Reimagining Business and Industry

Fasten your seatbelt.

Digital transformation has precipitously come into the spotlight.

Back in January 2019, Gartner predicted the Global IT spending to reach $3.8 Trillion, stating, "Information Technology is no longer just a platform that enables organizations to run their business. It is becoming the engine that moves the business. As digital business and digital business ecosystems move forward, IT will be the thing that binds the business together."[1]

That was a year ago. Eons ago! That was before COVID-19 tore into our lives and changed everything, in a way that none of us expected. In January, the Industrial Internet Consortium (IIC) was planning our Q1 2020 Member meeting in Athens, Greece. Then, unexpectedly, Mobile World Congress, the annual gathering of electronics makers, swiftly cancelled due to health and safety concerns over the spread of COVID-19. Like dominoes, events around the globe swiftly followed suit. The IIC among them began making arrangements to host our first ever, virtual meeting.

Change. It's a basic law of nature.

"Change is the basic law of nature. Changes wrought by the passage of time affects individuals and institutions in different way"

~Charles Darwin

Digital transformation is the integration of digital technology into all areas of a business, fundamentally changing how you operate and deliver value to customers, clients, students, citizens and employees. It's about leveraging connected things to transform processes and operations and produce better outcomes. It is also a cultural change that requires organizations to continually challenge the status quo, experiment and get comfortable with disappointment. Organizations need support, guidance and experience in fast-tracking their processes. This

[1] https://www.gartner.com/en/newsroom/press-releases/2019-01-28-gartner-says-global-it-spending-to-reach--3-8-trillio

month, when asked, "What's new at the IIC?" My answer: "Fasten your seat belt and get comfortable with change."

TIoTA joins IIC

Digital transformation is obviously a complex challenge. The integration of IoT with blockchain makes that transition easier. In an over-simplified elucidation, a blockchain serves as a cryptographic ledger which is made up of a digital log of transactions shared across the (public or private) network and addresses some of the concerns around security and trustworthiness. Thanks to technologies like machine learning, connected devices, industrial analytics, data lakes and global business services; the use cases for distributed ledger technology have grown exponentially. This is a key reason we are excited to combine memberships with Trusted IoT Alliance (TIoTA) and continue to work together under the IIC umbrella.

TIoTA has built a community of technology leaders focused on bringing blockchain/distributed ledger solutions to market. This consolidation will strengthen the ability of the IIC to provide guidance and advance best practices on the uses of distributed ledger technology across industries—and to boost the commercialization of these products and services.

IIC Community Forum

The Industrial Internet Consortium recently opened the IIC Community Forum, an online venue for industry experts to exchange ideas, to discuss IIoT problems in need of solutions and to network. The IIC Community Forum will be the go-to IIoT discussion forum to provide helpful, relevant content to technology users, vendors, integrators, technology experts, researchers, government entities and academicians. This online community will be our featured resource for follow-up conversations that began as Webinars, and for the upcoming World IoT Day (#IOTDAY) which takes place each year on April 9. As a member benefit, the IIC Community Forum provides another vehicle to showcase their industry expertise and thought leadership.

IIC Introduces Industry Connect Service

As the world's leading IIoT consortium, the IIC is comprised of leaders in the development and adoption of IIoT and emerging technologies with extensive knowledge and experience to share. IIC member experts have developed best practices, guidelines and frameworks and have applied these resources across many industries. The introduction of an Industry Connect Service can help technology users transform their businesses. Users seeking solutions to large complex problems, to scale existing proofs of concept or to identify requirements for industry standards are invited to submit a problem statement. Both the user organization and the IIC member organization would receive direct value through identification and delivery of possible solutions, opportunities for new technology development and proofs of concepts with testbeds and test drives. Interested in submitting a problem statement for consideration by the IIC? Contact Howard Kradjel, VP of Industry Programs, at kradjel@iiconsrtium.org.

