

# An 'AirBnB For Electricity': Institutional Theory and Practice for a Regulated Industry in a Technologically Dynamic Environment

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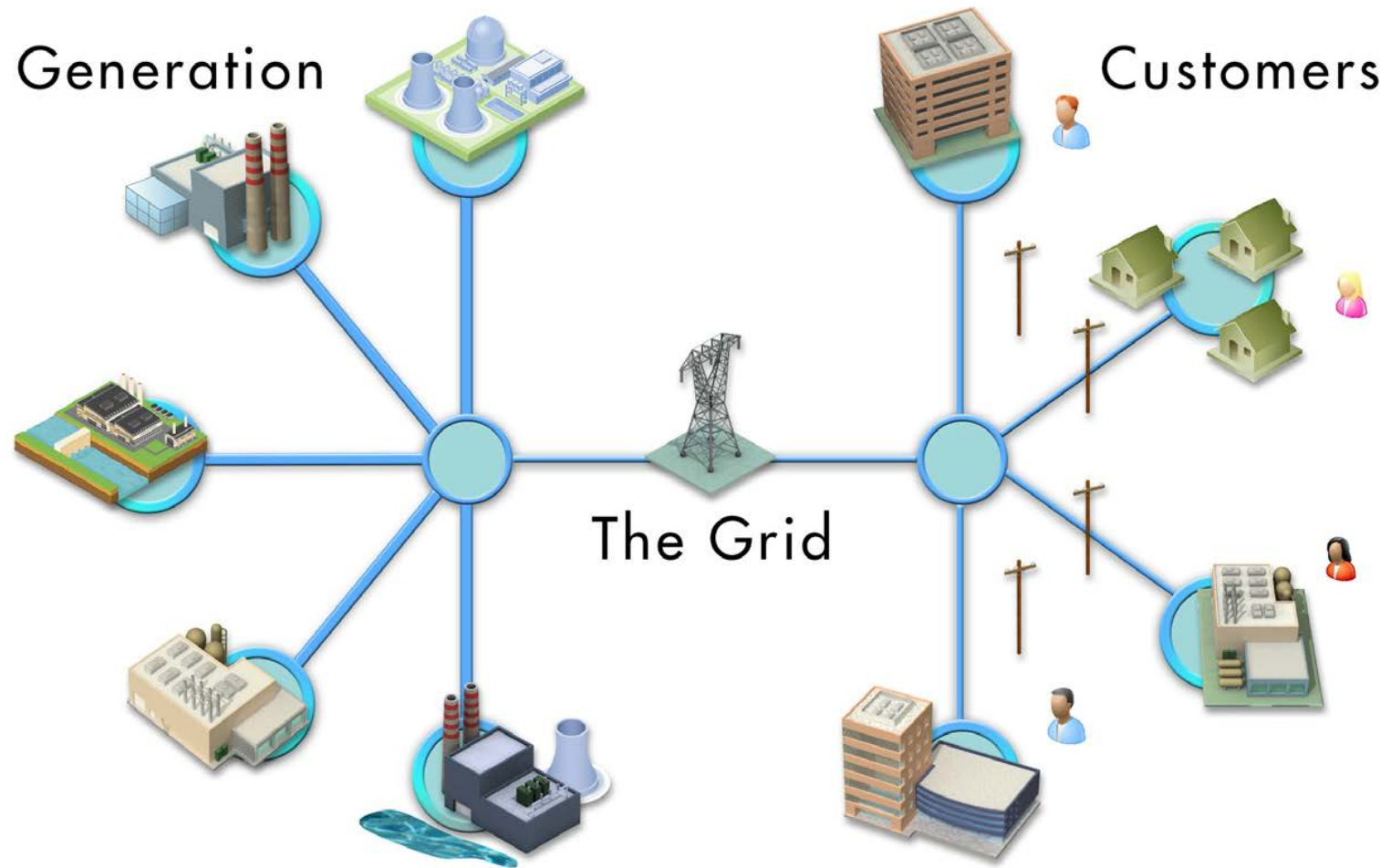


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# Today's power system

- Substantially, but not universally, **vertically integrated**
  - Differs across countries, and across states within the US, Australia, Canada
- Economic **regulation**, especially at distribution-retail level
  - Regulatory entry barriers
  - 1990s: first wave of unbundling
  - Wholesale power markets and contracts
- Regulatory and organizational models designed for an **analog**, mechanical world

