

Operating Smartly in a Networked World

Christian Posse, LinkedIn

BASNA 2010, Bangalore

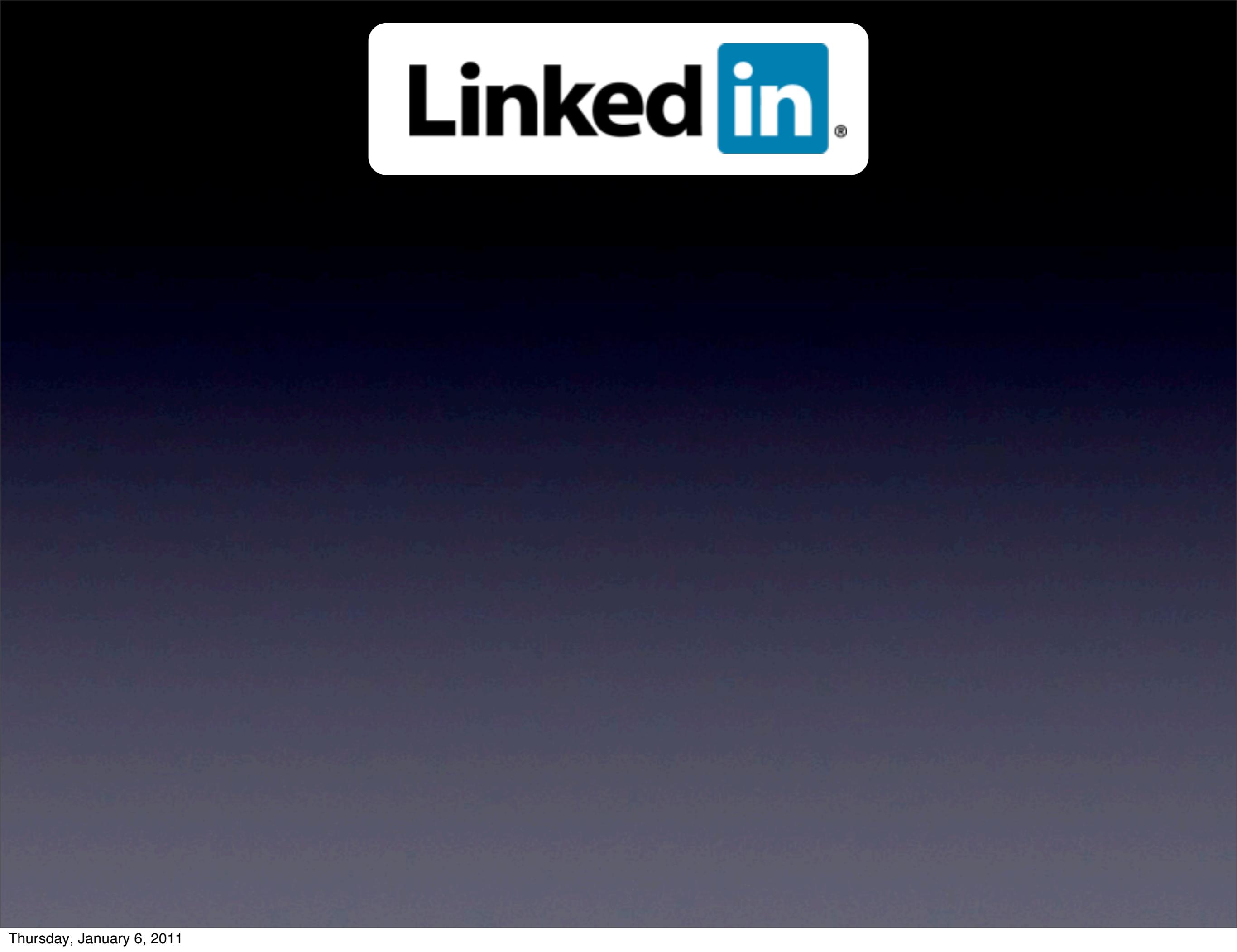


Do you Google yourself?

