For: Water Treatment & Chemical Professional

Will Water Treatment Companies survive the wave of Change?

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Summary

A wave of change sweeping over operational technologies will impact how Water Technology Companies (WTC) manages an expanded technology portfolio. The IoT (Internet of Things) brings inexpensive components and cloud-based analytics that will enable Water Technology Companies (WTC) of even the smallest businesses to dynamically sense and contextualize more real-world data.

Overview

Impacts

- Developments in consumer IoT will compel WTC to invest in new operational technology (OT) offerings that use "commodity sensors."
- WTC who lag in their adoption of physical assets with IoT-enabled improved transparency and efficiency will be left behind.
- The proliferation of OT data collected from sensors will drive WTC to seek benefits from new "data brokers" and data exchange businesses which will take them to next level.
- With more real-time OT data available about physical processes, WTC be wary of government regulators claiming "safety and environmental" concerns.

Recommendations

- Develop expertise in the rapidly evolving IoT space, and partner to determine where it makes sense to augment operational systems.
- Partner with business unit leaders to deploy the IoT to improve support of product output and services, and to help develop investment return models, especially as widespread monitoring initiatives become more cost-effective.
- Work with business leaders to determine the commercial value of various internal data "inputs," as well as where, when and how (or "if") to acquire and curate external data.
- Encourage business leaders to proactively determine how to collect and package the environmental and safety data that will increasingly be available as a result of IoT deployment.

Strategic Planning Assumptions

- By 2018, IoT technologies will be successfully exploited and integrated by over 70% of incumbent leaders in operational technology (OT).
- Through 2020, new vendors entering the IoT space will challenge OT incumbents for more than 80% of new OT customers in small/midsize businesses (SMBs) and in underserved industries, driving OT solution costs down by more than 50%.
- By 2020, over 90% of surviving IoT entrants focused on the industrial market will be acquired by established OT vendors.

Analysis

During the past 20 years (but especially during the past 10), operational technology (OT) systems have evolved to become mission-critical operating platforms for industrial and commercial real estate environments, akin to ERP systems in the business IT world. As such, the leading OT players have developed "ecosystems" around their OT platforms that enable other vendors (especially software and peripheral vendors) and integrators to utilize and extend their installations by adapting to new technologies. These OT platforms for managing plants, buildings and infrastructure have been widely deployed among the largest asset-intensive companies, while small and midsize companies have often underinvested, due primarily to cost and complexity. Increasingly, however, inexpensive sensor (meaning the core of semiconductor capabilities — sensing, communicating and processing) components feeding cloud-based analytics enable the WTC of even the smallest businesses to exploit the Internet of Things (IoT) to dynamically sense and contextualize more real-world data. This will impact how WTC manage a vastly expanded technology portfolio.

We use OT to refer to the platforms that are used in running the operation of physical assets of enterprises, especially those that involve taking specific actions (for example, controlling water temperature or water flow, valves, lighting, ambient environment, meters, machine tools or robots). Examples of OT include a wide range of items, including: process and discrete manufacturing systems; railcar control systems; water heating equipment; condition the air in commercial buildings, refining water and transport; industrial processes and commercial data centers; generate electric power; and systems used to manage utility infrastructure. (Note that we do not refer to technology used by consumers as OT).

The IoT is a network of dedicated physical objects (things) that contain embedded technology to sense or interact with their internal state or the external environment. The IoT is an ecosystem that includes things, communication, applications and data analysis. Within that category, we see some IoT offerings emerge that are specifically targeting the enterprises, rather than the consumer (see Figure 1).

