

Future city?



– but still the same old pipes!



London Feb 2013



Ohio Jul 2013

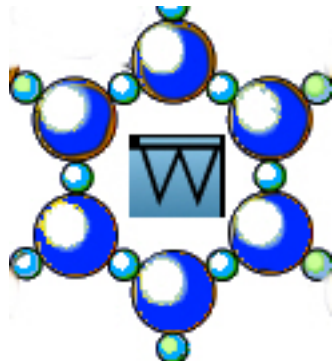
\$3.6bn of \$100bn - \$400bn

IFC; SWAN 2012



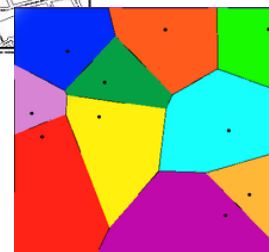
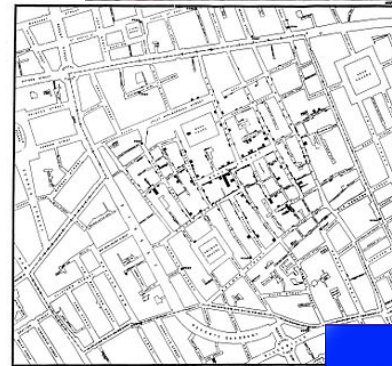
Connecting the water industry to an Internet of Things?

Integration of M2M and White Space to create smart water systems.



1854 – the 1st big data app in water

- John Snow, grandfather of drinking water
- Broad street cholera outbreak
- Identified importance of primary sanitation and link to health.
- Led to Sewerage system and wastewater networks



New technology || New possibilities



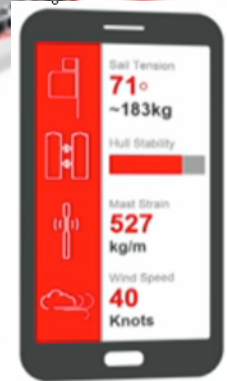
1851

34th America's Cup



**ORACLE
TEAM USA**
34th America's Cup

**NAVIGATING
TO WIN**

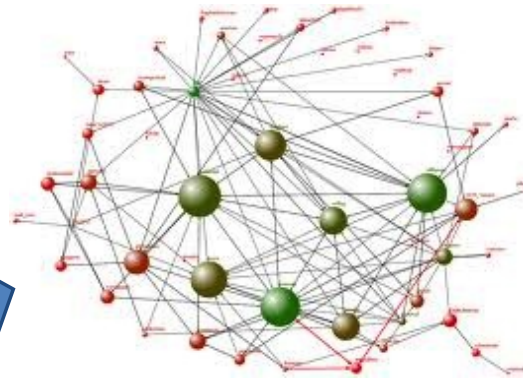
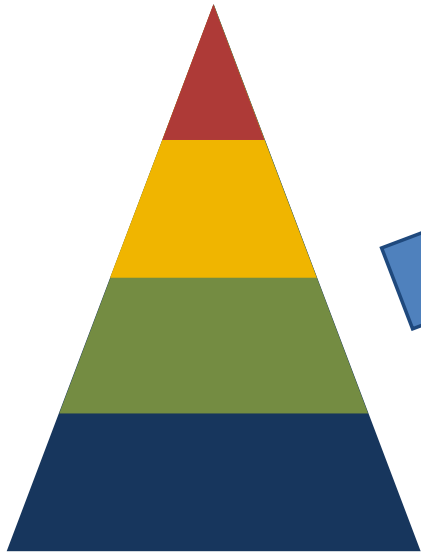


2013

The world is changing rapidly...

SCADA

- Hierarchical
- Proprietary
- Bespoke



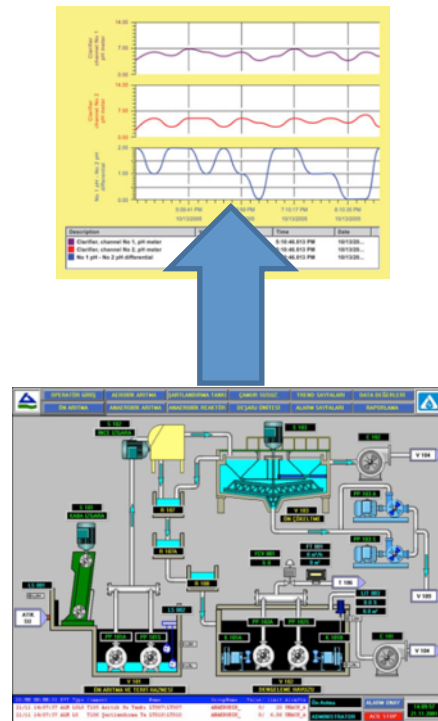
Networks

- Interconnected
- Multi-vendor
- Standardised



- Distribution networks
- Supply-chains
- Specialist Service providers
- Customers

