hunterH2O

Water Together

SCADA, IIOT and Digital Technologies for NRW detection and Management

About us

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Water Together

About us

- Australian and employee-owned
- Water-industry focused
- Internationally skilled and competitive.
- Strong operations heritage.

- We work alongside our clients to deliver:
  - Planning, modelling ,design, and project delivery services
  - Process engineering and operations consulting
  - Electrical ,SCADA ,Automation & Telemetry integration services
  - Strategic Management expertise.
  - Asset & Maintenance Management services

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Water Together

120 +
Water
Industry
Specialists

Servicing
Australia
and the
Pacific Region

Australia's
Largest
Specialist
Water
Consulting
Firm

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NRW

“The cost “

If all countries reduce leakage to less than 6%, the energy savings equate to 130 TWh, the entire energy needs of Poland.

World Energy Outlook 2016, “Water Energy Nexus”

6% Denmark	6% Japan	10% Australia
12% USA	24% European Union	48% India

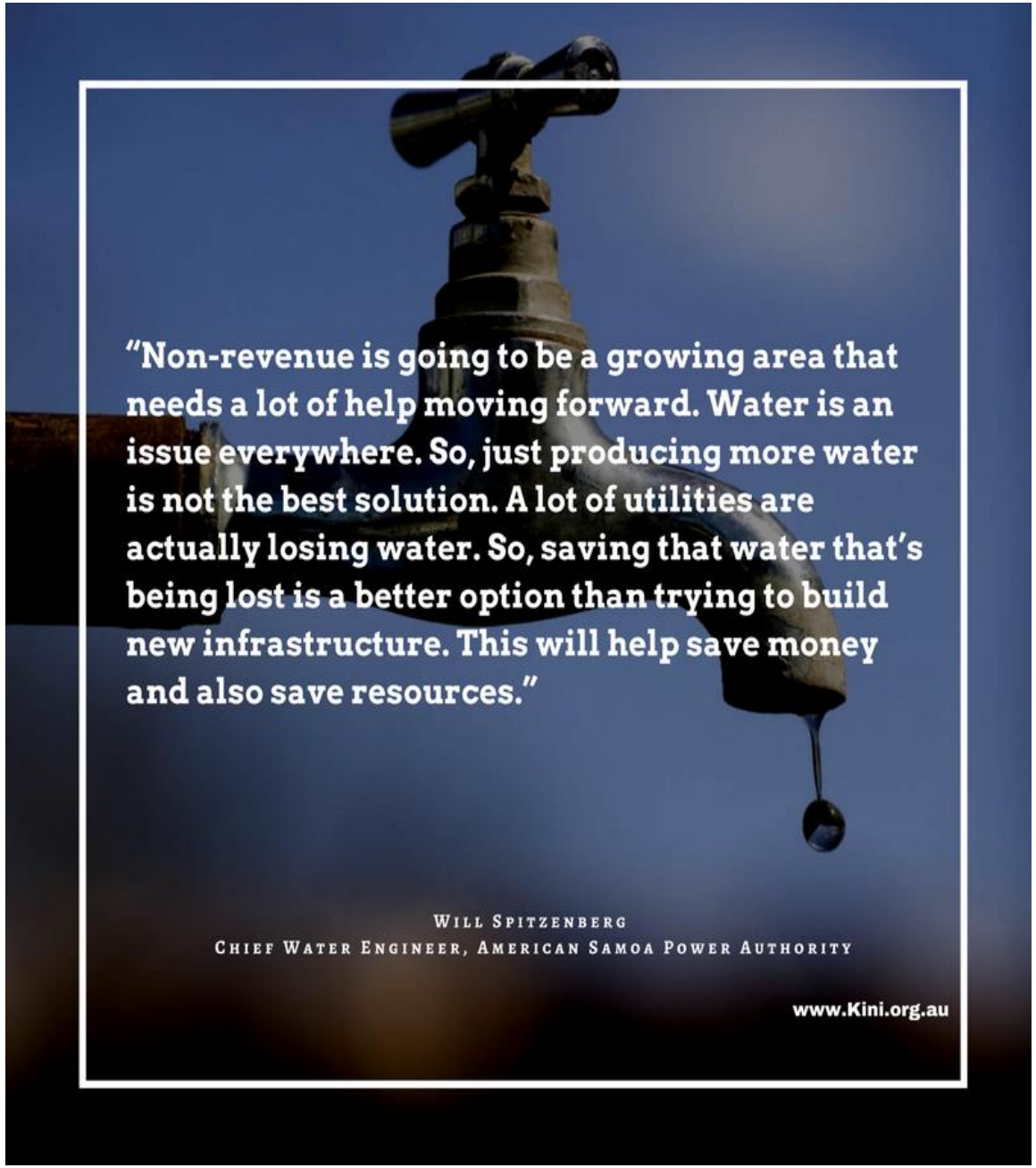
Global cost of non-revenue water is estimated at US$ 141 billion per year.

World Bank Paper No 8, 2006

4% of global electricity consumptions was by the water industry in 2014.

60% of this was for extraction and distribution.

World Energy Outlook 2016, “Water Energy Nexus”



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Leakage Control

- Pressure management
- Active leakage control
- Pipeline and assets management
- Speed and quality of repairs

