Intelligent (Smart Planet) Asset Management

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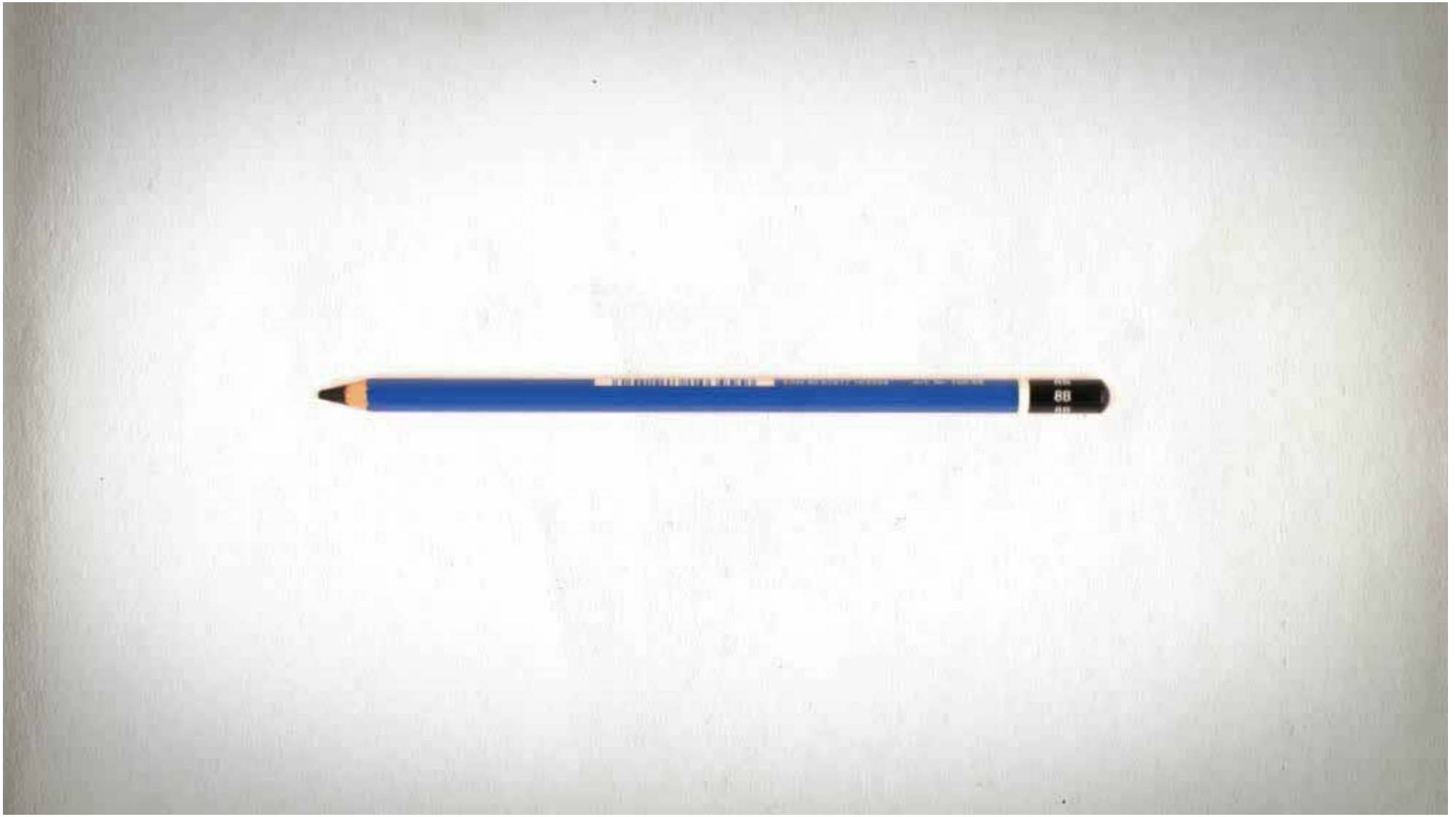
IBM Australia

PulseANZ2010

Meet the people who can help advance your infrastructure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Smarter Planet

A Smarter Planet is relevant today.

Smarter Planet is about company, country and our planet.

Smarter Planet is about your value, your competitiveness and your effectiveness

The Vision at a Glance…

Smarter	Planet
instrumented interconnected intelligent	people companies, industries man-made systems nature's systems

In this smarter world, we need our infrastructure to propel us forward, not hold us back.

An infrastructure that is **instrumented, interconnected and intelligent**. An infrastructure that brings together business and IT to create new possibilities.

Transportation Infrastructure

+

Facilities Infrastructure

+

Production Infrastructure

+

Technology Infrastructure

+

Communications Infrastructure

A dynamic infrastructure

Something meaningful is happening…
- the world is getting a whole lot smarter

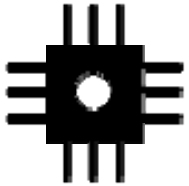
Every human being, company, organisation, city, nation, natural system and man-made system is becoming **interconnected, instrumented and intelligent**.

This is leading to new savings and new efficiencies—but perhaps as important, new possibilities for progress.

"The world will continue to become smaller, flatter and smarter. We are moving into the age of the globally integrated and intelligent economy, society and planet… What this means is that the digital and physical infrastructures of the world are converging. Computational power is being put into things we wouldn't recognize as computers."

– Sam Palmisano, CEO IBM, November 6, 2008

Something profound is now happening with the infusion of intelligence into the way the world works



INSTRUMENTED

INTERCONNECTED

INTELLIGENT

... Our planet is becoming smarter

For asset intensive organisations, “smart” means finding a way to lead in a new environment shaped by three mandates

IMPROVE SERVICE

Enhance asset reliability and availability to deliver the most optimal service to the business

REDUCE COST

Improve compliance with environmental, health, safety, regulatory and licensing requirements