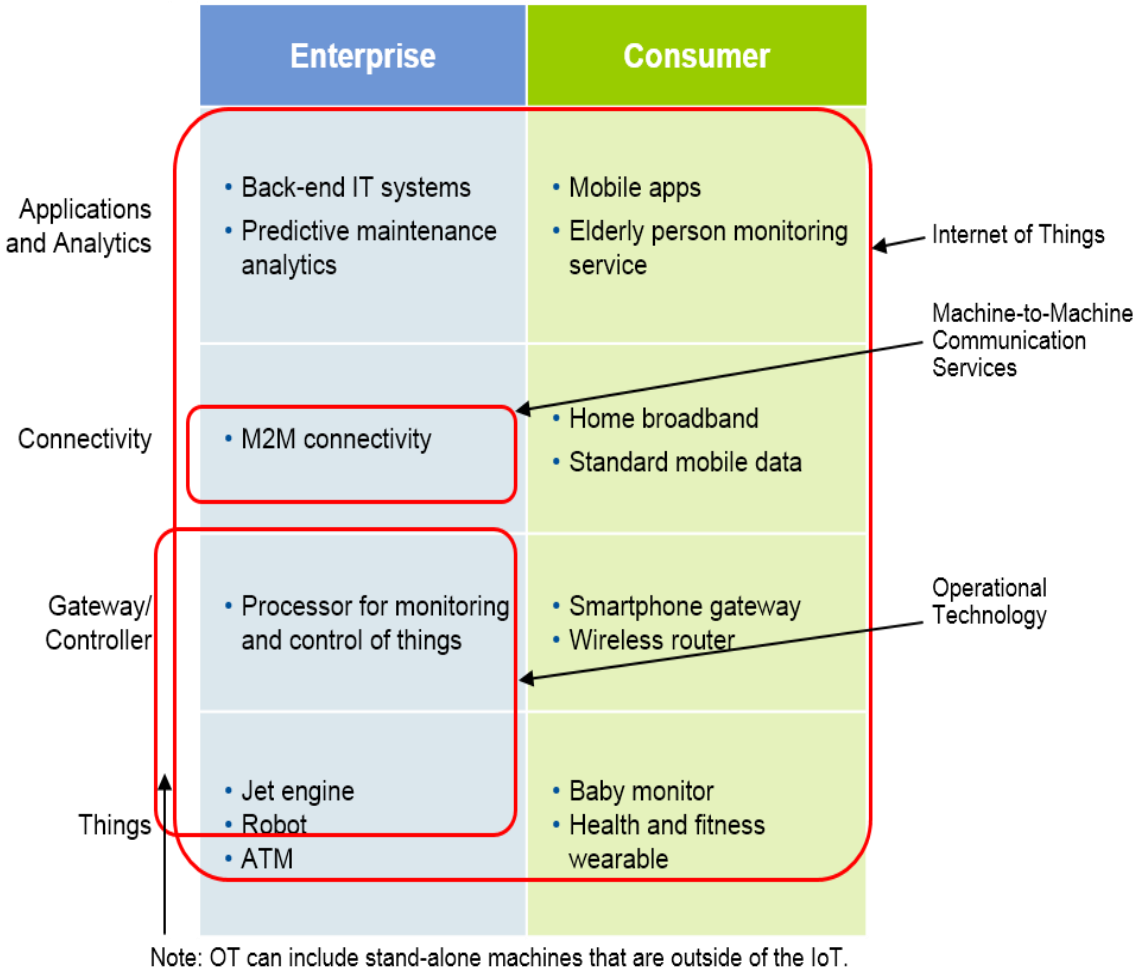

Figure 1. Relationship Between IoT, OT and M2M

Source: Gartner (April 2015)

We view systems in four categories to analyze the impact:

