



Users, consumers and citizens in the innovation system

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Objectives

- Demand side of innovations
- Main theories and research questions
- Discuss involvement of users, consumers and citizens in innovation system
- How user producer interaction affects dynamics of innovation
- Discuss different UPI concepts



Problem

Failure to involve users major reason for unsuccessful innovation processes

(e.g. Nahuis/Moors 2012; Boon *et al.* 2011; Peine 2011; Moors *et al.* 2010; Hyysalo 2010; Smits *et al.* 2008, 2007, Oudshoorn /Pinch 2008, 2005)

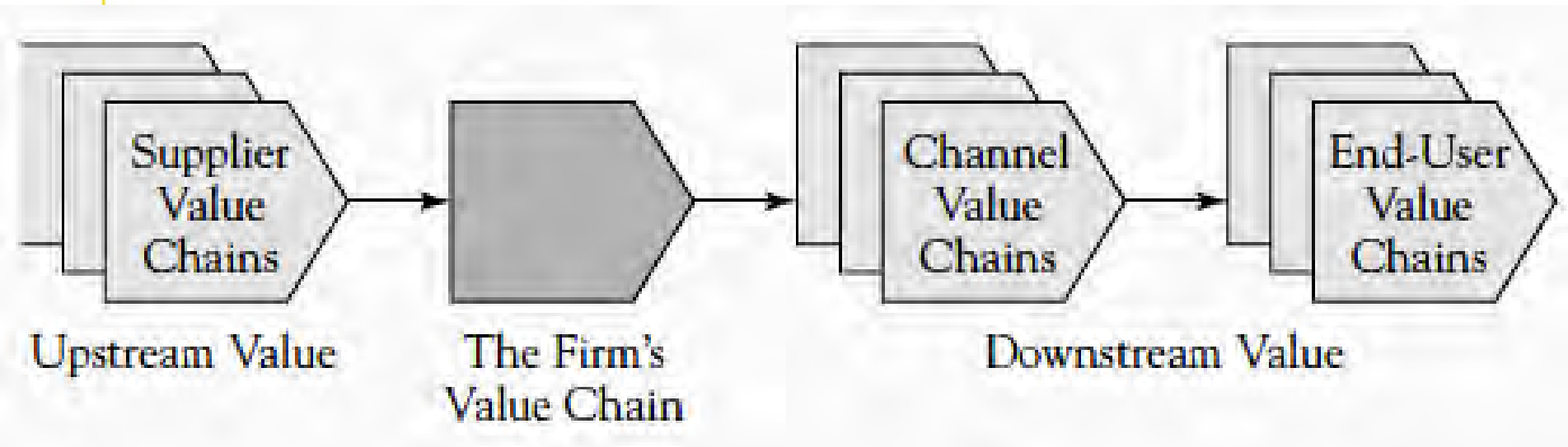
Difficulties in dealing with user-related issues in design account for majority of failures

Merits of user involvement are clear, but many barriers to effectively organise it

How to explain this user-technology paradox?