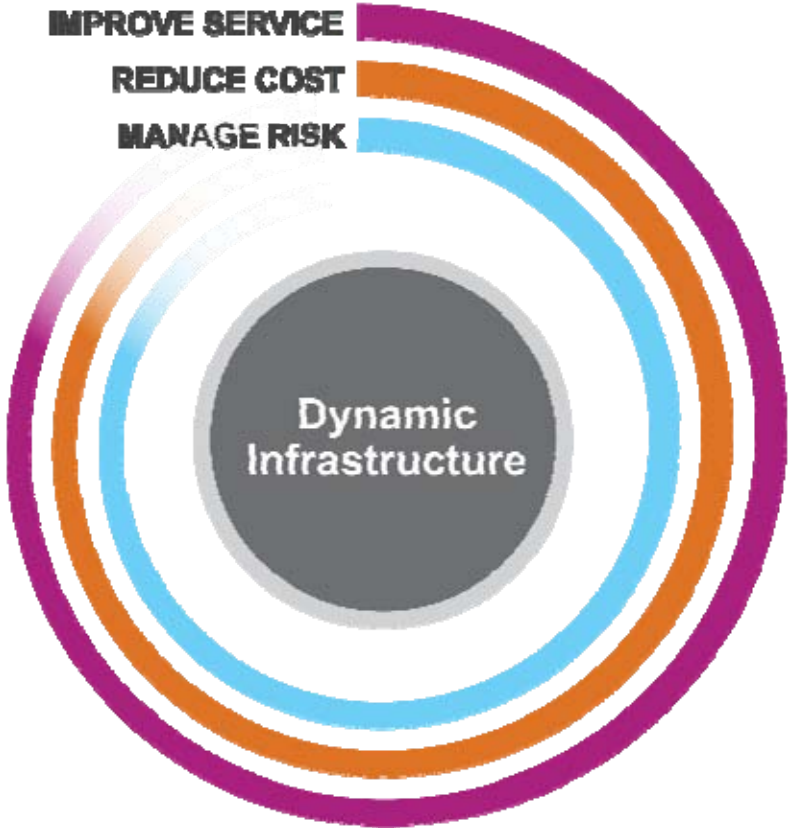
Dynamic Infrastructure

MANAGE RISK

Improve the productive useful life of assets at the most reasonable cost for a greater return on asset investment

Asset Management:
Helps improve service, reduce cost & manage risk by

- ✓ Managing assets through all the stages of their lifecycle
- ✓ Managing all asset classes in a single system – Production, Facilities, Transportation, Technology, Communications
- ✓ Supporting converged assets as they become intelligent and interconnected
- ✓ Applying deep industry specific solutions



What is an asset?

General


Tools


Signalling


Keys


Support Equip


Manufacturing


Recreation


Safety & Survival Gear


Milling


Personal Security

I. T.


Applications


Network


Wireless


Voice

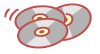

Storage


Mainframe


Distributed


Desktop


Mobile


Software

Transport


Trains / Rolling Stock


Ships


Trucks


Buses


Aircraft


Military


Space


Navigation


Avionics


Engines

Energy


Turbines


Reactors


Fire Suppression


Ventilation


Offshore


Boilers


Drilling


Generators


Wind Turbines


Solar

Utilities


Cabling


Power Transmission


Water Distribution


Meters & Measurement


Waste & Treatment

Linear


Rails


Roads


Pipelines


Bridges

Life Sci


Calibrated Equip


Medical Supplies


Compressed Cylinders


Pharmaceuticals


Lab Equipment

Comm


Microwave & Satellite


Fiber Optics


Wire


Poles

Facility


Structures


Electrical


Environmental


Lighting


Phys Security


Transport


Landscaping

Retail


ATM / POS


Scales & Measurement


RFID


Vaults & Safes

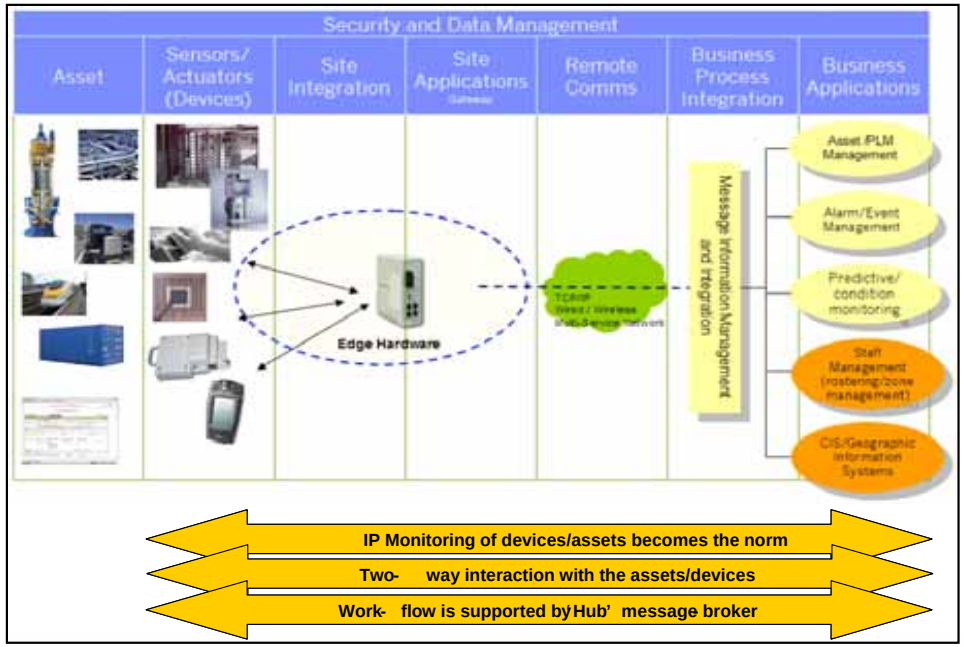
Smart is: Delivering Total Lifecycle Asset Management

Traditional Asset Classes	Asset Lifecycle: Asset Strategy → Plan → Evaluate and Design → Create / Procure → Operate → Maintain → Modify → Dispose
Facilities and Real Estate	 Airports, Seaports, Offices, Warehouses, Retail Space, Land, Hospitals, Schools
Transportation and Fleet	 Fleet, Freight & Logistics, Airlines, Marine, Military, Railroad, Transit
Infrastructure	 Runways, Railways, Roads, Tunnels, Electric / Gas Distribution, Telecom, Water
Plant and Production	 Industrial, Mining, Chemical, Petroleum, Electronics, CP, Life Sciences, Power Gen
IT Equipment and Network	 Laptops, Desktops, Servers, Networks, Routers, Software, Licenses