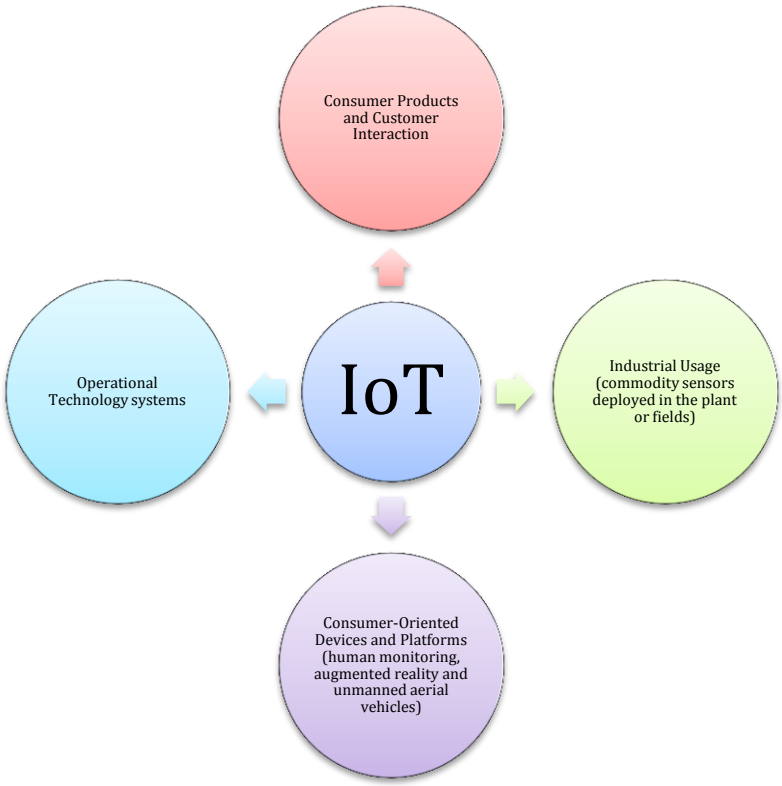

Figure 2. Four Categories of IoT

For WTC which are industrial and asset-intensive, OT forms the operating platform of the organization. OT will be enhanced, extended, integrated and evolved, but will remain at the core of industrial and asset environments. But because the OT system (especially the "back end") is used to control a substantial and crucial physical environment — such as facilities which has specific needs which must be balanced by water treatment companies — it is not going to radically or quickly change, but it can be enhanced and extended with IoT devices exploiting inexpensive remote monitoring devices to bring back situational data to help make operational decisions.

OT has supported business in some form for more than 200 years, originally managing mechanical and then electromechanical, and now electronic, equipment and processes. A microbiological fouling governor on a water system is OT by universal definition. Since the emerge of water treatment companies, there have been various epochs of change that affected the providers and the users of plants and equipment (see Figure 3):
And now OT platforms are being augmented and extended by using low-cost consumer IoT technologies adapted to industrial use.

