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IDEAS THAT WORK

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**Making smarter decisions
in urban environments**

Dr. Daan Velthausz

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70 Years
Ideas that work

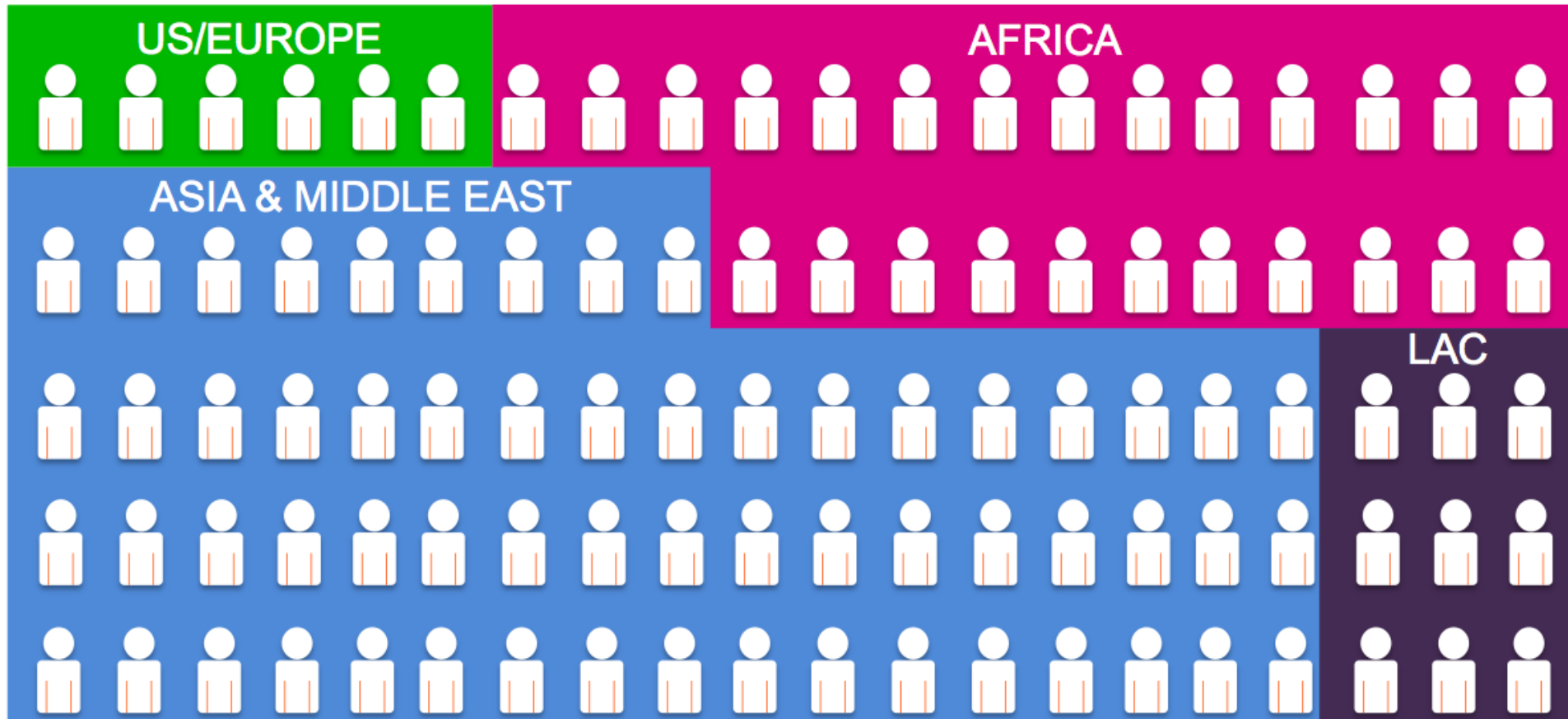
Urbanisation

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Urbanisation

Every 45 seconds, 100 new residents in urban areas across the globe



Challenges

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Challenge in urban environment

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How to maintain, expand and create new sustainable urban environments which provide a high quality of life, while effectively providing services and optimally preserving and managing resources

ICT trends: digital world

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Data and data sources
(un)structured, heterogeneous,
dynamic and large scale

Real and digital world

Real world

Future world

understand

sense

forecast

act

simulate

Digital world

implement
systemic
change

plan



Lead to smartness

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1. Do more with less
2. Do it better
3. Do new things

Using available information for
better decision-making

Challenges

Business

- How to identify decisions that have significant value and relevant decision data
- What is the value of improved decisions?