- **Drivers of Asset Management for A Smarter Planet:**
  - The emergence of pervasive devices, embedded chips, RFID, sensors, detectors and IP addresses attached to enterprise assets
  - Need to measure and manage the availability and use of all strategic assets
  - Improved risk management across the enterprise

Sensors: Intelligent Assets

- Asset convergence
- Pervasive devices
- IP enabled
- Intelligent assets /buildings
- Asset tracking / RFID
- Smart Meters
- Remote Asset Monitoring
- Intelligent Transportation Systems
- Condition – based Analytics



Smart is: Delivering industry specific capabilities


Energy & Utilities


Industrial


Public Sector


Oil & Gas


Life Sciences


Transportation

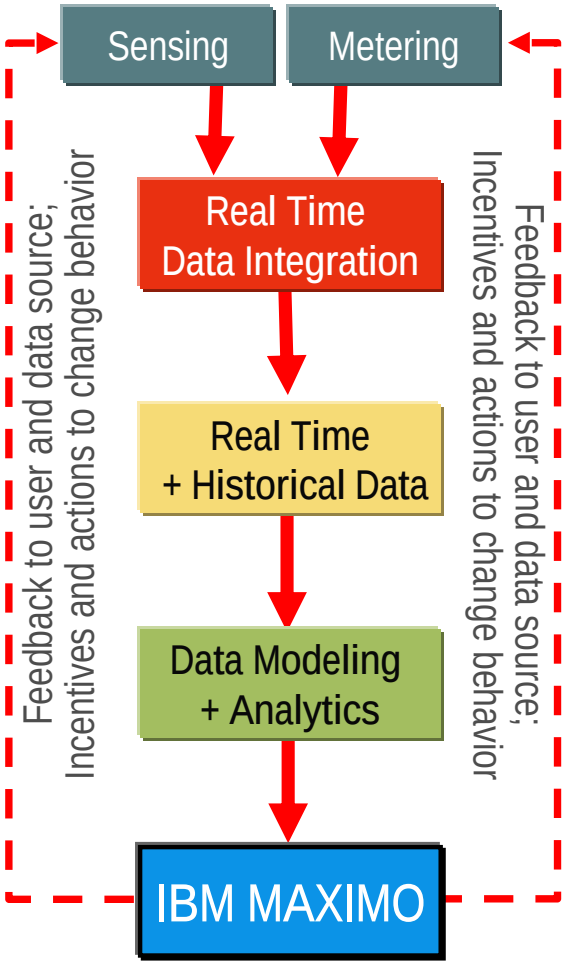

Telecom


Financial Services


Other

What does it mean to become Smarter?

Measuring, Monitoring, Modeling and Managing

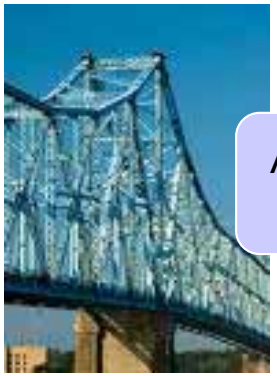


- **Data collection**
- **Data Integration**
- **Comparison of historical data, with newly collected data**
- **Data modeling and analytics to create insights from data to feed decision support and actions**

Source: IBM Corporate Strategy

What's smarter about an asset infrastructure?

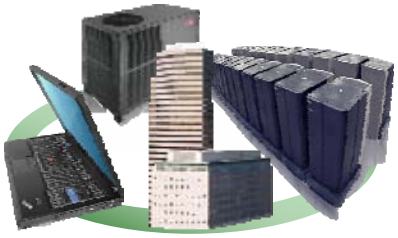
Centerpoint uses Smart Meters to reduce power consumption through demand response.



A bridge on I-95 in New London CT has built-in sensors to monitor stress and indicate potential failure.

Locomotives built by Bombardier have on-board computer systems using telematics for real-time diagnostics.

A datacenter reduces energy consumption and optimises service delivery by collecting power, thermal and temperature inputs from IT equipment, datacenter infrastructure and facilities.



Smart buildings use building automation systems to optimise comfort, safety and energy consumption.

Software is critical to enabling smarter energy and utility solutions

- **Software is increasingly viewed as a *strategic business asset***

- ***Software* is helping utility companies:**
  - Drive grid transformation with standards and flexibility
  - Increase visibility and control for operations and support IT
  - Turn network data into actionable information throughout the company

- **Leaders everywhere are deploying *increasingly intelligent* software, systems and products**
- **Accelerating innovation and enabling effective change is highly dependent on the ability to *manage effective software delivery***

And New Ways to Respond

Member of public calls in to report water main break

Call Centre operative enters details on system which generates a SR

Asset Management

Enrich event with co-ordinates of affected area and location of upstream water main valve

Parking officer on patrol sees main break reports it via PDA device

Common Alerting Server

Event Server correlates multiple reports into one incident report

Control Room at electric company recognises a key substation is at risk of flooding – they create a common alert to warn of that

Fire station Supervisor recognises that hydrants in a suburb will have low pressure – gets water tanker ready.

Traffic control recognises that there is a high risk of congestion – creates alert to warn of that

School Board recognises that two primary schools are affected – organises school buses and tells school principals to prepare to close early

Radio Station picks up alerts and reports news, traffic warnings and school closures on local news

Water Company's SCADA system

Remote sensor picks up drop in pressure

Bridges and Sensors (Smart Bridges)

Dynamic Loads cause deterioration on all Assets.

Capture “live” information regarding;
- Beam Flexural Stiffness
- Deflection
- …other structural properties

1. Immediate response to problems
2. To accurately determine deterioration patterns and service life….
3. Assist with Budgeting for repairs and replacement (forecasting)
4. Information for future construction projects

Intelligent Road :
City Bound Doncaster Rd, Melbourne… on ramp

- Some history:
  - 1960s: Planning for Eastern Fwy & Scoresby Fwy (later Eastlink).
  - Eastern Freeway - 18 kilometres east/west
    - **Stage 1:** From Hoddle Street to Bulleen Road; opened in December 1977.
    - **Stage 2:** From Bulleen Road to Doncaster Road; opened on 3 June 1982.
    - **Stage 3:** From Doncaster Road to Springvale Road; opened in December 1997.
  - 29 June 2008: Eastlink opens to traffic. .
- Traffic "turbulence"… modelling nature
- Sensors in the road
- Gantry & the creation of a "slip lane"
- Sequencing of vehicles off the ramp, onto the extended slip lane.


