A systemic view of innovation

TU-E2110 Innovation in Operations and Services

Aalto University
School of Science

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Innovation management topics

25.1. Introduction & innovation process

1.2. Knowledge, learning and innovation

8.2. Organizing innovation activities

15.2. Strategic innovation management

BREAK

1.3. Systemic / institutional view to innovation

8.3. Summary of innovation management

+ instructing the individual assignment

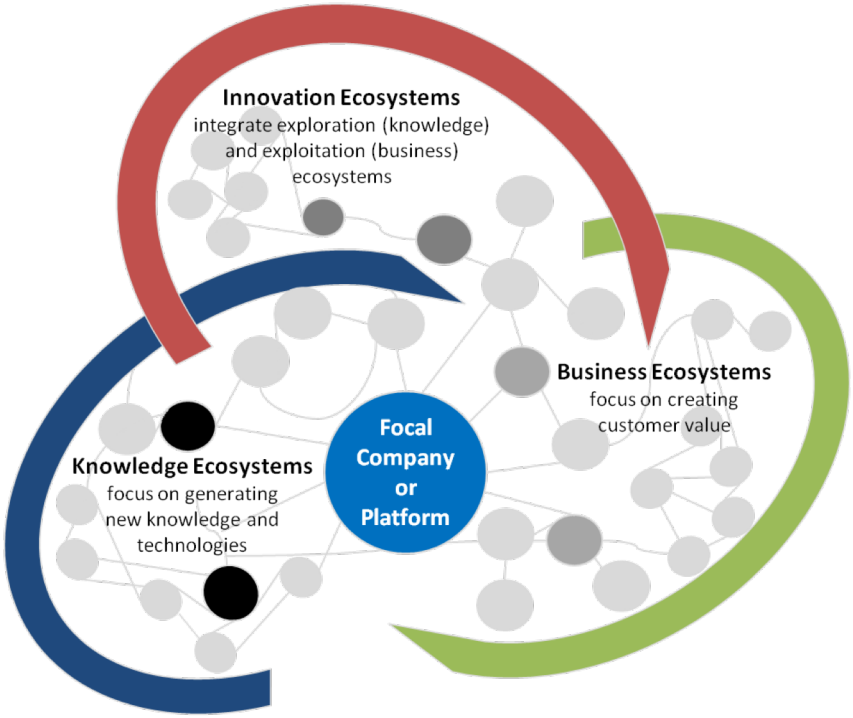
Previous session: Strategic innovation management

1. Industrial trajectories and organization-specific contingencies on innovation strategy
2. Building an innovation project portfolio from three types of innovation projects
   → Breadth versus selectiveness
3. Appropriation of benefits from innovation through business model and the appropriability regime

Today's learning objectives

After the session, you will be able to:

1. **Understand institutions as a key concept for understanding innovation in the ecosystems that surround an individual organization**
2. **Understand the concept of robust design and how it enables us to approach innovation in complex systems**



An institutional view of value-creating systems

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Systemic (combinatorial) construction of solutions: The computer mouse