Technical

- How to source, deliver, store and integrate large-scale, relevant decision data from multiple domains
- How to process and interpret data within the required time constraints and with the desired accuracy

Addressing technical challenges

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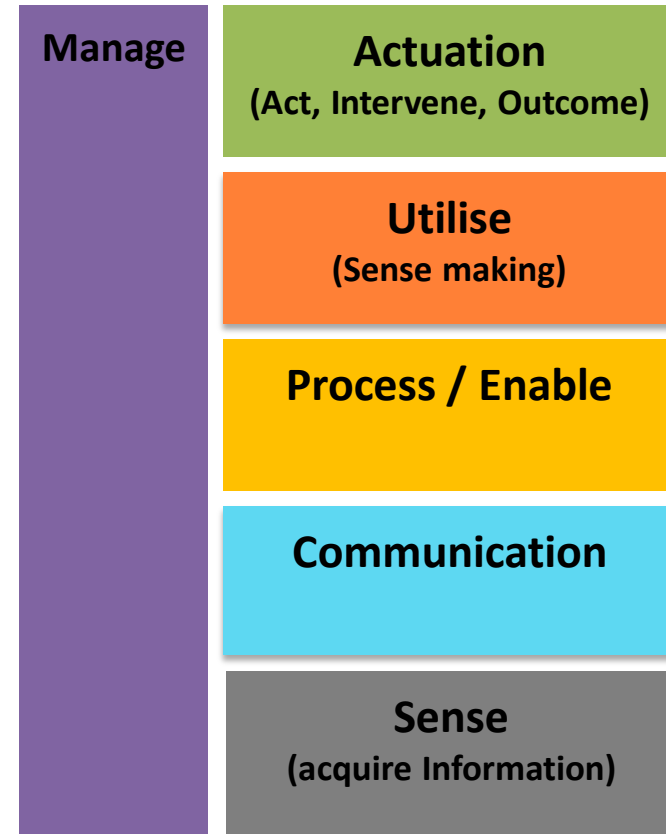
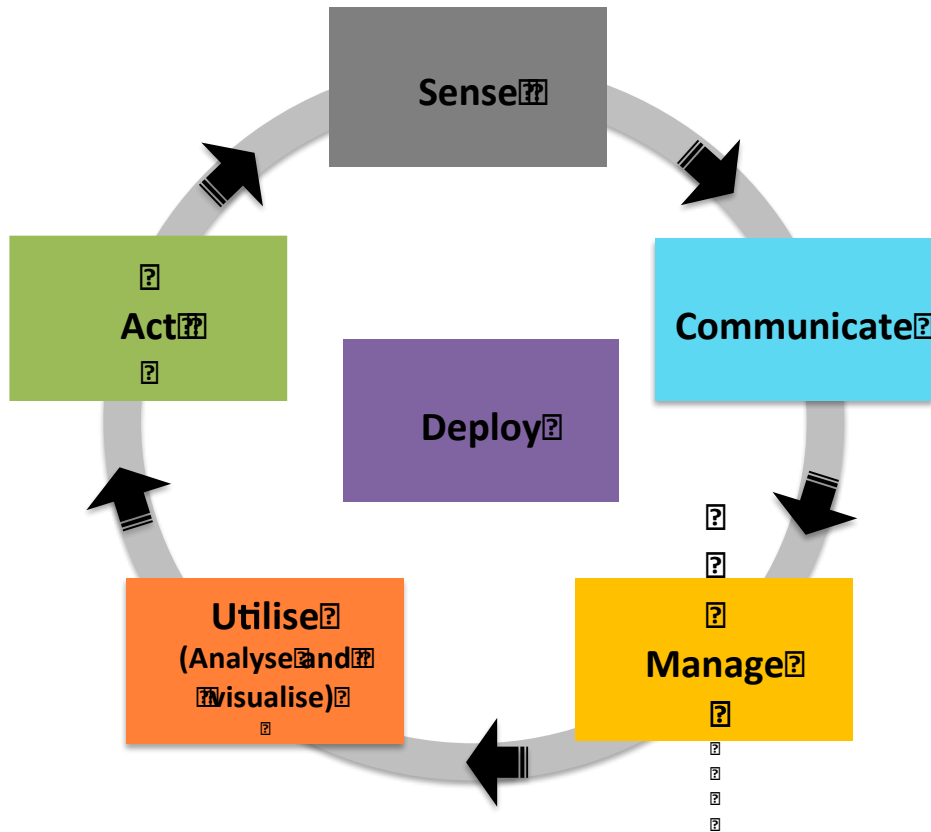
Key aspects

- Integration of the required system componentry (“the binding glue”)
- Integration of the data needed for decision-making
- Algorithms needed for decision-making

Technological solution

- Scalable, open, interoperable, transparent and secure

Smarter decision-making stack



Non-linear layers interconnected by data flows

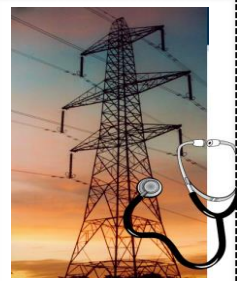
Smarter decision-making stack

CSIR examples: Smarter decision-making

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Mining



Infra-
structure



Subsidence



Logistics



Joburg

a world class African city

Smart city



Fire



Oceans



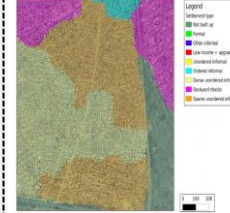
Energy



Water



Safety



Settlements



Testbeds for Reliable Smart City Machine
to Machine Communication



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Applicable to many domains

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Mobility
Transport
Infra.

