

# Recommending Intra-Institutional Scientific Collaboration through Coauthorship Network Visualization

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Computational Scientometrics: Theory and Applications  
CIKM 2013



# Agenda

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- Scientific Collaboration
- Best practices
- Potential Collaboration Index (PCI)
- Scientific Collaboration Diagram
- Case Study
- Results
- Conclusions
- Future Work

- **Researchers**

- Identifying colleagues with similar or complementary expertise to improve or foster a research.

- **Institution**

- knowledge transfer from experienced to new researchers.
- Having a robust scientific network.
- Allocating resources in strategic research areas.

# Scientific Collaboration best-practices

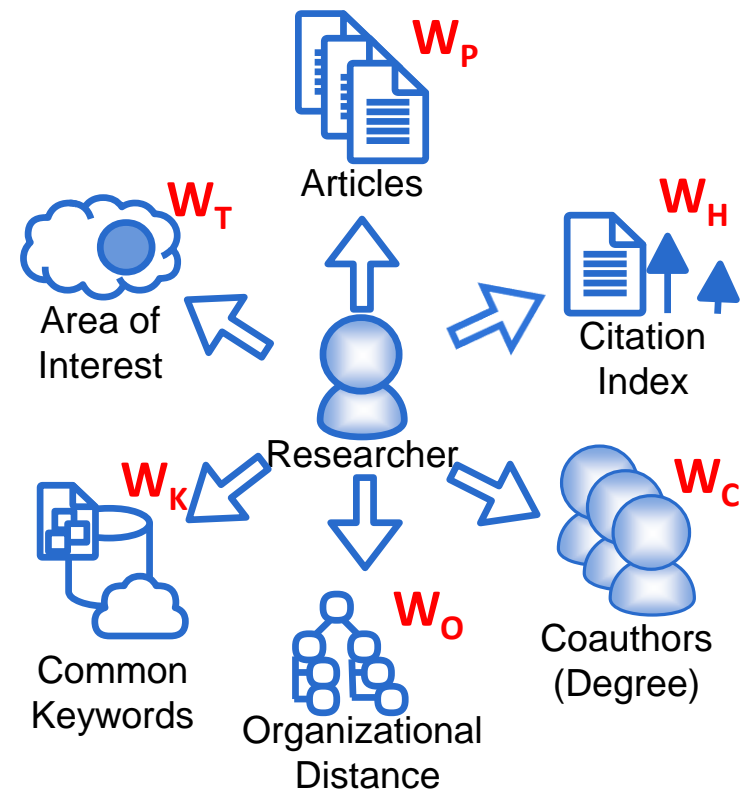
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- **Join to groups**
- **Expand your collaboration network**
- **Look for popular and prestigious partners**
- **Rank your choices**
- **Keep in touch with former collaborators**
- **Close triangles**
- **Choose close collaborators**

# Potential Collaboration Index (PCI)

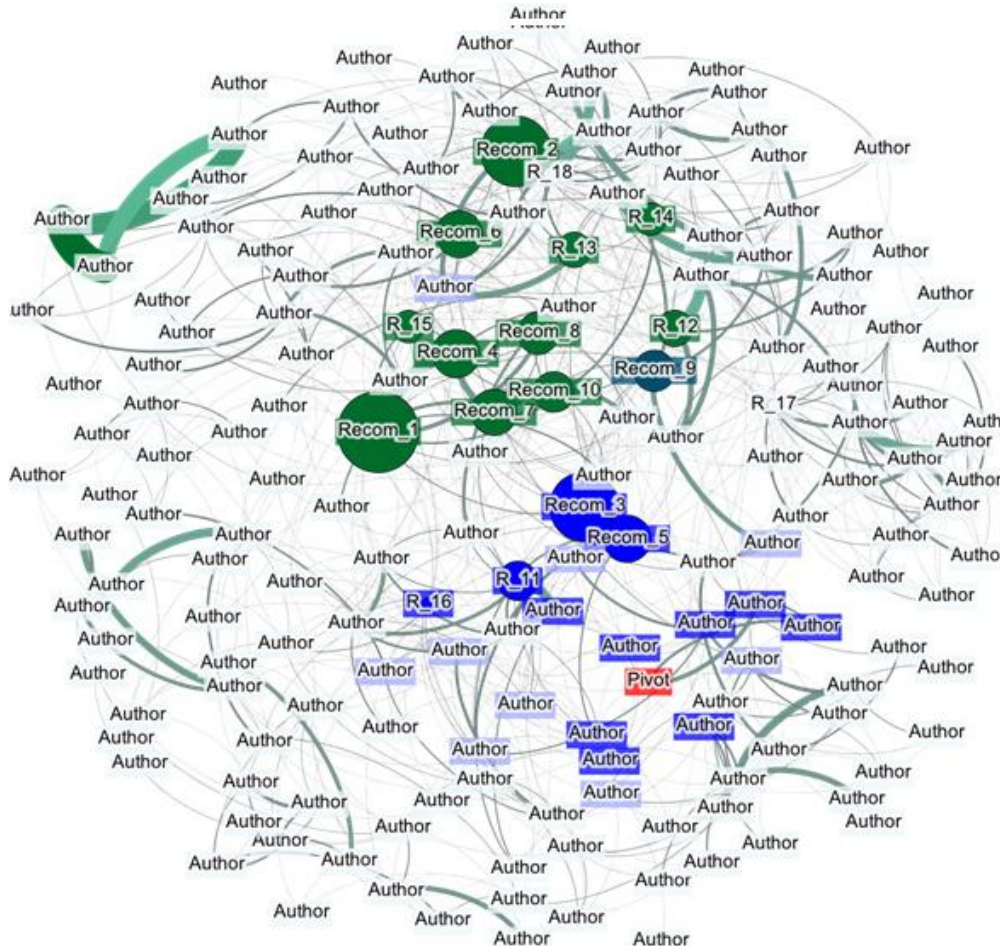
$$PCI = (0.2 \cdot W_C + 0.2 \cdot W_P + 0.2 \cdot W_H + 0.2 \cdot W_K + 0.2 \cdot W_O) \cdot W_T$$