Value Chain





Linear innovation processes



Linear drug R&D pipeline

Target
identification
& validation

Screening and
pre-clinical
trials

Clinical
trials

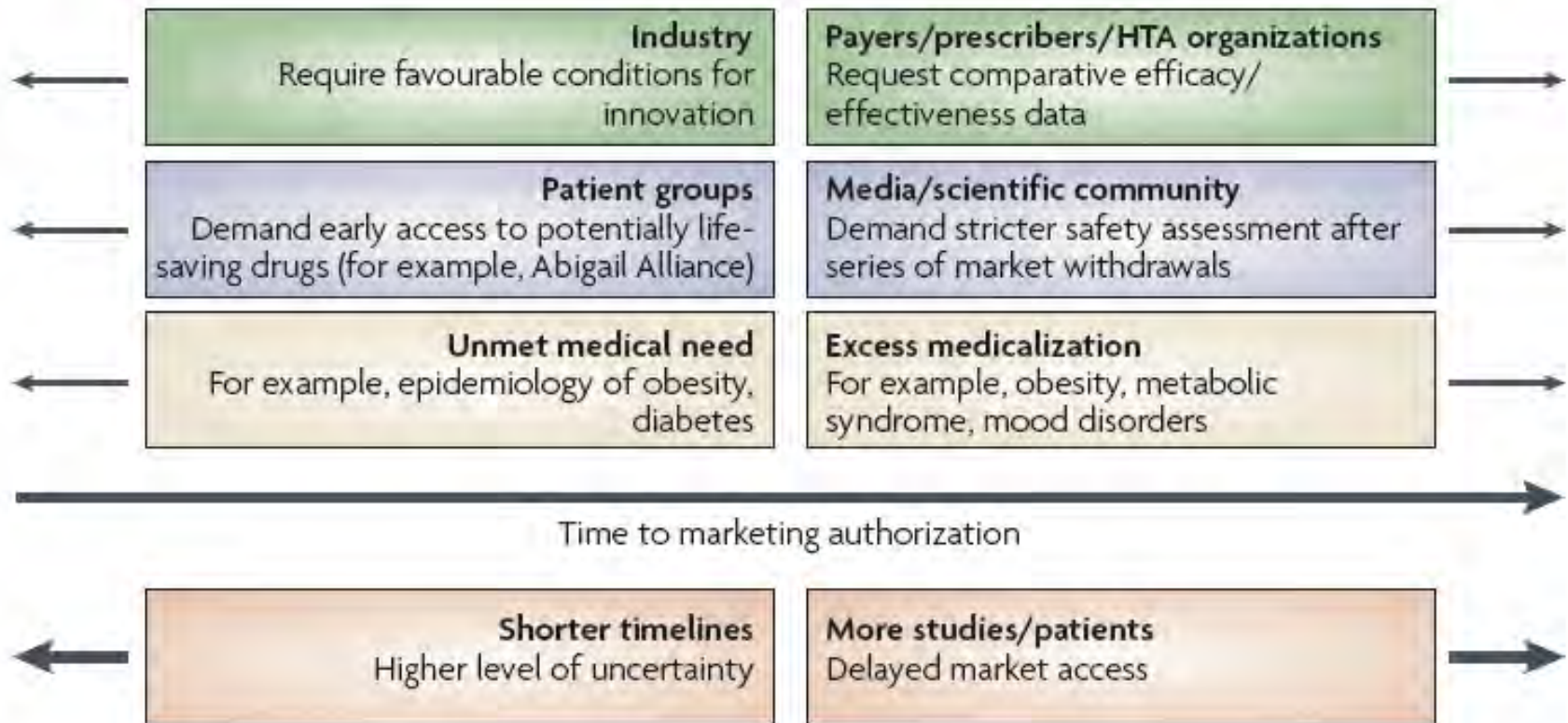
Registration
and market
introduction

Health care arena



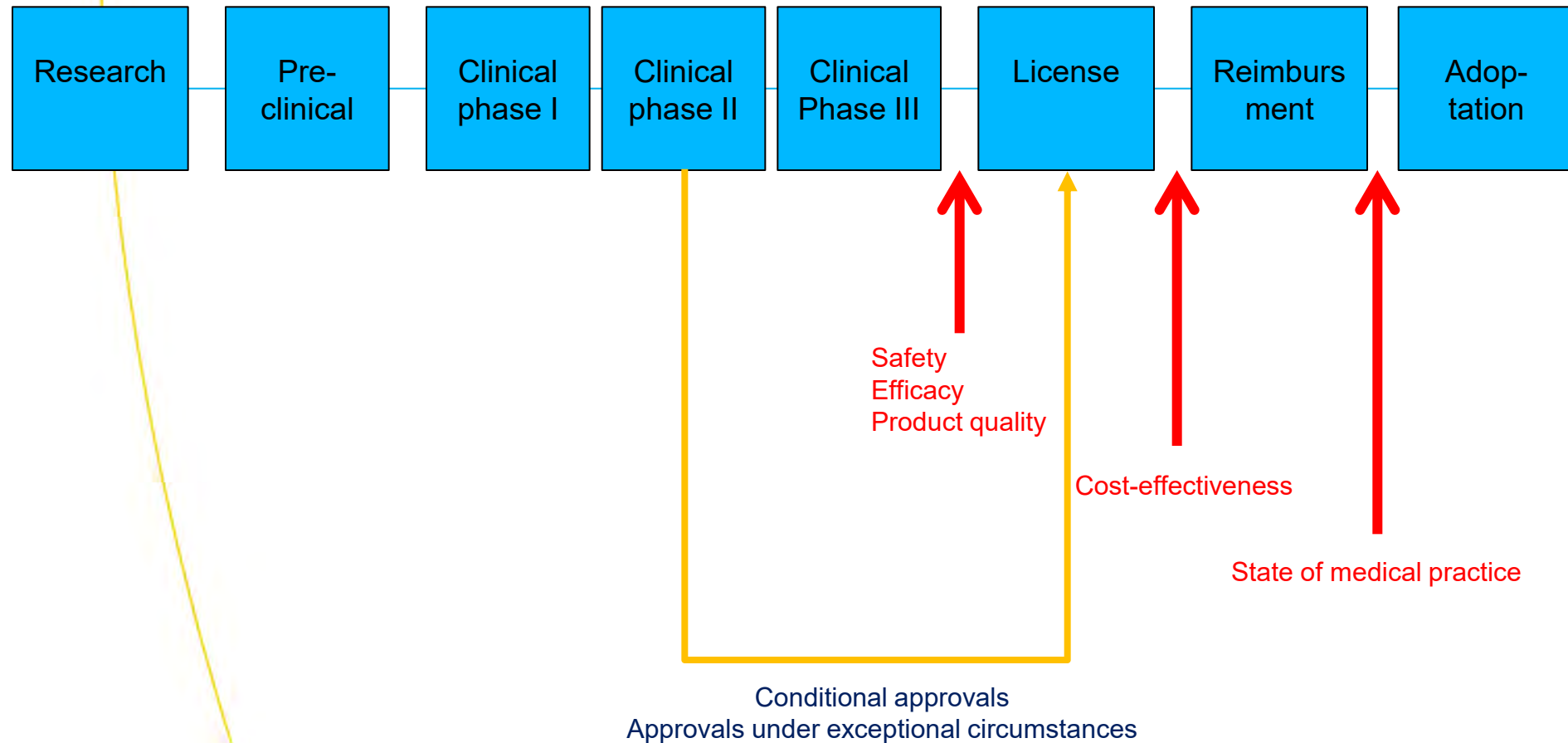
Different actors: different wishes & preferences