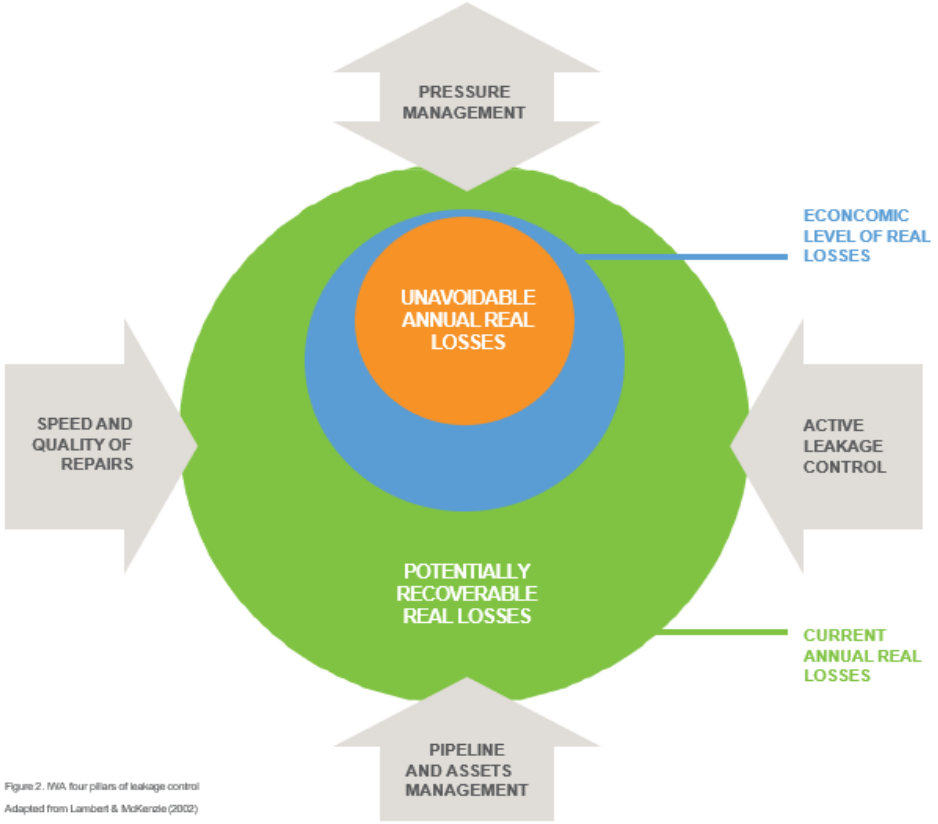
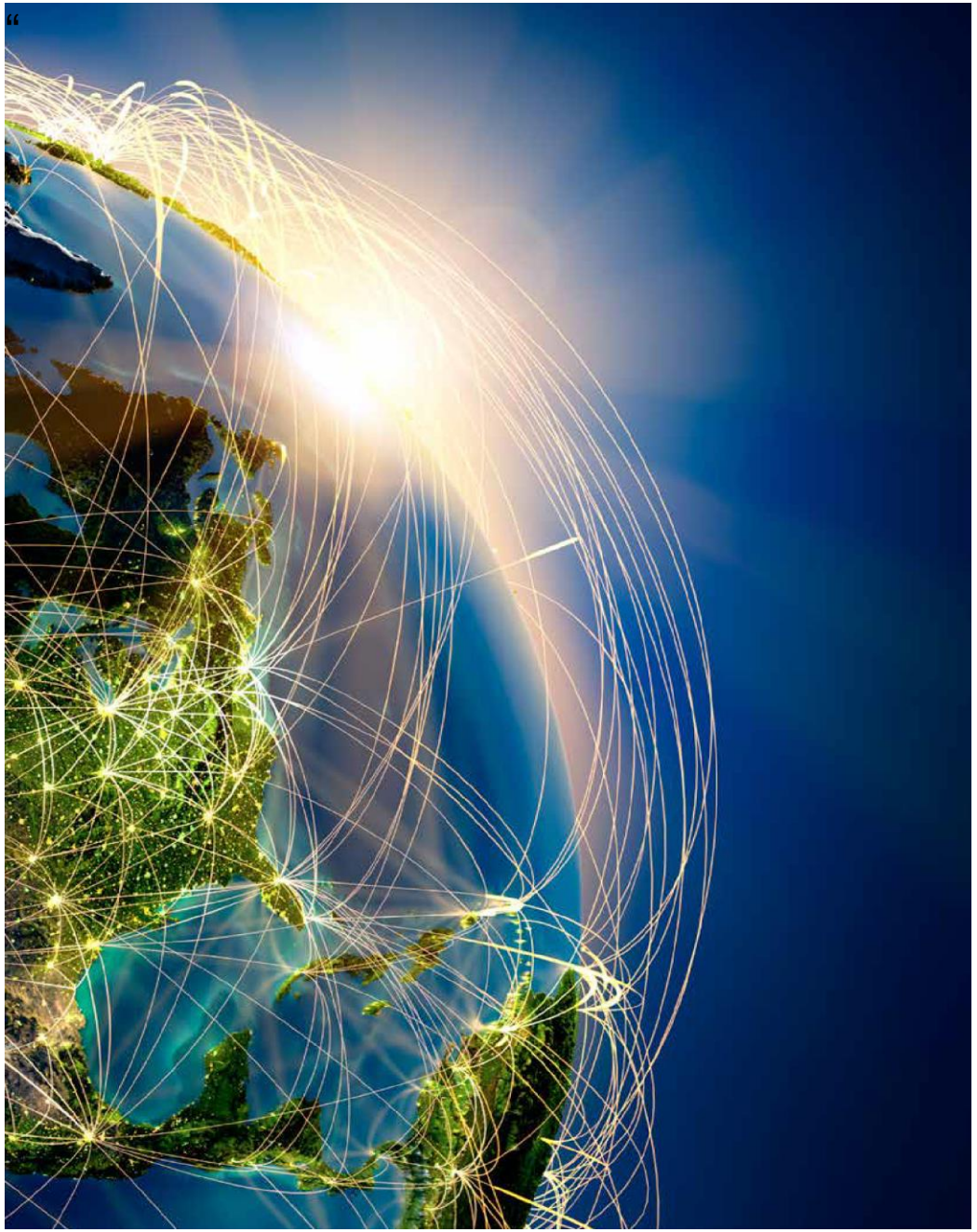


Figure 2. IWA four pillars of leakage control

Adapted from Lambert & McKenzie (2002)

The Internet of Things

IoT



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“If you think that the internet has changed your life, think again. The Internet of Things is about to change it all over again!”

