



Funding Proposal Overlap Mapping: A Tool for Science and Technology Management

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Data and Methodology

Conclusion and Discussion

02

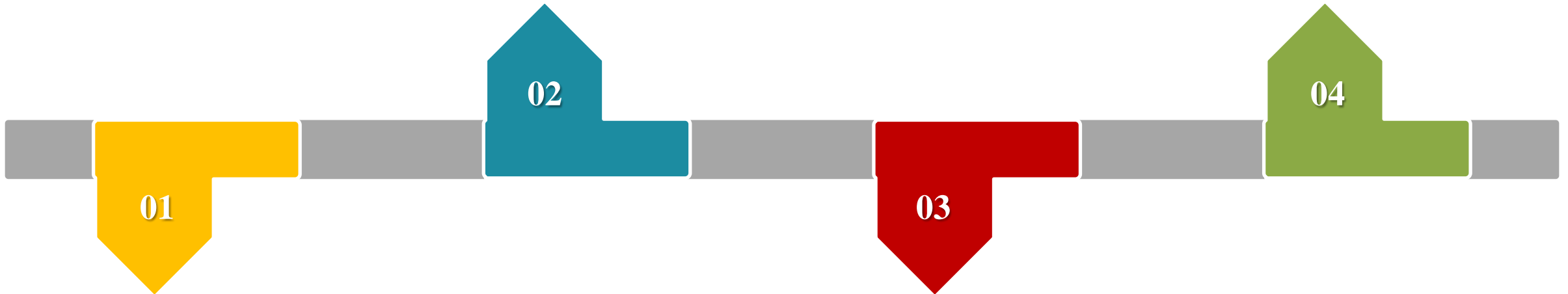
04

01

03

Introduction

Results



Type	Science overlay mapping	Patent overlay mapping	Funding proposal overlap mapping
Data source	Publication (Web of Science)	Patent (EPO, USPTO)	Awards (NSF)
Classification basic	Content-based classification; ISI subject category; Web of Science category ;	IPC	PEC
Purposes	Locate bodies of research within the sciences, both at each moment of time and dynamically and explore the ongoing sociocognitive transformations of science and technology systems.	Visualize the global innovation landscape as well as a method to locate the patent data of individual organizations, countries and technological fields on the global map.	Show changes in distribution of proposals on a given subject matter or by a research unit over time and contrast the emphases of different research units for science and technology management.
Factor relationship	Citing-to-Cited relationship	Citing-to-Cited relationship	Co-occurrence relationship
Cluster method	Cosine similarity matrix and factor analysis	Cosine similarity matrix and factor analysis	Maximum membership degree
Main reference	Rafols and Leydesdorff (2009) Leydesdorff and Rafols (2009) Rafols et al. (2010)	Kay et al. (2014) Leydesdorff et al. (2014)	--



The **National Science Foundation (NSF)**, as a United States government agency that supports research and education in all the *non-medical fields of science and engineering*, has tried to narrow the gap between science and society with its broader impacts criteria.

Simple Search	Advanced Search	Popular Searches	Download Awards	Send Comments	Award Search Help
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Download Awards by Year

Click on a link below to download a zipped file with all awards made in that fiscal year (October 1 - September 30) in XML format. [View XML schema.](#)

The "Historical Awards" link contains all awards made prior to 1976. Please note that some data, such as text abstracts, are not available for these older awards.

2014 - 24 MB	2003 - 21 MB	1992 - 15 MB	1981 - 6 MB	1970 - 668 KB
2013 - 22 MB	2002 - 19 MB	1991 - 14 MB	1980 - 7 MB	1969 - 106 KB
2012 - 23 MB	2001 - 16 MB	1990 - 14 MB	1979 - 7 MB	1968 - 108 KB
2011 - 22 MB	2000 - 17 MB	1989 - 12 MB	1978 - 7 MB	1967 - 41 KB
2010 - 24 MB	1999 - 17 MB	1988 - 12 MB	1977 - 7 MB	1966 - 17 KB
2009 - 29 MB	1998 - 15 MB	1987 - 11 MB	1976 - 7 MB	1965 - 14 KB
2008 - 24 MB	1997 - 16 MB	1986 - 8 MB	1975 - 4 MB	1964 - 9 KB
2007 - 22 MB	1996 - 15 MB	1985 - 7 MB	1974 - 3 MB	1963 - 21 KB
2006 - 20 MB	1995 - 15 MB	1984 - 7 MB	1973 - 1 MB	1962 - 11 KB
2005 - 20 MB	1994 - 15 MB	1983 - 6 MB	1972 - 1 MB	1961 - 5 KB
2004 - 19 MB	1993 - 15 MB	1982 - 6 MB	1971 - 583 KB	1960 - 1 KB
1959 - 22 KB				
Historical - 73 MB				