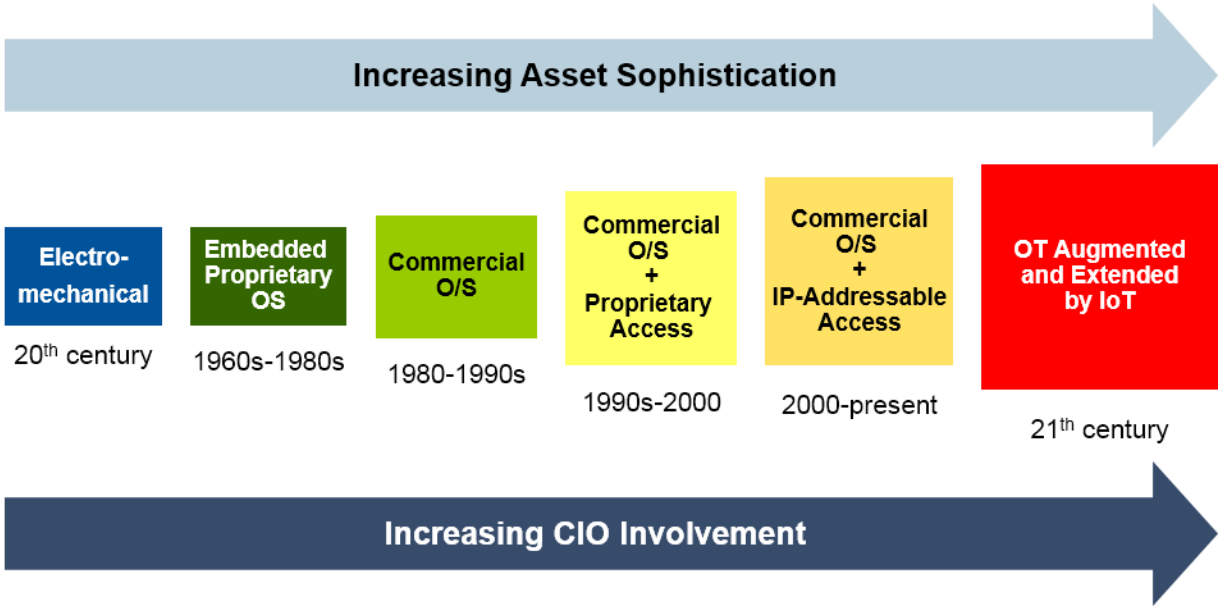

Figure 3

Overall, these sensor solutions will come at lower complexity and overall cost, improving significantly the ROI of adding new "sensory" capability to the installed OT systems and increasing their "reach" into the physical world. Moreover, by broadening the market, new offerings and IoT platform solutions will drive the overall cost down (following a variation of Moore's Law), as the back-end systems and basic aggregation software commoditizes, and the higher value transfers to the software ecosystem (business applications) that support the IT/OT environment. New service business opportunities for dynamically managing "things" will emerge from embedding sensors in various commercial and industrial goods, especially those with sophisticated, dynamic or mission-critical components subject to failure.

