Using KOS as a basis for text analytics and trend forecasting

NKOSS **Networked Knowledge Organization Systems and Services**
The 9th European NKOS Workshop at the 14th ECDL Conference, Glasgow, Scotland
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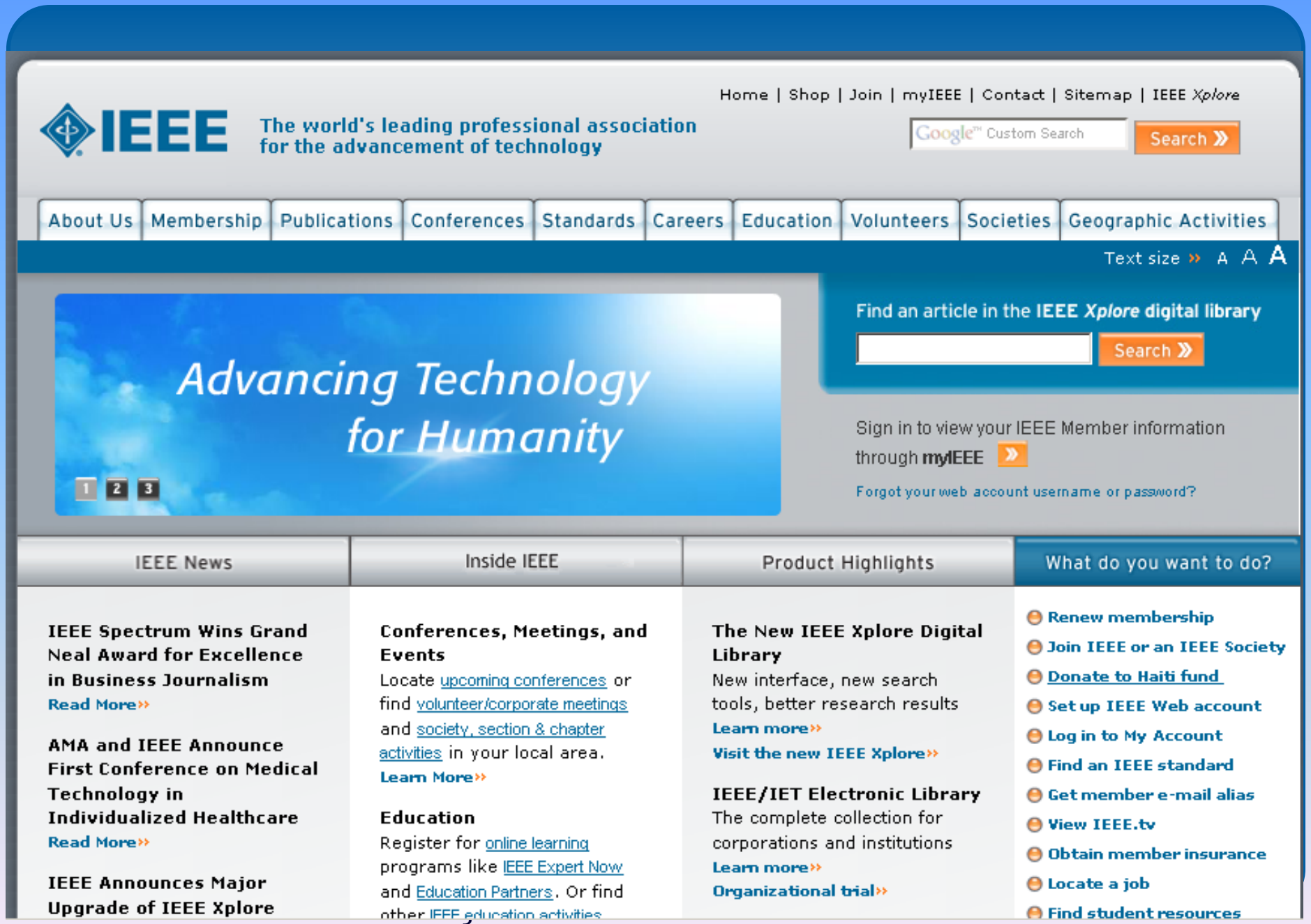
Agenda

- IEEE Challenge
  - Where are our publication strengths?
  - What are the emerging topics?
  - Use our own data to address these question
- Access Innovation's Response
  - Expanding and Mapping the IEEE Thesaurus
  - Use term instead of text analytics to investigate
- Findings



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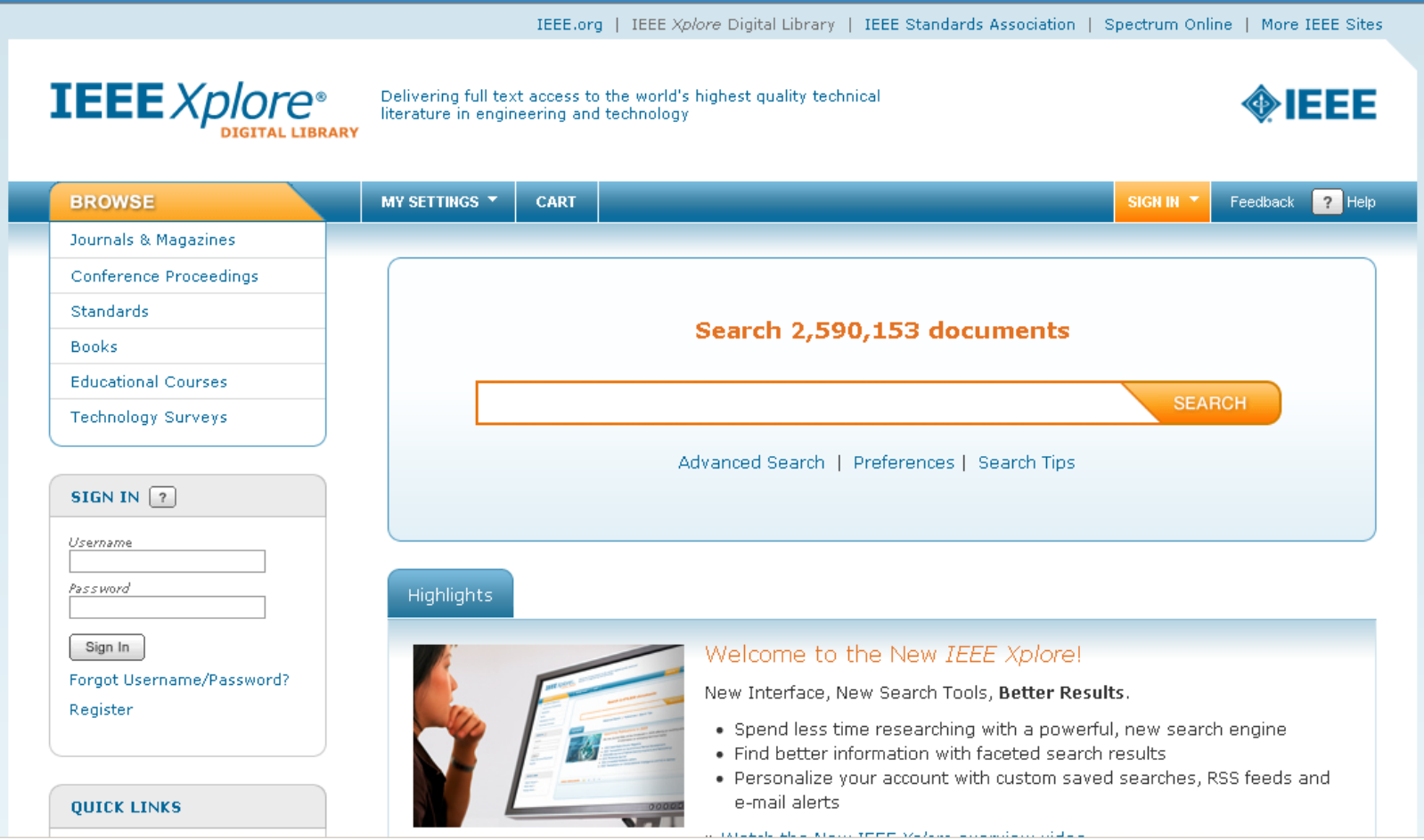
About IEEE…

