The Industrial Internet of Things in 2019

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IoT: What is it?
The Three Stages of the Internet of Things

**STAGE I**
Monitoring & Control
Remotely Connecting, Measuring, Tracking and Tracing (telemetry; telematics; M2M; LBS; RTLS; and ICS) [*]

**STAGE II**
Data Optimization
Data captured at the edge transformed into actionable and valuable ($) information (modeling & simulation; descriptive, predictive, and prescriptive analytics)

**STAGE III**
Interconnection of Intelligent Things
“The grand vision of the Internet of Things (IoT) is a world of networked intelligent objects.” (Harvard Berkman Center); see also the emerging concepts of “Massive IoT” and “Critical IoT” in the telecom industry, and “Intelligent Connectivity” at GSMA.

[*] Telemetry is the automatic measurement and wireless transmission of data from remote sources; [Vehicle] telematics refers to the gathering, storing, and transmitting of data about a vehicle(s) for monitoring purposes; M2M = Machine-to-Machine communications; LBS = Location-Based Service; RTLS = Real-time Locating System; ICS = Industrial Control Systems [including supervisory control and data acquisition (SCADA) systems, distributed control systems (DCS), and other control system configurations such as Programmable Logic Controllers (PLC)].
IoT for Manufacturing: It makes sense!
“As per the study by TMR [Transparency Market Research], the global market for industrial Internet of Things market is expected to register a massive 24.30% CAGR between 2018 and 2026. Geographically, North America is expected to hold a huge share of the industrial Internet of Things market, thanks to the growing adoption of advanced automation solutions.” (*)

“The manufacturing industry is a leader in IoT adoption, and often pulls other industries along too.” (*)

“87% of IoT decision makers in manufacturing have adopted IoT and the vast majority say IoT is critical to the success of their company and that they are satisfied with the technology.

48% of manufacturers apply IoT to industrial automation, 45% to quality and compliance, and 43% to production planning and scheduling as well as supply chain and logistics.

21% of manufacturing companies have begun to utilize IoT for worker safety and the vast majority report that they have already started to see safety improvements.

45% of manufacturing processes are becoming automated, and 85% of IoT adopters in manufacturing say IoT plays a critical role in automating processes.

The future of work is increasingly digital, and nowhere is that more evident than in manufacturing. APQC has gathered and analyzed information from 626 global organizations about their manufacturing practices, focusing on digitalization and the adoption of emerging technologies. One key area of investigation is the use of the Internet of Things (IoT) in manufacturing.
10 Concerns, Issues and other Topics of Interest in the (Industrial) Internet of Things Space in 2019
We laughed uncomfortably as we discussed the phenomena each of us has observed in every sector as “random acts of IoT,” or as one client described his IIoT efforts to date – “a four-letter word.” April 2019

(*) Source: Case Engelen, Industrial IOT: How to avoid Pilot Purgatory (71% is stuck), Titoma, blog, n.d., https://titoma.com/blog/iot-avoid-pilot-purgatory/

"Most of the leaders we surveyed (companies representing 17 countries and 13 industries) reported poor returns on their digital investments. The primary reason: unsuccessful efforts to scale digital innovations beyond early pilot work."


"The vast majority of manufacturers are having a hard time pivoting away from "pilot purgatory."


"Korean manufacturing's digital transformation have to escape ‘pilot purgatory’"


"Transform manufacturing with IoT part 1: how to move beyond pilot programs"


© 2019 Sight Machine
Source: The “S” in IOT is for Security - Posted on October 17, 2019 by geeknik https://www.openbugbounty.org/blog/author/geeknik/
“A survey by Netherlands-based Irdeto published recently [May 29, 2019] revealed that 79% of manufacturing and production organizations have experienced an IoT-focused cyberattack in the past year. Of 220 security decision-makers surveyed in the Internet of Things (700 respondents in total across healthcare, transport and manufacturing), nearly half of these organizations (47%) experienced operational downtime as a result of experiencing a cyberattack.” (*)

“Desire for speed typically trumps security concerns”

IoT: Speed to market offsets cybersecurity

Security leaders said there's a need for improved IoT security: Vendors work fast to bring IoT products to market, while enterprise leaders have moved just as quickly to capitalize on IoT deployments. In both cases, the desire for speed typically trumps security concerns, they said.

