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Distribution Side Load Balancing Program & Connection to Future Transactive Energy Markets

October 26, 2023

Municipal and State Clean Energy Forum

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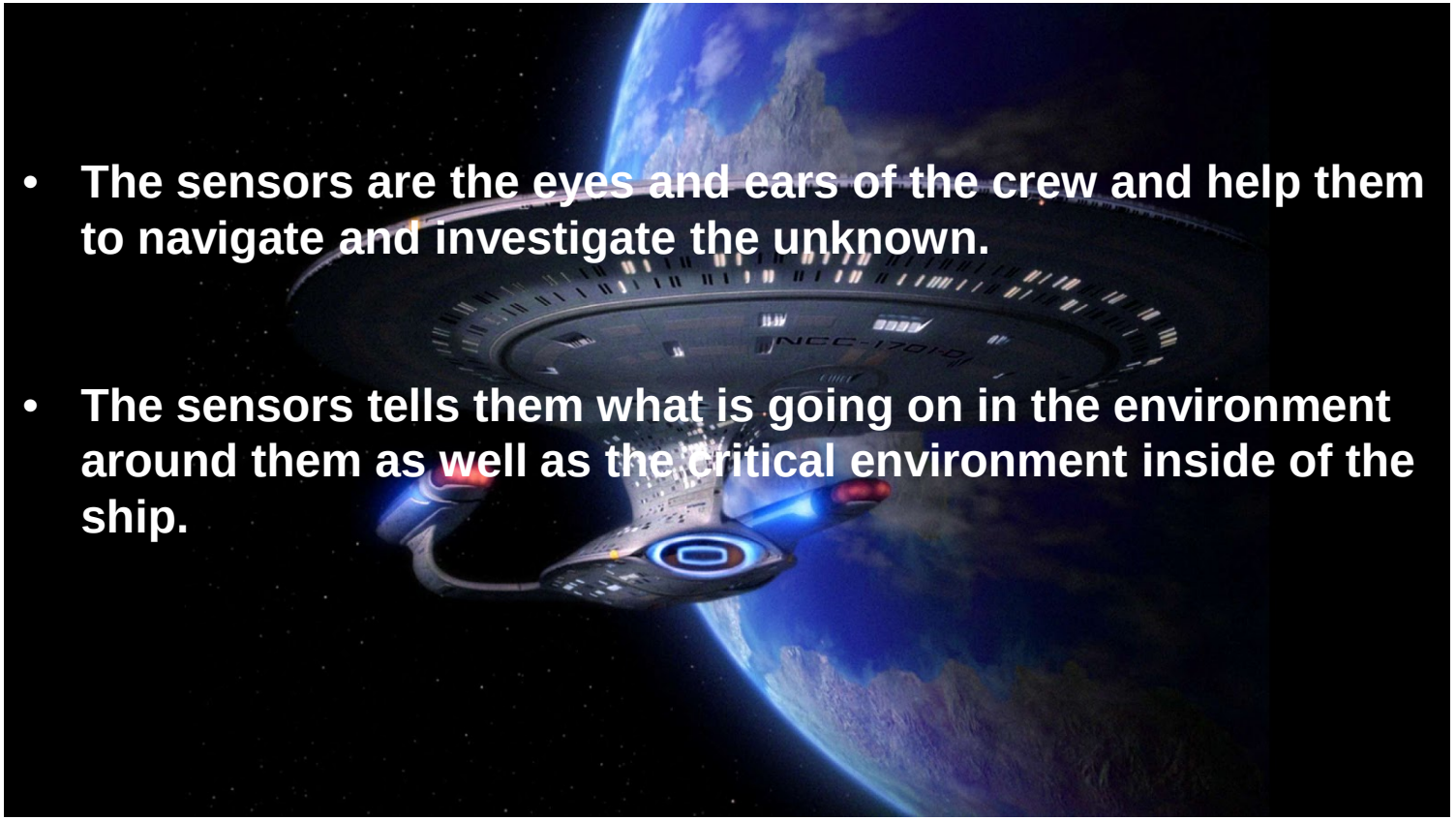
"The Secret Sauce"
"We Need to Re-Calibrate & Re-Align The Sensor Array!"



- The sensors are the eyes and ears of the crew and help them to navigate and investigate the unknown.
- The sensors tells them what is going on in the environment around them as well as the critical environment inside of the ship.

