

Is e-social science the future of the social sciences?

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Outline

- E-social science and social sciences
- My current research agenda = science and science policy studies
- I try to use e-social science approaches in this agenda
- Two examples of program lines
- Conclusions: Is e-social science the future of the social sciences?

Questions

- Is e-social science the future for the social sciences?
 - If so, implications for
 - Science policy
 - Education
- Or will it remain one of the many approaches next to the already existing ones?
- How would e-social science look like (in both cases)?

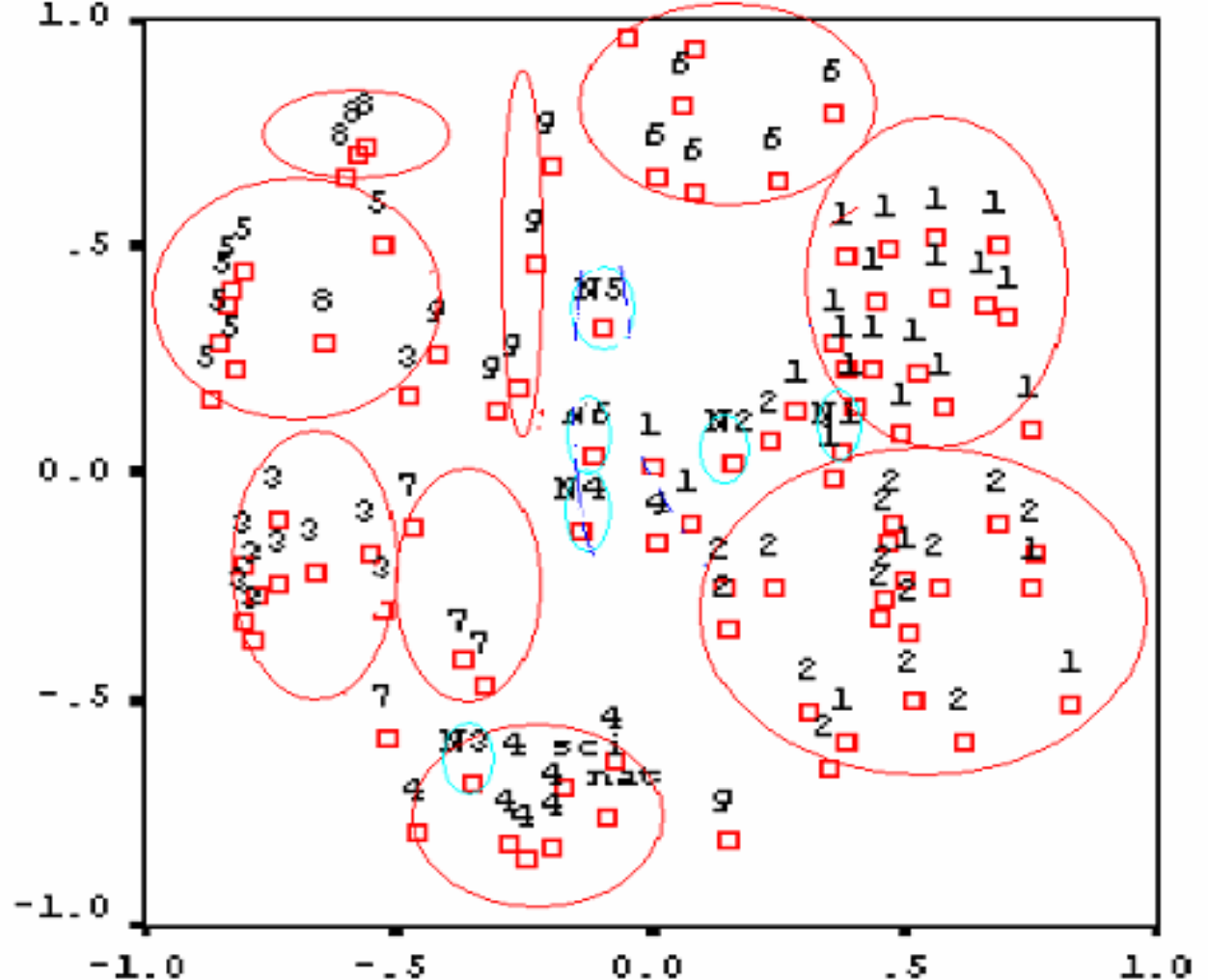
Infrastructures = use by all?

- Relatively small community that finds e-social science important (=we)
 - This and other conferences.
- Doing e-social science
 - Building infrastructures
 - Developing standard tools
- Not for small groups
- Analyzing the diffusion of e-social science

Technologies and tools in scientific development

- New “instrumentalities” (Derek Price) for observation and analysis are central in the development of the (social) sciences
 - **Lenses** as precondition for progress in astronomy (Huygens) and in studying microbes (van Leeuwenhoek)
- ICT in many fields: modeling, monitoring, mapping.
 - In the sciences the use of ICTs seems rather integrated
 - And in the social sciences???
- Instruments to work on *nano-scale* enabled a new multidisciplinary field of nanoscience and nanotechnology – very fast development.

Mapping nano- technology



nano lett => 1,2,3,4,9
 nanopart => 1,2,3,6,7,8,9
 nanosci/tech => 1,2,3,5,8,9

N1 = IEEE T Nanotechnology
N2 = Nanotechnology
N3 = IEEE T Nanobiology
N4 = Nano letters
N5 = J Nanoparticles research
N6 = J Nanoscience and nanotechnology

F1 =Physics - semiconductors
F2 =Physics - solid state physics
F3 =Chemistry
F4 =Life sciences (Science, Nature)
F5 =Polymers
F6 =Material science
F7 =Chemical physics
F8 =Colloid surfaces
F9 =Material science / chemistry

And the social sciences?

- Slow adoption of new tools, often by only a small part of the community: E.g., SNA
- Hardly any inter/multidisciplinarity: disciplinary identities are dominant
- Is this stagnation, do we need patience, or is this due to the traditional heterogeneity of social sciences: progress as (post modern) proliferation?

Example: sociology foresight

- The 2006 sociology foresight of the Royal Netherlands Academy of Arts and Sciences:
- No reference to new data, methods, and theory building
 - new *research questions* because the world has changed = topical ‘modernization’: same approaches, same questions in new historical situation
- Data oriented proposals:
 - general social survey in the Netherlands,
 - experimenting with archiving qualitative data for reuse

But why would the social sciences need e-science?

- Theory:
 - Social phenomena are high-dimensional – traditional approaches cannot handle this, but computer based modeling and simulation can (solving Von Hayek problem: complexity of social phenomena is far too high for social science to become scientific)
 - Philosophical more adequate: causality \neq relation between variables, but a mechanism (SNA: relations between people, not between variables).
- Data:
 - Survey / interview data are not very reliable. Observational data should be preferred. (e.g., *email study: contradicting results*)
 - And many new ‘observational’ data are becoming available (potentially)
 - the electronic traces of almost all human behavior.
 - Registrations and other existing data sources can be made accessible for research.
- Collaboration:
 - Comparative studies
 - Access to and sharing of data and analytical tools
- Useful knowledge

Useful knowledge: Pasteur's quadrant (Stokes)

What drives research?	Considerations of use		
Quest for fundamental understanding		-	+
	+	Bohr	Pasteur
	-		Edison

Useful knowledge?

- Economics (especially the large economic models)
- Political science (especially surveys about political opinions)
- Sociology (surveys on opinions and on state of social groups)

- But also skepticism:
 - Lot of small scale research
 - Generalization
 - Lack of understanding interventions in social

Useful knowledge?

- OECD on reinventing the social sciences
- OECD and others on social science for science policy
- Emphasis on models, metrics and comparative data
- Agenda's converge

What is e-social science?

- Modeling and simulation
- Analysis and visualization
- New types of data
- Increased accessibility of existing data
- Collaboration

Users perspective?

- Often technology driven – grid, infrastructures for distributed data access and collaboration?
- Often driven by existing practices (e.g., data infrastructure policies)
- Needs of researchers?
 - Different categories with different interests?
 - User needs: are (some) users conservative?
- Needs of users of knowledge ('society')?

