

Cultures of Innovation - Risk versus Reward in Nanotechnology

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Background

Science and technology studies (STS) describe cultural context as a key aspect that shapes socio-technical innovation. Comparative studies, based on actor network data, can specify and deepen insights on similarities and differences between cultures of innovation.

Research Question

What similarities and differences can be observed between cultures of innovation by employing actor network analysis?

Research Design

Interviews and workshops conducted with key actors in Switzerland (n=47; 2007) and in Metropolitan Phoenix (n=45; 2011).

Key Similarities

- ◆ No connection in either culture between government regulators and government funders
- ◆ Minimal engagement with NGOs and insurers in both cultures
- ◆ Similar network density (number of links between actors)

Key Differences

- ◆ Government regulators more central to innovation culture in Switzerland
- ◆ Private investors more central to culture in Phoenix
- ◆ Switzerland shows strong links among industry, academic research, and regulators – not in Phoenix

Zurich, Switzerland

Actor Network of Nanotechnology Innovation

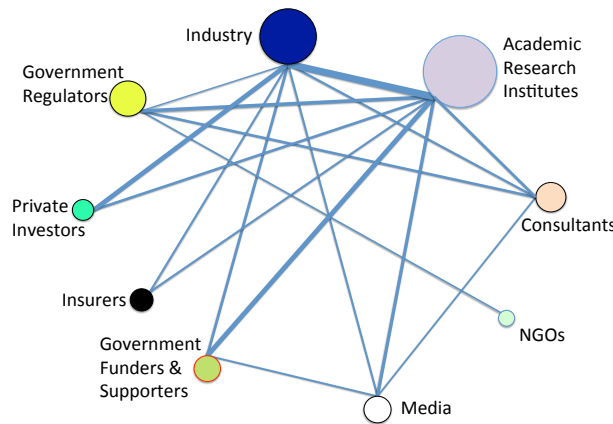


Figure 1. Actor network of nanotechnology innovation in Switzerland. Circle size represent number of reciprocal mentions by actor-category, line sizes represent number of actors mentioning each other (Wiek et al. 2007).

Actor	Mentioned									Activity Summ
	Ind (n=10)	Con (n=8)	Ins (n=2)	Inv (n=2)	Res (n=8)	Gov (n=4)	Ref (n=4)	NGO (n=4)	Med (n=5)	
Ind (n=10)	2.8	0.5	0.3	0.4	4.5	0.6	1.4	0.1	1.4	12.0
Con (n=8)	2.1	1.0	1.3	0.1	2.1	2.0	1.0	1.0	1.1	11.7
Ins (n=2)	2.0	0.0	1.5	0.0	2.0	0.5	0.0	0.5	0.0	6.5
Inv (n=2)	5.0	0.5	0.5	0.5	2.5	0.0	0.0	0.0	1.5	10.5
Res (n=8)	3.9	1.1	0.4	0.5	5.4	1.4	2.0	0.0	1.6	16.3
Gov (n=4)	1.0	1.0	1.0	0.0	2.8	3.0	0.5	0.0	0.5	9.8
Ref (n=4)	1.8	0.3	0.0	0.0	3.5	0.5	1.0	0.0	0.8	7.9
NGO (n=4)	0.5	0.3	0.8	0.0	0.5	2.0	0.0	1.0	0.3	5.4
Med (n=5)	1.0	0.8	0.6	0.2	2.2	0.8	1.4	1.0	0.2	8.2
Passivity Summ	20.1	5.5	6.4	1.7	25.5	10.8	7.3	3.6	7.4	

	Ind (n=10)	Con (n=8)	Ins (n=2)	Inv (n=2)	Res (n=8)	Gov (n=4)	Ref (n=4)	NGO (n=4)	Med (n=5)
Ind (n=10)	2.8								
Con (n=8)	1.3	1.0							
Ins (n=2)	1.2	0.0	1.5						
Inv (n=2)	2.7	0.3	0.3						
Res (n=8)	4.2	1.6	1.2	1.5	5.4				
Gov (n=4)	0.8	1.5	0.8	0.0	2.1	3.0			
Ref (n=4)	1.6	0.7	0.0	0.0	2.8	0.0	1.0		
NGO (n=4)	0.3	0.0	0.7	0.0	0.0	1.0	0.0	1.0	
Med (n=5)	0.0	1.0	0.3	0.9	1.9	0.0	1.1	0.0	0.2

Tables 1. Nanotechnology Actor Network in Switzerland. Key: Ind = Industry, Con = Consultants; Ins = Insurers; Inv = Investors; Res = Academic Research Institutes; Gov = Government Regulatory Agencies; Ref = Government Funders & Supports; NGO = Non-Governmental Organizations; Med = Media. (Wiek et al. 2007)