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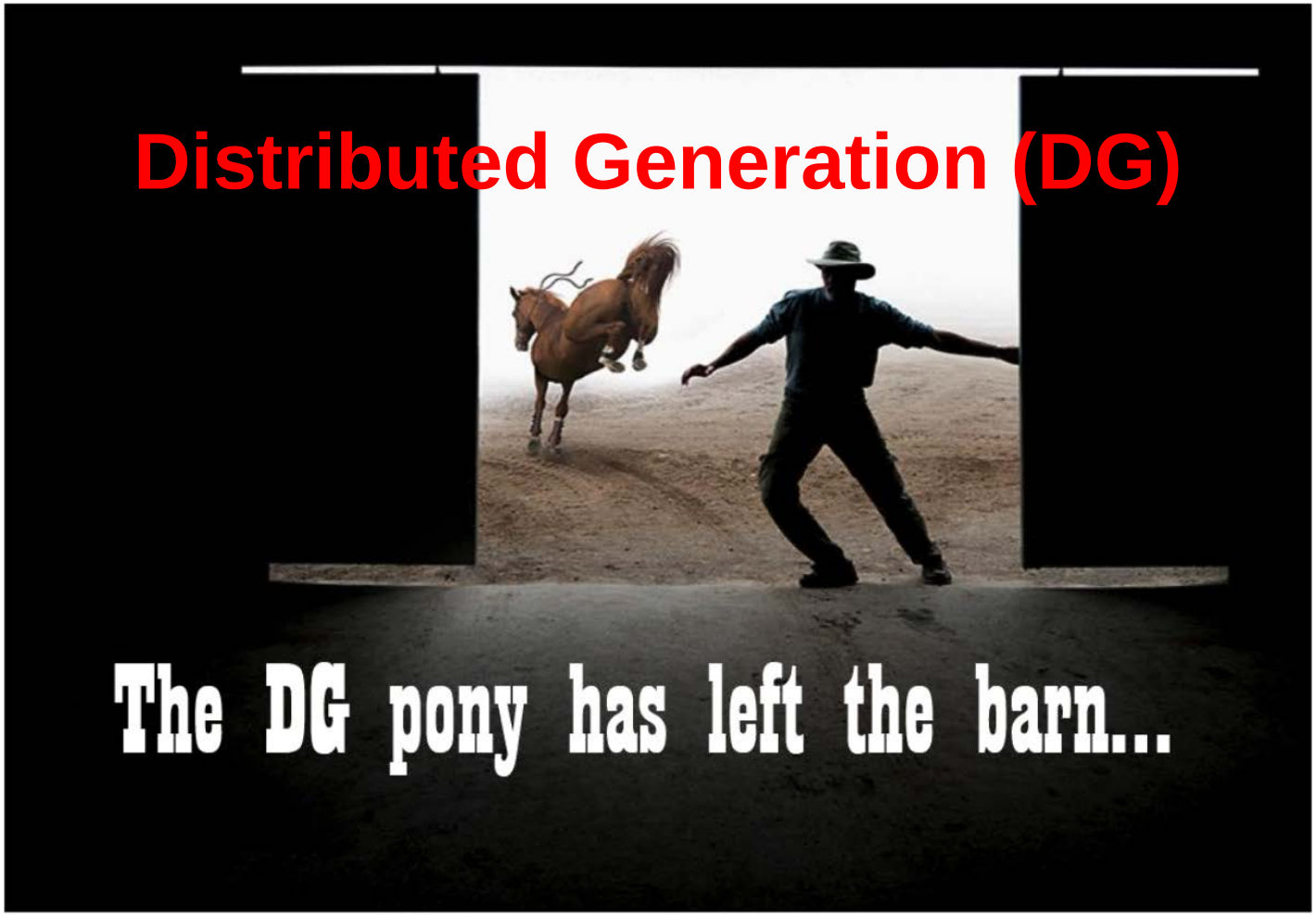

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"THE ENERGY INDUSTRY OVERHAUL"

"Like Sports, The Energy Industry must:"

- Play to where the puck is going – Hockey
- Hit the receiver in the open field - Football
- Hit ball to the open field - Baseball
- Pass to the open man - Basketball

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"THE ENERGY INDUSTRY OVERHAUL"

The Internet of Things

AGENT Technology

- Enables Both:
  - In The Utility Space and
  - Behind The Meter Space

+

The Internet of Energy

→

The Economic Engine of 21st Century

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The Vision!

- MS Windows like enabler for Utility Networks
- Embed into existing utility hardware.
- Embed into new DISRUPTIVE technologies.
- Embed into ANY Utility Network Cloud
  - Electric
  - Natural Gas
  - Water
  - Propane
- Embedded in end customer EMS equipment

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The Opportunity!

- A Global Potential
- Patented Algorithm – Offers Inexpensive Solution
- Neutral Party – Platform Agnostic
- Tames "**The Internet of Things**" for The Utility Networks

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The Opportunity!

