The Role of Connected Consumer Retail Products in the

INDUSTRY 4.0 REVOLUTION

A white paper by **QLIK**TAG Software Inc.

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INDUSTRY 4.0 IS INEVITABLE

The Industry 4.0 revolution is rapidly moving from a term associated with the manufacturing sector in Germany to a widely recognized global shift in economic activity across all industry segments. Playing a central role in this revolution is The Internet of Things or IoT, the communications and connectivity backbone for this revolution. Whether it's farming and agriculture, autonomous transport systems, city infrastructure, traffic-flow management or monitoring the environment and other areas, connected, data-driven, intelligent and more efficient processes are emerging in every area.

These new systems and processes are characterized by:

- The ability to connect with other devices, things and systems via the internet.
- The ability to exchange data with other entities over the internet.
- The ability to create a digital model of entities in the physical world and simulate interaction simultaneously in both worlds.
- The ability to collect and analyze vast amounts of data and increase efficiency and value.
- Sensors to connect or monitor different entities.
- Distributed or autonomous in-design instead of centralized systems.
- High levels of transparency.

While many organizations are still grappling with the implications of this global shift in the way goods & services are manufactured and delivered and figuring out how to navigate through it, one thing is clear – the Industry 4.0 era is inevitable. The question isn't whether we need to consider the changes and its implications, but how best and how soon do we prepare ourselves for these changes. Businesses are at a similar juncture as they were back when the digital revolution kicked off: considering whether we need to use a computer or continue using our typewriters and filing cabinets. The shift is coming for sure and it's coming fast.

Where Do Consumer Retail Products Come into This?

When the Industry 4.0 movement first began taking shape, the term was specific to the manufacturing industry and hence the common perception to associate them with each other. However, the role of IoT and smart technologies doesn't have to be restricted to the manufacturing plant and the machines that make them. According to IoT-Analytics.com, in a sample of over 1600 IoT projects surveyed, Smart Retail makes up for just 4% of all IoT projects. Smart City projects and Industrial IoT projects take the top two spots making up 23% and 17% of the total IoT projects.

> *"It's not just production machines that can connect to the Internet of Things and exchange data over the IoT network. Every individual consumer retail product produced can also be "connected" to the internet and exchange data, not just at the point of manufacturing, but through its entire lifecycle."*

In fact, a highly connected ecosystem with machines and devices communicating with each other will see various applications manifest to solve challenges and improve efficiency. A machine equipped with an oil sensor knows it is approaching a service interval and triggers a servicing request communicating this to another system; this would be a typical example associated with Industry 4.0. A traffic camera monitoring vehicle inflow into a city sending signals to the traffic lights coordination system in order to improve the flow of traffic and reduce potential jams would be another scenario albeit not related to manufacturing. Another potential setting would be in agriculture; sensors embedded in the soil scanning for moisture levels and triggering a sprinkler system while sending information to a crop monitoring application.

Just stop and think about the vast number of possible applications for such an environment. Imagine every consumer retail product connected to the internet capable of sending or receiving data about itself to people and other systems, potentially increasing the number of connected things on the IoT by the billions and expanding the scope of what the Internet of Things is today.

Thinking Beyond the Confines

Creating a digital twin or a digital representation of every product on the internet allows that product to be be updated in the digital world in real time as it moves through its lifecycle in the physical world. If a product has changed locations in the physical world, it can be updated to its digital twin. If the product has passed its expiry or use-by date, it gets reflected in its digital twin. If a new offer or price needs to be assigned because it's nearing the end of its shelf life, that can also be done via its digital twin. If the product changes ownership, the digital twin records the change.

Where retail consumer products like a pair of socks or a pack of Brussel sprouts differ from machines and devices connected over IoT is they don't have to constantly send or receive data at a regular time interval or every few seconds. As a result, they need not be directly or constantly connected to the internet through Wi-Fi. They only need to send or receive data when there is an interaction with the physical product. Such an interaction will constitute of scanning products by a POS system or using a connected device like a barcode scanner or a smartphone to not just scan products but activate warranty or relocate a product from one place to another.