Eichler *et al.* 2008





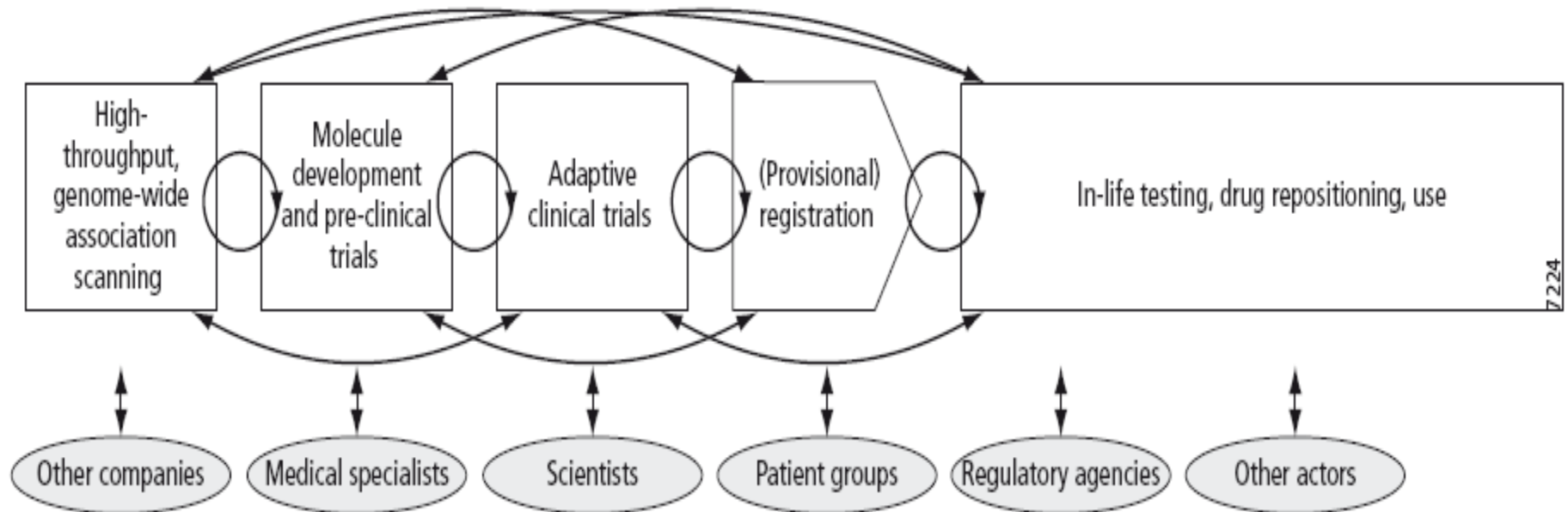
Hurdles in innovation process





Systemic perspective on innovation

Vision of non-linear, 'open' drug R&D innovation process

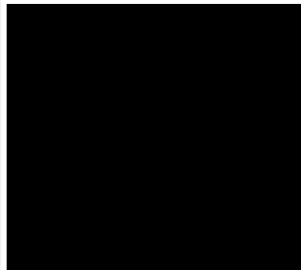




Supply side

Variety creation:

Heterogeneous actors supply technological alternatives during the innovation process :



treated here as a
'black box'

Supply side provides technological variety for selection

User-producer interaction

Demand side provides legitimacy as feedback

Demand side

Selection processes:

Heterogeneous actors can provide social acceptance (legitimacy) during the innovation process:

Socio-political acceptance

- Public preferences
- Politics
- Government & policy makers
- Media & opinion makers
- NGO's

Market acceptance

- Adopters
- Disposers
- Supply chain intermediaries

Community acceptance

- Users
- Local stakeholders

Start

Technology development

Market introduction

Diffusion

Adoption intention

Implementation



The background: Orthodox economics

- Perfect rationality and optimizing decision
- The production function: A strange definition of technology
- Technical change is fully exogenous, black box
- The economy is static, only responding to external changes



From science push to demand pull

Science-push model Bush (1945)

-favoured by scientists

Demand-pull model Schmookler (1966)

Changed market demands calls for innovation

Mowery & Rosenberg (1979): both demand and supply side influences crucial for innovation



Learning by doing/ Learning by using

- **Learning by Doing** (Arrow, 1962):
 - Learning after the R&D stage, but from experience reduces labor costs (per unit of output)
- **Learning by using** (Rosenberg, 1982):
 - “For in an economy with complex new technologies, there are essential aspects of learning that are a function not of the experience involved in producing the product but of its *utilization* by the final user.” (p. 122)



The Selection Environment

- ...influences the adoption of an innovation.
- Substitution vs. Imitation
- See MLP, regime approach Geels (2004).



Demand side: innovation theories

- . ***User Producer Interaction***
- . ***Diffusion of Innovation***
- . ***User Innovation***



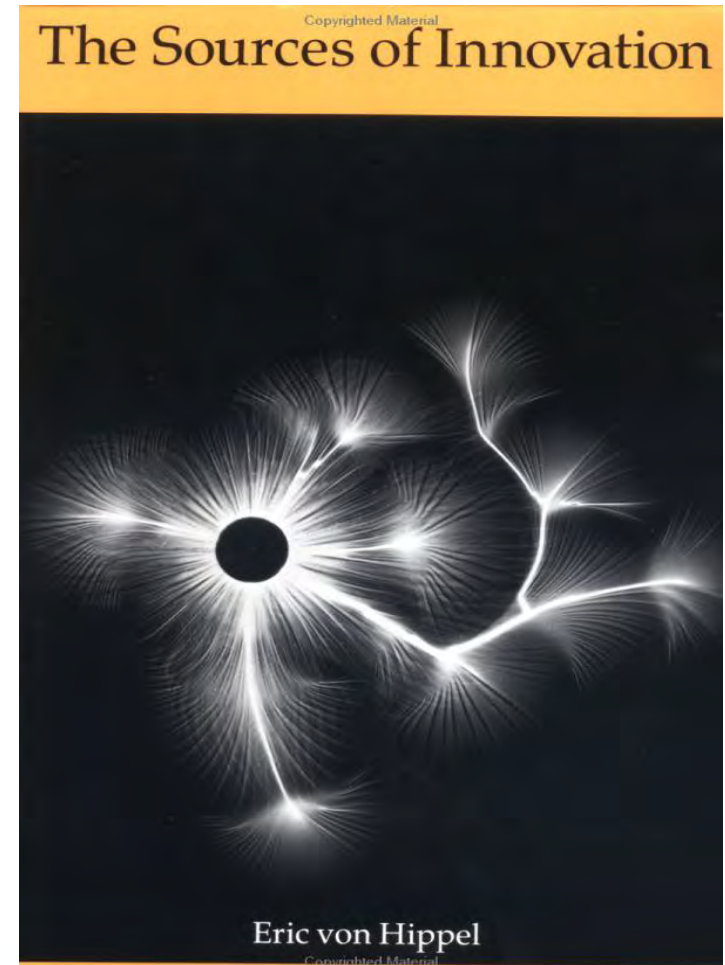
User-producer interactions

- On pure markets, economic actors are separated, relying only on quantitative information.
 - But: Is information about volumes and prices sufficient in innovative activities?
- More detailed, qualitative information is necessary, about needs and preferences
- Innovative activities involve interdependent relationships between users and producers (interactions)
 - Channels of information, code of information