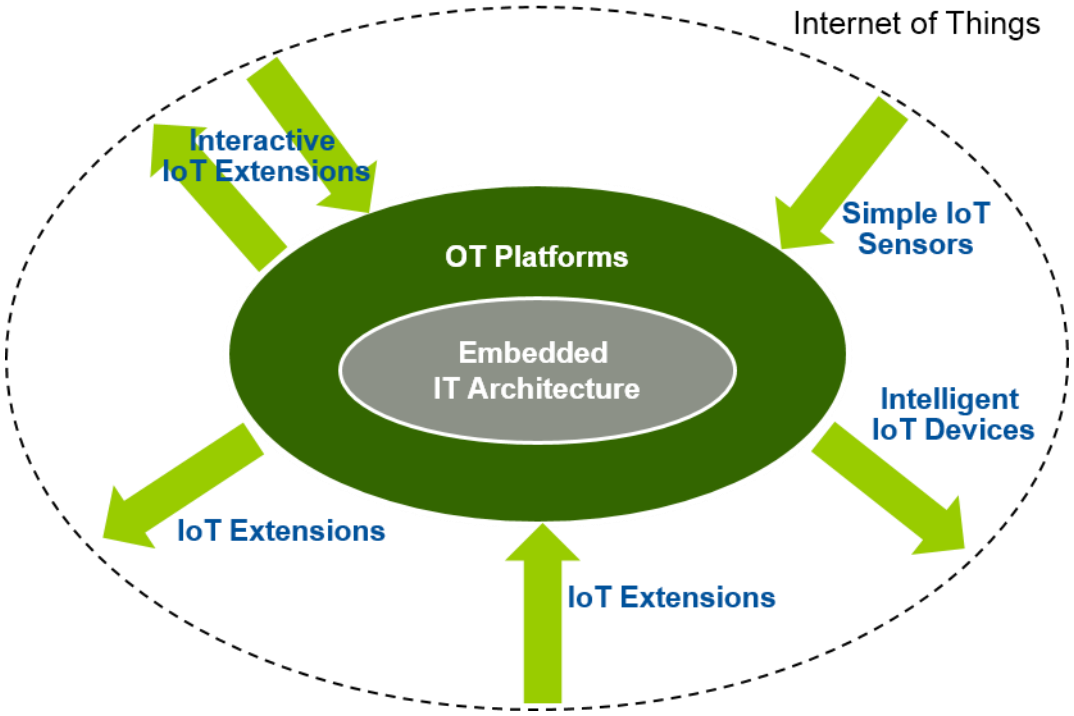

Figure 4

Gartner predicts that there will be 25 billion IoT units installed by 2020. A significant percentage (67%) of these will be in consumer devices. Some will be more sophisticated industrial systems (around 6%), but a good portion of these (and the majority contributing to industrial efficiencies and improvements) will be used to provide current "situation" or event monitoring (for example, temperature, vibration, pressure, light and intrusion). The IoT services growth is even more significant. Of the expected $230 billion by 2020, only $65 billion will be related to consumers. In most cases, this change will require system and process enhancements to deal with higher volumes of real-time data and likely will require other infrastructure upgrades, including networks, processing, storage and security. Architectures will vary according to use and complexity of the application.

WTC must develop their capabilities in IoT strategies and technologies and be involved in the governance of this rapidly expanding. IT/OT convergence (IT embedded in OT systems) brought a potential for IT teams to actively support security, governance and data extraction from OT systems. We project exponential growth of IoT devices, as technology and deployment solutions in IoT platforms become ubiquitous, cheaper and more prevalent, and are retrofitted to existing plants and equipment. WTC have much to offer in this new epoch, but it is different than being involved in a new consumer product initiative or a new customer engagement project. In those projects and initiatives, everyone is on the starting line together. But OT is not uninhabited territory. There are engineering and operational cultures and processes that must be respected and built upon, with mutual learning to maximize the benefits and minimize the risks to the enterprise.

Impacts	Top Recommendations
Developments in consumer IoT will compel CIOs to invest in new operational technology offerings that use "commodity sensors."	• Develop expertise in the IoT space. • Partner with business and operational technology system leaders to determine where it makes sense to augment operational systems. • Understand where the ROI will be.
CIOs who lag in their adoption of physical assets with IoT-enabled improved transparency and efficiency will be left behind.	• Work with business leaders to deploy IoT to improve support of product output and services. • Help to develop investment return models.
The proliferation of OT data collected from sensors will drive CIOs to seek benefits from new "data brokers" and data exchange businesses.	• Work with business leaders to determine the value of various data "inputs," as well as where, when and how to acquire them externally.
With more real-time OT data available about physical processes, CIOs in sensitive industries will be wary of government regulators claiming "safety and environmental" concerns.	• Encourage senior business leaders to proactively determine how to collect and package environmental and safety data that results from IoT/OT deployment.

Impacts and Recommendations

Developments in consumer IoT will compel WTC to invest in new operational technology offerings that use "commodity sensors"

We believe that the IoT will generally augment, rather than replace, existing OT installations, especially on the "periphery" (for example, new sensor components). The rapid proliferation of IoT data will challenge existing OT information infrastructures and disrupt existing approaches to security, process automation and data integrity.

The incumbent providers of OT systems have a key role to play in the rapidly evolving IoT space. They have traditionally trod carefully with their legacy solutions, but often have quickly adopted newer technologies (such as cheaper sensors for meters or Optical Character Recognition technologies) as they approach maturity, and added value such as better security or reliability with their experience. GE, Siemens, Schneider Electric, Danaher and Honeywell, for example, seem to be moving on the right path to embrace the new IoT changes *before* a Kodak moment has a chance to take root.

We see evidence of OT vendors' interest in nonindustrial technology where a traditional "historian" costs 10 to 100 times *more* to store data than using business IT offerings such as Hadoop, Cassandra or Redshift. They expect these data stores to come from the consumer-oriented business world, not the industrial world. They are seeking industrial strength and consumer-grade cost levels.
WTC's involvement in OT and IoT will vary considerably by country but WTC will rapidly exploit IoT capabilities during the next five years because it will help them to improve efficiency and to enter in new businesses. "Old guard" OT laggards and smaller manufacturers will augment their existing OT investment with IoT because it will be simpler and cheaper to rapidly deploy and test.

