

27th Technical Convention 2019

The 4th Industrial Revolution (“4IR”) | *Building the Power Utility of the Future, Today*

Evolving 4IR technologies and digital substations

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ABB South Africa

Hosted by



CITY OF CAPE TOWN
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STAD KAAPSTAD

Why should utilities embrace digital technologies and the new applications enabled by the Fourth Industrial Revolution?

Everything Electric



Electricity demand growing by
60% by 2040

>30 billion connected devices by
2020

35% of new cars electric by 2020

500,000 PV panels commissioned each
day in 2017 - x3 by 2020

connected living market >\$730 billion



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Utilities and the Fourth Industrial Revolution



The changing dynamics of power systems

The core themes in today's changing electricity system include:

- Bi-directional energy flow
- Need for information exchange,
- Storage for grid stability,
- New market designs, rules and regulations,
- New grid protection concepts
- New environmental and energy efficiency regulations,
- Increased capacity and efficiency of assets,
- Increased stakeholder involvement

We need Software Defined power networks



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Digital technologies are driving new innovation

Virtual/augmented
reality



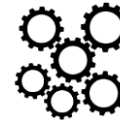
Software-defined
machines



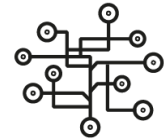
Machine learning



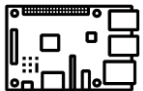
Time-sensitive
networking



Big data



Inexpensive computing



Cloud computing



Cybersecurity



Connectivity



Blockchain



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The dynamic digital world requires dynamic business operations

Digital transformation solutions from the field to the boardroom...
Faster decisions with insight from milliseconds to years.

Field

**ASSET
VISIBILITY**



Control room

**OPERATIONAL
CONFIDENCE**



Operations center

**PERFORMANCE
ORCHESTRATION**



Boardroom

**BUSINESS
AGILITY**



..... Milliseconds Seconds Minutes Hours Days Weeks Months Years Future ➔

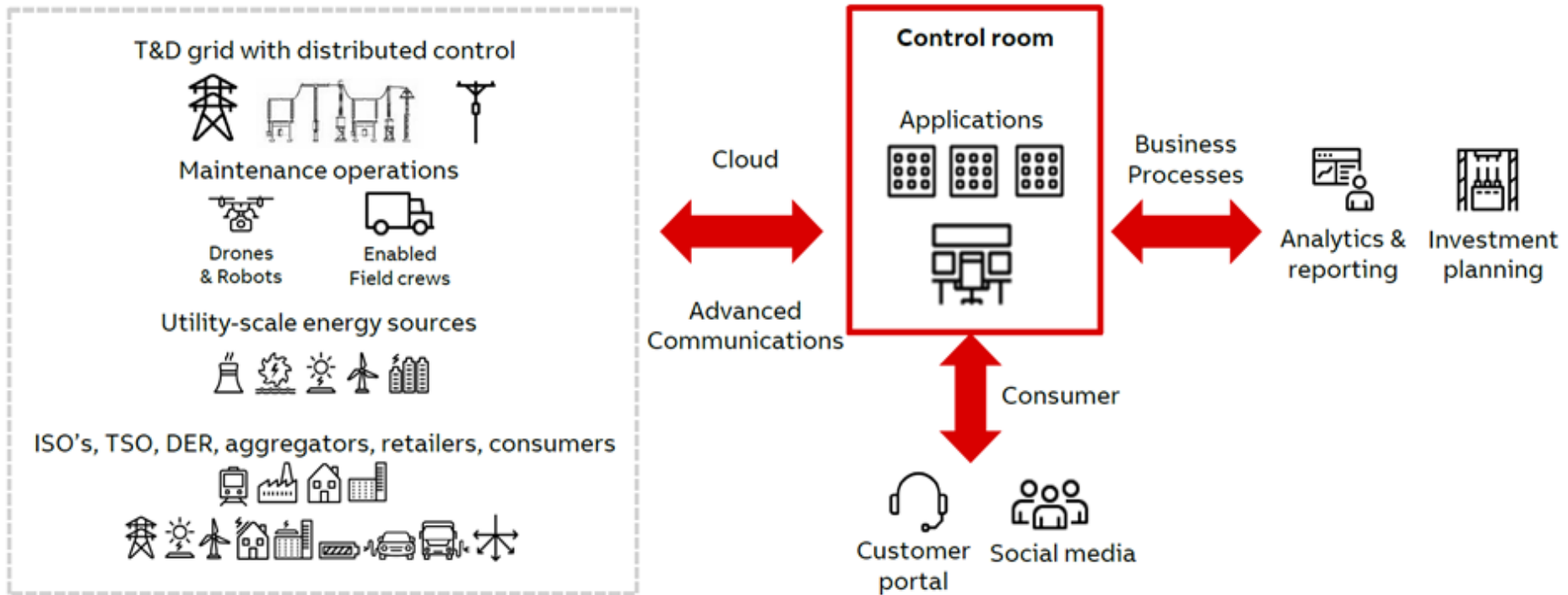
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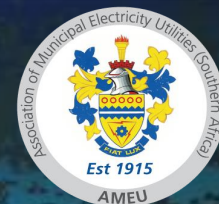
Embracing the Fourth Industrial Revolution