Dilemma's:

- E-social science seems to be able to help social sciences forward – but low adoption suggests diverging opinions about e-social science
- Should we inform developers of e-science tools and infrastructures through 'user needs studies'.
- Should we inform users about possibilities? And, is this 'helping', or 'transforming'?

Examples

- Studying the development of research fields / disciplines
- Studying the dynamics of international research collaboration
- Studying the social construction of data/research infrastructures
- Studying the use and effects of E-democracy technologies (participation)
- Modeling the science system
- Large scale data collecting and analysis (registrations; statistics; web)

Social construction of research infrastructures

- Cases:
 - Social sciences
 - Biodiversity research
- Infrastructures
 - Linking a diversity of communities of practice and interest groups
 - Dynamics, results, effects on process of knowledge production, participation in knowledge production, and the knowledge itself

Biodiversity case: national node of a new international infrastructure.

- Data owners such as:
 - Zoological museums
 - Many association of volunteers (e.g., bird watchers)
- Users
 - Researchers
 - Municipalities / provinces
- Funding bodies / policy
 - Ministry of Science and Education; NWO
 - Ministry of Urban and Regional Planning and the Environment
- Context:
 - OECD: data sharing; UN: environmental protection
 - EU: regulation with respect to the environment.

A need for a new infrastructure?

- NEW international standardized database with all biodiversity data (species; specimen; biotope; climate) is needed for monitoring and studying change of biodiversity and climate
- COMPETING portal of other Ministry -> serving municipalities
- EXISTING networks (light infrastructures) on small scale, eg between bird watchers and biological researchers, with trust, identity, status and reward systems, and so on, and with
- .
- ECONOMIC interests (because of new regulation, biodiversity data have an economic value)

Conclusions

- Reluctance of several existing networks to participate in the new structure.
- Unclear whether researchers want the new infrastructure? Are current 'informal' networks sufficient?
- Strategic game. Who will win? What are the costs?
 - (is this a 'user needs' approach?)

Example 2: Development of research fields

- Researching level (activities; informal)
 - Collaboration in teams, projects
- ‘Scientizing’ (formal communication)
 - Journal system
- ‘Politicizing’ (resources, external audiences)
 - External networks

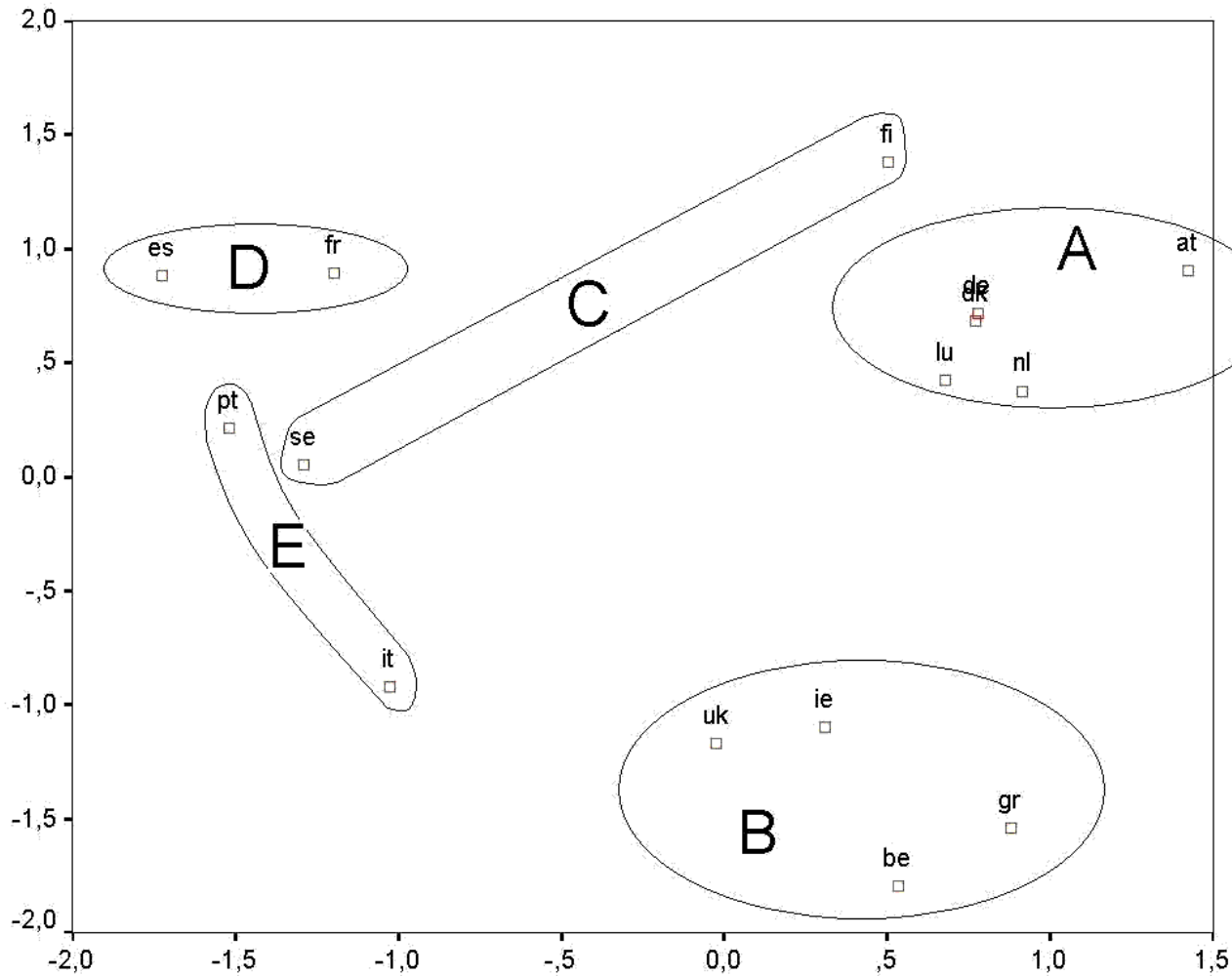
Webstudies

- Hyperlink networks as way of analyzing the researching and the politicing levels?
- But
 - What are the nodes that are linked: pages, sites?
 - And what should they represent: people, organizations?