Integrating separate data resources



SCADA
Real-time operational control and automation



Business Systems
Enterprise asset management

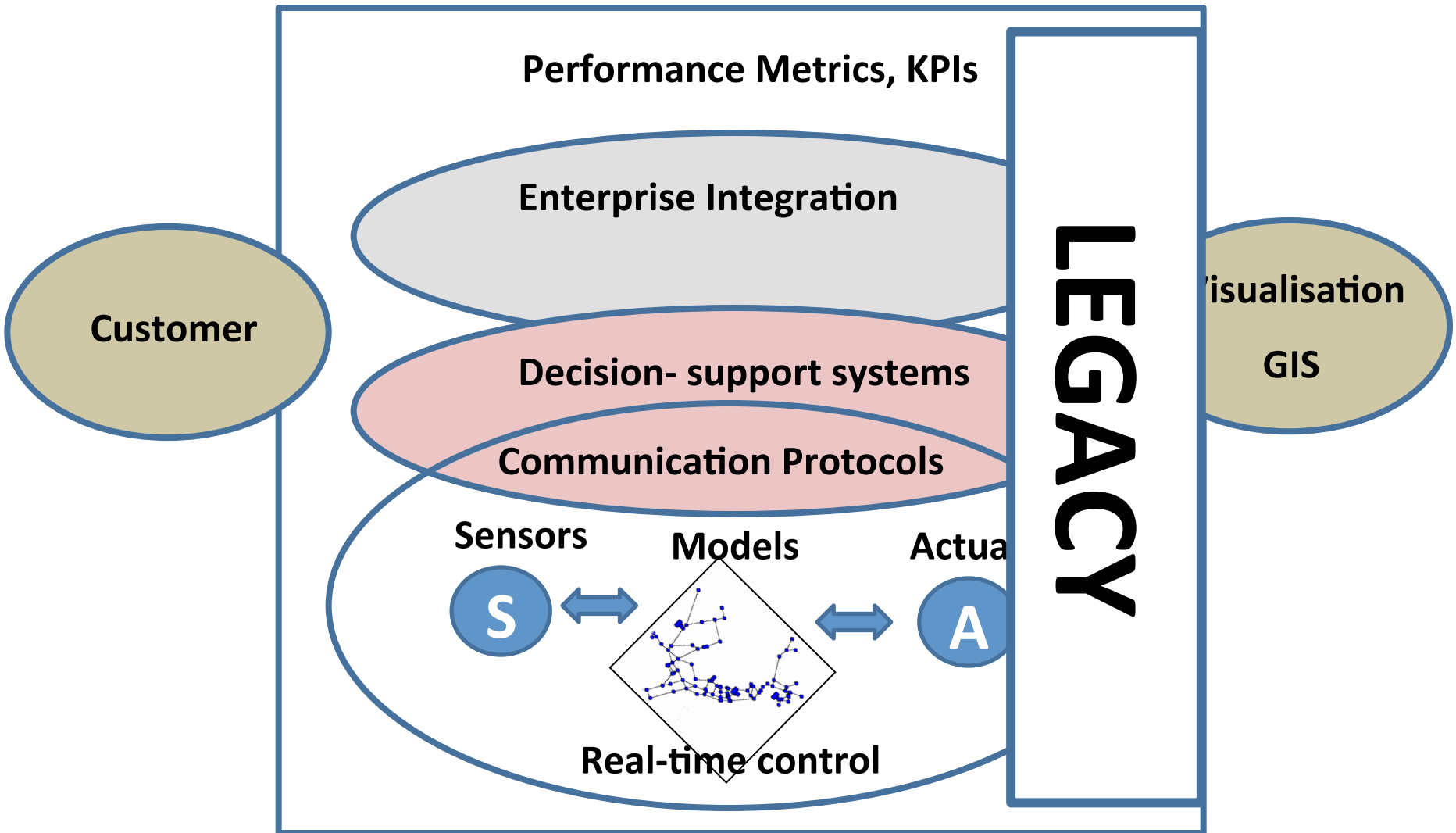


People
Unstructured data (knowledge assets)