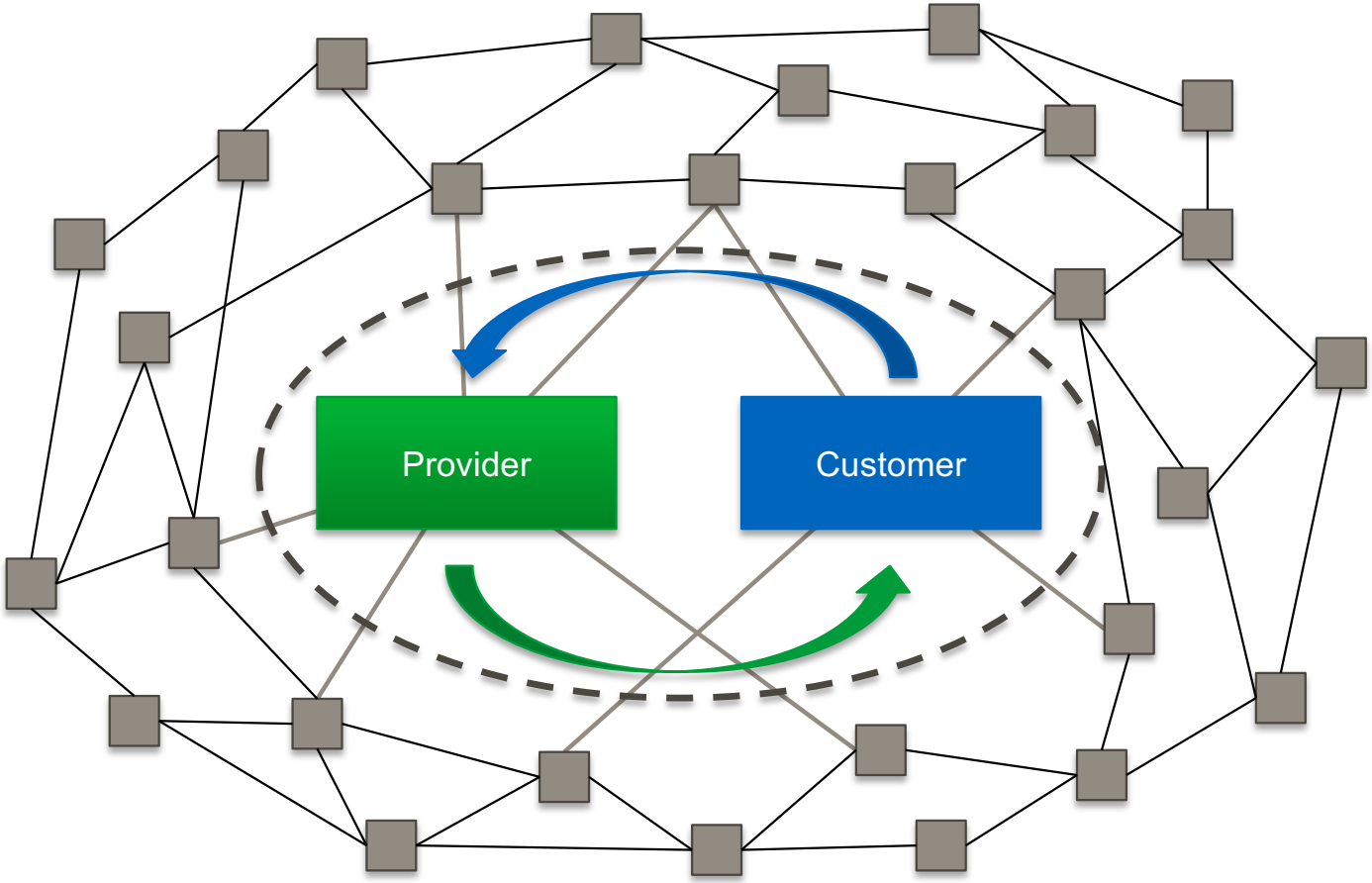
(Some) sub-components:

- Circuit board
- Processor
- Battery
- Wireless receiver
- Motion sensor
- Buttons & Scroll wheel
- Etc.

Production possible only in a highly specialized economy of interconnected firms

Arthur (2009)

Systemic view of value creation



(Vargo & Lusch 2011)

A systemic view on innovation

Innovation strategy and individual innovation projects must connect the firm's "internal environment" to the surrounding ecosystem

- Design *solutions-in-context*: Balance what's possible with resources at hand versus what makes sense and is beneficial in the wider context

Innovation challenge: The evolution of ecosystems steers toward stability

- ***Institutionalization*** = the process through which a solution becomes a shared and taken-for-granted part of collective action

→ **Laborious to change!**

Institutions

"*The rules of the game* in which organizations are the players" (North, 1990)

"Regulative, normative and cultural-cognitive elements that provide stability and meaning to social life" (Scott, 2014)

What are institutions?

Regulative	Normative	Cultural-cognitive
• Laws • Rules • Regulations • Governance systems	• Values • Expectations • Roles • Taboos • Conventions • Traditions • Standards	• Beliefs • Mental models • Schemas • Frames • Scripts • Categories • Identities

(Scott, 2014)

How do institutions work?

