management, computing, robotic automation, and additive manufacturing are coming together to make that happen. In fact, IIoT's economic impact on the industry is expected to be anywhere from \$3.9 to \$11.1 trillion by 2025, according to a study by the McKinsey Global Institute.^[1] A Cisco study goes even further, putting the anticipated impact at \$14 trillion.^[2]

IIoT uses sensors and other internet-enabled devices to monitor and control physical processes, but that's not

what makes it disruptive. The real excitement comes from the fact that it is a means of collecting, processing, and evaluating data in real time. That gives you a way to glean actionable insights and what-if analyses to support operational and tactical decisions in real time.

Established companies and startups alike can get a competitive edge if they adopt IIoT early enough, but the technology is both an opportunity and a threat. A recent Industry Week-Genpact research found that 82% of leaders in the field of manufacturing believe IIoT is critical to their success.^[3] Yet many leaders also said they were struggling with the how—how to put it to work. Only 25% indicated they have a clear strategy, and only 54% have budgeted for IIoT capital investments.

Figure 1 shows that succeeding with IIoT starts with a solid business strategy, coupled with process, and organizational change strategy. Technology and data management are critical and complex; however, to be truly transformative, business strategy and organizational change has to be considered upfront.

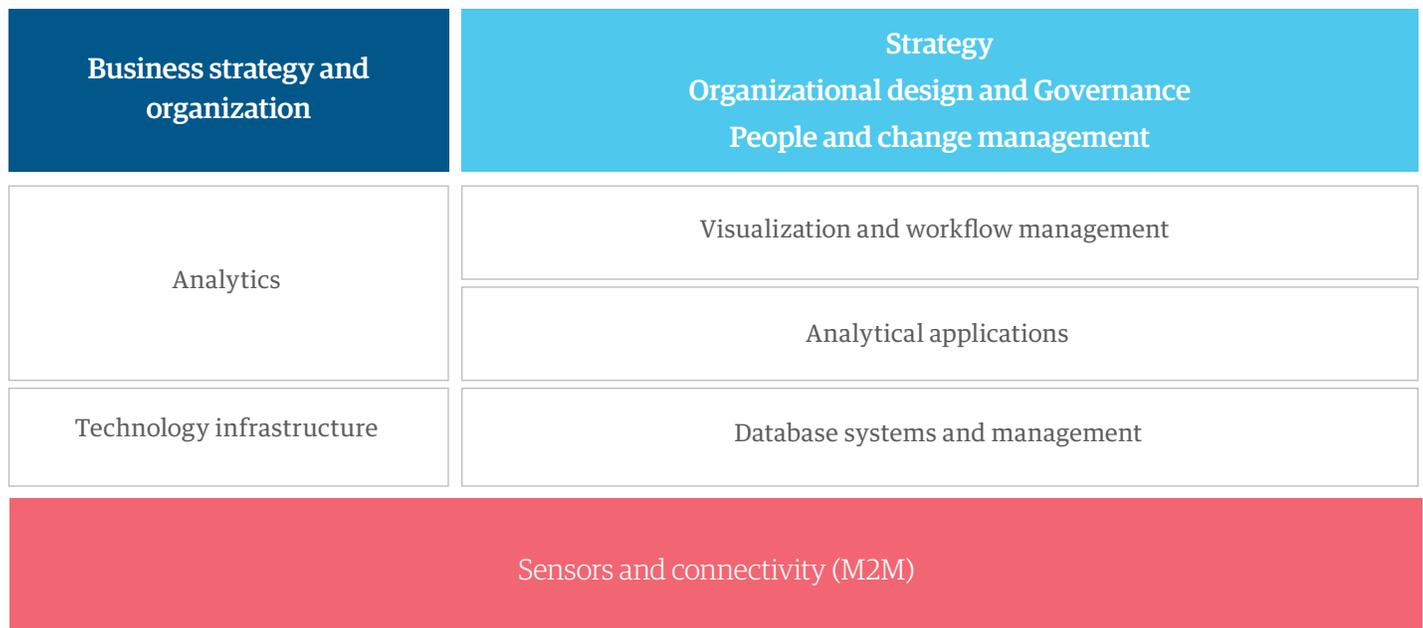


Figure 1: IIoT Solution architecture

[1] McKinsey Global Institute, "The Internet of Things: Mapping the Value Beyond the Hype," June 2015