- Founded in 1884, IEEE is the world's largest professional association advancing technology for the benefit of humanity.
- We publish 148 technical journals, transactions and magazines, sponsor nearly 800 conferences annually, develop technology standards, and support the professional interests of more than 400,000 members in over 160 countries.
- Members participate in 38 societies and 7 councils
- The **IEEE *Xplore*® digital library** provides access to IEEE journals, transactions, letters, magazines and conference proceedings, IET and other 3rd Party journals and conference proceedings, IEEE Standards and IEEE educational courses.
  - Over 2.5 million documents

The *New* IEEE Xplore



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Specific Challenges

- Is there a way, using IEEE information, to forecast future direction?
- Where is the industry headed? What about by technology sector?
- Does our coverage match the IEEE mission and vision?
- Can IEEE become smarter about their data and potential markets using their collection in new ways?
  Are the societies publishing and talking about what their charter indicates they cover?
- What are the trends – are topics emerging/cooling?
- Can IEEE use technology and their own data to explore these questions while enhancing their data?

Access Innovation's Response

- SciTech Strategies' Maps
- Access Innovation's Tools
- IEEE Xplore data
- Test with several thesauri

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Access Innovations / Data Harmony

- Founded in 1978
- Suite of Semantic Enrichment tools
- Updated the IEEE Thesaurus in 2005
- Built a rule base to auto index IEEE content
  - "90 % accuracy out of the box on journal data"*
  - "80% out of the box on proceedings data"*
- Auto indexed 1.2 million Xplore records
  - With the IEEE thesaurus terms rule base
  - With the MeSH rule base
  - With DTIC rule base

*Adam D. Philippidis, Manager, Indexing & Database Production, IEEE

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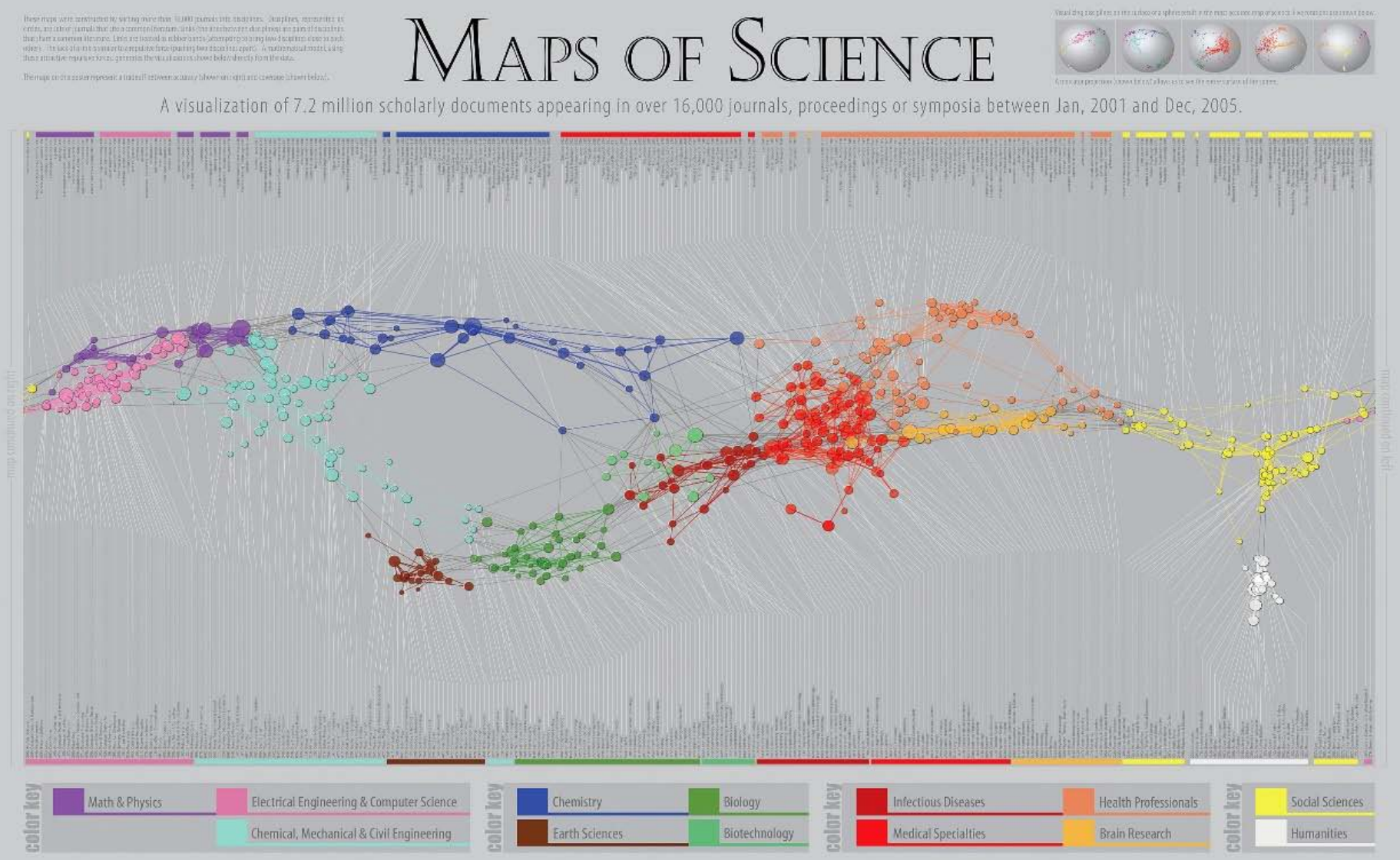
SciTech Strategies, Inc.

