Energy & Revenue
Management

How will new technology change the revenue protection processes in the future?

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Overview

- **Introduction**
- **What is smart metering?**
- **Conventional Revenue Protection processes**
- **SM facilities to support RP**
- **New approach to RP processes**:
- **Collection and analysis of data from SM systems**
- **Advantages of using new methodologies**
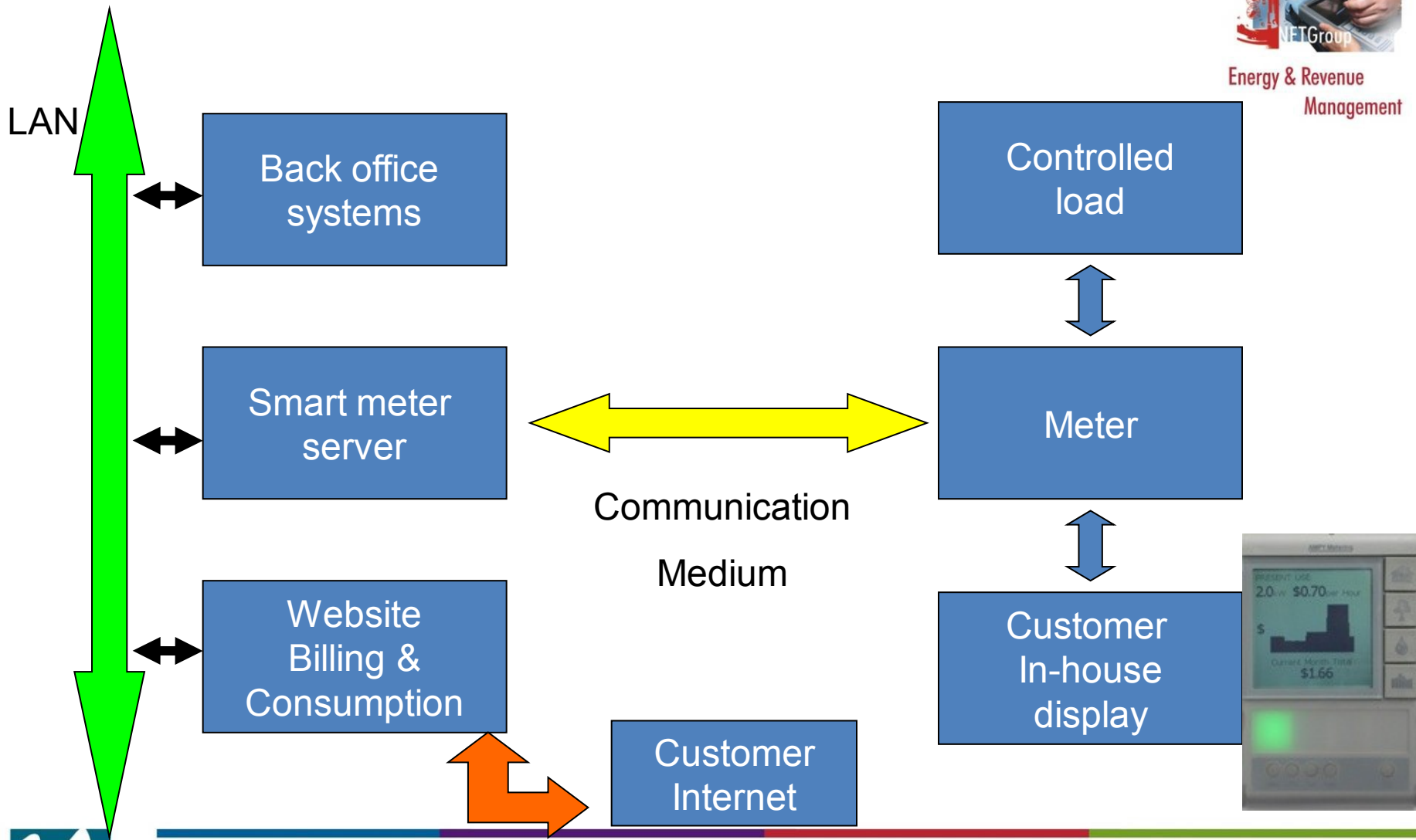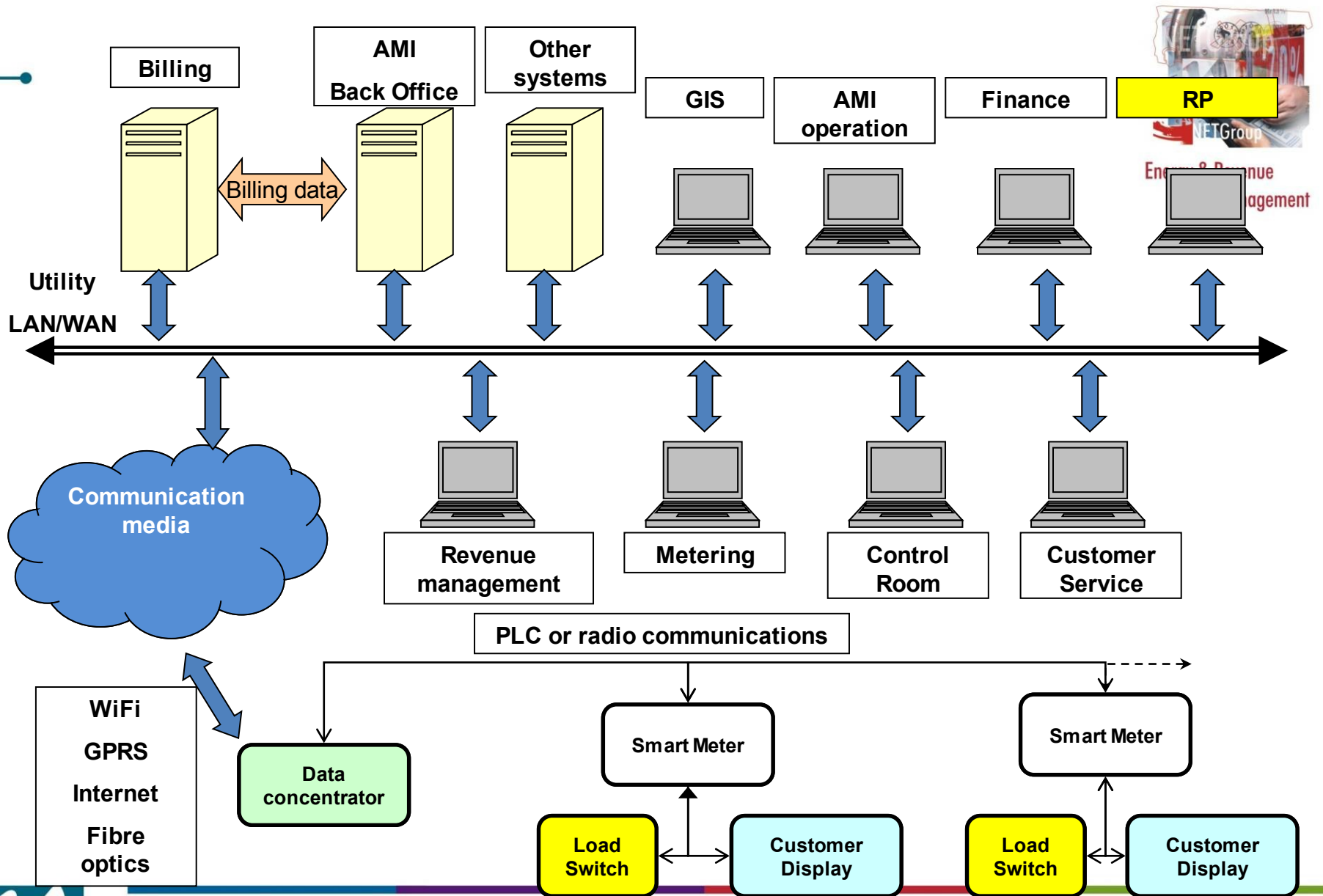- **Skills to drive new processes**
- **Conclusion**

