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# Introduction



Industrial IoT originally defined the Internet of Things (IoT) as it is deployed across several industries, mainly in manufacturing (Industry 4.0), logistics, oil and gas, transportation, energy/utilities, mining and metals, aviation and other industrial sectors with typical uses cases. The Industrial IoT also has a second meaning referring to the description of industrial transformation in the connected machines, cyber-physical systems, advanced analytics, AI, people, cloud, IoT edge computing and so forth. In Industry 4.0 where we essentially find the IloT as part of an integrated approach, data is key asset, and analytics is a necessity across the products' full life cycle, production assets and more<sup>1</sup>.

The Fourth Industrial Revolution integrates digital and physical technologies towards the interconnection of disrupting operations. From numerous areas ranging from the supply chain to the smart factory, organizations are using AI, robotics, edge computing, and the cloud to make informed and timely decisions. Solutions include connected sensors and edge devices to help improve product quality and factory operational efficiency in real time. Among the results are the potentially lower maintenance costs, new business opportunities, and increased productivity. Applying IoT in manufacturing enables new lines of business, and improve overall productivity.<sup>2</sup>

With IloT, manufacturers can derive machine data from a wide range of sources or network of sites as manufacturing plants, assembly facilities, and refineries, to proactively improve performance issues which frequently arise such as bottlenecks, failures, and quality issues. The combination of data from a network of different sites can also result in a more efficient control of material flow processes, the minimization of supply bottlenecks, and the optimized operation of machinery in all facilities.<sup>3</sup>

1. i-SCOOP. (2021, January). Business guide to Industrial IoT (Industrial Internet of Things).

2. Intel Corporation. (n.d.). Flexible building blocks for the Industrial Internet of Things.

3. Amazon Web Services Inc (n.d.). Industrial Internet of Things.

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IIoT is changing the way industrial companies daily operate. Whether it's about predictive analytics enablement for the detection of potential corrosion inside a refinery pipe, the provision of real-time factory data to uncover capacity capabilities in a plant, or the acceleration of a new product development, IIoT software solutions are driving powerful business outcomes.

Intelligent machines collectively solve complex problems autonomously. Along with AI, IoT connectivity, and M2M communications, they are a key component of smart systems, consisting of many state-of-the-art technologies such as smart dust, neurocomputing, and advanced robotics. Intelligent machines will also benefit significantly from the convergence of AI and IoT, also known as the artificial intelligence of things (AIoT).

The enablers for Industry 4.0 adoption include improvements in the smart workplace, smart data discovery, cognitive automation, and more. Intelligent machines refer to autonomous robots, self-driving vehicles, expert systems (such as medical decision support systems), medical robots, virtual private assistants (Siri, Google Assistant, Amazon Alexa, etc.), embedded software systems, neurocomputers and smart wearable devices.<sup>4</sup>



4. Research and Markets. (2021). Smart machines in enterprise, industrial automation, and IIoT by technology, product, solution, and industry verticals 2021-2026.

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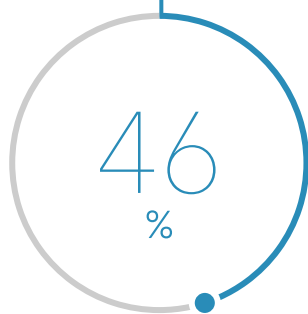
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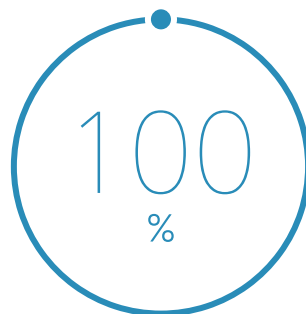




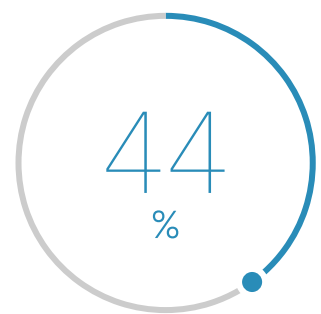
The efficient combination of machine-to-machine (M2M) communication with industrial big data analytics, sets unprecedented levels of productivity and performance. *As a result, industrial companies in equipment manufacturing, chemicals, food and beverage, automotive, steel etc., are experiencing significant operational and financial benefits. GE Digital predicts the benefits to the global economy through IIoT to be:*<sup>5</sup>



of global economy that can benefit from the Industrial Internet



Industrial Internet potential impact on energy production



Industrial Internet potential impact on global energy consumption

As manufacturing leaders digest new challenges, such as inconsistent supply chains and urgent changes to work safety environments, they are being forced to reassess and redefine factory operations.

5. Tiempo Development. (2020, March). What is the Industrial Internet of Things (IIoT)?.

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Figure 1. Top Industry 4.0 Business Goals. Software Strategies. (2019). Industry 4.0's Potential Needs to Be Proven on the Shop Floor.