Green
Energy
Water
Waste

E-Services

Safety
Disaster
Crime

E-health

Mining

Education

Using data from multiple domains can
improve decisions

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Sharing of information

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Digital cameras at a crossing in Singapore

More data is better? => Share !

Who do we trust?





Energy example



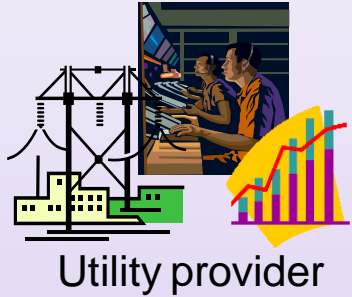
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Smart energy Utility perspective

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Utility provider

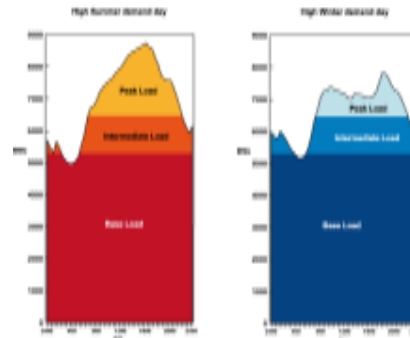
Planning and forecasting applications

Network connectivity status

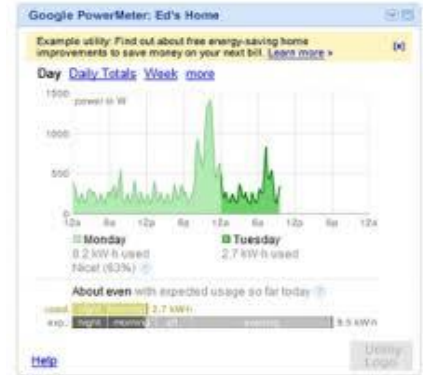


Load distribution management

Load curves for Typical electricity grid



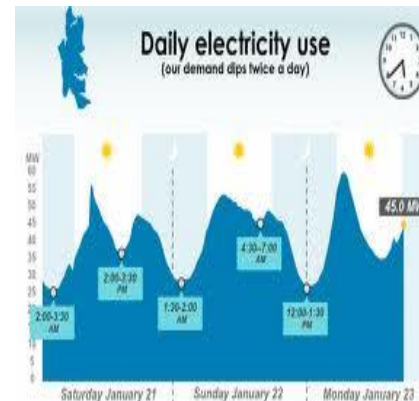
Electricity consumption



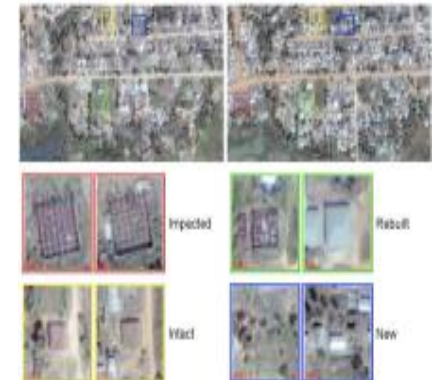
Alerting function



Short term projections

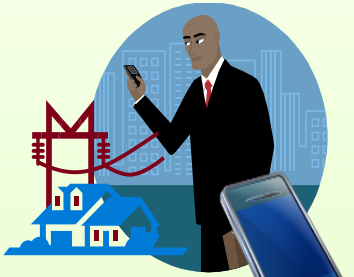


Long term projections



Smart energy Home - office perspective

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Home - office