Incumbent OT vendors will transform their offerings by adopting a hybrid IoT/OT approach and will generally remain competitive against the "new" IoT-oriented entrants. We believe that most of the major incumbents will move quickly, adapt their offerings and "elevate" their value proposition to more comprehensive services, where the outcomes — improved mean time between failure, lower service/maintenance costs and deeper customer engagement — offer clear savings, productivity or efficiency of operations.

What matters most for OT customers is the reliability of the components and their ability to work in harsh field environments without failure. Once these controllers, communication technology, sensors, displays, annunciators and actuators are installed, they have historically not been revisited for five to seven years. So the challenge for the suppliers of these technologies is to provide solutions that keep them up to date for more than five years without replacing them, and to do so at minimal or no additional cost, while adding value around new capabilities and services — which means leveraging software.

OT companies have been working with these challenges for decades. They have retained an industrial product model with long product life cycles to support customer demands for long field life, safety and reliability. Will the low cost of IoT products disrupt the market? Unlikely — but they will add new IoT sensor devices that drive new capabilities, are more easily updated and upgraded via software, and drive sensor/actuator capabilities deeper into assets that were historically too expensive to enable for data capture or control. Existing industrial product offerings will be upgraded to become more modular and software-defined (as in software-defined radio). Examples could include chip-embedded meters or vibration-powered sensors.

We believe that, in many cases, the OT incumbents will be the disrupters to "business as usual" as they adopt IoT and connectivity constructs (such as remote monitoring, mesh networks and low-cost deployment) and partner with or acquire other companies.

As more customers see the OT systems and IoT extensions as a growing software portfolio, the OT vendors will exploit more modern sourcing standards, as well as updated security and patching criteria. Also, the direct connection to clients' equipment that many OT vendors maintain will come under greater scrutiny.

Finally, we have noted that some new-generation engineers in traditional IT and operational groups have begun to experiment and innovate with IoT devices. A few have developed and deployed point solutions that have been integrated into new products and services. The good news is that these rapid innovation efforts create opportunities to sell new services. However, to become even more useful by sharing data, driving analytics and coordinating actions, they must also be integrated with existing IT (such as ERP or supply chain) and OT ecosystems.

Recommendations

WTC must develop expertise in the rapidly evolving IoT space. They should partner with their IoT vendors to determine where it makes sense to augment their operational systems (especially in plant and industrial settings and building management) with commoditized sensors. WTC should also investigate some of the smaller vendors that are now entering the IoT market with industrial solutions, and work with them to test products in "safe" environments before operationally integrating them. Finally, WTC should follow the developing IoT standards for their industry, and challenge incumbent OT vendors to provide a roadmap for how they will incorporate some of the IoT products into their ecosystems.

WTC who lag in their adoption of physical assets with IoT-enabled improved transparency and efficiency will be left behind

Many of the vendors supplying these sensor devices and systems are now experimenting with predictive, preventative service offerings where they charge for output per hour or outcome per day for their equipment. In these use cases, the equipment/vehicle suppliers inform customers of necessary maintenance and sometimes "fix it" with a software upgrade before equipment breaks down (a significant cost savings for both parties). Alternatively, required maintenance is scheduled in "off hours" or during other scheduled downtime. Indeed, these examples have often created entirely new business models with new economic architectures — ways of cutting costs, generating recurring revenue, and improving profits and market share.

Recommendations

WTC should work with IoT vendors to deploy IoT to improve support of product output and services and help to develop investment return models, especially as widespread monitoring initiatives become more cost-effective. WTC should emphasize the improved visibility of processes as an opportunity to enhance throughput and flexibility and eliminate waste. This would be particularly valuable in environments that are being asked to produce multiple products on the same lines or to improve response times by contextualizing real-world data and making it visible, especially to manufacturing units.

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