



**Open innovation, standard-setting and spatial concentration in
biotechnology and mechanical engineering: a cross-disciplinary
managerial & economic geography approach**

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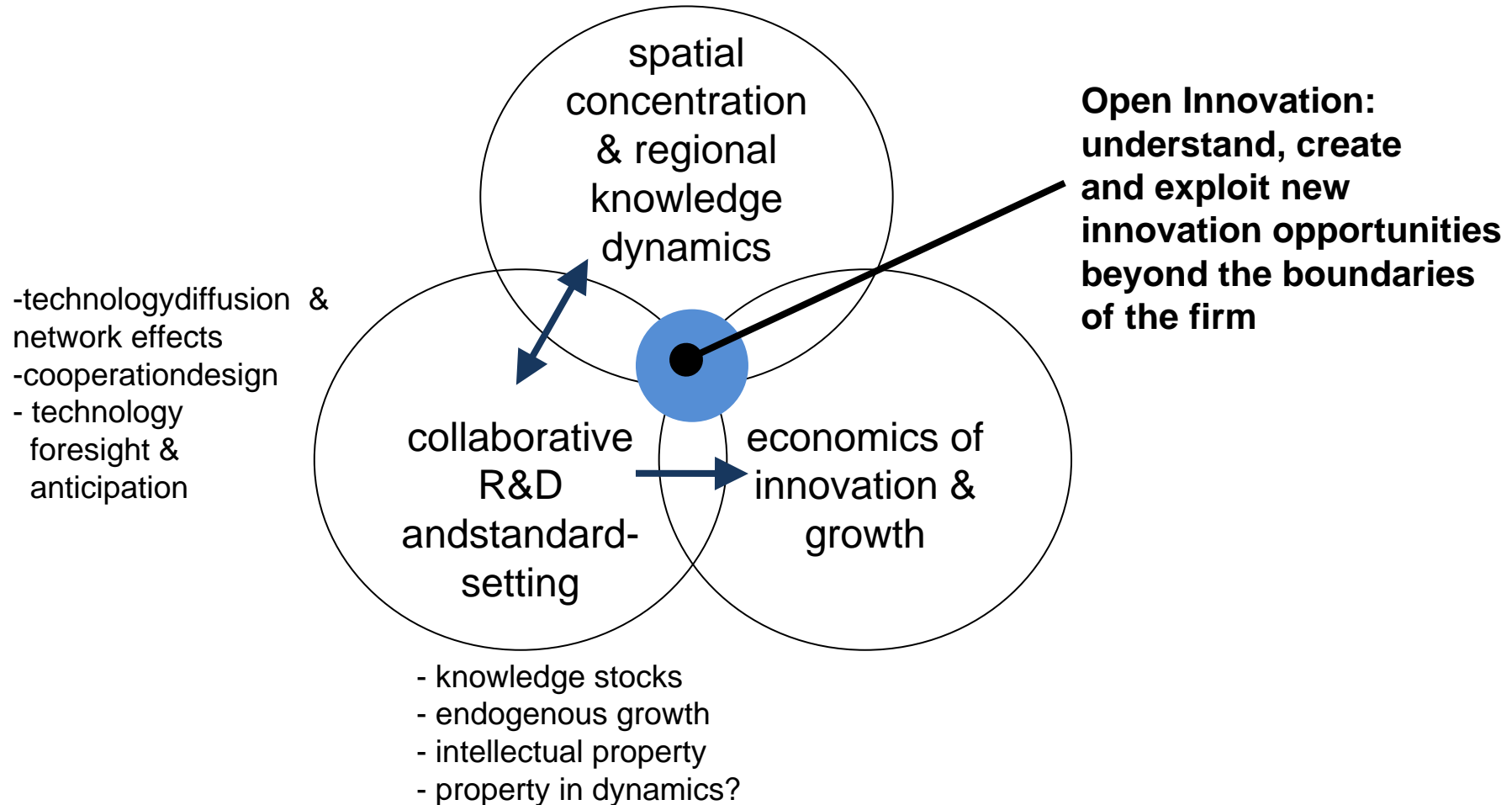
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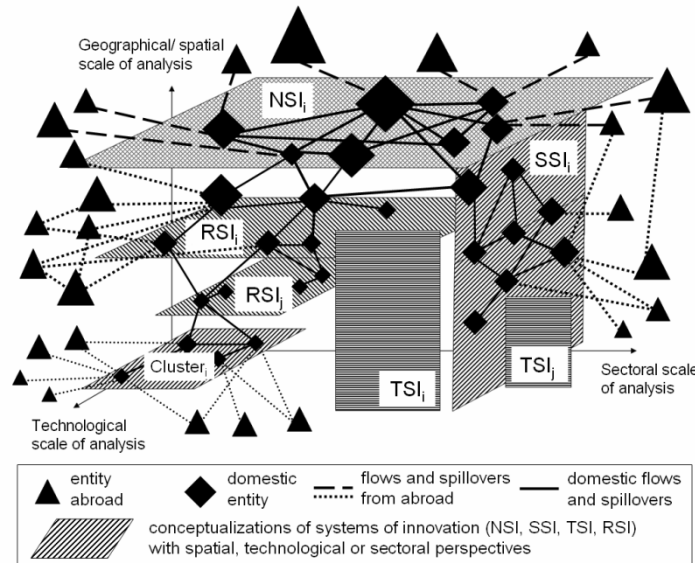