Standards – a key enabler

8	Global Standards	
7	National	Standards
6	Company	Policy
5	Business logic	Op. Rules
4	Semantics	Meaning of data
3	Syntax	Unicode
2	Network	TCP, XMPP, MQTT
1	Connection	IP/Modbus

Applications Framework



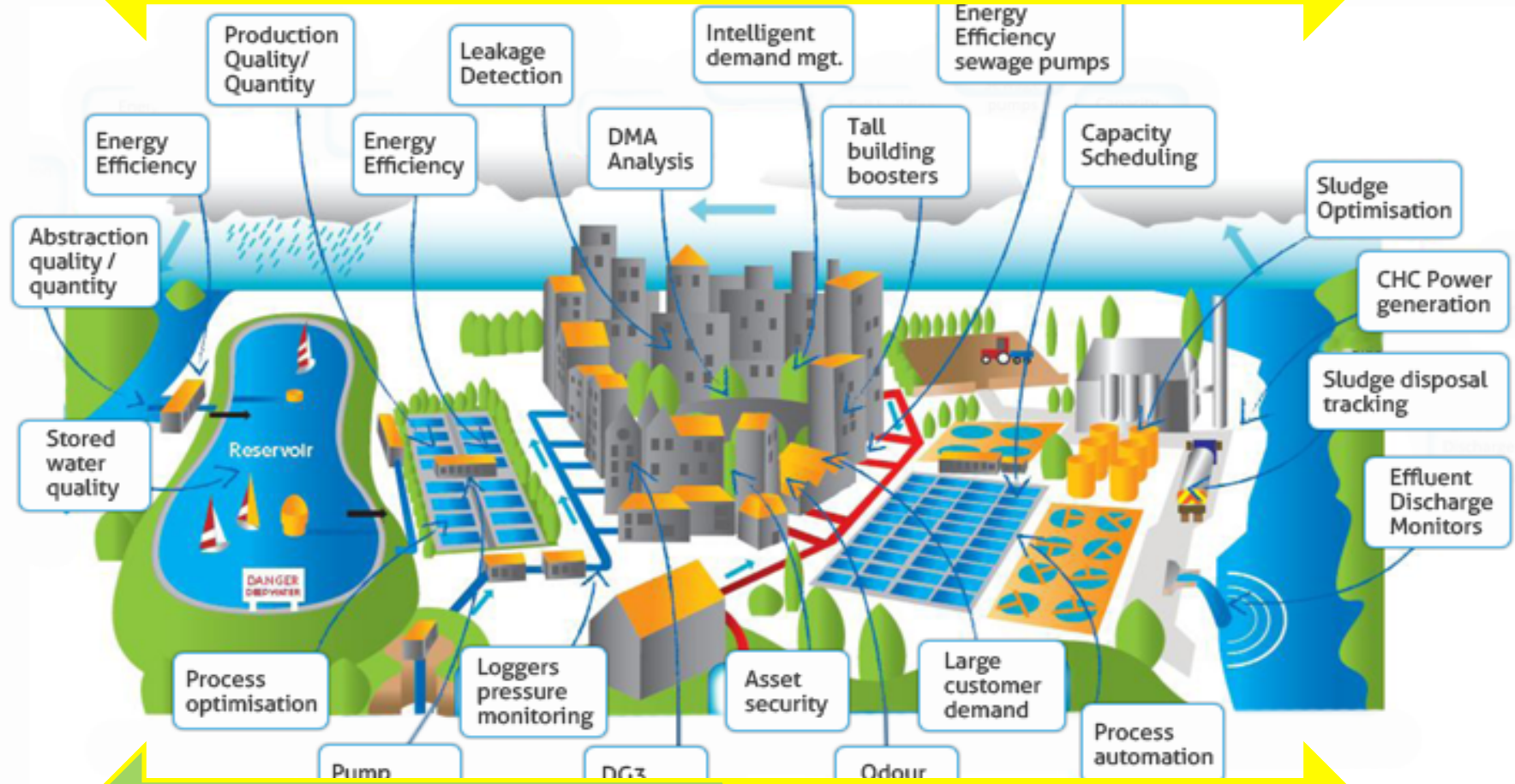
Beyond SCADA

Network Optimisation