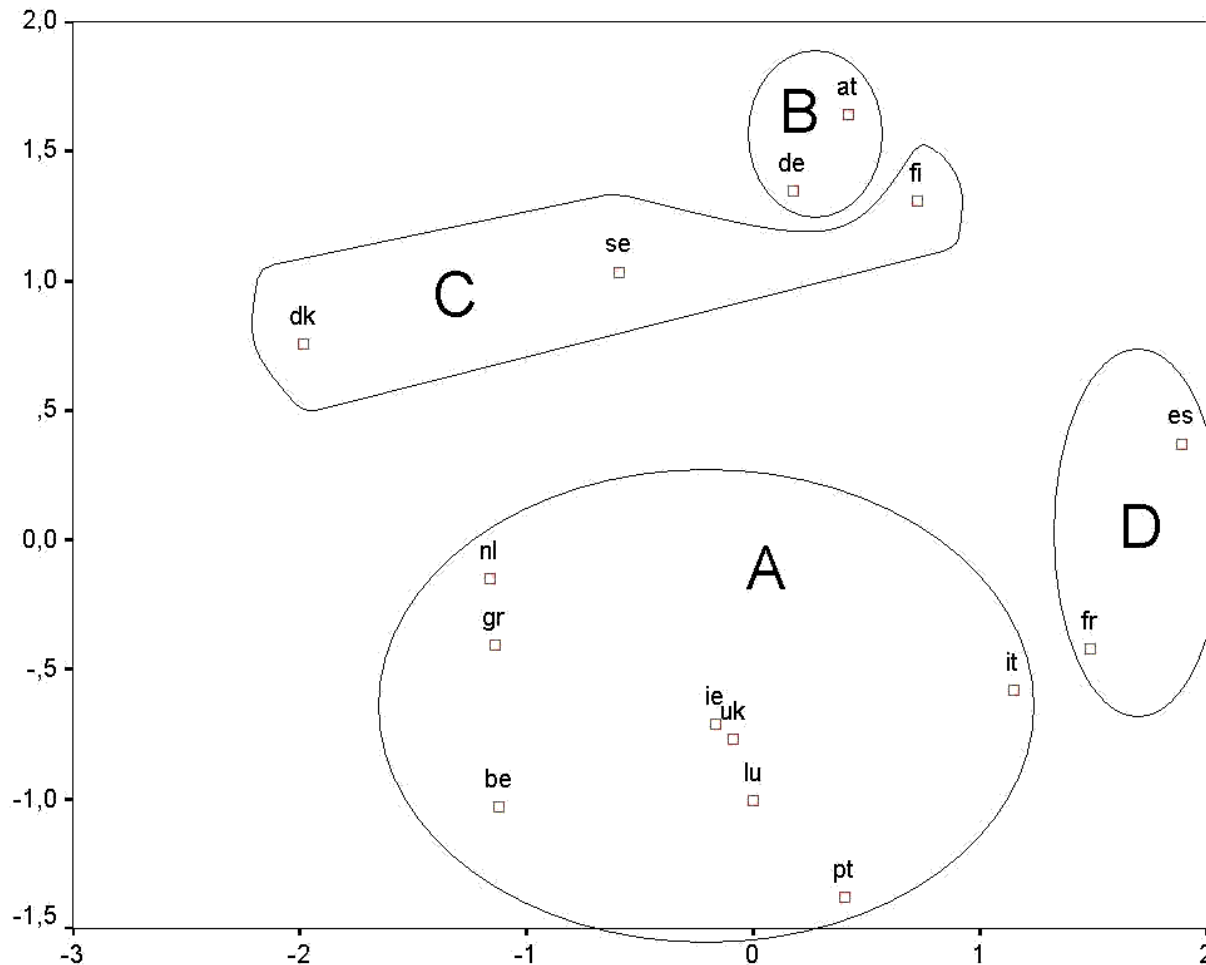
Eicstes project

- Hyperlinks between academic institutions (Heimeriks & Van den Besselaar, Cybermetrics 2006)
- Large database of university websites, characteristics and hyperlinks (universities, faculties, departments)
- Analytical tools
- Collaborative project

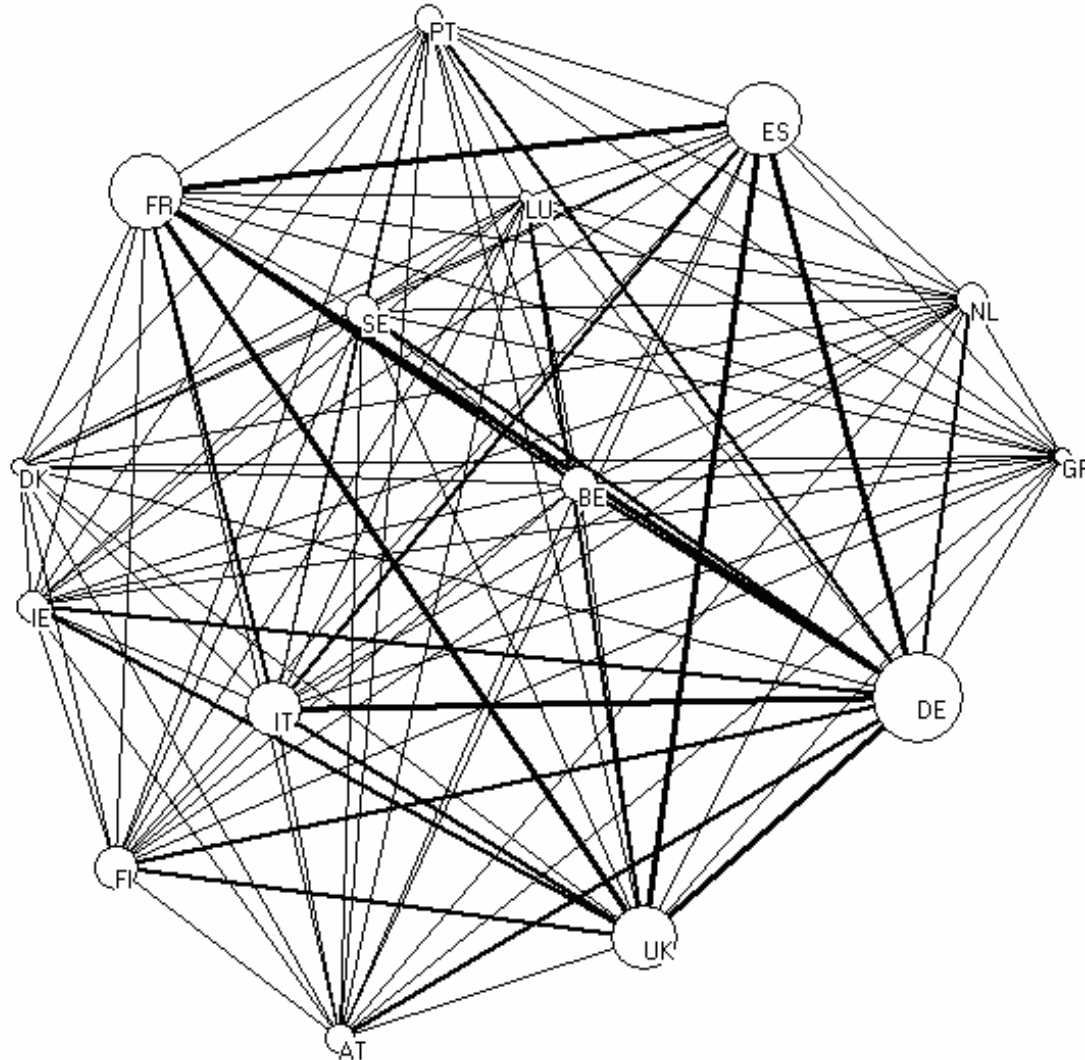
Positions of EU countries in the universities inlink network (2003)



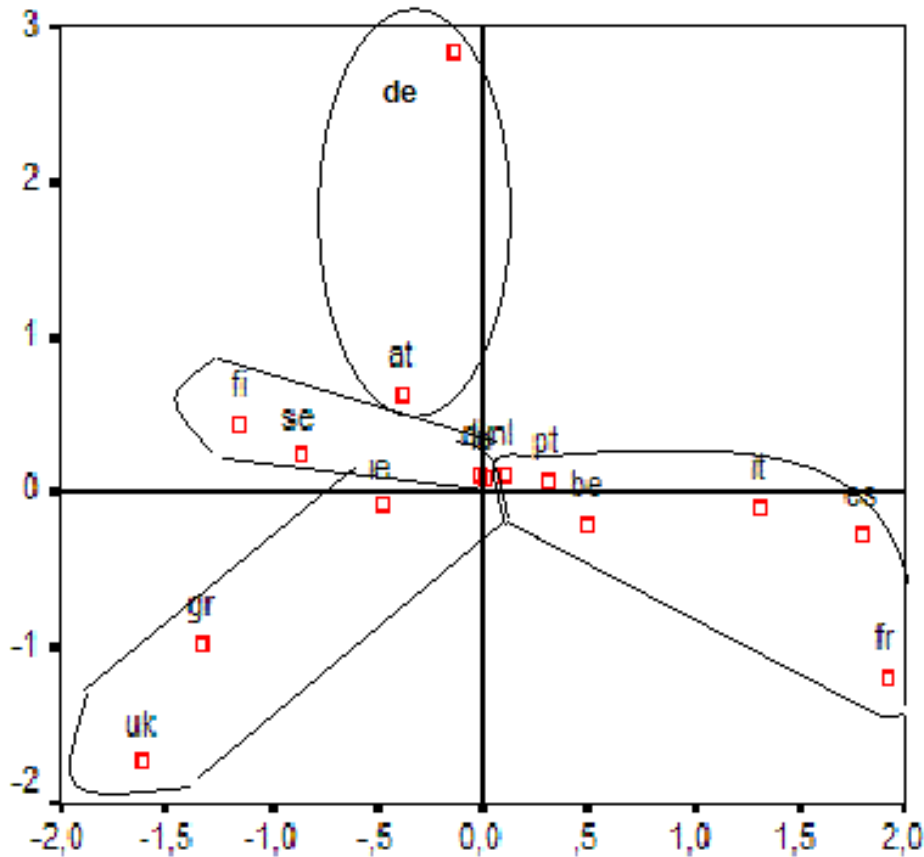
Positions EU countries in the universities outlink network