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SM features

- *"Smart metering has the following features:*
- *Automatic processing, transfer, management and utilisation of metering data*
- *Automatic management of meters*
- *2 way data communication with meters*
- *Provides meaningful and timely consumption information to the relevant actors and their systems, including the energy consumer*
- *Supports services that improve the energy efficiency of the energy consumption and the energy system (generation, transmission, distribution and especially enduse)" (*European Smart Metering Alliance)

Typical SM configuration

LAN

| Back office systems |

| Controlled load |

| Smart meter server | Communication Medium | Meter |

| Website Billing & Consumption |

| Customer Internet |

| Customer In-house display |

PRESENT USE
2.0 kW $0.70 per Hour
$
Current Month Total
$1.66

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Billing

AMI Back Office

Other systems

GIS

AMI operation

Finance

RP

Billing data

Utility LAN/WAN

Communication media

Revenue management

Metering

Control Room

Customer Service

PLC or radio communications

WiFi
GPRS
Internet
Fibre optics

Data concentrator

Smart Meter

Smart Meter

Load Switch

Customer Display

Load Switch

Customer Display

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Non- technical losses

- Incorrect metering
- No Metering/ malfunction
- Incorrect meter readings
- Tampering with meters
- Bypassing of meters

kWh

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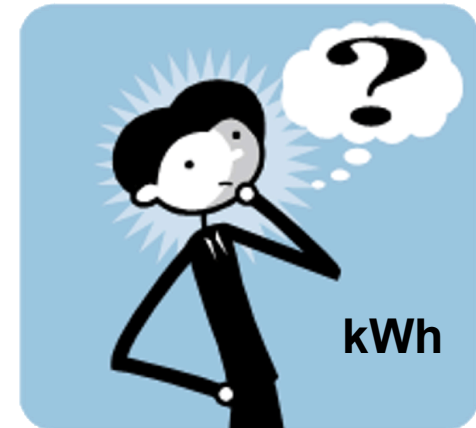
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Commercial losses

- Incorrect billing
- Incorrect tariffs
- Ineffective revenue collection
- Administrative losses

$$$?