# Today's power system



Source: EPRI (2014), p. 8

# Disruptive energy technologies



Source: Whirlpool



Source: <http://www.jetsongreen.com/2011/02/traditional-net-zero-home-connecticut.html>

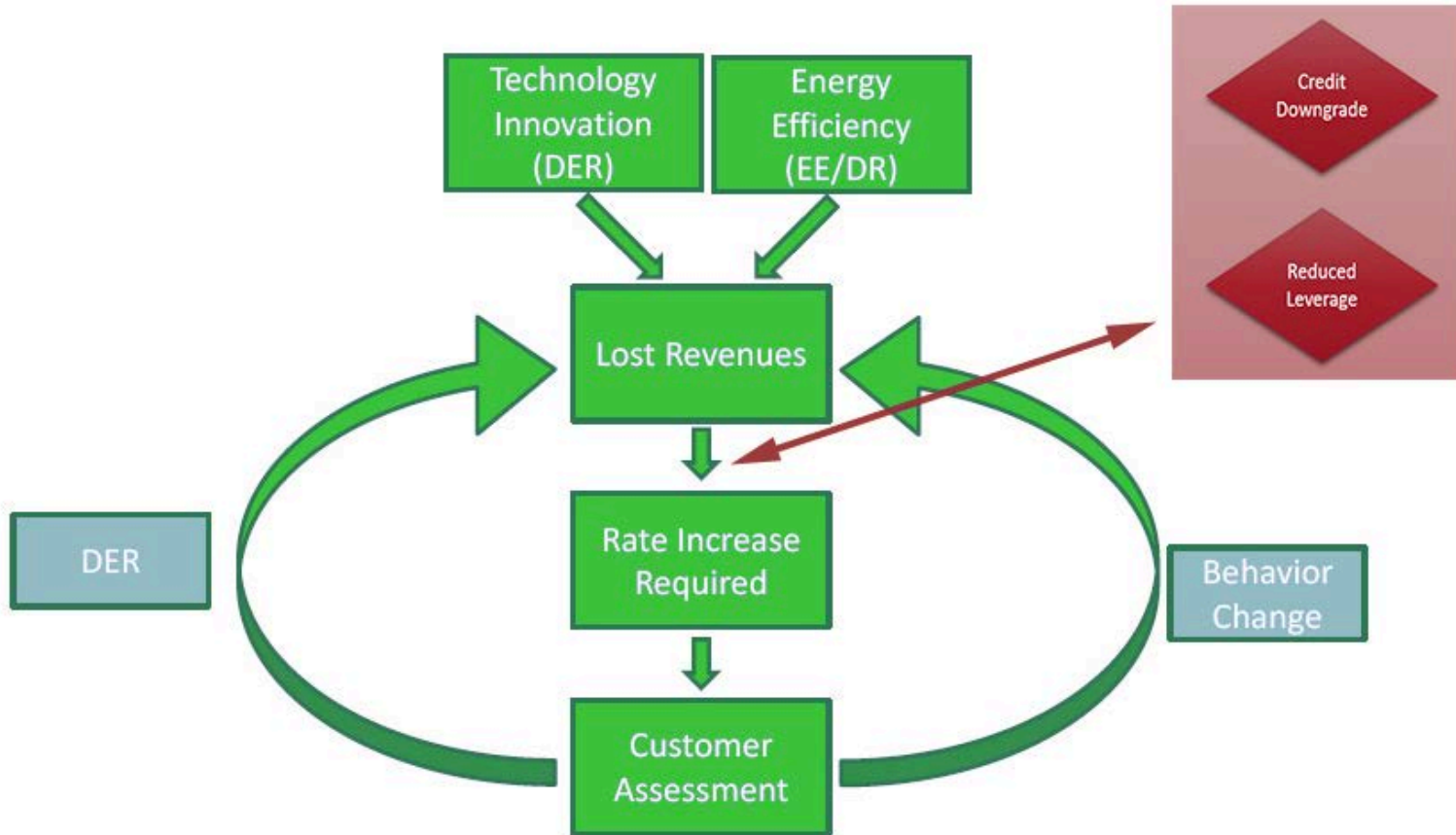
# Creative destruction – Joseph Schumpeter



The fundamental impulse that sets and keeps the capitalist engine in motion comes from the **new consumers' goods, the new methods of production or transportation, the new markets, the new forms of industrial organization** that capitalist enterprise creates. [...] This process of Creative Destruction is the **essential fact** about capitalism. It is what capitalism consists in and what every capitalist concern has got to live in.