Relations between EU countries in the universities outlink network

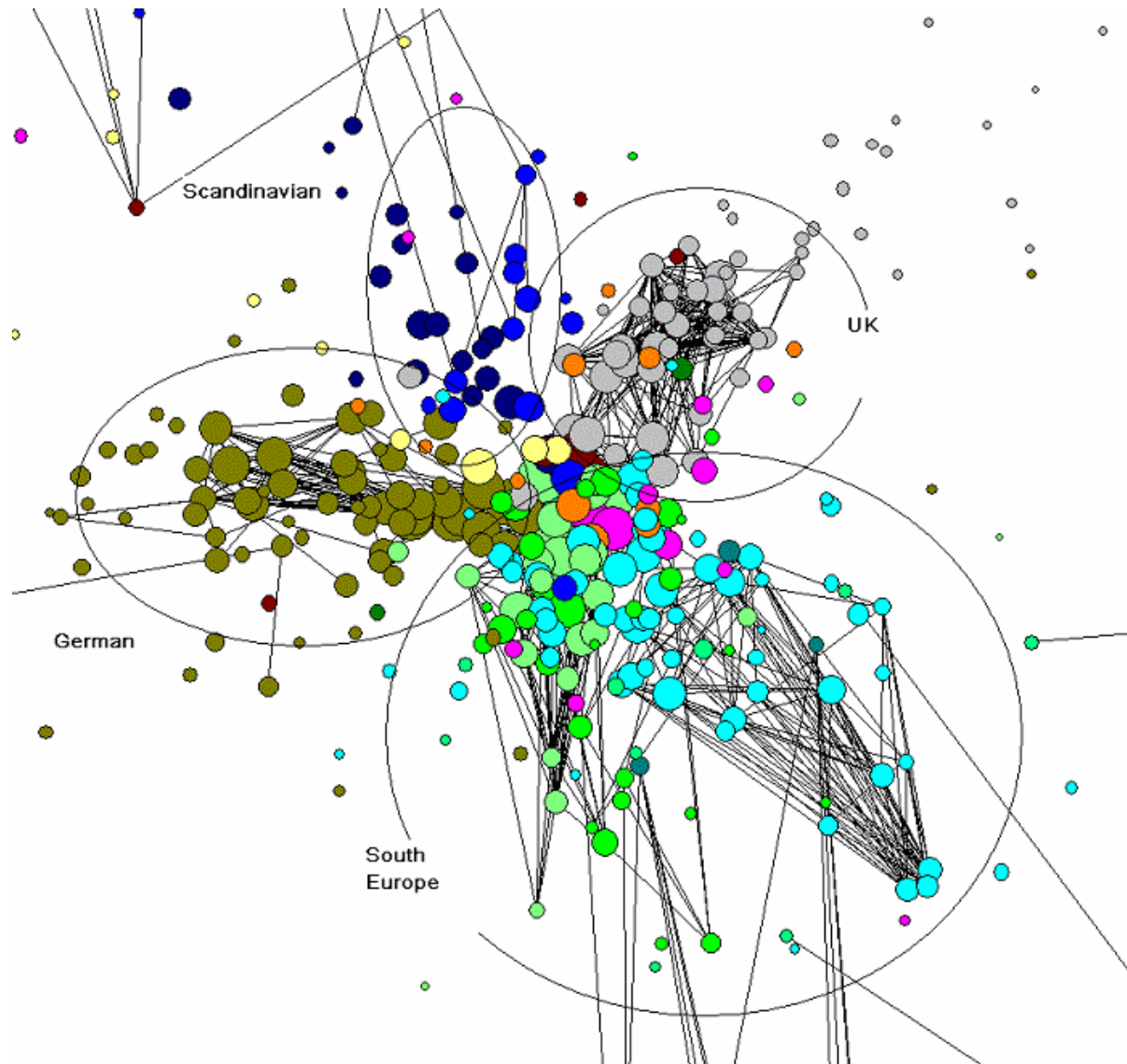


Positions EU counties in the AI-departments outlink network

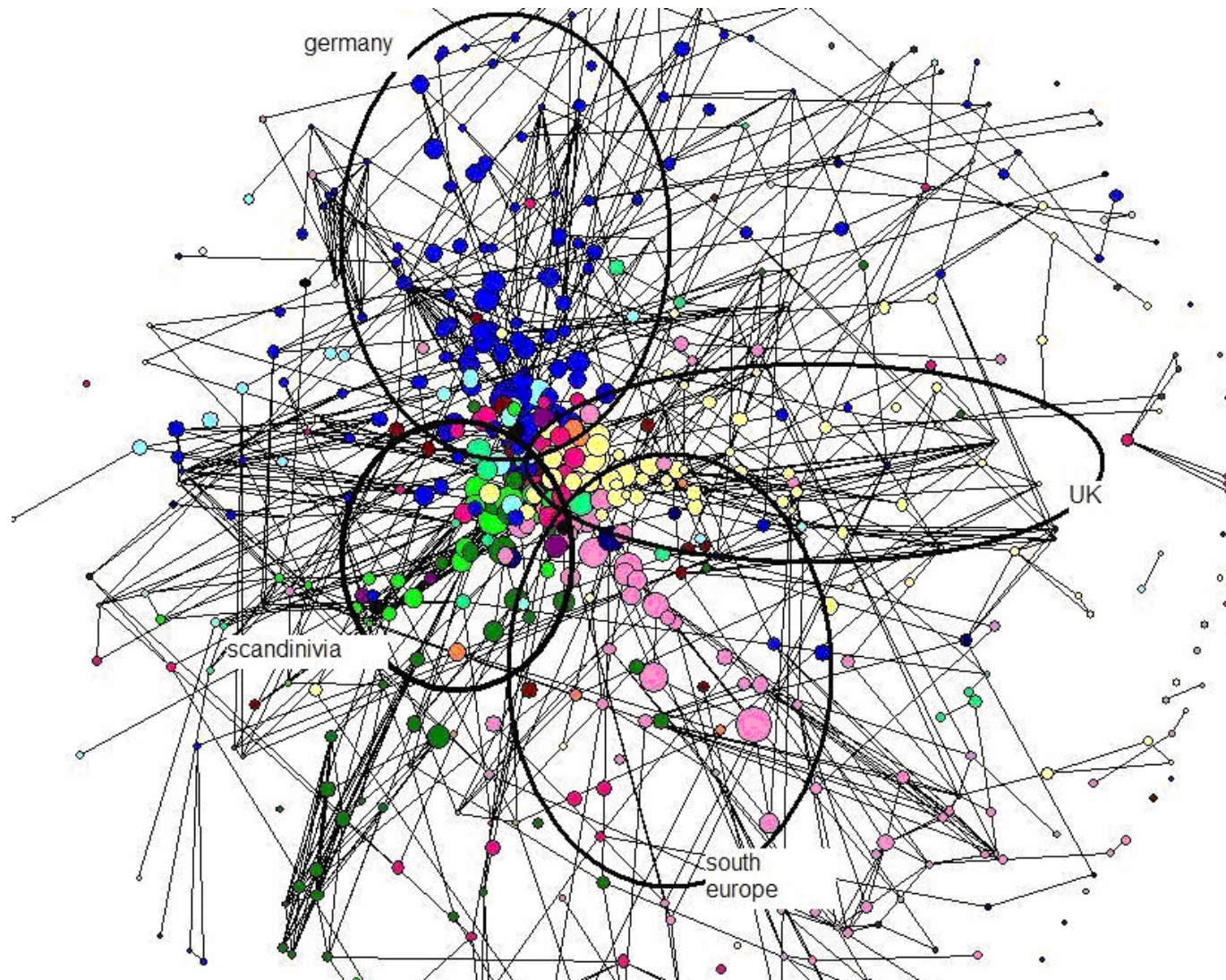


	1	2	3	4
BE	0,77	0,10		0,19
ES	0,77		0,18	0,13
IT	0,76			0,19
FR	0,75			
PT	0,66		0,20	0,19
NL	0,52	0,24	0,28	0,34
SE		0,85		
FI		0,75		0,23
DK	0,52	0,69	0,36	0,20
UK	0,33	0,36	0,81	
LU	0,39	0,32	0,73	0,32
GR	-0,19	-0,29	0,66	
IE	0,32	0,18	0,48	
AT		0,15	0,11	0,89
DE	0,27	0,16		0,85