Unit/ revenue losses

If one uses 2009 Eskom data the following can be calculated

– Non-technical losses amounts to 10% in the RSA according to a PB Power report

– Non technical losses Eskom 5927 GWh (50% of Distribution loss)

– Non technical losses of redistributors 4417 GWh (5% of energy purchased)

– Total cost at average Eskom supply price R0.25 = R2,586 bil

– Total cost at average Eskom residential selling price R0.53 = R5,482 bil

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Conventional RP

- Meter audits (physical visits)
- Billing/ prepayment consumption reports
- Disconnect non-payer/ tamperer by visiting the site.
- Follow up visits to ensure that the customer does not re-connect himself.
- Frequency of visits once every 1 to 5 years
- Meter reader can be used to report tampering
- Process is time consuming and expensive

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SM requires new RP methods
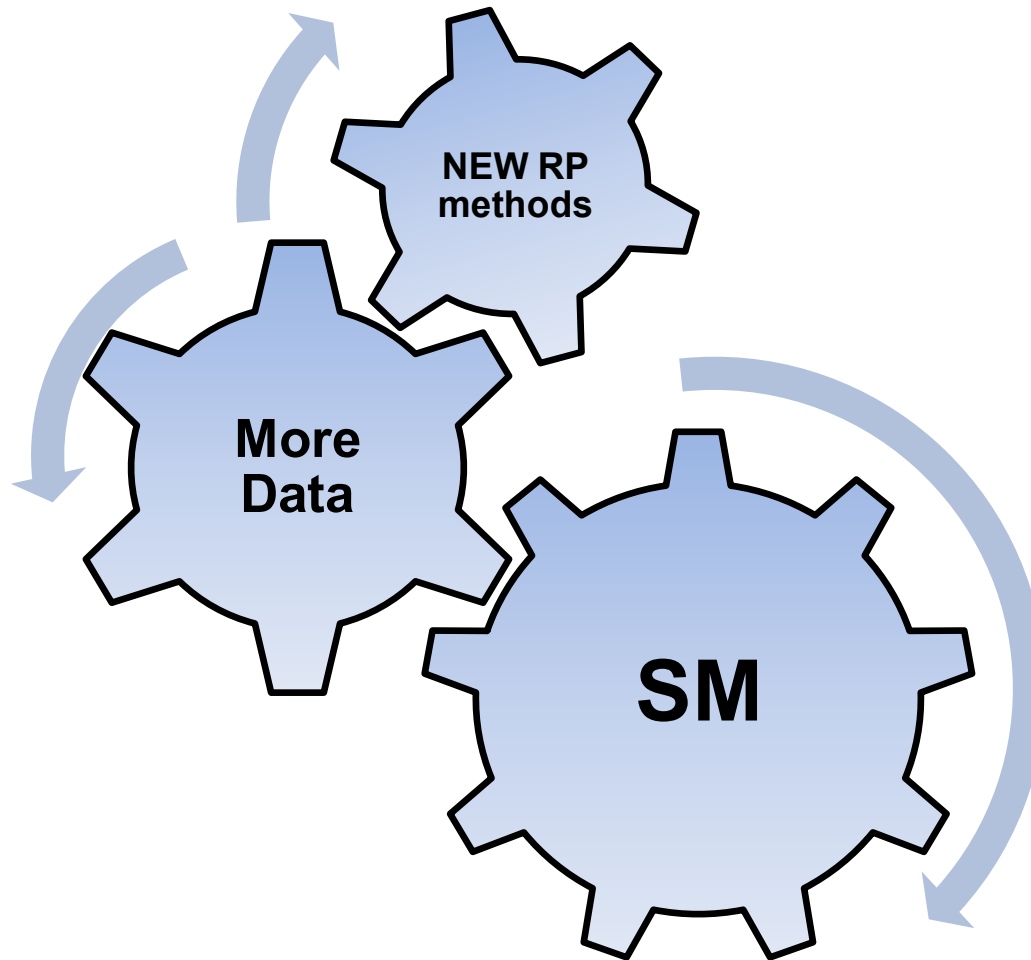
SM RP facilities

According to NIST (Xanthus Consulting International, 2009) the following RP functionality should be provided by the SM system

- *Tamper Detection*

- *Anomalous Readings detection*

- *Periodic Meter Status to Detect Any Tampering*

- *Suspicious Meter*

- *Remote Disconnect for Non-Payment*

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Advantages of using SM systems

- 24h monitoring of all meters.

