ROLE OF IIOT IN PRODUCTION

CH 17 AUTOMATED ASSEMBLY SYSTEMS

Sections:

1. Fundamentals of Automated Assembly Systems
2. Quantitative Analysis of Assembly Systems

IS IT EVOLUTION OR REVOLUTION? – A MILLION DOLLAR QUESTION

Early Carriage

Evolution

More Fancy Carriage

Revolution

Early Automobile

Vintage Analog Phone

Evolution

Fancy Digital Phone

Revolution

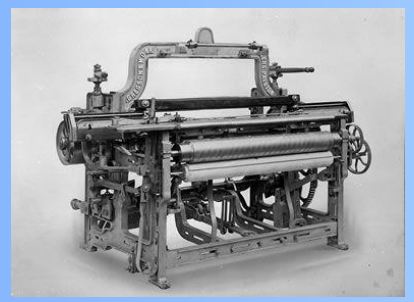
Smart Internet Phone

- Evolution - A gradual process in which something changes progressively from one stage to another
- Revolution - A total turn around; a sudden, complete, or fundamentally radical change in something
- Typically, Revolution leads to further Evolution – For example, Invention of Automobile was Revolutionary however innovations such as Ground Mail and Commercial Transportation evolved Automobile invention into a Commercial Enterprise

MANUFACTURING REVOLUTION – FROM INDUSTRY 1.0 TO INDUSTRY 4.0

Industry 1.0
FIRST
Industrial Revolution

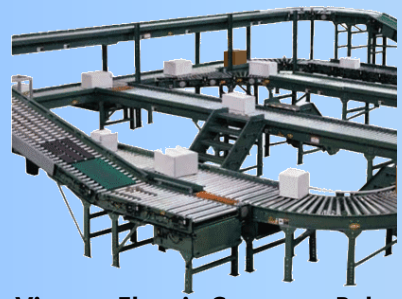
Key Change:
Introduction of Mechanical Production Equipment driven by Water and Stream Power



18th Century Mechanical Loom

Industry 2.0
SECOND
Industrial Revolution

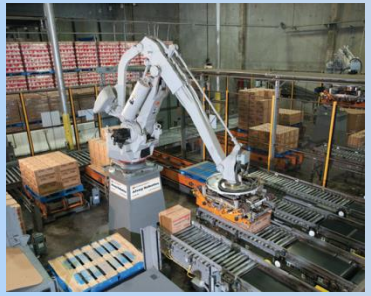
Key Change:
Introduction of mass Manufacturing Production lines powered by Electric Energy



Vintage Electric Conveyor Belt

Industry 3.0
THIRD
Industrial Revolution

Key Change:
Introduction of Electronics, PLC Devices, Robots and IT to automate Production



PLC Driven Robots

Industry 4.0
FOURTH
Industrial Revolution

Key Change:
Introduction of IoT and Cyber-Physical Systems driven by Augmented Reality & Real Time Intelligence