TRUCK
BUS
TAXI
LANE
SIGNALS
DO NOT
APPLY
ONE VEHICLE
PER GREEN
EACH
LANE
FORM
1
LANE
100


TRUCK
BUS
TAXI
LANE
SIGNALS
DO NOT
APPLY
ONE VEHICLE
PER GREEN
EACH
LANE
FORM
1
LANE

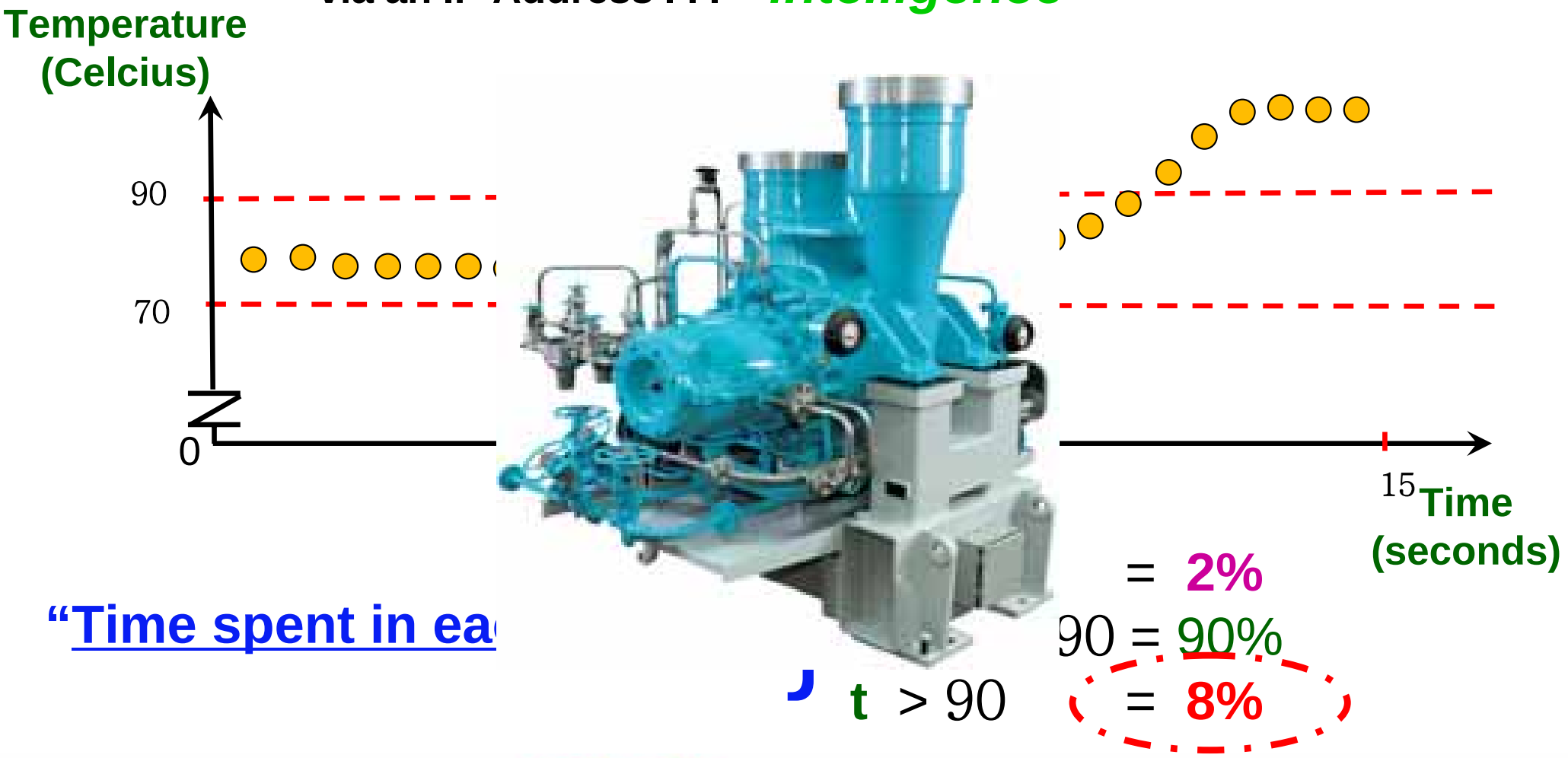
VMS – Vehicle Management System

- Traffic flow Information via “in road” sensors

IBM Maximo – Condition Monitoring

Asset 11430 – Cool Water Feed Pump, 6,000m3/hr

- connected to a SCADA, MES, or some other automation system via an IP Address . . . ***"intelligence"***