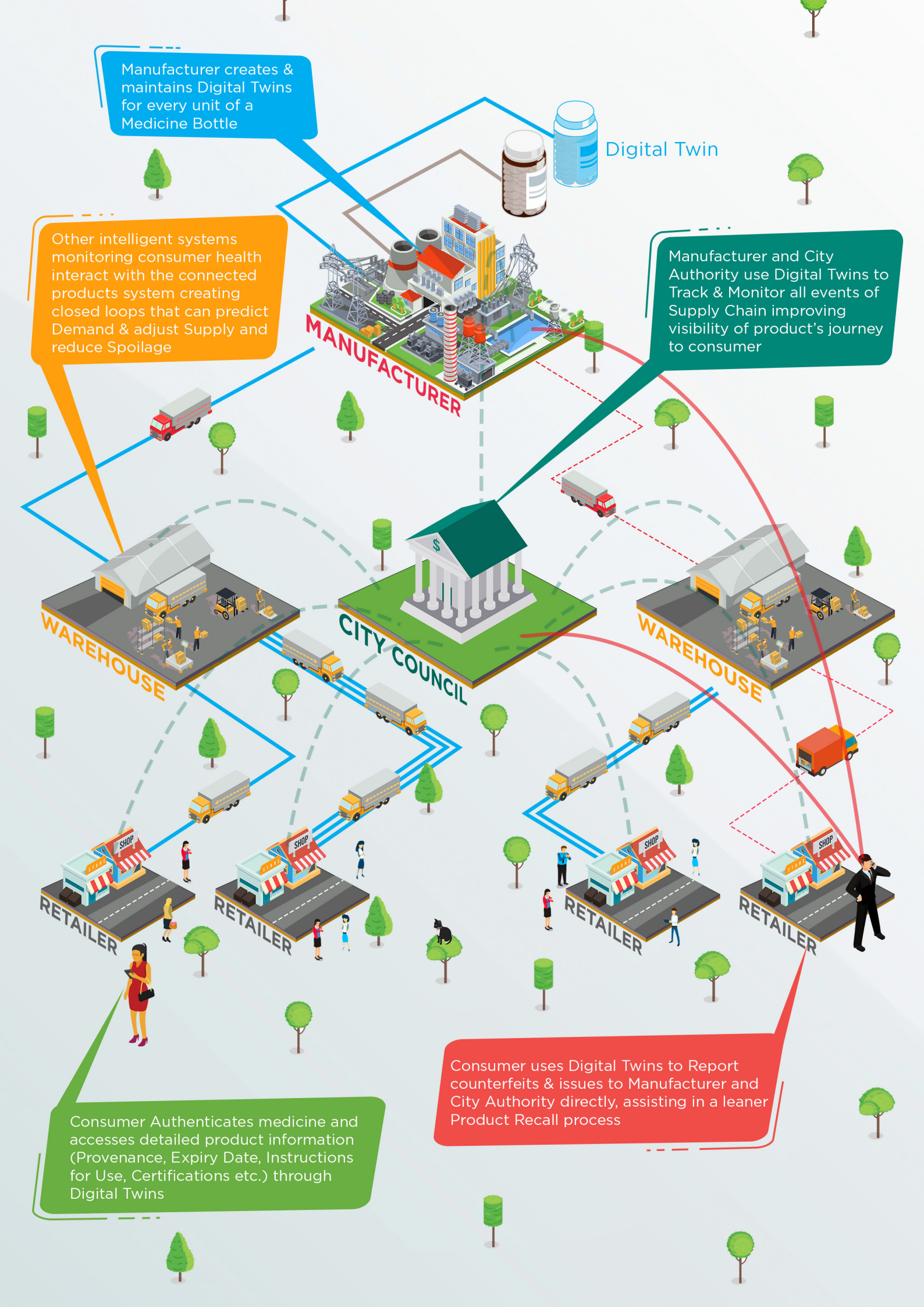
With consumer retail products, actions are usually event-based or interaction-driven, rather than time based which is the case with hardware devices and machines. Enabling consumer retail products as "connected smart products" opens up a world of possibilities and applications within the consumer retail industry and carries over to other areas within the Industry 4.0 realm, from Smart Cities to Smart Homes, Smart Supply Chains and Smart Agriculture.

Connected Products & Smart Cities

Picture a pharmaceutical company which has enabled every serial item in a batch of tablets as a connected product by equipping them with an internet accessible digital twin. As the container arrives at its target city's port, the container is scanned and updated so the company knows it has arrived at its destination. The customs authorities and health officials are also able to track the supply of this medicine into the country. As it's split into batches and shipped to the main retailers, the records are updated to indicate which batch has moved to which area of the city and which retailer. The retailer is able to authenticate that the product received is genuine and safe to sell. The consumer purchasing a unit is also able to confirm its authenticity as well as scan and get instant information on its provenance, whether it is fresh stock and within the safe to-use date and other critical safety instructions and certifications.

> *"IoT enabled smart connected products in smart cities bring a level of transparency and the ability to predict demand and match supply, reducing wastage and accumulation of stocks of unused medicines. Smart connected products generate data and meaningful insights that can modify production schedules creating seamless cycles of intelligent systems efficiently managing the movement of medicines"*

If consumers detect counterfeit products or ill effects, they can be reported through the digital twin. If city authorities see a trend of reports surfacing in a specific area, they can trace that batch, contact the retailer and suspend supply in that specific area. The city can match trends with certain health illness reports in areas to the supply of specific drugs required to treat those illnesses, making sure they are available where needed and exactly when needed. This level of transparency and ability to predict demand and match supply also reduces waste and large stocks of unused medicines from accumulating. That data can further be used to modify production schedules, creating seamless cycles of intelligent systems efficiently managing the movement of medicines.


Manufacturer creates & maintains Digital Twins for every unit of a Medicine Bottle
Digital Twin
Other intelligent systems monitoring consumer health interact with the connected products system creating closed loops that can predict Demand & adjust Supply and reduce Spoilage
Manufacturer and City Authority use Digital Twins to Track & Monitor all events of Supply Chain improving visibility of product's journey to consumer
MANUFACTURER
WAREHOUSE
CITY COUNCIL
WAREHOUSE
RETAILER
RETAILER
RETAILER
RETAILER
Consumer Authenticates medicine and accesses detailed product information (Provenance, Expiry Date, Instructions for Use, Certifications etc.) through Digital Twins
Consumer uses Digital Twins to Report counterfeits & issues to Manufacturer and City Authority directly, assisting in a leaner Product Recall process

In Conclusion

The ability to create and maintain a digital twin for a unit of a physical consumer product is a small but powerful concept when applied to the larger context of product lifecycle management, smart supply chain, smart agriculture and smart retail. It has the potential to enable ordinary everyday consumer products as smart products and connected things capable of generating and exchanging data with both people who interact with them as well as other networks and systems in the larger context of Industry 4.0

Connected everyday consumer products will play a significant role in the overall 4th industrial revolution or Industry 4.0. The question for organizations is no longer whether it needs to be given some thought. The real question to be answered is *how best and how soon can we equip ourselves for this shift.*

Contact Us

QLIKTAG SOFTWARE INC.
120 Newport Center Drive, Suite 100,
Newport Beach, CA 92660

Phone: +1 949-760-3888

Email: info@qliktag.com

QLIKTAG