- Like **MS Windows** and enables Smart Utility Networks
- The "**Holy Grail**" Optimizer that drives Smart Utility Networks.
- "**Tames The Internet of Things**" for Smart Utility Networks

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CMU's – Patented Optimization Algorithms "Consensus + Innovations"

"*The Holy Grail*" for Smart Utility Network Clouds

Gabriela Hug - *Assistant Professor, ECE, Carnegie Mellon University*

Soummya Kar - *Assistant Research Professor. ECE, Carnegie Mellon University*

Richard Pate – *Utility and Smart City Consultant*

Latest Report: **CMU - Agent-Based Coordination Scheme for PV Integration - 2020**

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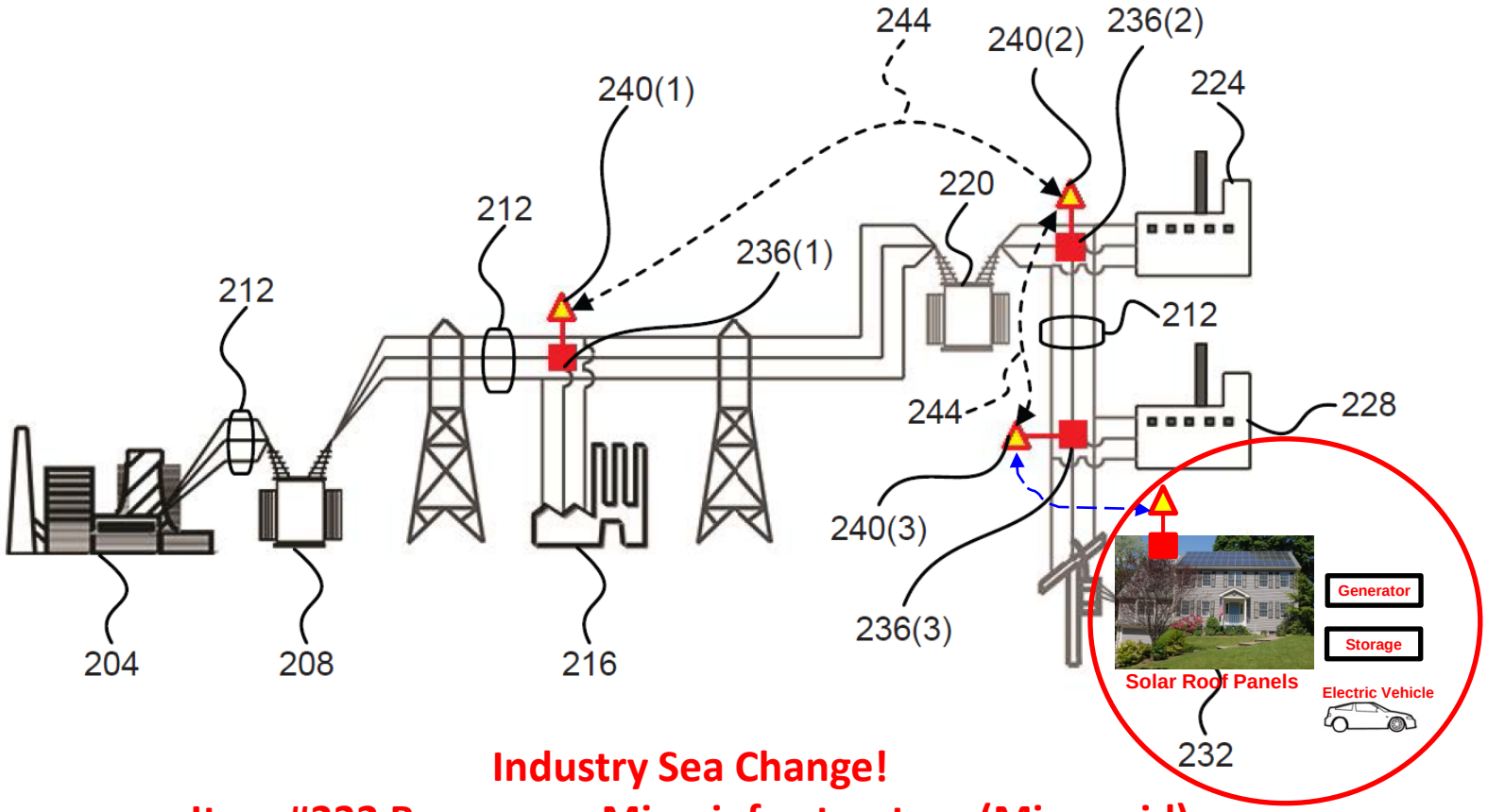
CMU Electrical System Patent Diagram



Industry Sea Change!