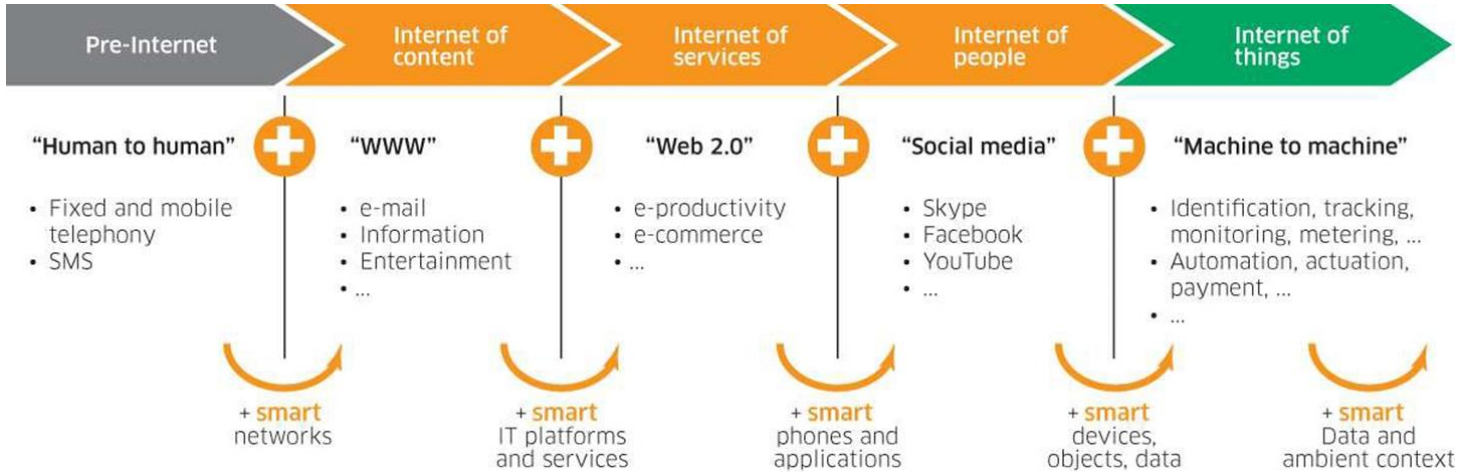
Brendan O’Brien
CIO Aria Systems

What is IoT?

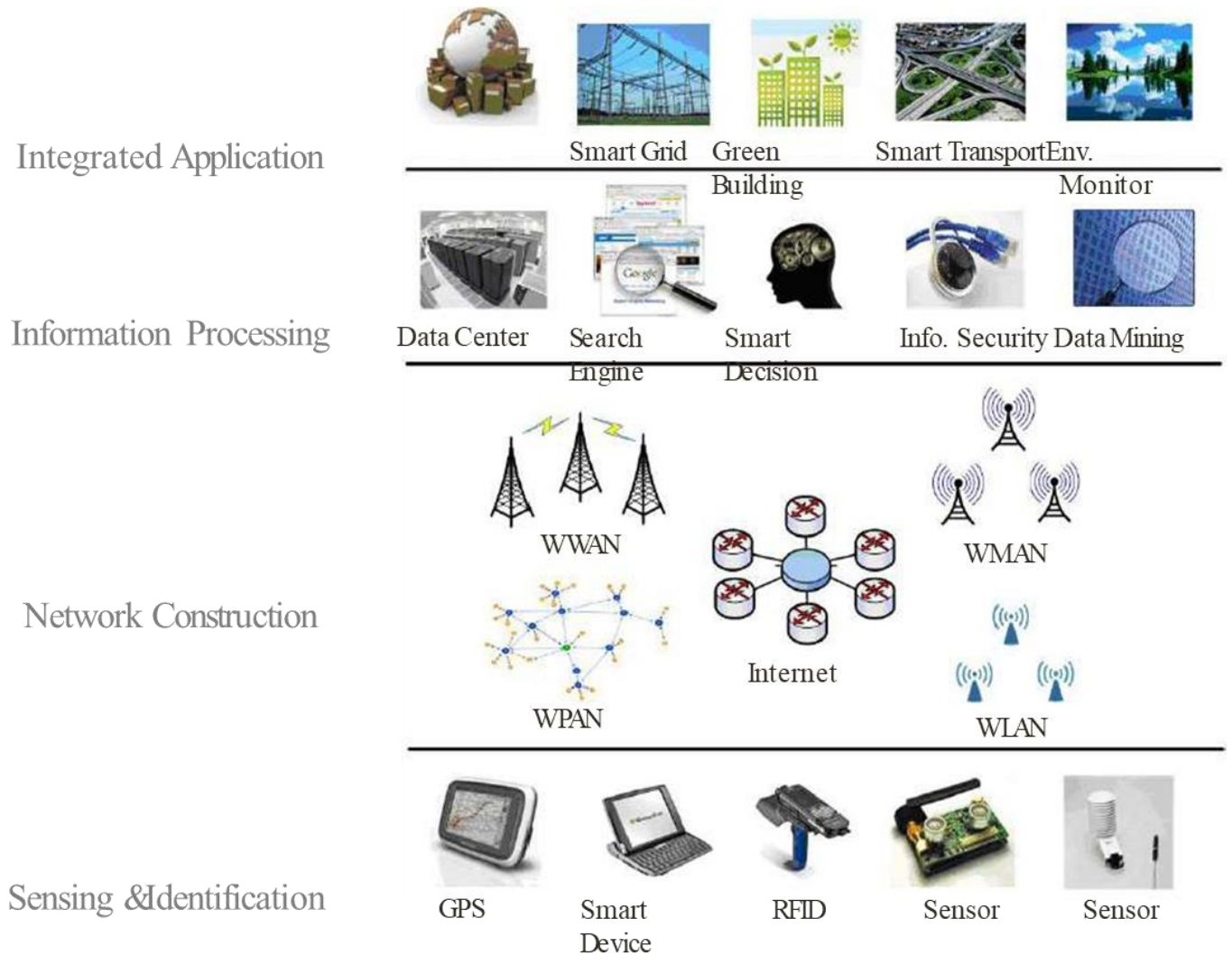
- Internet of Things (IoT): A network of physical objects that contain embedded technology to communicate and sense or interact with their internal states or the external environment via communication network.
- Industrial Internet of Things (IIoT) : A short-hand for the industrial applications of IoT
- The power of IoT is the cost effective configuration, control, monitoring and networking via the Internet of devices or "Things" that are traditionally ***Not*** associated with the internet.

  Eg: pumps, meters, lights, car engines, measuring instruments etc.
- IoT enables the capabilities of data from the endpoints that are connected to the internet

IoT Evolution



IoT Architecture



IoT Communications

Technology	Frequency	Data Rate	Range	Power Usage	Cost
2G/3G/4G	Cellular Bands	10 Mbps	Several Miles	High	High
Bluetooth/BLE	2.4Ghz	1, 2, 3 Mbps	~300 feet	Low	Low
802.15.4	subGhz, 2.4GHz	40, 250 kbps	> 100 square miles	Low	Low
LoRa	subGhz	< 50 kbps	1-3 miles	Low	Medium
LTE Cat 0/1	Cellular Bands	1-10 Mbps	Several Miles	Medium	High
NB-IoT	Cellular Bands	0.1-1 Mbps	Several Miles	Medium	High
SigFox	subGhz	< 1 kbps	Several Miles	Low	Medium
Weightless	subGhz	0.1-24 Mbps	Several Miles	Low	Low
Wi-Fi	subGhz, 2.4Ghz, 5Ghz	0.1-54 Mbps	< 300 feet	Medium	Low
WirelessHART	2.4Ghz	250 kbps	~300 feet	Medium	Medium
ZigBee	2.4Ghz	250 kbps	~300 feet	Low	Medium
Z-Wave	subGhz	40 kbps	~100 feet	Low	Medium