[2] Cisco, "Embracing the Internet of Everything to Capture Your Share of \$14.4 Trillion," 2013

[3] Industry Week, "2016 Reality Check: Transforming Industrial Businesses with the Internet of Things," 2016

To take full advantage of the radical promise of IIoT, focus on the following:

- Approach it as a business strategy imperative
- Use agile methodologies to test use cases for feasibility and impact
- Ensure interoperability, data management (e.g., volume, velocity, variety), and speed and scalability in technology platform and analytical tools

- Address security and privacy issues at the outset
- Have change management plans in place

A business strategy imperative

It's not about digitization or technology. It's about using IIoT to disrupt and stay competitive. Figure 2 shows IIoT opportunities for manufacturers. Figure 3 shows the relative business impact of these opportunities across the value chain.

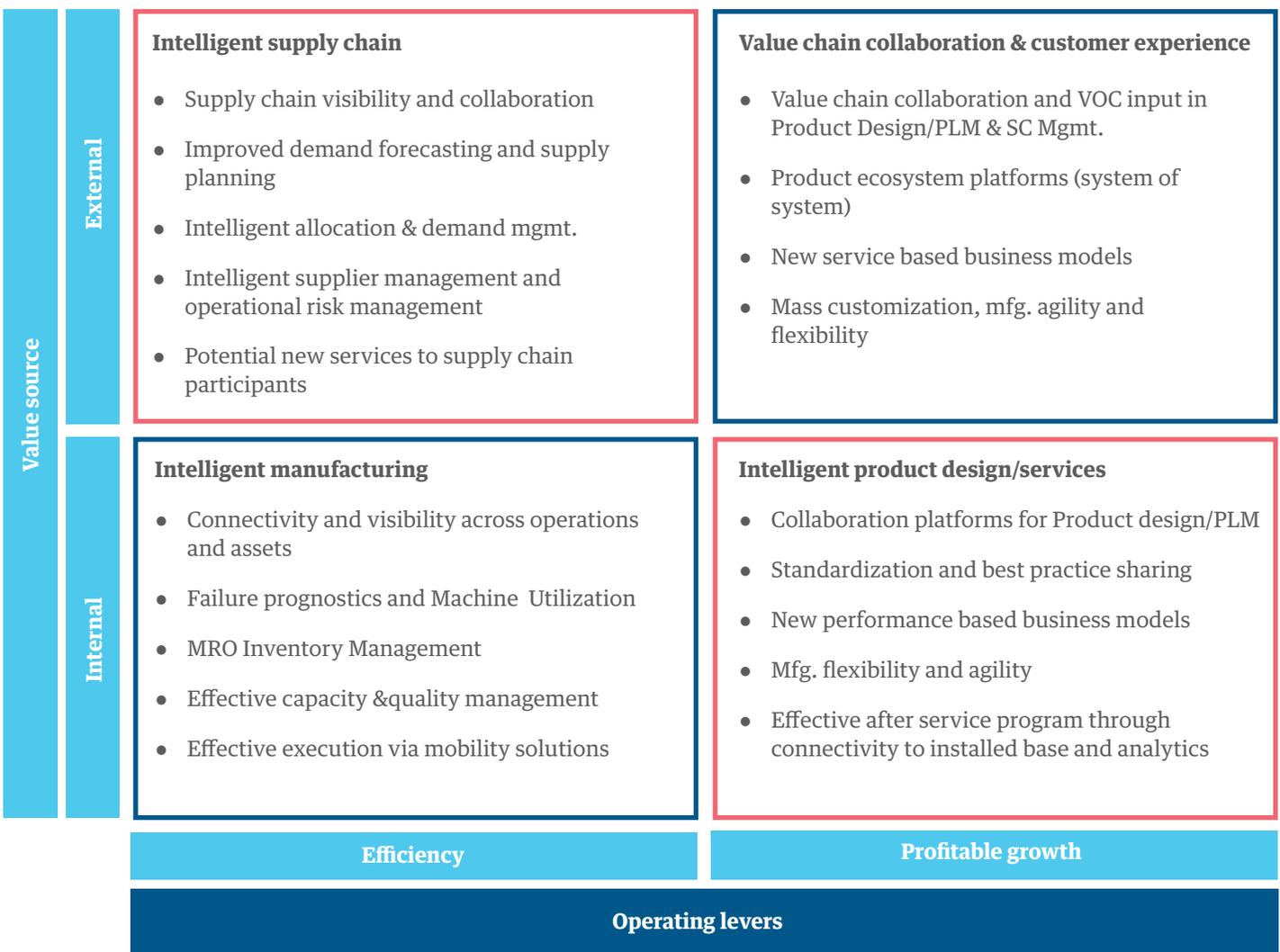


Figure 2: IIoT manufacturing opportunities

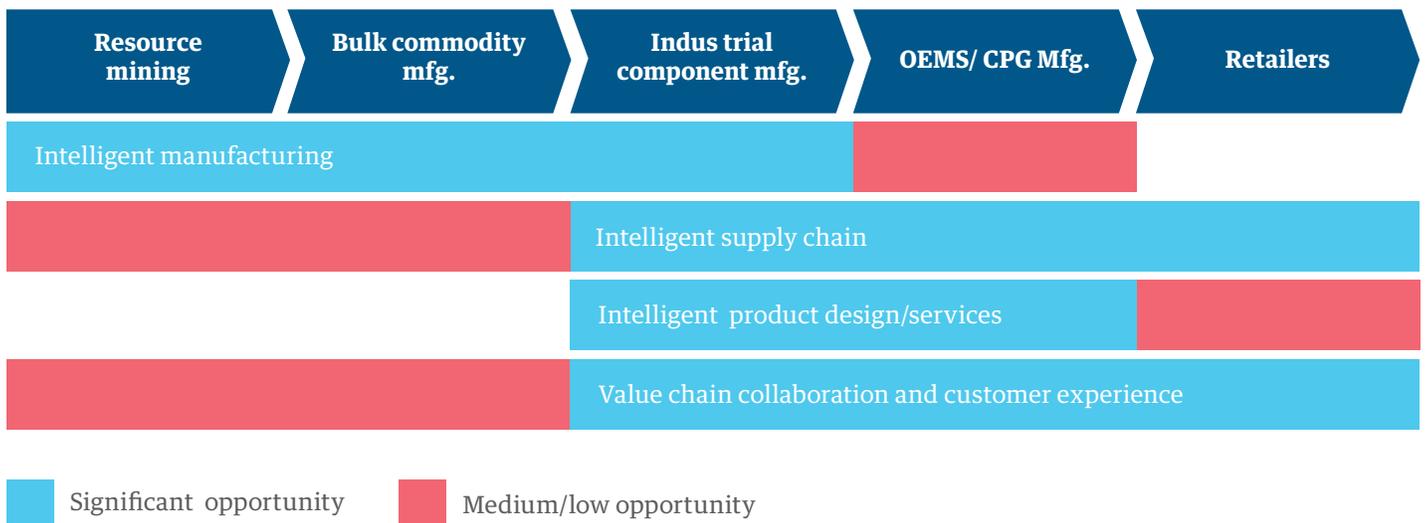


Figure 3: IIoT Opportunities across Value Chain

Once your company decides how to apply IIoT to further its business strategy, identify and prioritize specific operations for transformation to drive top- and bottom-line impact. An aerospace manufacturing company, for example, might want to concentrate on developing and growing its aftermarket services business. That would suggest an IIoT focus on asset monitoring and diagnostics, failure forecasting for parts management, and predictive algorithms to prevent failures. In manufacturing, some companies might prioritize plant asset failure forecasting and reliability improvement, as well as improved supply chain visibility through a control tower. Here are a few typical use cases for manufacturing:

- Asset failure forecasting, and MRO (maintenance, repair, and operations) inventory management
- Asset reliability strategy, and predictive & condition based maintenance
- Intelligence for quality improvements
- Capacity scheduling and management
- Warranty and after-market services
- New product development
- Supply chain control tower and demand sensing

Think big and think bold

Driverless cars are a great example of how technology and data science can radically change existing paradigms. To create a truly sustainable competitive advantage, you'll need to take a step back and explore the art of the possible. Look beyond the constraints of your existing structure and think big about what IIoT can do for your business. For example, advanced analytics can identify process parameters that will improve product quality. Advanced algorithms can alert operators to issues they need to handle. And they can automatically adjust process parameters or shut down a unit.

A key aspect here is to keep your eye on the outcome you want. Instead of looking at this as a program running on available data, remember what your organization aims to achieve with IIoT. Then work backwards to identify the right data sources, analytics models, and technology platforms to get you there in style.

