The Future of Energy
And the role of Distributed Ledger Technology

8th Smart Grids Cleanpower 2017 Conference
Cambridge, UK 19-20 June
www.cir-strategy.com/events

…follow up 9th SGCP18 26-27 June Cambridge

Erwin Frank-Schultz
Technical Leader
Utilities & Infrastructure

June 2017

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Agenda

1. **Technology disruption**
2. Strategic Capabilities for Utilities
3. DLT and Blockchain
4. Case Studies
5. Glimpse Into the Future

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Technology Disruption

Utilities are disrupted by four types of technology

I. Energy Technology

Distributed Energy Resources

Wind

Solar PV

Storage

Fuel Cells

Microgrids

Electric Vehicles

II. Consumer Technology

Smart Appliances

Prosumer Enablement

Convergence of Industries

Social Networks

Disruption

- Lower marginal cost of production
- Empowered consumers have viable alternatives at grid parity
- Digitally enabled business models emerge (asset-light ecosystems)

Automated Demand Response

Embedded Systems

Process Equipment

Smart Grid/Grid Digitization

Situational Awareness

IV. Grid / Operational Technology

Cognitive Computing

Blockchain

Big Data & Analytics

Internet of Things

Mobile

Cloud

III. Information Technology

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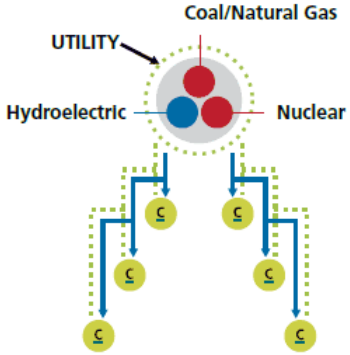
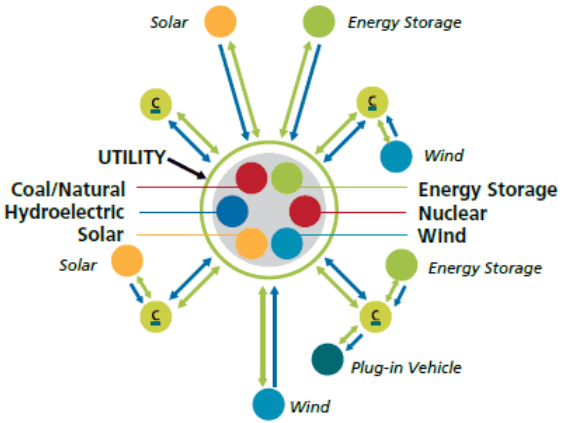
Energy & Utilities Industry Model Shift

The Energy & Utilities industry model is fundamentally shifting and becoming decentralised. As a result, more and more assets are stranded, raising financial pressures on incumbents

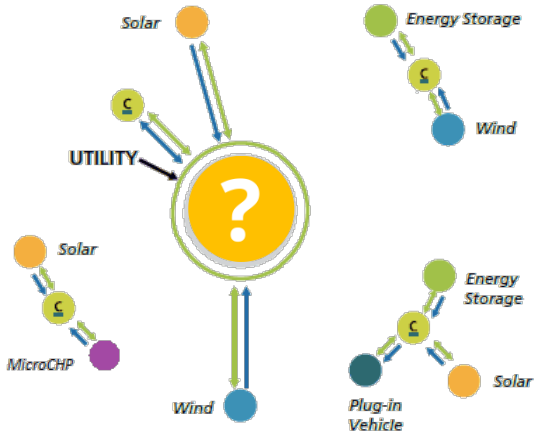
Traditional Industry Model (Centralized)



Today's Industry Model (Dual / Hybrid)



Possible Future Industry Model (Decentralized)



- Consumer
- Power Flow
- Periodic Information Flow
- Continuous Information Flow

