Karlsruher Institut für Technologie

Specialization, Diversification and Creativity in Nanotechnologies

Nina Menz | Workshop “Managing Decisions in the Era of Creativity“ 11.11.2010

CHAIR FOR ECONOMIC POLICY

Definition Nanotechnologies

- Control of matter at dimensions of roughly 1 to 100 nanometers
- Control = imaging, measuring, modeling, manipulating

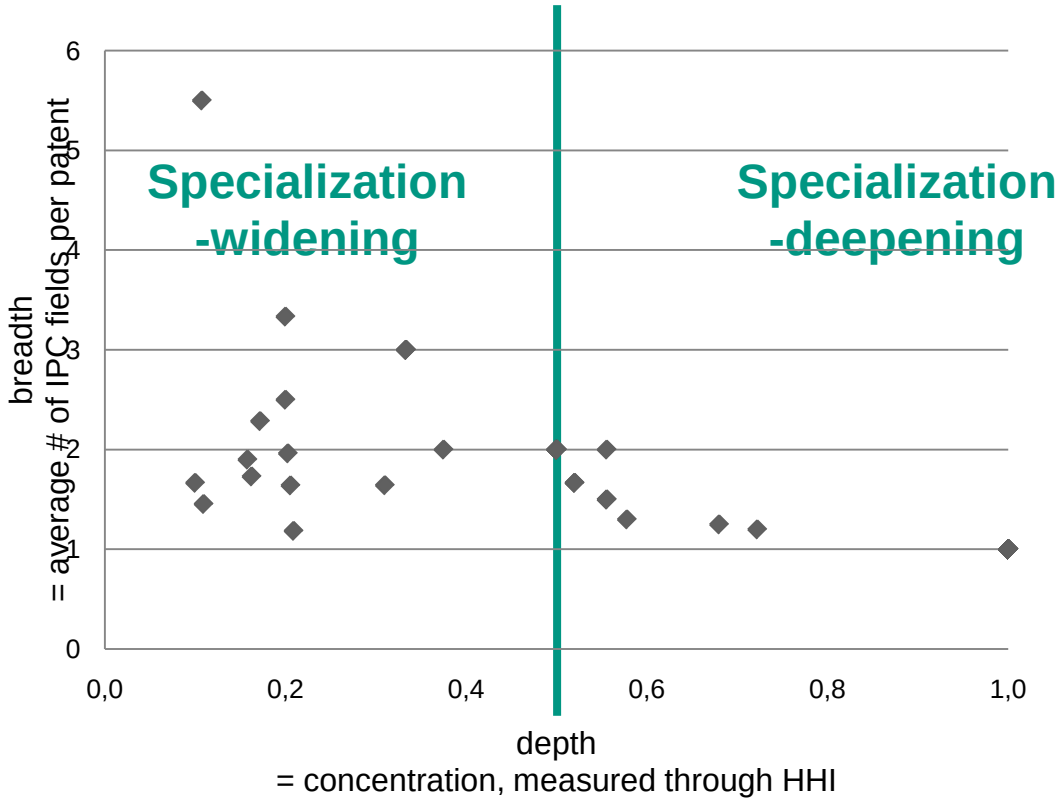
Nanotechnologies as a General Purpose Technology

- three features:
  - generality of purpose / pervasiveness
  - technological dynamism /scope for improvement
  - innovational complementarities

Nanotechnologies in Hamburg

- nano-development shall be supported through industrial policy
- a number of nano-related firms exist
- publicly financed research institutes and institutions that aim to coordinate R&D
- focus on **application in Life Sciences**
- **no functional nano-cluster:** technological distance between diverse application fields inhibits development of cluster coherence