"Time spent in ea

Maximo – Condition Monitoring

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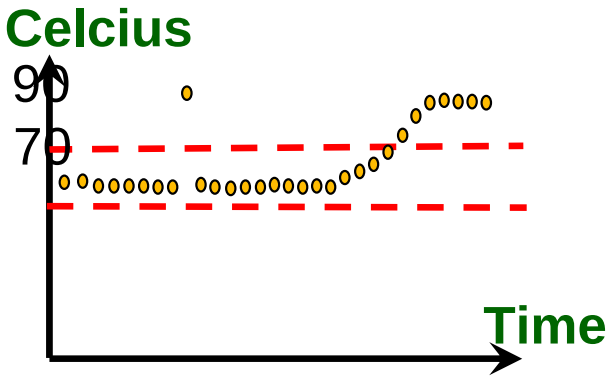
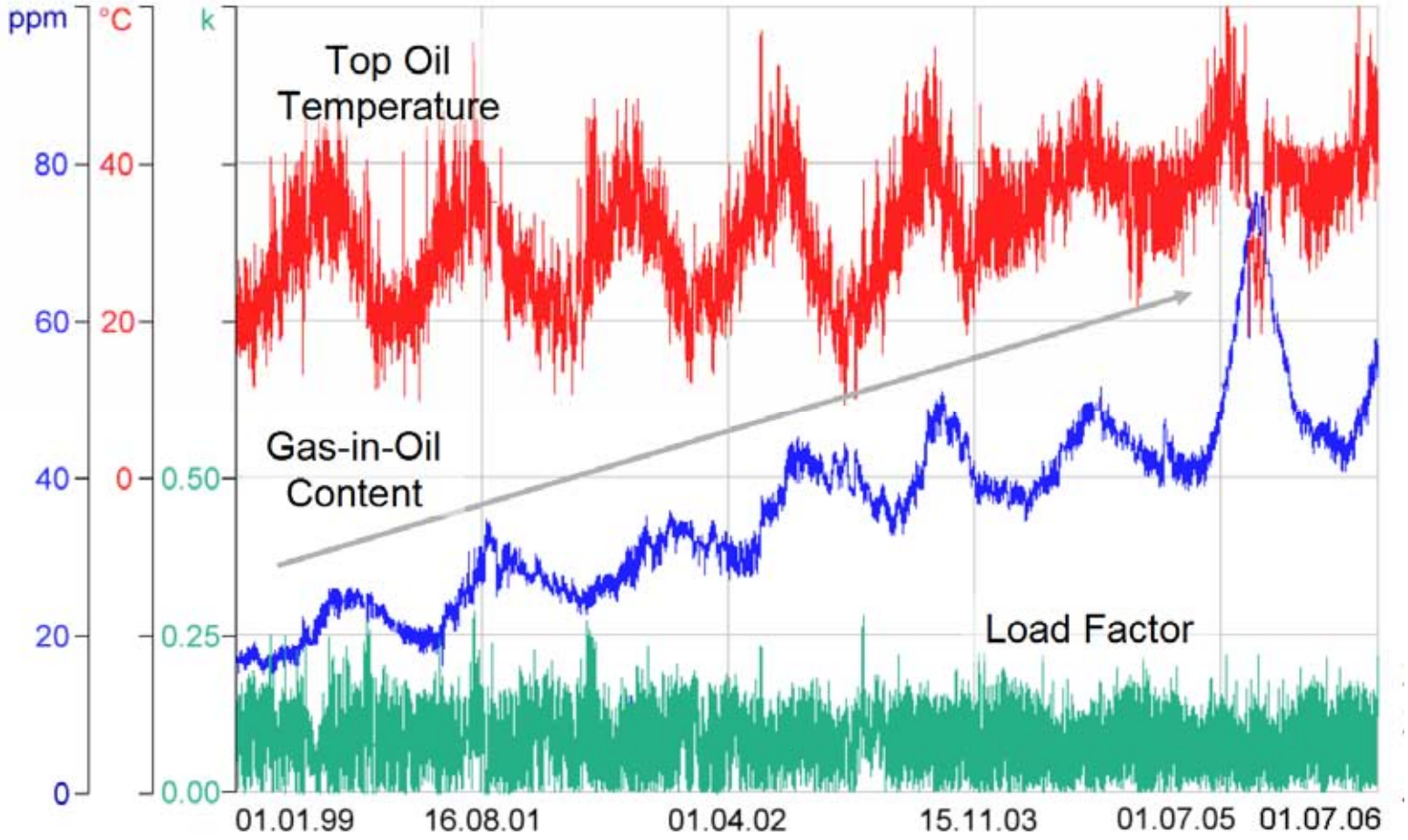


1. Condition Monitoring Records
2. Average reading
3. Date/time stamped
4. Queued for automatic processing by MIF
5. Entered into Condition Monitoring tables
6. PM chron task, triggers the WO creation …

Real case of a normal transformer in operation



Energy Australia DM&C Project Summary

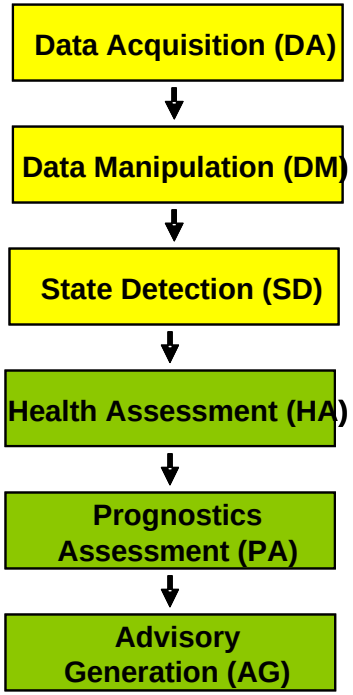
- Deploy Powersense monitoring devices to 12,000 distribution substations between 2008 and 2013.
- Use Optical sensing technology to monitor current on MV network based on the Faraday effect.
- Publish measurements every 10 minutes. The following items are monitored:
  - MV (11kV) Voltage, Current & Power Factor
  - LV (415V) Voltage, Current & Power Factor
- Generate alerts to assist in Outage Management if any of the following events are observed:
  - LV (415V) Blown Fuse High or Low Voltage
  - MV (11kV) Earth Faults, Line Faults, Open Phase
- Support Remote Control of 11kV Ring Main switches (where supported by substation).
- Communication is via 3G Public Network

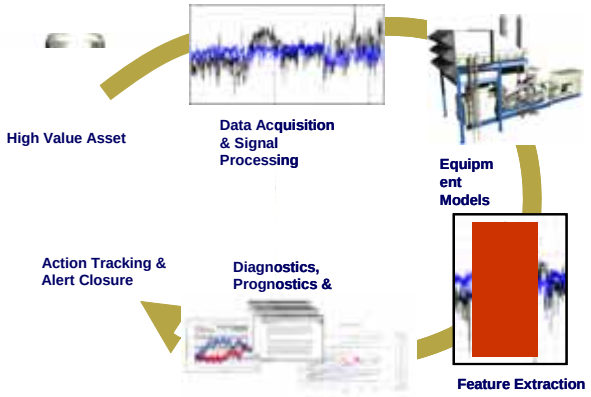
We do not use condition monitoring to its full potential today

- **What to measure and report?**
  - What are the relevant parameters to be measured?
  - How to set alarm thresholds?
  - What should be analysed locally?
  - What should be reported and analysed centrally?
- **What are the actions triggered by condition monitoring events and alarms?**
- **How can this data be used for enhanced grid operations?**
- **How can this data be used for enhanced asset management?**