Genpact's Machine to P&LSM approach, combined with our Lean DigitalSM framework, helps companies improve existing functions. It also factors in digital capabilities to reimagine processes and outcomes. Figure 4 shows the way we partner with companies to translate strategic imperatives into tactical action. The approach focuses on accelerating value using a systematic process and proprietary tools.

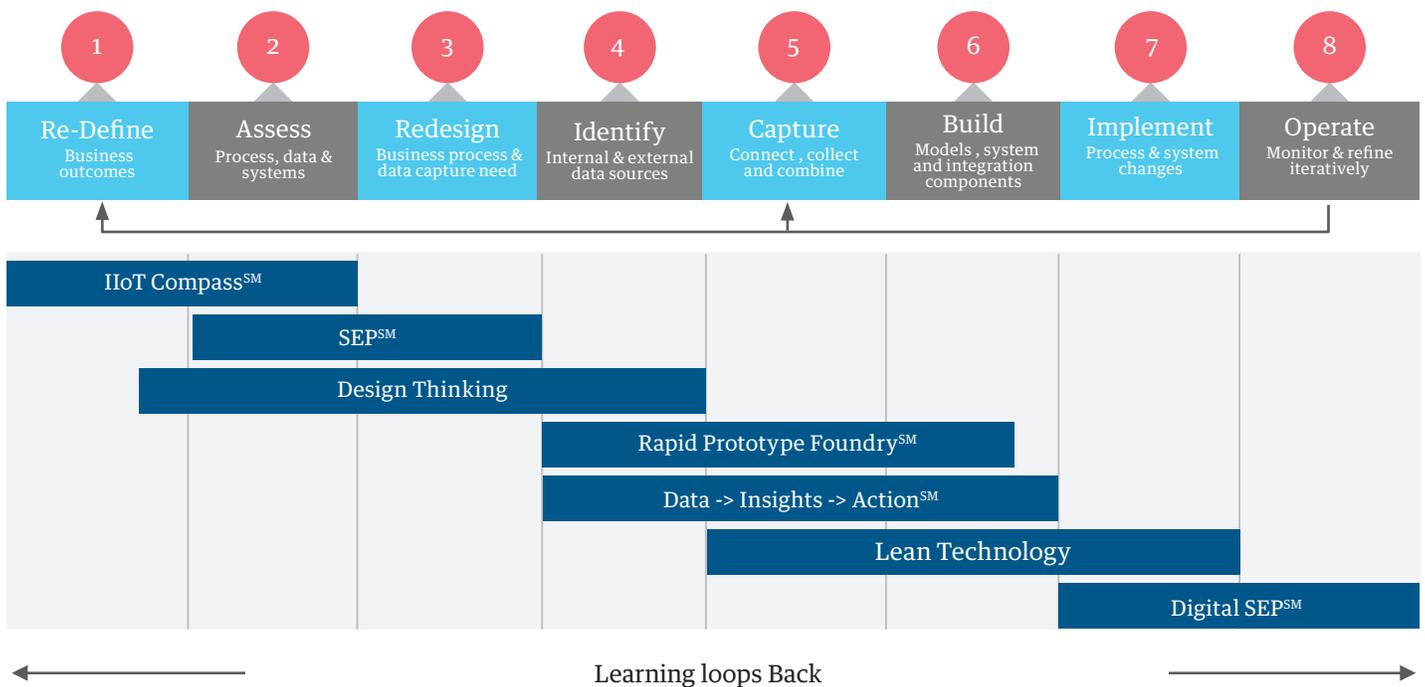


Figure 4: Genpact Machine to P&LSM Approach to Operationalize IIoT

Here are the steps involved:

Step 1:

Once your company identifies strategic imperatives, you can map them to operational levers and determine how IIoT can help redefine outcomes with specific KPIs.

Steps 2-3:

Getting business process, governance and organization design right is the key to a sustainable transformation and helps you identify the data and system requirements you'll need.

Step 4-6:

Use agile methodologies to develop rapid prototype/PoC to test the use case for feasibility and value. These steps will ensure that you remain ruthlessly focused on use cases that can drive impact, speed to value, and agility.

Steps 7-8:

Apply your tested use cases across your firm and put the infrastructure in place to ensure efficient operations and continuous improvement.