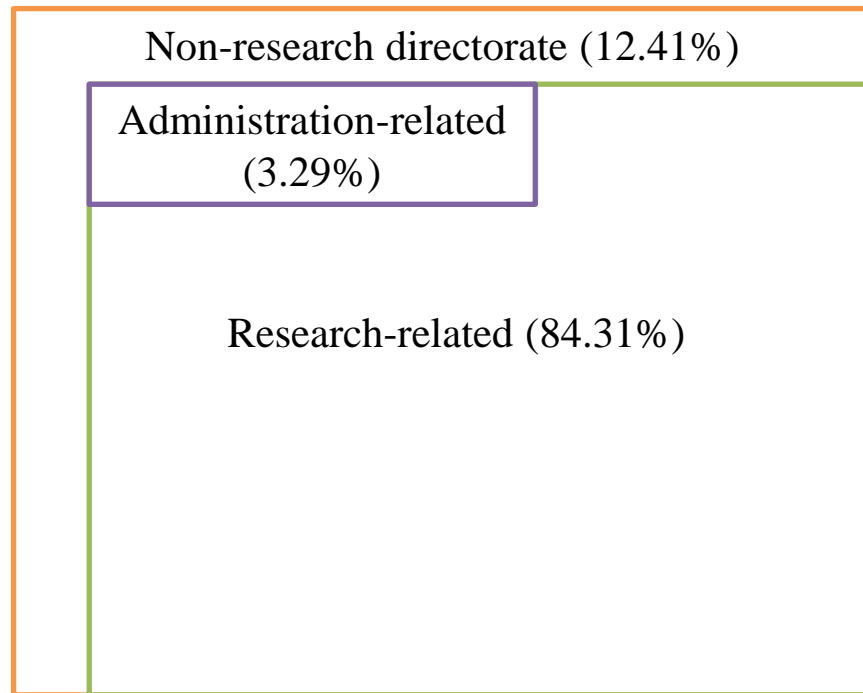
Timespan:
2000 to 2014

Results:
171074 awards

Three data search methods:

- Simple Search;
- Advanced Search;
- Popular Search (for ARRA Awards)

ARRA: American Recovery and Reinvestment Act



Non-research directorate:

- ❑ Office of the Director (O/D);
- ❑ National Science Board (NSB);
- ❑ Office of the Inspector General (OIG);
- ❑ Directorate for Education & Human Resources (HER);
- ❑ Office of Budget, Finance, and Award Management (BFA);
- ❑ Office of Information & Resource Management (IRM).

Two type of PECs:

- ❑ Research-related funding;
- ❑ Administration-related funding;

Type	PEC Number	Award Records	Rate	Cumulative number	Acculate rate
1000= \leq Award	43	62332	43.48%	62332	43.48%
500= \leq Award \leq 1000	60	39731	27.72%	95654	66.73%
100= \leq Award \leq 500	264	56363	39.32%	136805	95.43%
50= \leq Award \leq 100	101	6939	4.84%	140478	98.00%
10= \leq Award \leq 50	195	4926	3.54%	142549	99.54%
Award \leq 10	248	656	0.46%	142821	100.00%

Reset	PEC		1	2	3	4	5	6
	# Records		35491	30148	25903	21365	21166	15774
NSFOrganizationCode (long name)	# Records	▼ ▲ Show Values >= 1 and <= 4151 Cooccurrence # of Records	Directorate for Mathematical & Physical Sciences	Directorate for Engineering	Directorate for Geosciences	Directorate for Computer & Information Sciences	Directorate for Biological Sciences	Directorate for Social, Behavioral & Economic Sciences
		▼ ▲						
1	4152	5371		2151				1
2	3876	1189	1374	781	512	327	773	109
3	3321	9150	775	833	566	380	556	211
4	2208	1207	2208					
5	2194	1281	2193	1				
6	2172	1266	2066	65	16	3	18	4
7	1949	1320	10	5		17	1	1916
8	1900	1517	34	1849		17		
9	1755	1640	17	29	2	1686	9	12
10	1728	1620		1	1722	1	3	1
11	1674	1253	1361	92	25	122	45	29
12	1668	7298	372	417	383	139	210	147
13	1599	1271	1460	51	26	24	37	1
14	1563	1182	18		16		1519	10
15	1555	5373		1555				
16	1515	7363	2	3	2	1508		
17	1486	1650			1409		77	
18	1456	1574	6	3	1445	2		
19	1429	1352		8	44	1	19	1357
20	1405	1573	3	5	1396			1

Previous category method:

