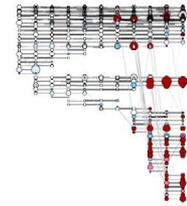
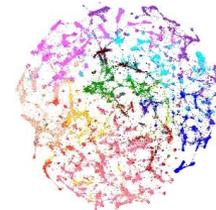


SciTech Strategies, Inc.

BETTER MAPS • BETTER DETECTION



Using Science Mapping to Shape the NIH Research Portfolio

NIH Portfolio Analysis Symposium
Washington, DC
July 24, 2012

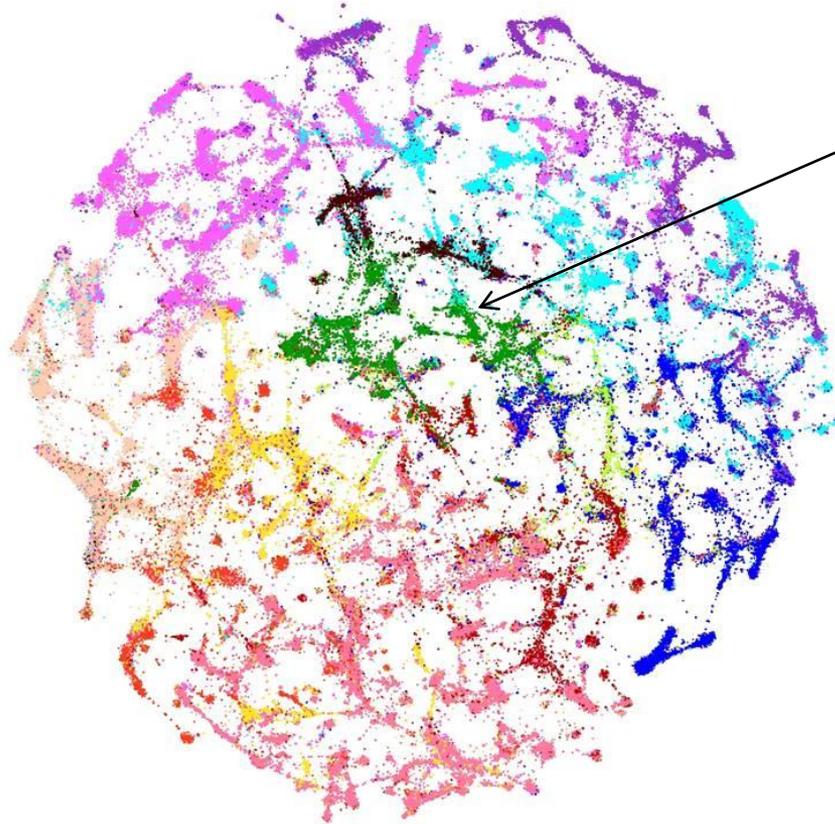
Richard Klavans, SciTech Strategies

Agenda

- Decisions
- Theory
- Measurement
- Results

Decisions

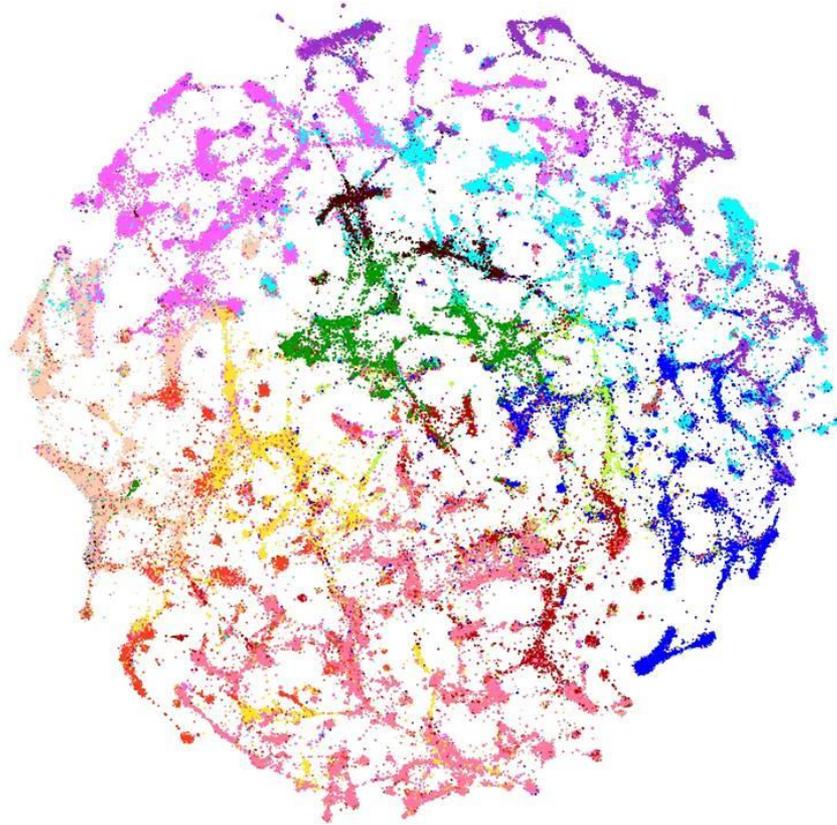
- Each 'dot' on the map represents a coherent research problem