What do you do to put yourself
in the right place for people to
find you?

How do you network
efficiently, separating
signals from the noise?

How do you participate in
the professional dialogue?





Christian Posse Edit
Principal Research Scientist at LinkedIn
San Francisco Bay Area | Information Technology and Services



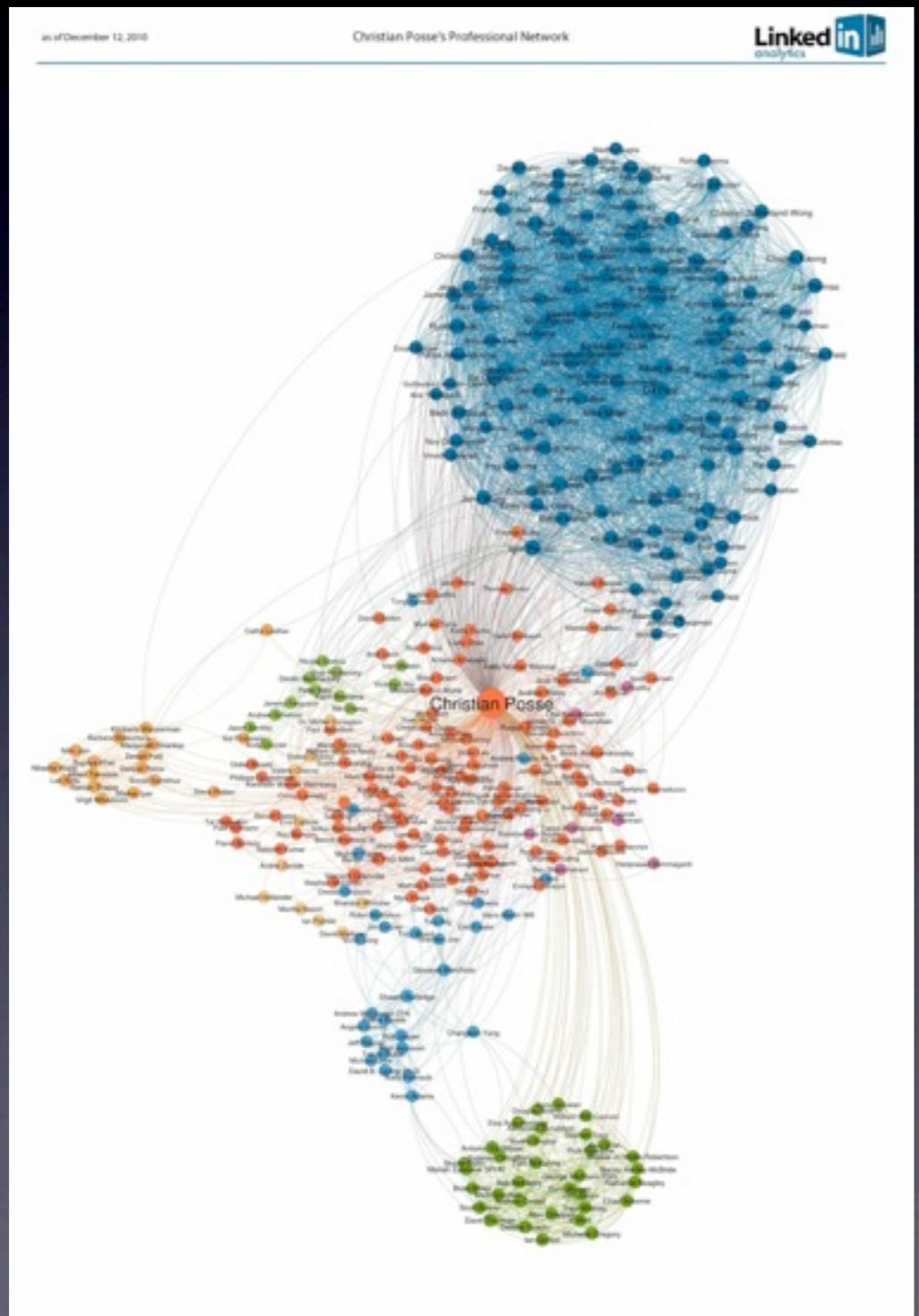
Christian Posse Interesting article on Quora vs LinkedIn "Quora: Experimental Public Knowledge Base For Grown Ups" X