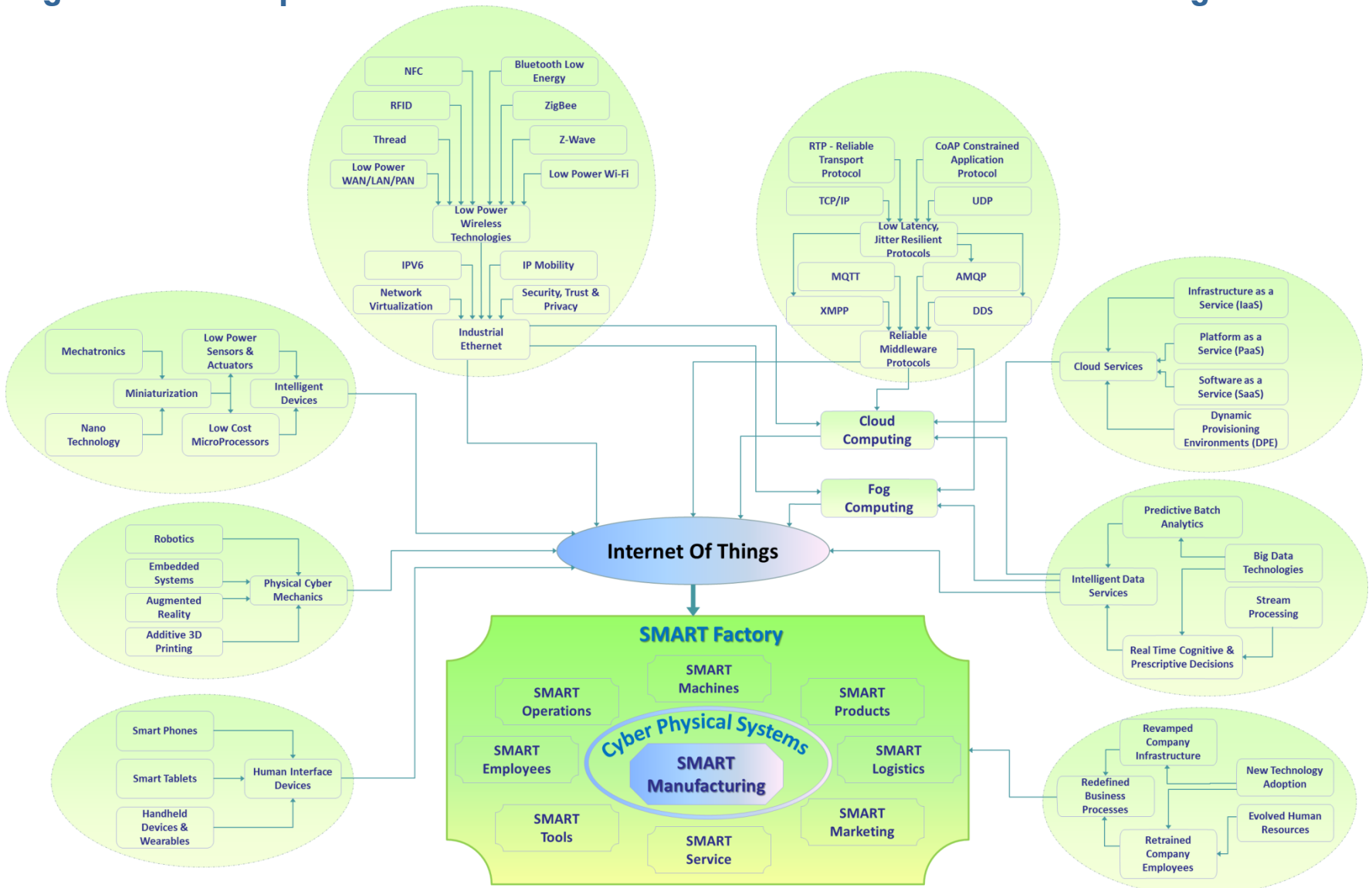
Augmented Reality Driven CPS

Level Of Complexity

End of 18th Century | End of 19th Century | Q4 of 20th Century | Start of 21st Century

WHILE MULTIFACETED INNOVATIONS ARE ENABLING IOT, IIOT IS DRIVING MANUFACTURING REVOLUTION……

Entrigna's macroscopic view of the network of 'Greenfield' Innovations enabling IOT



MANUFACTURERS ARE BEGINNING TO IMPLEMENT IOT SOLUTIONS AND BELIEVE IOT IS REQUIRED FOR FUTURE GROWTH

- 35% are currently collecting and using data generated by smart sensors to enhance manufacturing/operating processes
- 70% believe it is extremely or moderately important that US manufacturers adopt an IoT strategy in their operations
- 38% currently embed sensors in products that enable end-users/customers to collect sensor-generated data
- The North American market for IIoT will reach to $599B with a CAGR of 13.1% by 2021

Source:

http://www.digitaljournal.com/pr/3103499#ixzz4PWksAVFw

https://www.pwc.com/us/en/industrial-products/assets/big-data-next-manufacturing-pwc.pdf

CURRENT IOT LANDSCAPE IN MANUFACTURING

AIRBUS – FACTORY OF THE FUTURE

- MiRA (Mixed Reality Application) tablet
  - Cross between a sensor pack and a tablet