owner

Home owner
dashboard

Electricity consumption
- appliance



Alerts



Electricity consumption
- local



Preferences /
personalisation



current

today

this week

this month

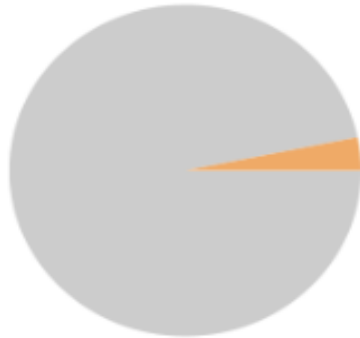
this year

Summary Demand Graph per Area

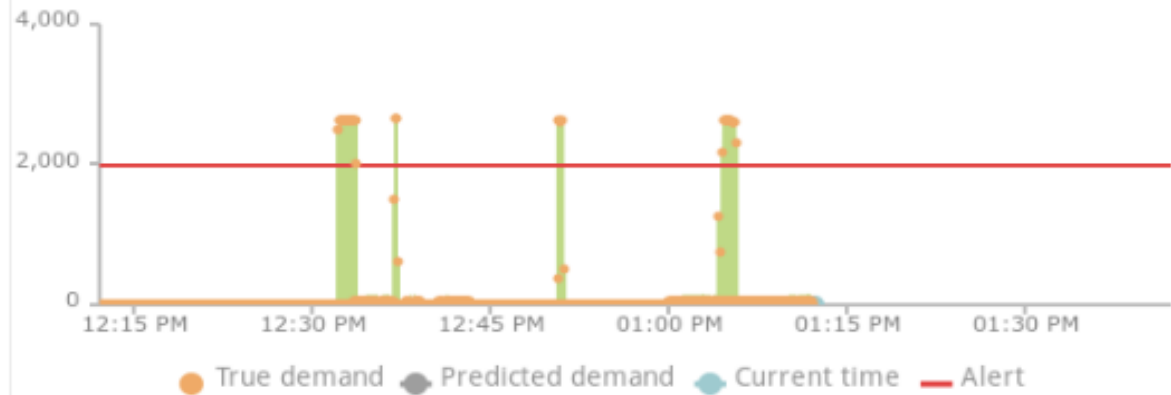
▸ Johannesburg

▾ Meraka Testbed

Toasters
 Reading lights
 Kettles

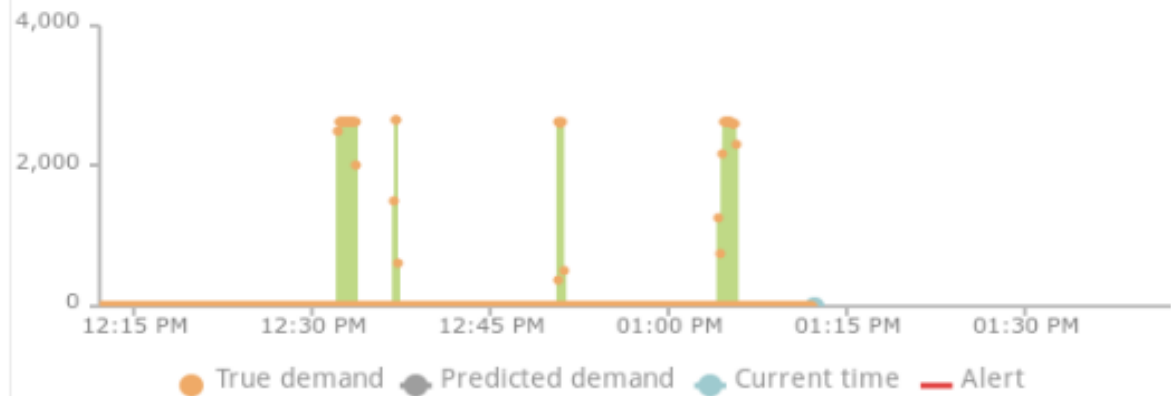


Data last received on: Mon May 18 2015 13:12:02



▾ Kettles

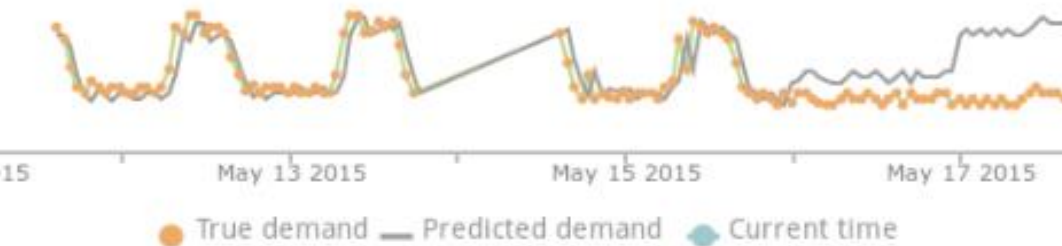
Data last received on: Mon May 18 2015 13:11:59



▾ Reading lights

Data last received on: Mon May 18 2015 13:35:00

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Signed in as Jurie du Toit

SIGN IN

SIGN OUT

Authenticating ...



Eskom (Trescimo)

REALTIME TODAY (HISTORY) THIS MO (HISTORY)

Total Lamp Power Fan Power

2
Watts

ON

Last Updated:
23-09-2015 10:04:59

Eskom (Trescimo)

About
Contacts
Exit

Month to Date's Device Power (W) & Energy (kWh) Usage [2015-09]

15d(11h) 16d(03h) 18d(20h) 21d(01h) 22d(14h)

■ Power Usage Data (W) ■ Energy Usage Data (Wh)

