

# How do radical innovations 'generalise': the role of market infrastructures

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EUSPRI Conference 2012  
Karlsruhe, June 11-13

# About radical innovations



- Multiple terminologies: radical for economists, breakthrough or disruptive for management science... but no specific adjective for sociologists of innovation!
- Abernathy as a starting point: ‘architectural innovations’ & their dual disruption (competences, market/customer linkage)
- Sources:
  - technologies: technological paradigms (Dosi), general purpose technologies (Bresnehan & Trajtenberg)
  - role of users (e.g. Von Hippel & instrumentation; Flichy & the internet; bricolage from the bottom: Karnoe & wind energy)
- Processes:
  - distinguish between exploration & exploitation (March), emergence & diffusion (Rogers, Stoneman)
  - emergence and protected spaces/ Latour’s collective experiments, niches (Rip & Kemp; Geels)

# The issue raised



- How to move from a protected niche? What is needed to move from exploration to exploitation, from a fluid to a dominant design (Tushman & Anderson)? In one word, what enables ‘new markets’ to develop?
- Many concepts difficult to ‘operationalize’
  - diffusion, innovation journey & narrowing process (Van de Ven),
  - Callon & Latour ‘alignment’ & stabilisation of actor-networks
  - transition management (Geels 2002, 2005; Geels & Kemp 2012): notions of ‘socio-technical regime’ and ‘transition pathways’
- Our hypothesis: a key aspect of ‘generalisation’ lies in the construction of **market infrastructures**.

# From Goffman's notion of frame...



- Callon's mobilisation of the notion of frame by Goffman & the image of a theatre play
  - there must be a theatre (stage, seats, entrance hall, backstage, dressing rooms...)
  - there is a set of rules that spectators should know & obey (curtain, lights, bell...)
  - there are established modalities of access (tickets, cashier, usherettes...)
  - the play is inserted in a set of norms (e.g. safety of spectators) and of regulations (e.g. authors' rights)
- → highlights the simultaneous presence of a conducive physical infrastructure and of a lasting institutional framework.

... through work on both dimensions ...



- The institutional framework
  - long-standing and multiple work on the role of standards or regulations that protect consumers
  - work on norms and values for a profession (e.g. Paradeise 1988, Karpik 1995)
- Physical infrastructures
  - key for spatial geography for a long time and a central feature of studies of internationalisation (e.g. P. Martin & C.A. Rogers 1995, see recent work on containers by Yates & Murphy 2010)
  - Recently revived by the plumbing metaphor of the Commission (2012) about transport infrastructures: it is “vital, but unglamorous and forgotten until something goes wrong”
  - recent work (Lee, 2010) about critical dimensions: (1) provide the basic equipment that underlies some activity; (2) be critical to support the activity; (3) require large investments; (4) involve some form of government or public sector involvement.

## ... to Market Infrastructures



- We follow Fligstein's use of the notion (2001)
- But consider its definition difficult to operationalise: the 4 types of rules proposed: (1) ownership; (2) competition & cooperation; (3) exchange rules; (4) normal functioning of companies.
- A provisional definition
  - a set of rules (what we are allowed to do), norms (what we ought to do) and values (what we should do)
  - supported by tangible investments and the corresponding organisations to make them lasting (& 'invisible')
- Some recent examples: financial markets (authors even use this terminology), the emergence of markets for utilities (energy as a reference case)

# From a static to a dynamic frame



- Our assumption: the ‘radicality’ of innovations requires that at least one dimension of pre-existing market infrastructure is transformed  
→ Can provide an entry into categorising ‘forms’ or ‘degrees’ of “radicalness”, e.g. from generic (Geels car ‘socio-technical regime’) to specific (changing only one dimension, e.g. Abernathy example of the car electric starter)
- Redefining ‘market’ framing/shaping activities (Courtney, 1997) as activities aiming at enabling extension beyond the established niche / collective experiment  
→ Callon’s notion of ‘framing & overflowing’, coupled with Callon & Rip notions of ‘fora’ and ‘robust compromises’ (that is lasting agreement of new expression of infrastructural dimension).
- Two critical aspects: time frames and cumulative dimension of transformation (from a trail of trials in the emergence phase to a trail of new infrastructures/ new dimensions of the market infrastructure in the diffusion phase)

# Lasting and cumulative processes for shaping market infrastructures



- Cars: starting with technology and a battle between options & their corresponding visions of users (electric vs thermal, luxury vs Ford T)
- Physical infrastructure as key to the development
  - roads between cities
  - availability of fuel and the petrol economy
  - changing streets in cities (pavements)
- New regulations
  - Traffic rules to insure street safety
  - Driving licence to insure the capability of drivers
  - Insurances to organise a collective coverage of individual liabilities of drivers
  - petrol as a central source of revenues for states
- New values (and the symbol of James Dean in 'rebel without a cause')
- But also progressively reshaping city structures with suburban "shoe box areas" (malls, hypermarkets, drive in movies...)
- And sets of cycles 'à la Noteboom' or of 'specific' overflowings 'à la Callon' that require periodic transformations: dangerous goods, gas powered cars, ... see on-going debates on electric cars

Remobilising Geels (2005) example of the automotive socio-technical regime

# Nanotechnology and the attempts for setting a new market infrastructure (1)



- Key knowledge infrastructure:
  - Building a shared repository of knowledge on toxicology of nanoparticles (ICON) (OECD)
  - Building a shared repertoire of terms (a basis for rules to be set-up) (2 years in ISO TC 229)
- Shaping values: Building a responsible way of doing research: EC code of conduct...
- Shaping norms (1): a transversal ISO group
  - with an original functioning within ISO practices
  - with an extension of safety to consider: producers, users, and the environment
  - with unique aspects about 'acceptability'
- Shaping norms (2): the engagement of actors in developing new tests (e.g. Michelin and the tire industry)

# Nanotechnology and the attempts for setting a new market infrastructure (2)



- Shaping rules:
  - Re-organising the value chain in the chemical industry (e.g. Arkema and nanotubes: beyond traceability, including control on modes of use & processes set out by customers )
- What anticipations of future markets? the translation of market shaping activities from individual 'states' to 'global' fora of market shaping, driving to a series of changes:
  - using existing ones, but reversing order (ISO)
  - new spaces fostered by diverse NGO (eg ICON)
  - new attempts by public policies to create a space of their own (mobilising OECD for nanoparticles)
  - using soft law, e.g. voluntary codes of conduct

# To conclude



- Work in progress
- Market infrastructures as a key process in fostering ‘transition’ – and as a marker about actors’ views of the future and about where ‘transition lies’.
- Next step: re-open ‘recent’ (post WWII) cases to better delineate dimensions and processes
- Look at on-going cases to look at effects of globalisation on the role of States/Nations/Governments