- Co-authorship network
- SNA metrics: Degree
- Calculate  $W_O$ ,  $W_K$  and  $W_T$  between each node pair.





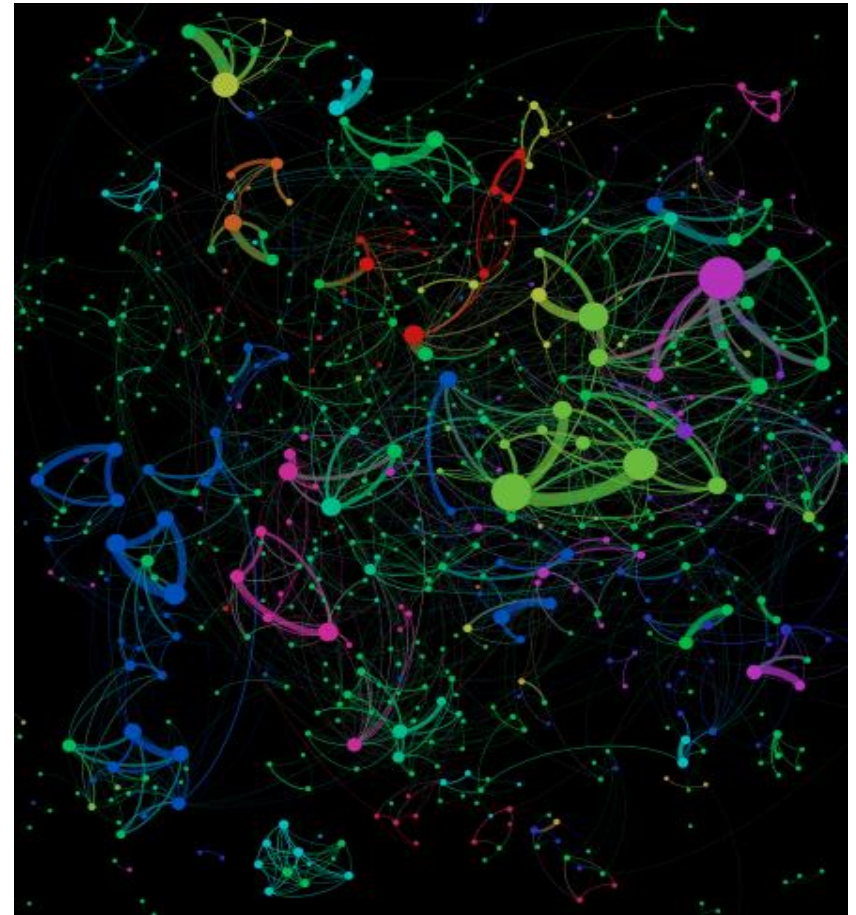
# Scientific Collaboration Diagram



- Pivot researcher
- Direct and indirect collaborators
- Node size ranked by PCI.
- Edge size indicates collaboration strength.
- Top 200 PCI researchers plotted