IoT Applications

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Consumer
- Smart home control (lighting, security, comfort)
- Optimized energy use
- Maintenance

Retail
- Product tracking
- Inventory control
- Focused marketing

Medical
- Wearable devices
- Implanted devices
- Telehealth services

Military
- Resource allocation
- Threat analysis
- Troop monitoring

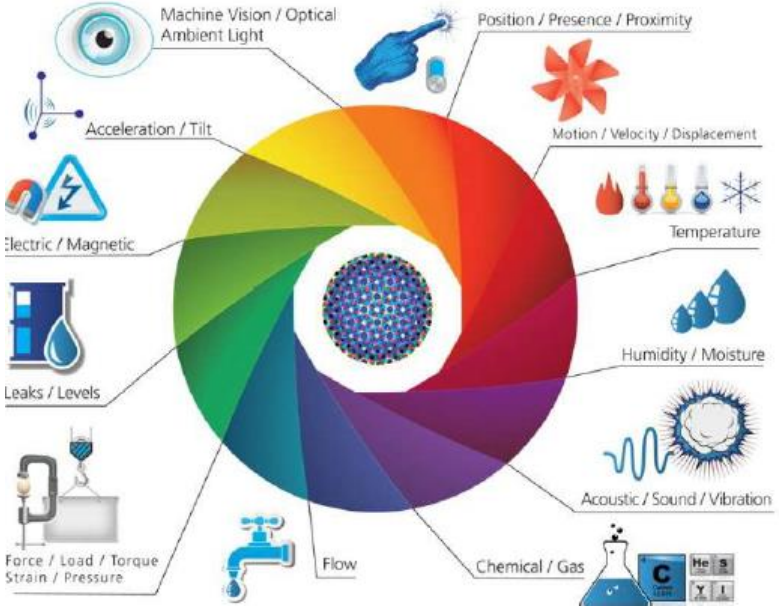
Industrial
- SmartMeters
- Wear-out sensing
- Manufacturing control
- Climate control

Automotive
- Parking
- Traffic flow
- Anti-theft location

Environmental
- Species tracking
- Weather prediction
- Resource management

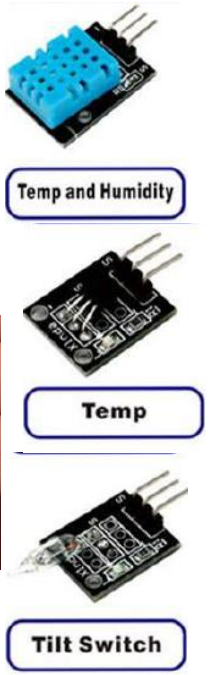
Agriculture
- Crop management
- Soil analysis

IoT Sensors and Actuators



Arduino Uno

Raspberry Pi



IoT Cloud Services

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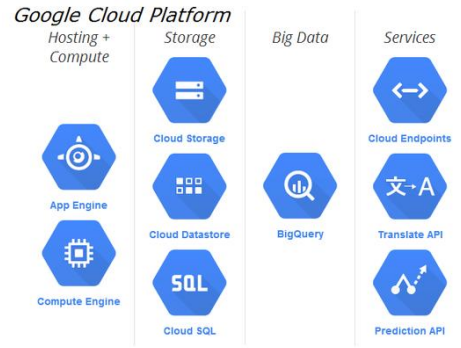
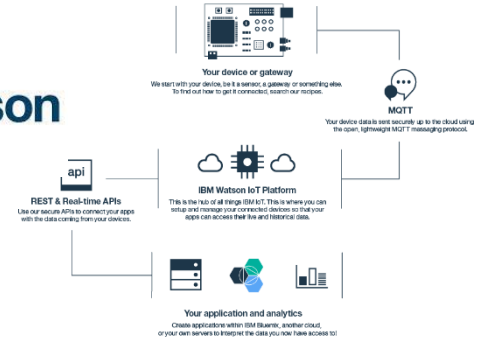
Google Cloud