Sources of Innovation

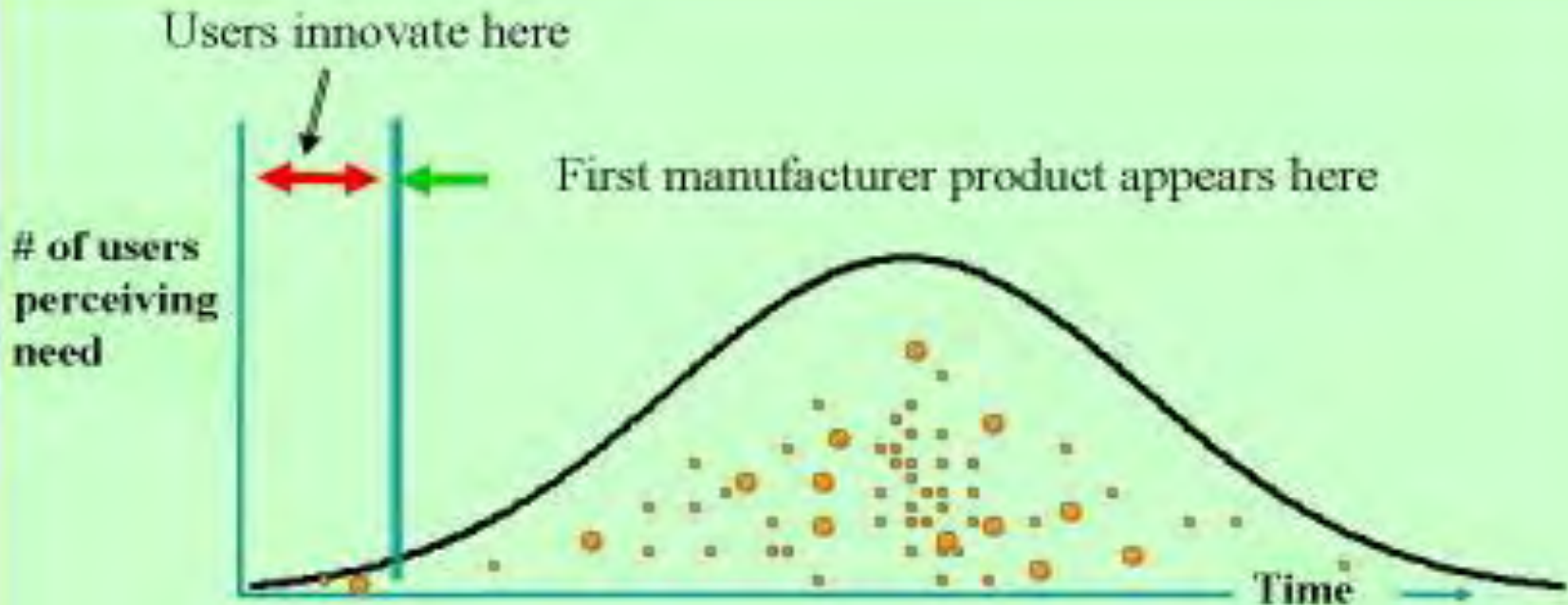
- Users as the actual source of innovation
 - Articulation of a need
 - ... **through provision of a solution**
- Examples and Relevance
 - Industrial goods (vHippel I)
 - Consumer goods (vHippel II)
- Lead-user method and other toolkits for innovation





Diffusion of User Innovations

- User innovations typically occur early in diffusion
- Lead users
 - Ahead of market trends: articulating need
 - Exceptionally knowledgeable: developing a solutions



Source: von Hippel 2007



Rogers: Diffusion of innovations

Diffusion = 'process by which an innovation is communicated through certain channels over time among the members of a social **system**' (Rogers, 1983: 5)

4 important elements diffusion:

1. **Innovation** = 'idea, practice, object that is perceived as new by an individual or other unit of adoption'
2. **Communication channels** = 'the process by which participants create and share information with one another in order to reach a mutual understanding'
3. **Time** = 'time does not exist independently of events, but is an aspect of every activity'
4. **Social system** = 'a set of interrelated units that are engaged in joint problem solving to accomplish a common goal'