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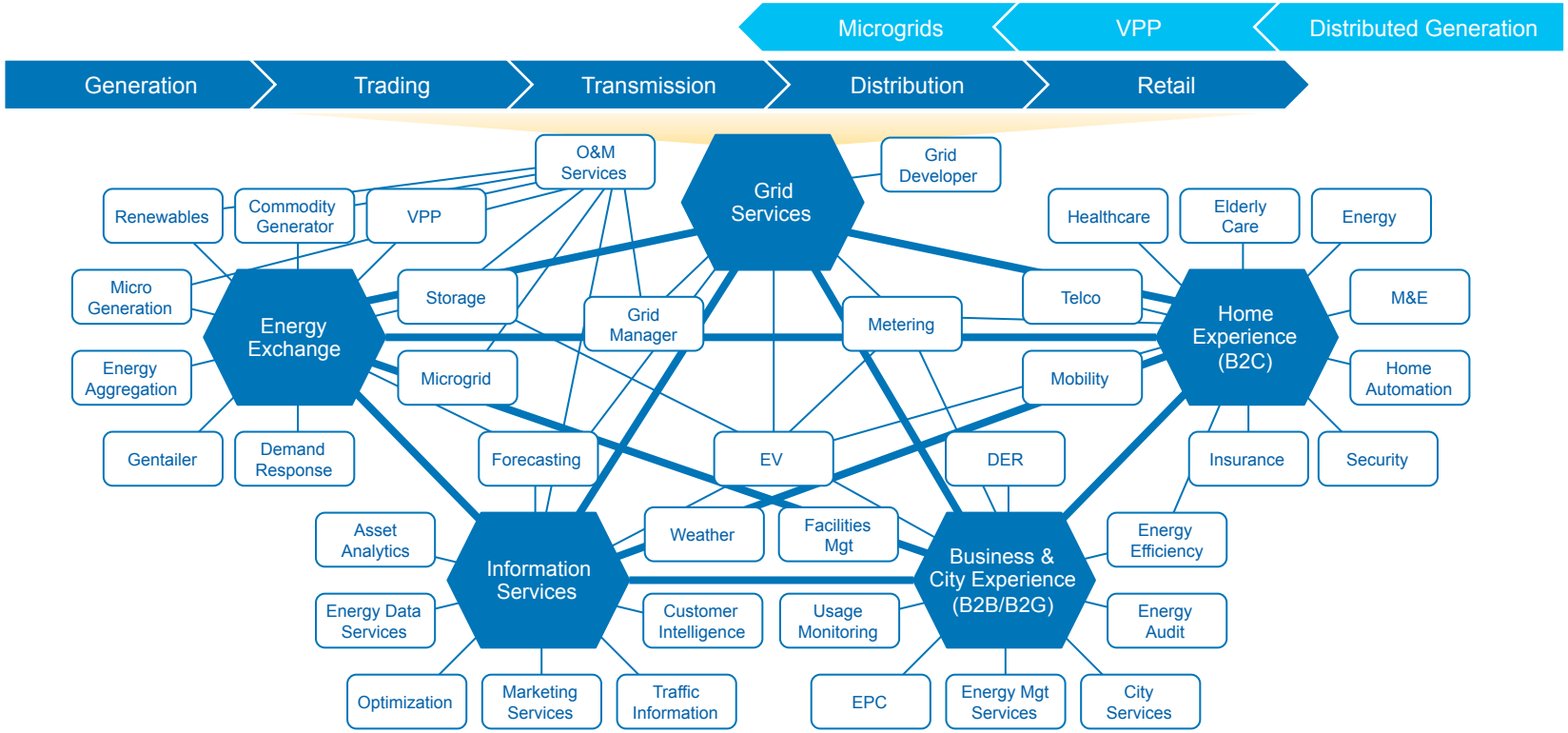
Future Energy & Utilities Industry Models

Emerging new business models transform the traditional utility value chain by integrating energy on the back of more flexible and digitally enabled ecosystems/business platforms



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Utility Key Imperatives

Utilities must focus on cost efficiency, and on redefining their future role in the transformed industry model

1

Optimize Work & Asset Management Performance

Long-term investments into capital intense assets requires continued focus on maximizing the commercial returns from the asset base, and on striving for maximum operational efficiency across the entire enterprise.

2

Innovate Business & Operating Models

Disrupt or be disrupted – incumbents must embrace the fundamental industry shifts as a strategic opportunity to innovate both their business and their operating models in a transformed industry with a different TSO role.

3

Redefine Customer Relationships & Partnerships

Regardless of their specific market role, utilities must engage with empowered customers – prosumers – and partner for capabilities in a decentralized industry model to crystalize new (digitally enabled) opportunities