GlobalPlatform launches IoTopia to give device makers and service providers a blueprint for IoT security implementation

The Internet of Things pose privacy challenges

Jinoy Jose P | Updated on October 24, 2019 | Published on October 25, 2019

India must tune its policies to accommodate the emerging challenges, and companies must bring in better security to IoT products.

Tech companies keep getting caught sending recordings of voice assistant users to contractors.


“Watch what you say. The appliances have ears.”
Privacy

1. THE AGE OF SURVEILLANCE CAPITALISM
   SHOSHANA ZUBOFF
   January 15, 2019

2. Digital Minimalism
   CAL NEWPORT
   February 5, 2019
The Future of IoT Includes Edge Computing, AI, and Blockchain

IDC forecasts a steep climb in IoT spending through 2022. An IDC researcher explains the stages of IoT development—past, present, and future.

by: Rob Spiegel in Automation & Motion Control, IoT on January 04, 2019

**Edge Computing, AI and Blockchain**

**THE WALL STREET JOURNAL.**

Blockchain, AI Combine to Make an Internet of Smarter Things

Using the ‘swarm’ method, internet-connected devices will be able to process information in groups, without sending private data to the cloud.


**IoT World Today**

Scale Your IoT Architecture with AI at the Edge

Once primarily cloud-based, IoT architecture is moving steadily to the edge.

Written by Rupal Vyas 4th October 2019

Thanks to the proliferation of IoT devices, enterprise data volumes are exploding. Traditionally, the sensitive data IoT devices gather has largely been stored in the cloud. But given the latency between data centers and end-users, this arrangement is becoming untenable. When dealing with pressing operational needs, organizations can struggle to rely on remote servers to process their data. Cloud data security is a further complication. Given these concerns, it’s no wonder many enterprises are looking to the edge. That is, they need to process data locally to support real-time decision-making. In essence, they need faster processing than the cloud allows.

AI and Edge: An Emerging Paradigm for IoT Applications

Source: [https://www.iotworldtoday.com/2019/10/04/scale-your-iot-architecture-with-ai-at-the-edge/](https://www.iotworldtoday.com/2019/10/04/scale-your-iot-architecture-with-ai-at-the-edge/)

**INFORM**

What happens when the edge, AI, and blockchain get together?

5G for the Industrial Internet of Things 2019

Date: Monday September 30
Time: 11:00 – 17:00
Room: Conference Room 3

There is no doubt, that requirements from the Manufacturing sector, and more generally, the Industrial Internet of Things (IIoT) has been one of the driving verticals for the design and development of new 5G concepts and technologies. The notion of ultra-reliable low latency communications and massive machine type communications are somehow reflecting the primary communication types needed within the IIoT domains. In addition, we can also witness the emergence of fog and edge computing from the IIoT domain in the past years, which also have driven the architectural evolution of 5G infrastructures. Last but not least, it is probably this domain, which is supposed to be affected most by the ongoing digitalization and there are many important initiatives underway, like Industrie 4.0, the Industrial Internet, and many edge computing related standardization fora, which have to be carefully taken into account when positioning and optimizing 5G for this.
In the meantime, in Washington (D.C.)
Bipartisan Bill Aims To Foster U.S. Advanced Manufacturing Growth

BY CATHALINE ADAMS | FRIDAY, MAY 10, 2019


To amend the National Institute of Standards and Technology Act to improve the Network for Manufacturing Innovation Program, and for other purposes. For example: instead of “tool”, insert “tool development for microelectronics, food manufacturing, superconductors, advanced battery technologies, robotics, advanced sensors, quantum information science, supply chain water optimization, and aeronautics and advanced materials”

Energy Efficiency Legislation Paves the Way for Smart and Sustainable Manufacturing

By Laura Berkey-Ames | March 8, 2019 | Energy, Environment, Shopfloor Main, Shopfloor Policy, Sustainability

“This week, Senators Jeanne Shaheen from New Hampshire and Lamar Alexander from Tennessee introduced the Smart Manufacturing Leadership Act (S.715), a bipartisan bill that would support manufacturers—particularly small- and medium-sized manufacturers—in adopting advanced technologies to increase their sustainability by improving the energy efficiency and productivity of their facilities and operations.

