



Fostering Regional Innovation and Development through Anchors and Networks: A Cross Regional Comparison in an Evolving International Context.

FRIDA

Clusters and Leagues in nanotechnologies – contribution to WP6

C. Cinici, Khalid Errabi, Vincent Mangematin
Grenoble Ecole de Management and Univ of Catania

www.nanoeconomics.eu

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Motivation, intuitions

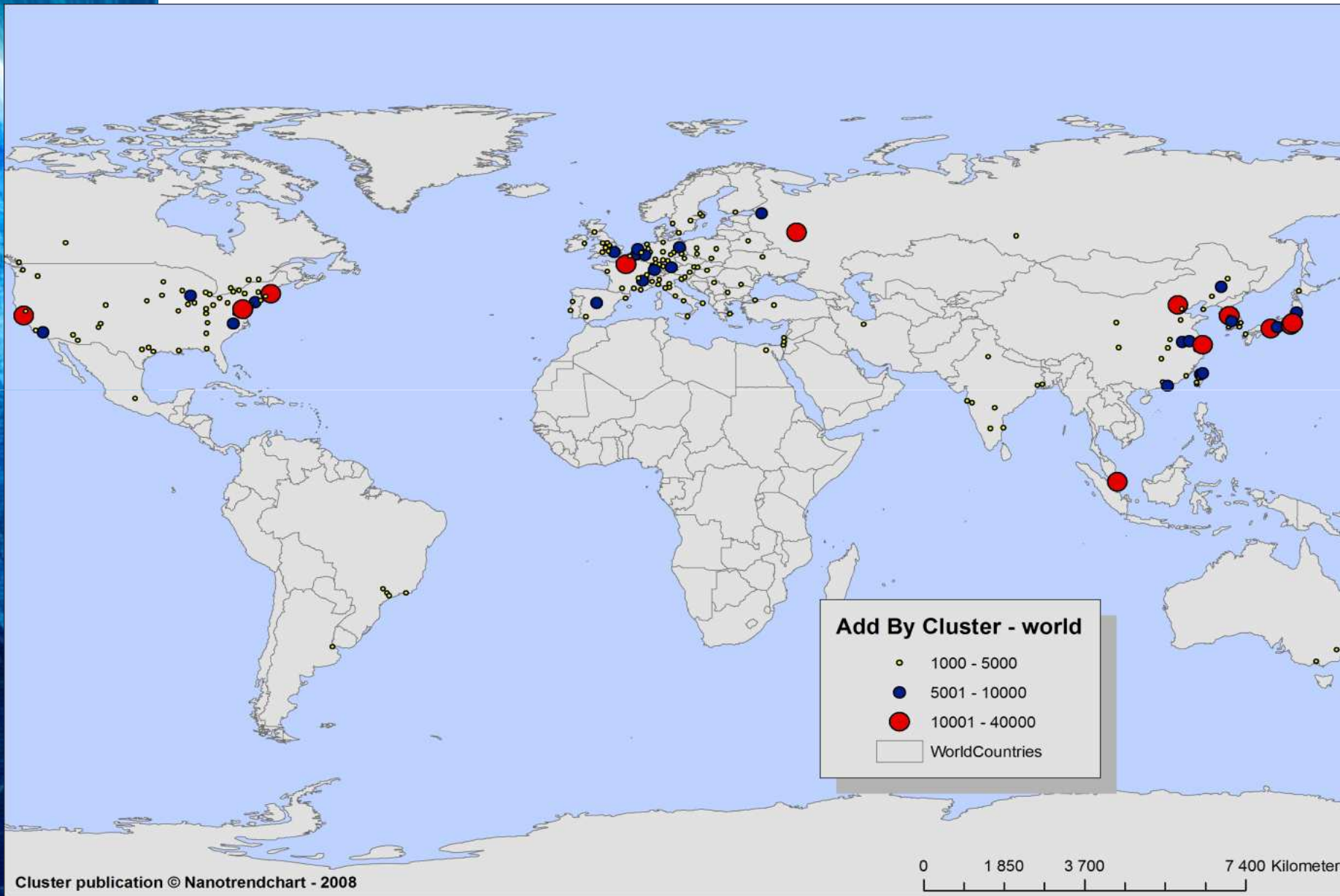
- Motivation
 - High geographic concentration of nanotech
 - Key role of clusters in the innovation policies
 - But which is the role of networks? Any leagues amongst large clusters? Amongst similar or complementary?
- Intuitions
 - Polarised situation between Asia, Europe and US. Asia is outstanding
 - Changing rules of the game. Growth is not sustainable. Will networks replace clusters? Which are the changes under way?