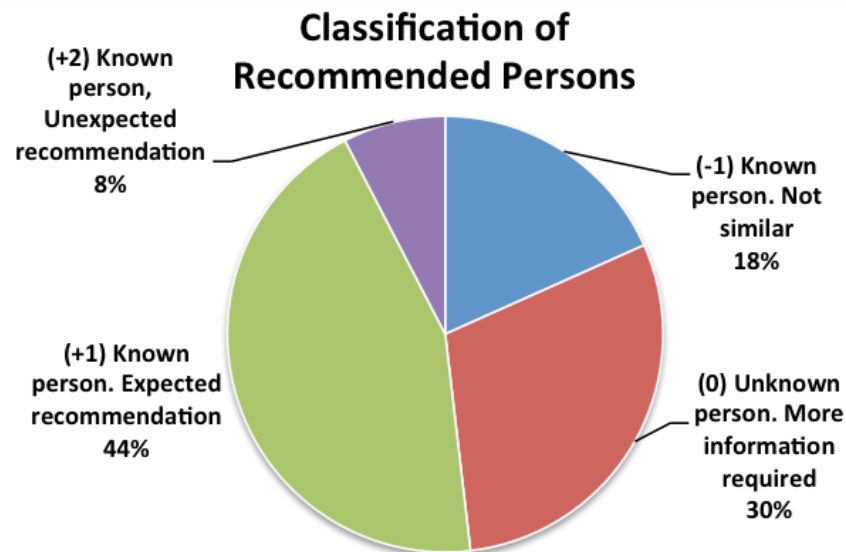
# Case Study at Tecnológico de Monterrey

- 926 researchers
- 124 research groups
- 15 strategic areas
- 7 campuses
- Coauthorship in Books, Chapters, Articles, and InProceedings.



Coauthorship Network colored by area

- **27 interviews**
  - 19 (very) useful.
  - 5 regular.
  - 3 not useful
- **Feedback**
  - Top 18 recommendations
  - List of expected colleagues



Selection	Avg. Relevant Persons (+2)	Avg. Listed Expected Persons	Avg. Precision	Avg. Recall	F-measure on Avg. Precision and Avg Recall
Top 3	20.0%	13.0%	0.538	0.219	0.311
Top 10	18.9%	18.9%	0.404	0.459	0.430
Top 18	7.6%	32.5%	0.336	0.665	0.446





# Conclusions

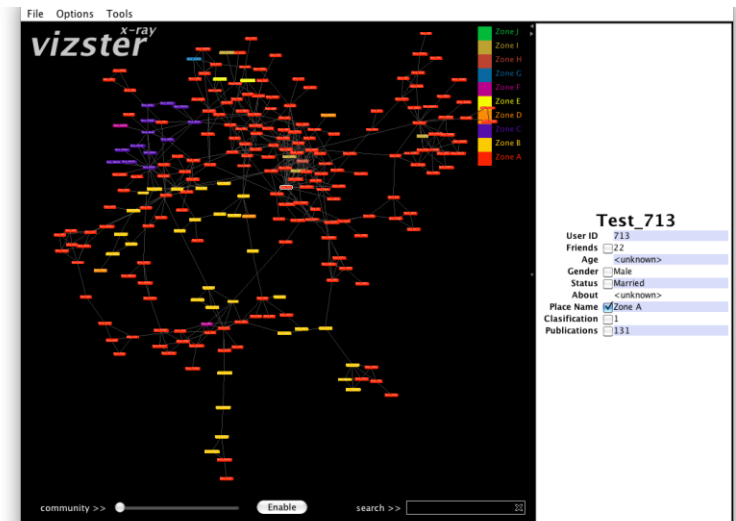
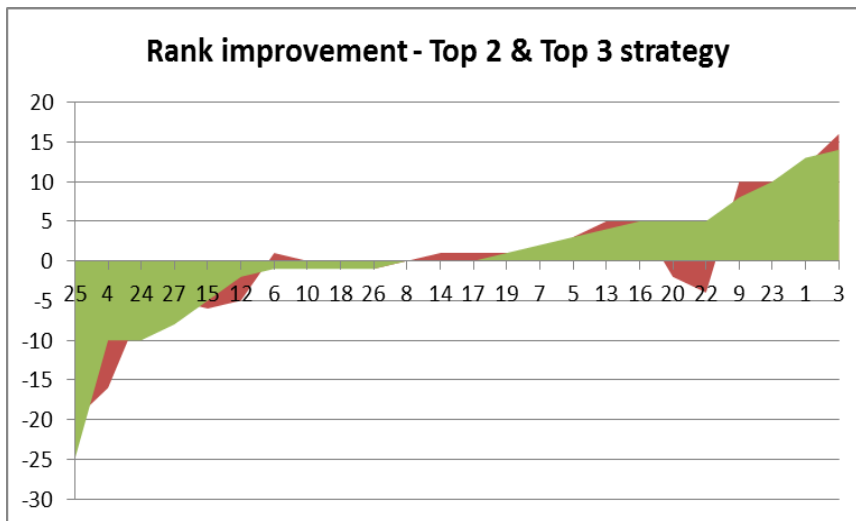
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- The PCI makes visual recommendation manageable in large networks.
- Most of the researchers considered the diagram useful.
- Top 18 recommendations: 52% good, 18% bad
  - 30% of the recommendations could not be classified due to lack of information.
- Main drawbacks
  - looking for complementary/specific expertise
  - relationships not considered (e.g. thesis committees).