phrases	Nematostella vectensis sea anemone anemone Nematostella Wnt signaling bilateral symmetry cell fate axial patterning stem cells axis formation jellyfish Podocoryne
titles	Kusserow A.: Unexpected Complexity Of The Wnt Gene Family In A Sea Anemone Kortschak R.D.: Est Analysis Of The Cnidarian Acropora Millepora Reveals Extensive Wnt Signaling Miller J.R.: The Wnts Finnerty J.R.: Origins Of Bilateral Symmetry: Hox And Dpp Expression In A Sea Anemone Technau U.: Maintenance Of Ancestral Complexity And Non-Metazoan Genes
authors	Martindale M.Q. (University of Hawaii) Matus D.Q. (Duke University) Schmid V. (University of Basel) Plickert G. (University of Cologne) Frank U. (National University of Ireland, Galway)

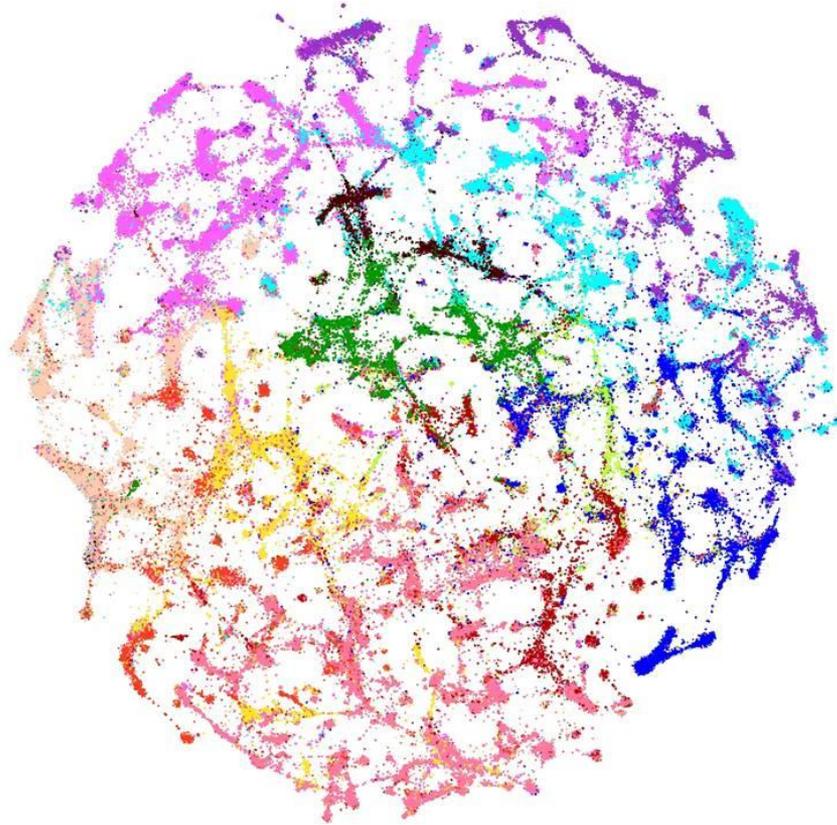
Decisions

- From the Scientist's Perspective
 - » What problem can I work on?
 - » What problems do I want to work on?