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The Digital Substation

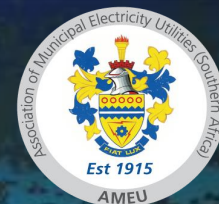
Substation as a data source

- Digitalisation increases flexibility of substation design
- Digitalisation allows substation applications to be implemented in software

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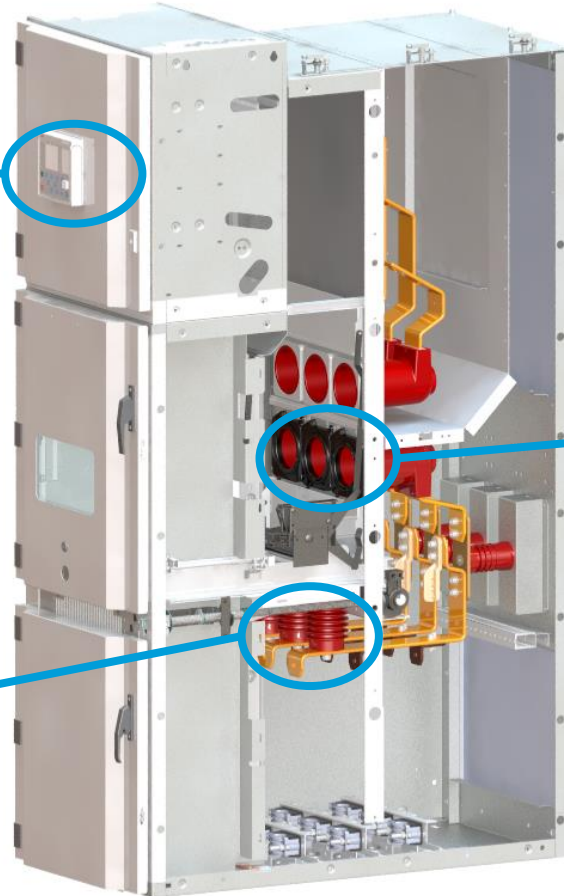