- Auto energy balancing.

- Payment and billing monitoring.

- Only audit meters on exception reports/ more efficient operations.

- Early warning of any fraudulent actions at the metering site.

- GPS tagging of meters during the installation phase will allow the RP operators to go to a specific meter directly

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Meter and customer data

- One view of:
  - Meter readings
  - Meter alarms
  - Energy balance metering
  - Billing data
  - Tariff data
  - Customer history and type
  - Payment data
  - Various analysis and reporting options
  - Inspection scheduling and feedback
- Meter failure feedback
- Administrative processes

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Single RP view on customer
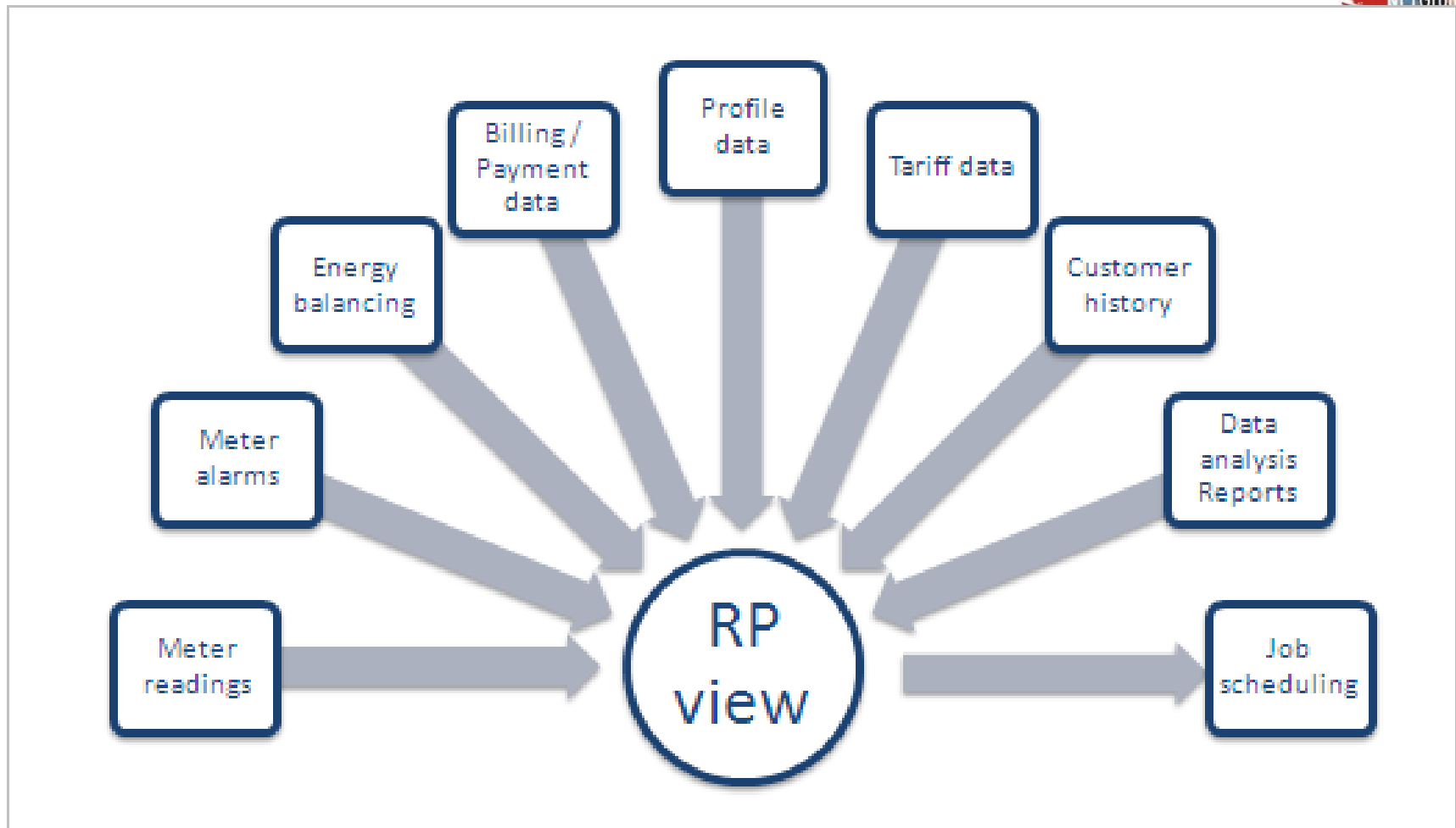
GIS view of problem areas
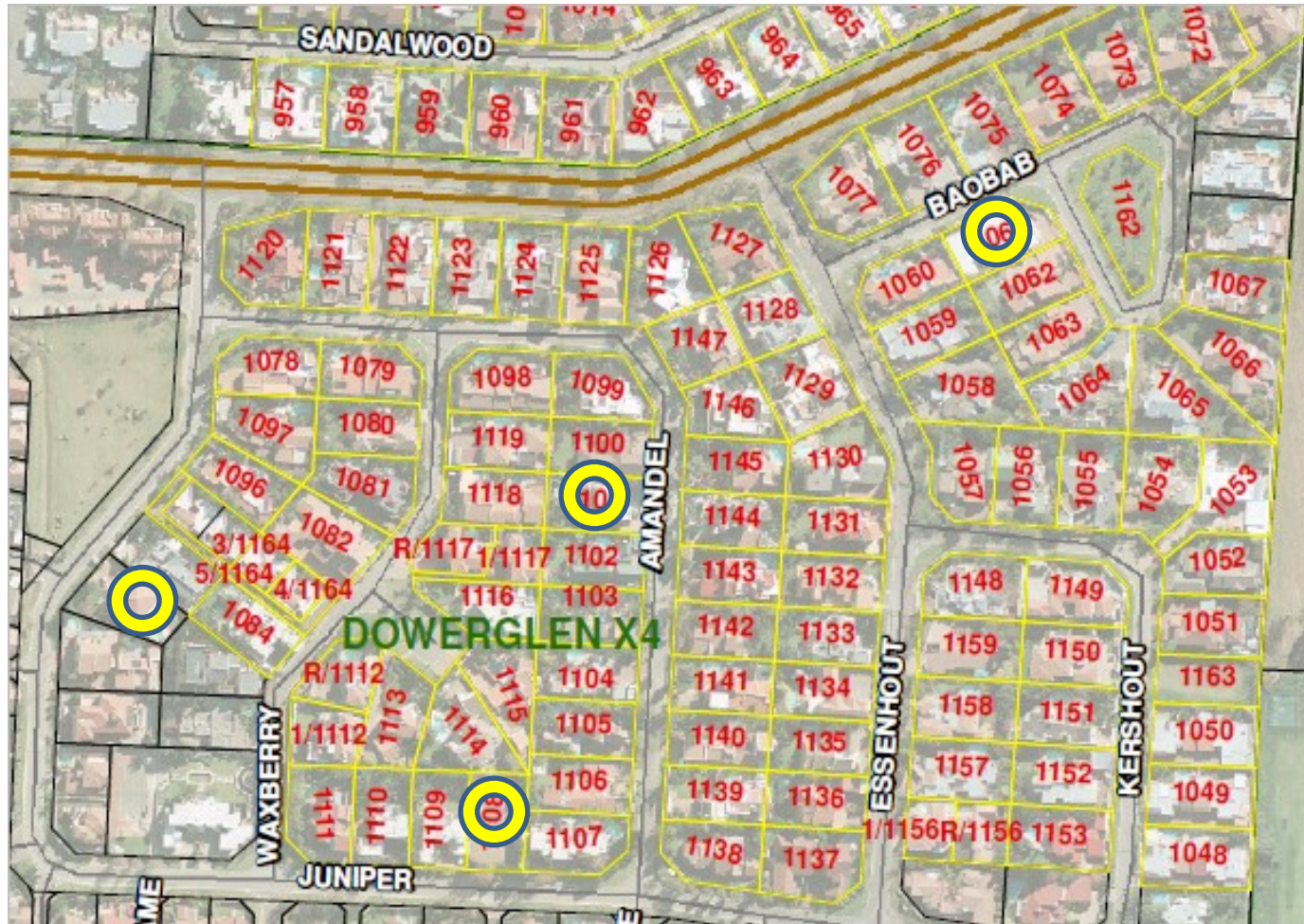
Residential Profile
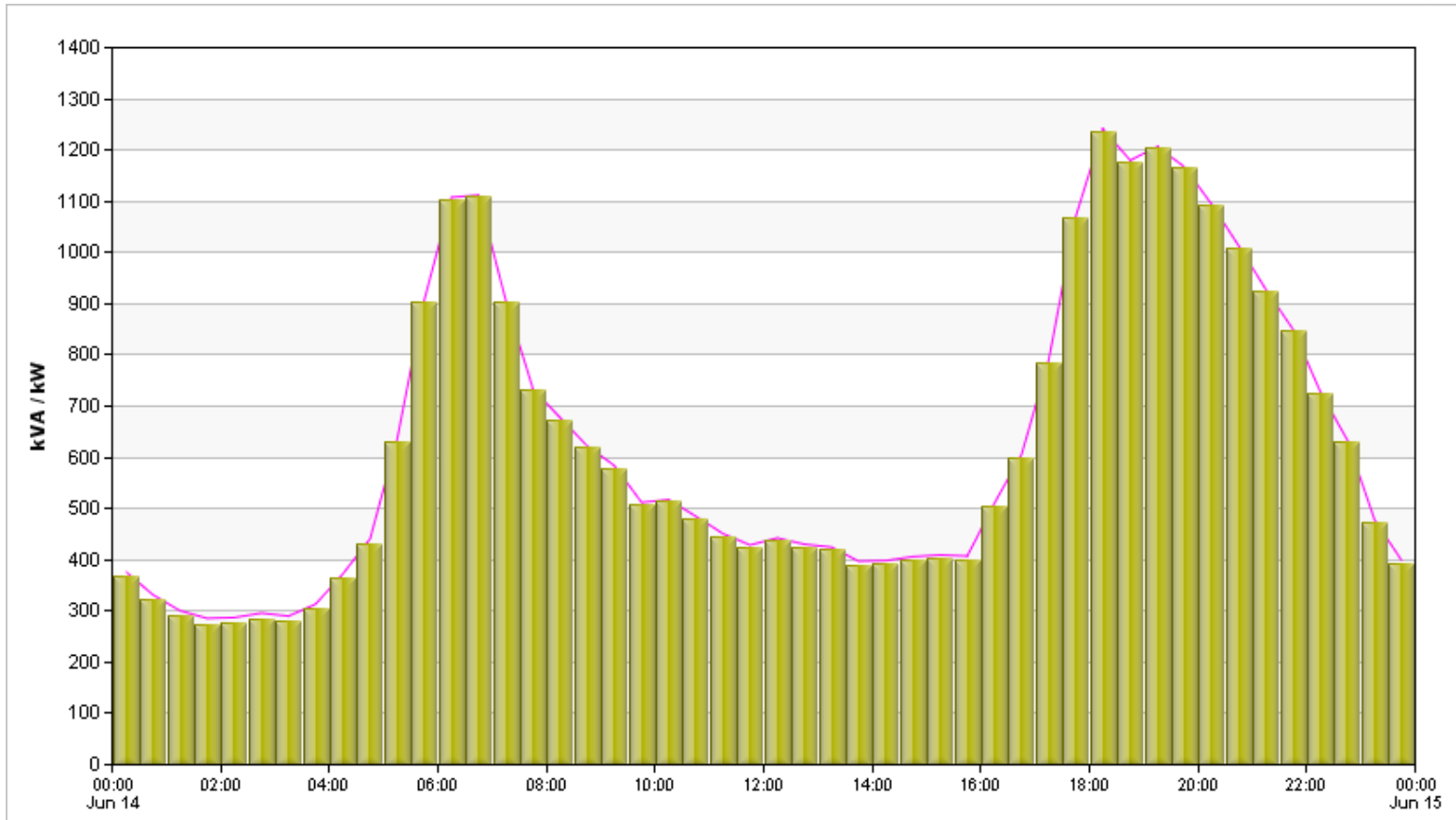
Trending graphs