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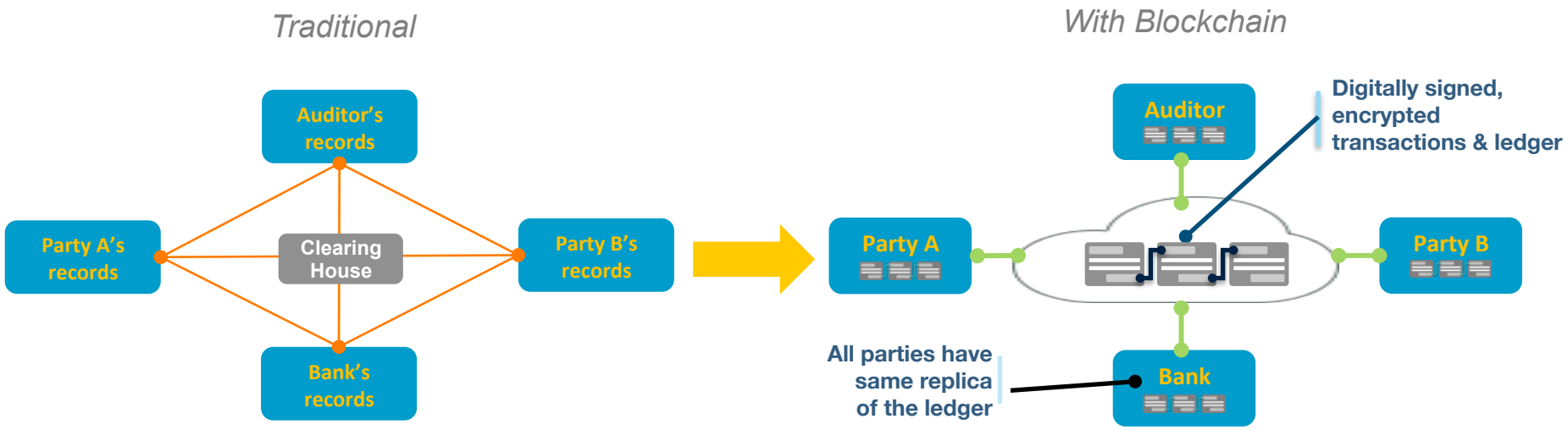
Blockchain will fundamentally change business processes



… Inefficient, expensive, vulnerable

… Consensus, provenance, immutability, finality

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Linux Foundation Hyperledger Project participation expands almost 5X since launch in December 2015

Premier

accenture, AIRBUS, CME Group, Deutsche Börse Group, Digital Asset, DTCC, FUJITSU, HITACHI, IBM, intel, J.P.Morgan, R, 万达·飞凡科技, American Express

Updated Jan 2017

General

ABN·AMRO, Aesthetic Integration, ALTOROS, ANZ, 博图纵横, JM, MonetaGo, ML, Moscow Exchange, Murphy & McGonigle, NSE, NEC, belink, bitse, Blockchain, blocko, Blockstream, bloq, NETKI, NOKIA, norbloc, NTT Data, onchain, 橙色魔方, BNP Paribas, BNY Mellon, Broadridge, bubi.cn, ca technologies, Calastone, PAXOS, PDX, redhat, Ribbit, Samsung SDS, SANY, cisco, cloudsoft, CLS, coinplug, colu, consensys, Sberbank, GINGKOO, NEXGO, 点融网, Skry, CREDITS, Cuscal, Energy Blockchain Labs, Eurostep Digital, FACTOM, Gem, SORAMITSU, State Street, SWIFT, swisscom, symbiont, PeerSafe, guardtime, 33.CN, Hashed Health, HUAWEI, HUNDSUN, tequa creek, Thomson Reuters, TMX, UMP, vmware, Wells Fargo, 趣链科技 Hyperchain, intellect, intuit, Invoshare, IROOTECH, KSD, 云象, 梧桐树, 保全网, koscom, LedgerDomain, Libra, Lykke, Milligan Partners, MIRACL

Associate

Chamber of Digital Commerce, CSA cloud security alliance, Investrata Foundation, NXT Foundation, sovrin, INUIT