The Digital Substation

Protection relay with IEC 61850

Current sensor

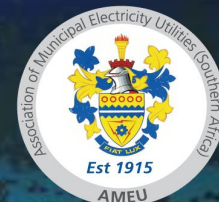
Voltage sensor



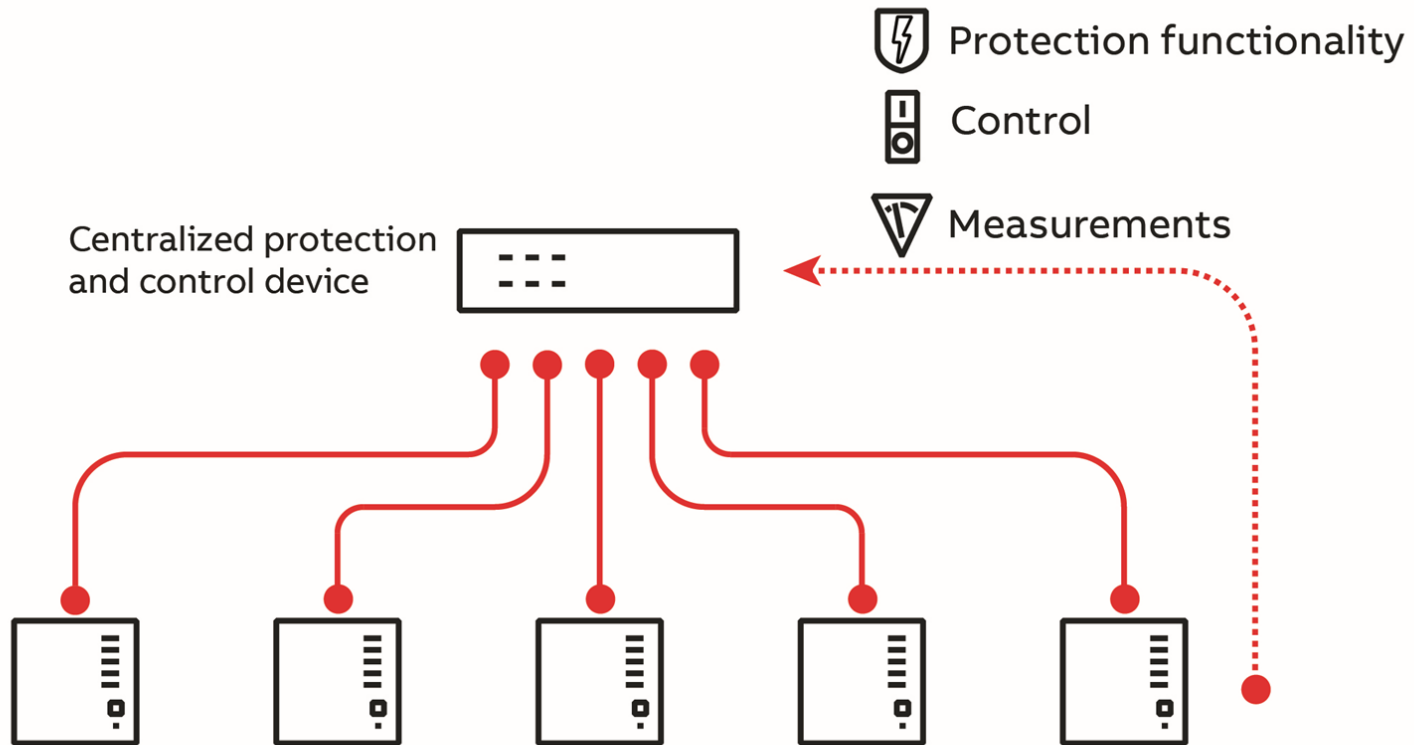
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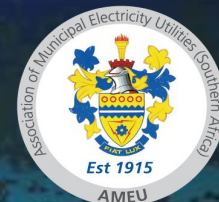
The Digital Substation



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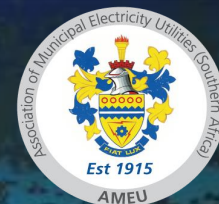