 Future of Social Network: Quora: Experimental Public Knowledge Base... futureofsocialnetwork.blogspot.com

1 hour ago · Like · Comment · Share · See all activity · Post an update

Current	<ul style="list-style-type: none">• Principal Research Scientist at LinkedIn Edit+ Add a current position
Past	<ul style="list-style-type: none">• Director of Technology at Cisco• Director, Development - Analytics Center of Excellence at First Data Corporation• Sr. Research Scientist at Pacific Northwest National Laboratory see all...
Education	<ul style="list-style-type: none">• Stanford University• Swiss Federal Institute of Technology• Swiss Federal Institute of Technology
Recommendations	9 recommendations Edit
Connections	351 connections
Websites	+ Add a website
Twitter	cposse Edit
Public Profile	http://www.linkedin.com/in/christianposse Edit

Professional Identity



Professional Identity
Web of Trusted Relationships



LinkedIn - Search results for "ipad"

Filter by

My network

- By Me (1)
- 1st Connections (1)
- 2nd Connections (2,753)
- 3rd + Everyone (140,017)

Industry

- Information Technology And Services (18,512)
- Internet (10,400)
- Marketing And Advertising (4,200)
- Computer Software (10,237)
- Online Media (3,111)

Company

- ComboApp (1)
- Conseil Régional De Lorraine (1)
- Microsoft Corporation (1)
- International Business Machines (1)
- British Institutes (1)

Last posted

- Last Minute (1)
- Last Hour (1)
- Last Day (16,223)
- Last Week (28,580)
- Last Month (65,998)

Region

- Greater New York City Area (1,000)
- San Francisco Bay Area (1,000)
- Japan (1,000)
- London, United Kingdom (1,000)

Search results for "ipad": 143,583 results

Show 2 more recent results

Rachel Griffiths Win 1 of 10 iPads from @LightCMS - RT to enter or read more <http://speaklight.com/iPad>

10 iPads In 10 Days | LightCMS

Win one of ten iPads from LightCMS! Just tweet to enter.

10 iPads 10 Days

Less than a minute ago

Wrecatcular College Lifestyle Festival If you haven't already downloaded the official WREC app, get it today for FREE! <http://fb.me/GQyNTYcE>

Chico State Wrec Gym for iPhone, iPod touch, and iPad on the iTunes App Store

Learn more, read reviews, and download Chico State Wrec Gym by Bizness Apps on the iTunes App Store.

Chico State Wrec Gym

Less than a minute ago

Petra Beierling E-textbooks expected to grow with iPad on campus - Yahoo! News [#edchat #edtech](http://yhoo.it/cSQaFd)

E-textbooks expected to grow with iPad on campus - Yahoo! News

Video and color graphics are key to why many people think Apple Inc's iPad and other tablets will usher in the era of electronic textbooks.

ASK AMERICA

Less than a minute ago

Zhjie Lai 会备份app附带的数据吧。有个小软件可以把备份关掉。RT @motodexter: iTunes连上iPad后有时备份的速度是按小时为单位的。怎么会是啊？！#ipadon #itunes

L. Michelle Humphress iOS 4.2: The iPad is a Real Computer Now: Apple's iPad might be "magical," but of late it's been feeling a little ...