ingWorx

Standard Apps



SaaS - SCADA as a service

WaterWorX IOT Stack

Apps

pumpWorX

sewageWorX

netWorX

Semantic Interoperability Model

SWIM

SaaS model

WaterWorX

VEOLIA WATER

TOOLS

ThingWorx

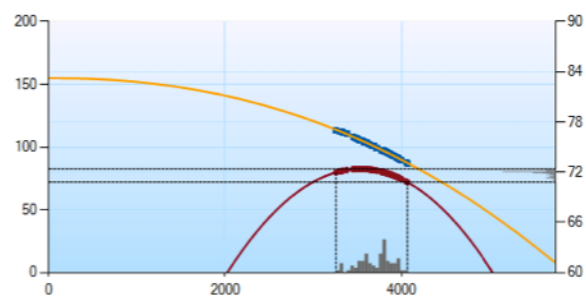
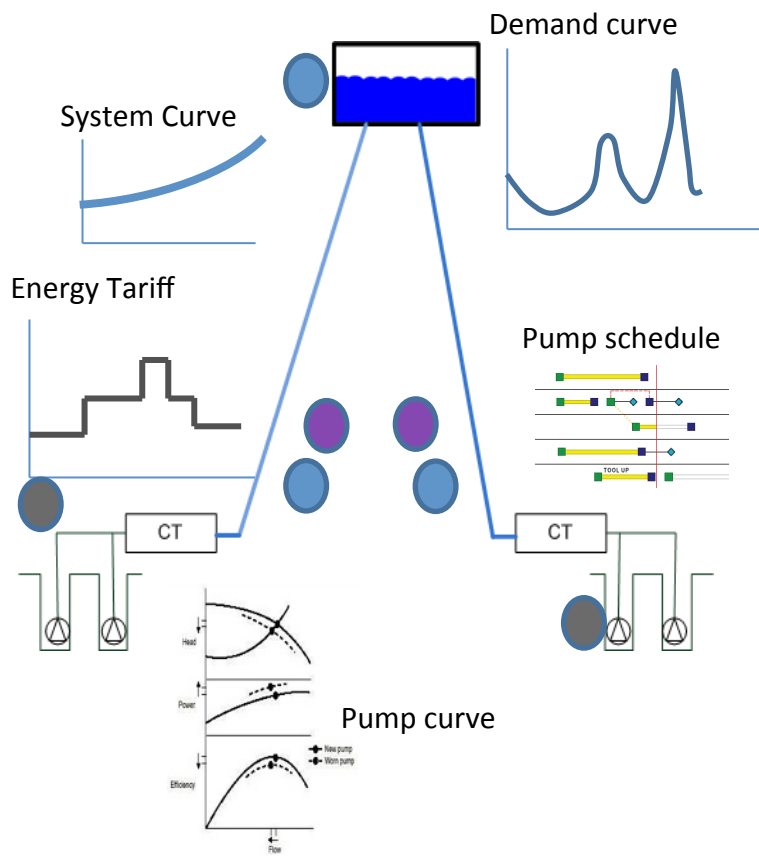
NoSQL Graph DB