aws

IBM Watson



Microsoft Azure

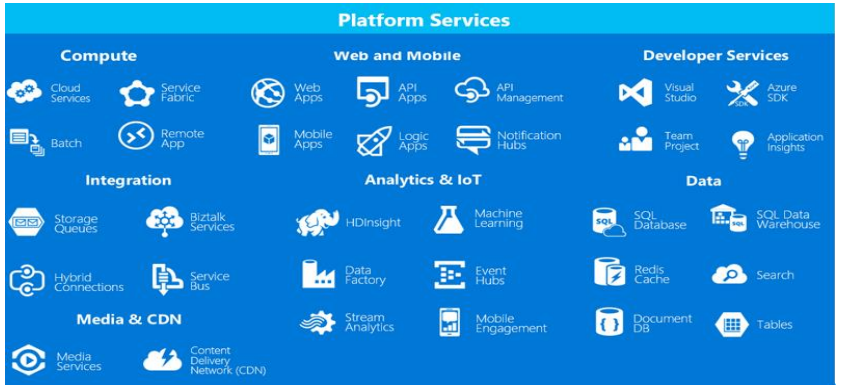
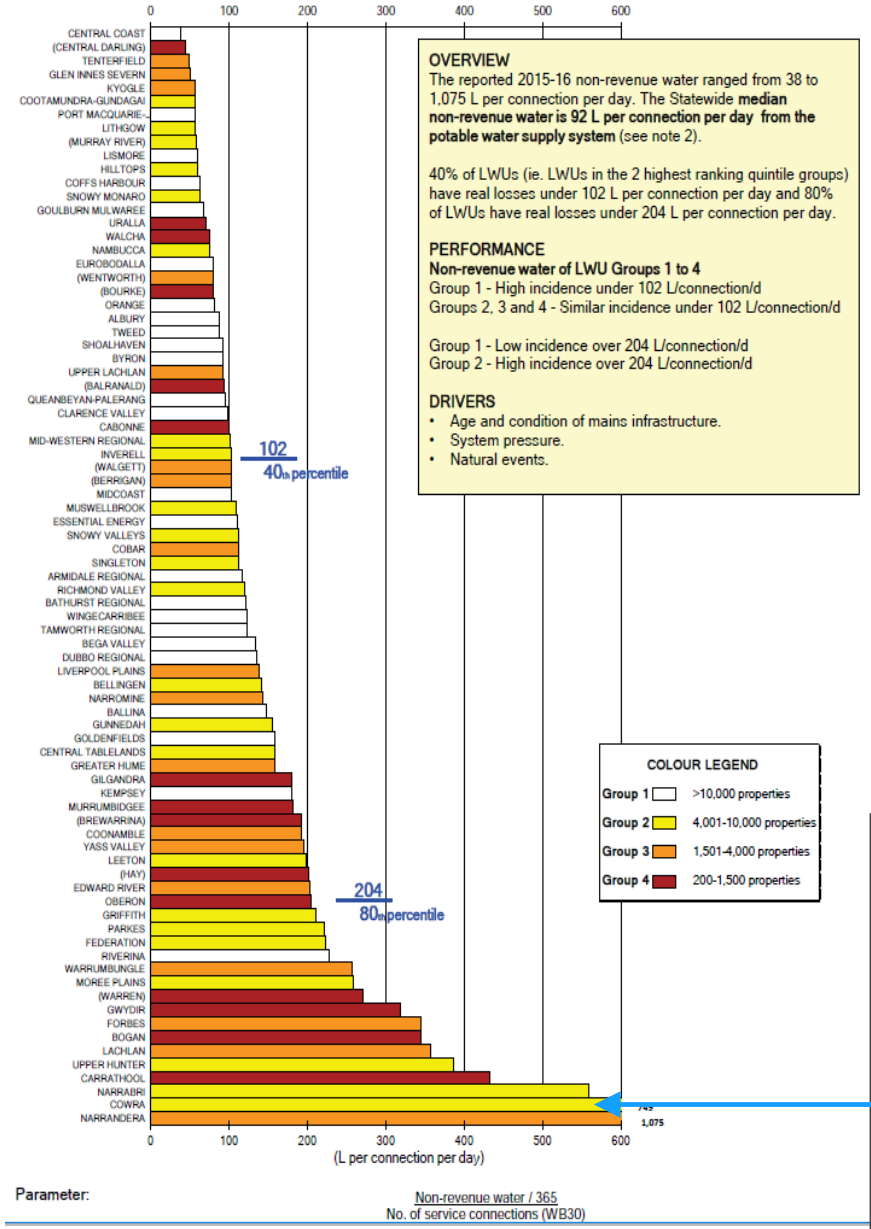
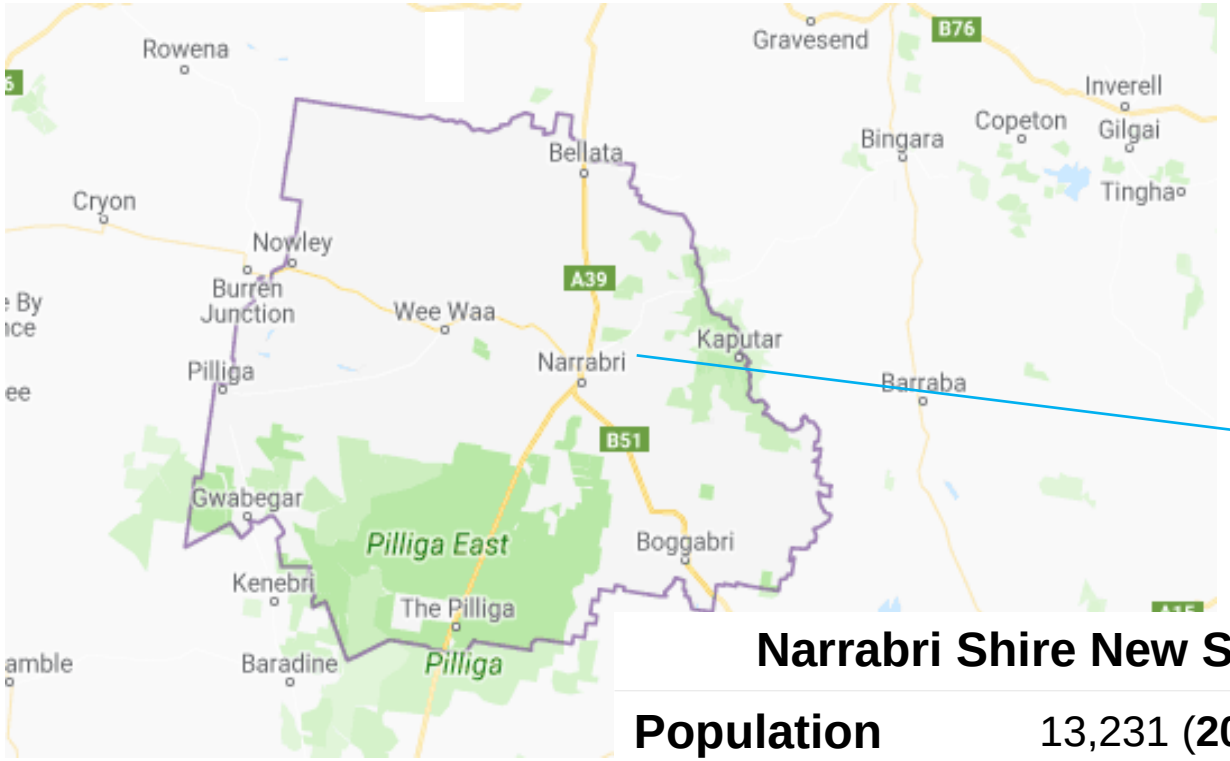


Figure 18: Non-Revenue Water 2015-16 - W10.1 per connection per day



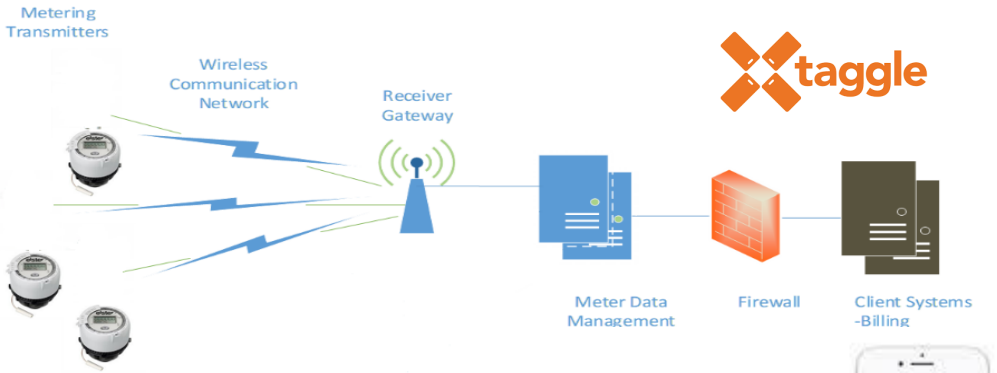


Narrabri Shire New South Wales

Population	13,231 (**2018** est.)
Density	1.00407/km^2 (2.60052/sq mi)
Area	13,031 km^2 (5,031.3 sq mi)