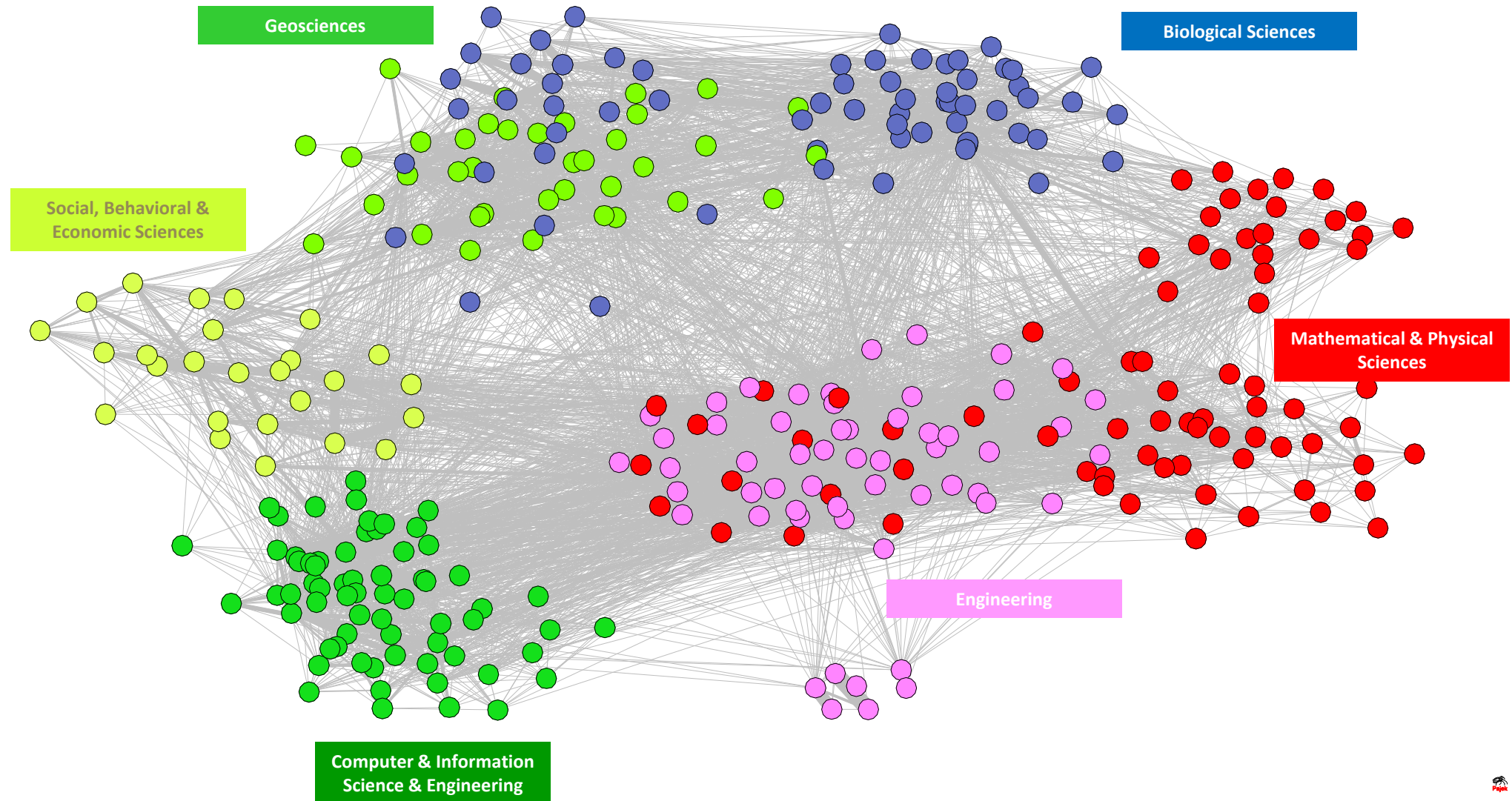
Cosine similarity matrix;

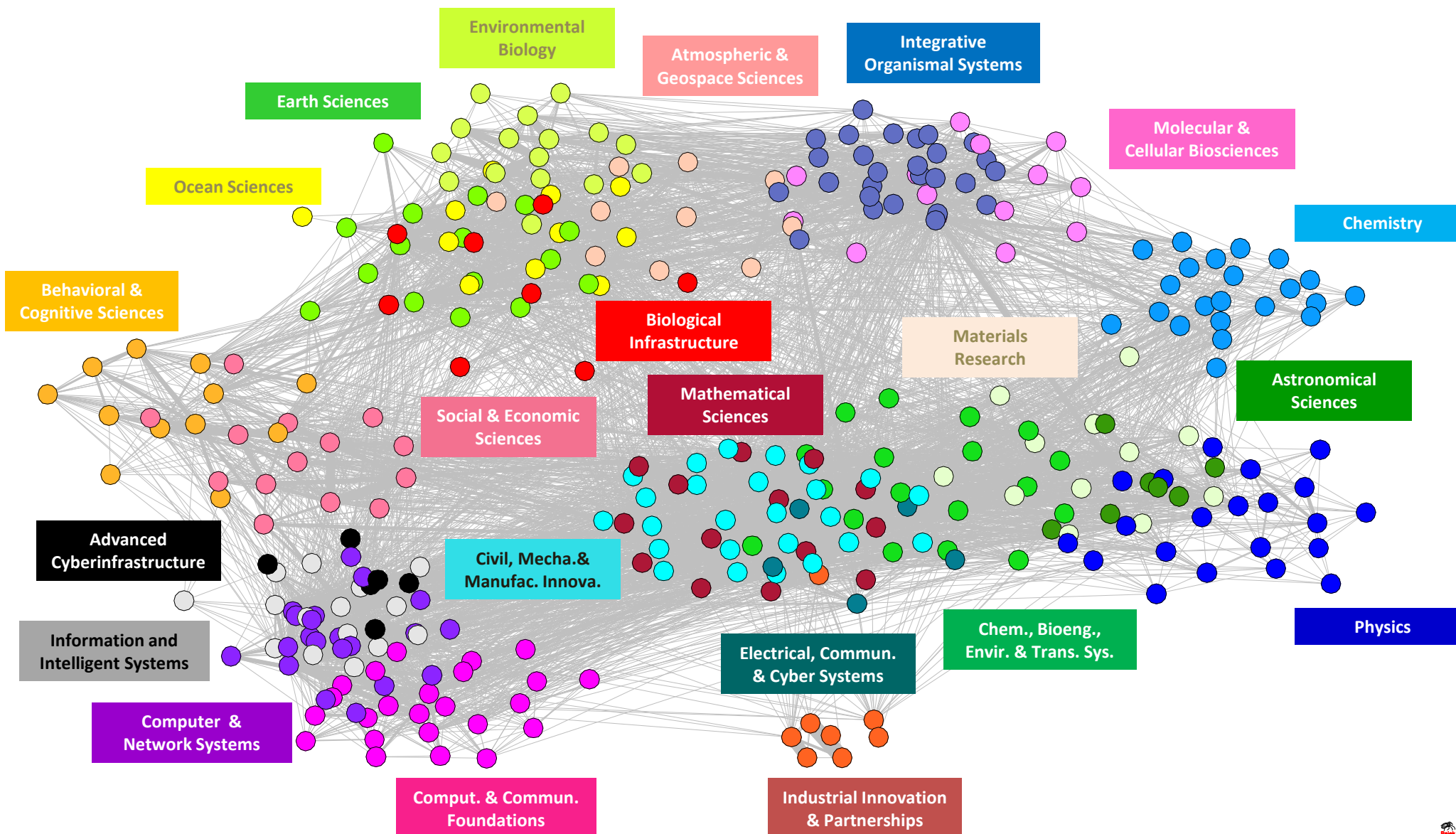
Factor analysis;