# The “utility death spiral”

Vicious Cycle from Disruptive Forces

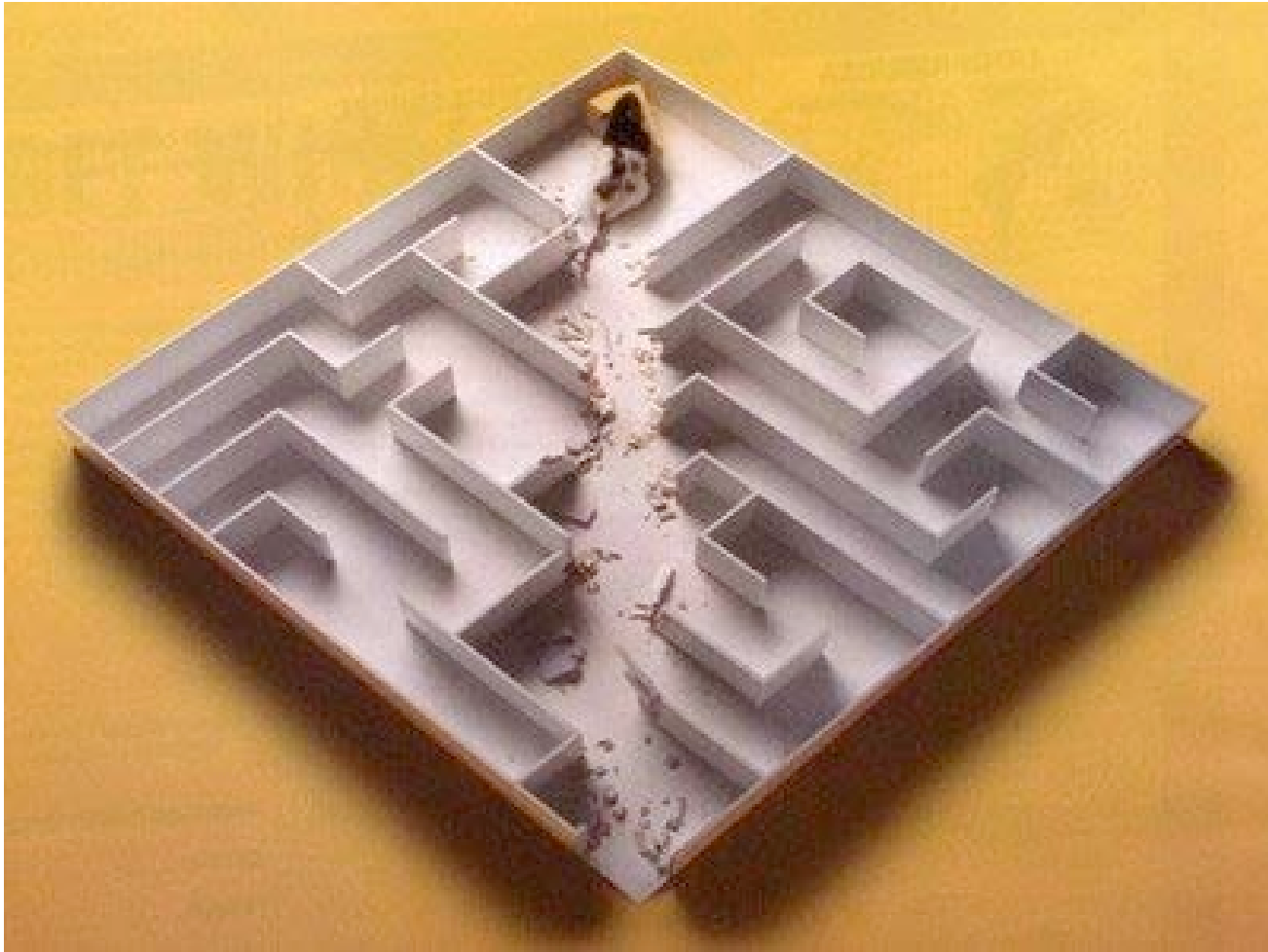


# Second wave of unbundling? Transaction costs & the boundary of the firm – Ronald Coase



- Digital innovation reduces transaction costs
- Changes in transaction costs change the boundary of the firm
- Falling transaction costs reduce the economic impetus for vertical integration