Item #232 Becomes a Microinfrastructure (Microgrid)

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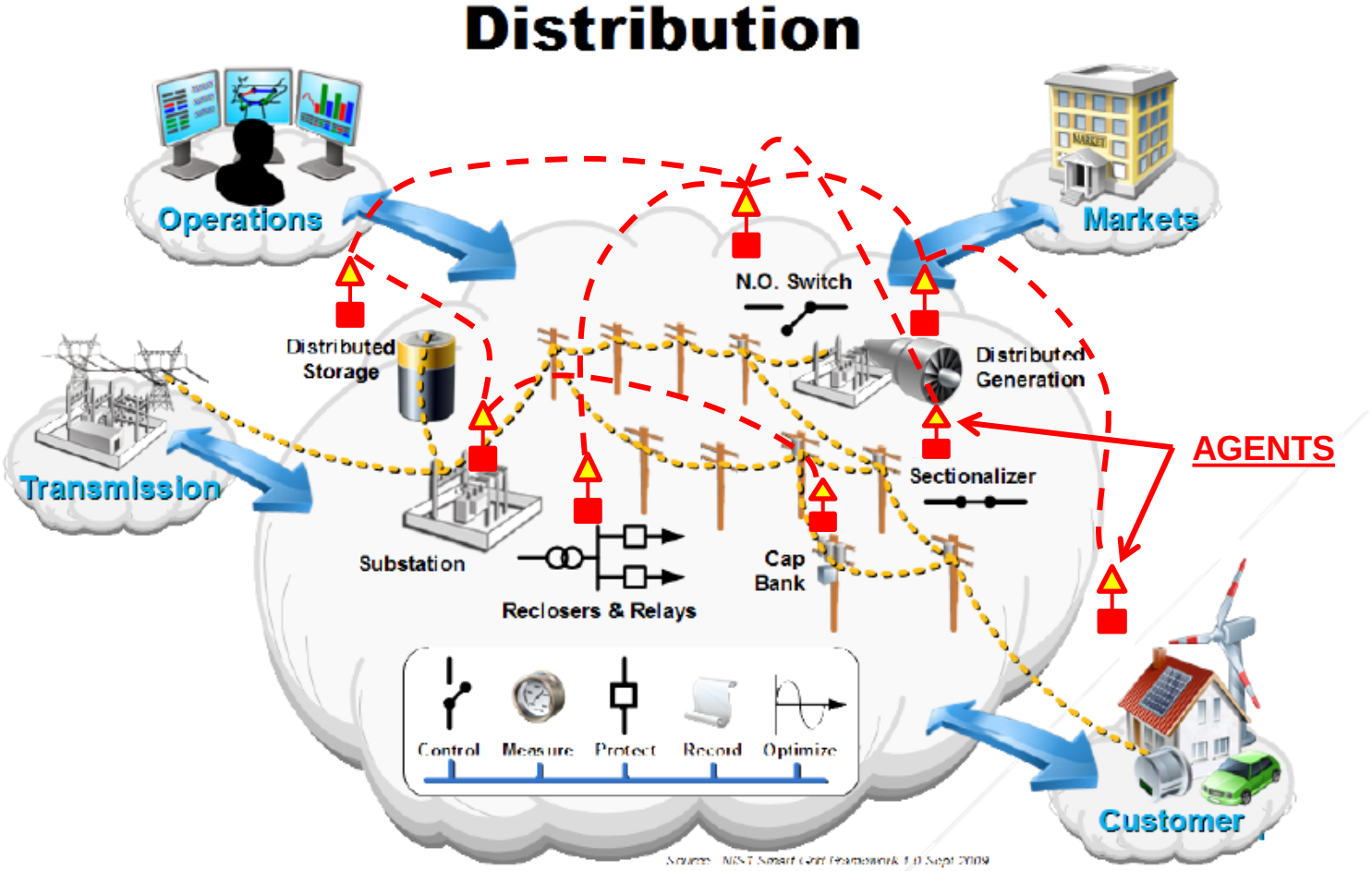
National Institute of Standards and Technology

Framework and Roadmap for Smart Grid Interoperability Standards, Release 3.0 – (Sept. 2014)