HYPERLEDGER

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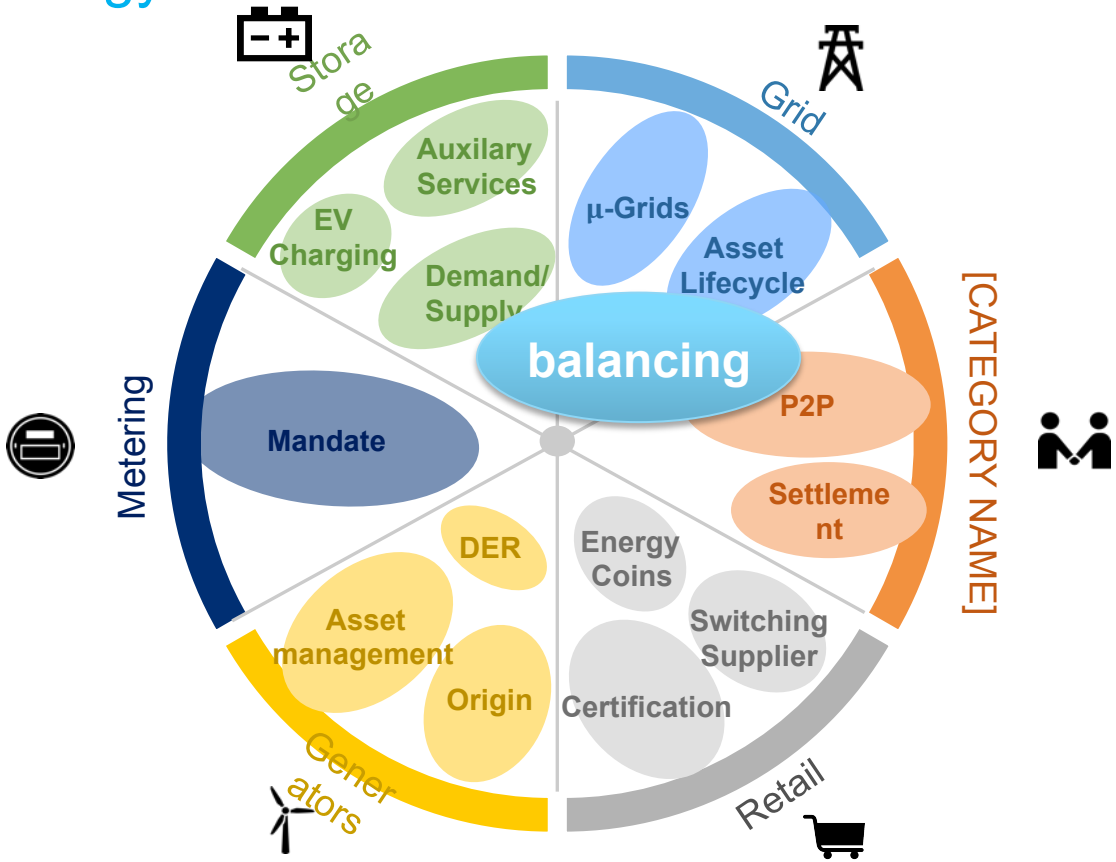
DLT Use cases in Energy



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E&U Example 1: EV charging ´behind the meter´

- Separate handling of EV charging ´behind the meter´ creates new options to EV drivers
- EV drivers can separate EV charging costs from the household consumption (e.g. for allocating it to e.g. company car scheme).
- Using blockchain creates trust by sharing one common truth in the value chain (consumer, MSP, DSO, BRP).
- Companies active in EV services (MSP´s, CPO´s or new entrants) can create new value propositions based on this registration: ´Embedded Energy´
- This can scale along multiple axes.

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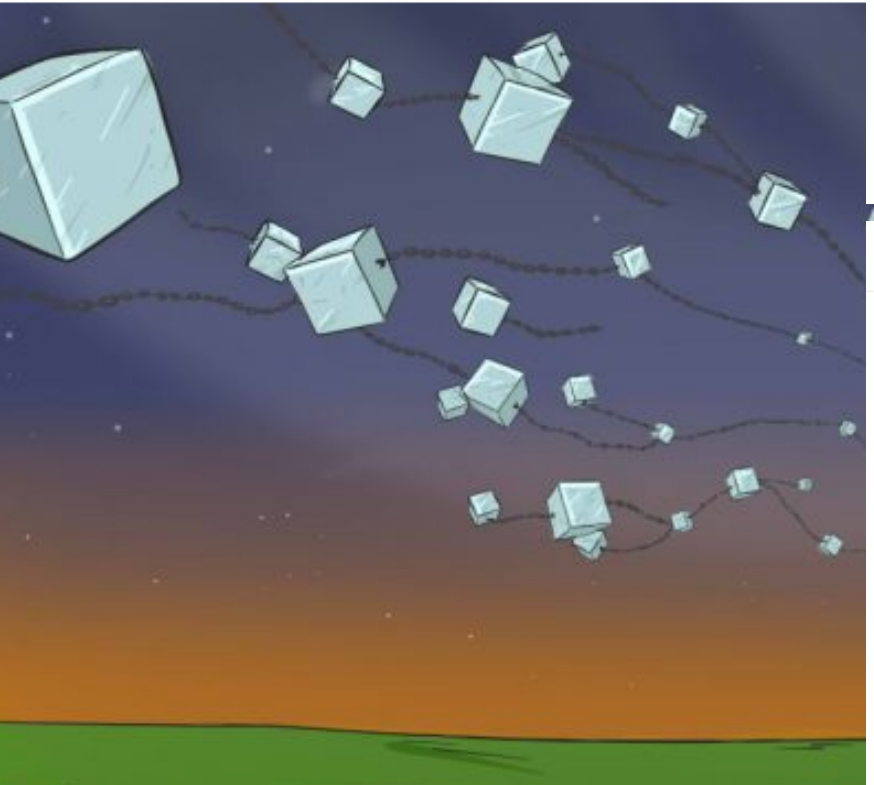
European Energy Operator, TenneT, To Use Blockchain For Electricity Security Of Supply