There is no innovation without experimentation

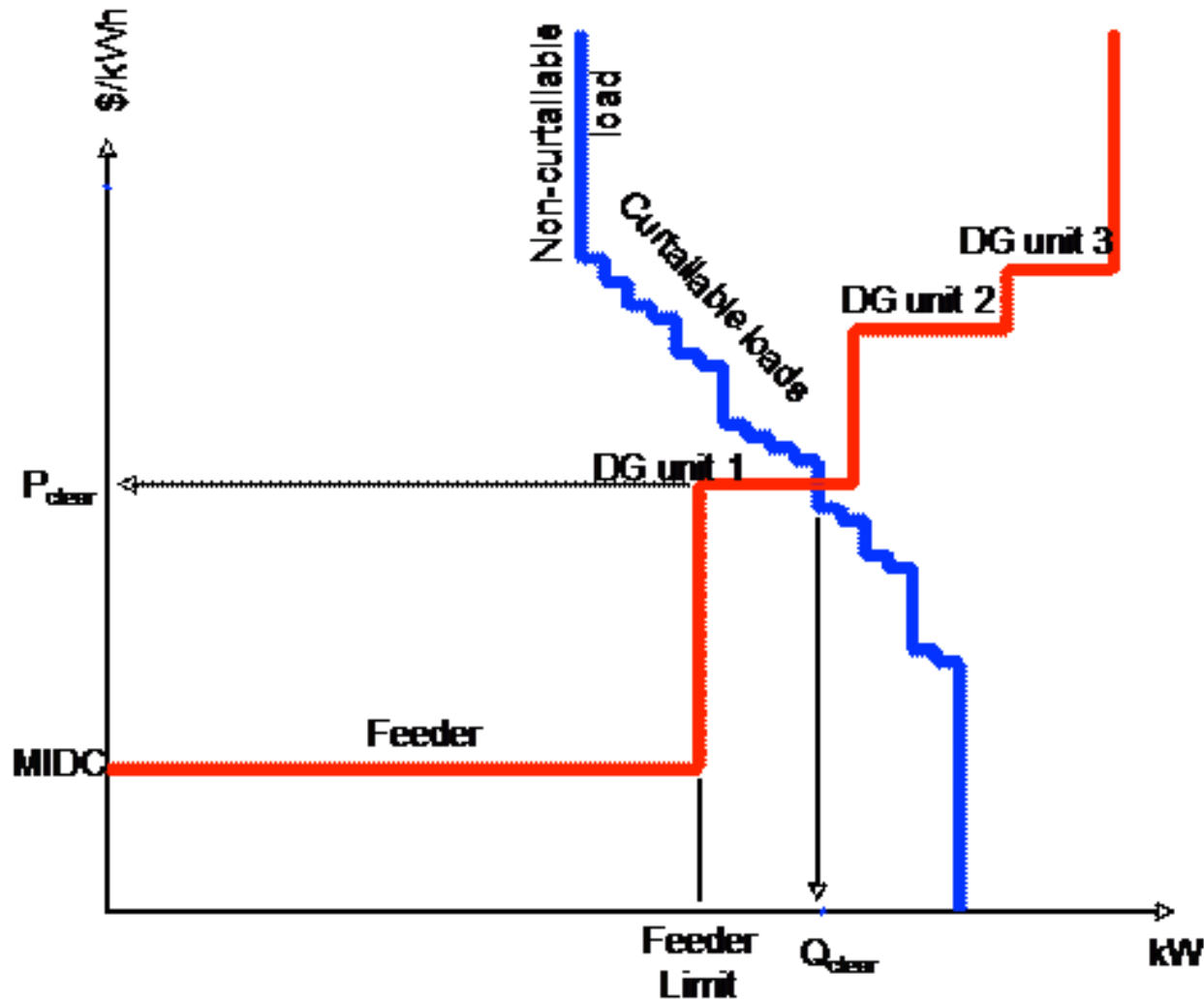




# Conceptual-theoretical framework

- Market design for a retail market
  - **Who** can exchange – what entities can buy/sell?
  - **How** do they exchange – units, definition of the item being bought/sold
  - **Time** delimiters matter in electricity
  - Elasticity is **dynamic**, not static, and a function of enabling technology

