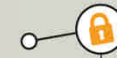
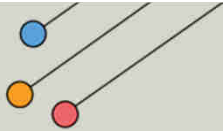


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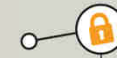
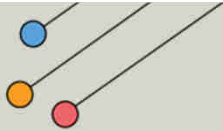
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Cyber-Physical Security and Resilience Measures for Future Smart Grid Services

Padraic McKeever

Institute for Automation of Complex Power Systems

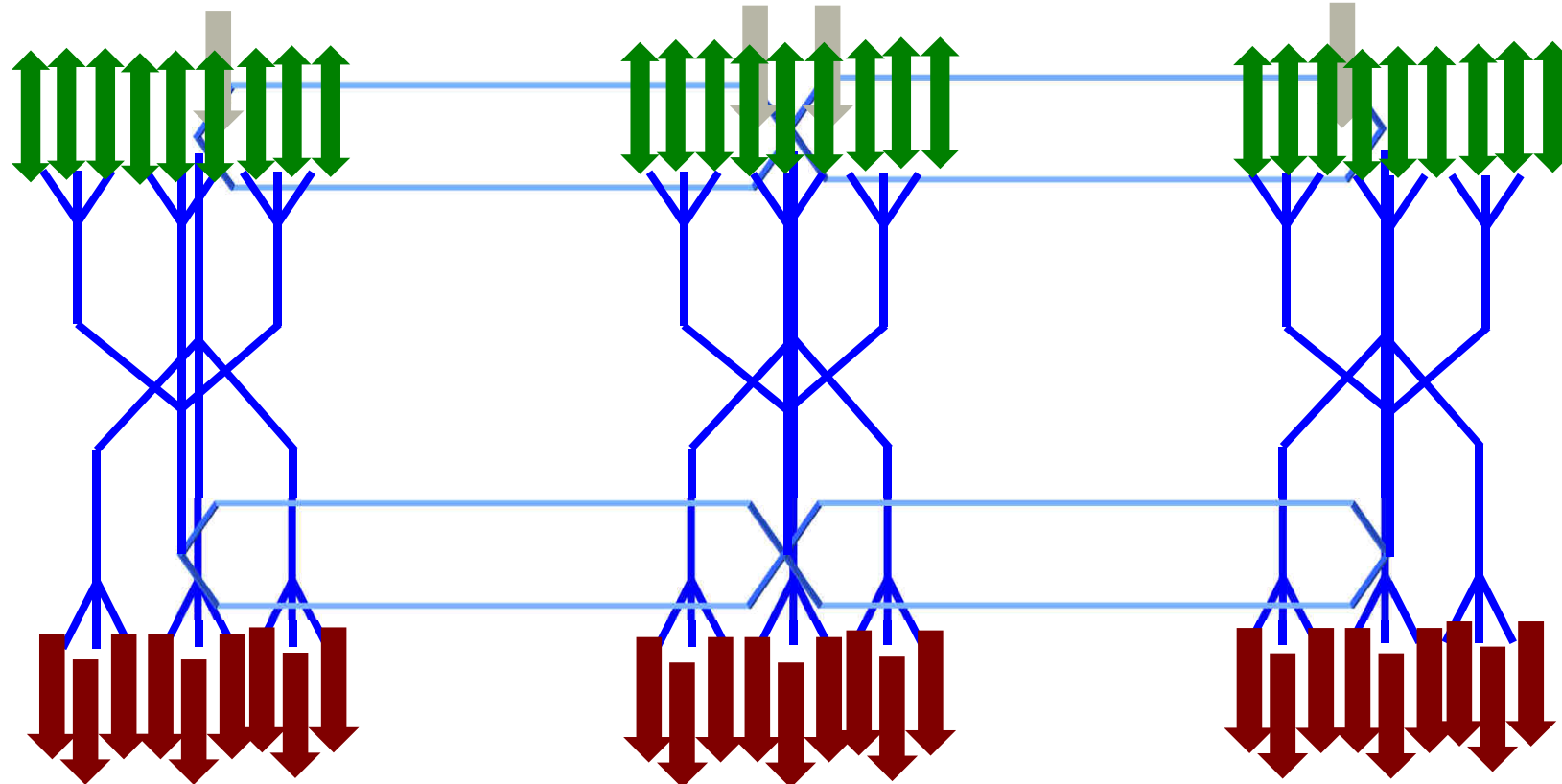
RWTH Aachen University, Germany



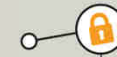
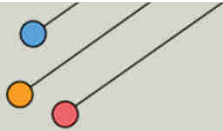
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Grid (r)evolution: customer-centric energy systems