Utility Network Cloud or Distribution Domain

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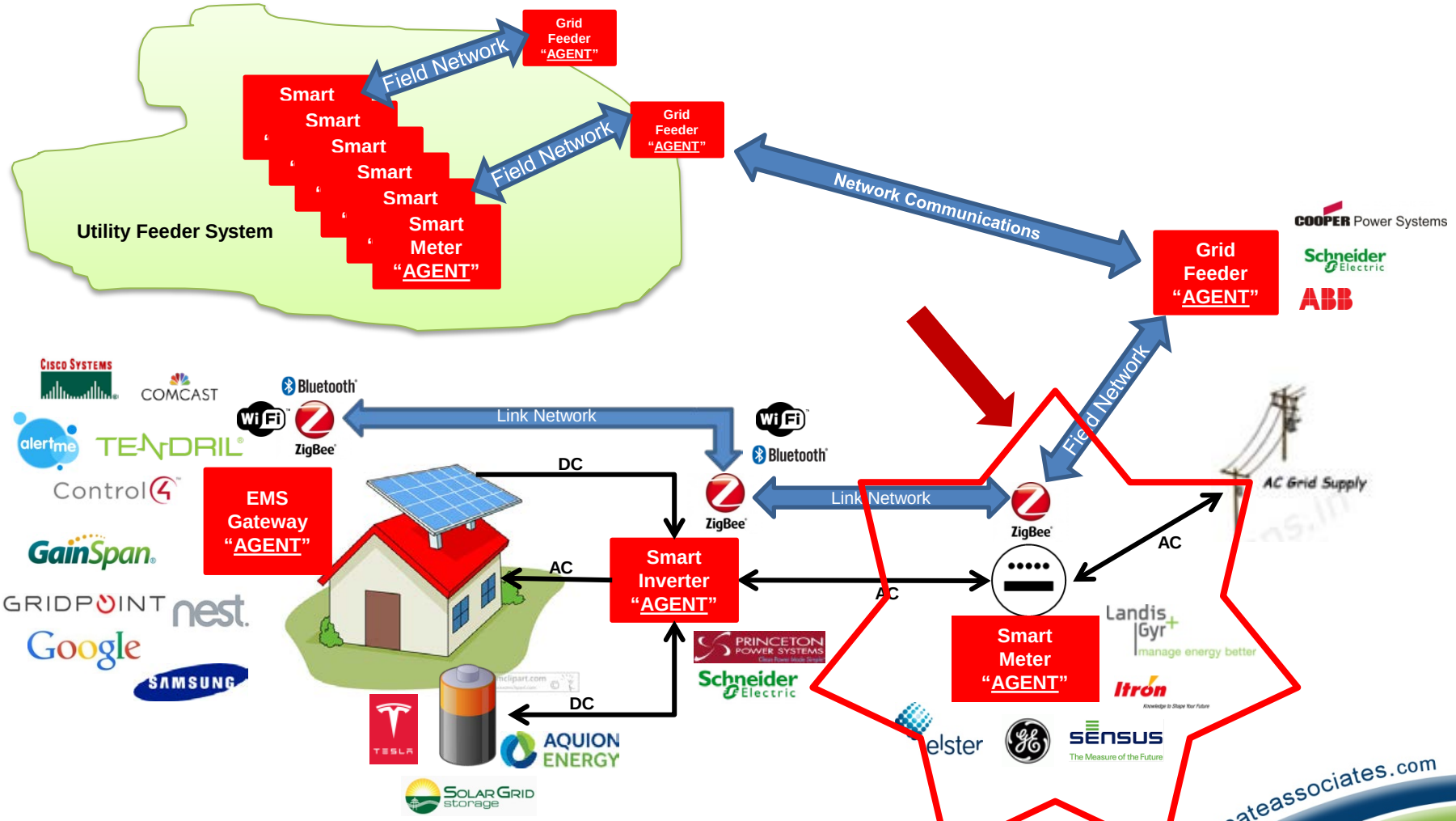
On The Feeder System

The Smart Meter is "KEY"



