INTERNET OF THINGS

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Pan-European IoT Innovation Architect | IBM Watson IoT
Tumbleweed
SyNAPSE powered, brain-inspired, search and rescue robot

Nest
Intelligent thermostat

IoT is already here
So... what have we learned?

Nons
Cultural City
Urban dynamics

Brad, The Toaster
Addicted product experiment

Sen.se Mother
Home IoT ecosystem

Dash Button
1-click ordering

INVENTION

ECOSYSTEMS

INNOVATION

NEW ANALYTICS

SUSTAINABILITY

MARKET DISRUPTION

INNOVATION

NEW ANALYTICS

INVENTION
Enabling Industry 4.0 (Smart Factory, M2M, IoT, Industrial Internet)

Digitization of manufacturing, fostered by instrumentation, data volumes, computational power, connectivity, analytics, and new means of cyber-physical interaction, offers optimized decision making and resource productivity and efficiency.
IBM’s take on IoT
IBM@IoT

- $3B investment
- New platform for customers, partners industries
- New IoT services
- Expansion of IoT partner ecosystem

The Highlight Towers – Munich, Germany
Meet Olli

Olli contains over 30 sensors to enable self-driving and passenger interaction...

- Rear facing LIDAR (1)
- Interior Cameras (2)
- Interior temperature sensor
- Passenger Counter
- GPS
- Wheel speed sensors (4)
- Suspension rotation sensors (2)
- Forward facing LIDAR (3)
- Stereo camera (sign recognition)
- Exterior temperature sensor
- Window fog sensors (2)
- Odometer sensors (4)
- Impact sensors (2)
- Wheel speed sensors (4)
- Suspension rotation sensors (2)
- Suspension height sensors (2)
ISS Turns to IBM Watson IoT to put the 'Human Touch' into buildings

Global leader in facility services taps insight from sensors and devices to create better, happier buildings.

ISS, a leading global provider of facility services, has signed a commercial agreement with IBM to use the power of Watson IoT to transform the management of over 25,000 buildings around the world.

Headquartered in Copenhagen, ISS is one of the world’s largest private employers with over half a million staff managing everything from concierge to cleaning, catering to technical maintenance for thousands of high profile clients including Rolls-Royce, Nordea, Novartis, and Royal Air Force in the UK.

Through the new agreement, ISS will tap IBM’s Watson IoT platform, consulting and advanced facilities management technologies to transform the services it provides to building owners and users around the world with the goal of making buildings more personalized, intuitive and user-friendly.

Working with IBM, ISS will integrate and analyse data from millions of devices and sensors embedded into buildings including doors, windows, chairs, meeting rooms, dispensers and air conditioning systems. Data will be uploaded onto IBM’s Watson IoT cloud platform and cognitive computing technologies will learn from this data helping ISS optimise its services as well as furthering its understanding of how people use buildings, thereby creating new opportunities for innovation.
COGNITIVE BUILDING TOUCHPOINTS

GETTING HERE

- Multi-modal transportation services
- Alerts before leaving home
- "Please be aware that we are serving fish in the restaurant" (and you are allergic)
- Remember your umbrella
- Car sharing with colleagues
- Pre-book work area (and you might decide to work from home)
- Various work-from-home services

Weather integration | Transport integration | Cognitive HR analytics | IoT integration | Tririga integration | MobileFirst

WORKING HERE

- Locate my colleagues
- Who is in my working area today
- Status on infrastructure
- Find me an empty seat based on personal profile
- Optimise usage of office space
- Crowd and usage analytics

Indoor localization | IoT platform | Tririga integration | Cognitive Analytics | Big data analytics

ENTERING

- Walking around guidance
- Pay for your parking (app, guest)
- Issue mobile parking ticket
- Provide alternative parking
- Find me a parking spot (before arriving)
- Find my car

MobileFirst | IoT integration (outdoor/camera) | Tririga integration | Maps 3D | Cognitive advisory services