I. Our perspective on innovation

- synthesizing BERD, GERD, academia research, and user-driven innovation
- regional science & technology base



II. Open RIS



Source: Christ (2007)

- Globalization processes accompanied by agglomeration tendencies and specific spatial & sectoral boundaries
- Spillovers are spatially bounded
- Innovative clusters induce regional growth

RSI: "the localised network of actors and institutions in the public and private sectors whose activities and interactions generate, import, modify and diffuse new technologies..."
(Iammarino, 2005: 499)

- How can we conceptualize clusters' contribution to new knowledge, to innovation and growth?



III. Open Innovation

- Open innovation mechanisms? (Gassmann 2006; Gassmann/Enkel 2004)
- Collaboration between whom? Tripple helix (Etzkowitz 2002; Etzkowitz/Leydesdorff 2000)
- Lead-user integration? (von Hippel; Reichwald/Piller)
- Semi-openness? (Gerybadze/Slowak 2008)
- **Clusters as promising frameworks / places for open innovation? (Christ/Slowak)**

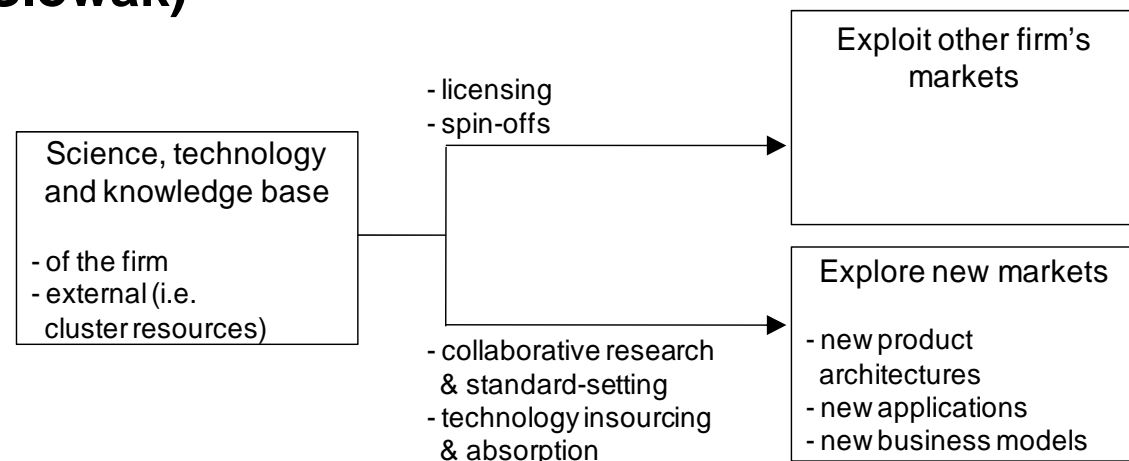
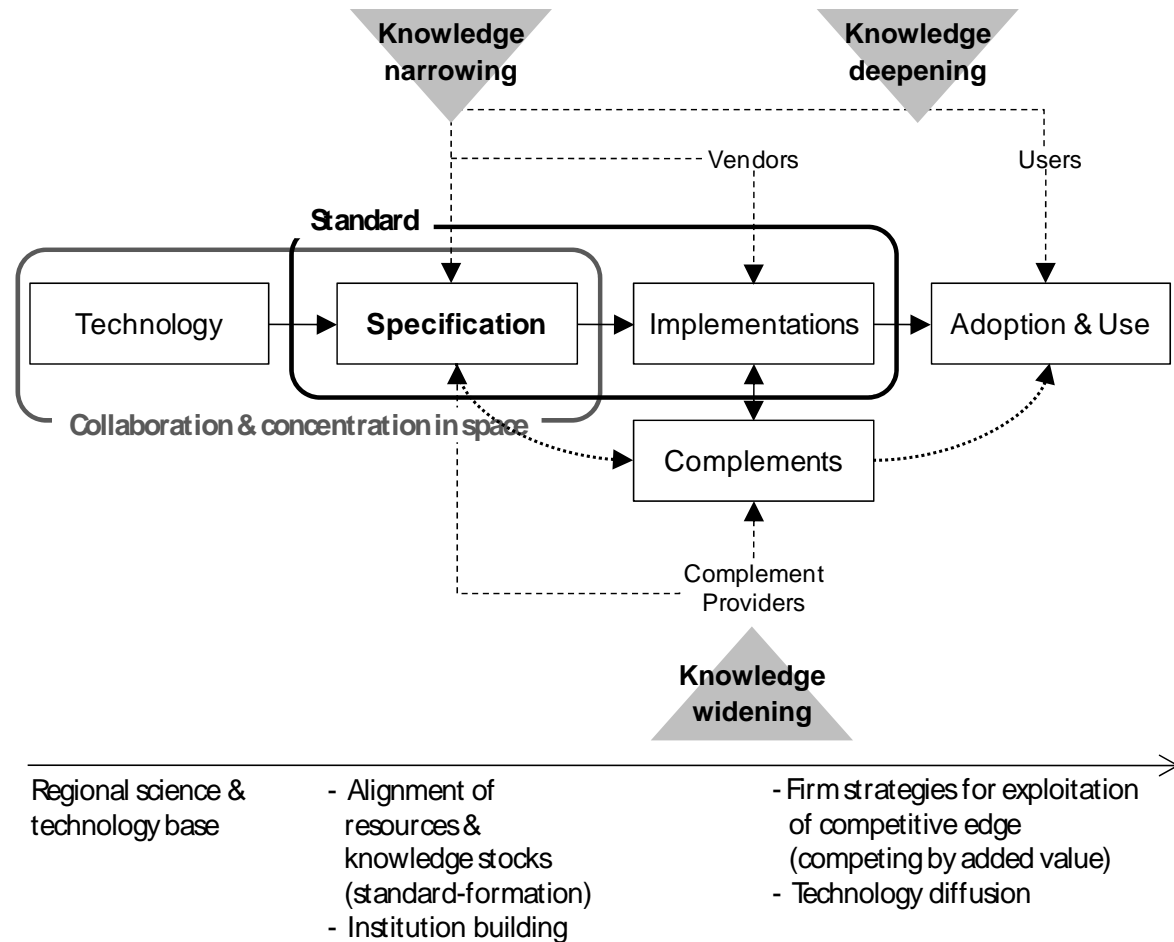