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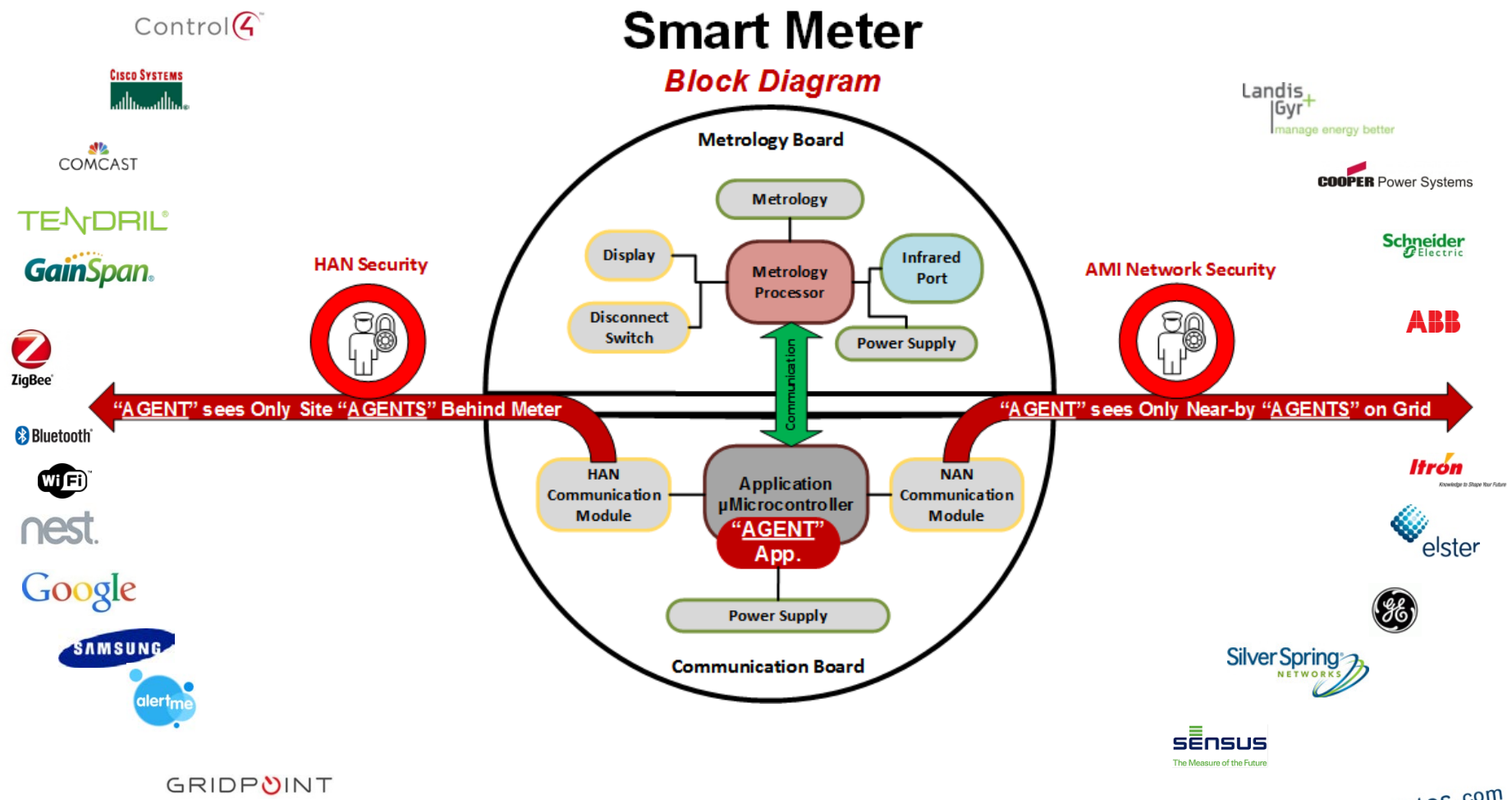

Control4
Cisco Systems
Comcast
TENDRIL
GainSpan
ZigBee
Bluetooth
Wi Fi
nest
Google
SAMSUNG
alertme
GRIDPOINT
Landis Gyr manage energy better
COOPER Power Systems
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elster
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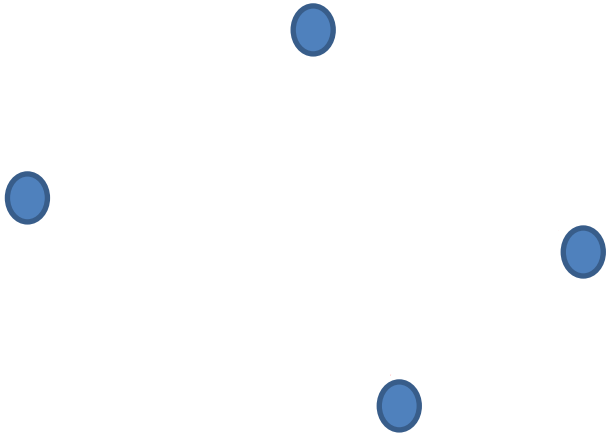
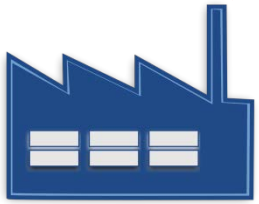
Traditional Power Flows





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"AGENT"

Sub

"Transactive" Power Flows

"AGENT"

"AGENT"

"AGENT"

"AGENT"