Decisions

- From the Funder's Perspective
 - » What are the results from problems that I have funded?
 - » What problems do I want to fund in the future?



Theory

- (Corporate) Portfolio Analysis
 - » History: GE > Harvard > SPI > Major Consulting Firms
- Shumpeterian Theory of Technological Innovation
 - » History: Pareto Circle > Innovation & Entrepreneurship Studies
- Science Policy
 - » History: Kuhn > Latour > theoretical fragmentation
 - » History: Price/Garfield > Web > Open Source > Full Text

Theory: Novelty is Critical

- (Corporate) Portfolio Analysis
 - » Novelty = Emerging Opportunities (or Threats)
- Innovation
 - » Novelty = Innovation
- Entrepreneurship
 - » Novelty = Risk Taking by Entrepreneurs & Venture Capitalists
- Science Policy
 - » Novelty (Kuhnian) = Paradigm Shifts
 - » Novelty (Latourian/Social Construction) = Controversy
 - » Novelty (Garfield/Information Science) = New Literature Category
 - » Novelty (Price/Network Theory) = Structural Holes

Measurement

Strategy

Local Global

Databases

Partition Concept

Problem Community Discipline

Partition Size

Log₁₀ SIZE

Linkages

Distance Measures

Clustering Methods

Temporal Pattern

Visualization

Accuracy

Precision **78.3**

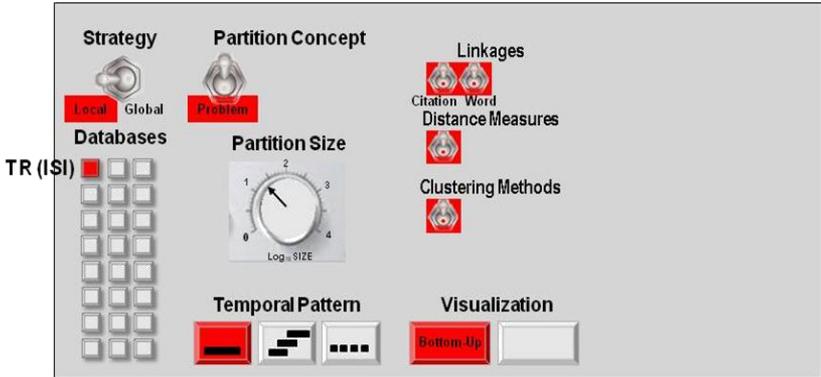
Recall **85.3**

Coherence (A) **65.8**

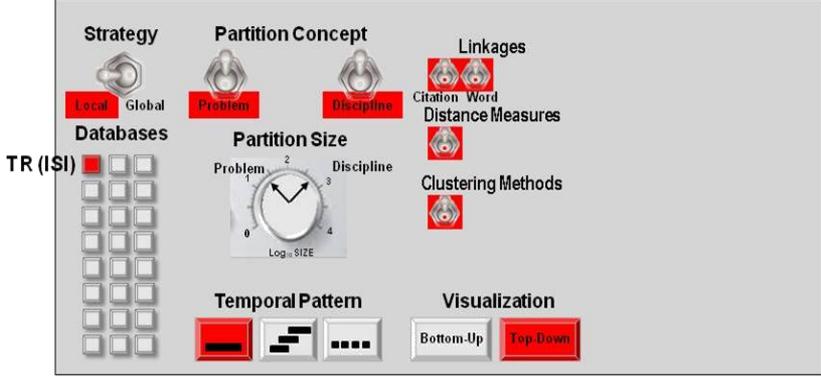
Coherence (B)

