

IoT Impact on Pharma Manufacturing

CONNECTIVITY IS THE NEW SMART!

TEXT: ROBERT HARRISON,
INDUSTRY MANAGER PHARMACEUTICAL

The terms “Industry 4.0”, “Smart Factory” and “Industrial Internet” are the sounds of the “Internet of Things” (IoT) reaching the shores of industrial manufacturing – and they are poised to make radical changes to pharmaceutical production operations. With strong talk of increased productivity and energy efficiency as well as massive reductions in production costs and downtime, one cannot help but tune in to the future knocking at the door.

Imagine a world in which things can communicate with other things, collecting and exchanging data. Objects are sensed and controlled remotely across existing networks. This is a world in which things are conjoined with their users across the company and its partners, no matter where they are. At the heart of this world is the complete integration of people, processes and data.

Intelligent sensors, networks, storage and cloud services – these are the essential elements that make the IoT possible and they are becoming easily accessible and affordable to an increasing number of companies. This means that the factories of the near future could have every device connected to one network and analyzed for many purposes. It is hoped that this will lead to intense production cost savings through energy reduction, waste reduction, impeccable quality and increased productivity.

It is clear that running manufacturing efficiently is moving into a new era. Plant operations are being challenged with the question: what do you plan to do differently going forward?

FACILITIES OF THE FUTURE

The scope of the IoT is phenomenal. Measures are being integrated into existing technologies with a promise of near-limitless improvement to our everyday lives. In the mainstream you can see anything from internet-connected home refrigerators to citywide Smart Energy grids. Pharmaceutical manufacturers are asking two questions:

1. How can the IoT be beneficial for my business? And
2. How do I implement it?

BENEFITS

So how will economic impact be generated? How do you achieve energy efficiency and/or process efficiency? How do we reduce waste and increase productivity? Is it a black box you can plug into a plant and then walk away from to witness the benefits? Of course, life is just not that simple ...

Such mechanisms require company strategy, cultural changes, and change management. Industrial IoT can provide you with data; information to visualize in such resolution you really see your processes in motion. But first



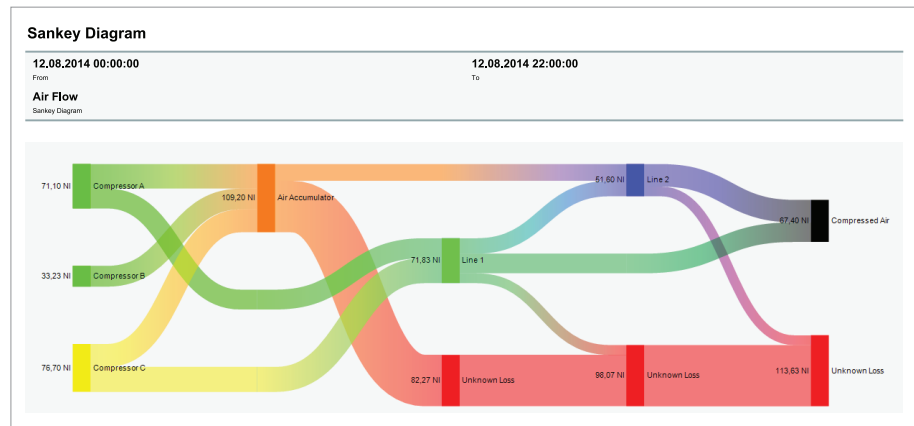


Figure 1: zenon Sankey diagrams visualize energy flows. Here, it displays compressed air usage: from air compressor outputs, through flow rates in circulation, to consumers and a review of losses.

it requires a clear understanding of strategy and processes. The data it can provide can be abstracted to focus on specific usages and areas.

PROCESS OPTIMIZATION: The potential of the IoT comes from the ability to monitor all aspects of the process with much greater resolution and accuracy, also across the boundaries of industrial automation systems. All process values could be accessed at every stage, including temperature, pressure, weight, flow, pH, dissolved oxygen, humidity. The IoT makes it possible to visualize the process, understand the science and see where the edge of failure lies. Parameterize the process and monitor with increased resolution to create a control strategy and alerting mechanism that prevents the equipment from ever reaching or getting close to your predetermined limits.

When we talk about process, we are referring to every small process loop or discrete control in the plant. This is a science: to advance with an accurate vision. And it is in this vision that you can find the paradigm shift for improvement.