Data and methods

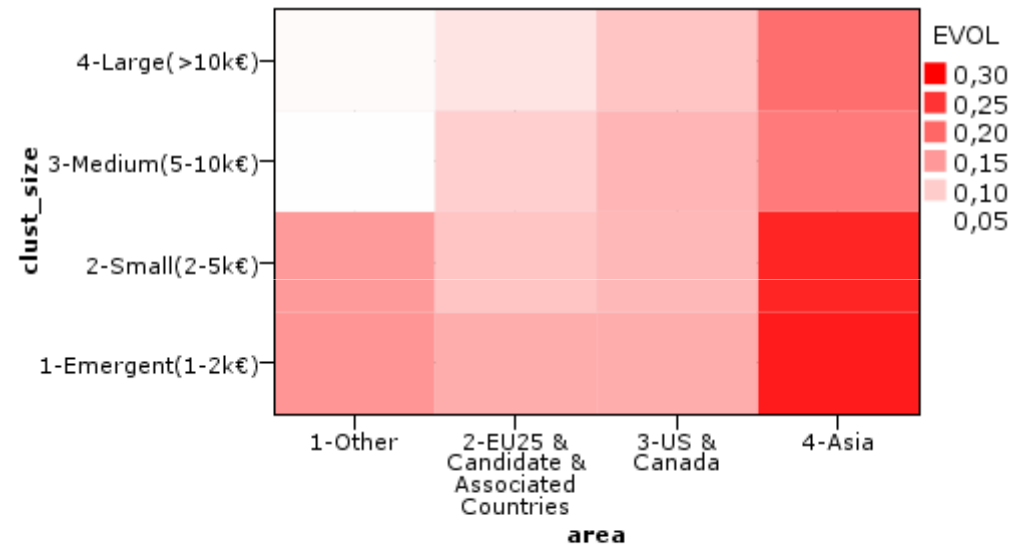
- Publications focusing on nanotechnologies (Query from Mogoutov et al.) : 1,000,000 participations to publication. 70% within clusters
- Cluster : at least 1,000 publications from the same geographic area
- Network: coauthorship of authors within or amongst clusters
- Identification of 200 clusters worldwide
- Main linkages amongst clusters

Empirical evidences: clusters

Area and Size	SIZE (cumulative no. of pub participations)				Out of Cluster*	Total	Average
	Large 10000 -40000	Medium 5000 -1000	Small 2000 -5000	Emergent 1000 -2000			
EU** # of clusters	1	9	40	31	***	81	
# of pub part	16,385	66,607	131,339	45,906	102,979	363,216	3,213
% of pub part	4.51%	18.34%	36.16%	12.64%	28.35%	100%	
US/Canada	3	4	24	21		52	
	41,118	27,811	75,367	28,532	77,142	249,970	3,324
	16.45%	11.13%	30.15%	11.41%	30.86%	100%	
Asia	7	9	21	12		49	
	141,089	65,701	61,384	18,140	66,335	352,649	5,843
	40.01%	18.63%	17.41%	5.14%	18.81%	100%	
Other	1	1	7	9		18	
	10,368	5,287	18,805	12,698	42,137	89,295	2,620
	11.61%	5.92%	21.06%	14.22%	47.19%	100%	
Total	12	23	92	73		200	
	208,960	165,406	286,895	105,276	288,593	1,055,130	3,833
	19.80%	15.68%	27.19%	9.98%	27.35%	100%	