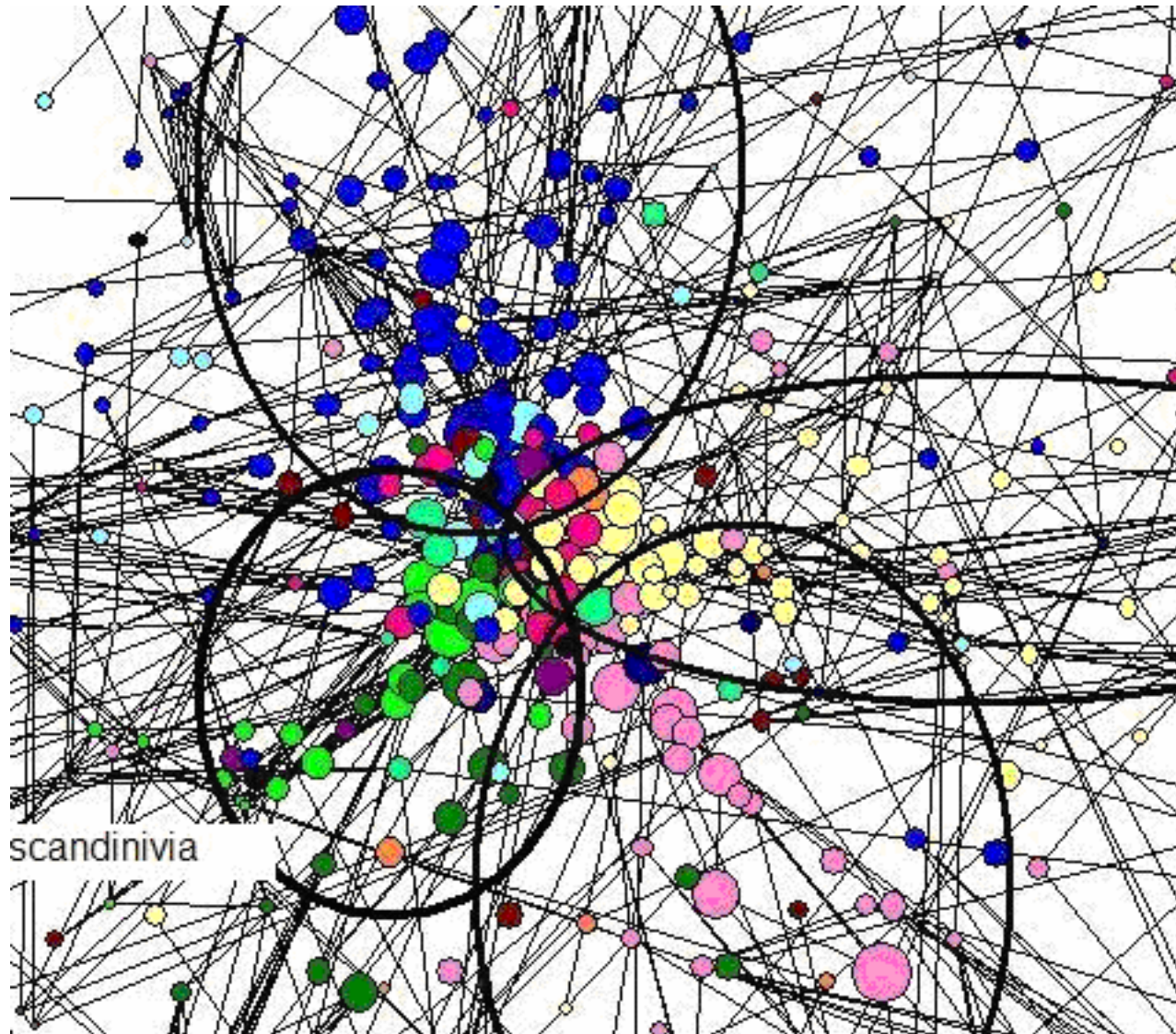
Core of the EU Universities network



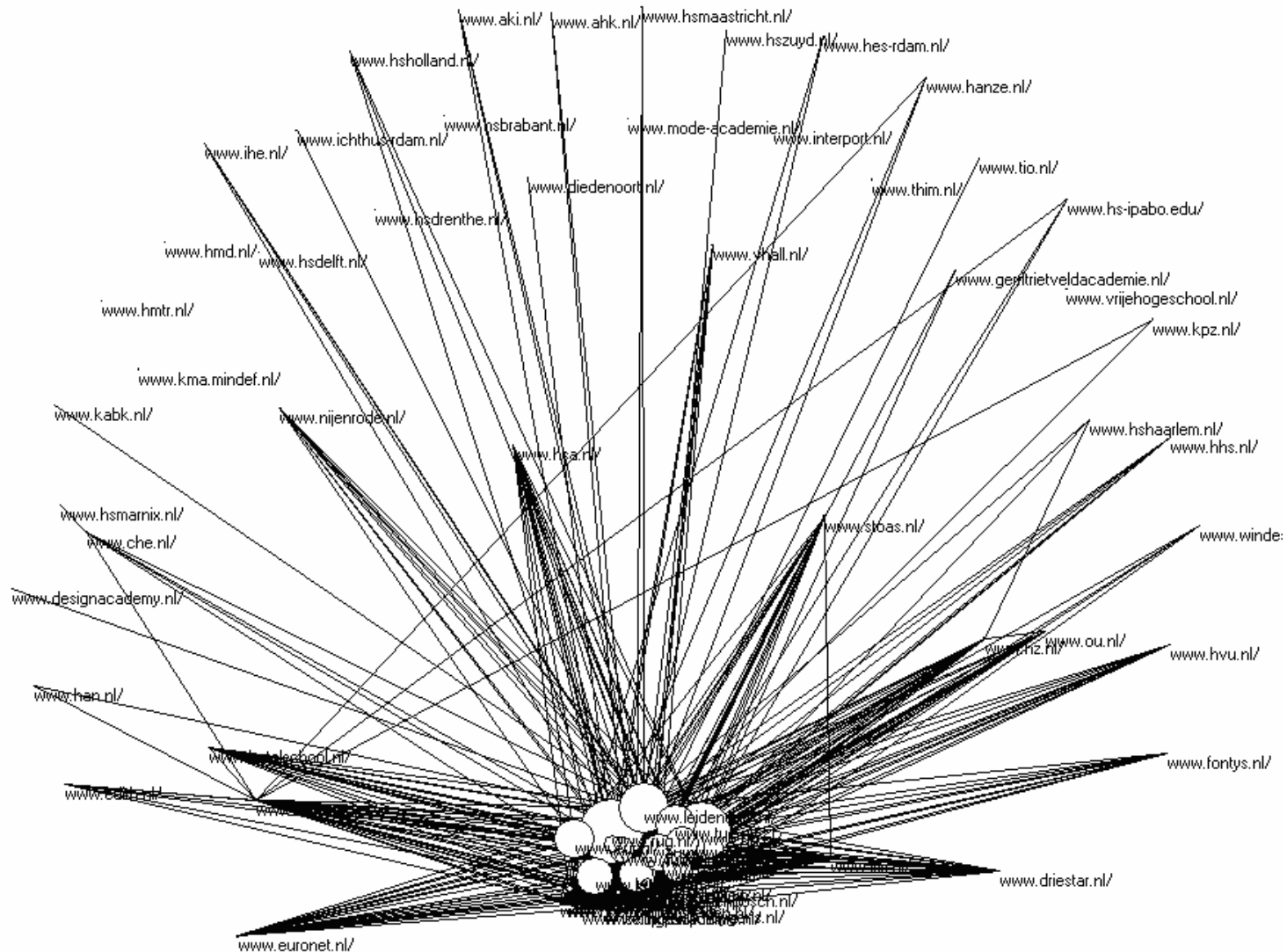
All of the EU AI-departments network



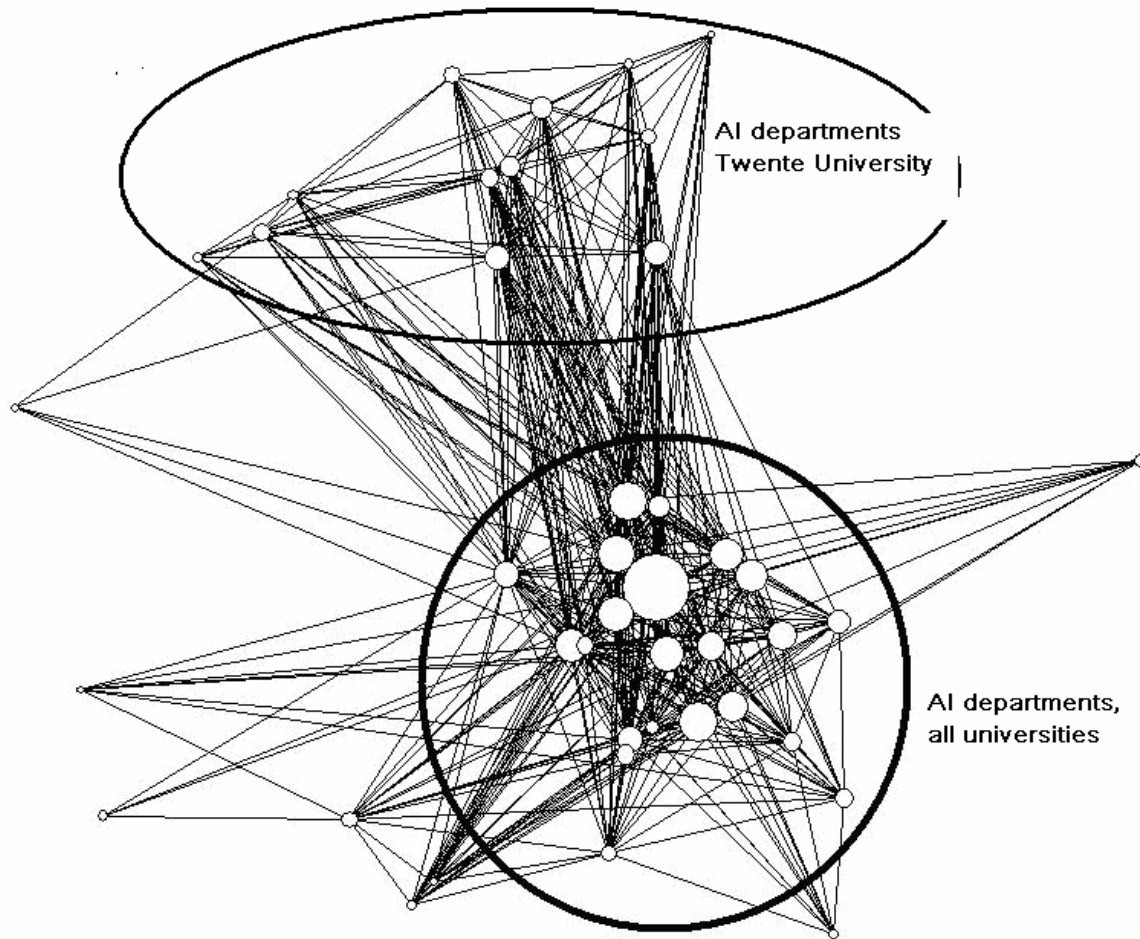
Core of the EU AI-departments network



The Netherlands' universities outlink network



The Netherlands' AI network (university departments)



Findings

Nodes	Network	
	Structural equivalent positions:	Relations:
National academic web spheres	Language / region	- no structure
National disciplinary networks	Language / region	- no structure
University websites in 15 countries	Country	Country
Department websites in one fields	<i>Core international set departments.</i> Some national orientation remains	<i>Core set</i> Country
University websites in one county	Region <i>Research field</i>	<i>Research field</i> Size
Department websites, one field, one country	<i>Core: departments from all universities.</i> Local group of departments at one technical university	University <i>Core set</i>
Individuals	No structure	No structure

Conclusion