Current category method:

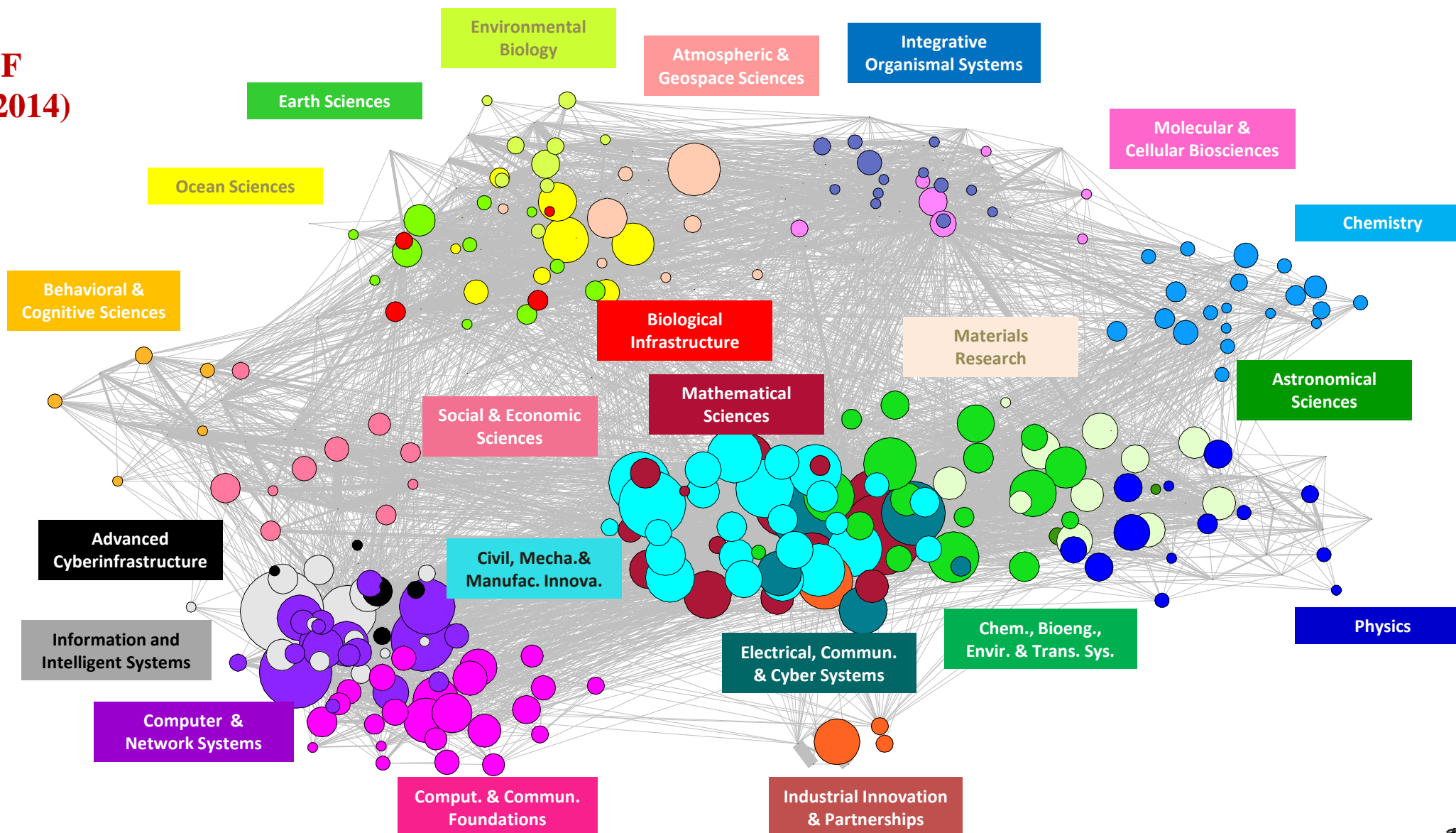
Maximum membership degree;