Trending Links

10 iPads In 10 Days | LightCMS (3997 members)

10 iPads In 10 Days | LightCMS Who shared this link

Making Future Magic: iPad light painting (1224 members)

Who shared this link

Get the new Newsday iPad application (617 members)

Who shared this link

RevTwt - Twitter Advertising - Sign Up For Advertiser (555 members)

Who shared this link

Kaleidoscope Heart by Sana Barilles - Download Kaleidoscope Heart on iTunes (347 members)

Who shared this link

Professional Identity

Web of Trusted Relationships

Groups, Q&A, Network Updates and Sharing, Signal

LinkedIn at a glance

- Founded in **2003**
- **#14** site in the US (Alexa)
- **85m+** members
- First million members = **477 days**
- Latest million = **12 days**
- **12m+** small business professionals
- **78%** college educated, **42%** decision makers
- Average age: **43**
- **1m+** company profiles
- **700K** professionally-oriented groups
- **1bn+** people searches in 2009
- **100K+** members joining groups every day
- **3X** job postings and applications in the past year

Internationally

- **50%** members are outside the US
- Over **200** countries & territories represented
- **18m+** members in Europe
- **50%** of the addressable market in the Netherlands
- **7m+** members in India

How do we keep the lights on?

- Profitable since 2007
- Well diversified and international revenue
 - **Subscriptions**
 - **Advertising Sales**
 - **Hiring Solutions**
- **60+%** of Fortune 100, **25+%** of FTSE 100 use LinkedIn's corporate recruiting solutions

Let's talk analytics

Professional Identity



Web of Trusted
Relationships

Groups, Q&A,
Network Updates
and Sharing, Signal

How do we think of analytics?



Data jujitsu

Data jujitsu

Def(jujitsu) = *The “art of softness”. A method for defeating an armed opponent without using weapons.*

Def(data jujitsu) = *Using (multiple) data elements in clever ways to solve iterative or auxiliary data problems that when combined solve a data problem that might otherwise be intractable.*

Data jujitsu comes in three forms

Product Analytics

- User facing products
- Behind the scenes product enablement
- Rapid prototyping

Data Insights & Business Intelligence

- Understanding the user and usage
- Reporting
- A/B testing
- Exposing demographic trends

Fraud, Abuse & Risk

Data jujitsu via SNA

- **Degree, indegree, outdegree**
- **Velocity**
- **PageRank**
- **Community detection**
- **Connection strength**
- **Multi-scale:**
 - Content, connections, behavior
 - Dynamic, static
- **Network visualization**

Case I

The simplest recommendation product
to build....

Item-based collaborative filtering

Viewers of this profile also viewed...

Igor Perisic
Director of Engineering; Search,...

Monica Rogati
Data Scientist @ LinkedIn

Peter Skomoroch
Sr. Data Scientist at LinkedIn

DJ Patil
Chief Scientist, Chief Security...

Shirley Xu
Data Scientist at LinkedIn

Heyning Cheng
Sr. Research Scientist at LinkedIn

Manu Sharma
Senior Research Scientist at LinkedIn

Sunil Shirguppi
Sr. Data Scientist at LinkedIn

Nitasha Walia
Software Engineer at Cisco Systems

Sumeet Patel
Data Scientist at LinkedIn

People Who Viewed This Job Also Viewed

- Sr. Product Manager at **Extreme Networks**
- Product Engineering Manager - Consumer Web Services at **Skype**
- Senior Product Manager at **PayPal**
- Sr. Technical Product Manager at **Intacct Corporation**
- Product Manager - Health Informatics at **4medica**

Professionals that recommend this product also recommend...

- HP Desktops & All-in-One PCs
- HP Printers & Multifunction
- Phaeton
- HP Laptops, Notebook Computers & Tablet PCs
- HP Solutions

People who looked at Hewlett-Packard also viewed

<>

Case 2

Filtering out LIONs

LinkedIn Open Network

LIONs' goal:

Collect as many connections as possible

LIONs

Stacy Birnbach | 15000 connections   

President/CEO Verus Staffing Solutions® LION Toplinked.com
sbirnbach@verus.com

Washington D.C. Metro Area | Staffing and Recruiting



Current • President at **Verus Staffing Solutions**

Past • Principal at Health Search International and Clinical Resources
• President at Health Search International
• President at Clinical Resources Inc.