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From Physical to Cyber-Physical: example of Telecom

1940s-80s



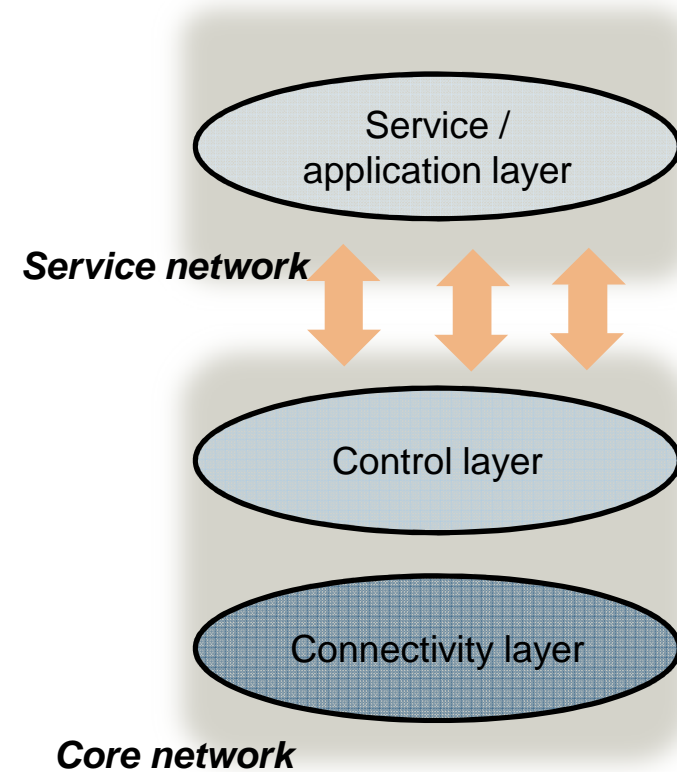
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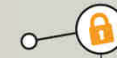
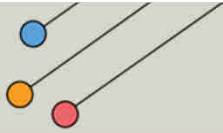
1970s-now