Figure source: Chesbrough (2006b), modified model.



IV. Knowledge dynamics in standard-setting



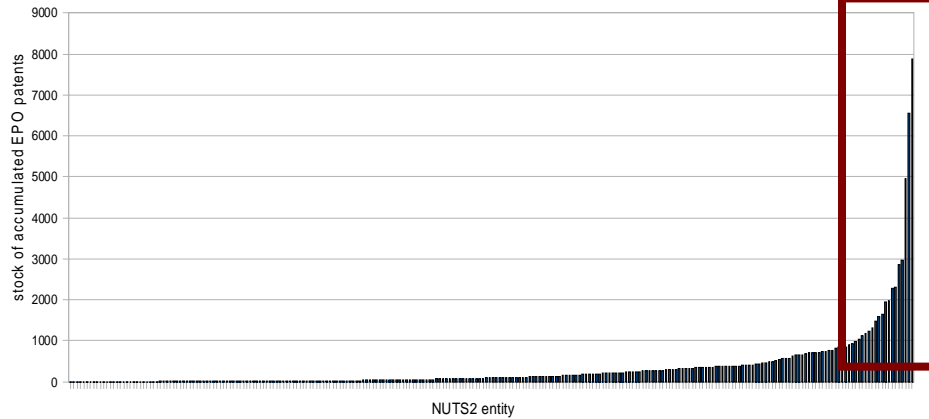
Source: Slowak (2008b); West (2007, p. 95 Figure 3.2). Modified and extended in the context of regional innovation systems.