The use of accelerators is extremely critical for a structured and data-driven approach to transformation that is fast and agile

The winning idea: Start small, fail fast and learn faster

It is easy to get lost when—armed with new technologies, platforms, and tools—you set out to create a perfect solution. For speed, agility, and the best business impact, start small. That way you can decide if the solution you've tested delivers the return on investment you expected before you spend time, effort, and resources scaling up.

Too often, companies adopt a big bang approach to IIoT. That approach often fails because too much has to change at once. We highly recommend use cases that are consistent with business strategy, and backed by PoCs to validate impact, before scaling up. This is also a way to get champions and change agents on your side who can support the subsequent scale-up. It's important, too, to have access to accelerators, such as process, agile development, and data-to-action frameworks, which help ensure speed and accuracy in the development and validation process. Figure 5 shows a typical rapid prototyping process. The length of a PoC can range from a few days to a few weeks, depending on complexity, as well as existing user interfaces and algorithms.

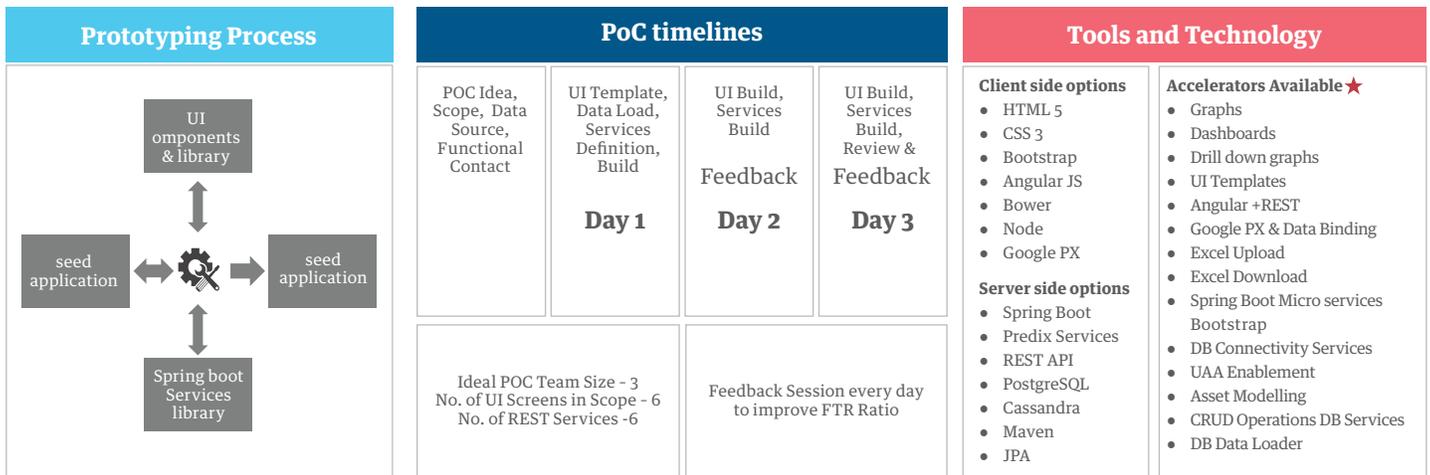


Figure 5: Rapid Prototyping Foundry (RPF) - Process & Tools

Once you’ve validated and implemented the PoC, your company will be on the first step of its journey to Industry 4.0—a connected enterprise with an enhanced value chain—as depicted in Figure 6 below.