Source: ericsson.com

mid 1990s-now

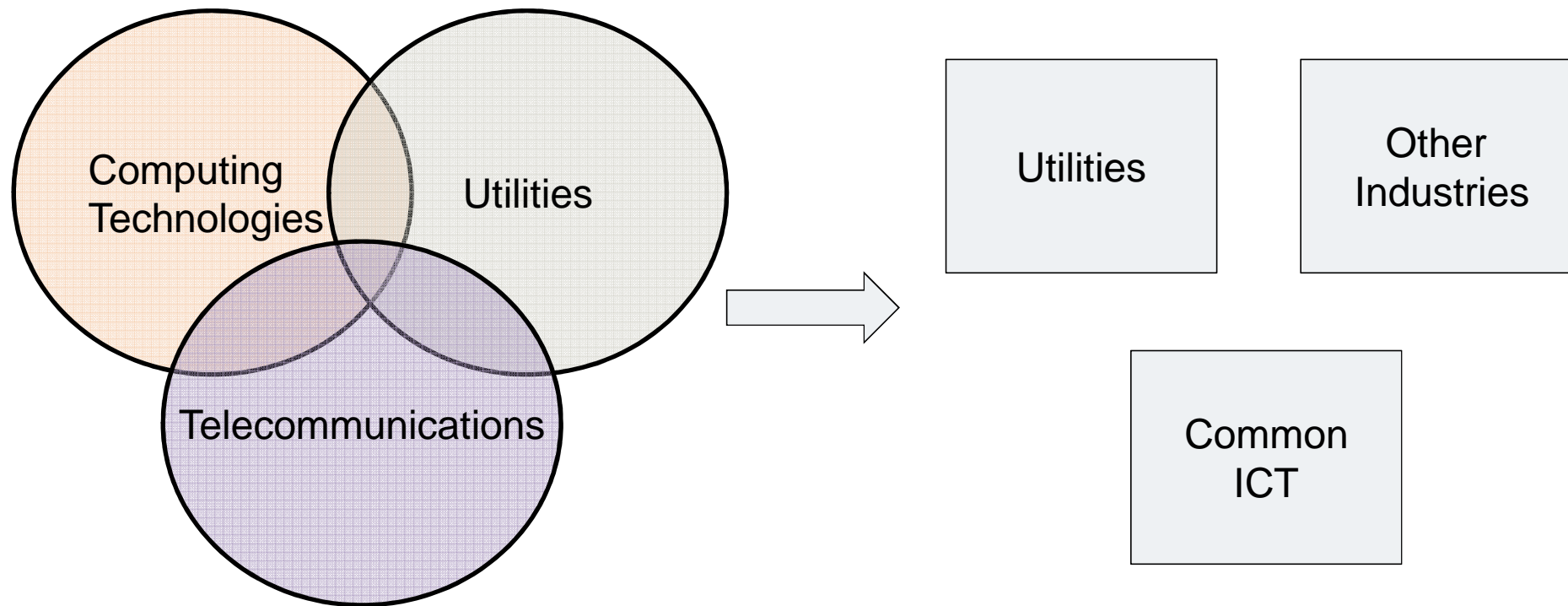


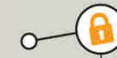
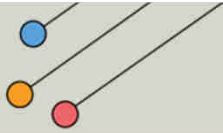


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Convergence of Digitalisation





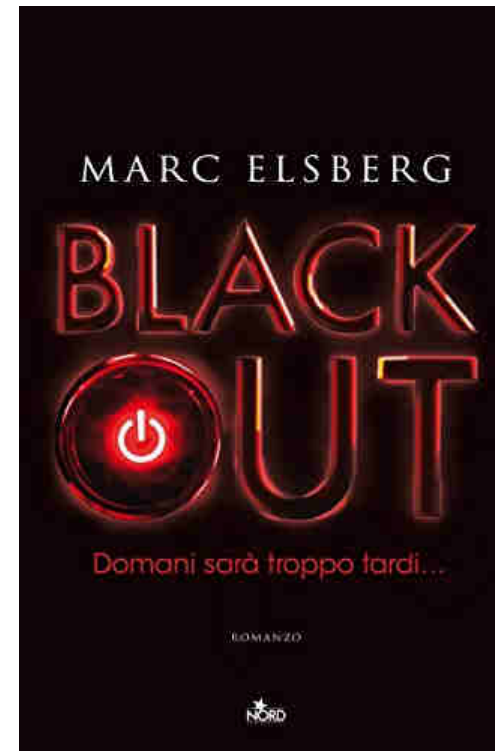
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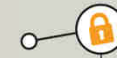
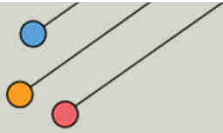
Need to Recognise Friends