- Founded in 1982 (Center for Research Planning)
- Bibliometric Modeling of very large datasets
  - Thomson/ISI data (1982-2004)
  - Elsevier/Scopus data (2004-present)
- Focus on Accuracy
  - Disciplines > Research Communities > Researchers

Disciplinary Map of Science



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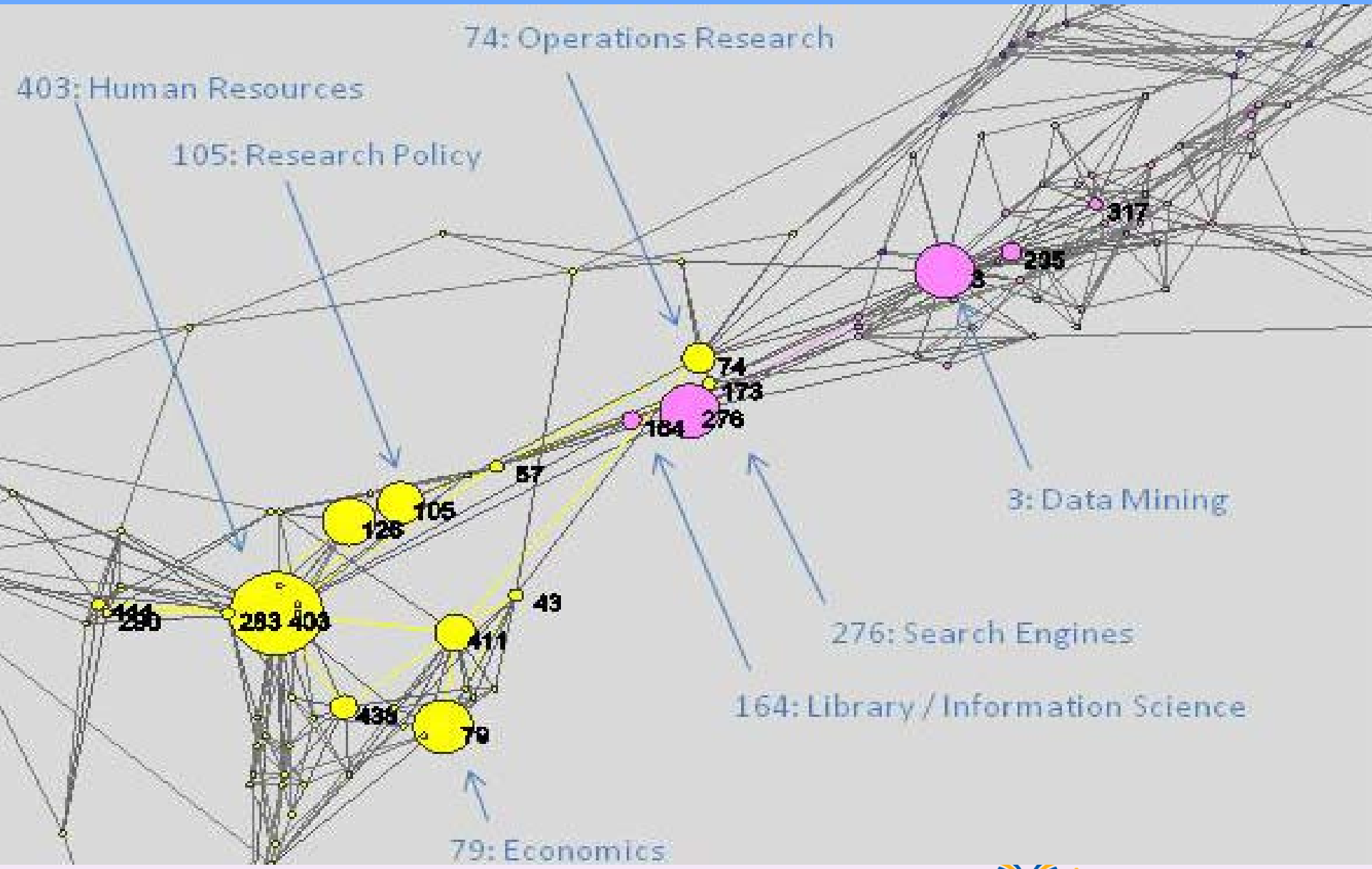
Relevant Disciplines for Science Mapping



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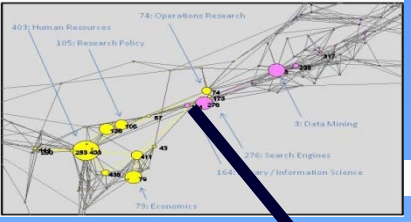
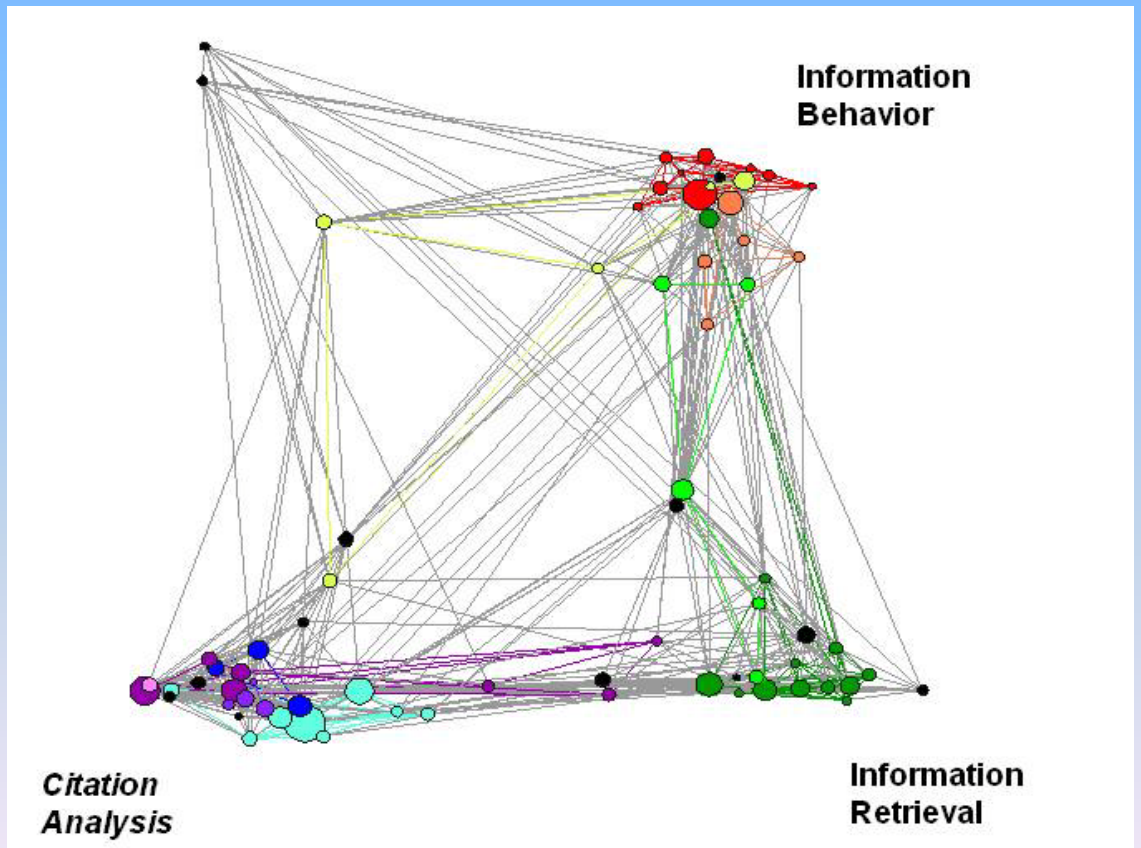
Research Communities in the Information Science Discipline