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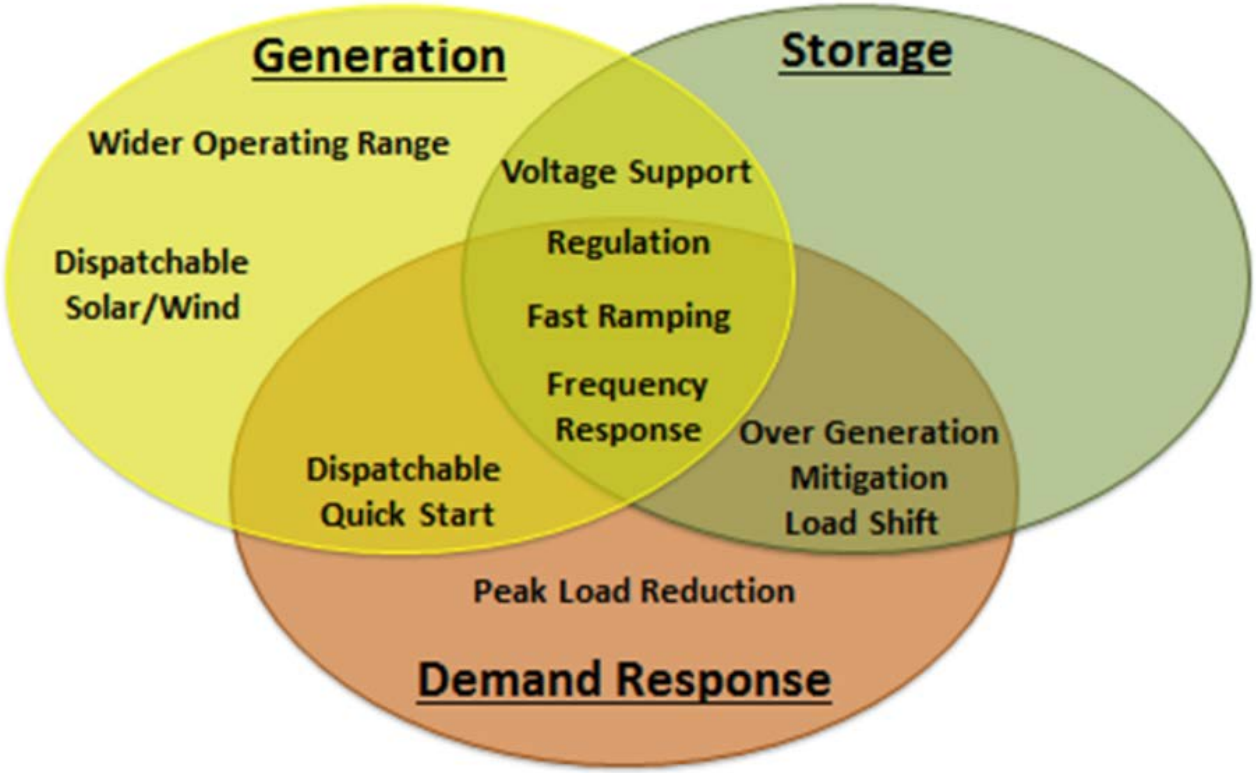
AGENT Technology

- Enables All



The integration of distributed energy resources such as solar PV presents unique opportunities generated by the overlapping applications of generation, storage, and demand response

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What Smart Meters Do "NOT" Do!

Show a consumer how, or where, or why that energy is being used.

No **visibility** or **discoverability**.

Instead, users are given just one bulk figure for an entire building.

With "Smart Homes"/"Intelligence Energy Systems"

It's now possible for end customers to see **not only their total power consumption** but also **the power draw of their individual device**.

(Customers chose to share or NOT to share)

They get "**Vision**" into how much energy they are consuming and what each device is consuming and which devices are consuming the most.

Bottom Line, **Each Customer**, gets to see the **cost** to their chosen **"Life Style"**.

A Big Opportunity to help customers achieve their "Chosen Life Style" and greatly reduced their cost.

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"Home/Building Intelligence Systems" offers consumers:

- the ability to organize the data by room.
- view daily, weekly or monthly summaries.
- Identify the top ten energy wasters in a home or larger building.

Users are able to look at and act on:

- which devices are using the most amount of energy
- **"Take Effective ACTIONS"** to have the maximum impact on overall energy consumption.

This type of overall visibility:

- **"EMPOWERS"** energy users to use the data gathered by **"Smart Home/Building Systems"**
- So the user can **"Intelligently"** mitigate the circumstances that lead to wasted energy**.**

Once **"EMPOWERED",** the users will move to automate their **"Life Style Wishes"** through autonomous actions taken on their behalf by **"Smart Home/Building Systems".**

This moves energy savings into a "24x7" operation with "NEW " revenue potentials.

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"Smart Home/Building Technology" does more than just meter the power usage of a property.

It "ACTIVELY" and "INTELLIGENTLY" works to reduce usage.

Smart Home/Building Technologies have been around for some time. Its benefits are still just as compelling **but** the enormous cost and understanding the complex operation (not to mention the disruption of having to alter the very fabric of the user's home to accommodate it) is still far out of the reach of most people.