Source: <https://www.flickr.com/photos/brianklug/6870002408/>



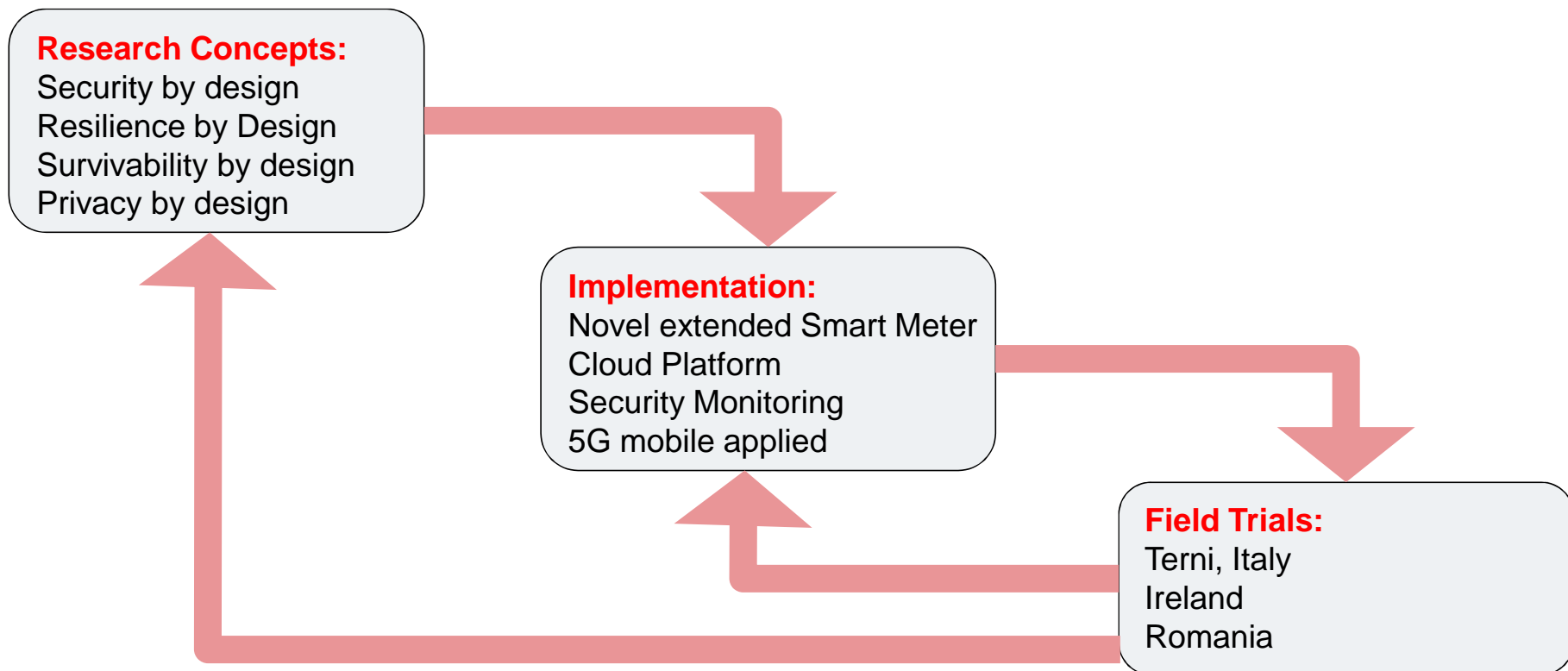
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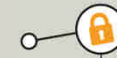
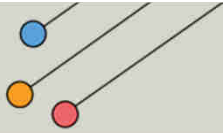


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SUCCESS Methodology



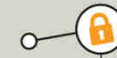
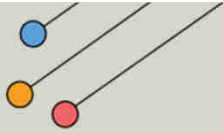


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SUCCESS Research Concepts

- Security based on jointly re-configurable power and communications systems that ensures security and detects attacks
- This means;
 - Resilience through virtualisation of controllers (local and cloud)
 - Survivability: Recovery of power grid from failure.
 - Compliance of measures with privacy and data protection laws.

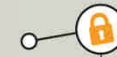
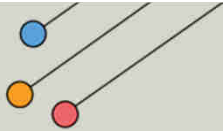


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Security Threat and Countermeasure Analysis

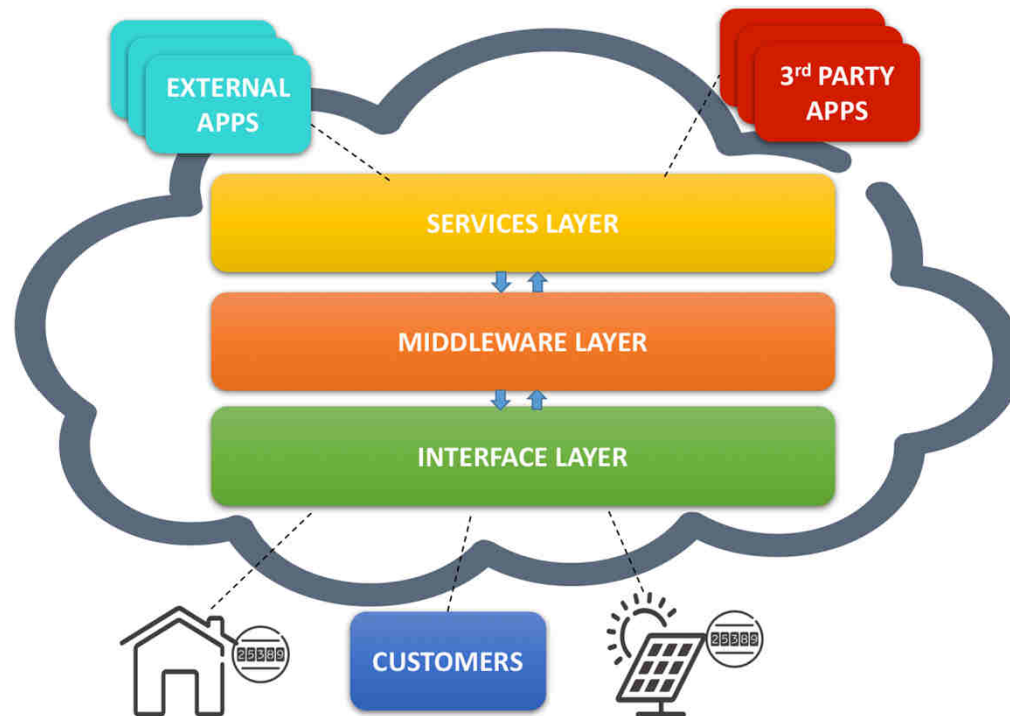
- Special focus on the vulnerabilities introduced by Smart Meters
- Recommendations for countermeasures for short-, medium-, long-term threats
- Monitoring Centres
 - on pan-European level
 - on DSO level