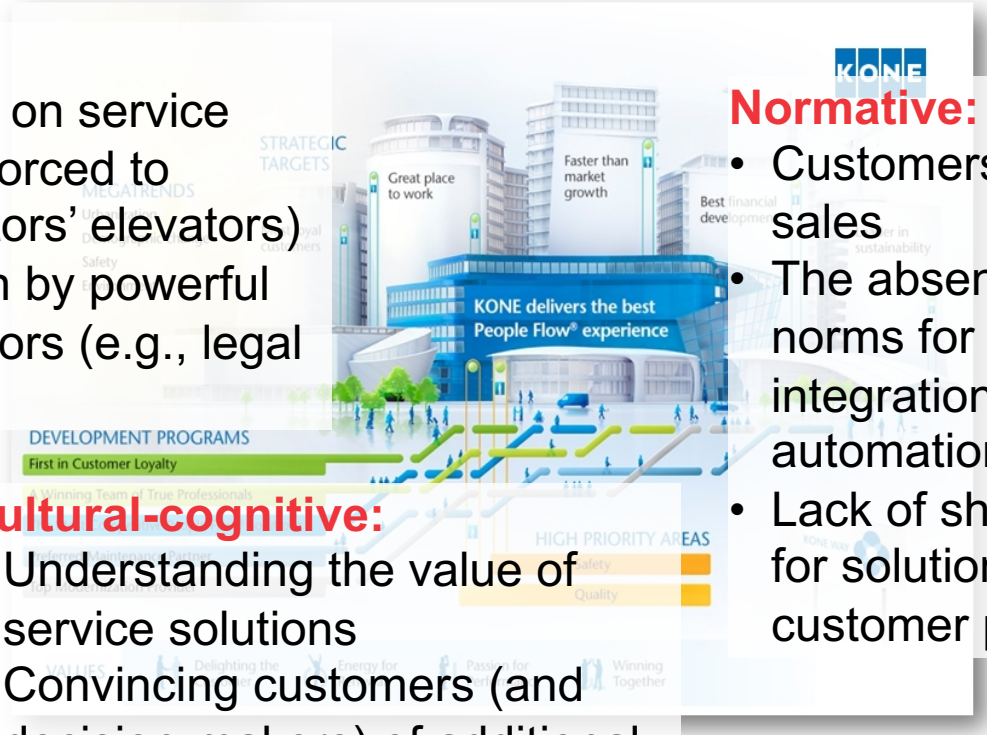
What makes actors (especially firms) *act alike*? (DiMaggio & Powell, 1983)

1. **Coercion by threat of sanction**
   - E.g., resource dependency, formal authorities
2. **Normative pressure on 'belonging'**
   - E.g., the standardization of industries and professions
3. **Mimetic pressure on comprehensibility and recognition**
   - E.g., benchmarking industry leaders to alleviate uncertainty, conforming to existing product categories

Example: Institutional constraints on service strategies

Regulative:

- Legal limitations on service provision (e.g., forced to service competitors' elevators)
- Direct opposition by powerful supply chain actors (e.g., legal action)



Normative:

- Customers expect product sales
- The absence of industry-wide norms for information integration (e.g., building automation systems)
- Lack of shared contract forms for solutions (e.g., liability, customer protection)

Cultural-cognitive:

- Understanding the value of service solutions
- Convincing customers (and decision-makers) of additional benefits

(Bhakoo & Choi, 2013; Neely, 2008)