Energy balancing

Customers

SM1

Substation

Supply to
substation

SM2

SM3

SM
SubS

SM_n
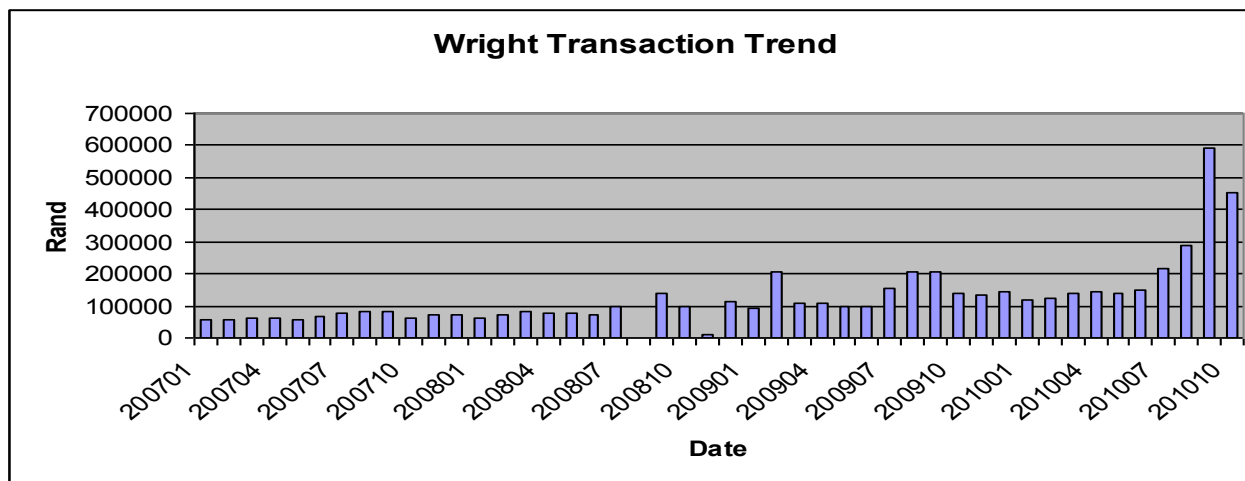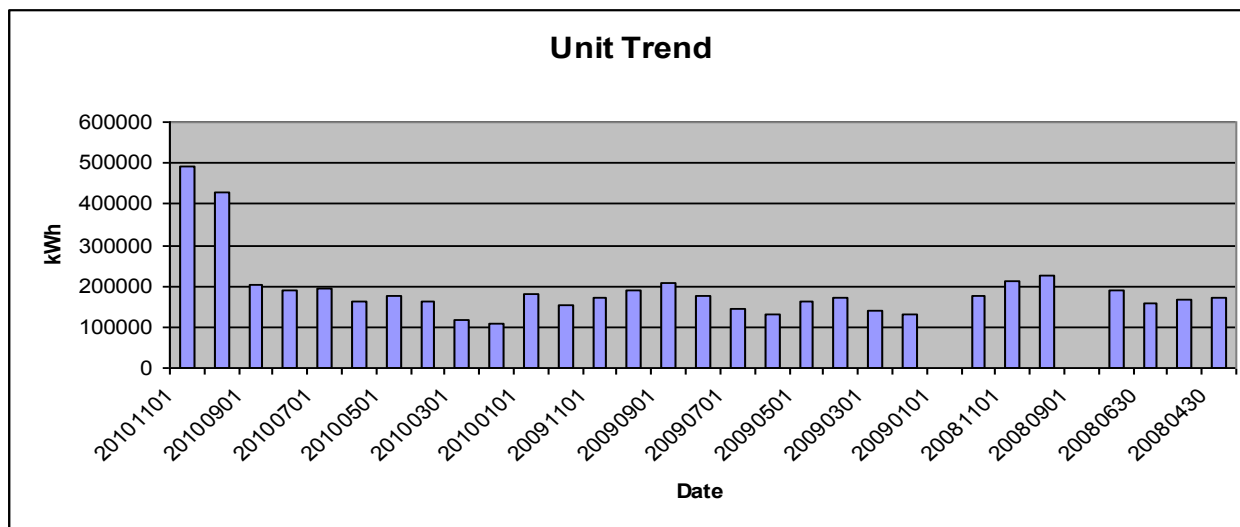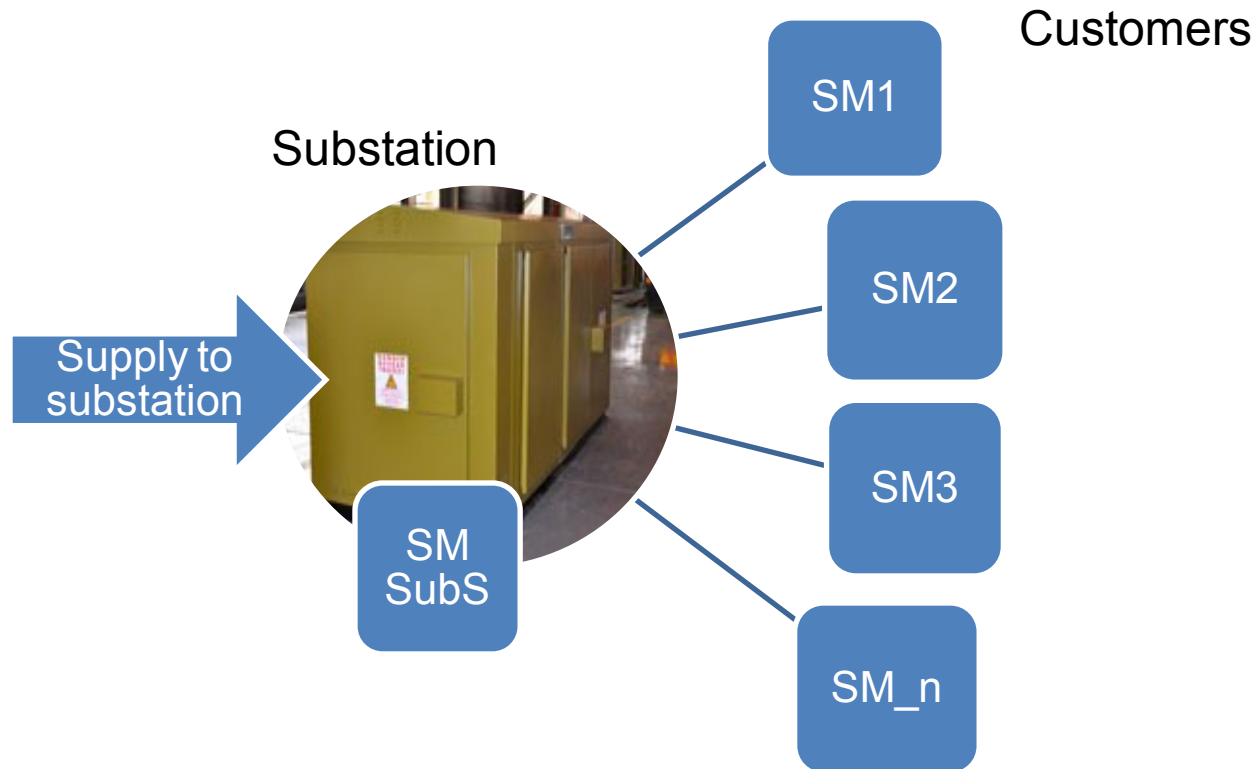
Substation SM units = Sum customer SM units