Empirical evidences : Growth



Results from econometric models

- The determinants of cluster growth are different in Asia, US and Europe

	Europe	US/Canada	Asia
Initial size	Negative	Positive	Negative
Degree of openness	Positive slightly	Positive	Negative
Technological specialisation	None	Eng (+), Medical Sc (-) and Life Sc (+).	Engineering (+)
Technological diversity	Positive	Positive	
Actor variety	Negative		Negative

Public policy implications

- Cluster growth potential: highly dependant of the Regional and National System of innovation, existing structure and history / patterns of collaborations
- Impossible to replicate best practices from one area to another
- Different paths of development in the 3 continents
 - Role of collaborations intra clusters
 - Role of collaborations inter clusters
 - Role of technological specialisation
- Main question: to what extent the growth of cluster is a policy objective?
 - Creation of clusters has been highly supported
 - But after being created, what happens? Growth? Stability? Renewal (still a blind spot)



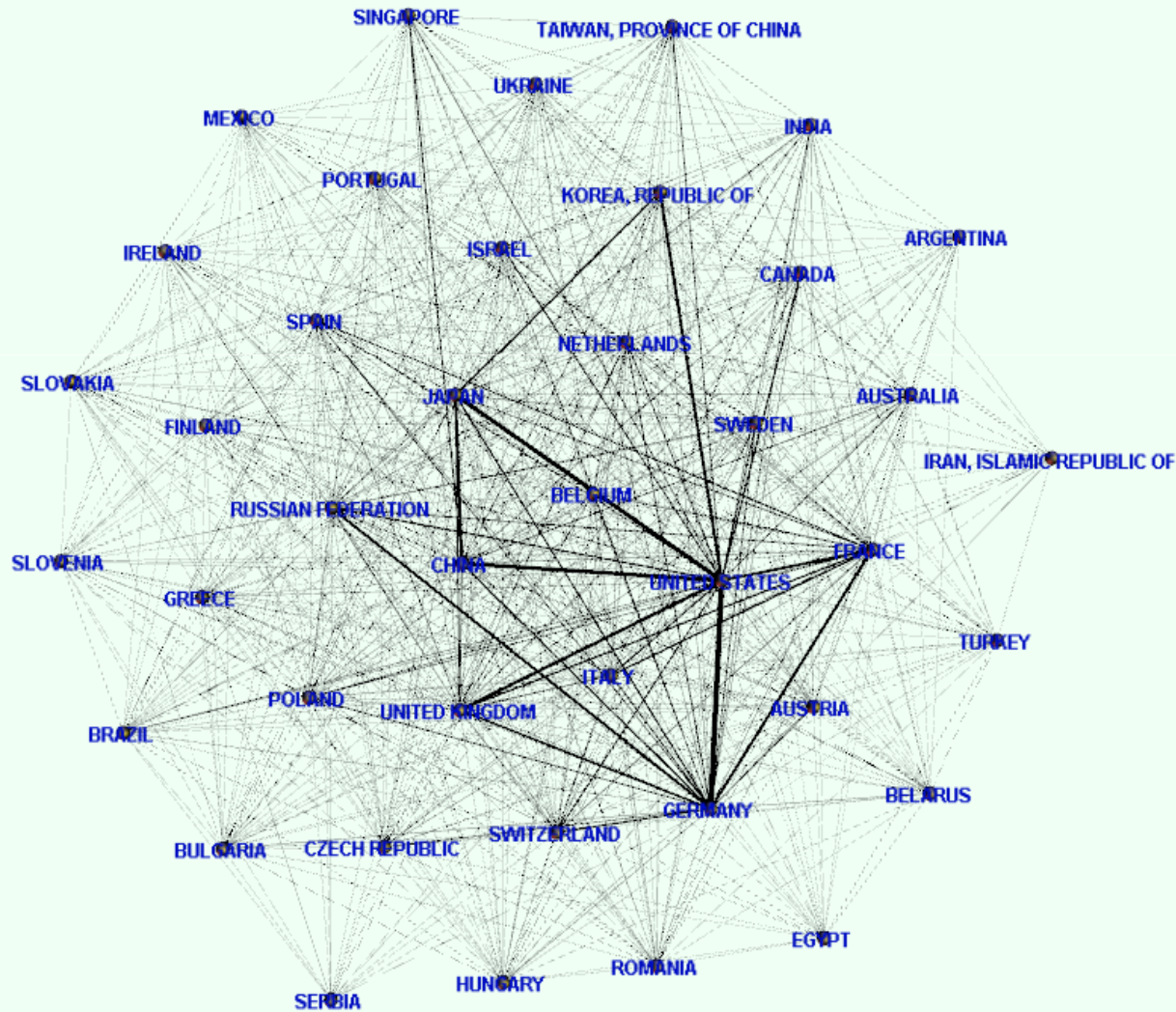
Clusters and networks of clusters

- Cluster: hub to develop research based activities more effectively and quickly
- Cluster: way to enter networks for SMEs and marginal actors.
- Patterns of collaborations of the cluster, analysed through co-authorship
- Different levels
 - Geographic zone
 - Clusters
 - Technological specialisation

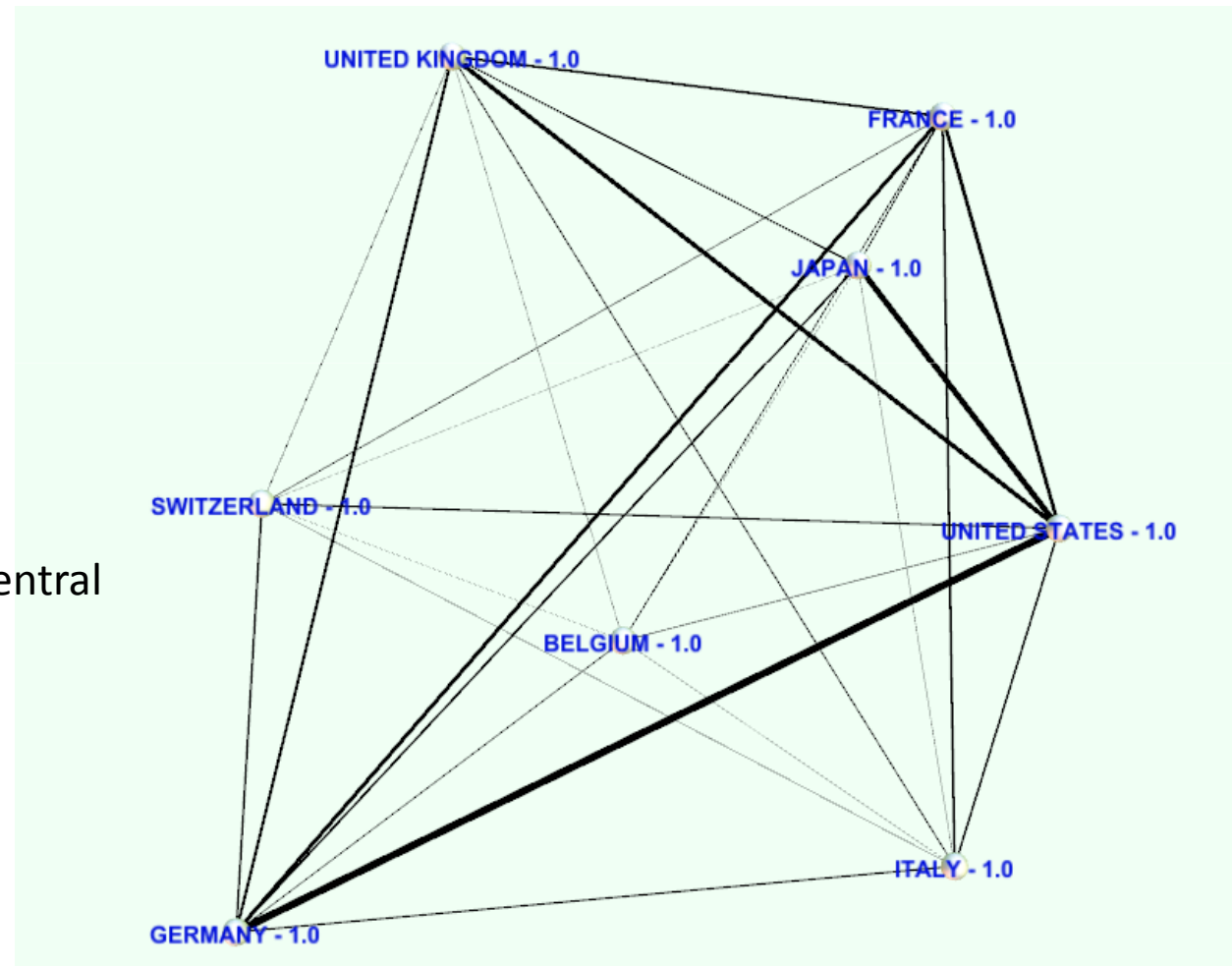
Collaboration by zone: Mostly internal relationships