- Quality of data collection tools and of the data
- Tools to handle these large sets
- Tools for analysis

- Research group (department) as unit of analysis (for cognitive networks)
But what do the networks on that level indicate?

- Case study: Heterogeneous media, heterogeneous networks.
 - Heimeriks & Van den Besselaar (forthcoming)

The networks under study

Offline networks based on
<ul style="list-style-type: none">- Co-authorships- Project co-operations
Online networks based on
<ul style="list-style-type: none">- Outgoing emails- Outlinks- Outlinks from personal pages- Bookmarks files- Incoming emails- Inlinks- Website visits
Perceived networks based on
<ul style="list-style-type: none">- A survey

Geographic distribution

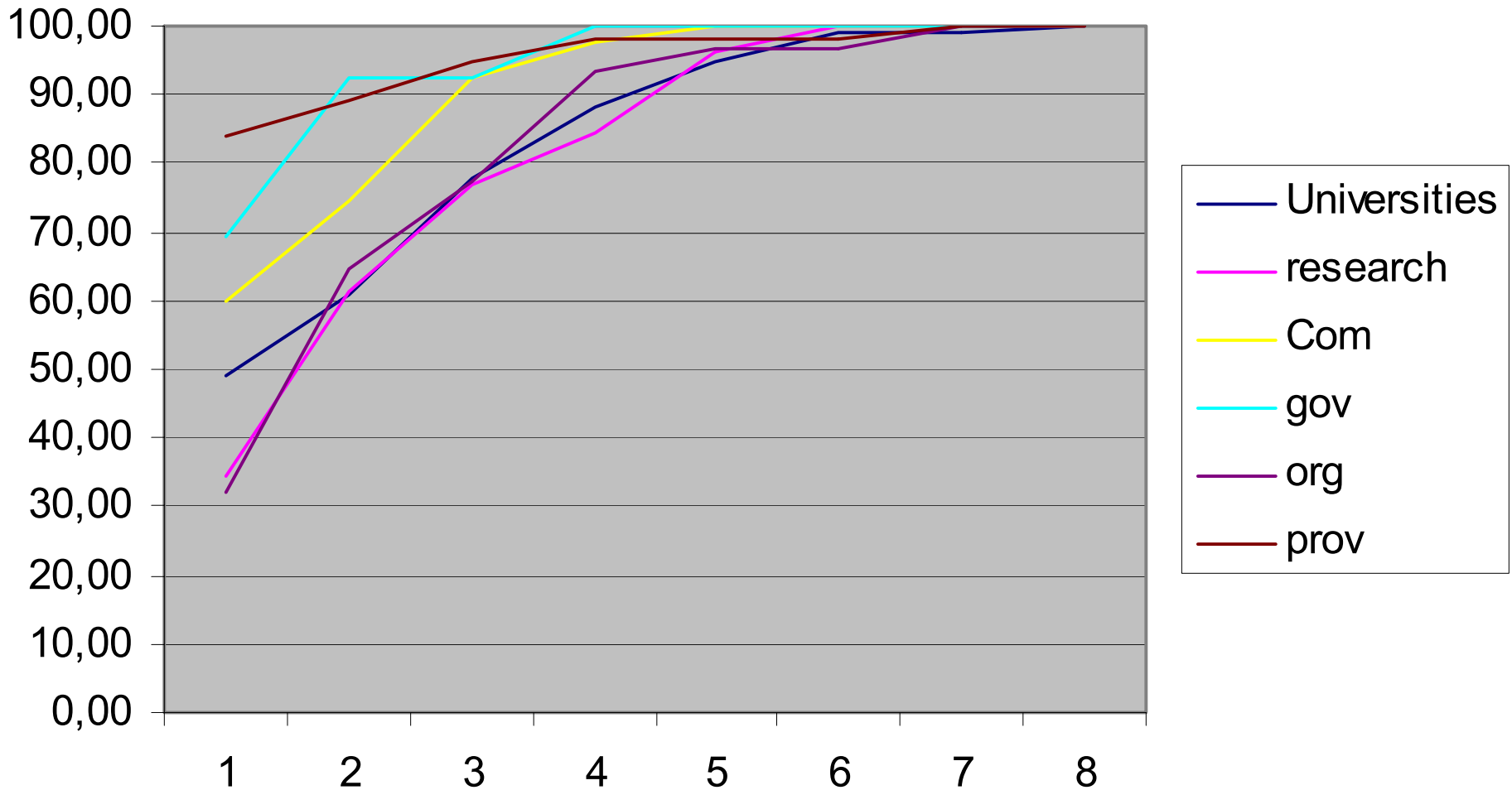
	number	%	% foreign
Home university (including IRIS)	9	-	-
Academic	130	37.5	88.5
other research	26	7.5	84.6
Companies	90	26.0	84.3
Governmental	13	3.8	84.6
non-governmental	31	9.0	83.3
portals, search engines	12	3.5	91.7
Providers, list servers	44	12.7	65.1
Total	353	100.0	83.7