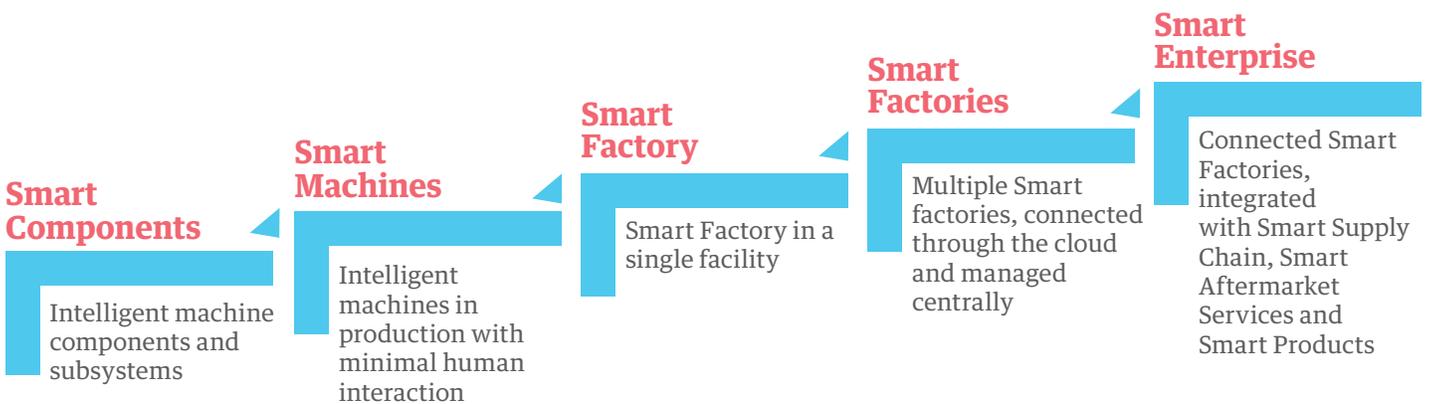


Figure 6: IIoT Maturity Journey

Here’s how it all comes together:

Smart Components respond to sensor information and make predictive or adaptive decisions based on protocols. Technologies and analytics introduced at the component or subsystem level make the components smart, productive, and efficient.

Smart Machines can control their operations and make predictive or adaptive decisions based on sensor information

and advanced analytics. Technologies and edge analytics make machines smart, productive, and efficient.

Smart Factory is the term for smart machines working together to drive autonomy. Technologies and edge analytics at the factory level help the whole facility become smart, productive, and efficient. In a Smart Factory, machines and production systems are smart, both individually and collectively.

Connected Smart Factories link individual Smart Factories across the enterprise. A centralized operations function manages them.

Smart Enterprises integrate the connected Smart Factories with other business domains, such as supply chain, aftermarket, engineering, and planning, among other functions. That’s how you get the most out of manufacturing processes, create new revenue streams, reduce and control inventory, keep an eye on resources, develop digital clones and what-if simulations, and become predictive.

The right platform can take a heavy load ensuring right infrastructure, precise data, and smart analytics to create actionable insights

IIoT can impact front, middle, and back office operations, so it’s important to have a flexible and scalable technology platform, such as [Genpact Cora](#), to accommodate new

processes, data sources, and analytical requirements. This AI-based platform for digital transformation features a modular, interconnected mesh of technologies that tackles specific business challenges from beginning to end. It works with clients’ IT ecosystems in alignment with their long-term strategic vision. It has the following benefits:

- It automates and optimizes work
- It provides business flexibility with investment protection
- It creates business insights
- It enables accelerated revenue growth and cost reductions

We tailor our approach to the technology stack to meet business requirements as efficiently as possible—both from a cost and a technical perspective. We co-develop our tool and system selection criteria with our clients so we can fully consider their current and future business requirements. Some of the criteria that we take into account include the following—but this is by no means an exhaustive list.

Vendor longevity	Functional capabilities	Operational	Governance
<ul style="list-style-type: none"> • Financial strength • Product roadmap 	<ul style="list-style-type: none"> • Security • Expandability • Data management capability—volume, velocity and variety • Data ETL capabilities • Functionality <ul style="list-style-type: none"> – Statistical packages – Text and natural language capabilities – ML/AI – Cognitive capabilities • Technical sophistication • Compatibility with other systems and tools • Data visualization 	<ul style="list-style-type: none"> • Availability • Performance • Computation speed • Stability • Accuracy • Learning curve • Ease of use/UI • Ease of change/ upgrade 	<ul style="list-style-type: none"> • Access • Updates • Legal

Secure your business

Making sure your data is secure is foundational for IIoT as it drives convergence between traditional IT and operational technology (OT) systems. But keeping your data safe is a challenge for the following reasons:

- **Old technology:** Almost 75% of U.S. plants are more than 20 years old and plant automation systems are reaching end of life. What's more, more than 80% of U.S. plants have machinery operating in silos—particularly in discrete manufacturing facilities.
- **Corporate misalignment:** Most manufacturing companies don't have standard corporate cybersecurity policies because the IT and OT teams don't coordinate. Traditional information systems have expanded to factory plant floors with TCP/IP protocol standardization.
- **Talent shortage:** Cybersecurity skills are in high demand. Hiring and retaining cyber talent in manufacturing is a major challenge globally, as the sector competes with high-tech companies.
- **Perceived lack of ROI with security systems:** Many businesses still believe that cyber crime only affects enterprise environments. They assume IT is already taking care of the problem. As a result, they underestimate the risk of the damage a cyber event can cause in terms of safety, brand reputation and litigation.