# Example: Olympic Peninsula retail double auction



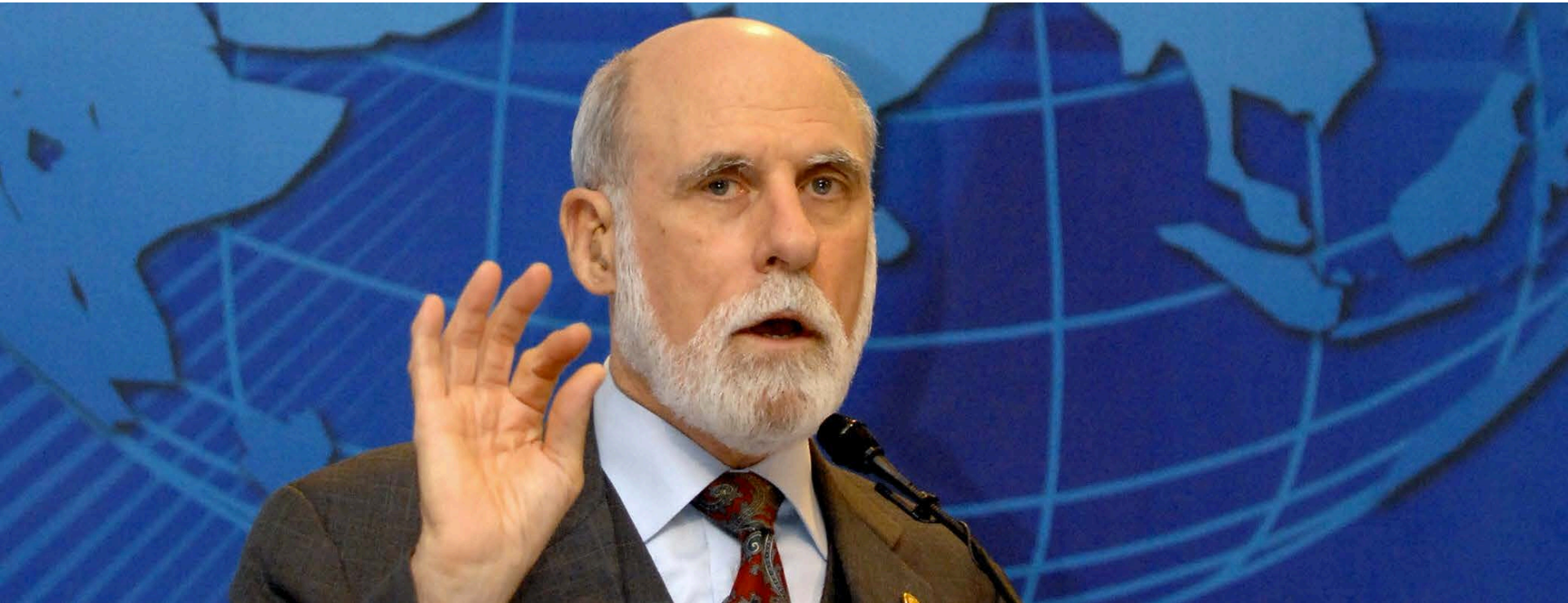
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  - Elasticity is **dynamic**, not static, and a function of enabling technology
- Organizational economics & theory of the firm
  - What are the **transactional** boundaries of the distribution company?