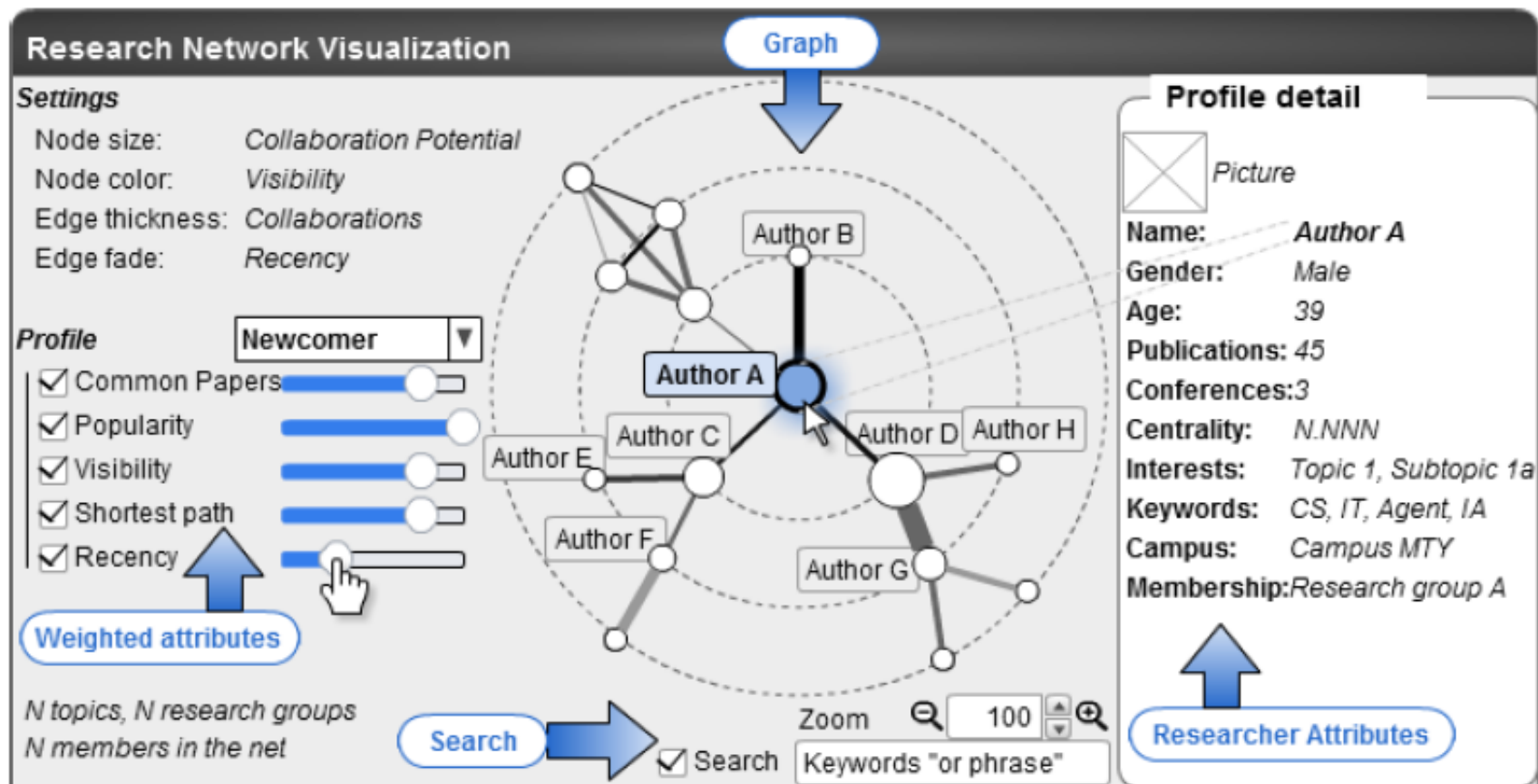



# Future Work

- Analyzing recommendations of interviewed researchers.
- Allow the user to equalize PCI factor weights.
- Connect directly to the publications database and explore results with Vizster.