IoT Challenges – Winners

The series of IoT Challenges announced in Spring 2019 wrapped up Round 1 of the Smart Buildings Challenge with winners announced at Bosch Connected World in February 2020. The Smart Buildings Challenge presented contestants with a set of smart building problems faced by building operators and investors, as well as a set of parameters required of the solutions. Technology suppliers developed solution proposals, alone or with partners, and competed for the opportunity to deploy pilot implementations to fulfill the requirements outlined by the challenge. A jury selected the winners from a pool of 39 entries from 26 contestants. The winners were:

- Cubelizer S.L., who won for Smart Space Flow Analytics;
- Aedifion and Thing Technologies, who won for both the Smart Metering in Multi-Tenant Commercial Buildings and Smart Automated Building use cases; and
- Holisticon and its subsidiary Markenwerk, who won for Smart Building Cockpit.

Winners receive the opportunity to deliver a live proof-of-concept in a shopping mall supported by Deka Immobilien, ECE and TÜV SÜD. Technology partners providing technology for the challenge included Bosch, Microsoft and Security and Safety Things. Additional finalists for the Smart Buildings Challenge were BuildingMinds, Cloud Studio, G2K Group, Limitless Insight, Moeco, Oriient New Media and Umajin.

Technical Documents

- *Digital Twins for Industrial Applications: Definition, Business Values, Design Aspects, Standards and Use Cases*

  Digital twins are recognized as a key technology for realizing the promises of Industrial IoT, yet there is still much confusion surrounding the topic. On the heels of the November 2019 edition of the Journal of Innovation, IIC members published a whitepaper highlighting use cases as a way to illustrate an industrial IoT use case and its twin. "*Digital Twins for Industrial Applications: Definition, Business Values, Design Aspects, Standards and Use Cases*" is available for download and can be used by business and technical leaders to gain a better understanding of the concept of digital twin and its industrial applications in the technical context of building up new IIoT systems and improving existing ones, and in the broader business context of advancing their digitalization process.

- *Advancing the Industrial Internet of Things, a joint whitepaper*

  A new joint whitepaper released by the IIC and oneM2M reveals how developers seeking to reduce complexity when designing IoT and IIoT systems can leverage different architectural approaches side-by-side to enable faster time-to-market of new industrial services and use cases. This collaborative work demonstrates how two leading IoT

organizations are working together to advance the IIoT and digital transformation through the creation of a robust, interoperable, flexible and efficient IIoT ecosystem. An effort of the Liaison Working Group, IIC and oneM2M aim to help vertical markets achieve interoperability and reusability by minimizing complexity and the cost of designing, developing and deploying IoT and IIoT systems to shorten time-to-market and value-creation cycles.

- The Industrial Internet of Things: Managing and Assessing Trustworthiness for IIoT in Practice

  Trustworthiness is the degree to which a system performs as expected in the face of environmental disturbances, loss of performance quality and accuracy, human errors, system faults and attacks. Assurance of trustworthiness is the degree of confidence one has in this expectation. A system must be assured as being trustworthy for a business or organization to have confidence in it. Depending on the context of the system and the possible consequences of failures, the effort spent on achieving a specific level of confidence will vary. With this whitepaper, the IIC hopes to raise awareness in industry of the importance of trustworthiness, context and assurance; how to measure, analyze and assess it; as well as how to manage and govern it.

- Software Trustworthiness Best Practices

  Untrustworthy software has significant, even life-threatening effects in an industrial context where trustworthy implementations are required for safe, secure, private, reliable, resilient and functional systems. This paper provides a high-level overview of software trustworthiness for developers, owners/operators and decision makers in IIoT systems. Written my members of the Trustworthiness Task Group, this document addresses various aspects of creating, acquiring and protecting software. It provides practical and actionable best practices for recognizing, addressing managing and mitigating risks and their sources, whether developed in-house or acquired.

Testbeds, Test Drives and Testbed Results

- *Long Term Evolution (LTE) for Metro Testbed*

  Announced in March 2020, the new Long Term Evolution (LTE) for Metro Testbed led by Huawei and partners is the first IIC testbed for the rail transportation industry. The LTE for Metro Testbed shows the feasibility of adapting LTE for Metro technologies for the urban rail sector.