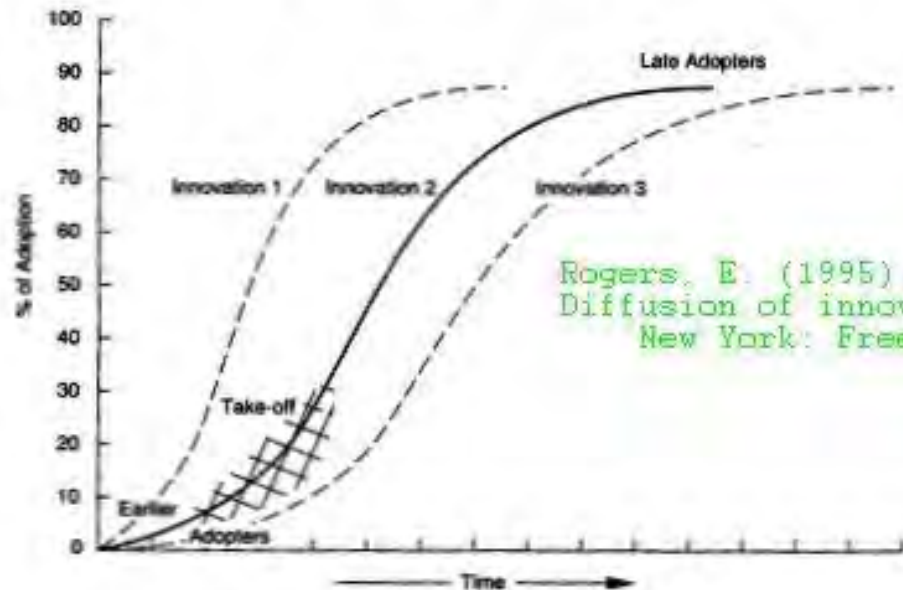


Diffusion of Innovation (Rogers)

- Diffusion of an innovation within a population
- Normality of adoption within a social system
- Categories of adopters

FIGURE 6.5 Shapes of curves of diffusion for innovations that spread over various periods of time

source: Everett M. Rogers, *Diffusion of Innovations*, 3rd ed. (New York: Free Press, 1963), p. 11.





Rogers model of diffusion

- What can the model explain?
 - Characteristics of adopters
 - Adoption decisions and characteristics of innovations
 - The timing of diffusion processes
 - For practitioners: Prevention of non-diffusion





Table 3

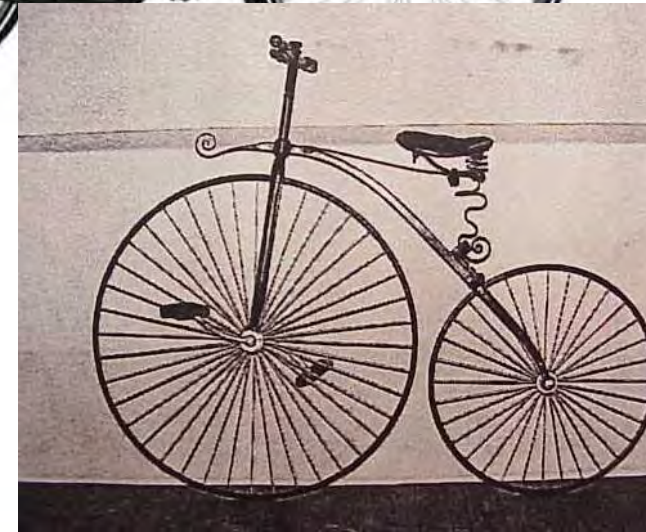
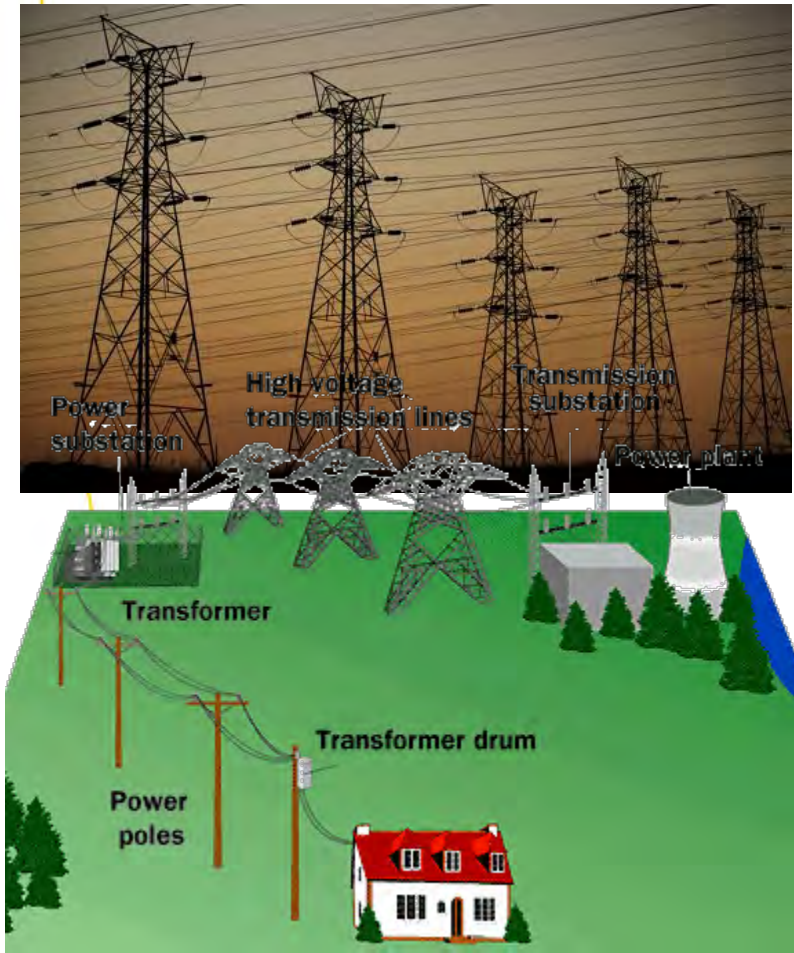
Frequency of user-dominated innovative processes by type of instrument

Major improvement innovations affecting	% User dominated	Innovation process dominated by			Total
		User	Manufacturer	NA	
Gas chromatography	82%	9	2	0	11
Nuclear magnetic resonance	79%	11	3	0	14
Ultraviolet spectro- photometry	100%	5	0	0	5
Transmission electron microscope	79%	11	3	0	14
Total	81%	36	8	0	44