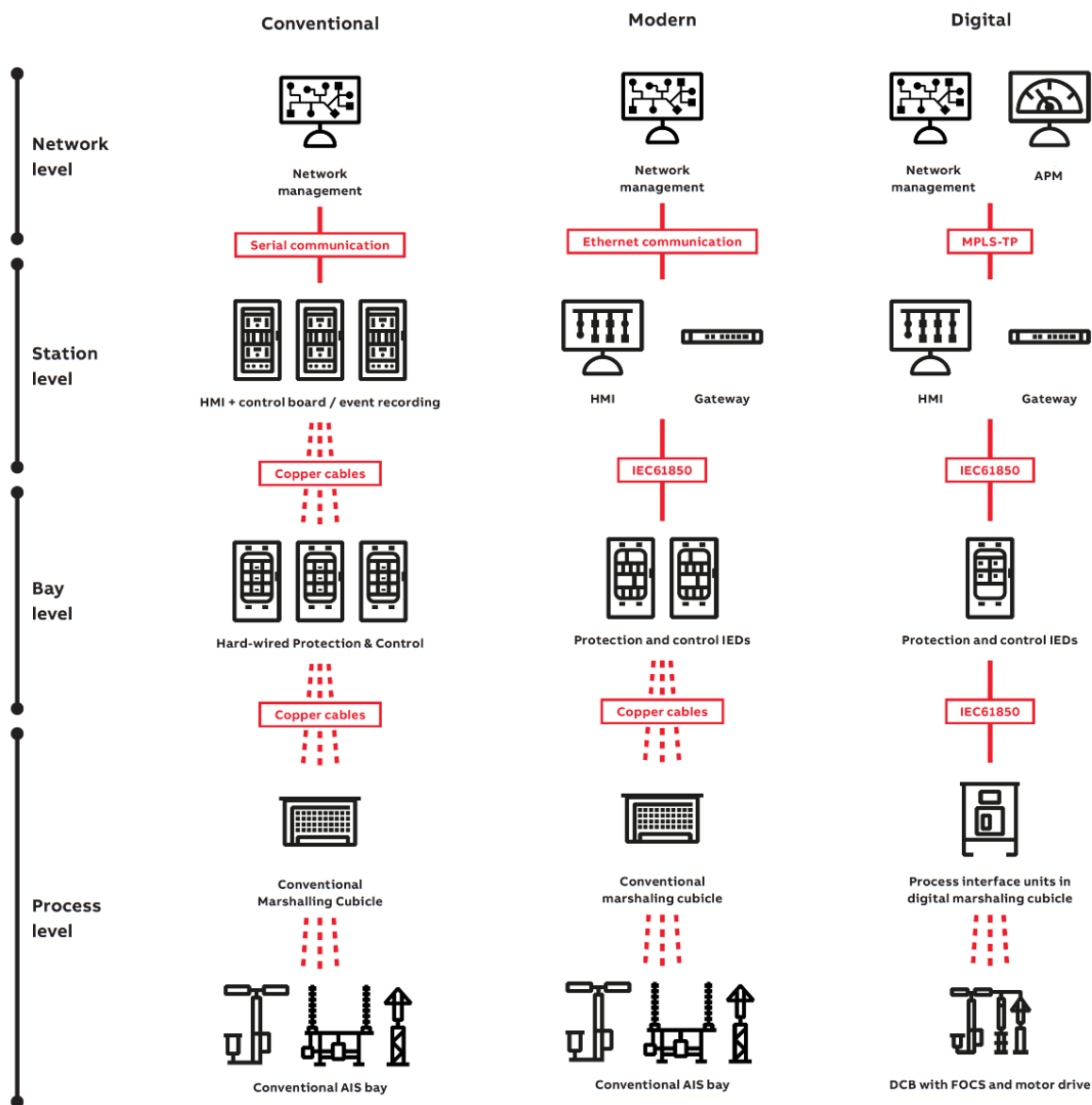
The HV Digital Substation



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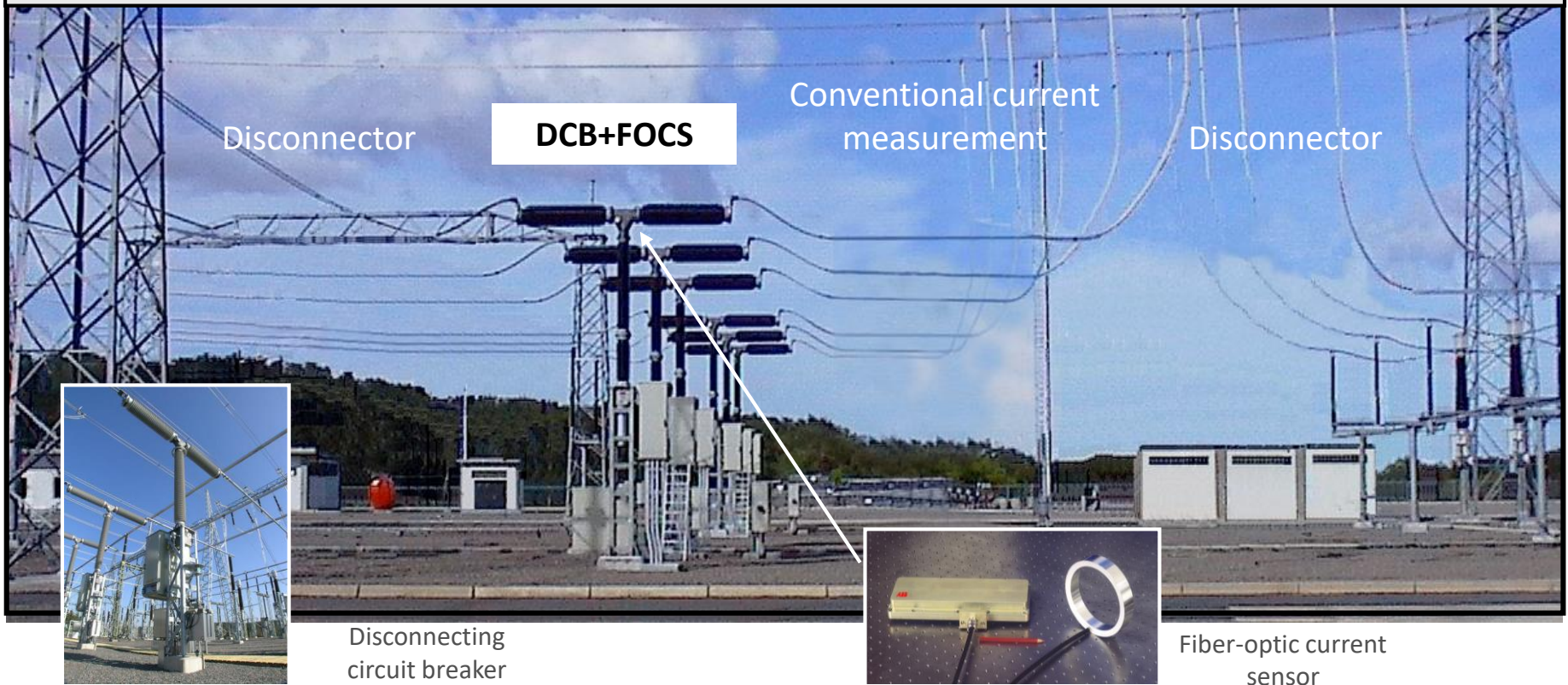
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Less space required

1. Reduce needed space with DCB, Disconnecting Circuit Breaker
2. Minimize the footprint even further with integrated optical CT