> But thanks to a **new breed of wireless technologies that can be retrofitted into any property in minutes** that is changing smart home technologies and becoming a reality for the average consumer.

Although smart meters do provide a degree of visibility, they ultimately are tools for monitoring, rather than reducing, energy usage.

A more impactful solution will have to be something much more adaptable, user-friendly and intelligent.

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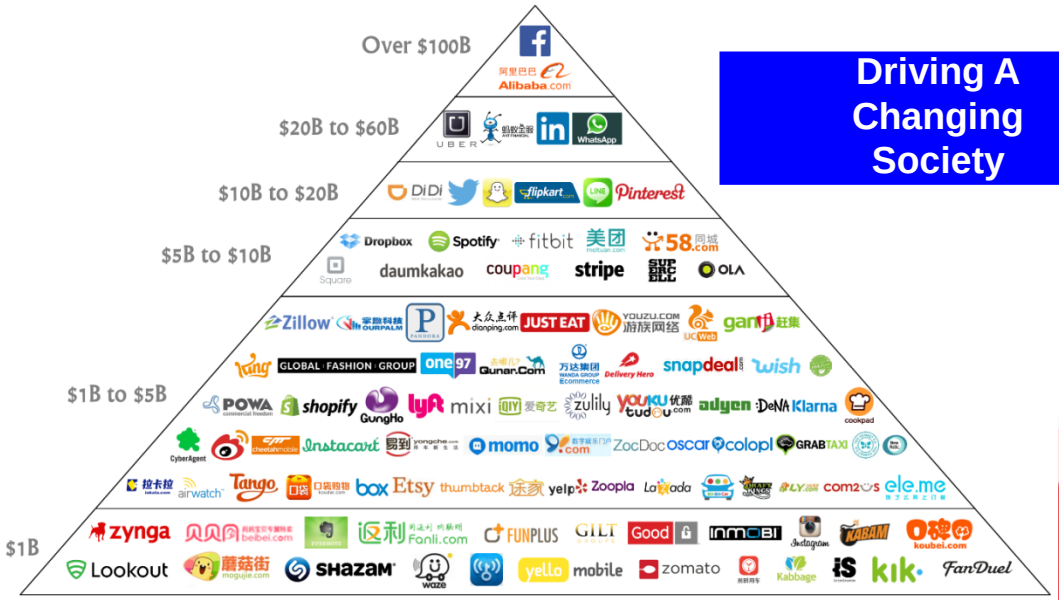
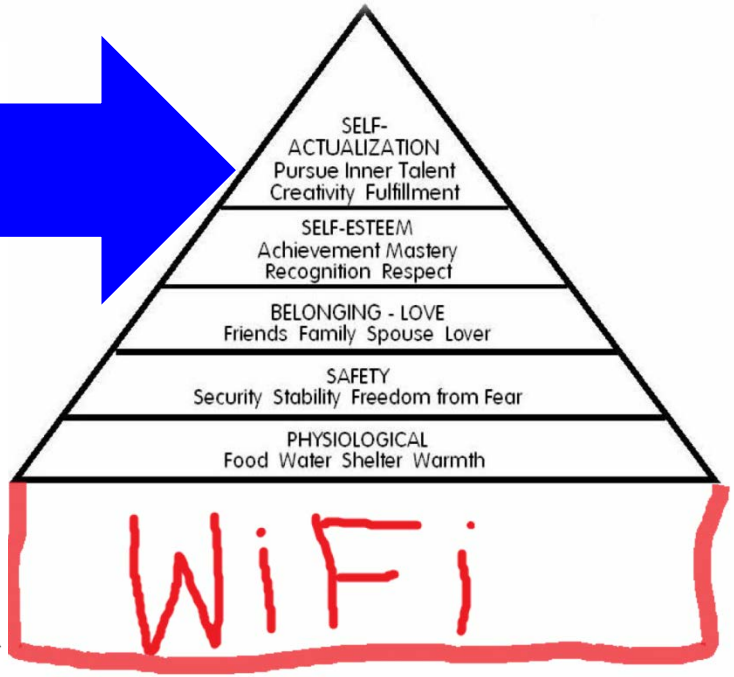
Tech Companies



Driving A Changing Society

Basic Needs



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The ZigBee Alliance serves this market with open, global standards for smart connected products that give consumers:

- **information and automation they need to easily reduce:**
  - **their energy consumption,**
  - **save money, and**
  - **live a greener lifestyle.**

Consumers are finding these smart products provide more than just energy savings but also:

- **enhance comfort,**
- **convenience and**
- **security.**

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What Are We Looking For?

- **Partners to help move forward with.**
- **Funding Sources.**

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Questions??

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