May 5, 2017 14:15 by Alexander Lielacher



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News room > News releases >

TenneT unlocks distributed flexibility via IBM Blockchain

- TenneT, sonnen, Vandebron and IBM join forces in two pilot projects aimed at developing first 'blockchain' distributed database for managing the electricity grid in the Netherlands and Germany
- Energy transition requires new energy sources to maintain grid stability
- TenneT is first Transmission System Operator (TSO) to use innovative blockchain technology for managing the electricity grid

BLOCKCHAIN / NEWS / PRESS RELEASE / WORLD DEVELOPEMENT / WORLD NEWS 0

Tennet Will Use Blockchain Pilots for the Electric Grid in The Netherlands and Germany

BY ARMANDO NOGUERA · MAY 3, 2017

TenneT, a leading European electricity Transmission System Operator (TSO), clean energy provider sonnen, renewable energy provider Vandebron, and tech giant IBM are teaming up to develop blockchain for electricity grid management in the Netherlands and Germany.

TenneT
Taking power further

Tennet is already using blockchain

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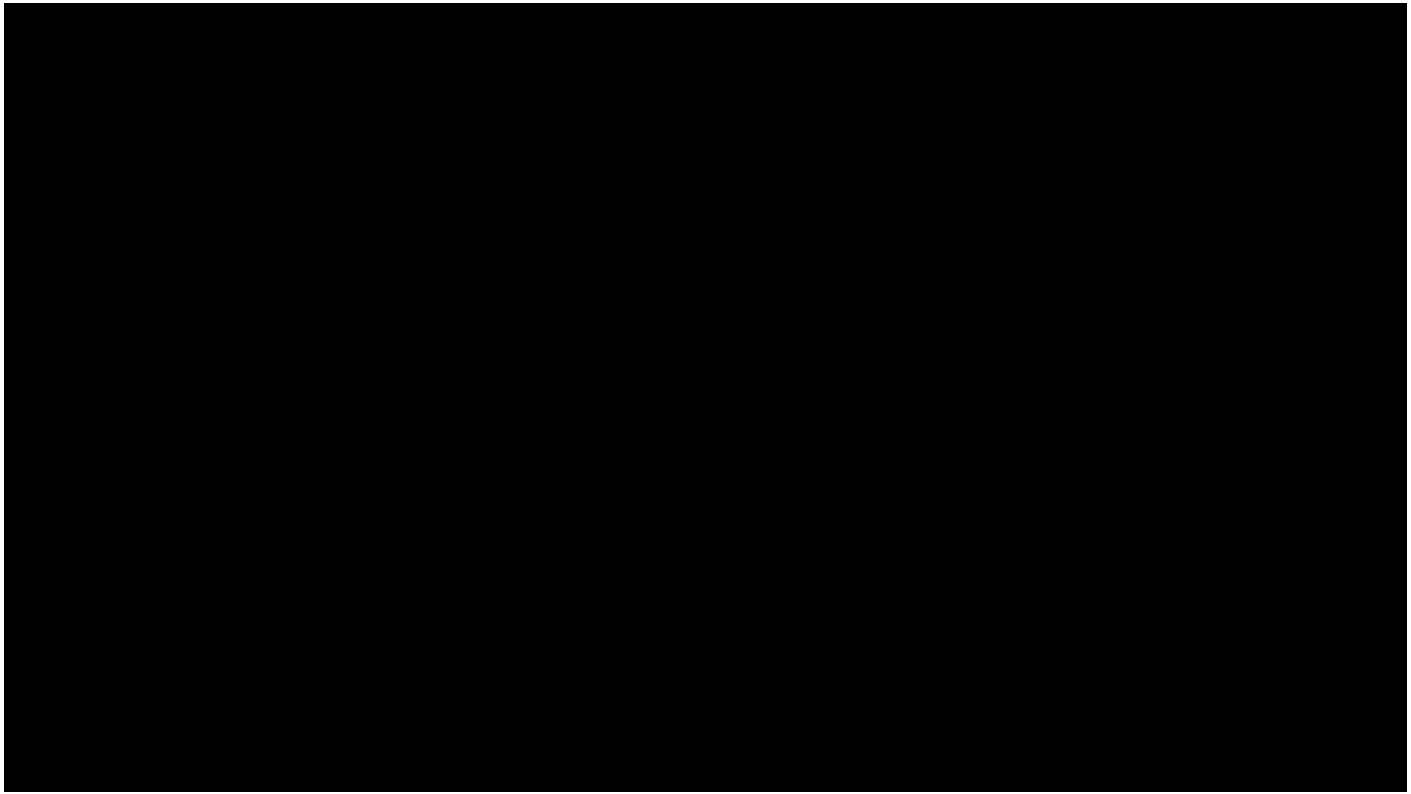
Applying Watson to reinvent Maintenance and Operations – 70 miles from shore