  Within metro systems, multiple types of wireless communication services are used for train control and for management between devices on a moving train and facilities on the ground. As information and communications technology in construction continues to grow, the requirements for urban rail operational management become more stringent

and diverse. Train-to-ground wireless communication networks must be more reliable and secure, and must provide more sufficient bandwidth resources.

The services include Communication Based Train Control (CBTC), Passenger Information System (PIS), CCTV monitoring, trunking communication and Train Control and Monitoring Systems (TCMS). Multiple wireless technologies support the different services. To guarantee critical service, two Wi-Fi-based networks carry critical and noncritical services respectively, operating with vendor-specific extensions. They are not standardized or interoperable. The IIC LTE for Metro Testbed plans to replace existing non-standard networks with a standard single-technology-based network tailored to metro railway requirements and meeting the needs of the urban rail industry for service functions, performance and reliability. The LTE for Metro Testbed will serve as a benchmark and technical resource for future urban rail communications.

- *Testbed Results: Best Practices for Developing and Deploying IIoT Solutions*

  IIC testbeds are where the innovation and opportunities of the industrial internet—new technologies, new applications, new products, new services, new processes, new business models—can be initiated, thought through and rigorously tested to ascertain their usefulness and viability before coming to market. The IIC portfolio of testbeds includes nearly 30 testbeds, all in various stages. IIC recently published a whitepaper offering key insights based on a compilation of testbed outcomes. This whitepaper, "A Compilation of Testbed Results: Toward Best Practices for Developing and Deploying IIoT Solutions," offers lessons learned about project initiation, planning/management, establishing the value of platforms, dealing with brownfield constraints or limited resources, deploying supportive technologies such as machine learning and artificial intelligence (AI) and mistakes to avoid.

  The authors interviewed many testbed sponsors and participants, and the paper includes learnings from the following testbeds:

  - INFINITE (INternational Future INdustrial Internet Testbed) Testbed
  - Track and Trace Testbed
  - Time Sensitive Network – Flexible Manufacturing Testbed
  - Distributed Energy Resources Integration Testbed
  - Intelligent Urban Water Supply Testbed
  - Smart Factory Web Testbed
  - Manufacturing Quality Management Testbed
  - Smart Manufacturing Connectivity Testbed
  - Factory Operations Visibility and Intelligence Testbed
  - Deep Learning Facility Testbed
  - Smart Printing Factory Testbed
  - Smart Machine Learning for Predictive Maintenance Testbed

"Testbed learnings that pertain to IIoT development and deployment are often seen as by-products of a testbed," said Chaisung Lim, Chairman of Korea Industry 4.0 Association/Konkuk University and one of the lead authors of the whitepaper. "We call them IIC 'horizontal learnings' and these provide valuable insights on how to deploy IIoT, or utilize emerging technologies such as AI or digital twins, especially when correlated or reinforced by other testbeds."

Typical horizontal challenges shared by many testbeds include:

- Project initiation – approaching management for funding an IIoT project
- IT/OT mismatch – dealing with the cultural and human differences in IT vs. OT
- Human factors –managing people's concerns about IIoT pilot/project risks and fears about job relevance
- Other typical roadblocks – determining the IIoT technologies appropriate for the deployment context, dealing with limited resources, an uncertain timeline, disruptive trials in production environment, integrating a diverse set of technologies and standards and developing analytics models without a large quantity of data, among others.

Digital Transformation

The Industrial Internet Consortium ecosystem is your complete resource for all things related to Digital transformation. IIC members are building and creating capabilities that did not exist before and are integrating or retrofitting existing solutions with new capabilities that will integrate them with frameworks for the future.

In today's climate, a business may take on digital transformation for several reasons; but by far, the most likely reason is that it is essential for growth and survival, and they are prioritizing accordingly. The digital transformation of industries represents a huge opportunity to create value for both industry and society. Rapid advances in digital technology are redefining our world—and in today's environment of the COVID-19 pandemic, our culture.

You cannot stop natural progress, so you might as well embrace it—or for the foreseeable future, at least acknowledge it from within your local Center for Disease Control's six-feet of social separation guidelines.

Charles Darwin may have said it best:

> *"It is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is most adaptable to change."*

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