REFRESH

Water example



Macro-scale



Meso-scale



Micro-scale



Water example

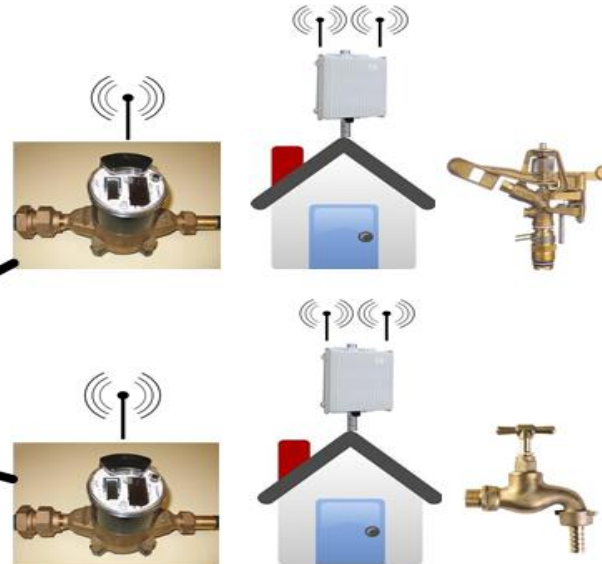
Water storage



Back Office



Residential area

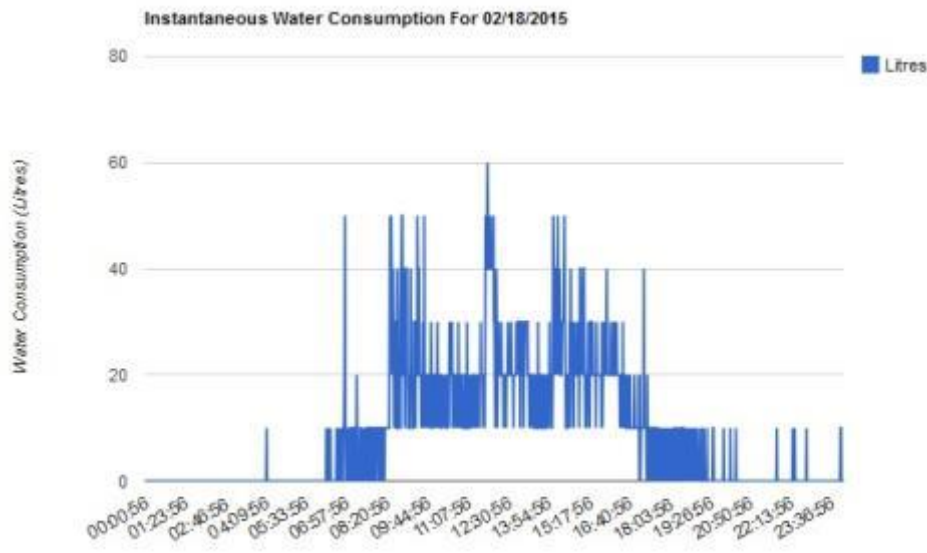


Distribution

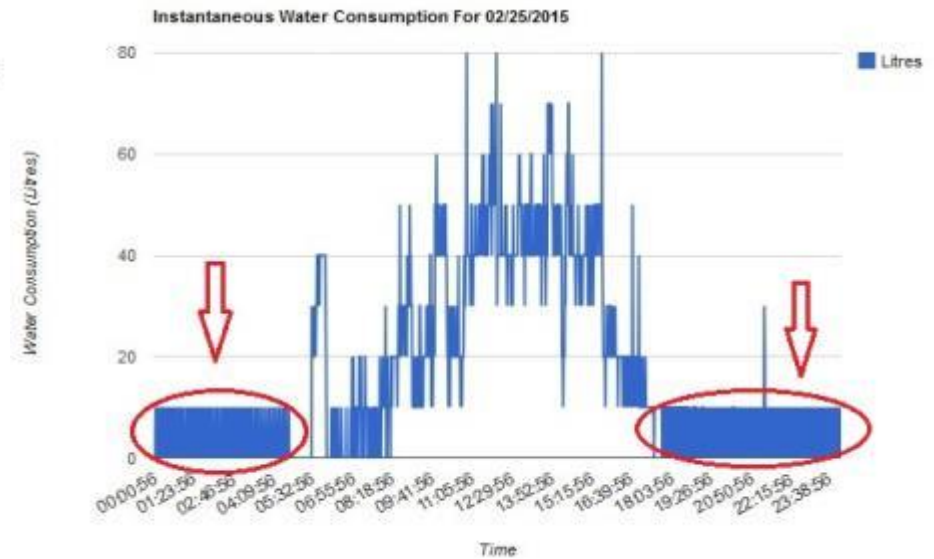
- Automated metering
- Real time
- Bulk metering
- Loss detection
- Anomalous use
- Trend prediction