Institutional arrangements

Institutions exist in interrelated arrangements

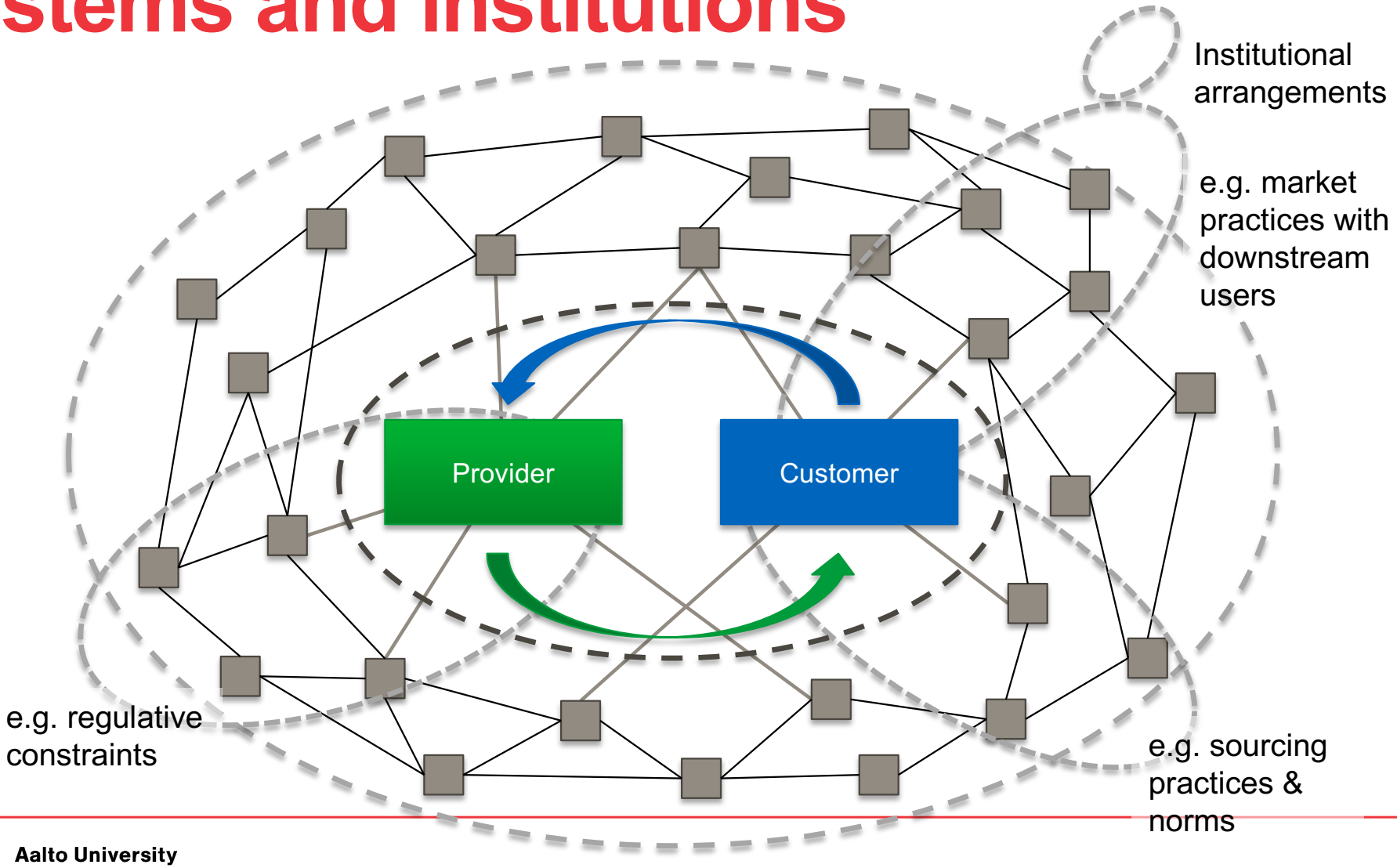
- Formed around a functional purpose
- Define a field of activity, provide a common 'logic' for action