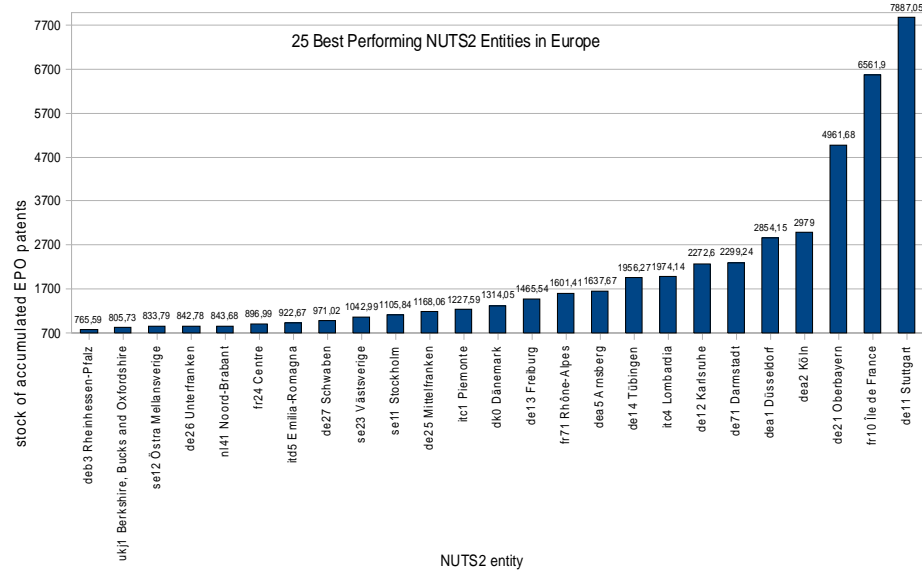
V. Accumulation of knowledge

Mechanical Engineering

Accumulated EPO Patent Applications NUTS2 (1977-2003) - IPC F (mechanical engineering)

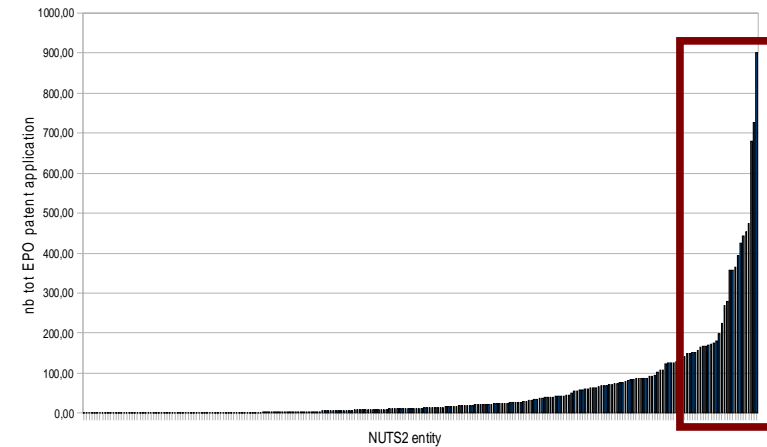


Accumulated EPO Patent Applications NUTS2 (1977-2003) - IPC F (mechanical engineering); 254 observed NUTS2 entities

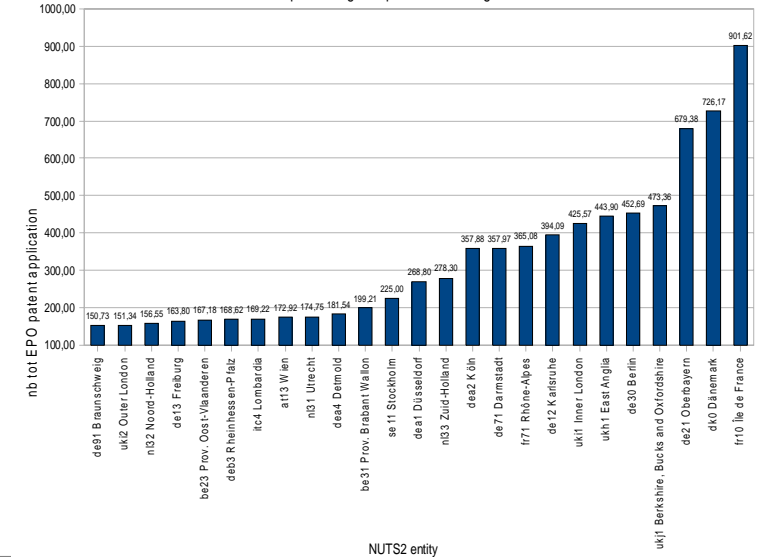


Biotechnology

Accumulated EPO Patent Applications in Biotechnology (1999-2003); European NUTS2 Regions



Accumulated EPO Patent Applications in Biotechnology 1999-2003
25 best performing European NUTS2 Regions