New approach to RP

- The RP operators will thus not have to embark on sweep audits due to the fact that the system is self auditing.

- ½ hour consumption data uploaded every day as well as alarms from the meters will enable RP operators to identify tampered or faulty meters on a daily basis.

- Field work will be directed at specific tamper cases resulting in more efficient processes.

- Many RP processes will be meter data related rather than field work driven..

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New approach to RP

- Automated energy balancing will assist RP operators to identify problem areas effectively.
- Data from billing systems will assist with the identification of tariff problems, billed reading problems, non-payment issues
- Administrative process verification
- Meter reading verification

SM data analysis

- Reverse power
- More than say 20% deviation from average consumption
- Lower power consumption when the group increases
- Energy balance analysis
- Power loss when group is still powered
- Tamper alarm
- High number of power loss instances
- Inspect 1/2h consumption profiles
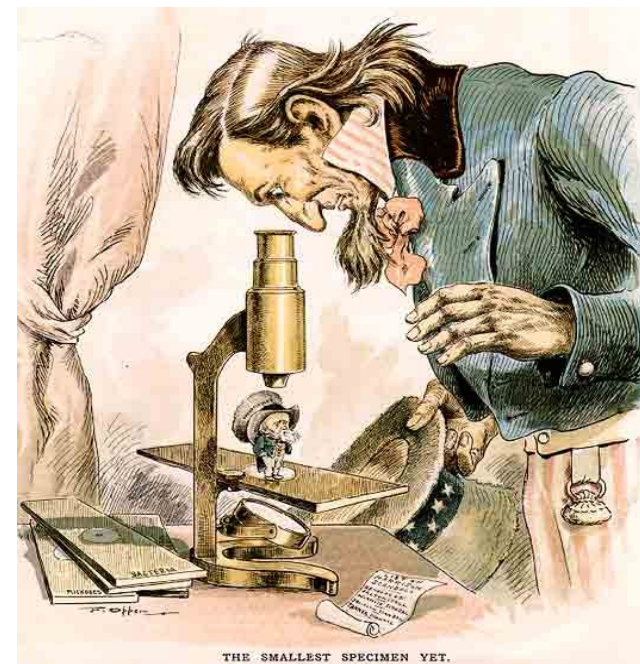- GIS plotting of problems to detect hot spots
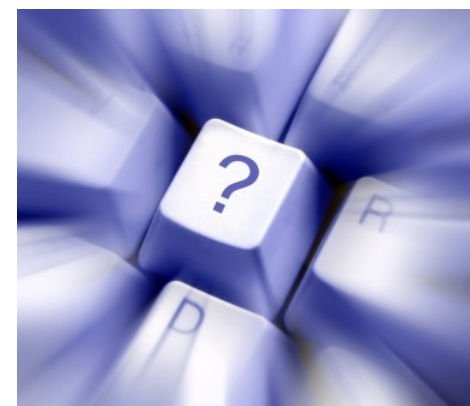
New skills

- Computer systems
- Databases usage
- Reports generation with the MDMS
- Data interpretation
- SM metering systems
- GIS systems
- RP processes

THE SMALLEST SPECIMEN YET.

Conclusions

- New meter technology will require the development of RP operators to acquire new skills to understand and use SM data to manage energy losses.

- SM systems will enable the utility to monitor metering systems 24h/7

- Energy balancing metering will generate and provide automatic loss reduction information

- Non-payment control will be more efficient with remote disconnection facilities

- RP programs will be much more cost efficient and effective with alarm and consumption feedback from the meters in the field

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