Representatives Peter Welch from Vermont and Tom Reed from New York also introduced companion bipartisan legislation (H.R.1633) in the House. The National Association of Manufacturers has been a longstanding proponent of The Smart Manufacturing Leadership Act and looks forward to working with Congress as these measures moves forward.”

Sample of IoT-related Bills in 116th U.S. Congress (2019-20)
(as of October 23, 2019)

**Bipartisan Legislation to Improve Cybersecurity of Internet-of-Things Devices Introduced in Senate & House**

H.R.1668
S.734

Mar 11 2019

WASHINGTON – Bipartisan legislation to improve the cybersecurity of Internet-connected devices will be introduced today in the Senate and the House of Representatives. The Internet of Things (IoT) Cybersecurity Improvement Act of 2019 would require that devices purchased by the U.S. government meet certain minimum security requirements.

The legislation is being introduced in the Senate by U.S. Sens. Mark R. Warner (D-VA) and Cory Gardner (R-CO), co-chairs of the Senate Cybersecurity Caucus, along with Sens. Maggie Hassan (D-NH) and Steve Daines (R-MT), while Reps. Robin Kelly (D-IL) and Will Hurd (R-TX) are introducing companion legislation in the House of Representatives.

**Latta Re-Introduces SMART IoT Act**

H.R.2644

WASHINGTON, May 13, 2019 | Mikayla Hall (202)226-4356

WASHINGTON, D.C. - Congressman Bob Latta (R-Bowling Green) recently re-introduced the State of Modern Application, Research, and Trends of IoT Act, or the SMART IoT Act. This legislation would direct the Secretary of Commerce to conduct a study on the state of the internet-connected devices industry, or ‘Internet of Things’ (IoT). [Click here](#) to read the bill text. Upon introduction, Latta released the following statement:

**Senator Markey and Rep. Lieu Reintroduce Legislation to Improve the Cybersecurity of Internet of Things Devices**

H.R.4792
S.2664

**Fischer, Gardner offer bipartisan bill to support growth of IoT-related technologies**

S.1611

WASHINGTON, May 24, 2019

U.S. Sens. Deb Fischer (R-NE) and Cory Gardner (R-CO) introduced bipartisan legislation to ensure the prioritization, spectrum planning and interagency coordination exist to support growth of the Internet of Things (IoT).

“As connected technology continues to evolve, it’s critical that Congress update federal policy to keep pace with innovation in order to keep America competitive,” said Sen. Gardner.

**DelBene and Katko Introduce ‘Internet of Things’ Legislation to Determine if Spectrum Supply Meets Future Demands**

H.R.3789

WASHINGTON, D.C., July 17, 2019 | 0 comments

Today, Congresswoman Suzan DelBene (D-WA) and Congressman John Katko (R-NY) introduced the Internet of Things (IoT) Readiness Act, bipartisan legislation that would direct the Federal Communications Commission (FCC) to provide Congress with the data it needs in order to be prepared for the continued growth of IoT devices, and devices that use 5G mobile networks.

**Matsui, McCaul Introduce Internet of Things Standards Leadership Act**

H.R.3811

WASHINGTON, D.C., July 17, 2019 | Kyle Morse (202)557-4890

Washington, D.C. – Today, U.S. Reps. Doris Matsui (CA-06) and Michael McCaul (TX-10), co-chairs of the High-Tech Caucus, introduced the IoT Standards Leadership Act of 2019. This legislation strengthens national economic and security interests by promoting robust United States participation in the international standards setting processes for Internet-connected devices.
“Because IoT has no universally accepted definition, there aren’t any universally accepted standards for quality, safety, or durability, nor any universally accepted audit or assurance programs.” (*)

“intelligent system” also includes the notion of many connected pieces working in concert.
Beyond Technology