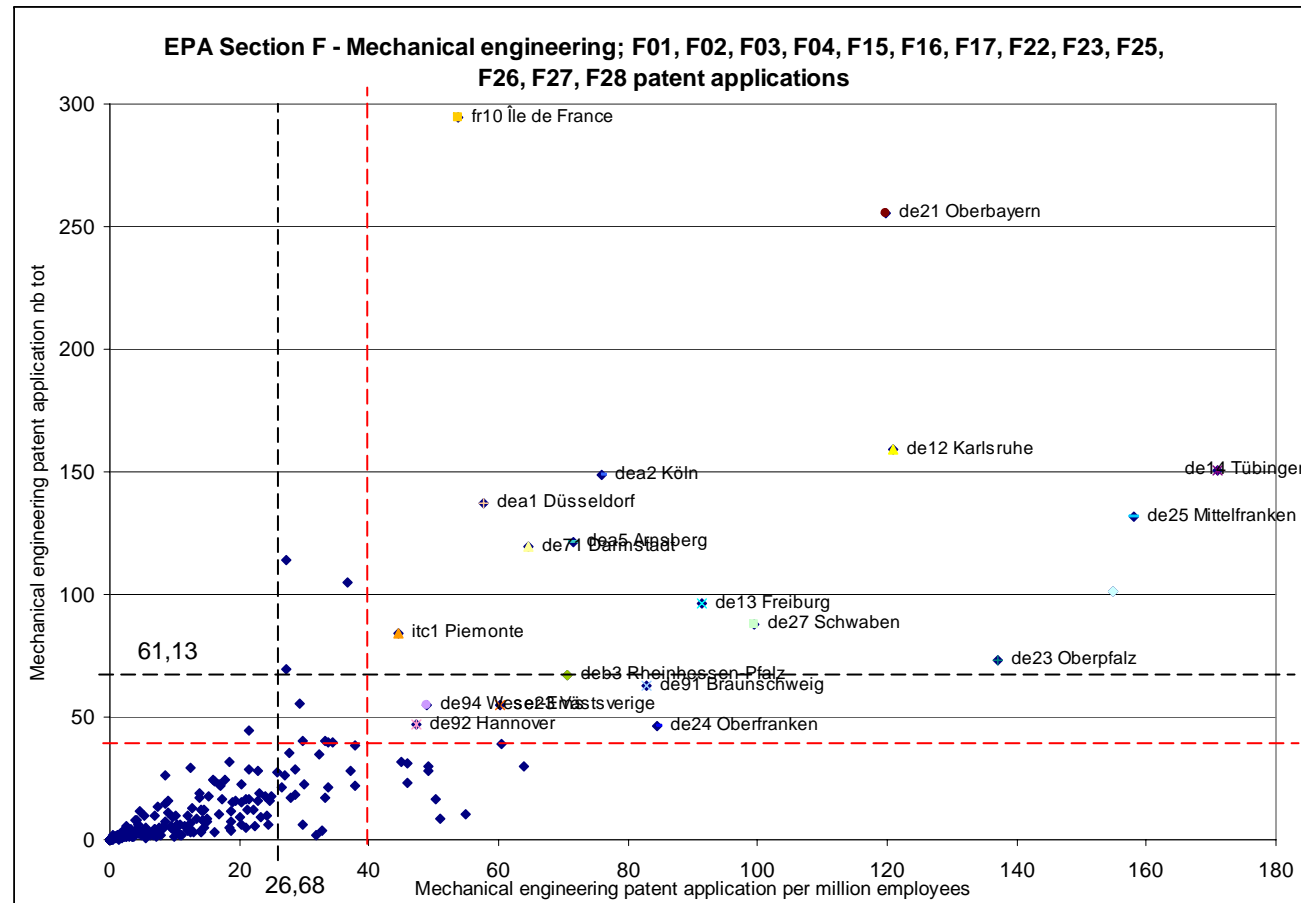




V. Spatial patenting performance – mechanical engineering

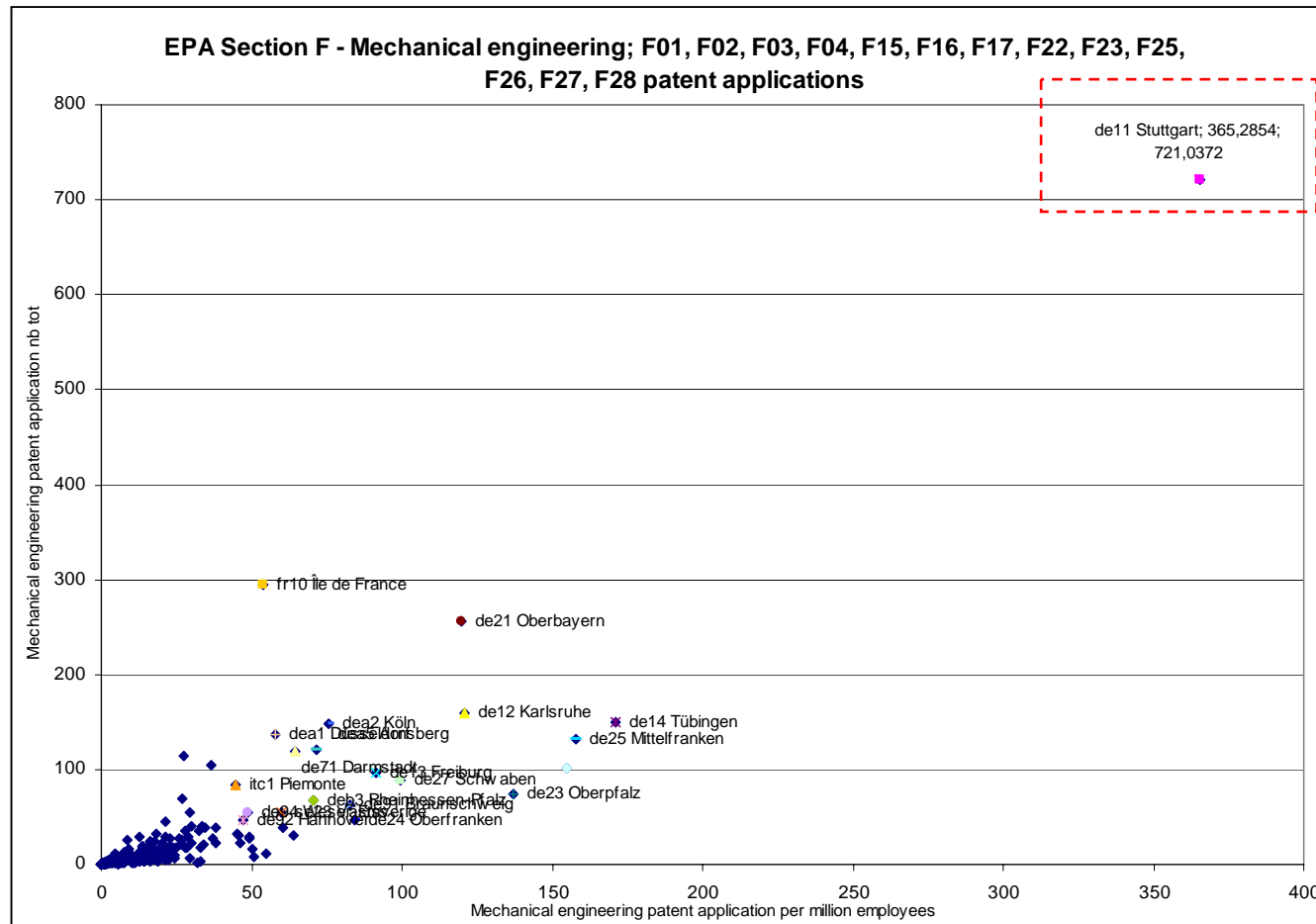
Mechanical engineering in 254 EU regions (NUTS) – relative and absolute strength; year 2002

Source: Own calculation and illustration. EUROSTAT database, Regional science and technology statistics; Patent applications to the EPO by priority year at the regional level (Feb, 2008).