[see all...](#)

Education • University of Maryland
• Half Hollow Hills East

Recommendations 9 people have recommended Stacy

Connections 500+ connections

Public Profile <http://www.linkedin.com/in/stacybirnbach>

2008 published numbers

- 1 Ron Bates 40,000+
- 2 Andrew 'Flip' Filipowski 35,000+
- 3 Kenneth W. Weinberg 35,000+
- 4 Wei Guan 25,000+
- 5 Jan Mulder 25,000+

Ron Bates   

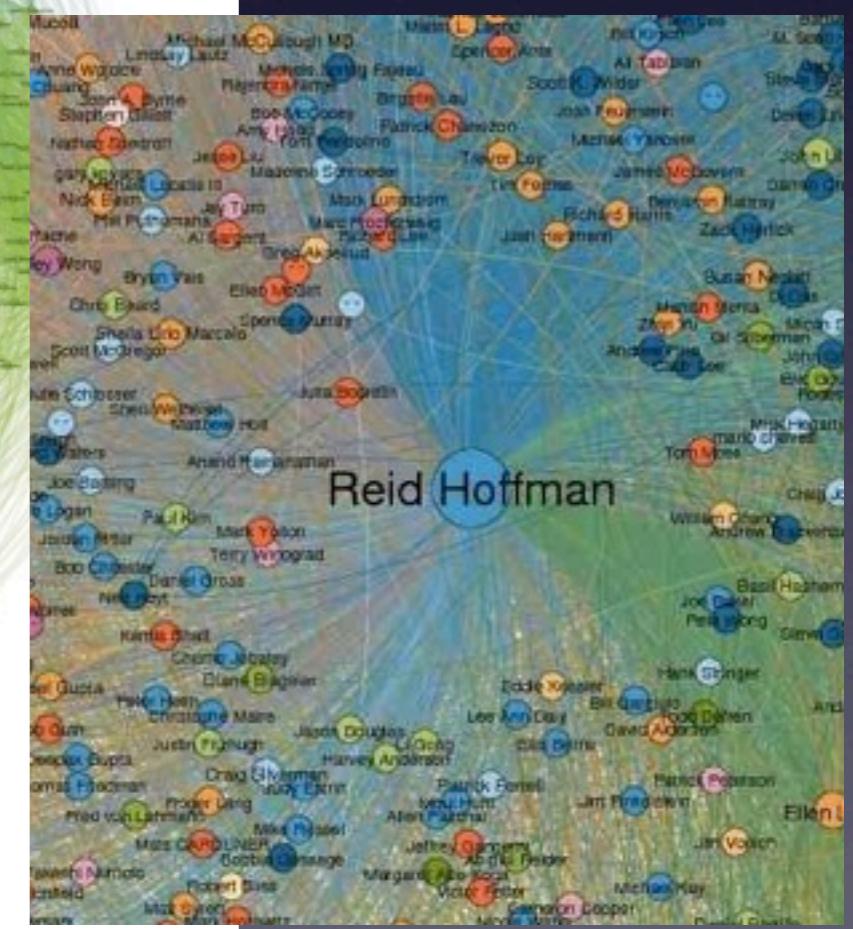
Managing Principal, Executive Advantage Group, Inc.
San Francisco Bay Area | Staffing and Recruiting



LIONs characteristics

- *Not all members with large # of connections are LIONs*
- Have maxed out the # of invitations they can send
- Low acceptance rate of their sent invitations
- Almost 100% acceptance rate for received invitations
- Received invitations from all over LinkedIn

Definitively not a LION



How can we score LIONS?