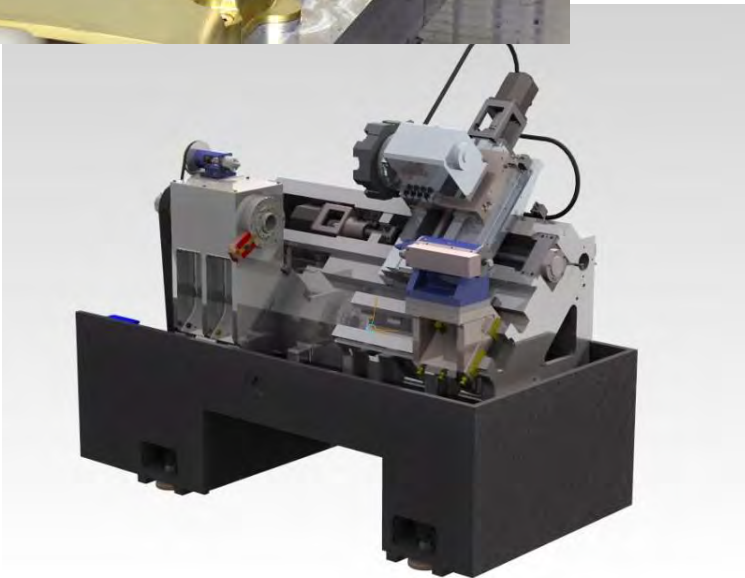
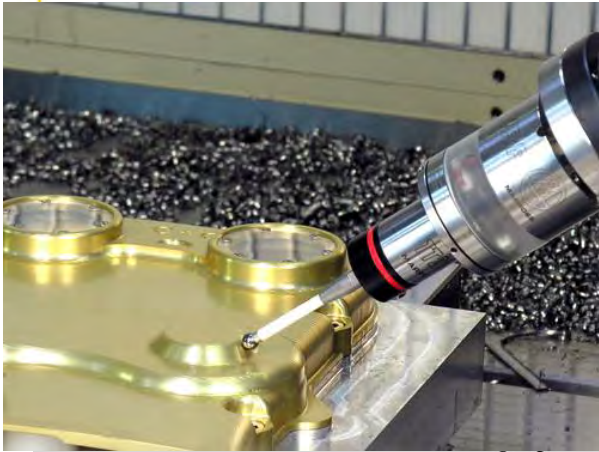


Infrastructure vs. Stand-alone





Industrial vs. consumer goods





User Innovations

- User innovation
- User driven innovation: living labs
- User as intermediary / partner
- Community innovation / public sector innovation
- Open innovation

Gault, SPP 2012



User perspective

- Different ***user involvement models***: user configurations, scripts, framing etc
- Different types of ***user-producer interaction***: demand articulation, interactive learning, broadening, framing
- User involvement can be beneficial to co-evolutionary innovation processes
- Questions remain about needs, ideas, values, representation of users in innovation



Starting points

1) UPI as umbrella concept: **various types of interaction**

General UPI objectives: (Smits & Den Hertog 07):

- 1) More effective articulation social needs
- 2) Enhanced competitive strength enterprises
- 3) Improved acceptance + societal embedding new technologies
- 4) Improved learning capacity of social networks
- 5) Enhanced democracy

2) **Setting or organization of UPI**

-> Objectives and characteristics context are important



Five reasons for user involvement

1. Address market failures + ways to overcome them
2. Employing experiential knowledge of users and their creative potential
3. Instrumental to process, supporting boundary conditions of innovations, enhance effectiveness
4. **'Champion' the innovation, counteract resistance**
5. Increasing moral and democratic value of innovation processes



Types of UPI

Evolutionary economics

1. Demand articulation
2. Learning by using / interactive learning
- 3) Innofusion / first user enrolment

Constructive Technology Assessment

- 4) Broadening

Social Construction of Technology

- 5) Framing

Semiotic approaches

- 7) Configuring the user, scripts
- 8) User representation



User Producer Interaction in context: a typology

		<i>Demand</i>			
		<i>Homogeneous</i>		<i>Heterogeneous</i>	
		<i>Protected space</i>	<i>Wider world</i>	<i>Protected space</i>	<i>Wider world</i>
<i>Technology</i>	<i>Specific</i>	Demand articulation Enriching	Configuring the user	Demand articulation Learning by interacting Broadening Enriching Frame sharing User representation	Learning by using Configuring the user
	<i>Flexible</i>	Demand articulation Learning by interacting User innovation Enriching	Demand articulation Configuring the user	User innovation Broadening Frame sharing	Demand articulation Learning by using Innofusion User innovation