V. Spatial patenting performance – mechanical engineering

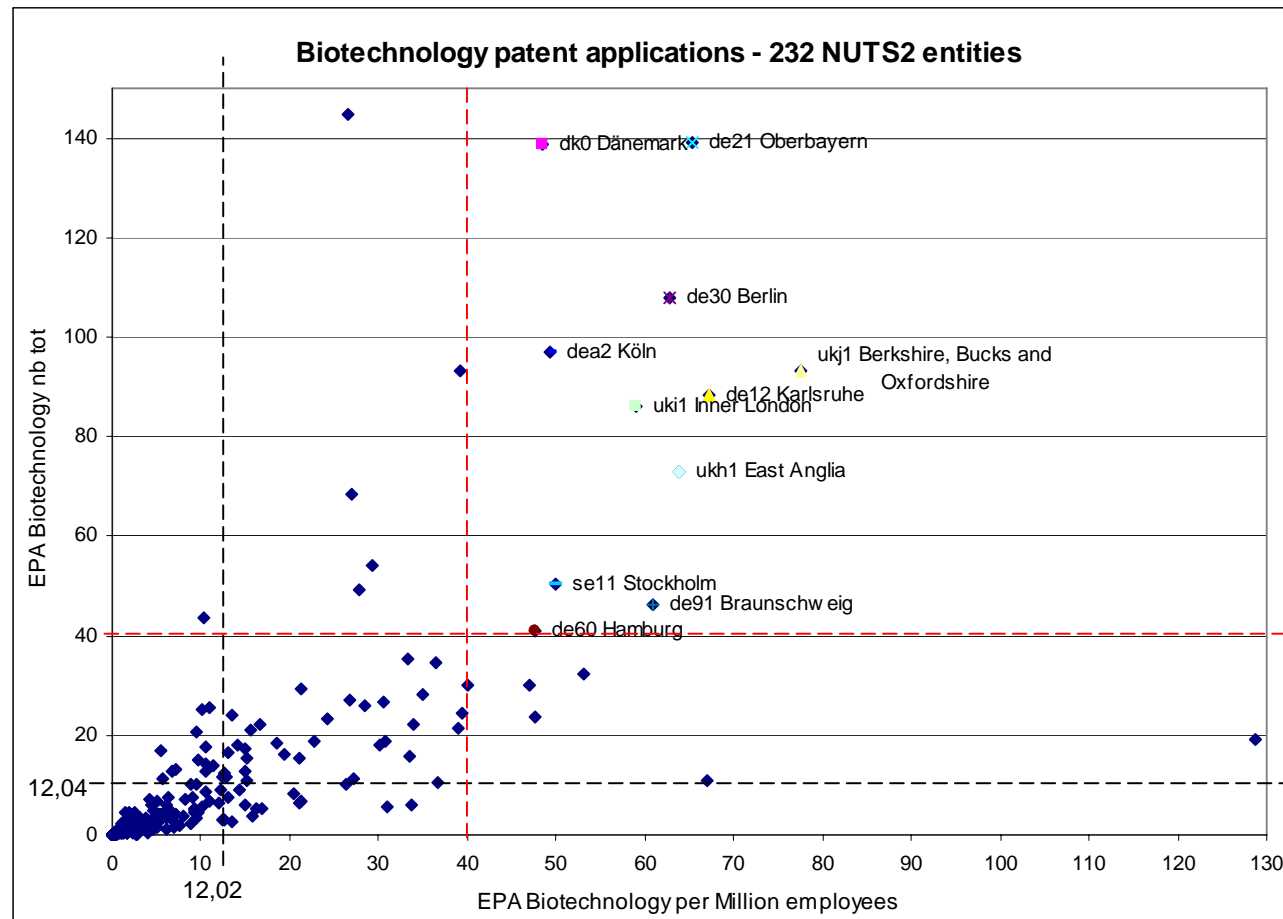




V. Spatial patenting performance – biotechnology

Figure 11: Biotechnology in 232 EU regions (NUTS) – relative and absolute strength; year 2002

Source: Own calculation and illustration. EUROSTAT database; Regional science and technology statistics, Biotechnology patent applications to the EPO by priority year at the regional level (Feb, 2008).