Specialization-widening and specialization-deepening: Patent analysis

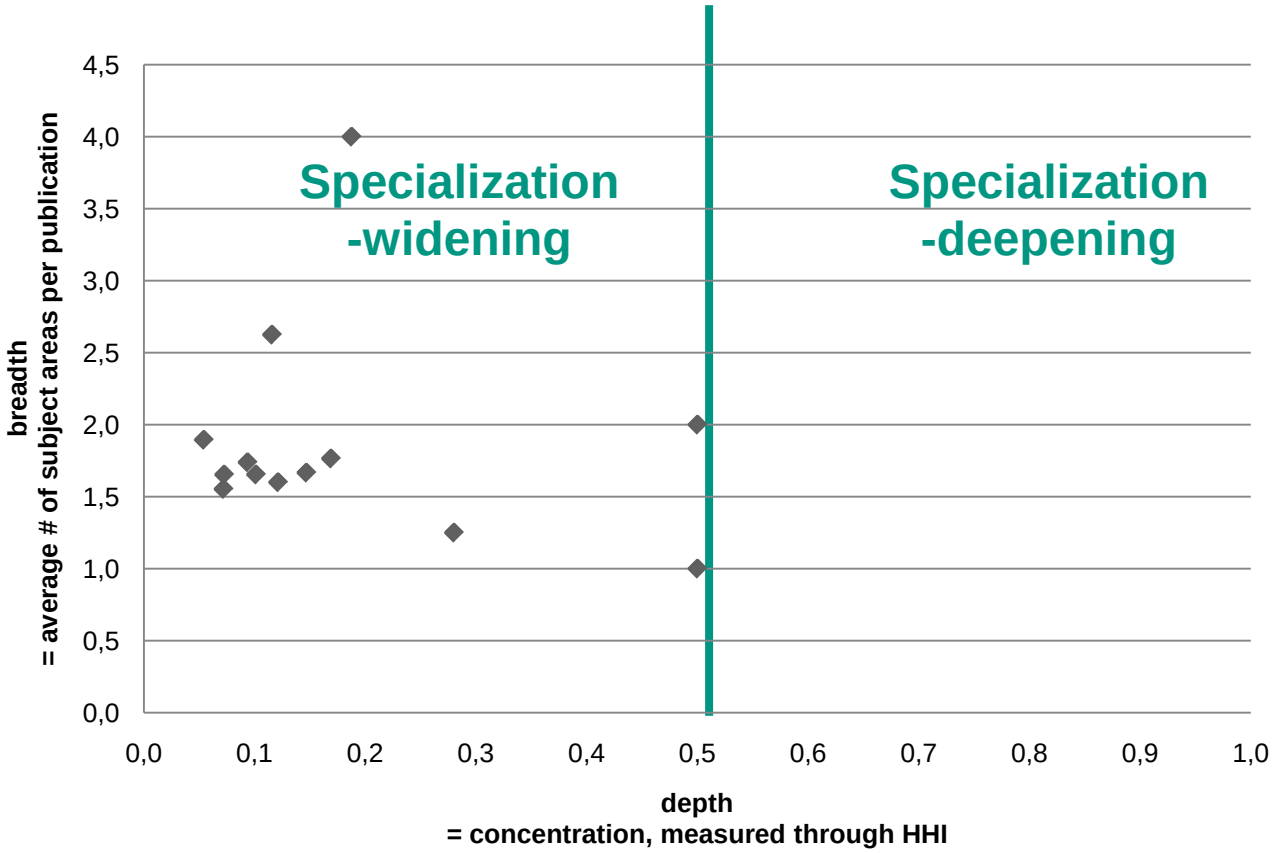


$$HHI = \sum_{i=1}^{N} \left(\frac{x_i}{\sum_{j=1}^{N} x_j} \right)^2$$

Diversification *and* Specialization

- Conclusions of Patent Analysis
  - firms hold diversified nano-patents, although nano is specialized on life sciences in Hamburg
  - most of the nano-inventions filed as patents from Hamburg are likely to be applicable in more than one technological field, emphasizing the generality of purpose-feature of nanotechnologies

Specialization-widening: Publication analysis



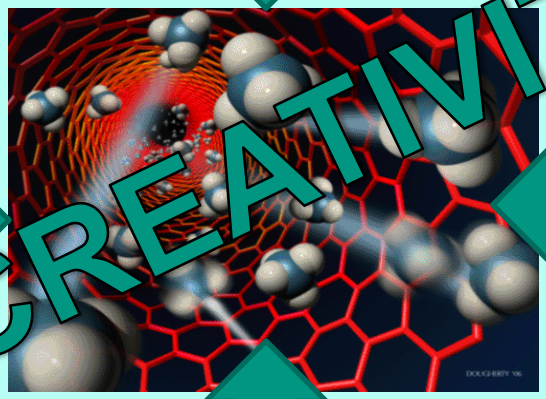
$$HHI = \sum_{i=1}^{N} \left(\frac{x_i}{\sum_{j=1}^{N} x_j} \right)^2$$

Diversification *and* Specialization

- Conclusions of Publication Analysis
  - most of the nano-publications stemming from Hamburg are relevant in different scientific fields
  - scope for scientific cooperation
- research & application in and across different fields might open new (economic) opportunities through cross-fertilization/ connection of so far unconnected technological fields

Role of Creativity

- Up to now: Specialization of nanotechnologies on applications in Life-Sciences
- creativity in this field might connect so far unconnected application fields of nanotechnology (and thereby induce growth), e.g.
  - Lotus effect relevant in Life Science application as well as aviation industries
  - quantum dots relevant in drug delivery systems and solar cells
- Platform to exchange ideas between different industries → creativity → cross-fertilization



CREATIVITY

Thank you for your attention and for your ideas.

Database

- German patent information system (DEPATIS) provided by the German Patent and Trade Mark Office (DPMA),
- access September 2010
- search query 'PA=Hamburg UND AC=DE UND((BI = Nano? NICHT BI = Nanometer NICHT BI = Nanoliter NICHT BI = Nanosekunden NICHT BI = NatriumNitrat) ODER (TI = Nano? NICHT TI = Nanometer NICHT TI = Nanoliter NICHT TI = Nanosekunden NICHT TI = NatriumNitrat) ODER (AB= Nano? NICHT AB= Nanometer NICHT AB= Nanoliter NICHT AB= Nanosekunden NICHT AB= NatriumNitrat) UND PA=DE UND PUB>=01.01.2000'

Measure of Concentration : Example Beiersdorf

IPC field	# of quotations by all Beiersdorf patents	# of quotations/94	^2	
A47	1	0,0106383	0,00011317	
A61	79	0,84042553	0,70631507	
B01	6	0,06382979	0,00407424	
C11	3	0,03191489	0,00101856	
C08	2	0,0212766	0,00045269	
C09	2	0,0212766	0,00045269	
D04	1	0,0106383	0,00011317	
Σ	**94**		**0,71253961**	**HHI (Σ)**
			0,28746039	**DIV = (1-HHI)**

Subject areas of publications of Prof. Weller