Strategic and operational decision-making, Asset Analytics

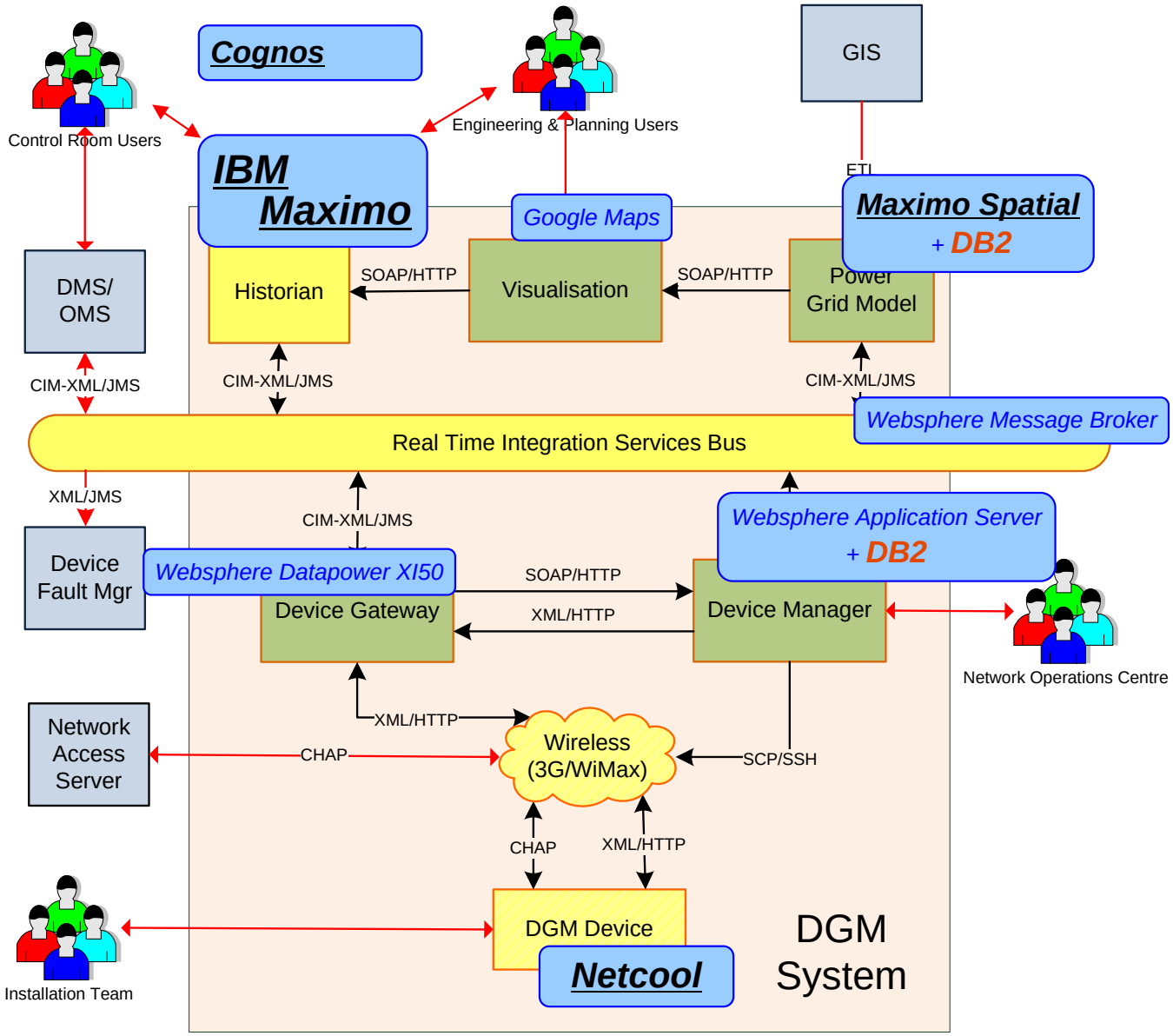
- Analytical tools and people skills
- Drill down capabilities
- Rapid problem identification
- Prognostication & optimisation
- Monitoring and control centre
- Strategic asset dashboard
- Performance management
- Informed decision making





COGNOS AN IBM COMPANY

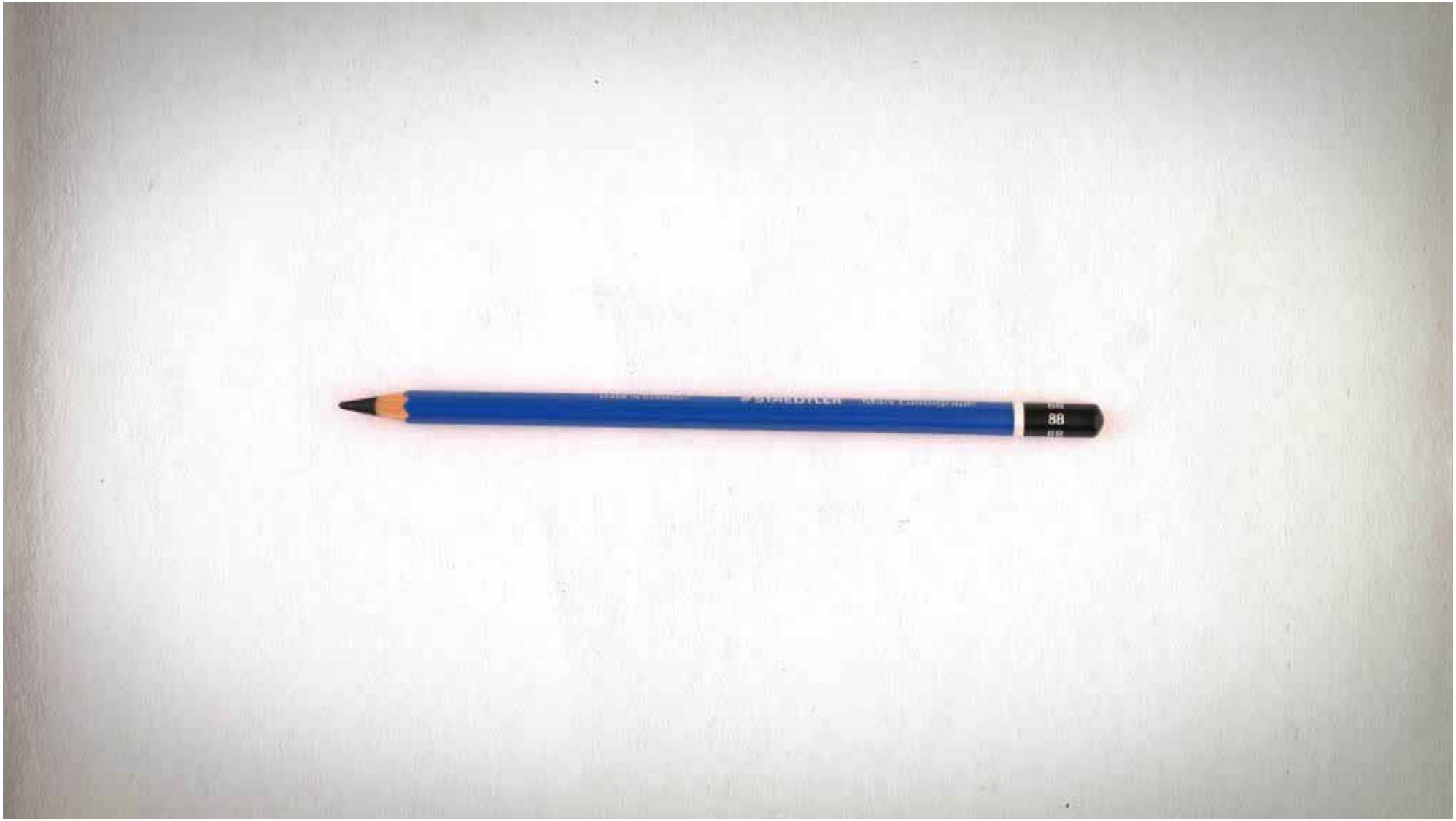
Product stack being tested for an internal environment