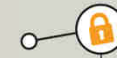
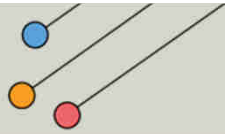
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SUCCESS Security Architecture



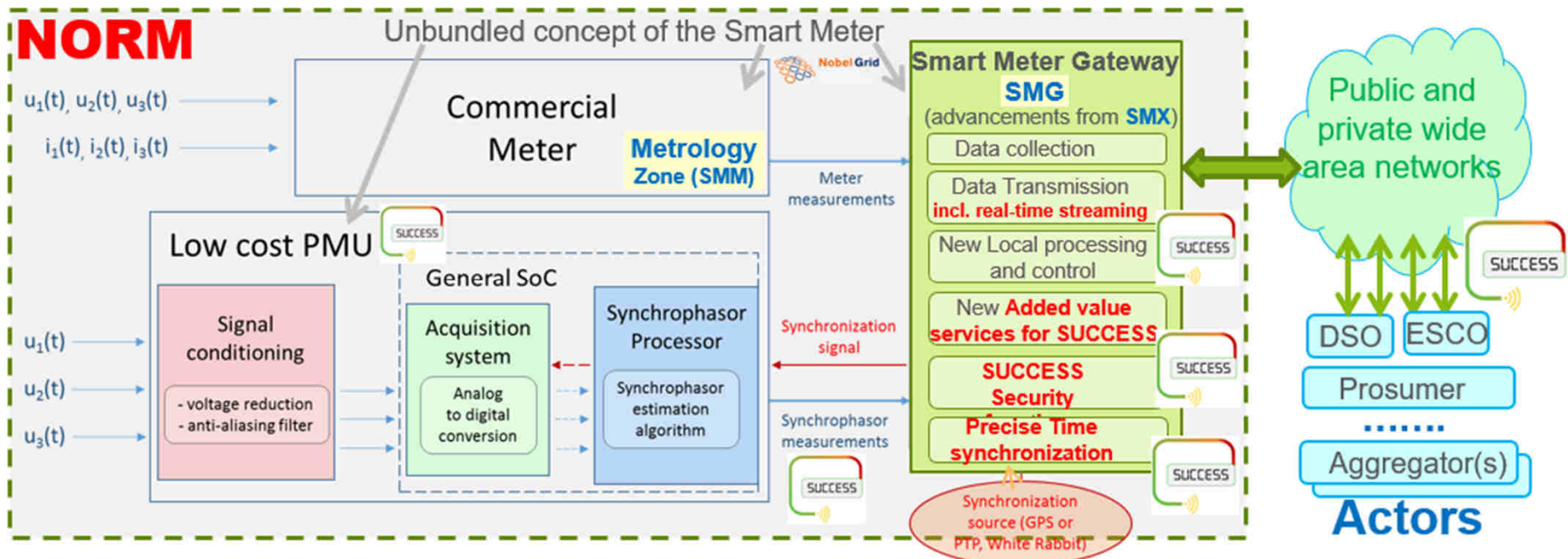
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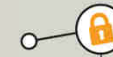
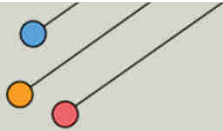


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New-generation Open Real-time smart Meter)