ENERGY USAGE: In a facility with a network of connected devices, you can see accurately how much energy is being used, and what is consuming it. Then execute the same strategy for optimization as you did with your process improvements. The first step is to understand your facility, understand “why”. Then the IoT makes it possible to more easily and accurately calculate efficiency for each piece of hardware, process, or line. Energy Managers are then

empowered to make the choice to optimize use; continuous improvement is then easily rewarded and clearly seen.

The IoT is already growing the idea of improved visibility far beyond current understanding. Allowing equipment remote access reduces production costs through intelligent supervision. Connected manufacturing environments promote reliability and sustainable operations; improving decision-making all the way up the ladder to business optimization.

IMPLEMENTATION

Industrial IoT is far more advanced than commercial IoT, mainly due to the high prevalence of sensors in the industrial world. The mechanisms to integrate new or additional devices into industrial systems is well understood, particularly in zenon-based systems because of the wide scope of communication drivers available in zenon.

Sensors and devices are the “Things” in the IoT. Connectivity is therefore a key factor and, more particularly, the flexibility of connectivity. This is a continuously evolving platform: bridging existing processes and new process sensors. Interoperability translates data from disparate sources, from one layer to another, passing information intelligently and bi-directionally. When this is combined with seamless integrated access to information from the shop-floor to higher management – and further business partners such as CMOs – the possibilities for improvement are maximized.