Example: The university / higher education

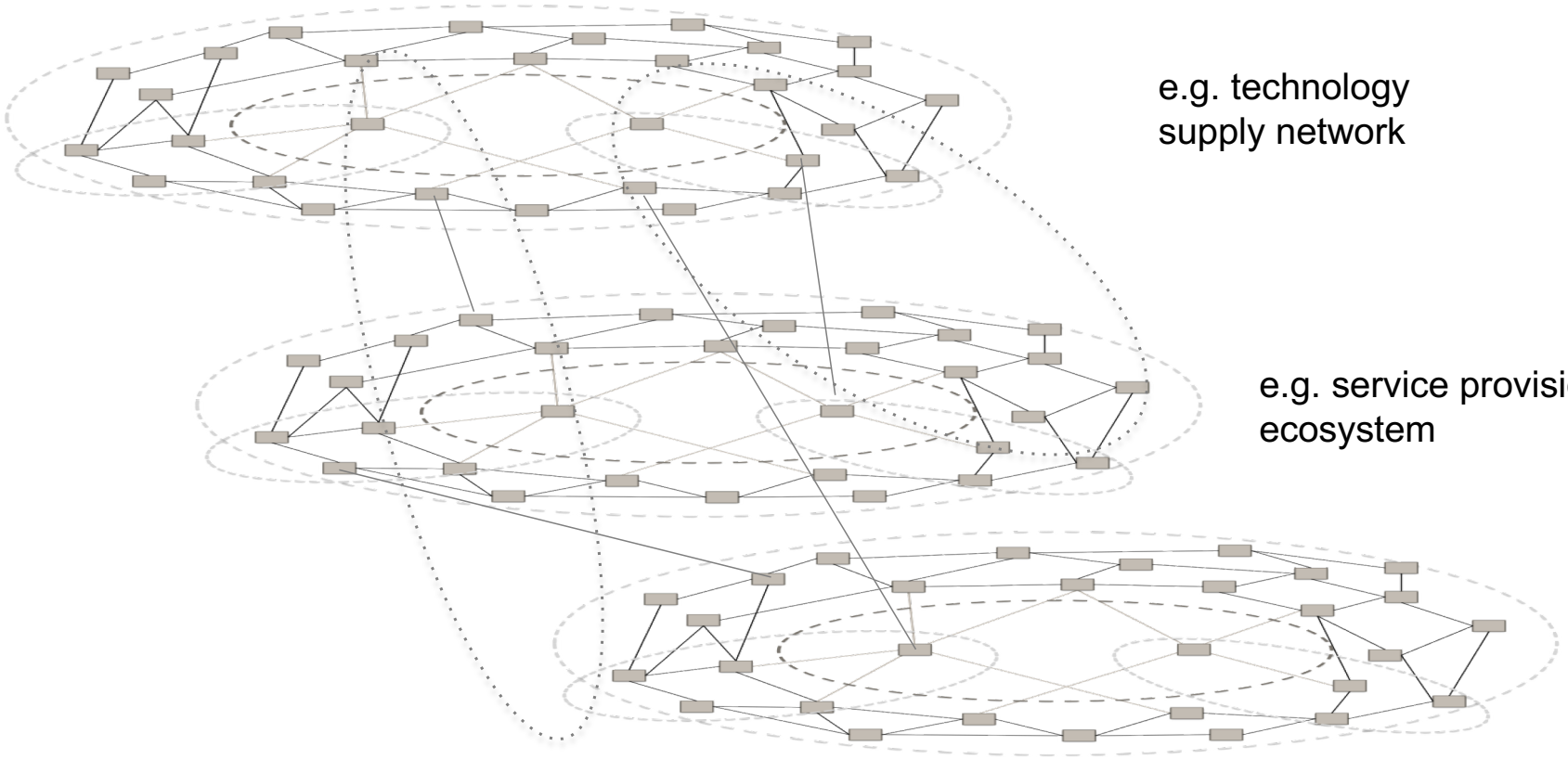
- University law
- Norms within and across universities (e.g., publishing)
- Shared practices, scripts (e.g., exam practices, guild activities)
- Shared understandings, meaning (e.g., prestige of HE degree)
- Etc.

(Friedland & Alford, 1991;
Vargo & Lusch, 2016)

Systems and institutions



Interlinked institutional systems



e.g. technology supply network

e.g. service provision ecosystem

e.g. customer's downstream ecosystem

“Utility” of institutions

Efficiency

- Reduce the need for conscious and reflective thinking (which slow and laborious) as well as power-laden negotiations

Effectiveness

- Embodies lessons learned in practice (historical evolution by ongoing refinement)

Trust

- Increases the predictability of behaviors among actors (basis for collaboration in communities & larger societies)

(Sewell, 1992)

Economic versus institutional view

ECONOMIC VIEW

- Rational actors: Calculative optimization of decisions
- Act to maximize utility that is unambiguously defined
- Individualistic and economic view of human collaboration

INSTITUTIONAL VIEW

- Boundedly rational actors: ”Satisficing” dependent on institutions
- Act to garner legitimacy in the multiple contexts of social life
- Social view of human collaboration

Scott (2014)

Innovation as institutional change

Innovation depends both on "engineering" and "social change"

- Create a new solution to an existing or unsolved problem
- Effect changes in (and leverage) the surrounding ecosystem

Innovation as 'institutional work'

- Redefine problems & solutions (understandings, interests)
- Mobilize old & new resources (power)
- Reconstruct relationships (ecosystem structure)

Hargadon & Douglas (2001): T.A. Edison and the creation of the electric lighting system

Institutional context for Edison's venture

Highly institutionalized gas lighting ecosystem

- Existing *regulations*, *norms* and *political decision-making* support the incumbent solution
- Existing *technological ecosystem* of infrastructure, suppliers, power plants, etc.
- Powerful gas companies