Watson is learning to become the engineer's advisor



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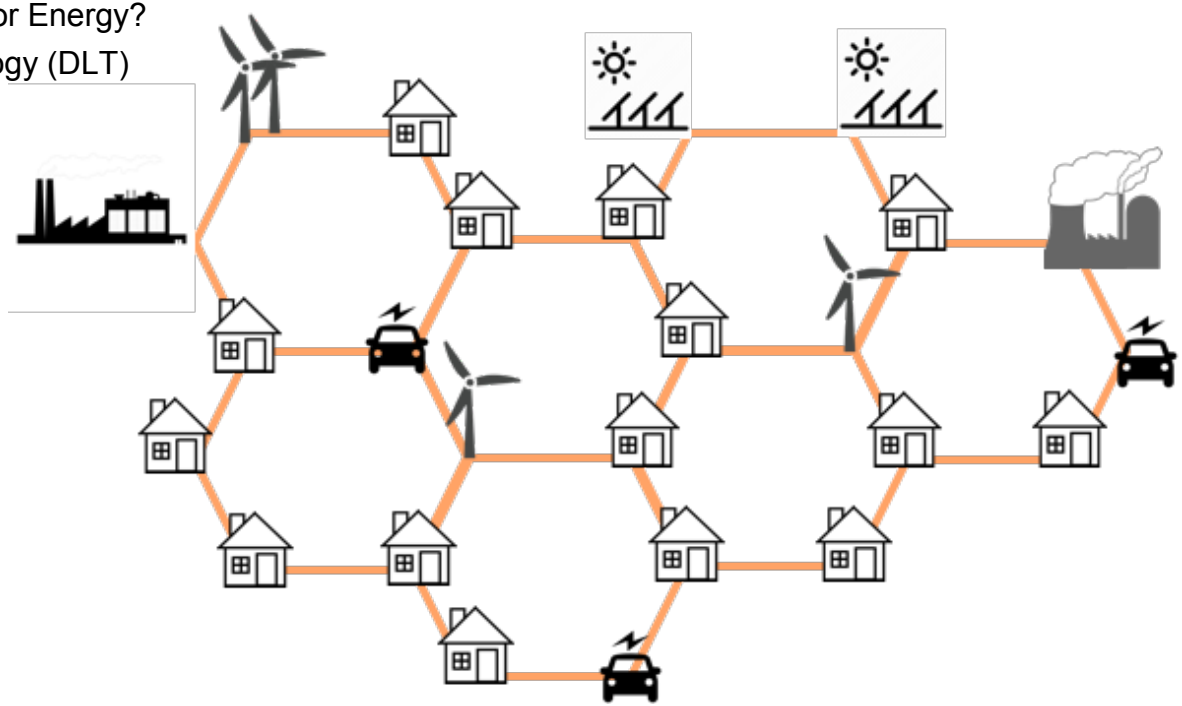
Final thoughts…

- What would be the Uber – moment for Energy?
- Imagine Distributed Ledger Technology (DLT) enabled peer to peer market



- https://erwinenergy.wordpress.com/2016/11/04/what-could-an-open-peer-to-peer-electricity-market-look-like/http://www.renewableenergyworld.com/articles/2017/05/will-blockchains-inspire-the-democratization-of-energy.html?utm_content=bufferec5cc&utm_medium=social&utm_source=plus.google.com&utm_campaign=buffer

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Thank You !

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