Neo4j



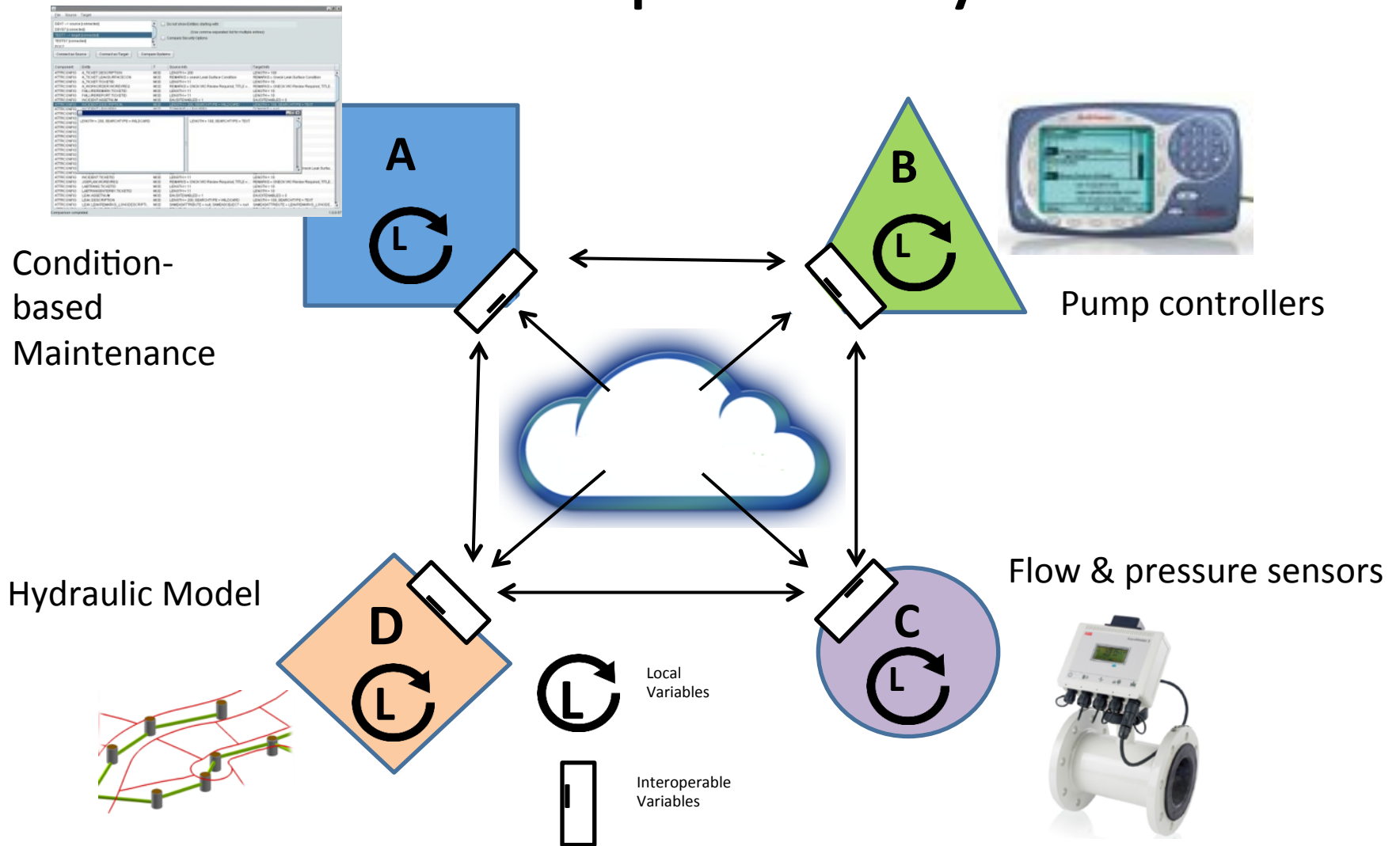
Apps:

- Pumping energy management
 - 3% of UK energy demand
- Lowest cost/risk scheduling
- Performance benchmarking
- Demand response
- Integrated **powerWORX** tools



Energy Efficiency Rating		
	Current	Potential
Very energy efficient - lower running costs		
(92-100) A		
(81-91) B		
(69-80) C		
(55-68) D		
(39-54) E		
(21-38) F		
(1-20) G		
Not energy efficient - higher running costs		
	74	76

Interoperability



Wireless Communications networks

- GSM
 - Requires medium power
 - Designed for high data-rates
 - Too costly for ubiquitous sensors
 - High frequency = poor range/penetration
 - Congested when scaling
 - Asynchronous
- Whitespace (Weightless)
 - Ultra-low power, 5yr battery
 - Low-frequency 470mHz = 2-5km range + good penetration
 - Low-cost, 1/20th GSM cost
 - Scalable – 100,000 nodes

Why IoT in water?

- Improved energy efficiency
- Efficient deployment of labour
- Predictive asset health & condition monitoring
- Extend asset life and function
- Fewer failures = higher availability (measurable)
- Improved service standards
- Water quality monitoring – safety & security