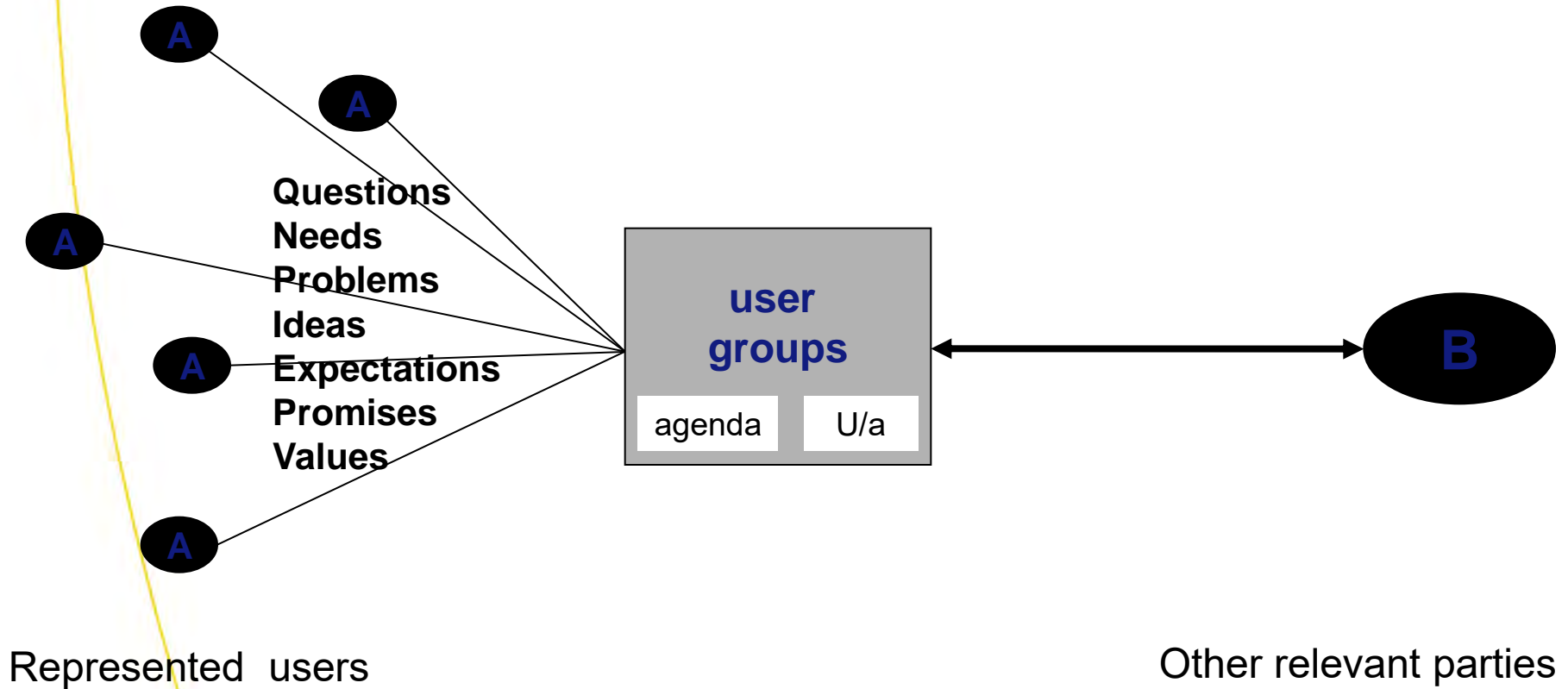


Demand articulation

- An iterative, inherently creative process in which stakeholders try to unravel preferences for and address what they perceive as important characteristics and values of an emerging innovation (Boon *et al.* 2008, 2010)
- Learning process: demands (1st order) and underlying assumptions/values (2nd order)
- Intermediary user organisations influence innovation processes and debates (Boon, 2009)