# Persistent regulatory entry (& exit) barriers



Permissionless innovation, focus on value rather than cost – Vint Cerf



# Decentralized market processes are innovation platforms



# A platform business model: Uber, AirBnB



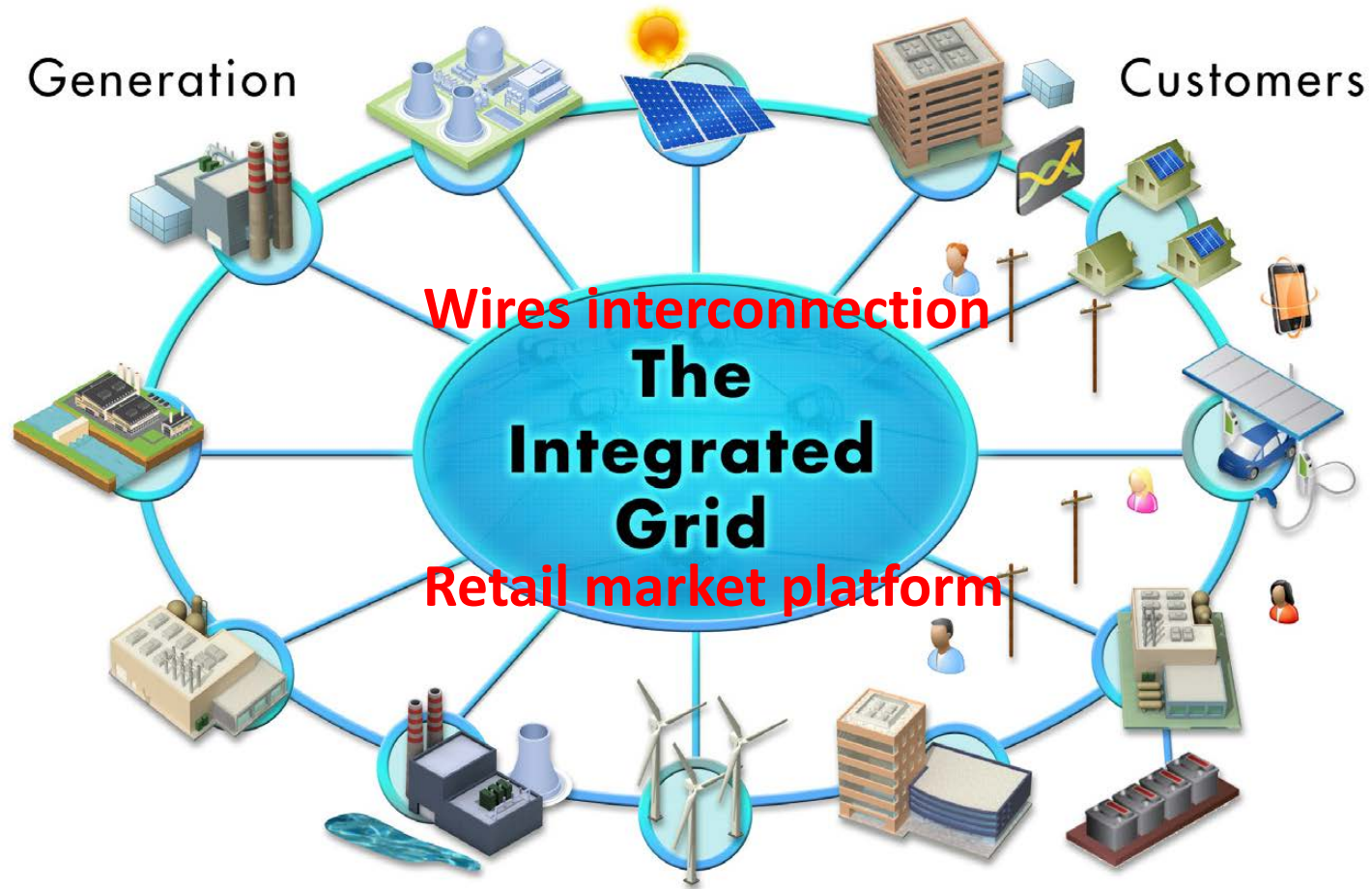
Source: <http://www.imore.com/imore-editors-choice-uber-little-inferno-jot-mini-and-more>;  
<http://fontsinuse.com/uses/7192/airbnb-identity-and-website-2014-redesign>

# Proposal: Physical + digital distribution platform business model

- **Technology** platform
  - Common core, heterogeneous periphery
  - Open interface standards
  - Loosely-coupled interoperable system of systems
  - Distributed digital sensing and communication
- **Economic** platform
  - Facilitate mutually beneficial connection
  - Heterogeneous agents with distributed knowledge & intelligence at the edge of the platform
- **Organizational** structure
  - Firm
  - Industry
- Compatible & enabling **regulatory** institutions
  - Competition around the distribution edge
  - Open interoperable standards
- NY REV proposal: Incumbent utility as a **Distributed System Platform Provider (DSPP)**



# A techno-economic electricity distribution platform



# Challenges

- Risk and physical reliability
- Financial risk
- Cybersecurity and privacy
- Political economy/behavioral
  - Still a regulated monopoly with an incentive to expand its footprint
  - Status quo bias, incumbent bias, inertia
  - Transitional gains trap (as we see with Uber)
- Should P2P wires be legal?
  - Chicago McCormick Place CHP example

# Regulator as gardener, not engineer – F. A. Hayek



If man is not to do more harm than good in his efforts to improve the social order, he will have to learn that in this, as in all other fields where essential complexity of an organized kind prevails, he **cannot acquire the full knowledge which would make mastery of the events possible**. He will therefore have to use what knowledge he can achieve, not to shape the results as the craftsman shapes his handiwork, but rather to **cultivate a growth by providing the appropriate environment, in the manner in which the gardener does this for his plants**.

# Conclusions

- Digital and distributed energy technologies are on the verge of transforming this century-old industry's **regulatory and organizational models**
- **Regulatory barriers to innovation** and experimentation limit the trial-and-error learning process that characterizes market processes
- A **transactive** distribution platform model may yield a valuable and resilient system, but is not without challenges