- Internet Connected Smart Tools
  - Auto-adjust to different actions
  - Log information
  - Reduces assembly time

- Augmented Reality driven instructional & educational tutorials

Photos courtesy of Airbus Factory of the Future

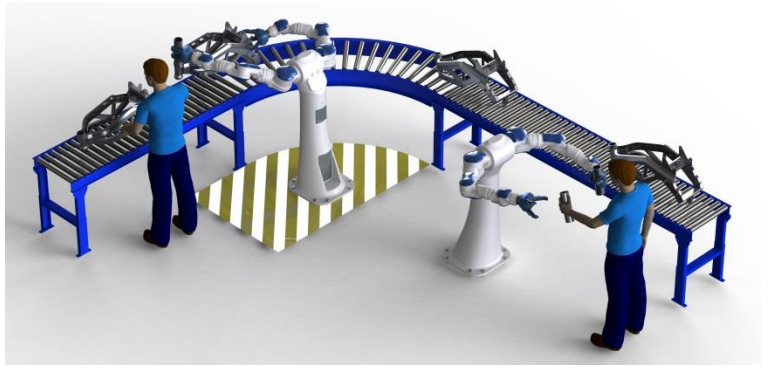
SIEMENS – SHAMPOO PLANT

- Bottle carriers with RFID tags can talk to machines in a production line
- Smart Dispenser Machine:
  - Reads RFID info
  - Determines type of shampoo to fill
  - Knows how much shampoo to fill
- Smart Labeling Machine:
  - Reads RFID info
  - Determines if the bottle is filled
  - Knows what label to put on the filled bottle
- Eliminates the need for human input in the dispensing and labeling process
- Eliminates the need for a separate production line for each type of shampoo

CONTINENTAL AG'S SMART FACTORY

- Active RFID tags and Geo-location are used to move the tire components throughout the factory

- Collaborative robots
  - Robots are "shown" how to do a task once and then they can repeat that action
  - Reduces risks of injuries and reduces the need for additional assisting employees



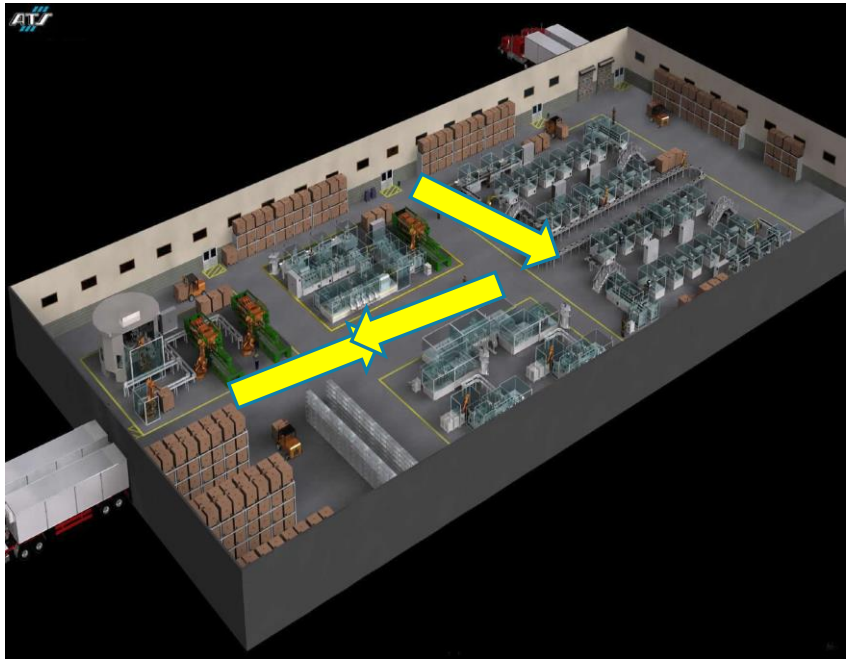
WHAT THE FUTURE HOLDS....

STREAMLINED FACTORIES

Sensors are attached to components, forklifts, employees and other assets

STREAMLINED FACTORIES

- By geolocating the sensors, one can see how people and products are moving



Processes can be streamlined and production time reduced.