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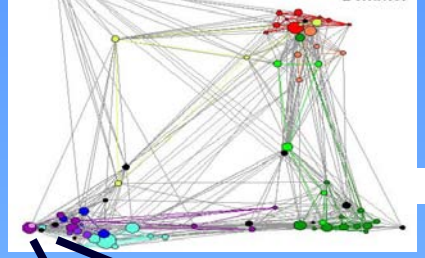
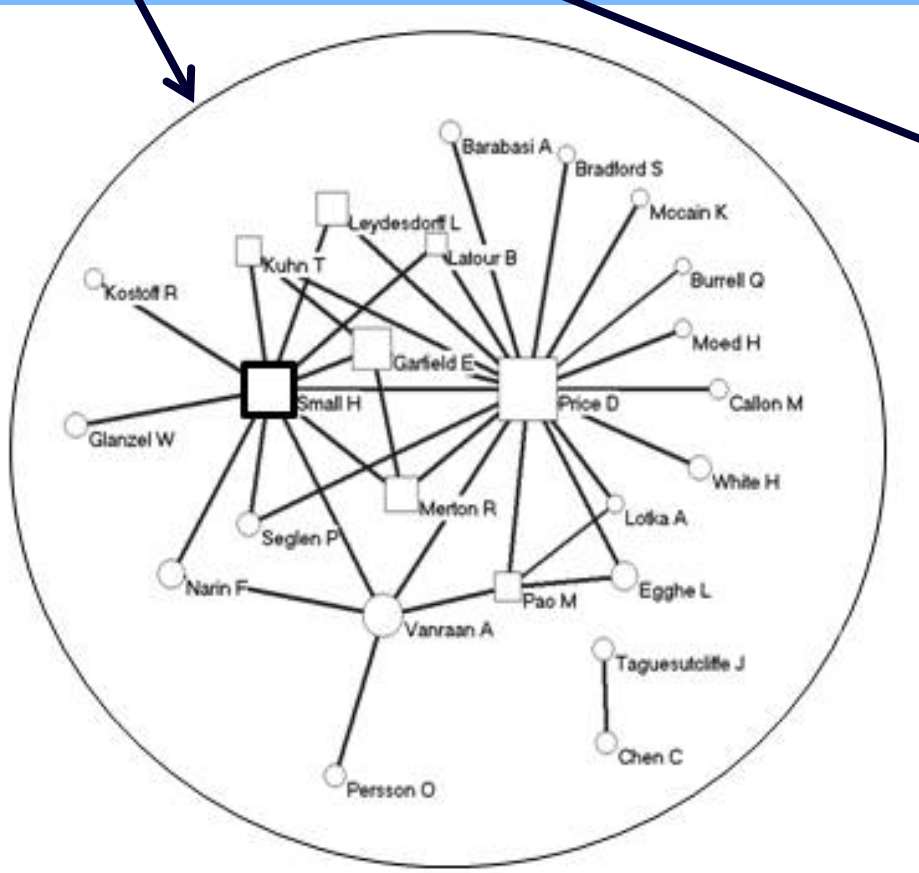
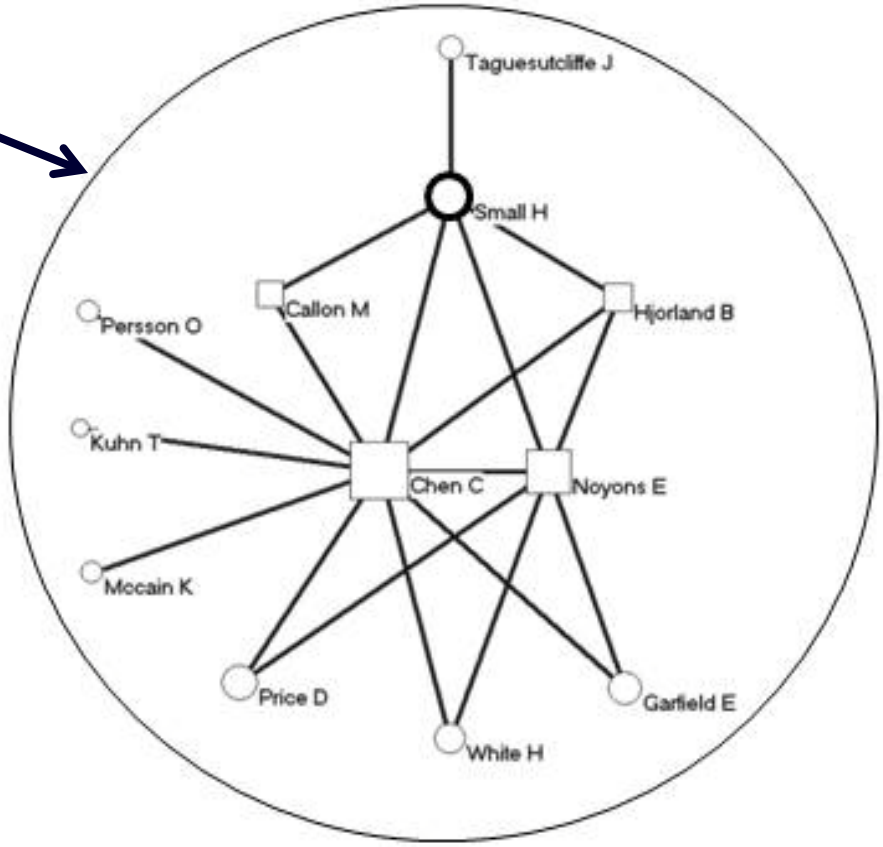
Intellectual Base of Two Research Communiities







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From a society / publisher perspective visual answers

- Which topical areas form our core? Periphery?
- Where is the coverage dense? Thin?
- Which topical areas are most active? Least active?
- Which topical areas seem to be emerging? Declining?
- Which topical areas are interrelated? Isolated?
- What are the overlaps between journals / segments?
- Where are the potential expansion points?

Questions with visual answers

- From a thesaurus perspective
- What terms are too broadly defined?
- How do actual topical relationships differ from the thesaurus structure?

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Preparing the data

- Index 1.2 Million Xplore records
  - Using the IEEE Thesaurus
  - Using the MeSH - Medical Subject Headings
  - Using the DTIC Thesaurus
- Normalize and enrich the XML as needed
- Create an XML / SQL Database

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Mapping IEEE thesaurus space

- We are more interested in an expanded map that includes adjacencies to the IEEE data
  - Expanded term set shows adjacent white space; opportunities for expansion
  - Similar process to that for simple map except …
  - We need additional terms to add

Mapping IEEE thesaurus space

- Criteria for additional terms
  - Low occurrence rate in IEEE documents
  - Linkage to terms in IEEE documents
  - Similar level of detail to current IEEE thesaurus terms
- Where do we find these terms? How can we add them?