Manual check;

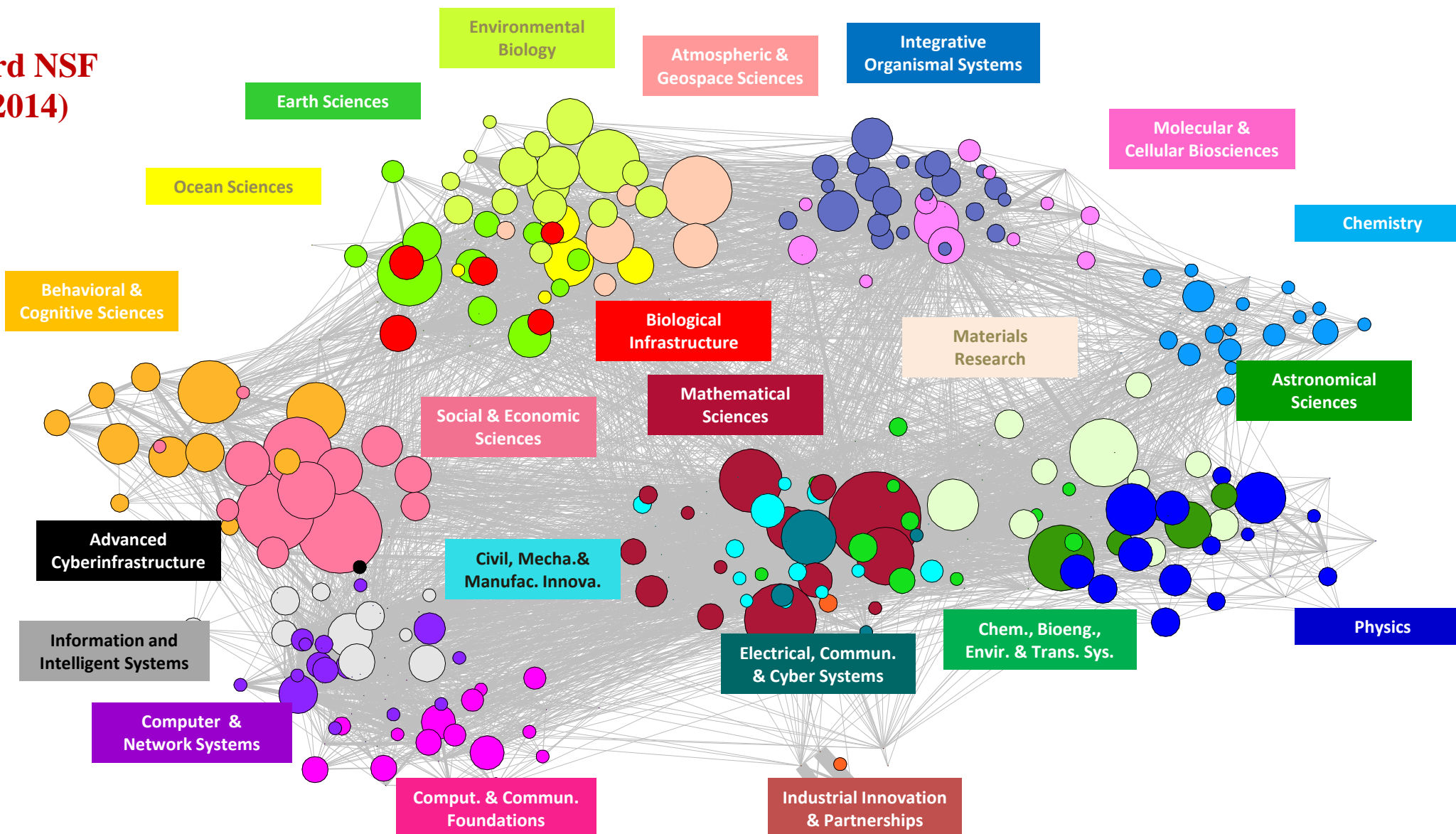




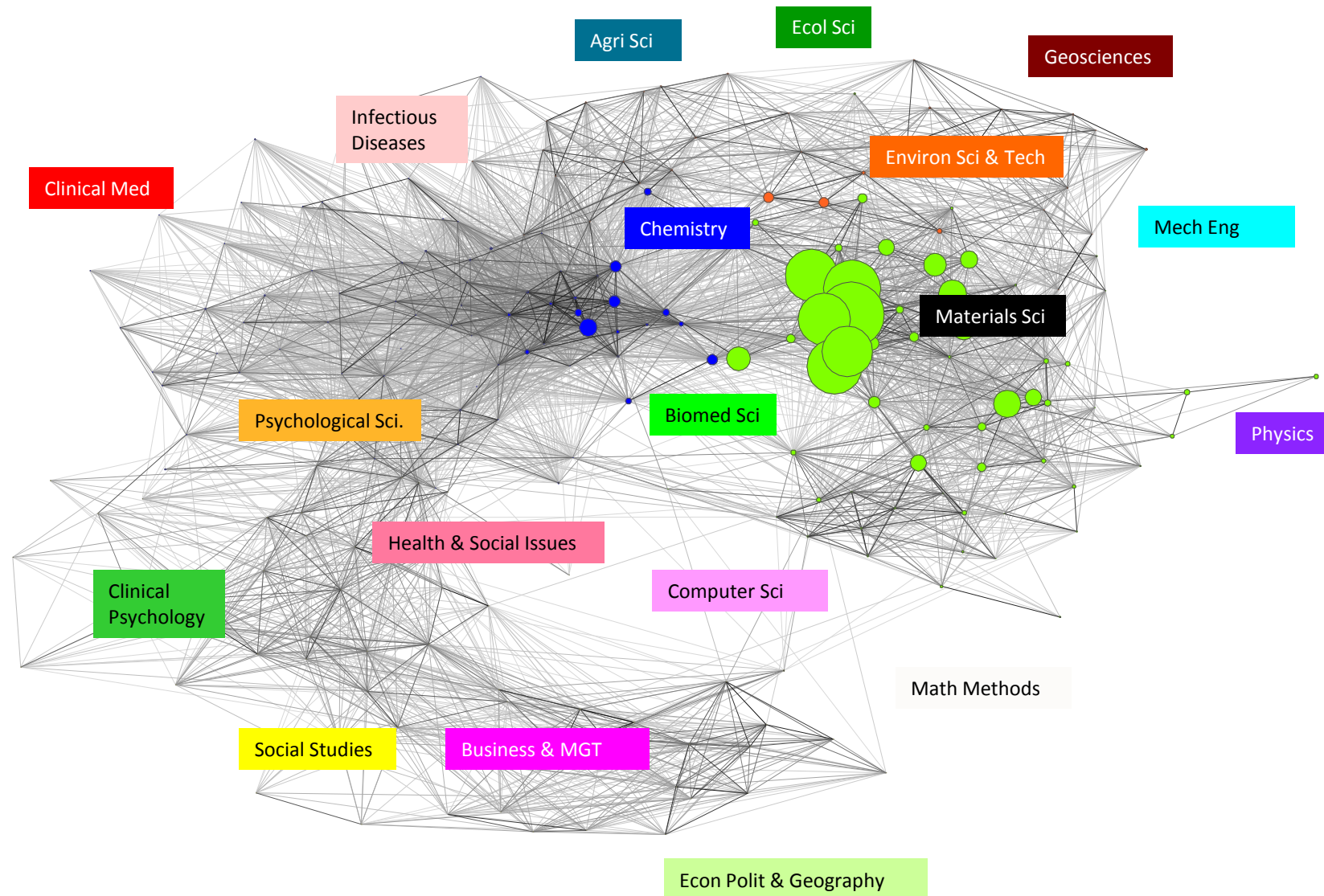