Water example

Normal usage

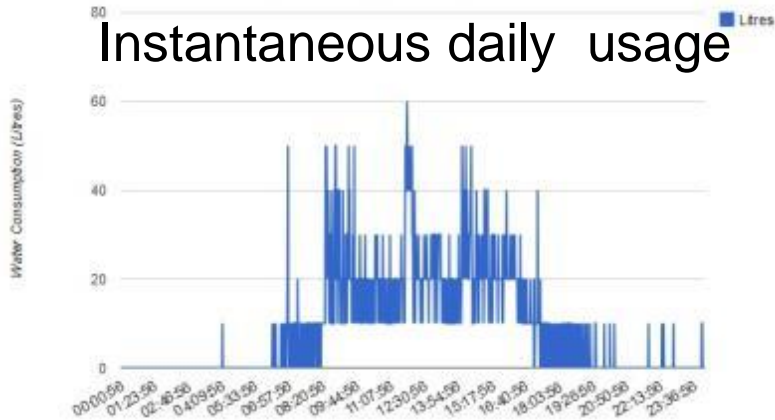


Abnormal usage

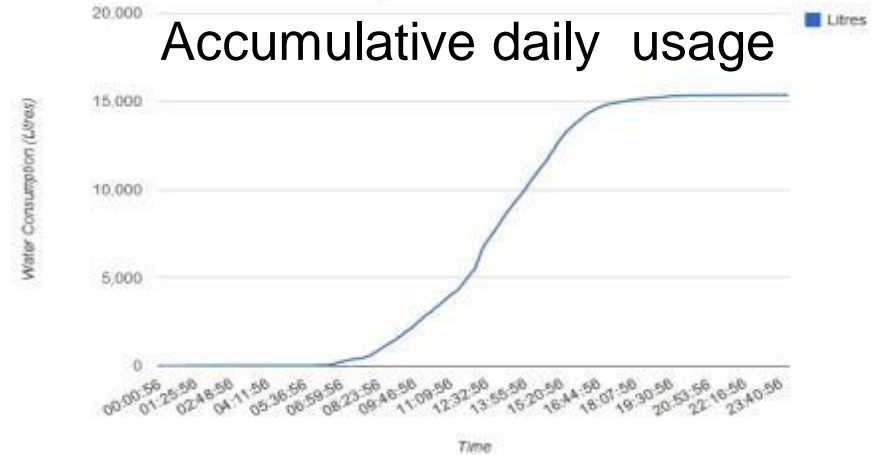


Water example

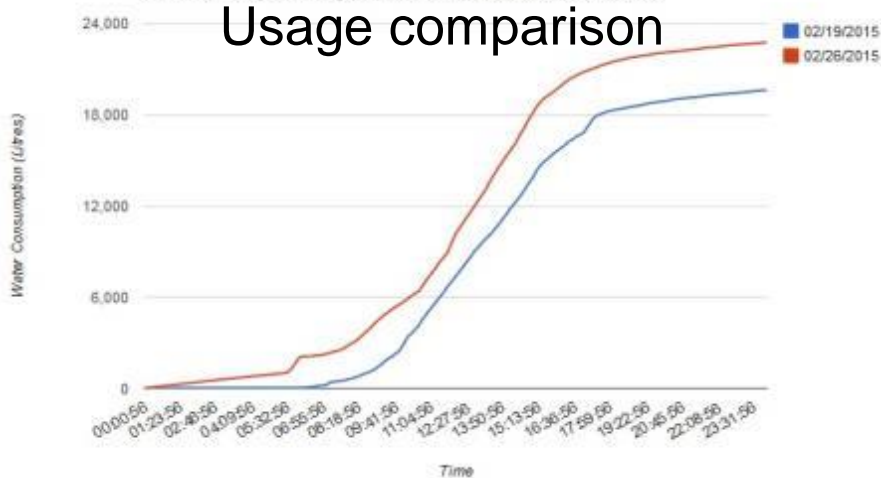
Instantaneous Water Consumption For 02/18/2015



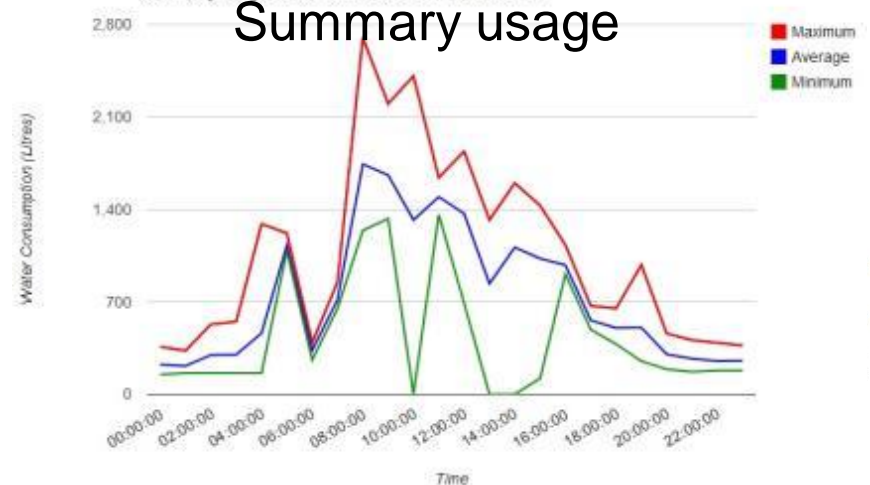
Accumulated Water Consumption For 02/11/2015