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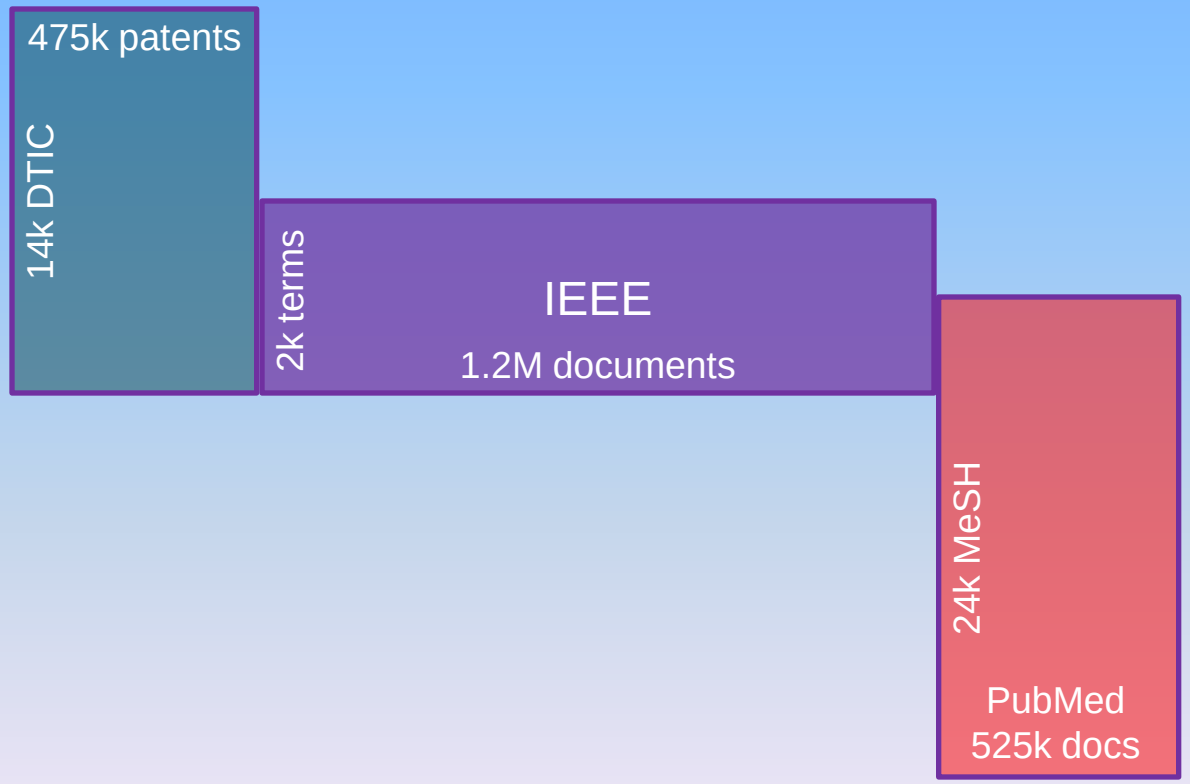
Defining expanded term space

1. Select related corpus'



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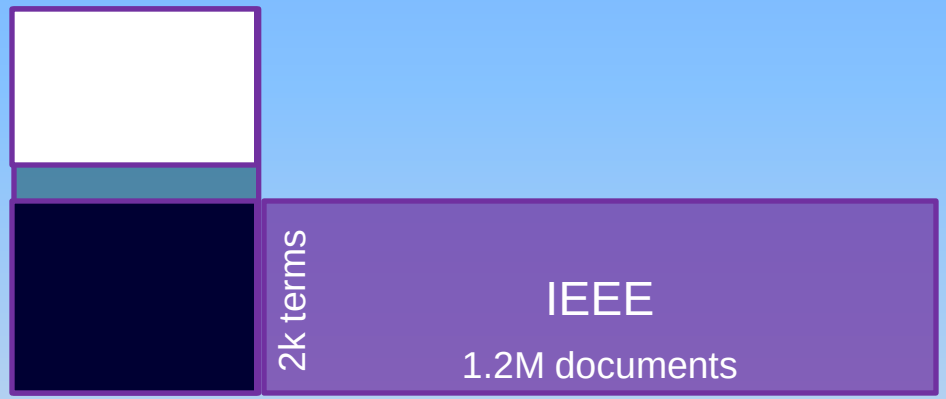
Defining expanded term space

2. Identify related terms



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Defining expanded term space

2. Identify related terms

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Defining expanded term space

3. Resulting term set

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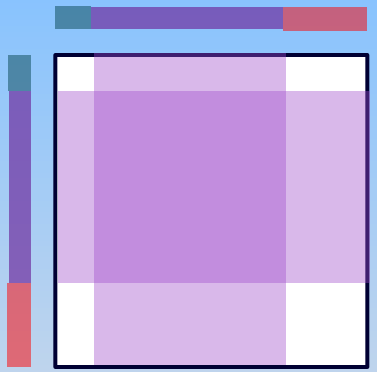
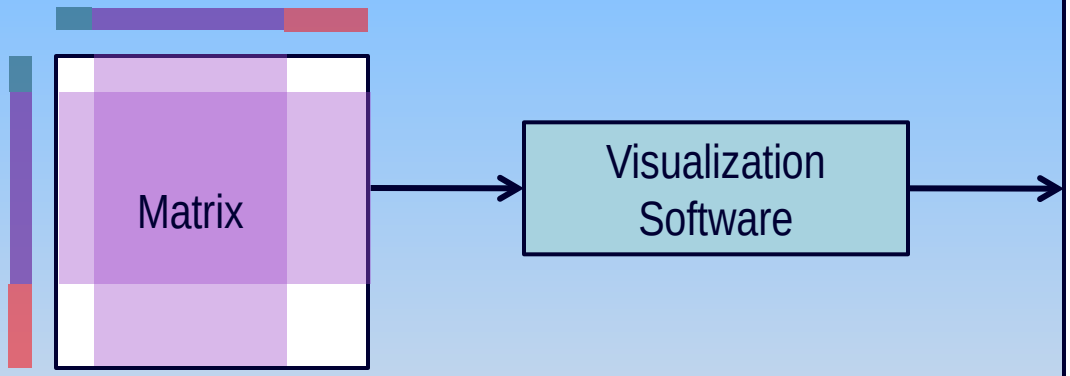
Defining expanded term space