New safety requirements mean that operations professionals must be able to access data remotely. By using IIoT solutions this way, they can support more safely improvements in maintenance practices, production efficiency and quality. Manufacturers can derive data at ever increasing rates, but 73 percent of the producing data cannot efficiently be used due to inconsistent access, slow analysis or difficulty in deriving data patterns. Moreover, it becomes more complicated as the average age of production equipment is 22.5 years and not compatible with new technology standards and protocols. <sup>6</sup>

In order to be able to capitalize on existing data and introducing new equipment with a successful scalability of IIoT projects, manufacturers need a set of critical capabilities. The seamless connection to a vast, heterogenous quantity of devices and sensors, enables the data analysis to understand conditions and predict outcomes with predictive analytics.



6. Riley, S. (2021, February). How to leverage IIoT for smart factories. Software AG.

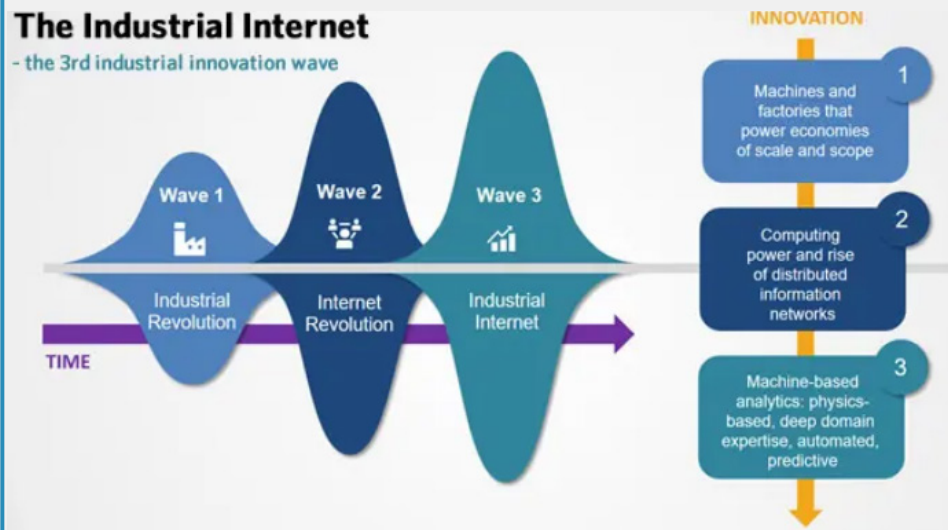


Figure 2. The Industrial Internet. i-SCOOP. (2021, January). Business guide to Industrial IoT (Industrial Internet of Things).



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The rise of the internet of things presents a tremendous opportunity to build a more sustainable and prosperous future for all. Concurrently, it poses new risks and governance challenges. The global pandemic has highlighted the role of IoT in providing the critical data needed to track and fight the disease, yet it also raises concerns about IoT's security, privacy, interoperability, economic sustainability and equity. Addressing the risks and governance gaps identified in this report is critical to enabling trust in IoT and promoting its long-term growth. IoT is already an essential part of our daily lives and basic infrastructure. As its scope and capabilities expand, we must act if we are to realize the full potential of IoT.<sup>46</sup>

As industrial companies take these implications on board and develop their IIoT strategies and approaches, a question that frequently arises is how speedily they need to move those efforts forward. Because of the fact that unicorns are already disrupting the technology landscape, many businesses may be left behind. The pace of growth is underlined by research from Gartner, which predicts that by 2021, one million IoT devices will be purchased and installed every single hour.

The headlong growth in the IIoT reflects several drivers. Firstly, executive members should take into consideration IT costs, mainly involving storage, compute power, and network capacity, even as the number of devices that can potentially be connected continues to grow.

Secondly, the continuing flood of start-ups and venture capital investments are showing no sign of slowing down from their current breakneck speed, in turn contributing to rapid advances in capabilities and benefits. Thirdly, the wave of technology disruption is affecting diverse industries, boosting its momentum still further.

What most industrial companies do not fully realize or appreciate that after a deployment effort, it would cause them to 'behave' like technology firms. This demonstrates how far the IoT is breaking down industry barriers. Consequently, some industrial CEOs are expressing doubts about their capacity to evolve further and break this barrier for the fear of the unknown.

Finally, ongoing advances around big data are also helping to drive the IoT projects forward and opening up new growth opportunities through the adoption of disruptive business models. The returns will be countless, starting from reversing business polarity among industries and creating entirely new ways of procuring, provisioning and consuming goods and services of all types. Disruptions enabled by technology have turned industries ranging from media to transportation to lodging on their heads in recent decades. The software industry is a good example: over the last fifteen years, it has transitioned from an industry based primarily on selling licensed packages through resellers to one that sells its offerings directly to users on an OPEX-based, software-as-a-service (SaaS) model.<sup>47</sup>

46. European Commission. (2021). Industry 5.0 Towards a sustainable, humancentric and resilient European industry.

47. European Commission. (2021). Industry 5.0 Towards a sustainable, humancentric and resilient European industry.

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