ARRIVING

- Access control
- The concierge knows you and can notify
- The building knows you and can advise/notify
- Alternative authentication means, e.g. combination of smartphone and biometrics, face recognition, smart watch + pincode/fingerprint etc.
- Information services - app based
- Counting, crowd and pattern analytics
- Video surveillance
- Anomaly video analytics (security)

Biometrics | IoT integration | Sensing | MobileFirst | Tririga integration | Video analytics | Video content management

BEING HERE

- Get alerts and notifications on building app (smartphone or Watch)
- Get around - office maps 2D/3D
- Order hot drinks
- Order light meal
- Check delivery situation on beverage machines
- Manage postal services via app and notifications
- Understand building usage and environment
- Align internal climate with outside
- Space management

MobileFirst | 2D/3D maps | IoT Platform | Legacy Integration | Tririga Integration | Video analytics | Big data analytics

WORKING HERE

- Get today’s menu at the restaurant
- How long is the queue right now?
- When is it optimal for me to eat?
- Nutritional information compared to personal health profile
- Order guest tickets
- Order takeaway based on preferences

Content management | IoT integration | Video surveillance | Partner integration | Cognitive

MEETING WITH OTHERS

- Checking out
- Evaluating the day
- Find my car, bicycle or the path to the train station
- Heating the car
- Notifying the spouse

IoT Integration | Partner Integration | MobileFirst

TRANSFERING

- Physical meeting room displays
- Reserve meeting room
- Arrange spontaneous meeting (lets meet in 4 minutes in the cafe)
- Conference support app
- Booked but unused meeting rooms
- Meeting room outages / defects

Tririga Integration | MobileFirst | Location services | Problem detection | Bookings

LEAVING

- Finding my car
- bicy or the path to the train station
- Heating the car
- Notifying the spouse

IoT Integration | Partner Integration | MobileFirst
Scalable IoT Platform

Cognitive analytics for deep insights to unlock new cost savings.

Navigate a campus via Watson speech

Manage and find your assets in 3D

Understand energy flow and diagnose anomalies with cognitive analytics

Easily monitor and maintain assets before they fail

Understand temperature, comfort and occupancy in buildings and data centers

Customizable IoT platform that provides simple integration and high scalability

Plug-and-play instrumentation with IoT devices

Vibration Data with IoT Sensors

Electricity with IoT Meter

Occupancy with PIR

Proximity with BLE

Desk Comfort Sensors

Rapid modelling with laser scanner

INTERACT

LEARN

INTEGRATE
Locate Assets in Real Life

Sam, Maintenance Worker

„Just let me fix the problem. Hand me my wrench“

**Tasks**
- Has to find assets within unknown locations
- Has to troubleshoot reoccurring issues
- Needs to access sensors and system information while in the field

**Challenge**
- Locating assets in the field and identifying their values

**Enabler**
- BIM, indoor Localisation and Augmented Reality

**Solution**

Sam can locate broken assets and the related system in Maximo in a 3D viewer. He can plan his route for the day and locate himself in the field with his mobile app. Sam can also view real-time data by pointing his mobile device at the sensor.
The Platform
The IBM portfolio for cognitive IoT

Applications
Optimizing operations for business impact

Solutions
Enabling new business models with integrated solutions for industry

Platform
Everything you need to innovate with IoT

Connecting the data that matters

Powered by IBM Watson

Enabling new business models with integrated solutions for industry

Business Transformation

IoT for [X] industry
Predictive maintenance
Asset management
Facilities & real estate
IoT Product engineering
IoT Platform

Blockchain
Edge
Weather
Non-traditional partners

Local Deployment

Enabled by IBM Cloud
The IoT value chain

Opportunity for partnerships right across the IoT value chain to provide end-end IoT solutions

- **Silicon**
  - Silicon, embedded OSes & Recipes

- **IoT Devices**
  - IoT devices & recipes for connecting them

- **Gateways**
  - Gateways and recipes for connecting them

- **Networks**
  - Network partners

- **Cloud**
  - Additional value add cloud services

- **Solution & Applications**
  - Customer solutions built on IBM and partner IoT technology