IIoT Case Study Narrabri Council NSW

NRW : Approximately 550 liters per connection per day averaged over 365 days. Third worst in the state of NSW



- *Small Rural Region*
- *8 Townships*
- *Budget $1.74M*

- Successful tenderer Taggle Pty Ltd
- *5,000 Meters*
- *Installed and operational in 5 months*
- LoRaWAN Network
- *MiWater MDM Analytics*
- *Integrated with Council Billing System*
- *Integrated with GIS and SCADA*
- *Reduction in NRW*
- *Payback in 12 months*
- *System being expanded to sewer monitoring ,weather data and irrigation*

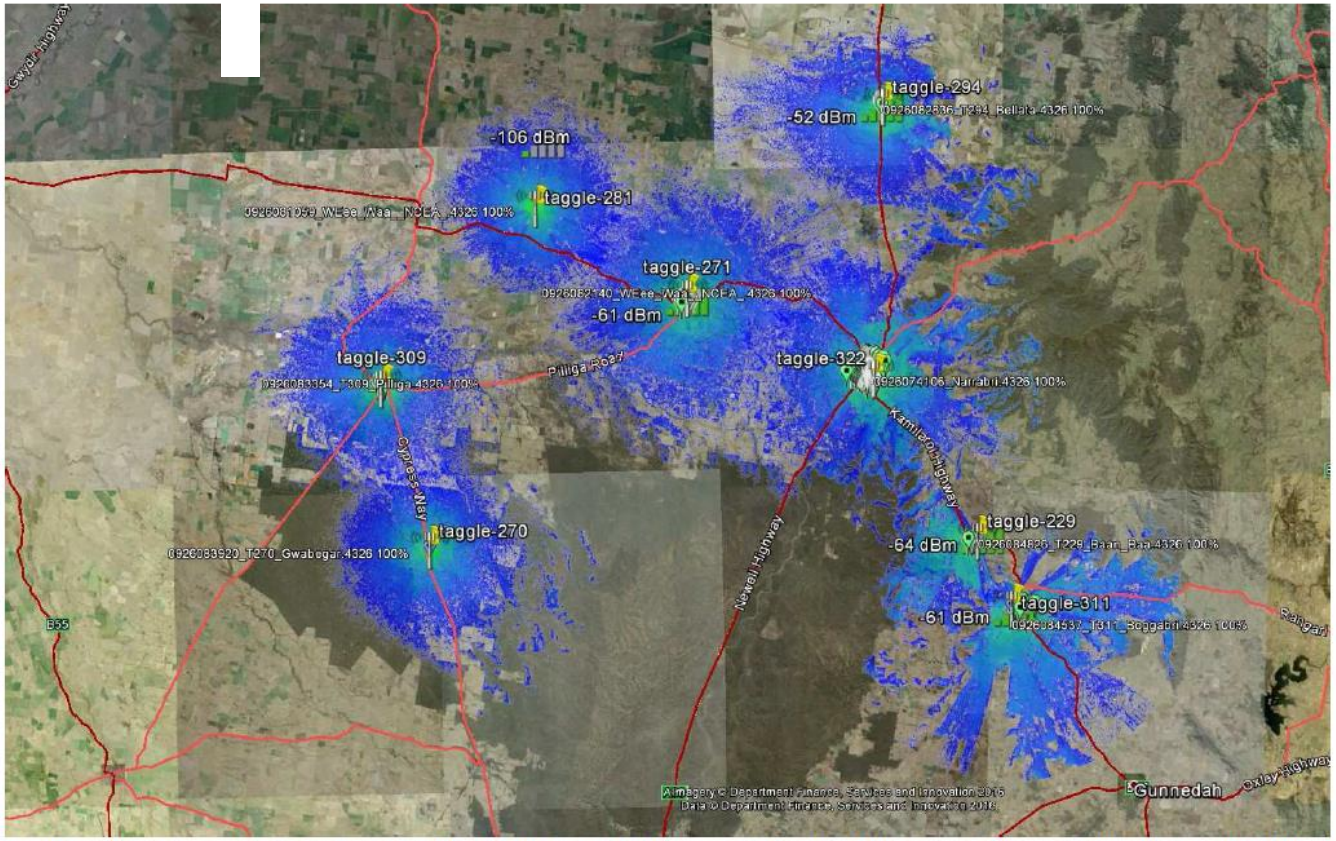


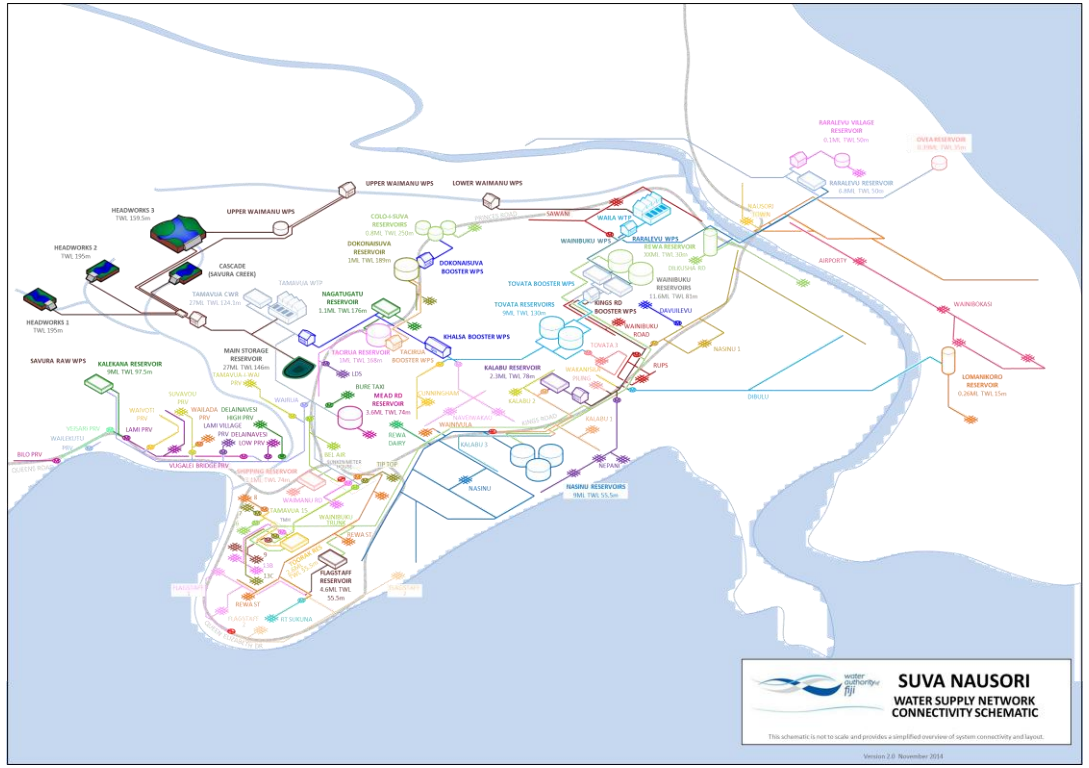
Figure 2 : Taggle receiver coverage in blue for Namoi Valley, courtesy of Narrabri Shire Council and NCEA at USQ.