**GT NSF
(2000-2014)**



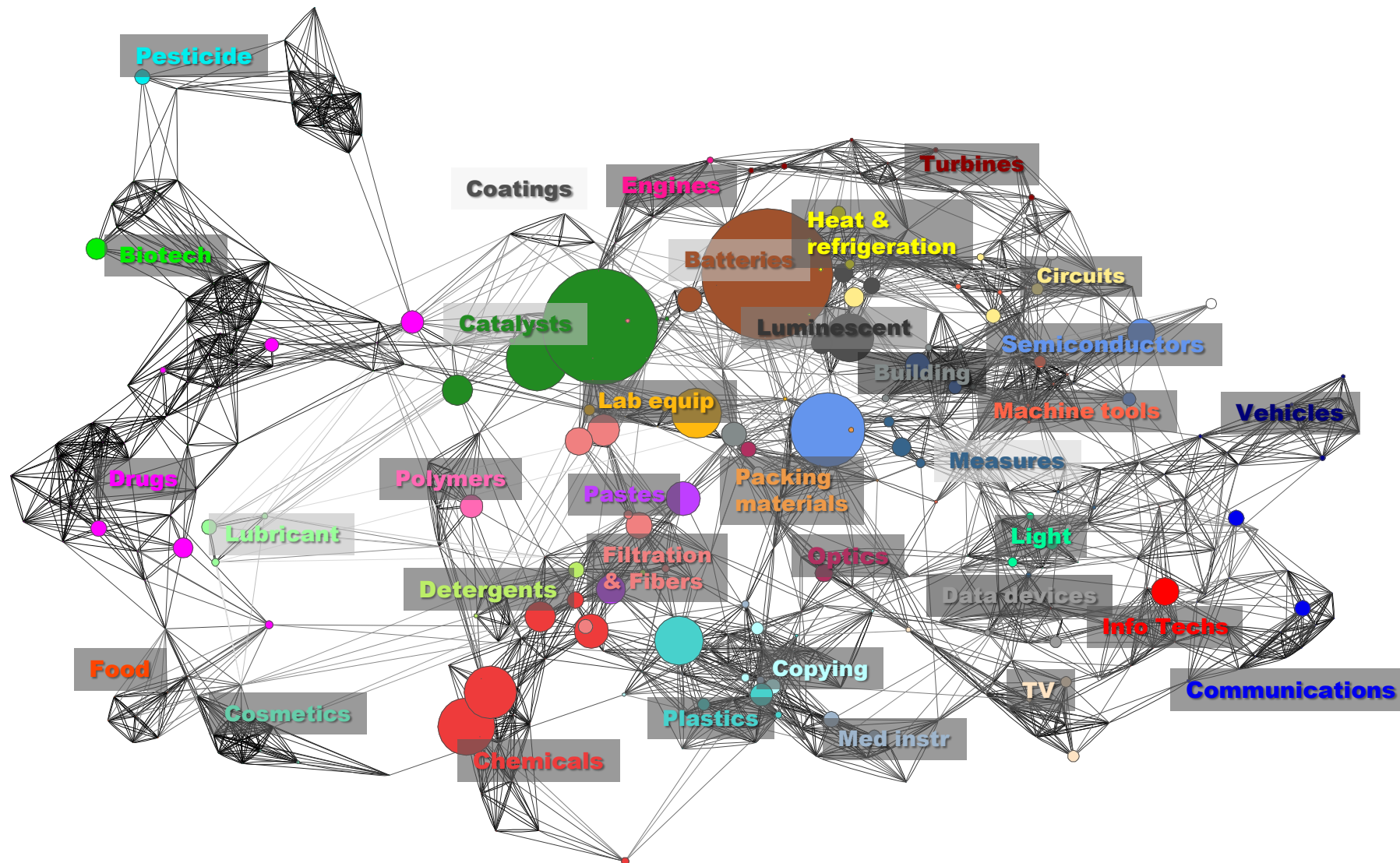