2 directed graphs

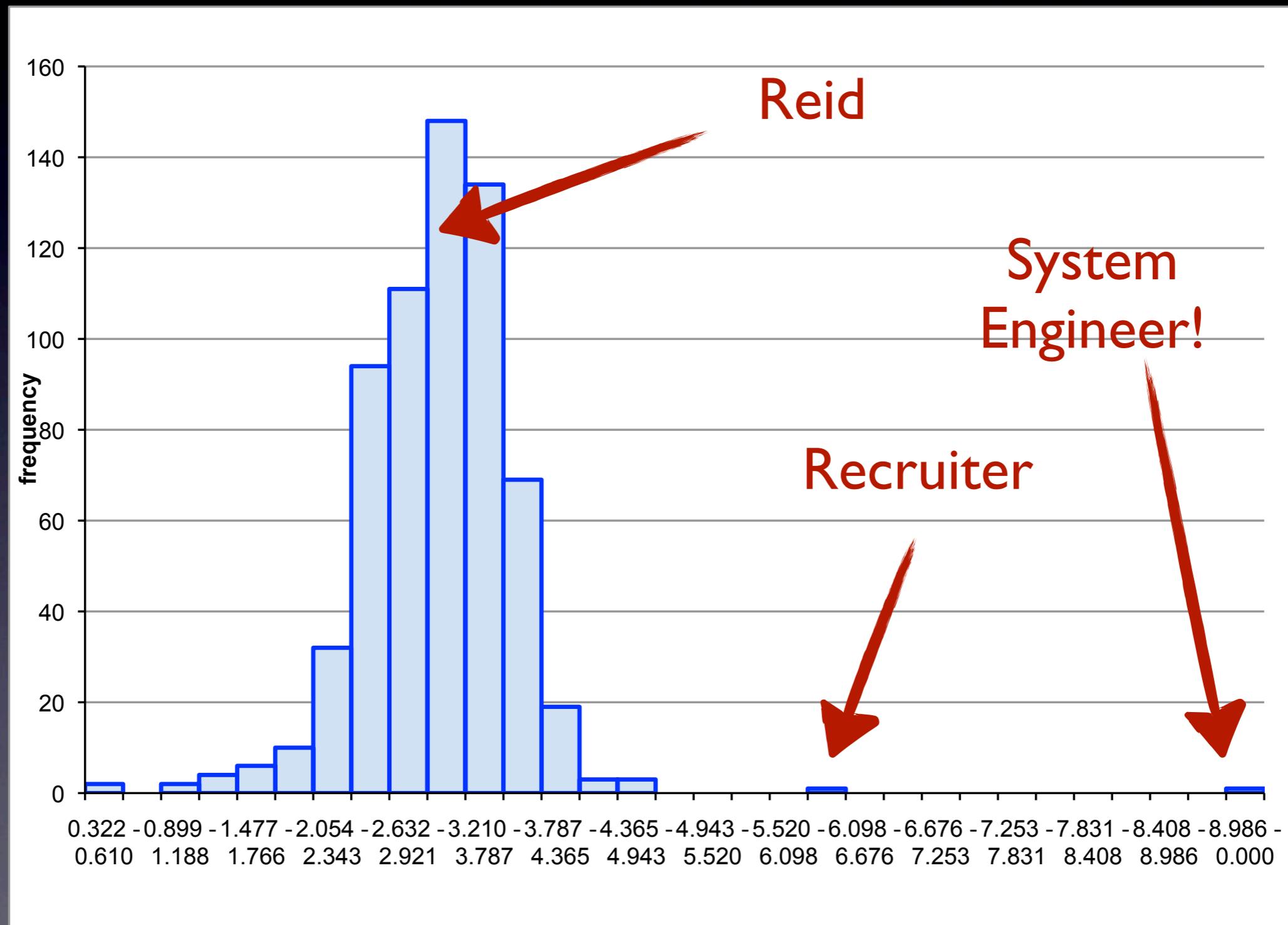
- G_1 = sent and received invites
- G_2 = accepted sent and received invites

Score = $F(\text{indegrees} \& \text{outdegrees in } G_1 \& G_2)$

Add the connection graph G

Score = $F(\text{indegrees} \& \text{outdegrees in } G_1 \& G_2,$
 $\#\text{communities in } G \text{ or clustering coefficient of } G)$

LinkedIn LION Scores



Case 3

Can Item-based collaborative filtering
power similarity products?