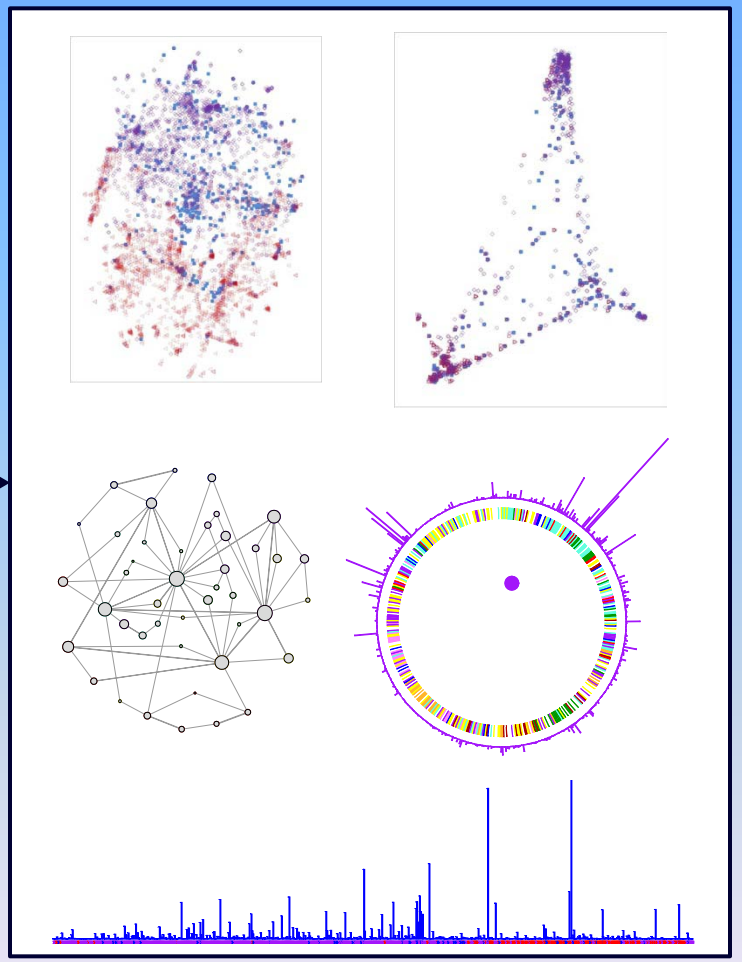
4. Term:Term Matrix



Defining expanded term space

5. Visualization





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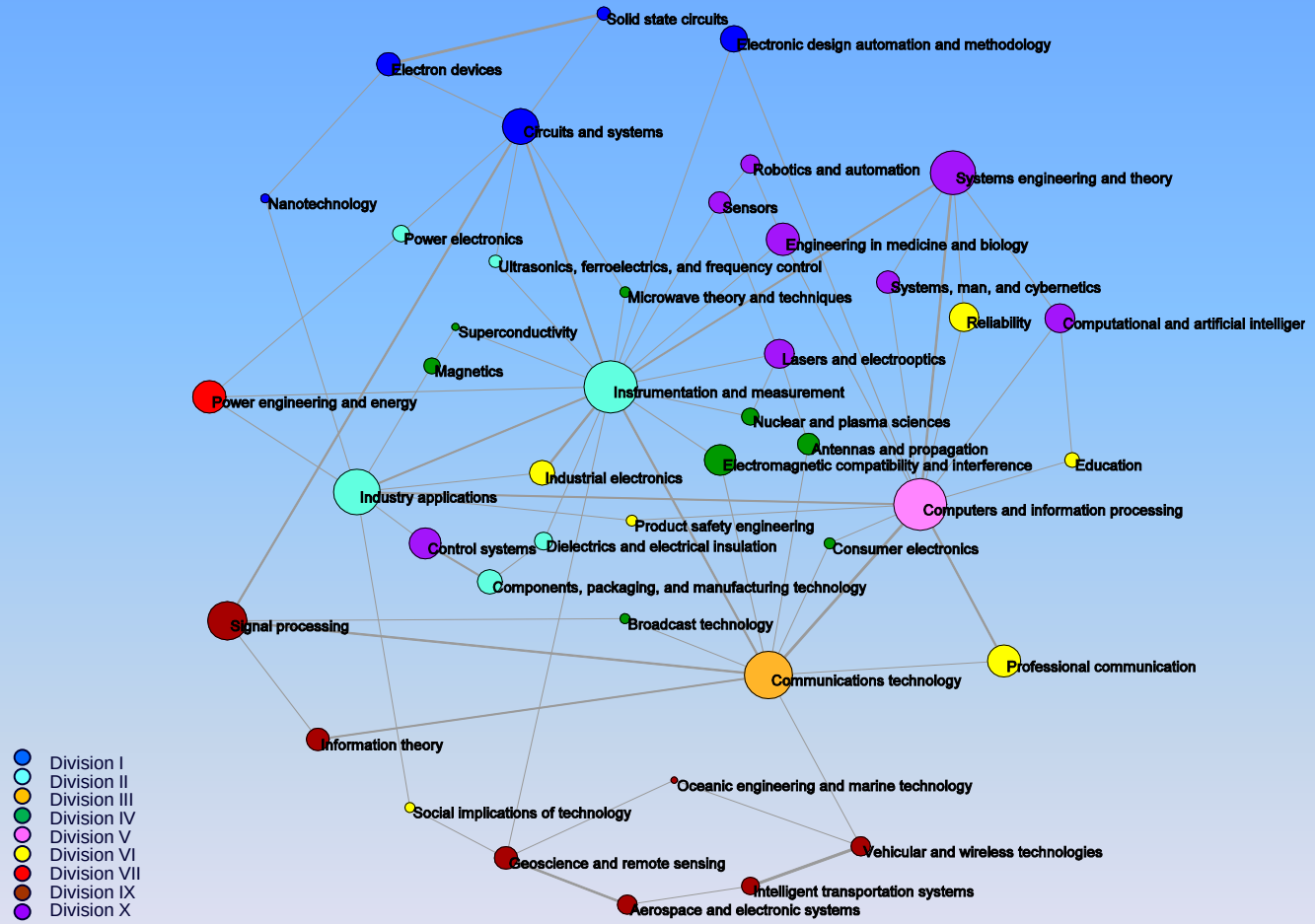
Sample term and data maps



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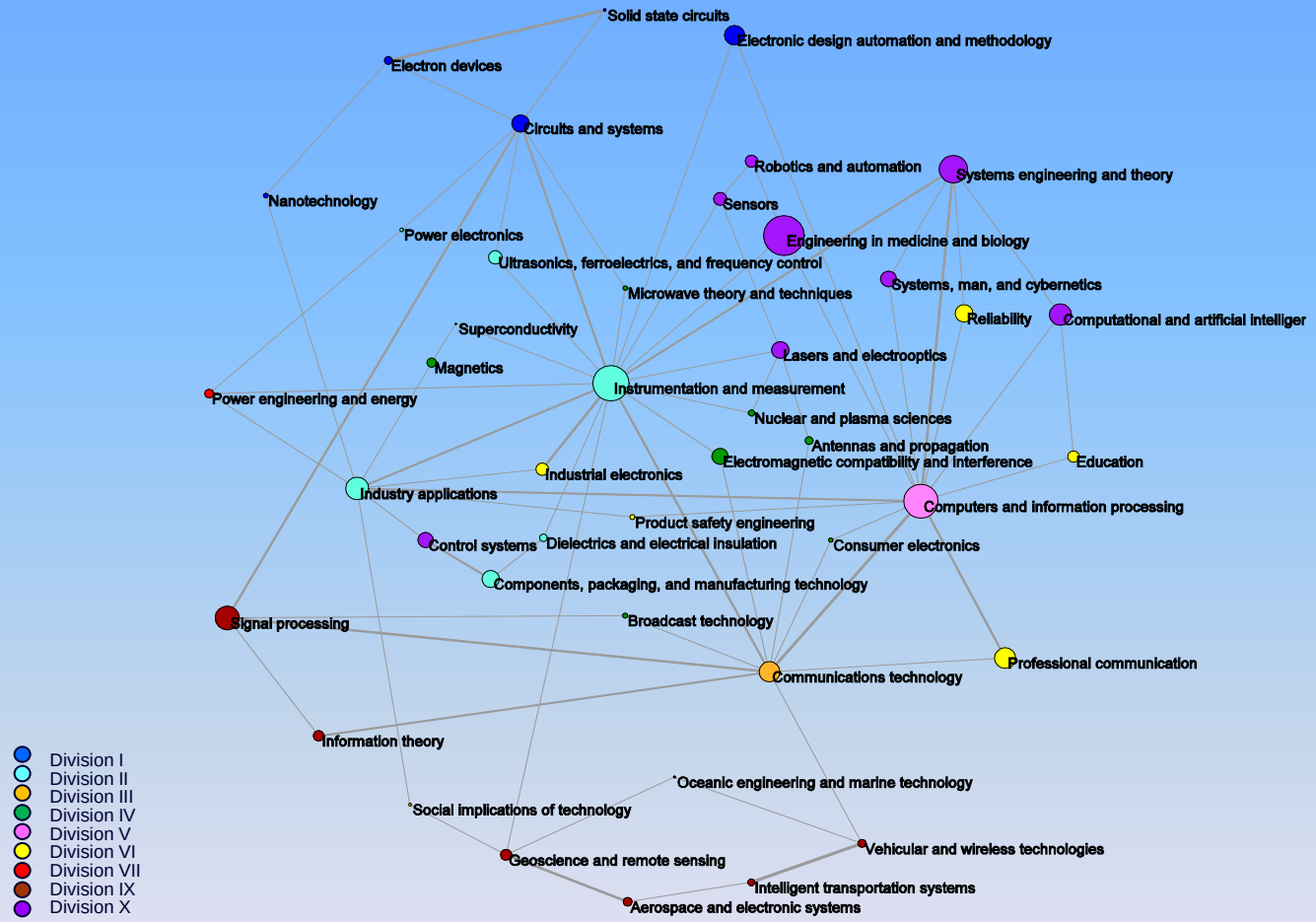
PubMed