Service providers need to incorporate cybersecurity best practices into their solutions for a successful IIoT engagement. That includes secured data compute infrastructure plus analytics and smart services to maximize value. It also calls for new business models, such as cyber anomalies detection, security managed services, incident response and forensics, disaster recovery, and so on. In addition to physical infrastructure security, IT solutions around access, authentication, firewall and cyber-attack monitoring and defense, and most importantly governance (policies, training, risk assessments, audit, etc.) are critical to minimize the risk of a security breach.

Preparing your people for the journey agnostic

Bringing IIoT into your company is cause for excitement, but it will upend many things, too. It's transformative: It will disrupt processes, target operating models, resource levels, and skills. So it's critical to have senior executive sponsorship and buy-in. To get the most out of IIoT, you'll need a dedicated program run by a dedicated team. The IT department alone can't run it. The project needs its own program management and governance structure.

Genpact's change management methodology prepares people—including executives—for the adventure. It offers robust program management and governance structures to detect problems before they happen. It also makes sure everyone is working in close coordination and that the IIoT undertaking has visibility across local, regional, and corporate organizations.

Here are some of the best practices to ensure successful change:

- Create a compelling case for change; make benefits relevant
- Provide strong and unwavering leadership support—both in words and deeds—to drive the required changes
- Align and get buy-in from key stakeholders affected by changes, such as site leaders, engineering, and IT, for example
- Prioritize opportunities and focus on quick wins to create momentum and enthusiasm by delivering value
- Create a communication plan; celebrate success stories
- Address the “human side” early, honestly, and systematically
- Recruit change agents early in the process
- Pilot changes to work out the kinks and create more internal champions

- Ensure people prepare for success by giving them training and resources
- Monitor change and reward adopters while encouraging detractors

Keep in mind that IIoT requires highly skilled personnel, difficult to find and retain. What's more, talent isn't enough. You'll also need people with deep domain expertise in your industry. One way companies address the talent gap is by adopting a Center of Excellence (CoE) model or using third-party managed services to accelerate implementation and scale-up.

Ready, set, go!

Geared up to get started? Here's a recap.

- Determine how to leverage IIoT to achieve strategic priorities. First, decide how IIoT can help your company transform its operations—in asset management, or the supply chain, for example. You can act on this quickly. You'll gain experience with IIoT technologies and tools as well—and come to understand the art of the possible. Next, assess how IIoT can disrupt industry business models and offer a competitive edge.
- Use agile methodology for PoC validation. IIoT is new, but it's developing quickly. To stay ahead of the curve,

businesses will need to experiment in an agile way to learn what works and what doesn't. Test a use case for feasibility quickly as a minimum viable solution, not a comprehensive one. This will help you get the most out of your investments and improve speed to market.

- Create a full-fledged IIoT program. IIoT is a transformative initiative that will impact most functional areas in your firm. It isn't a part-time project. It will likely need the sponsorship of a senior executive and the commitment of a few key people to manage strategy, projects, design, implementation, and rollout. Put someone in charge who your staff respects and who can gain their buy-in.
- Analyze data and information criticality. For IIoT use cases and applications, establish the data/information criticality. This will define security and infrastructure requirements. For example, it will help you decide the kind of cloud infrastructure you need, how you'll store your data, where computing occurs, who has access, and how you'll ensure security.

IIoT can deliver a knockout punch to your competition if you put it in place first. Plan for it well—and carry out your plan strategically, as we've outlined here. The rewards will be exponential.

About Genpact

Genpact (NYSE: G) is a global professional services firm that makes business transformation real. We drive digital-led innovation and digitally-enabled intelligent operations for our clients, guided by our experience running thousands of processes for hundreds of Global Fortune 500 companies. We think with design, dream in digital, and solve problems with data and analytics. We obsess over operations and focus on the details - all 78,000+ of us. From New York to New Delhi and more than 20 countries in between, Genpact has the end-to-end expertise to connect every dot, reimagine every process, and reinvent companies' ways of working. We know that rethinking each step from start to finish will create better business outcomes. Whatever it is, we'll be there with you - putting data and digital to work to create bold, lasting results - because transformation happens here, at Genpact.com.

For additional information contact, industrial.manufacturing@genpact.com and visit

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