- Issues to deal with
 - Co-occurrences may come from different interests
 - ‘single-minded’ community detection
 - May require stronger signal at the cost of sparseness of co-occurrences
 - Cold start problem in some cases
- Data jujitsu
 - I-CF data element(s) part of a more comprehensive similarity ranker
 - Co-views, co-follows, co-joins, co-applications, co-searches,
 (x,y) co-occurrences where $(x,y) = (\text{view,follow}), \dots, (\text{follow,join}), \dots$

Job similarity search

Similar Jobs | LinkedIn

http://www.linkedin.com/jsearch/sim?clickSimilarJobSeeMore=&trk=j... Google

Gmail Gmaps U JIRA W JIRA RE FIGO MSTR Dashb Cheetah PPP DWH-CF DWoP LICE LiX Signal OWA Wiki Q&A S ATP NYT

LinkedIn Network Posters: Print a... DJ Patil | LinkedIn Similar Jobs | LinkedIn

LinkedIn Go to LinkedIn Recruiter » Christian Posse Add Connections

Home Profile Contacts Groups Jobs Inbox 10 Companies More Jobs Advanced

Jobs Home Saved Jobs Saved Searches Advanced Search Referral Center

Similar Jobs to Support Product Manager - Cloud Computing at Red Hat

Go back to Job Listing

Refine By

Company

- All Companies
- Red Hat (3)
- Nuance Communications (2)
- EMC (1)
- Manpower Inc. (1)
- SunGard Availability Services (1)

Show more... Enter company name

When Posted

- Any Time
- 1 day ago (0)
- 2-7 days ago (4)
- 8-14 days ago (8)
- 15-30 days ago (14)

Location

- All Locations
- San Francisco Bay Area (13)
- Greater Boston Area (6)
- Dallas/Fort Worth Area (2)

Support Product Manager - Cloud Computing
Red Hat · View job details Nov 30, 2010 Save job Similar jobs

Product Manager - JBoss Application Platforms
Red Hat - Westford, MA - Nov 17, 2010
47 people in your network at Red Hat

Product Manager - Red Hat Enterprise Linux
Red Hat - Westford, MA - Nov 17, 2010

Sr.Software Engineer-Cloud Computing & Data Automation
Nuance Communications - United States - Nov 30, 2010
43 people in your network at Nuance Communications

Product Manager (Virtualization and Cloud Computing)
Acadia (JV of Cisco, EMC, VMware, and Intel) - "Silicon Valley", "Research Triangle Park, NC"; "San Jose, CA"; "Dallas, TX" - Nov 28, 2010
12 people in your network at Acadia (JV of Cisco, EMC, VMware, and Intel)

LinkedIn Premium

Tips to stand out from the crowd

NEW Move to the Top
of the list as a Featured Applicant

Keep Track
of important contacts with Profile Organizer

Group similarity search

Groups Directory | LinkedIn

http://www.linkedin.com/groupsDirectory?itemaction=simg&anetid=1

Gmail Gmaps U JIRA W JIRA RE FIGO MSTR Dashb Cheetah PPP DWH-CF DWoP LICE LiX Signal OWA Wiki Q&A S ATP NYT

LinkedIn Network Posters: Print a... DJ Patil | LinkedIn Groups Directory | LinkedIn

Christian Posse Add Connections

Home Profile Contacts Groups Jobs Inbox 10 Companies More Groups ▾

My Groups Following Groups You May Like Groups Directory Create a Group FAQ

Search Groups

Keywords

All categories

Choose...

Search

Similar Groups to Social Network Analysis in Practice

Social Network Analysis (www.degreeCentrality.com)
For professionals who are involved in applying social network analysis or organizational network analysis techniques in their work for either internal management, external clients, or research.
Yesterday's Activity: Discussions (1)
Owner: [Terrill Frantz](#) | 565 members | Share
Similar groups »
Already a member