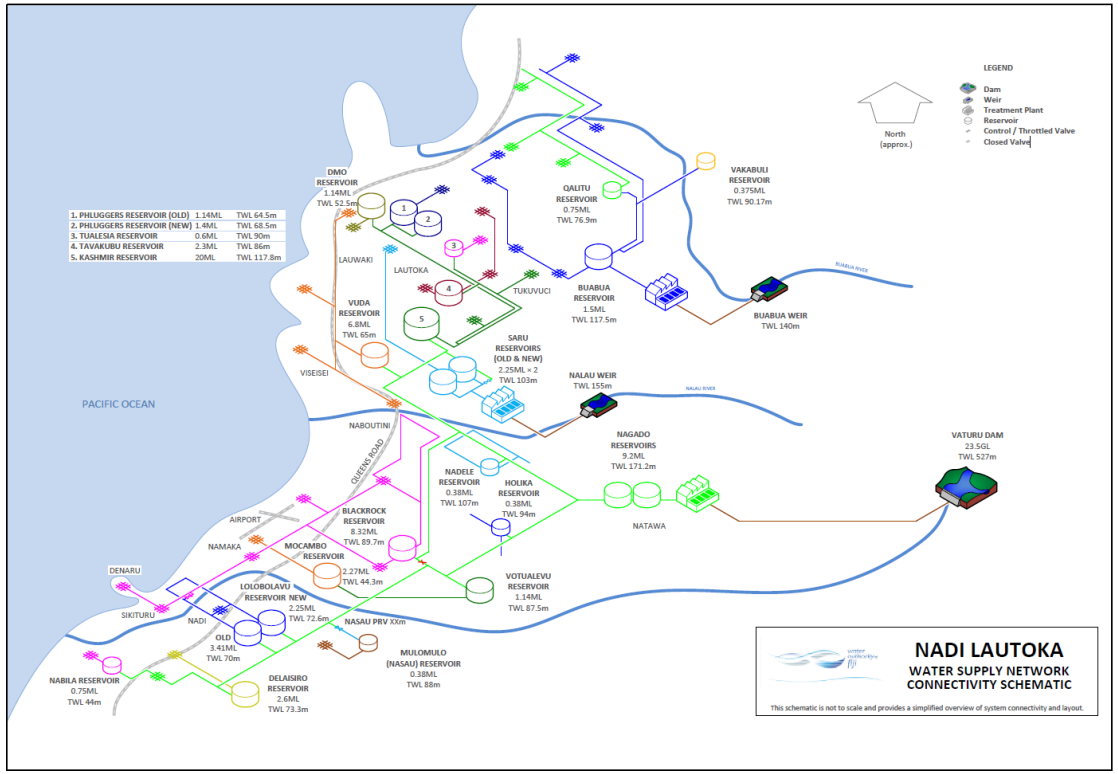
IIoT Case Study Narrabri Council

Take-Away !

- Review your business strategy and start taking advantage of the latest developments in IIoT & Cloud technologies
- Identify partners, and determine whether you should join a partner's platforms or develop your own.
- Identify one or two relevant simple projects that can be piloted to create necessary momentum and learning in IIoT.
- IIoT in conjunction with cloud analytics is the new cost effective tool in NRW reduction.
- Data Analytics will transform organisations
- IIoT device Interoperability has a way to go
- Consider off the shelf integrated systems rather than DIY bespoke products.
- IIoT is just one part of the puzzle.