Institutionalized understandings also limiting

- *Assumptions*, *interests* and *preferences* of actors shared and stable around the gas lighting ecosystem
- A frame for interpreting the new system as *illegitimate and threatening*
  - *E.g., scientists discrediting Edison's vision as "impossible"*

Timeline of the electric lighting system

Pre-1878:
Growing dissatisfaction with gas lighting, invention of electric lighting system components

1878:
Design begins, founds Electric Lighting Co

1880:
First application in street lights by competitor

1880:
Edison's first application on Wall Street

1880-1882:
Issues with power main installation, safety & power loss

1882:
Introduction of electric bulb & centralized power plant system in NY

1883:
550 subscribers

1884:
First profitable year

1882:
NY gas companies lower prices → cheaper than electricity

1886:
Shift to AC from Edison's DC system

1892:
Edison's electric lighting system widely institutionalized as the dominant solution for lighting buildings & public spaces

Challenges on the new solution

Pre-1878:
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invention of
electric lighting
system
components

1878:
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Opposition from incumbent actors

1880:
First application in street lights by competitor

1880:
Edison's first application on Wall Street

1880-1882:
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High capital investment needs

Negative publicity & heavy criticism on the new system
More salient than the benefits over gas lighting

1883:

Shortage of competent workforce for electricity installations

1882:
NY gas companies lower prices → cheaper than electricity

1886:

Edison's personal myopia
In the battle against the more efficient AC system

1892:
Edison's electric lighting system widely institutionalized as the dominant solution for lighting buildings & public spaces

Robust design in overcoming challenges

Pre-1878:
Gr… dis… wit… lighting, invention o… electric ligh… system components

1878:
…Design…

1880:
First application in street lights by competitor

1880:
Edison's first application on Wall Street

1880-1882:
…ain…

1882:
NY gas companies lower prices → cheaper than electricity

1886:

1892:
Edison's electric …stem …dely …ized …nant …n for …ings …aces

Opposition from incu… ac…

Visioning a radically novel system while pursuing a comprehensible first application

High capital investment

Linking concrete design features to the existing gas lighting system
E.g., centralized power supply, wires dug in ground, brightness of bulb, same revenue model

Edison's …

Emergence of new suppliers and system components leveraging the original system design
Even despite the designer's biased schemas
E.g., Thomson-Houston's AC alternators

Shortage o… workforce for electricity installations

Robust design

“An innovation's ***design is robust*** when its arrangement of concrete details *cues schemas and scripts* that are **immediately effective** in the short term, by invoking preexisting understandings, but *that do not constrain us* to only those existing understanding and actions, instead **allowing us to discover** new ways to interact with the new ideas as our understandings evolve.”

(Hargadon & Douglas, 2001: 488)

Discussion: FlexIT's approach as robust design?

Based on the Edison case, discuss the following questions:

1. Which features make it comprehensible from the perspective of the existing system?
2. Which features are novel and possibly compelling in light of short-term adoption?
3. How might it accommodate longer-term evolution and more radical change in maintenance / spare parts supply?

5min discussion + summary

Discussion: AM as robust design for elevator spare parts

What makes it (potentially) a robust design?

1. Which features make it comprehensible from the perspective of the existing system?
2. Which features are novel and possibly compelling in light of short-term adoption?
3. How might it accommodate longer-term evolution and more radical change in maintenance / spare parts supply?

Design & institutional change

Design features a key in "rationalizing" new solutions as perceived within existing social systems

- Alignment with features of existing designs *activate particular past schemas & scripts* to interpret the new solution as useful
- Accommodate other interpretations later on
- *Balance familiarity and novelty*!

"Skeumorph"

- Element of a design that *serves no objectively functional purpose* but is *essential to the public's understanding* of the relationships between innovations and the objects they displace

Challenges in attaining robust designs

Short-term offsetting of early investments difficult to combine with enabling more radical solutions in the long term

- Balance between *conformation to existing institutions* & *providing a compelling new alternative* (impact versus acceptance)
- Balance between *fixed design features* for current market and *flexibility* to enable future evolution

The limitations of developers' schemas

- *Imposing narrow views* on the use of new solutions may act against the adoption and particularly future evolution

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