ASIA	ASIA	170119	32,57	Intra	91,53%
EU27	EU27	145973	27,95		
US & Canada	US & Canada	107244	20,53		
OTHERS	OTHERS	54767	10,48		
US & Canada	EU27	10844	2,08	Inter	8,47%
OTHERS	EU27	10280	1,97		
US & Canada	ASIA	7652	1,46		
EU27	ASIA	7443	1,42		
US & Canada	OTHERS	4558	0,87		
OTHERS	ASIA	3465	0,66		
Total		522345	100,00	100,00%	

USA as an orchestrator of networks



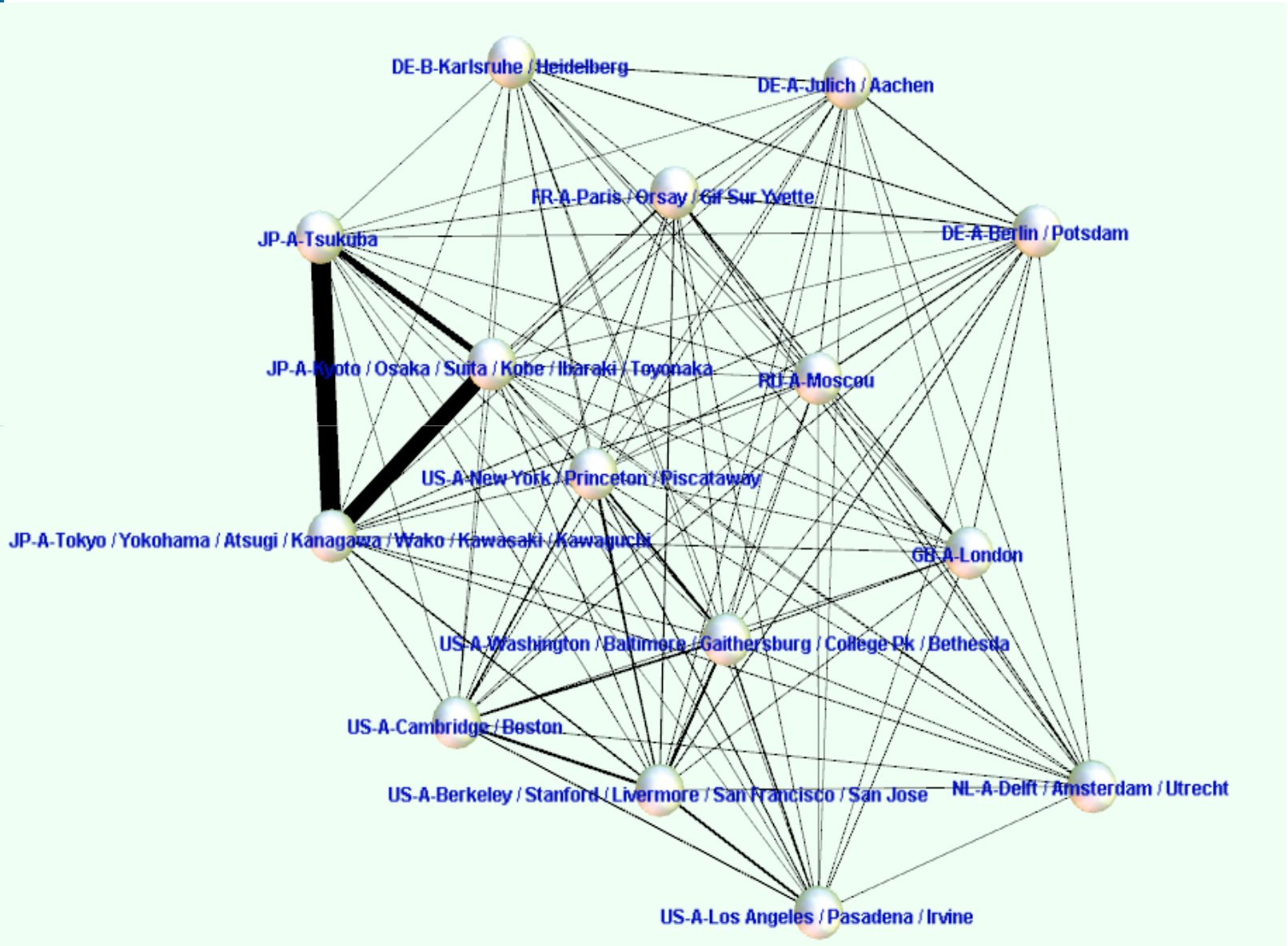
USA as an orchestrator of networks



The most central countries

Collaboration by technology: Mostly collaborations with similar clusters

Materials Science, Multidisciplinary	Materials Science, Multidisciplinary	101517	8,77%	Intra	63,05%
Physics, Applied	Physics, Applied	89649	7,75%		
Physics, Condensed Matter	Physics, Condensed Matter	62258	5,38%		
Chemistry, Physical	Chemistry, Physical	57528	4,97%		
Chemistry, Multidisciplinary	Chemistry, Multidisciplinary	31764	2,75%		
Metallurgy & Metallurgical Engineering	Metallurgy & Metallurgical Engineering	23280	2,01%		
Polymer Science	Polymer Science	22410	1,94%		
Nanoscience & Nanotechnology	Nanoscience & Nanotechnology	22242	1,92%		
Materials Science, Coatings & Films	Materials Science, Coatings & Films	21789	1,88%		
Engineering, Electrical & Electronic	Engineering, Electrical & Electronic	20374	1,76%		
////////////////////////////////////Top 10 Intra Categories////////////////////////////////////					
Physics, Applied	Materials Science, Multidisciplinary	24010	2,07%	Inter	36,95%
Physics, Condensed Matter	Materials Science, Multidisciplinary	23200	2,00%		