Percentage of organizations within the media

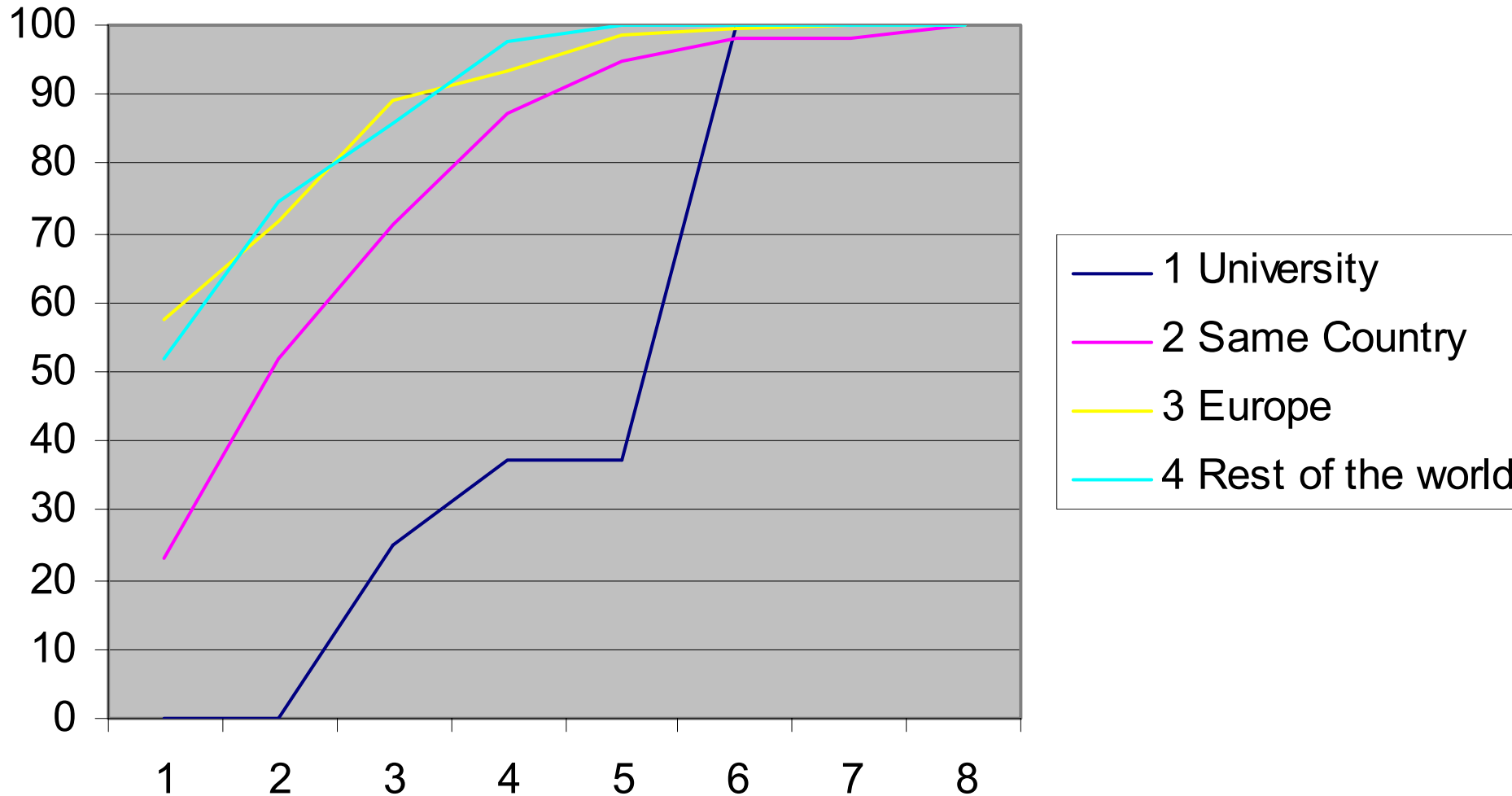
		1	2	3		4	5	6	7	8
Org types:	Share	co-auth	projects	Bookmarks	Pers. links	Out links	Out Mail	Inmail	inlinks	Site visits
Dom acad	(4)	38	7	10	4	6	8	7	6	2
foreign acad	(33)	46	25	37	37	28	32	25	40	35
other res	(8)		18	8	8	2	11	11	9	2
Commercial	(26)	8	35	22	22	26	17	20	15	33
govern	(4)		7	2	2	6	2	3	2	
non-gov	(9)	8	6	10	12	26	7	8	23	5
Portals	(3)			5	5	2	4	6	4	4
Providers	(13)		1	5	12	4	21	21	2	20
total	100	100	100	100	100	100	100	100	100	100

(boldface: the organizations overrepresented in the specific medium)