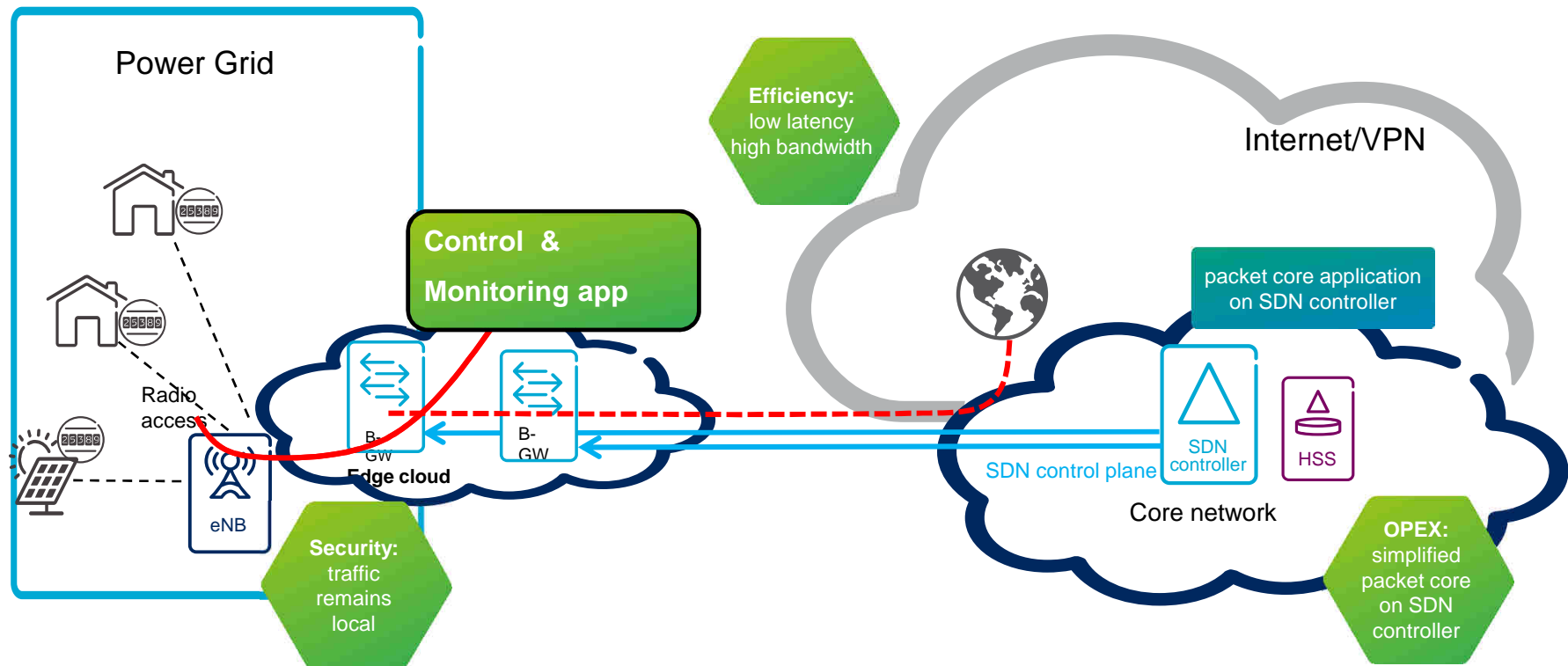


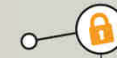
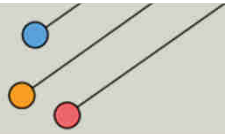


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Application of Mobile 5G Technology to Power Grids