Physics, Condensed Matter	Physics, Applied	21613	1,87%		
Physics, Applied	Materials Science, Coatings & Films	17816	1,54%		
Materials Science, Coatings & Films	Physics, Applied	17816	1,54%		
Metallurgy & Metallurgical Engineering	Materials Science, Multidisciplinary	16989	1,47%		
Materials Science, Multidisciplinary	Chemistry, Physical	14219	1,23%		
Nanoscience & Nanotechnology	Materials Science, Multidisciplinary	14086	1,22%		
Physics, Applied	Engineering, Electrical & Electronic	13354	1,15%		
Physics, Condensed Matter	Materials Science, Coatings & Films	12178	1,05%		
////////////////////////////////////Top 10 Inter Categories////////////////////////////////////					
Total		1157146	100,00%	100,00%	



Interpretation and conclusions

- Huge clustering effect worldwide. The rate of growth of the # of pub higher in clusters
 - Huge scientific investment in Asia. Rather centered on Asia, fostering collaboration on Asia.
 - Scientific diversity plays a critical role
 - Asia : mostly auto-centred development
 - Technology : mostly collaboration between clusters with similar technological capabilities. Few notable linkages
 - Unsustainable development: just like for firms, diseconomy of scale, increasing rigidities, increasing costs and competition for resources
 - Changing strategy of leading univ. : remain small and increase centrality
- Being central and visible rather than being big**

Thank you for your attention !
Questions and comments welcome

To know more www.nanoeconomics.eu

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