Why Engineering Teams Are Shutting Down Industrial IoT Projects
Nebulous goals, undefined business requirements, and vague user stories are the fertile fields in which you sow the seeds of your digital demise.

by Marc Philips  •  Oct. 02, 19  •  IoT Zone  •  Analysis

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“Industrial IoT Is No Longer a Technology Problem

Today, industrial IoT is a product management problem. It's a company culture problem. It's an executive leadership problem. But it's no longer a technology problem. Unless you understand — and clearly articulate to your engineering team — why you want to connect your equipment, what scenarios must be enabled, and how you will measure success, the system will inevitably fail to create sustainable value for your organization and your customers. How could it be any other way?” (*)

“However highly complicated the technical dimension of IoT is, which, if anything, will become even more so and whose effective and efficient handling allows no shortcuts or vague approximations, the human dimension, albeit fuzzy and somewhat volatile, is much more complex and in need of leadership and management attention.” (*)

“According to new research that **IFS conducted in late 2018**, most industrial companies planning to increase IoT investments are still looking primarily in areas associated with cost containment, instead of revenue generation.

Sixty percent of respondents planned to increase spending on process automation, while 50 percent planned to spend more on condition-based maintenance. Yet less than 30 percent planned to increase IoT spending for field service and aftermarket service, which drives net revenue at margins higher than realized on the initial product sale.”

Source: [https://www.rfidjournal.com/articles/view?18748](https://www.rfidjournal.com/articles/view?18748)
Cost Containment/Efficiencies Still Main Drivers

Where do you expect the highest benefits from Digitalization for your business?
What are the greatest challenges / barriers to implementing Industry 4.0?

**Expected Benefits**

- Cost reduction: 78%
- Supply chain: 61%
- Energy efficiency: 52%
- New business models: 43%
- Sales growth: 22%
- New products: 17%
- Other: 4%

**Greatest Challenges**

- Awareness about the topic internally: 50%
- Changing the existing process organization: 46%
- IT systems and infrastructure: 42%
- Identifying opportunities and calculating ROI: 38%
- Ensuring data security and protection: 29%
- Implementing common technical standards: 25%
- Securing financing: 17%
- Education and training of resources: 17%
- Machinery/equipment: 17%
- Existing policies: 8%
- Research and development capabilities: 8%
- Protecting know-how: 8%
- Other: 4%

According to Software AG survey [reported in September 2019]:

84% of automotive and heavy industry manufacturers agree that the most important area of IIoT is “monetization of product-as-a-service-revenue.”

The Road to the Future of Mfg: Product-as-a-Service

The average cost of IoT sensors is falling

2004 average cost: $1.30
2020 average cost forecast: $0.38

Exhibit A

Source: https://www.theatlas.com/charts/BJsmCFAI
"At present, Haier is not selling a single piece of household appliances, but providing complete solutions such as smart living room, smart kitchen and smart bathroom based on scenes."

"In Haier's scene ecology, household appliances such as refrigerators and washing machines are installed with sensors, which become "net devices" for collecting various kinds of life scene data and become access ports for the Internet of Things." (*)

"The manufacturing industry must change. Products in the future will become more and more worthless. The scene is the most valuable." Zhang Ruimin [chairman of Haier Group's board of directors] has revealed the transformation code of manufacturing industry in the Internet of Things era.”

“Companies trying to sell products as a service have to realign everything from pricing models to sales incentives. **Deloitte estimates** that more than 65% of a typical company’s operational capabilities are affected when they shift to a services model. That’s why Emerson is undertaking this shift slowly and why Adesto will offer customers and integrators a choice of both options. **HPE, on the other hand, is going full throttle.** At the end of June it said that it plans to make all of its products available as a service within the next three years. By 2022 it will offer its software, servers, and other products as a service. Maybe by then customers will have embraced the idea.”

(*) Source: [https://staceyoniot.com/were-far-off-from-everything-being-delivered-as-a-service/](https://staceyoniot.com/were-far-off-from-everything-being-delivered-as-a-service/) (Stacey Higginbotham, Blog, July 2019)
Thank You!

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