The benefits of being “intelligent” …

The world is connected: economically, socially and technically

- “Better able to predict”…. “Quicker to react, precisely”….
- Stay ahead of your competitors
- Deliver on regulatory requirements for; health, environment, etc
- Lead new products to the “new” market
- Data now has a new meaning, new value
- Better positioning to address globalisation
- New customer demands and business models
- Stay ahead of the game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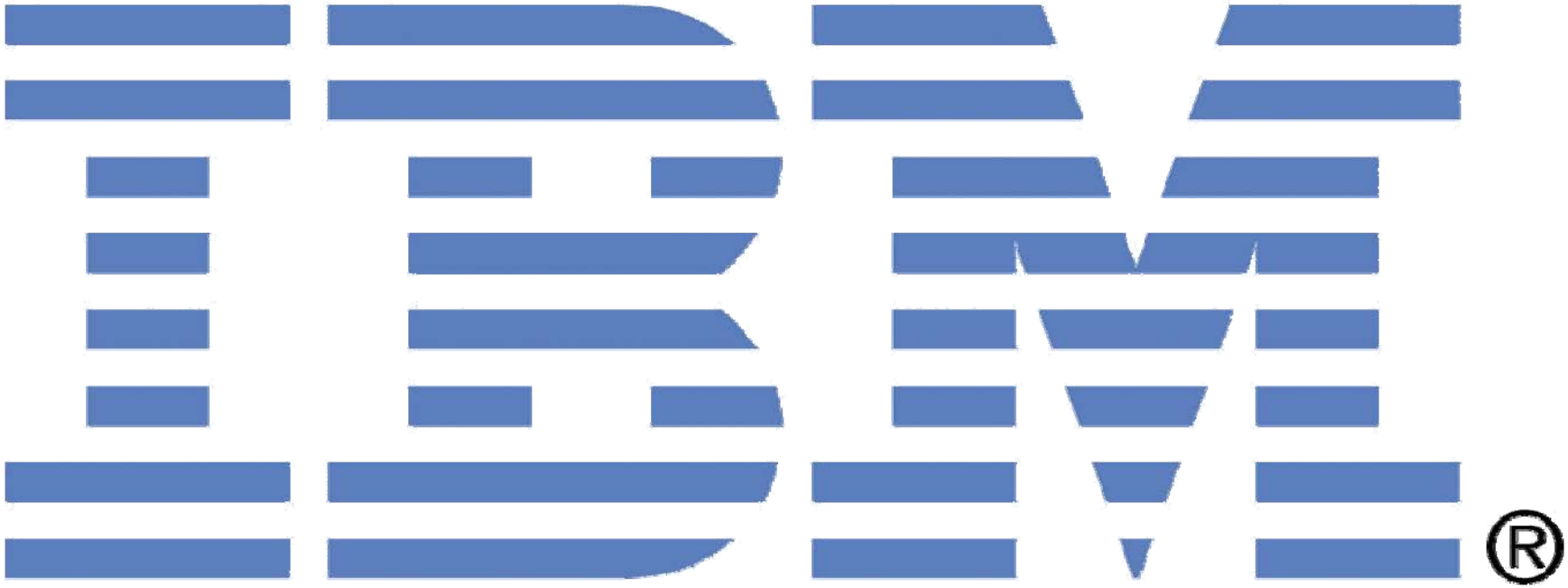
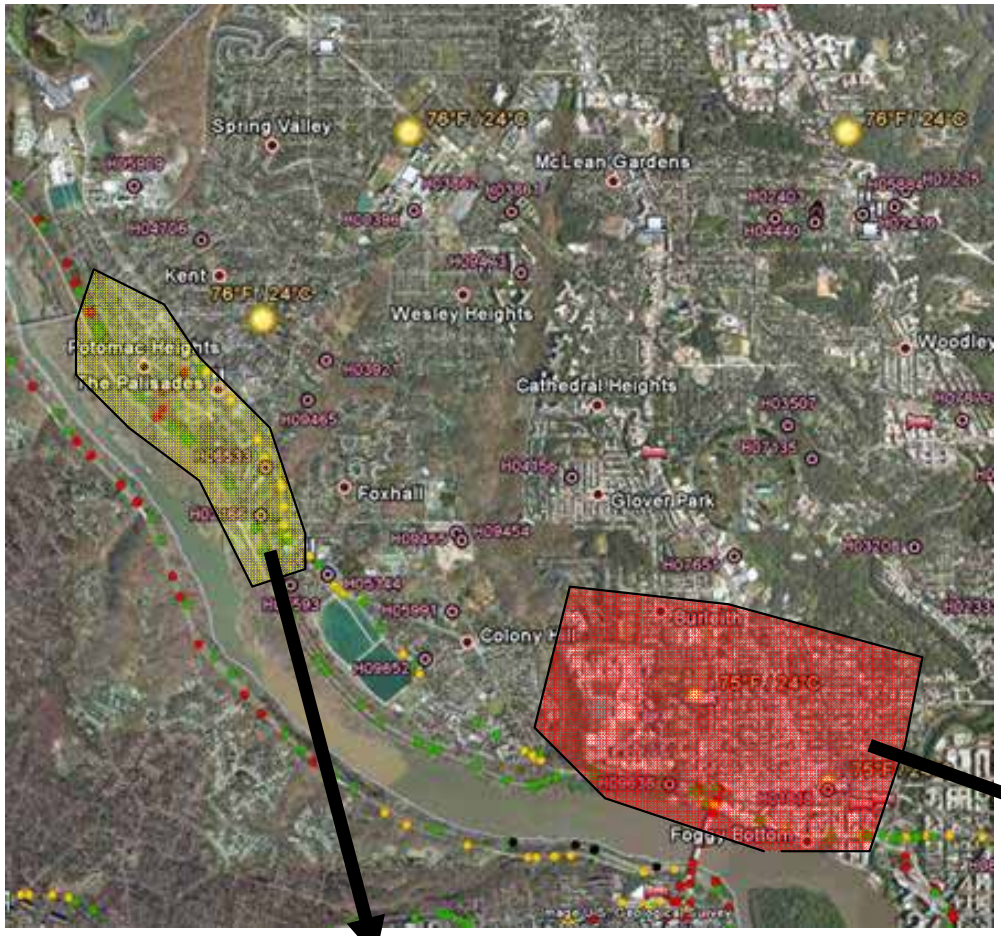
Thank you!