SMART INVENTORY MANAGEMENT

Sensors on containers can determine when a product is running low

Employees will be alerted to proactively re-order the parts when a certain level is reached or orders can be automatically placed with suppliers

Components will not run out or run low
Reduced costs of production
More uptime for factories which leads to higher productive levels

SMART INVENTORY MANAGEMENT

Sensors can also be used to determine if a container is reaching its capacity. This could trigger an alert for a forklift to remove the container and replace it with an empty one. Can also be used for waste management

Components will not overflow from a container
More uptime for factories which leads to higher productive levels

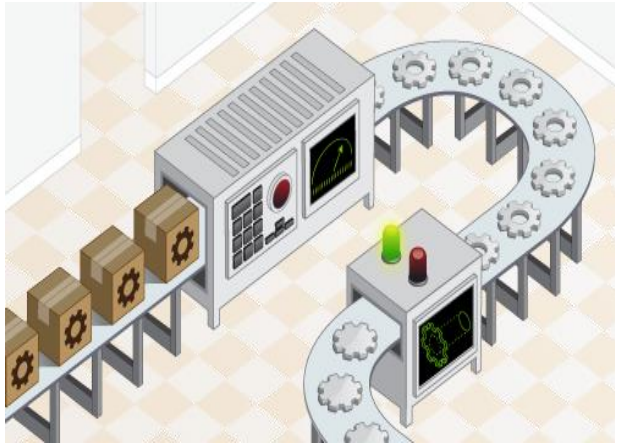
SMART QUALITY CONTROL

RFIDs attached to products can be used to tag defective products

If over a certain number, an employee can be alerted to see if there is a bad batch of components or if an adjustment needs to be made to the machinery

Employees can be alerted if the problem is the result of a defective part

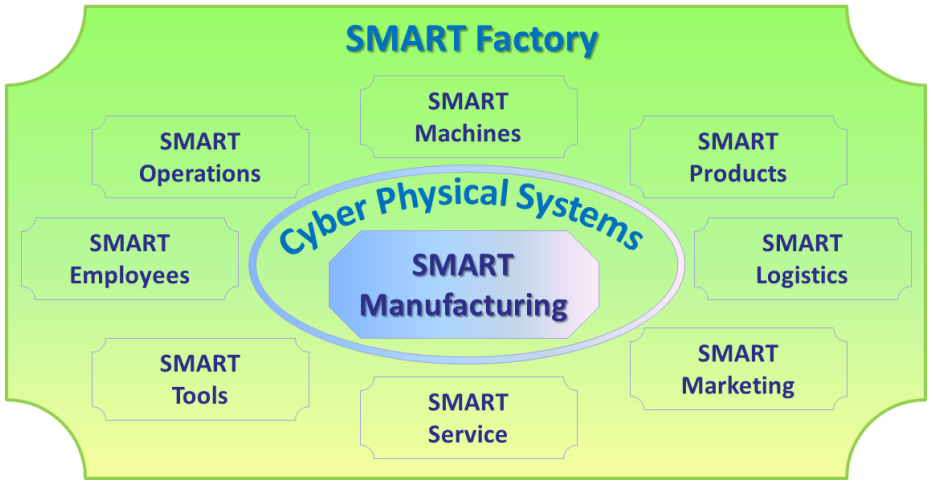
If an adjustment is needed, it can be automatically made in real-time



Product quality is controlled and course corrections are made while product is still moving through the production line

MANUFACTURING REVOLUTION IS SHAPING SMART FACTORIES..