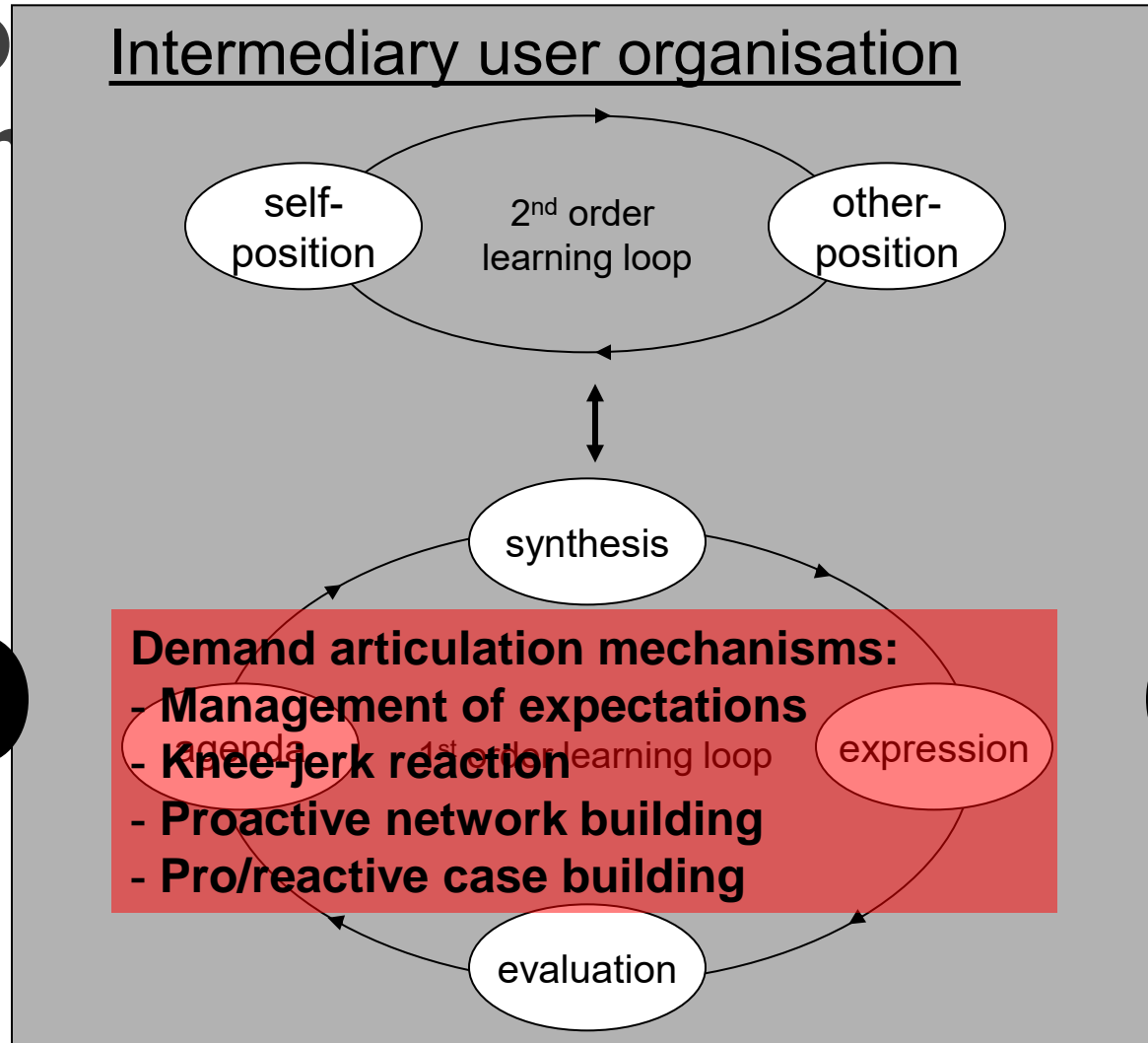


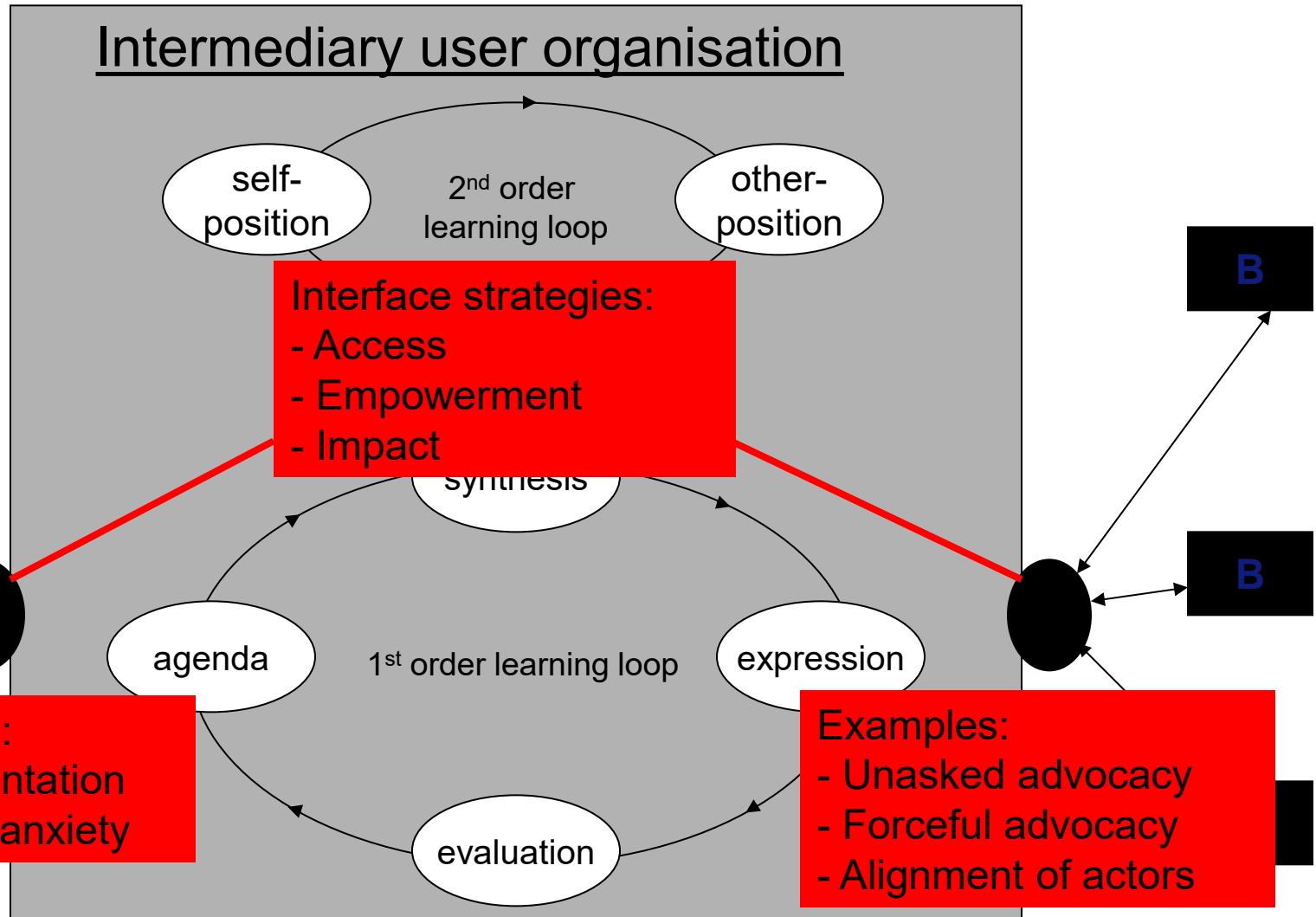
Demand articulation processes in innovation





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Further reading

Boon, W.P.C., E.H.M. Moors, S. Kuhlmann, R.E.H.M. Smits (2011) Demand articulation in emerging technologies: intermediary user organizations as co-producers? *Research Policy*, 40, pp.242-252

Eichler, H.G. et al. (2008) Balancing early market access to new drugs with the need for benefit.risk data: a mounting dilemma. *Nature Review Drug Discovery* 7, pp. 818-826.

Gault Fred (2012) User Innovation and the market, *Science and Public Policy* **39**, pp. 118-128

Jong, J.P.J. de, E. von Hippel (2009) Transfers of user process innovation to proces equipment producers: A study of Dutch high-tech firms. *Research Policy* 38, pp.1181-1191

Nahuis, R., Moors, E.H.M. & Smits, R.E.H.M. (2012). User producer interaction in context. *Technological Forecasting and Social Change*, 79(6), 1121-1134.