Connection to Asset Performance is Revealing



Association Discovery
Alert: Hydrant's from company ABC fail under high temperature

Spatio-Temporal Queries
Highlight regions where fire hydrants have had more than 3 failures in the last 8 weeks

Spatio-Temporal Alerting
Alert: Unusual clustering of fire hydrant failures: Dispatch crew to look for common failure reasons

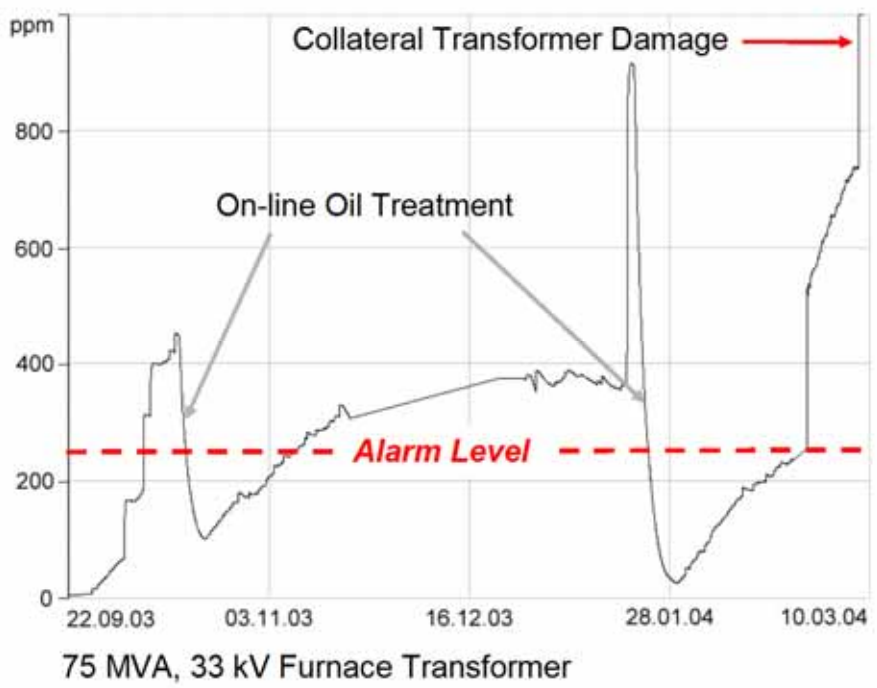

The European retail sector wasted nearly EUR2 billion (£1.36 billion) in 2006 because of a lack of document output control


$11.5B worth of produce is wasted in India because of outdated processes


U.S. CPG companies and retailers lose $40 billion annually due to inefficient supply chains.

… and detect early probability of failure

Example 1: Real case of early detection of a fault leading to collateral damage

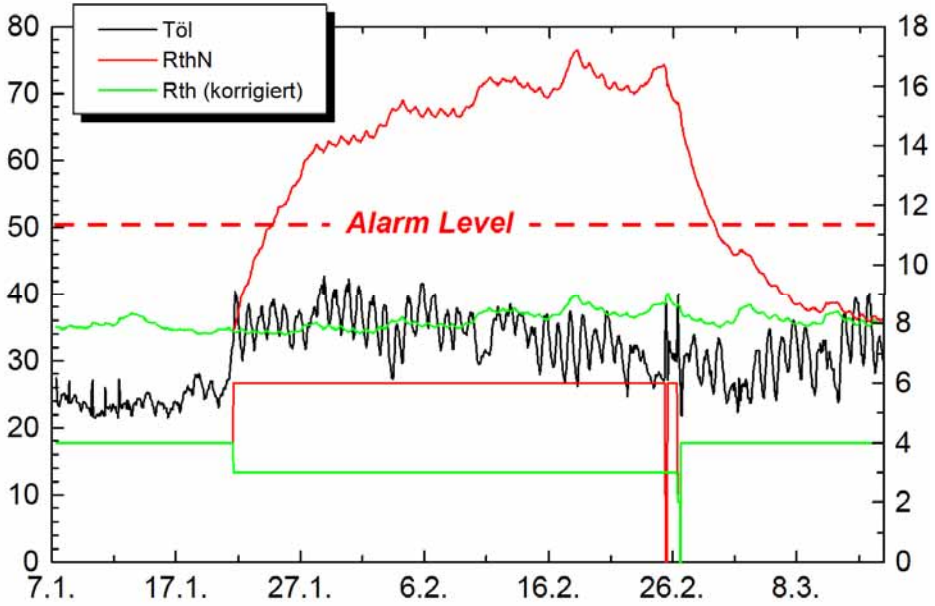


75 MVA, 33 kV Furnace Transformer

Example with Areva transformers:

Monitoring of active part + tap changer can point out the risk of failure well in advance

Example 2: Detection of Temperature problem (due to pollution of fans or pump failure)



Example with cooling units:

The problem may be due to pollution of fans or pump failure

Cooling Unit

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