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IEEE Transactions on Antennas and Propagation

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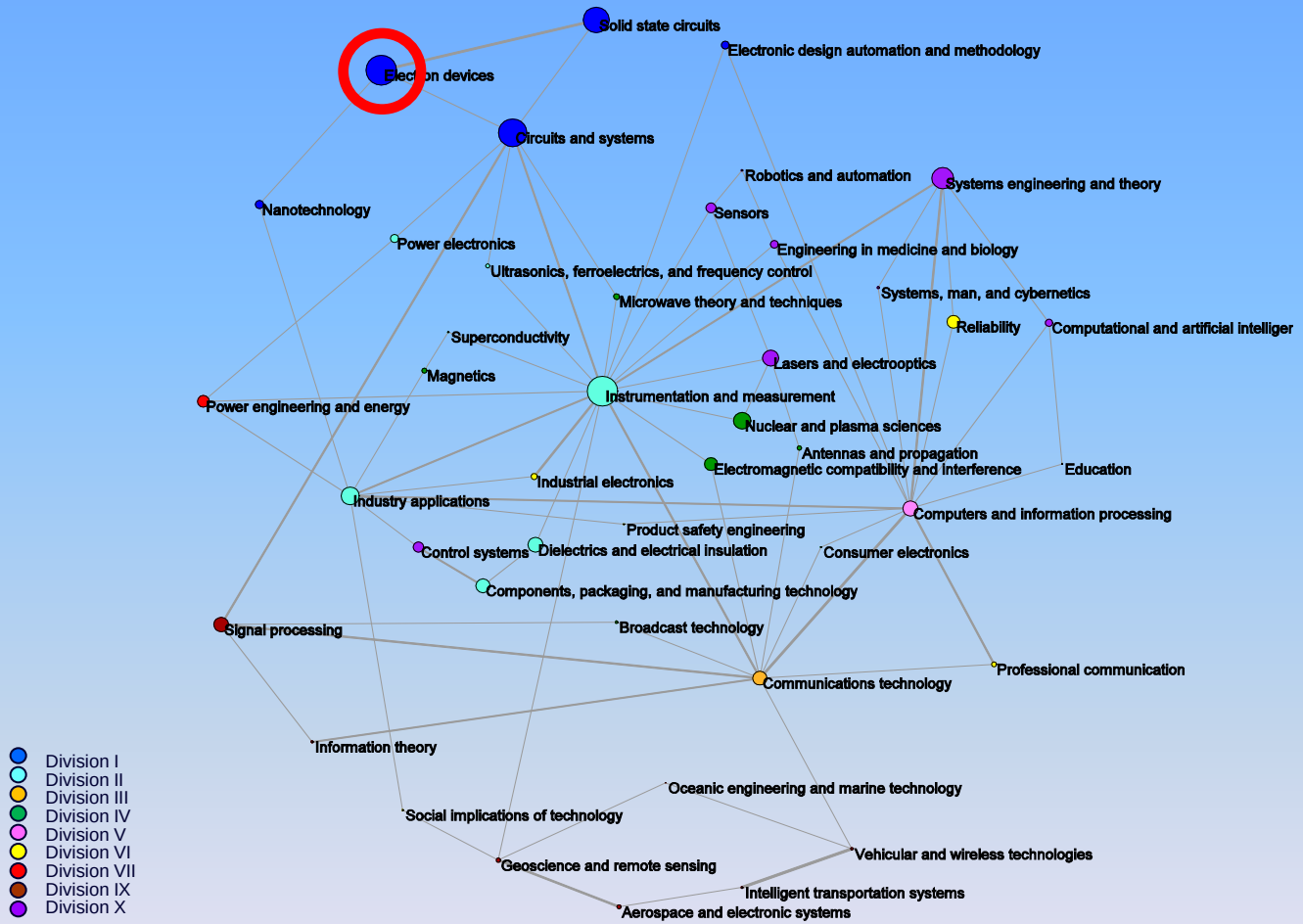
IEEE Transactions on Electron Devices



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Findings

- Term space can be mapped effectively
- The mapped space can be used to show distributions and trends that give answers to questions
  - Database distribution comparisons
  - Journal / segment distribution comparisons (overlaps)
  - Journal / segment trending
  - Identify groups of terms that need trimming (rule base changes)

Answering the IEEE questions

- Yes, we can use IEEE information, to forecast future directions
- Yes, look at each industry by technology sector over time to see where it is headed.
- IEEE coverage does not match the IEEE mission and vision by industry sector
- Provides new ways for IEEE to become smarter about their data and potential markets using their collection
- The societies are not all publishing and talking about what their charter indicates they cover.

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Looking to the future

- We can see specific trends and which topics are emerging/cooling
- Using the IEEE data and these term analytics technology we can explore the future and the boundaries of the IEEE future