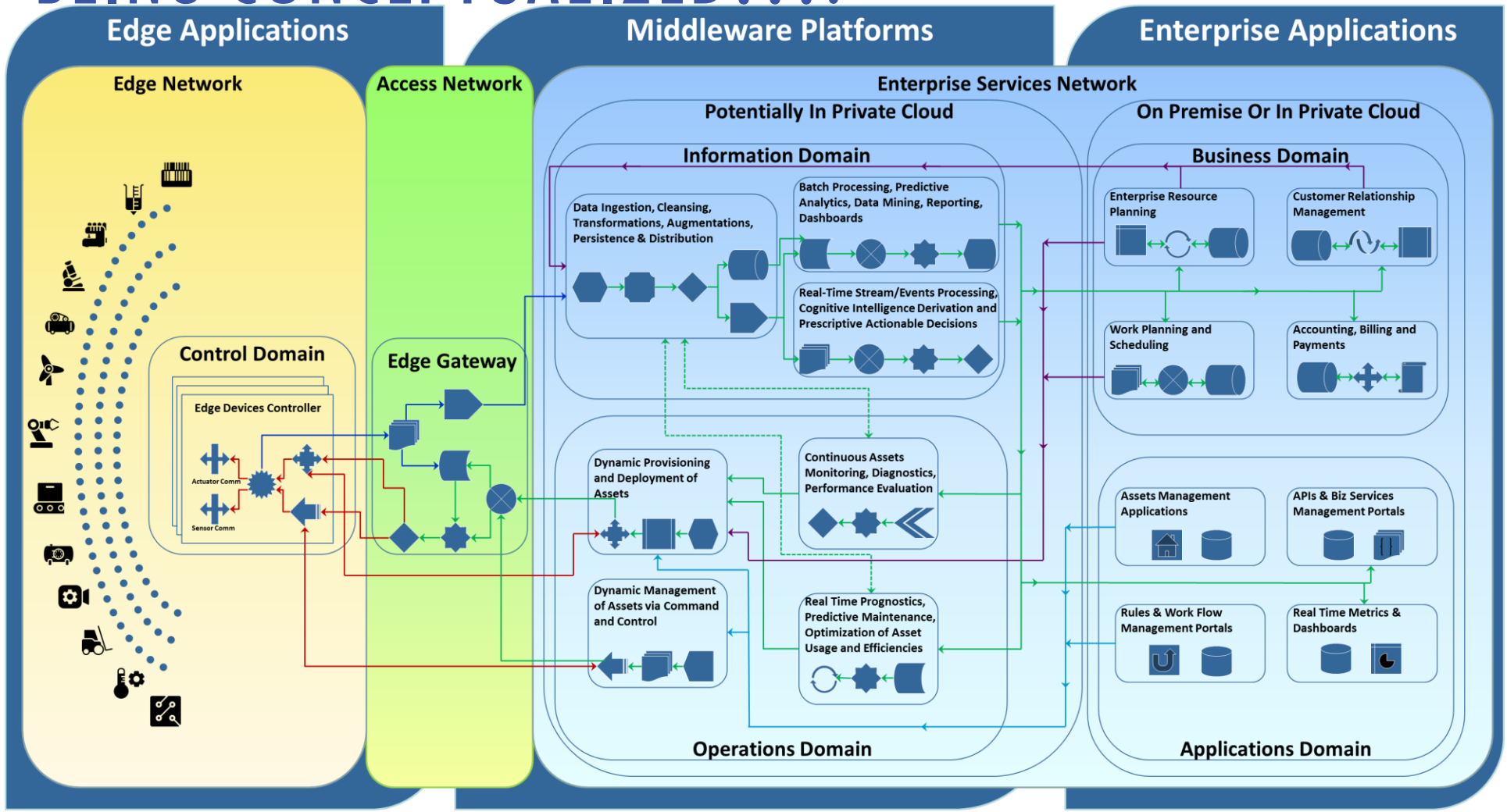
- Smart factories are connected in a network through the use of cyber-physical production systems which lets factories and manufacturing plants react quickly to variables, such as demand levels, stock levels, machine defects, and unforeseen delays
- This networking also involves the smart logistics and smart services
- The whole value chain in such integrated network is subjected to through-engineering, where the complete lifecycle of the product is traced from production to retirement through the use of IoT technologies