Phoenix, Arizona

Actor Network of Nanotechnology Innovation

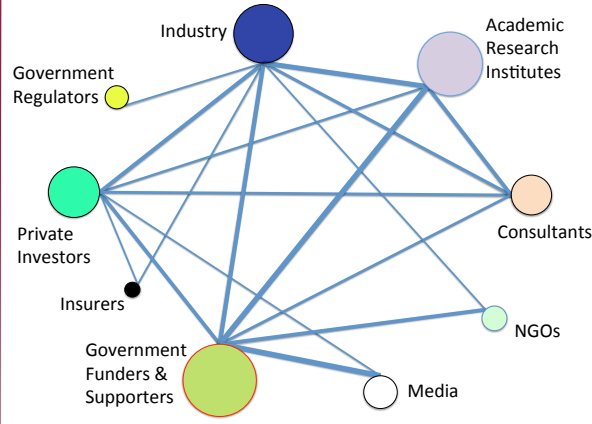


Figure 2. Actor network of nanotechnology innovation in metro Phoenix. Circle size represent number of reciprocal mentions by actor-category, line sizes represent number of actors mentioning each other (Foley & Wiek 2012).

Actor	Mentioned									Activity Summ
	Ind (n=9)	Con (n=6)	Ins (n=1)	Inv (n=3)	Res (n=14)	Gov (n=2)	Ref (n=6)	NGO (n=2)	Med (n=2)	
Ind (n=9)	2.7	1.4	0.1	0.7	1.1	0.8	1.9	0.0	0.0	8.7
Con (n=6)	2.2	1.7	0.0	1.3	1.0	0.3	3.0	0.2	0.2	9.8
Ins (n=1)	2.0	1.0	1.0	2.0	0.0	0.0	1.0	0.0	0.0	7.0
Inv (n=3)	4.0	2.0	0.0	2.7	1.0	1.0	2.3	0.0	0.0	13.0
Res (n=14)	2.3	1.0	0.1	1.2	1.1	0.4	2.2	0.0	0.5	8.6
Gov (n=2)	1.5	0.5	0.0	0.0	0.5	2.5	0.5	1.0	1.0	7.5
Ref (n=6)	3.3	0.2	0.0	2.0	1.0	0.0	4.3	0.0	0.0	10.8
NGO (n=2)	2.0	1.0	0.0	1.0	1.0	0.0	4.5	1.0	1.0	11.5
Med (n=2)	1.5	1.5	0.0	2.0	1.0	0.0	6.5	0.0	1.0	13.5
Passivity Summ	21.4	10.3	1.2	12.8	7.7	5.0	26.2	2.2	3.6	

	Ind (n=9)	Con (n=6)	Ins (n=1)	Inv (n=3)	Res (n=14)	Gov (n=2)	Ref (n=6)	NGO (n=2)	Med (n=2)
Ind (n=9)	2.7								
Con (n=6)	1.8	1.7							
Ins (n=1)	1.1	0.0	1.0						
Inv (n=3)	2.3	1.7	1.0						
Res (n=14)	1.7	1.0	0.0	1.1	1.1				
Gov (n=2)	1.1	0.0	0.0	0.0	0.0	2.5			
Ref (n=6)	2.6	1.6	0.0	2.2	1.6	0.0	4.3		
NGO (n=2)	1.0	0.0	0.0	0.0	0.0	0.0	2.3	1.0	
Med (n=2)	0.0	0.0	0.0	1.0	0.0	0.0	3.3	0.0	1.0

Tables 2. Nanotechnology Actor Network in metropolitan Phoenix. Key: Ind = Industry, Con = Consultants; Ins = Insurers; Inv = Investors; Res = Academic Research Institutes; Gov = Government Regulatory Agencies; Ref = Government Funders & Support; NGO = Non-Governmental Organizations; Med = Media. (Foley & Wiek 2012)

Results

A transverse relationship between government regulators and government funders reflects cultural differences between Phoenix and Switzerland. In Phoenix high recognition of government funders and little connectivity of government regulators is observable. This is the opposite in Switzerland. Actors in Switzerland seem to be concerned with regulating risks, while in Phoenix actors focus on funding awards.

Discussion

Actor network data provide insights on cultures of innovation. A comparative setting, supported by visuals, allows for highlighting key similarities and differences. In-depth case studies need to verify the initial comparative results.

References

- Foley R, Wiek A (2012, under review) Nanotechnology innovation – Governance by actors within a metropolitan area. *Review of Policy Research*.
- Wiek A, Zemp S, Siegrist M, Walter A (2007) Sustainable governance of emerging technologies - Critical constellations in the agent network of nanotechnology. *Technology in Society* 29, 388-406.

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