**Harvard NSF
(2000-2014)**



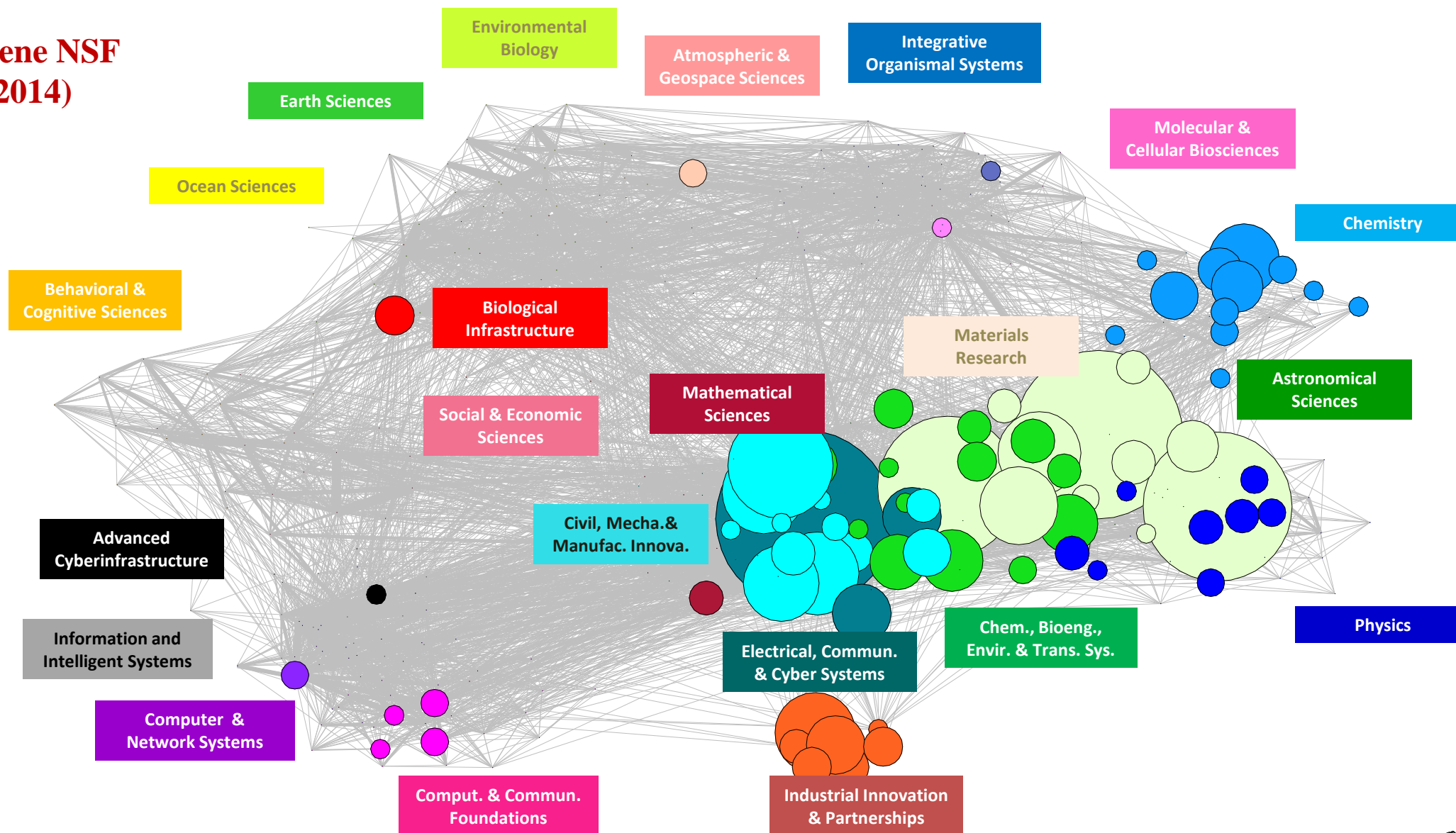
Graphene WoS (2000-2014)