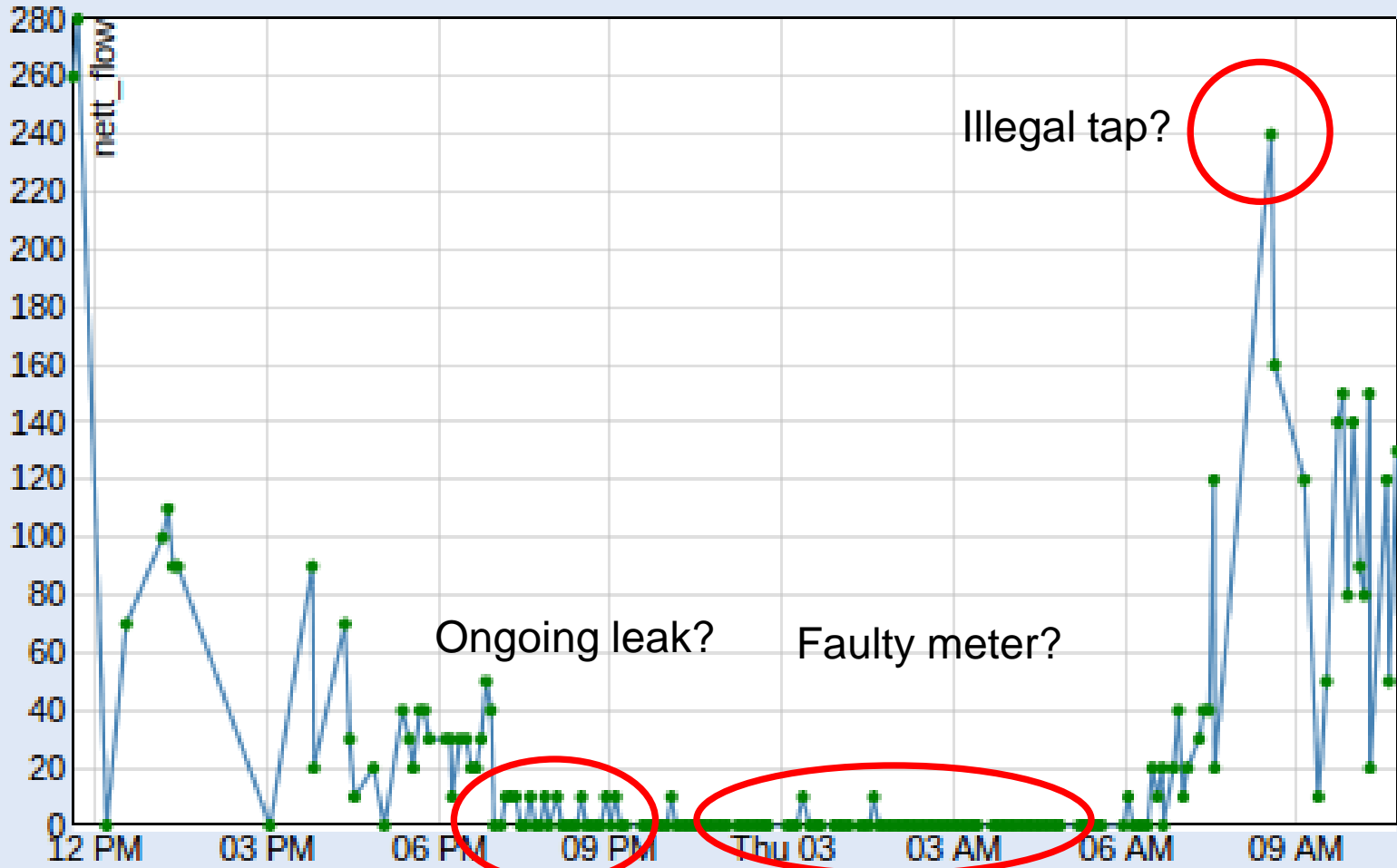
Water Consumption Comparison for Dates 02/19/2015 and 02/26/2015



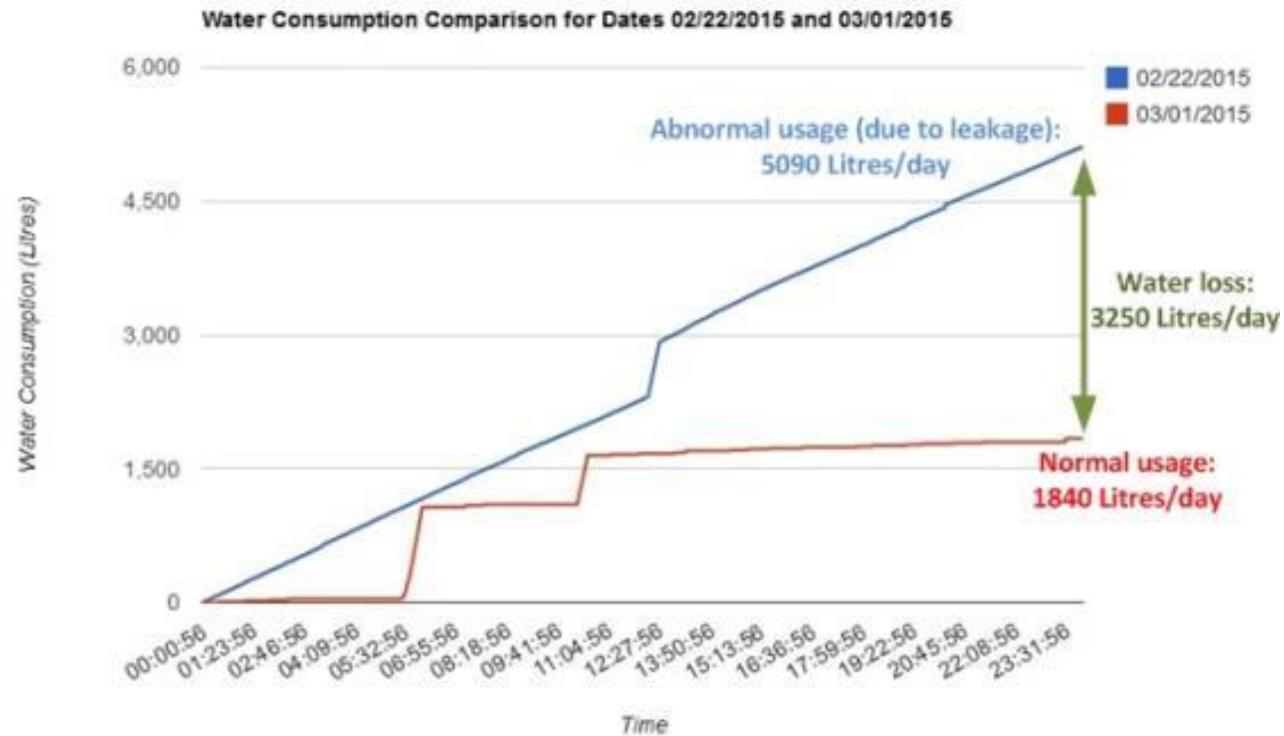
Summary Usage Between 04/13/2015 And 04/17/2015