Nr of media used by org type



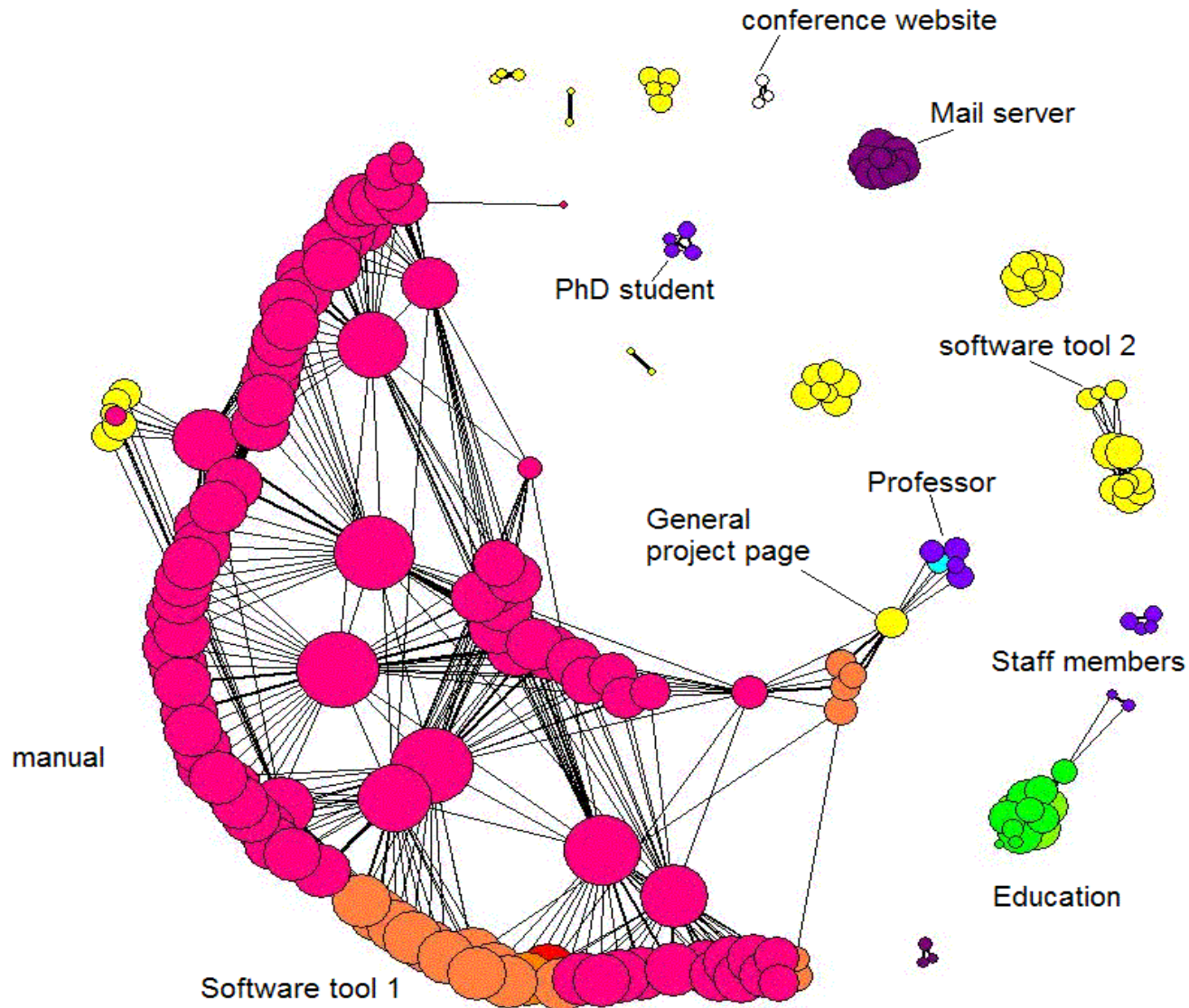
Nr of media used by distance



Visits to the site

Subdomain	Visited pages	
Software tool 1 ; tool 2	5402, 233	90.5%
Research project 1, 2, 3, research directory	77, 26, 7, 20	2.1%
Personal pages prof, Assoc, Assist, PhD, pages directorit	36, 16, 16, 5, 9	1.3%
Various: Conference, mail server	7, 142	2.4%
teaching	245	3,9%
total	6342	

Visits to the site



Correlations between media use

Co-auth	1							
Projects	.07	1						
Bookmrks	.07	-.12	1					
Outlinks	-.01	-.05	.31	1				
Outmail	.08	-.17	.09	.27	1			
Inmail	.09	-.09	.06	.19	.28	1		
Inlinks	.15	-.01	.17	.08	.08	.03	1	
Sitevisits	-.07	-.16	-.03	.19	-.06	-0.1	-.08	1
Survey	.33	.35	.51	.31	.08	.36	.32	0

Dimensions of media space

	Factor		
	1. local comm	2. resources	3. information delivery
			4. Collaboration
Outgoing mail	.778	.	
Incoming mail	.776		
Bookmarks		.788	
Outlinks		.618	-.332
Inlinks		.561	.400
Visits			-.709
Co-authors		.216	.548
Project cooperation	-.323		.477

Factor loadings be Low 0.25 not displayed

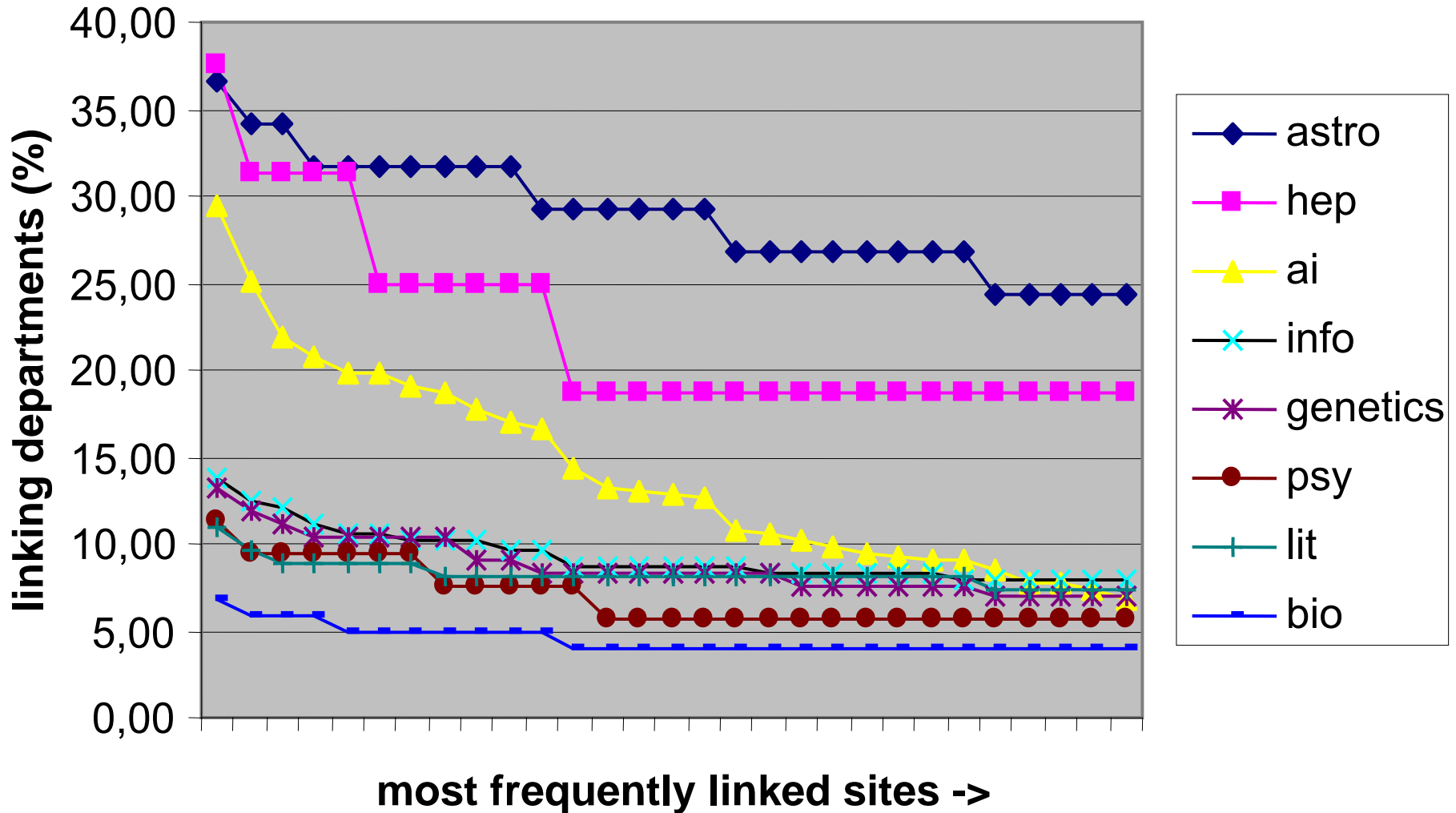
Conclusions

- Different media, different networks
- Different media, different functions
- Further analysis needed
 - Better data, longer periods
 - Other groups in same field
 - Other research fields

Disciplinary differences in web/ict use?

- Comparing research groups in different fields.
- High Energy Physics (mode 1, science)
- Astrophysics (mode 1, science)
- AI (mode 2, science)
- Information Science (mode 2, (social) science)
- Genetics (mode 2, science)
- Biotechnology (mode 2, science)
- Psychology (mode 1, social science)
- Literature studies (mode 1, humanities)
- Heimeriks, Van den Besselaar, Frenken, forthcoming

Differences in link patterns



Different network configurations

- Some fields have organizations with high inlink probability: data repositories; professional associations, core (research) institutions
- National versus more international oriented networks
 - (all networks have strong national component: local scientific institutions)
 - (some have strong links with local ‘users’)

Conclusions:

- Strong differences exist between fields
 - Size and content of website; link patterns;
- Relation with nature of the research field:
 - Mode-1 versus mode-2 research
 - International versus local orientation

What have we learned from this: perspectives

- E-social science as a challenge in science policy studies
 - it improves our understanding by opening up new possibilities to observe and analyze.
 - and this holds of course for many other fields of social research
- But e-science infrastructures are not neutral:
 - Developing it in direct relation with users – but which group of users?
 - Not a homogenous practice / no homogeneous interests!
- Changing the social sciences landscape / science policy issues
 - Allocation of means, Institutional reform (my own group!)
 - Education of new generations students
- E-social science as the future of the social sciences, or only as one of the approaches? Ambivalence

Thanks for your attention