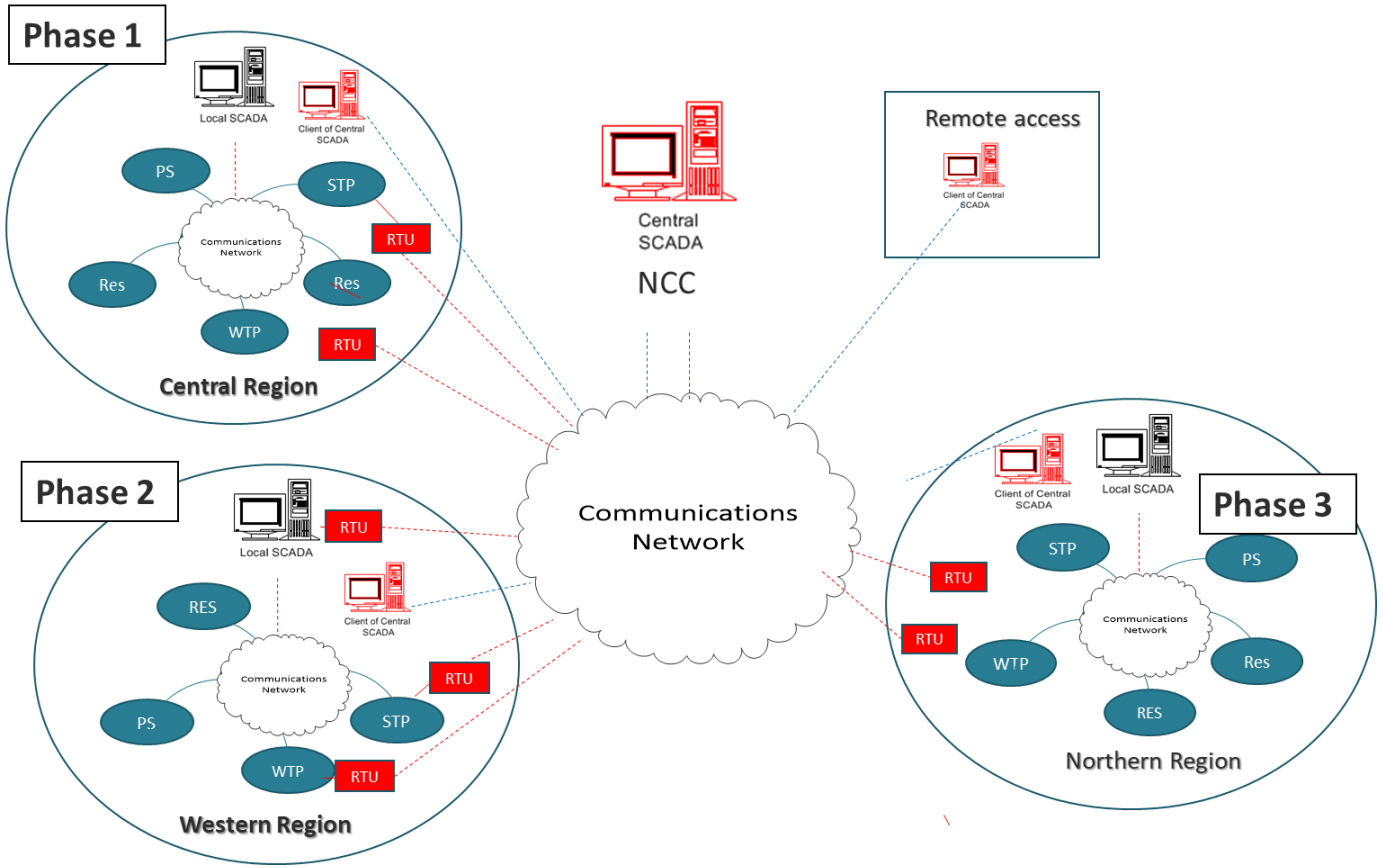

Waste Water System - Western Trunk - Nabua Main Sector 2
Water System - Tamavua System
Tamavua WTP
Sunken MH
Suva Nausori - Waila System Overview
Waste Water System - Regent SPS
Station Status
Lautoka - Walu St WWPS
SCADA
&
Realtime NRW





SCADA Mimics & DMA's

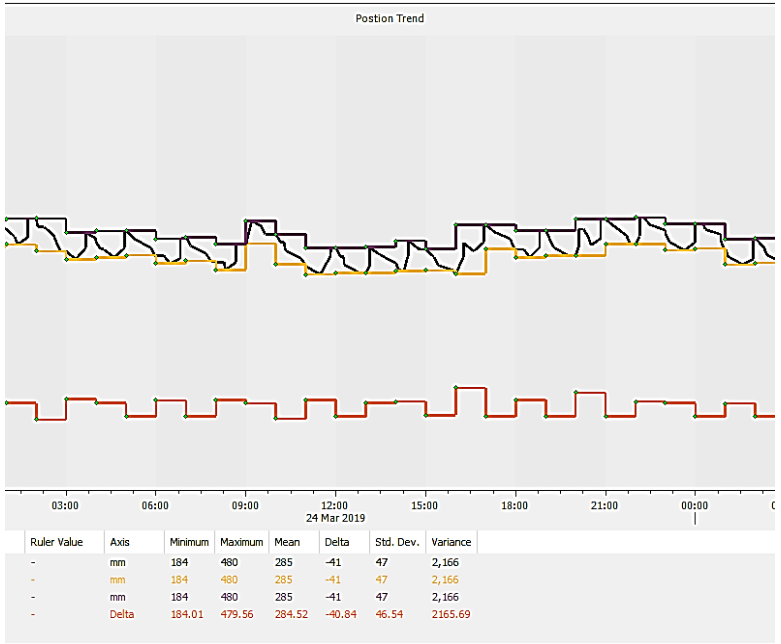
SCADA System Architecture



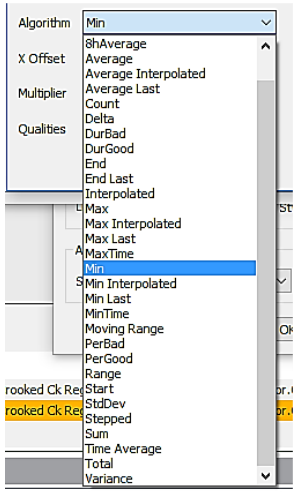
Low Power RTU's

ClearSCADA Tools

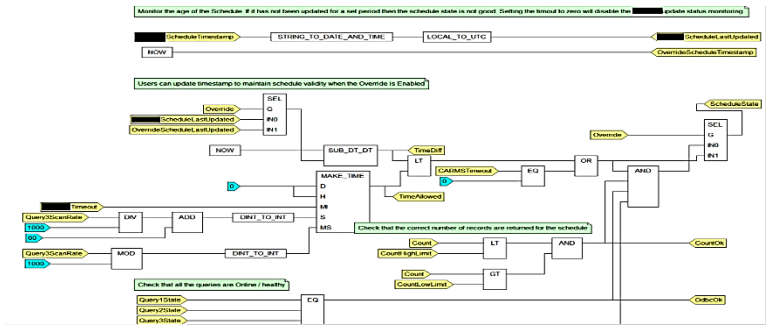
Inbuild Data Historian & Trend Tools



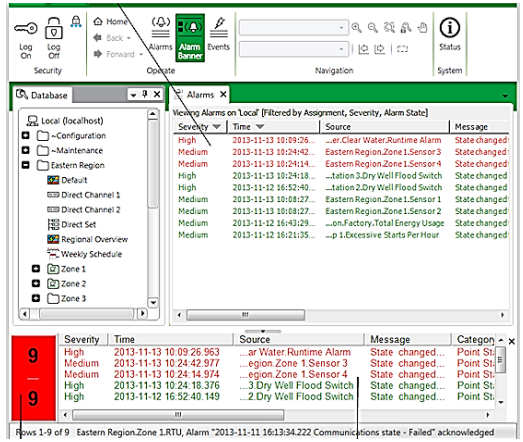
Inbuilt Statistical Tools



Inbuilt Logic Engine



Alarms & Actions



Take-Aways !

- SCADA and Telemetry Systems can provide real-time NRW monitoring management tools.
- Low cost Battery RTU's and IOT gateways provide a cost effective means to collect real-time NRW data
- SCADA systems do not replace AMRS
- SCADA Systems can interface to Hydraulic Models and assist with Model Calibration
- Real time pressure and flow measurement and alarming can improve repair response times
- SCADA trend and Logic tools can assist with uncovering of long term trends.

Questions ?

Thank You