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IBM

- Connectivity & Security technology
- Connectivity, Security and edge analytics
- Relationships & reach
- SoftLayer Cloud platform
- Bluemix innovation platform
- IoT services

Partners

- Oil & Gas
- Smarter Cities
- Consumer Electronics
- Connected Vehicles
- Transportation & Rail
- Life Sciences & Healthcare
- Manufacturing

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End-end IoT solution
Fast!
Predictive Maintenance and Quality
Predictive Maintenance: improve asset availability, reduce maintenance costs, and increase process throughput

- maintenance logs
- inspection reports
- repair invoices

- assess overall asset health
- assess individual asset health
- identify top failure modes

- calculate failure probability
- recommend repair procedures
- modify maintenance schedule

- initiate or update work order
Asset Management & Optimization Maturity

**Reactive**
- Assets are fixed when they break
- A “failure alert system”
- Disparate Management Systems
- Reporting & Records are manual
- As Costs go down....

**Preventative**
- Repairs are good as before
- Parts replacement
- Proactive, preventative maintenance
- Scheduled OEM Recommended Maintenance

**Conditional**
- Repairs are good as NEW
- Asset Conditional Value Preserved, Asset Technological Value declines.

**Predictive**
- Value & Performance go up
- Value Chain Integration
- Assets become ubiquitous
- Asset Real-time Monitoring
- “Healthcheck” Alert System

**Prescriptive**
- Optimized Decision Making
- “Peak Performance” & Cognitive capabilities
- Proactive, predictive maintenance
- Asset value linked to quality outcomes

**Maintenance as an “Expense”**
- Assets Depreciate

**Maintenance as an “Investment”**
- Systems Appreciate

Time
Predictive maintenance, quality & warranty: critical to Industry 4.0

- maintenance – when and why will equipment fail?
- quality – are processes and products meeting quality standards?
- warranty – what are the reasons for accelerated wear and replacement?
Capabilities required to operationalize asset data

- asset + sensors + data + connectivity + analytics + monitoring + reporting

- real-time, fact-based understanding of asset performance and usage

- reduced unplanned downtime
- lower maintenance costs
- lower parts and inventory costs

- extended asset life
- improved production yield
- optimized maintenance schedules
Analyze data and develop predictive models

**Data Sources**
- maintenance logs
- inspection reports
- repair invoices
- customer complaints
- warranty claims
- operator profiles
- test results

**Apply Modeling Algorithms**
- sensor health
- top failure reasons
- integrated health
- feature based
- custom ensemble
- industry-specific assets

**Identify Relevant Data Sources**
- maintenance logs
- warranty claims
Detailed understanding of operations and asset health
So, where are you?

Customer Value Increases At Higher Levels
The path through the model is not necessarily linear

**Innovate**

- **Manage**
  - **Connect**
    - Level 1: Unconnected
      - Fire fires
      - Limited product feedback
      - High cost of service
    - Level 2: Connected
      - Remote access as needed
      - Fragmented information
      - Reactive response to issues
    - Level 3: Serviceable
      - Remote access as allowed
      - Some proactive monitoring
      - Service cost avoidance
      - Electronic software delivery
    - Level 4: Intelligent
      - Predictive maintenance
      - Monitor and report on services
      - View and analyze product data
      - Leverage usage data for new product enhancements
    - Level 5: Optimized
      - Enterprise integration
      - Configuration and warranty management
      - Pay-per-use models/billing integration
      - Track and locate/inventory management
    - Level 6: Differentiated
      - New revenue-generating capabilities
      - Cloud-Delivered customer applications
      - Replenishment management
      - Remotely control product
      - Compliance and audit reporting
      - Mobile integration
      - Cloud-to-cloud-to-mobile mashups

**Integrate**

- **Analyze**
  - **Service**
    - **Level 1**
    - **Level 2**
    - **Level 3**
    - **Level 4**
    - **Level 5**
    - **Level 6**

Source: Axeda Corporation
Learn more about IBM’s point of view on the Internet of Things: ibm.com/IoT

Try out Internet of Things on Bluemix: ibm.biz/try_iot

Join us in our IoT conversations: @IBMIoT

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