Measurement

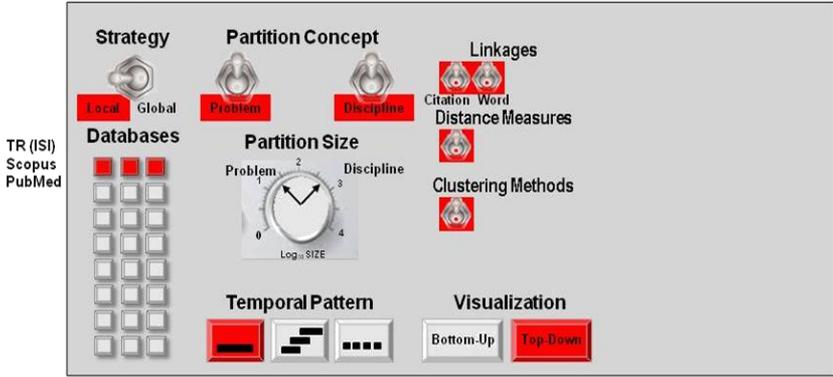
Chaomei Chen



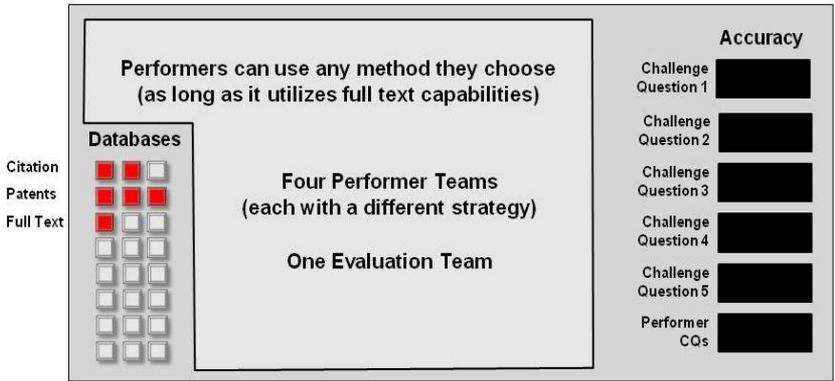
Interdisciplinarity (Porter)



Sci2 (Börner)



FUSE



Settings for the 2000-2010 Science Model

Strategy
Local **Global**

Partition Concept
Problem Community Discipline

Linkages

Distance Measures

Clustering Methods

Accuracy
Precision
Recall
Coherence (A)
Coherence (B)

Databases
Scopus

Partition Size
Log₁₀ SIZE
0 1 2 3 4

Temporal Pattern

Settings for the 2010 Top 20 PTRs

Strategy

Local **Global**

Partition Concept

Problem Community Discipline

Linkages

Distance Measures

Clustering Methods

Temporal Pattern

Databases

Scopus

Partition Size

Log₁₀ SIZE

0 1 2 3 4

Accuracy

Precision **78.3**

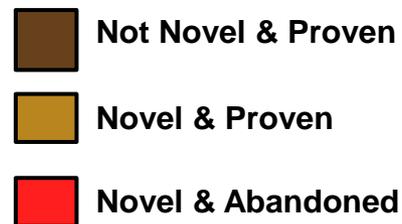
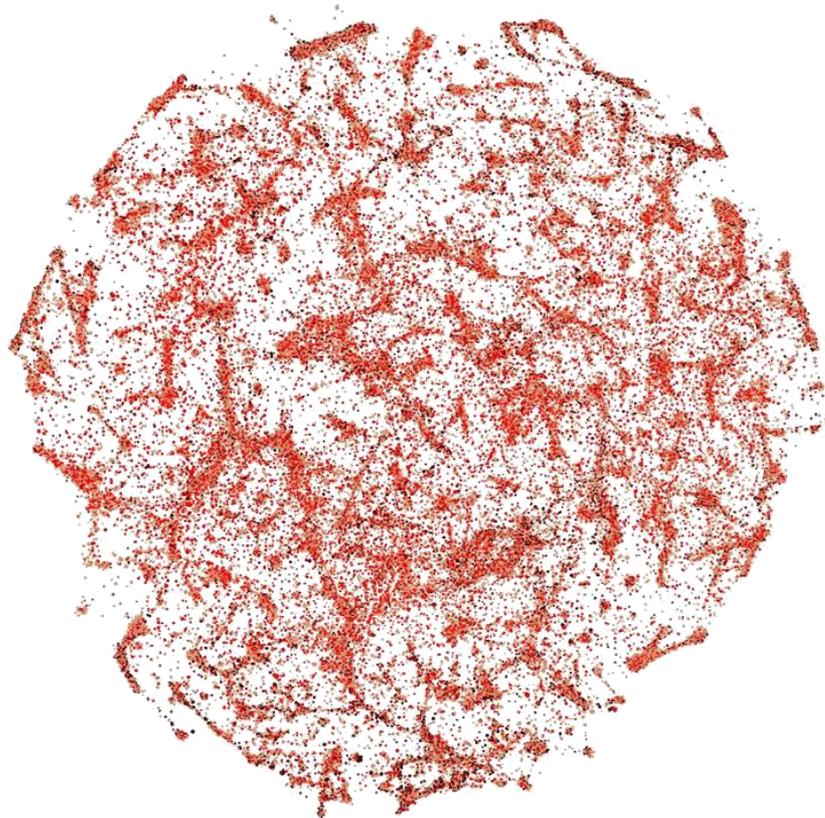
Recall **85.3**