VI. Patent ranking in biotechnology

Biotechnology: Patent Application Ranking - 20 Best Performing European NUTS2 Regions										
RANK	1998		1999		2000		2001		2002	
	observed regions:	229	observed regions:	219	observed regions:	219	observed regions:	232	observed regions:	231
	Total applications:	2134,74	Total applications:	2481,23	Total applications:	2767,89	Total applications:	2860,42	Total applications:	2787,55
	average (229):	9,32	average (219):	11,33	average (219):	12,64	average (232):	12,33	average (231):	12,07
	average top10 regions:	80,52	average top10 regions:	88,75	average top10 regions:	104,83	average top10 regions:	113,22	average top10 regions:	106,11
	average top20 regions:	59,23	average top20 regions:	64,81	average top20 regions:	76,38	average top20 regions:	78,12	average top20 regions:	75,85
	Share top10/229:	0,38	Share top10/219:	0,36	Share top10/219:	0,38	Share top10/232:	0,40	Share top10/231:	0,38
	top 10 from Germany	3	top 10 from Germany	2	top 10 from Germany	4	top 10 from Germany	5	top 10 from Germany	5
	top 10 from UK	4	top 10 from UK	3	top 10 from UK	3	top 10 from UK	3	top 10 from UK	3
top 10 from France	2	top 10 from France	2	top 10 from France	2	top 10 from France	1	top 10 from France	1	
1	fr10 Île de France	154,30	fr10 Île de France	154,36	fr10 Île de France	184,33	fr10 Île de France	205,89	fr10 Île de France	144,81
2	dk0 Dänemark	117,35	dk0 Dänemark	120,84	dk0 Dänemark	142,81	de21 Oberbayern	159,63	de21 Oberbayern	139,14
3	de21 Oberbayern	93,95	de21 Oberbayern	98,51	de21 Oberbayern	129,38	dk0 Dänemark	145,97	dk0 Dänemark	138,78
4	ukj1 Berkshire, Bucks and Oxfordshire	78,90	ukj1 Berkshire, Bucks and Oxfordshire	90,61	de71 Darmstadt	102,93	de30 Berlin	103,84	de30 Berlin	107,76
5	ukh1 East Anglia	73,14	ukh1 East Anglia	86,43	de30 Berlin	96,69	ukh1 East Anglia	100,91	dea2 Köln	96,82
6	uki1 Inner London	64,23	de12 Karlsruhe	70,36	uki1 Inner London	83,77	ukj1 Berkshire, Bucks and Oxfordshire	98,02	ukj1 Berkshire, Bucks and Oxfordshire	93,20
7	fr71 Rhône-Alpes	61,03	uki1 Inner London	69,62	ukh1 East Anglia	81,41	uki1 Inner London	97,81	dea1 Düsseldorf	93,08
8	de12 Karlsruhe	55,47	fr71 Rhône-Alpes	68,23	ukj1 Berkshire, Bucks and Oxfordshire	79,09	de12 Karlsruhe	84,62	de12 Karlsruhe	88,38
9	ukh3 Essex	55,03	be31 Prov. Brabant Wallon	67,54	dea2 Köln	74,06	de71 Darmstadt	69,01	uki1 Inner London	86,10
10	de30 Berlin	51,85	nl33 Zuid-Holland	60,95	fr71 Rhône-Alpes	73,80	dea2 Köln	66,45	ukh1 East Anglia	73,06
11	de71 Darmstadt	51,55	de71 Darmstadt	60,02	dea4 Detmold	71,50	dea4 Detmold	65,95	fr71 Rhône-Alpes	68,60
12	nl33 Zuid-Holland	47,18	de30 Berlin	59,59	de12 Karlsruhe	61,57	fr71 Rhône-Alpes	64,97	de71 Darmstadt	54,18
13	be31 Prov. Brabant Wallon	41,90	dea2 Köln	52,40	nl33 Zuid-Holland	58,88	dea1 Düsseldorf	47,42	se11 Stockholm	50,46
14	se11 Stockholm	41,37	se11 Stockholm	38,19	nl31 Utrecht	50,17	deb3 Rheinhessen-Pfalz	42,58	nl33 Zuid-Holland	49,37
15	dea2 Köln	38,64	be23 Prov. Oost-Vlaanderen	35,31	se11 Stockholm	45,26	at13 Wien	40,72	de91 Braunschweig	46,07
16	uki2 Outer London	35,99	at13 Wien	34,15	be31 Prov. Brabant Wallon	40,42	nl33 Zuid-Holland	36,67	itc4 Lombardia	43,52
17	be23 Prov. Oost-Vlaanderen	33,94	uki2 Outer London	33,19	nl32 Noord-Holland	39,48	se11 Stockholm	36,03	de60 Hamburg	41,16
18	fr42 Alsace	30,21	ukh3 Essex	32,92	dea1 Düsseldorf	38,71	de13 Freiburg	32,71	de13 Freiburg	35,29
19	nl32 Noord-Holland	29,31	deb3 Rheinhessen-Pfalz	31,76	at13 Wien	37,48	nl31 Utrecht	32,24	deb3 Rheinhessen-Pfalz	34,76
20	fi18 Etelä-Suomi	29,18	fi18 Etelä-Suomi	31,23	de14 Tübingen	35,97	de91 Braunschweig	30,86	nl31 Utrecht	32,48



VII. Findings

- Both initial regional setting and regional focus (funding, education) matter
- Policy makers need to manage the loose coupling of NIS, RIS, and SIS (implications for a decentralized, global knowledge economy / new patterns of Schumpeterian competition?)
- RIS pooling and mapping of varieties of knowledge & assets
 - they create a strong micro-science & technology base for open innovation; and they promote collaboration between firms
 - they provide collective strategies and organizational frames
- In order to drive open innovation forward firms should...
 - establish new paths to the market
 - advancing the mechanisms of knowledge-alignment
 - avoid draw backs from IPR hold ups etc.



VIII. Further quantitative research

Research issue	Method	Data basis	
Technology strength	Specialization of labor pool	Employment statistics EUROSTAT (NUTS 2), ILO	
	Distribution of patents in space	Patent counting EUROSTAT (NUTS2) EPO, OECD (i.e. European Patent Bulletin Information Vol. 2007/001R including data for the years 1979-2006)	
Standard strength	Potential (which patents are essential to global standards?)	Triad patent counting USPTO, EPO, JPO (i.e. OECD MSTI)	
	Technology focus & deepening for standard-formation, but knowledge widening for added value capturing	Estimating and comparing deepening of cluster-specific knowledge stocks k_{ij} over time (IPC classes serve as proxies for i ; $strength(k_i) \geq strength_{min}(k)$)	EPO; EUROSTAT (NUTS 2), USPTO and NSF (MSA); JPO
	Influence on formal global standards (high-norm activities)	Norm counting	PERINORM
	Focused regional innovation policy	Comparative analysis of governmental policy papers; high level group white papers; Also see the portfolio technique applied in our paper.	
Cumulativeness of knowledge	Patent citation counting	EPO, OECD	