Water example



Leakage detection





Mining example

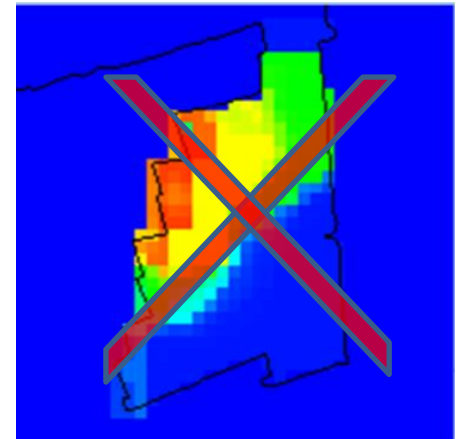
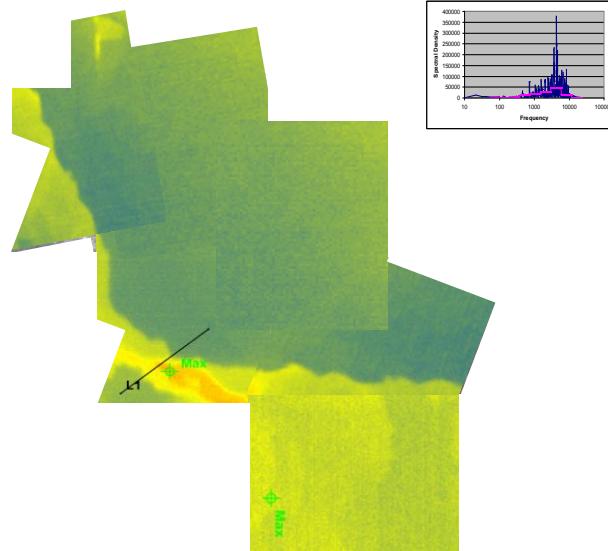


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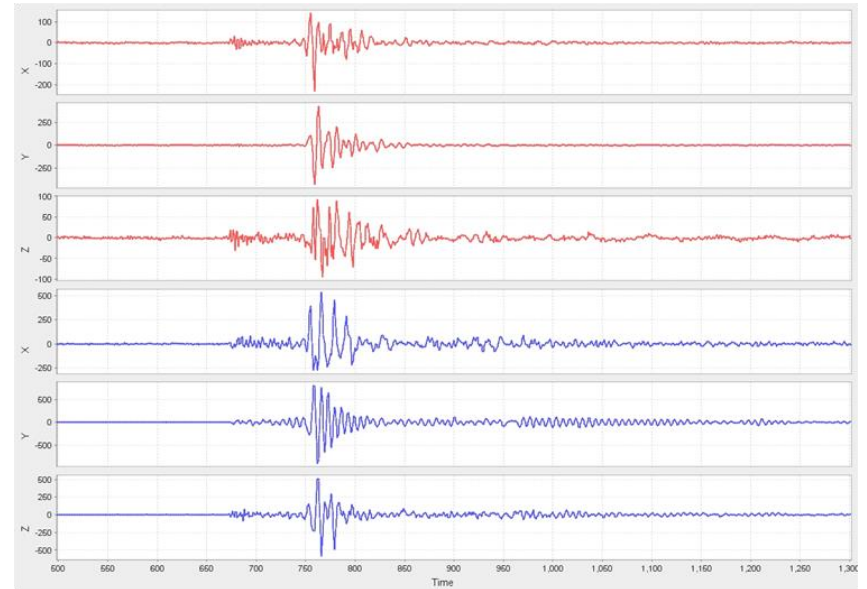
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Mining example



Mining example

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Value of paterning with CSIR

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- Expert vision of neutral party
- Thought leadership
- International collaboration, eco system
- Joint execution of innovative projects
- Technology skill to develop novel solutions
- Stimulation of local employment, local manufacturing, local skills/HCD development, new entrepreneurship and smarter industry
- Improving service delivery with standardised solutions

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Thank you

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