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Thank You

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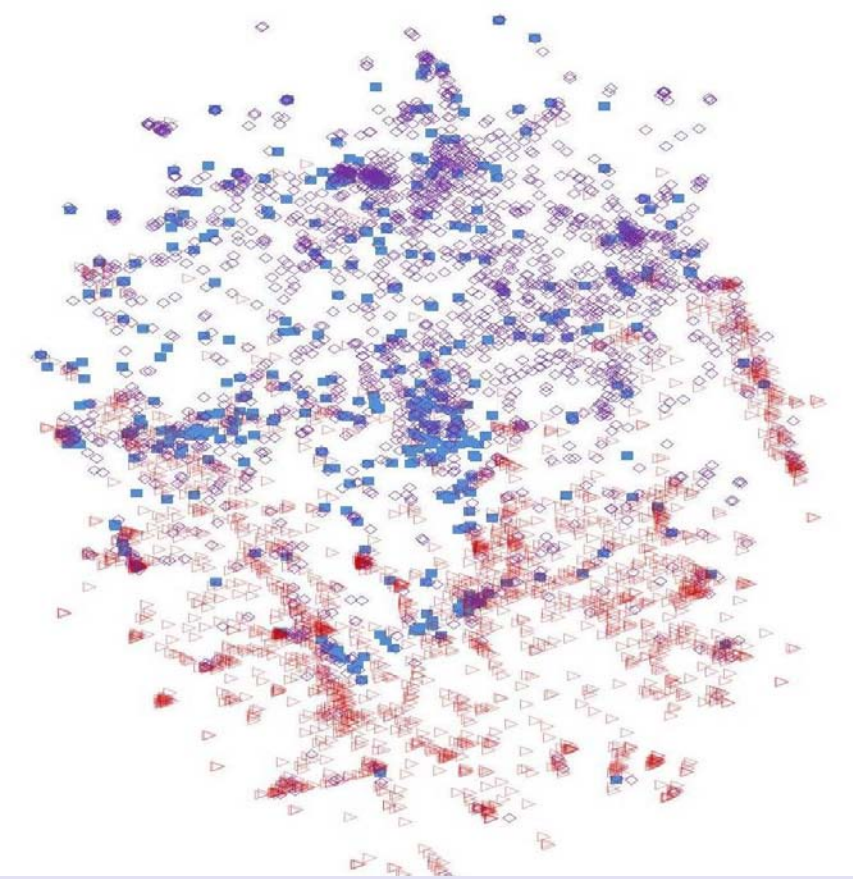
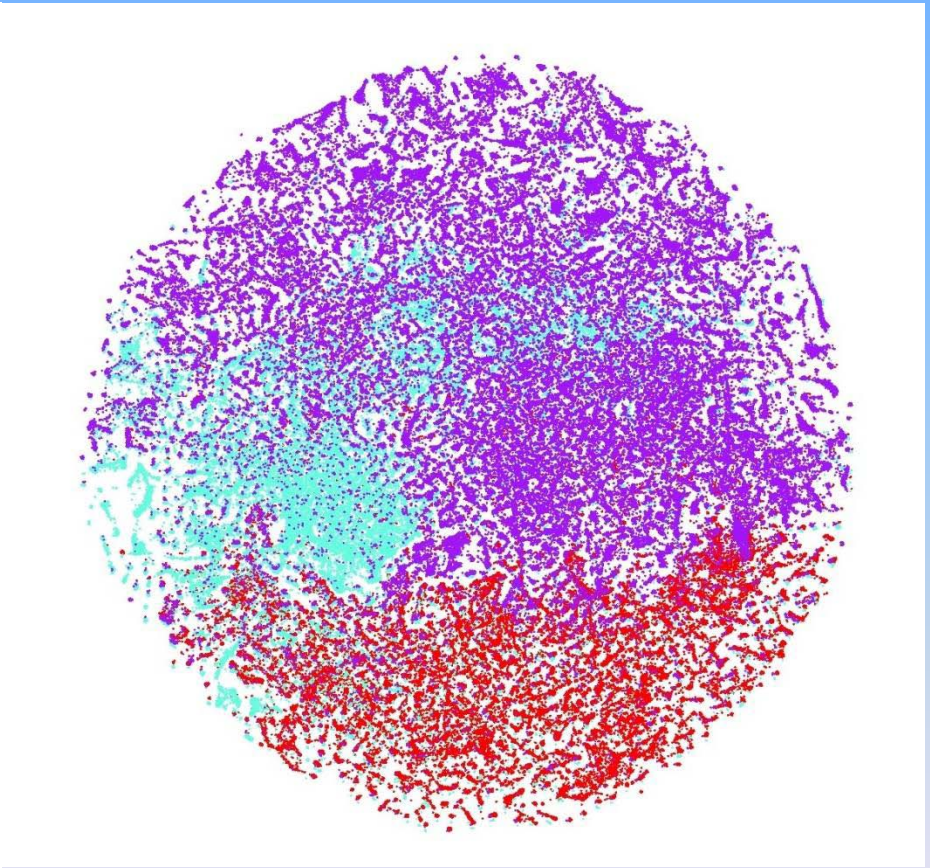
Consensus: Thesaurus vs. Titles

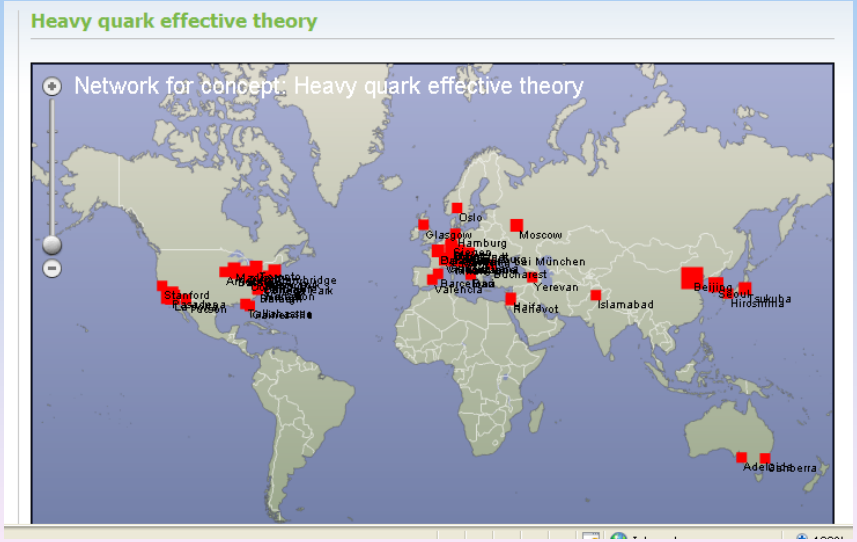




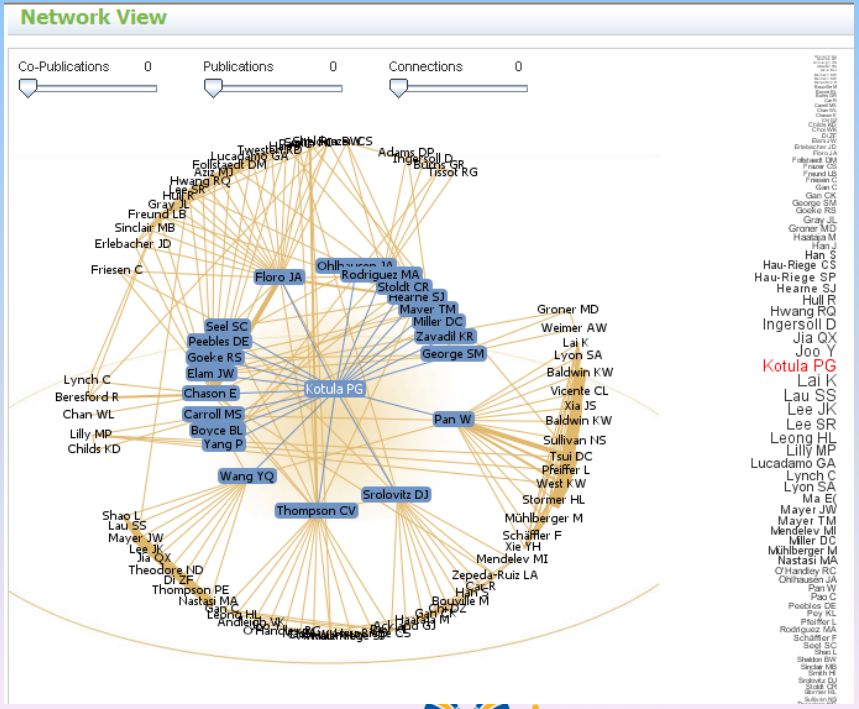
Scientific Social Networking Based on Metadata

- Idea has been here - Who is citing who like
  - ISI does it with references
  - API UniPHY does it using semantics
- Expand your options using
  - good metadata and descriptors

Map who is working in the field and where



See the authors connections



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