# FW: An interactive tool for collaboration recommendation





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# Molina-Gutiérrez, Arturo



## Overview

Arturo Molina is Professor of Product Innovation and Vicerrector of Research and Technology Transfer of Tecnológico de Monterrey. He received his PhD degree in Manufacturing Engineering at Loughborough University of Technology (England), a University Doctor degree in Mechanical Engineering at Technical University of Budapest (Hungary), his M.Sc. degree and B.Sc. in Computer Science from Tecnológico de Monterrey. He is member of the National Researchers System of Mexico (SNI-Nivel III), Mexican Academy of Sciences, Mexican Engineering Academy, Mexican Academy of Computer Sciences, a member of IFIP WG5.12 Working Group on Enterprise Integration Architectures and IFIP WG 5.3 Cooperation of Virtual Organizations and Virtual Organizations. He is the author of 14 books and over 120 scientific papers in journals, conferences, chapter books, and holds 3 patents, 7 patent solicitations. He has created 3 technology based companies (ECOS (www.iecos.com), Albiomar (www.albiomar.com) and SMES (Solution for Manufacturing Enterprise Systems))

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Campus Monterrey, School of Engineering and Sciences, Tecnológico de Monterrey

Overview

Publications

Research

Teaching

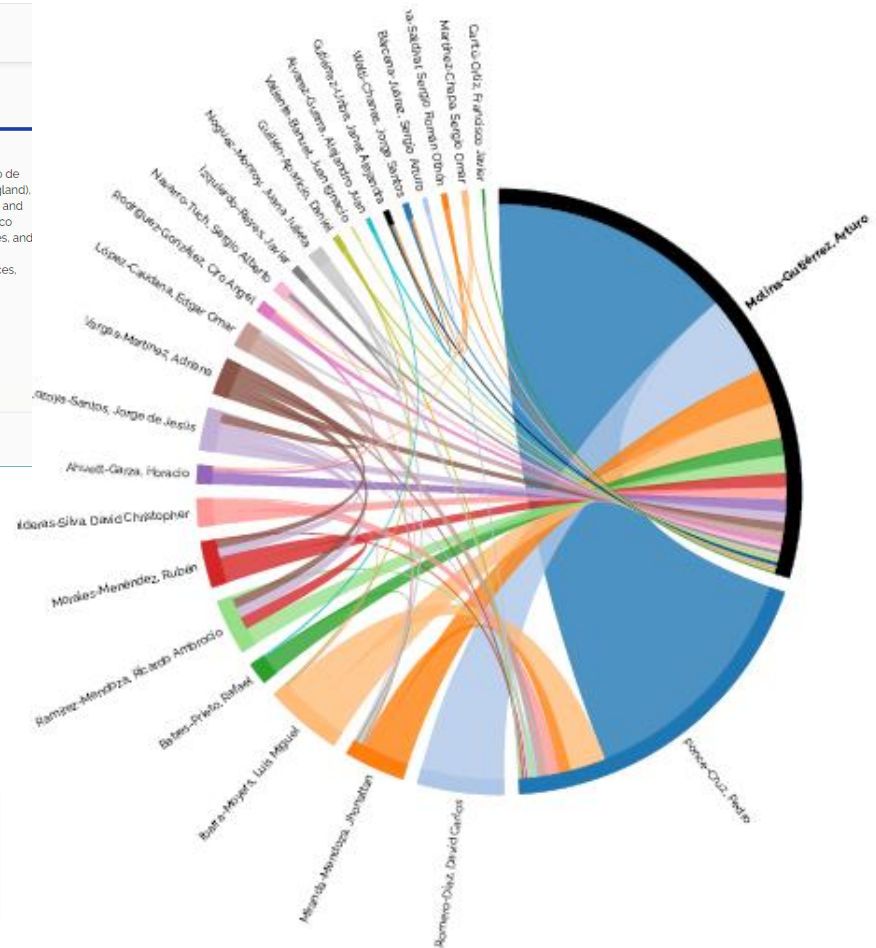
Background

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### Governing Authority

Product Innovation Research Group



291 publications  
from 2001 - 2020



24 co-authors  
from 2004 - 2020



More info: [Gustavo Parada. Research Network Visualization to foster Intra-Institucional Scientific Collaboration. Tecnológico de Monterrey. Masters on IT Administration. May 2013.](#)

Research Group: [Information Technologies for Intelligent Organizations](#)

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## Q & A