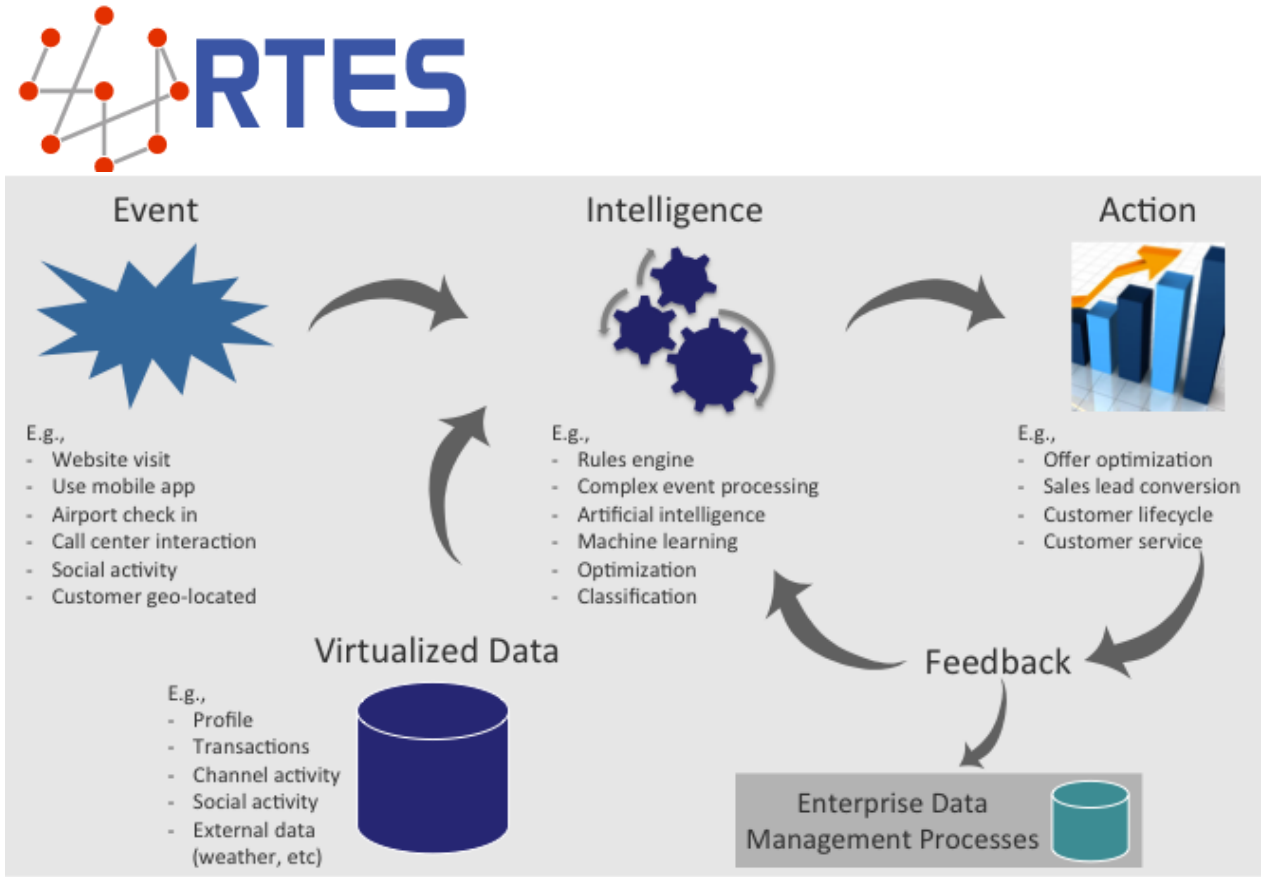
ENTRIGNA'S ROLE IN IOT SOLUTIONS

WHILE NEW IOT TECHNOLOGIES ARE BEING ENABLED, IIOT REFERENCE ARCHITECTURES ARE BEING CONCEPTUALIZED....

Entrigna's conceptual Reference Architecture based on Industrial Internet Consortium RA Viewpoints



ENTRIGNA'S RTES IS ANALOGOUS TO A "BRAIN" THAT ENABLES & PRESCRIBES INTELLIGENT, REAL-TIME DECISIONS & ACTIONS



RTES Features

- Robust set of modules including data virtualization and multiple decision frameworks
- Seamless integration of product modules with flexibility to easily turn on / off
- Limited, frictionless touch points with internal systems

RTES Advantages

- Increased functionality and flexibility for decision services
- Faster implementation timelines
- Lower implementation costs

Connect with Entrigna today to learn more!!

Thank You.

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