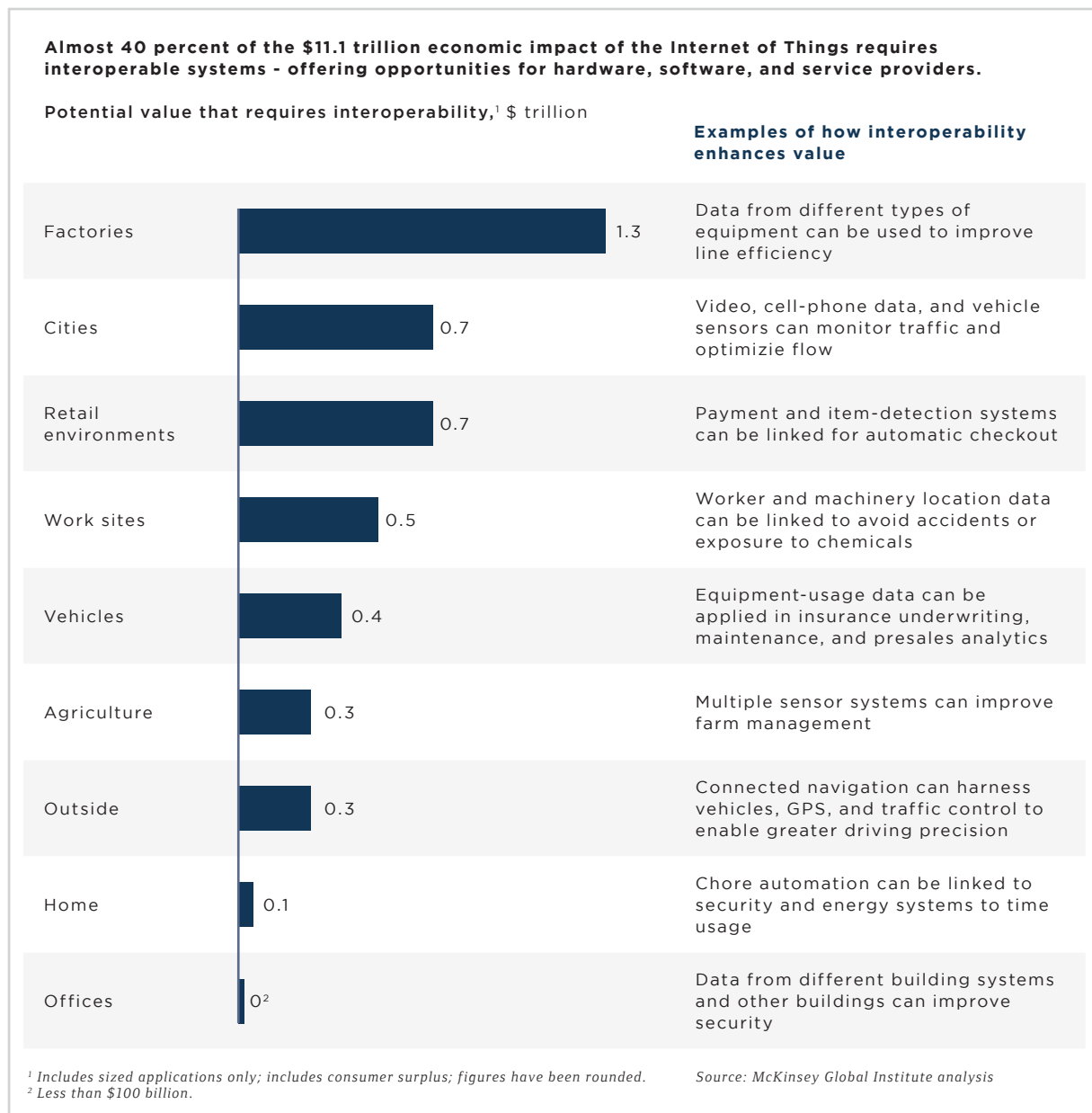


Figure 2: McKinsey's view on the global impact of IoT credits factories with the most to gain financially.

Continuous improvement by its very nature means you don't know what you will do at the next turn. This makes it vital that flexible connectivity should be easy to achieve, allowing new devices to be added, using different protocols optimized for the chosen device. Process and business applications often demand modularity and this is a further driver for flexibility. Making it simple to plug in and plug out mechanisms without impacting production or business is key.

Analytics and visualization empower you to bring meaning to the massive raw input of the IoT. Real-time data enters the system and can be filtered and stored using data historian tools. Real-time data can then deliver more than real-time visibility: it offers predictive analytics. Through your system, you can foresee critical events and maintenance well in advance, and ensure compliance and improved quality.

CONNECT AND BRING DATA TO LIFE

zenon already delivers this much-desired functionality to support IoT initiatives.

Connect with data sources. zenon enables you to bring existing infrastructure and new technology onto the same page. Using zenon, you can create data networks across multiple layers from physical sensors up to the cloud; offering access to production, operations, planning, and business strategy. zenon supports the integration of data from varying sources under the watchful eye of regulation compliance, for example the FDA Part 11 with its demands of data integrity, consistency, security and authorization.

Historical and real-time information puts emphasis on efficient data storage. As increasing amounts of data are collected, storing data at the right time and frequency becomes more important. zenon enables you to store data intelligently where you need it, to aggregate data, and capture process understanding.

Visualization. The value of data is brought to life through analysis, taking raw data and turning it into actionable information. zenon's visualization dashboards and reporting solutions convert remote machine monitoring into performance metrics. Measurable markers such as energy KPIs or OEE can be easily defined. Predictive algorithms learn your processes, identify potential problems, and communicate the status of a facility in real-time.

Changes to the way we work mean visualization must be available everywhere, whether you are on-site at a PC, or mobile with a smart phone, tablet, email, or SMS. zenon supports this way of working and through complete automation a better allocation of resources is possible.

Planning. Clarity and visibility across the value chain generate business insights. Because zenon gives you your current facility status at hand with visual feedback, it provides gravity to leadership teams.

Improved quality and compliance. Smart systems with greater precision and visibility offer better control with real-time reporting. This will eventually eliminate manual data retrieval and analysis. Automated data acquisition improves regulatory reporting. A better understanding of the manufacturing process facilitates better decision-making, where critical exceptions can be handled swiftly. zenon supports manufacturers to ensure productivity and efficiency originates from an improved quality environment of "right first time" and which results in less waste.

Internet of Things is a highly dynamic, future-ready technology. It has to be highly scalable and flexible, allowing newer applications to evolve and support new devices. zenon lifts processes out of the physical layer – start thinking about Moore's law – so you can move intelligence up the ladder to more capable systems.

STRATEGIC GROWTH TOOL

The pharmaceutical manufacturing facilities of the future will go well beyond current standard methods of operations and development. The IoT will add orders of magnitude to QbD (Quality by Design), with six sigma performance made possible on all quality parameters.

The IoT vision is one of highly automated production with high levels of visibility in all processes. Equipment will be highly precise, process controls will be well understood and constantly refined. As a result, in the IoT-driven plant, products remain cost-effective long after patent expiry.

The Internet of Things has arrived: you simply need to ask for it!