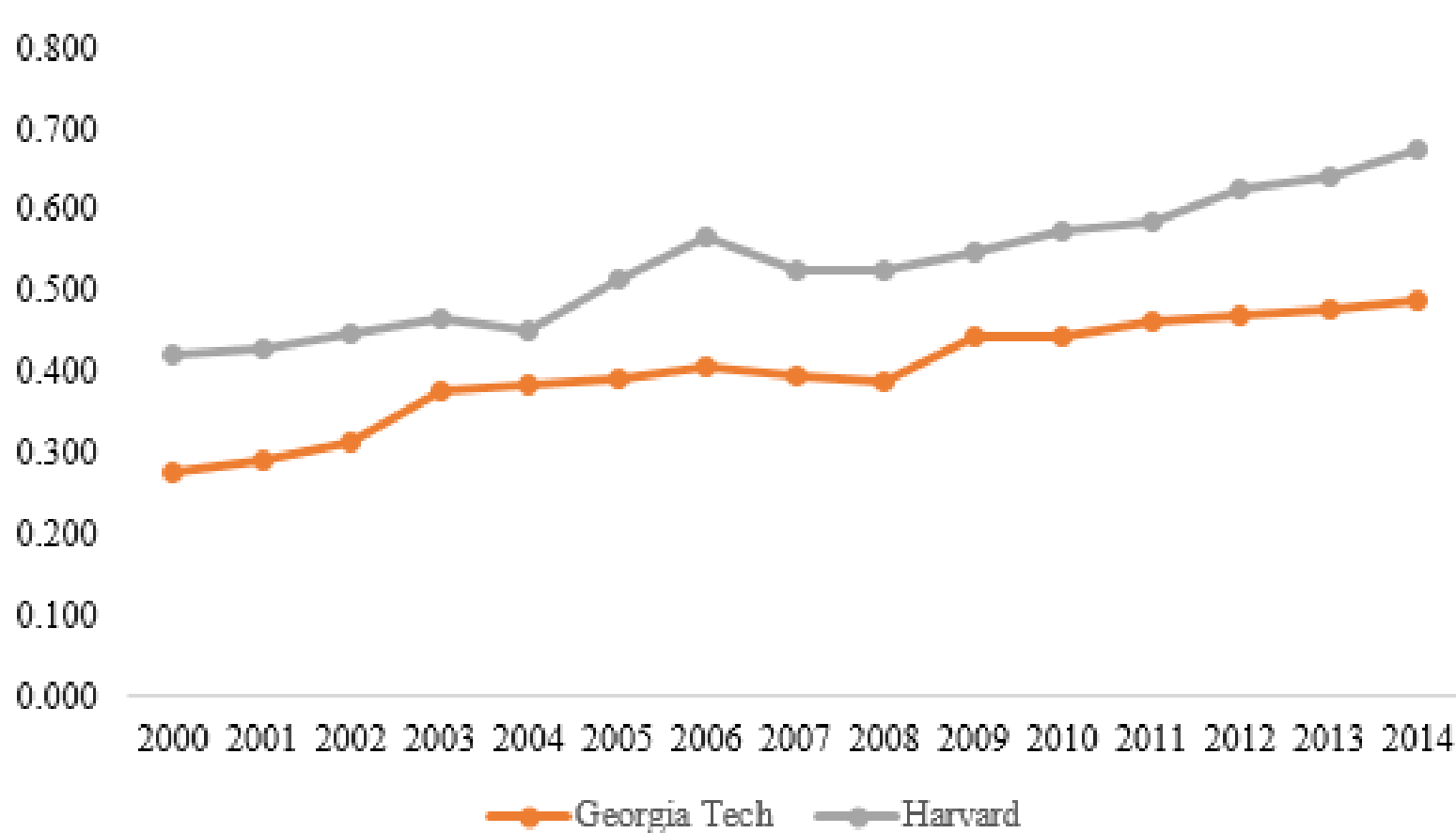
Graphene DII (2000-2014)



Graphene NSF (2000-2014)



Interdisciplinarity: Georgia Tech VS Harvard University



Funding Proposal Overlap Mapping offers some potential advantages:

- ◆ Provides an effective visualization way in showing changes over time, as in distribution of proposals on a given technology;
- ◆ Contrasts the emphases of different research units, including academic institutes and universities;
- ◆ Contributes a new approach to measuring interdisciplinarity;

Funding Proposal Overlap Mapping has some limitations:

- ◆ **Only frequent PECs have been considered to building the co-occurrence network;**
- ◆ **Discipline categories are mainly based on the organization NSF divisions;**
- ◆ **NSF cannot comprehensively reflects the all funding activities.**

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Thanks you for your attention!
Question & Comments

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