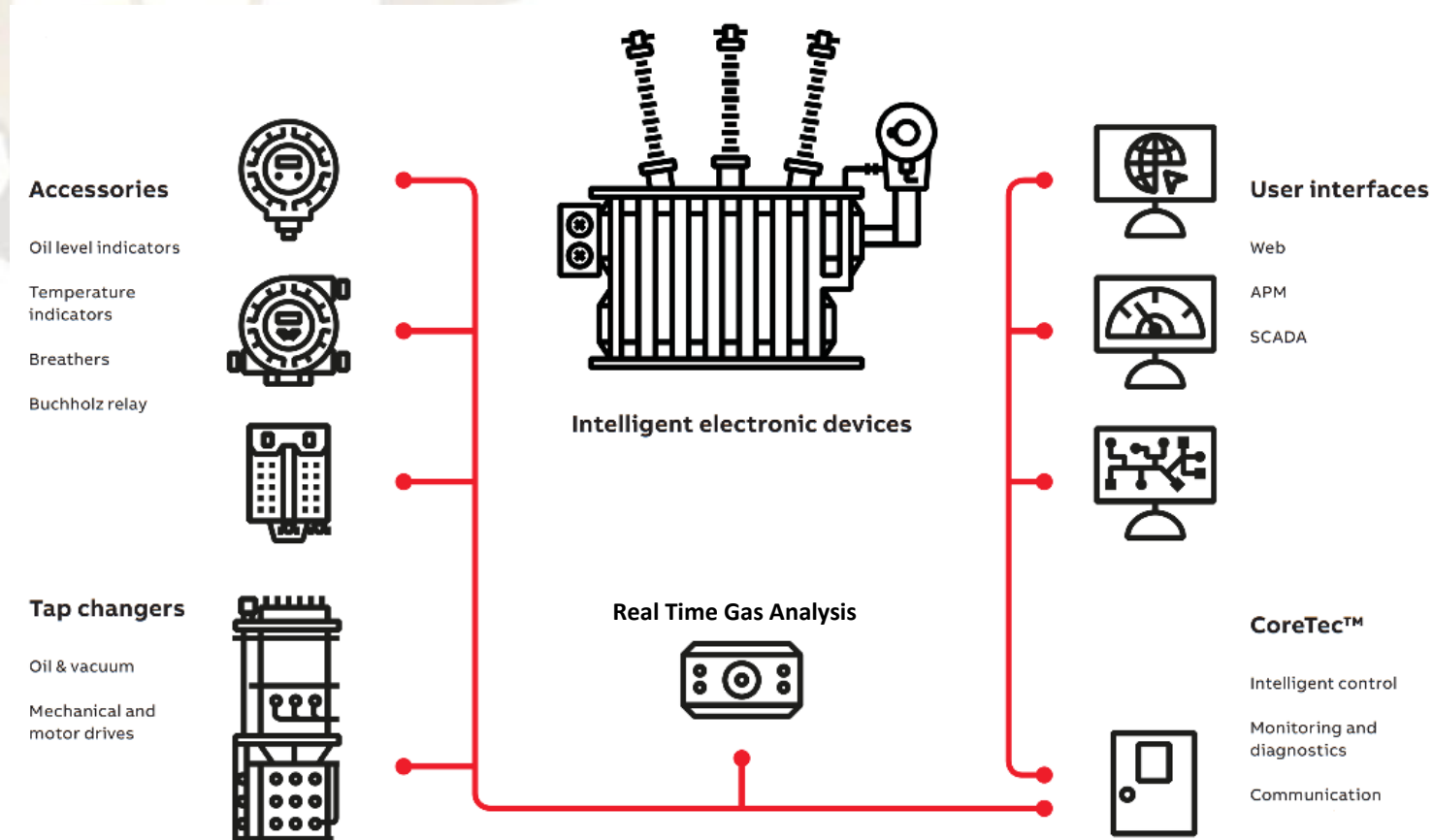
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The Digital Transformer



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4IR: Big picture thinking

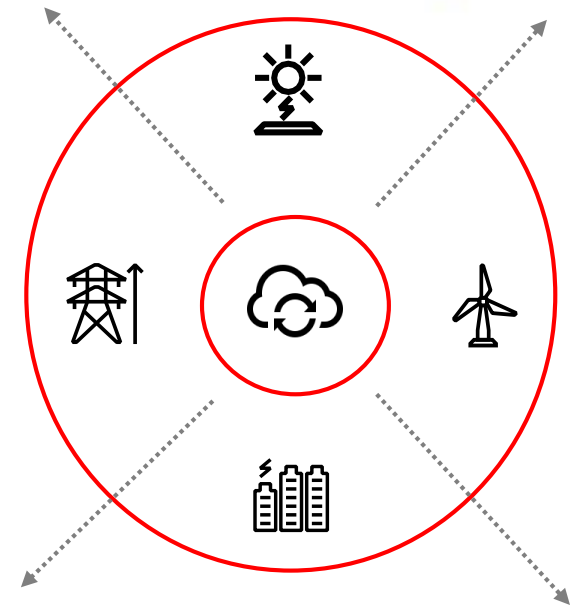
Ways Forward

Moving to the software defined power grid brings flexibility to cope with new demands on the grids

Skills and resources need to be developed to cope with this new digital age

Allow a new generation of engineers the freedom to innovate and implement ideas

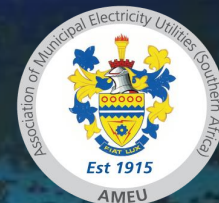
Important to develop a digital strategy

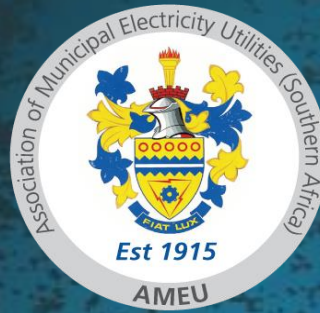


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Thank you

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