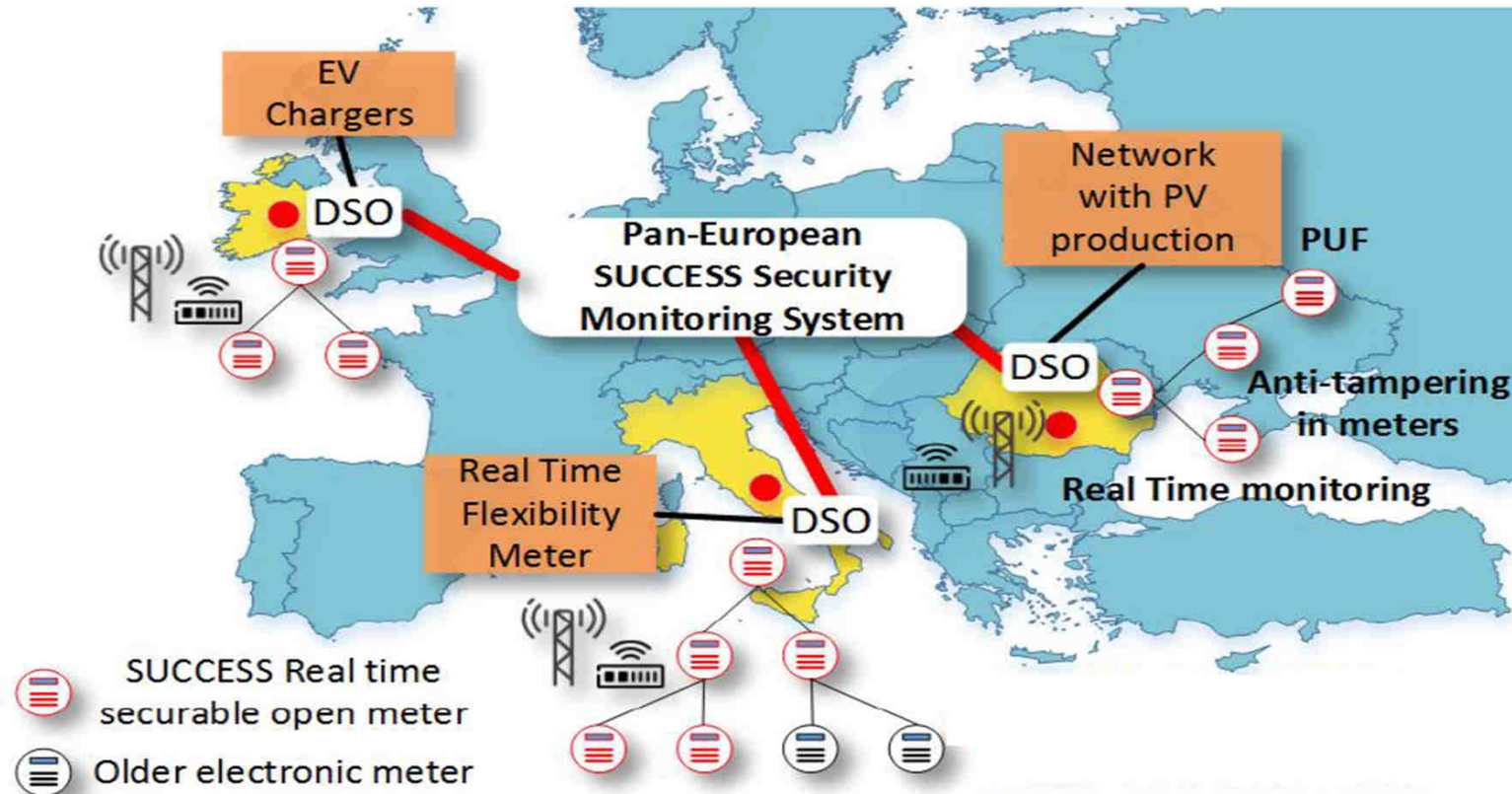




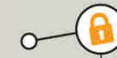
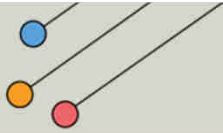
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SUCCESS Field Trials



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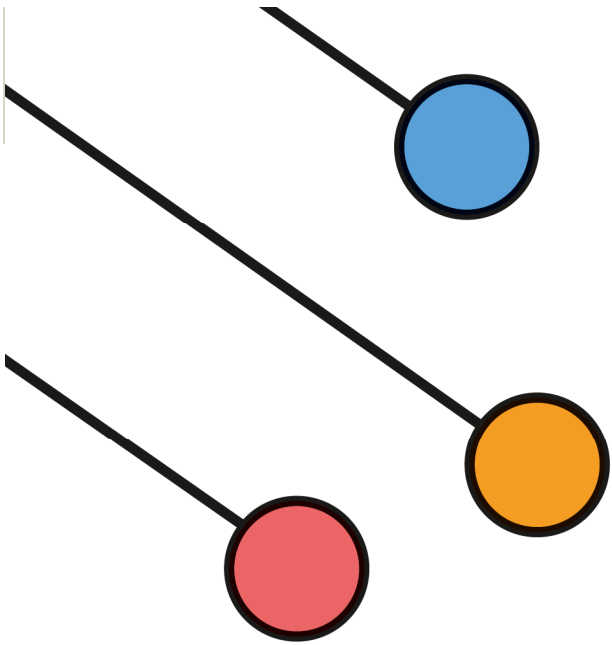


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SUCCESS

- enables customer-centred grid, services brought to edge
- security solution to future grid automation, from meter to cloud
- novel ICT applied to grid security




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