Coherence (A) **65.8**

Coherence (B)

Results

- Survey of 10 Program Managers (NIH & NSF)
 - » Which problems were 'hot' (versus cold in the 2000-2008 time period)?

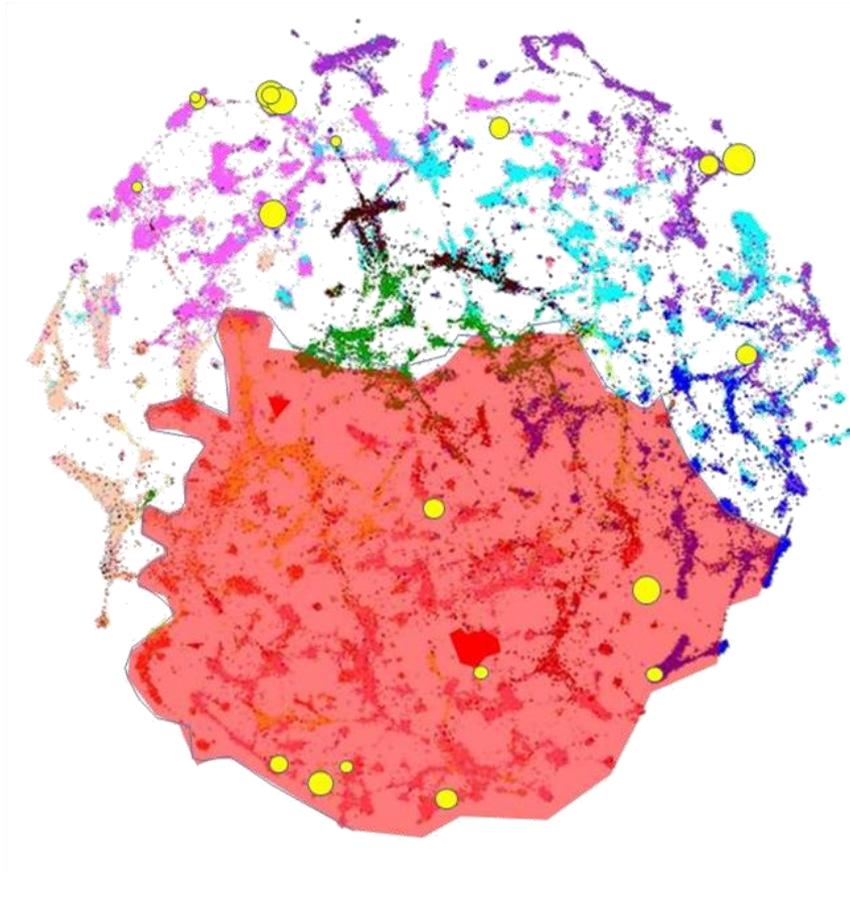


Survey Results

	Cold	Avg.	Hot
Not Novel & Proven	33	34	22
Novel & Proven	38	57	74
Novel & Abandoned	32	18	28

Results

- Current Shape of the NIH Portfolio
 - » What large set of related problems are linked to NIH grants
 - » Where are the top 20 Potentially Transformative Research Opportunities



Results

Additional 'Results' Slides will be presented

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Thank you!