NBA
Ego-Social-Org

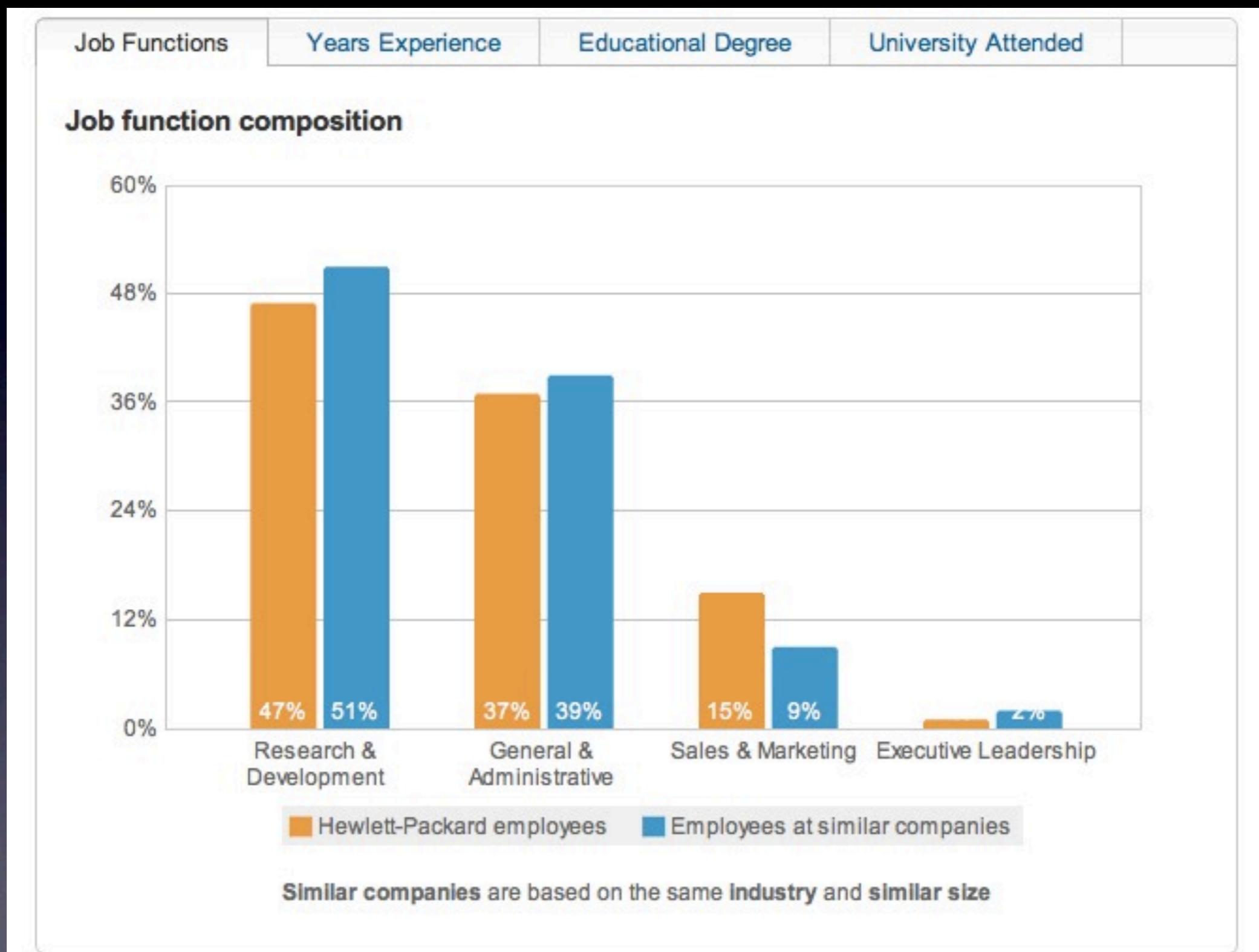
Network Behavior Analysis (NBA)
Thought space for Social Network Analysis (SNA), Organizational Network Analysis and Egonets using performance metric science. Key Words: Social Network, Orgnet, Scale-Free, KPI, Competency This group is dedicated to leverage passive network monitoring for Talent LifeCycle Management
Owner: [Michael Brown](#) | 93 members | Share
Similar groups »
Join Group

DYNAMO

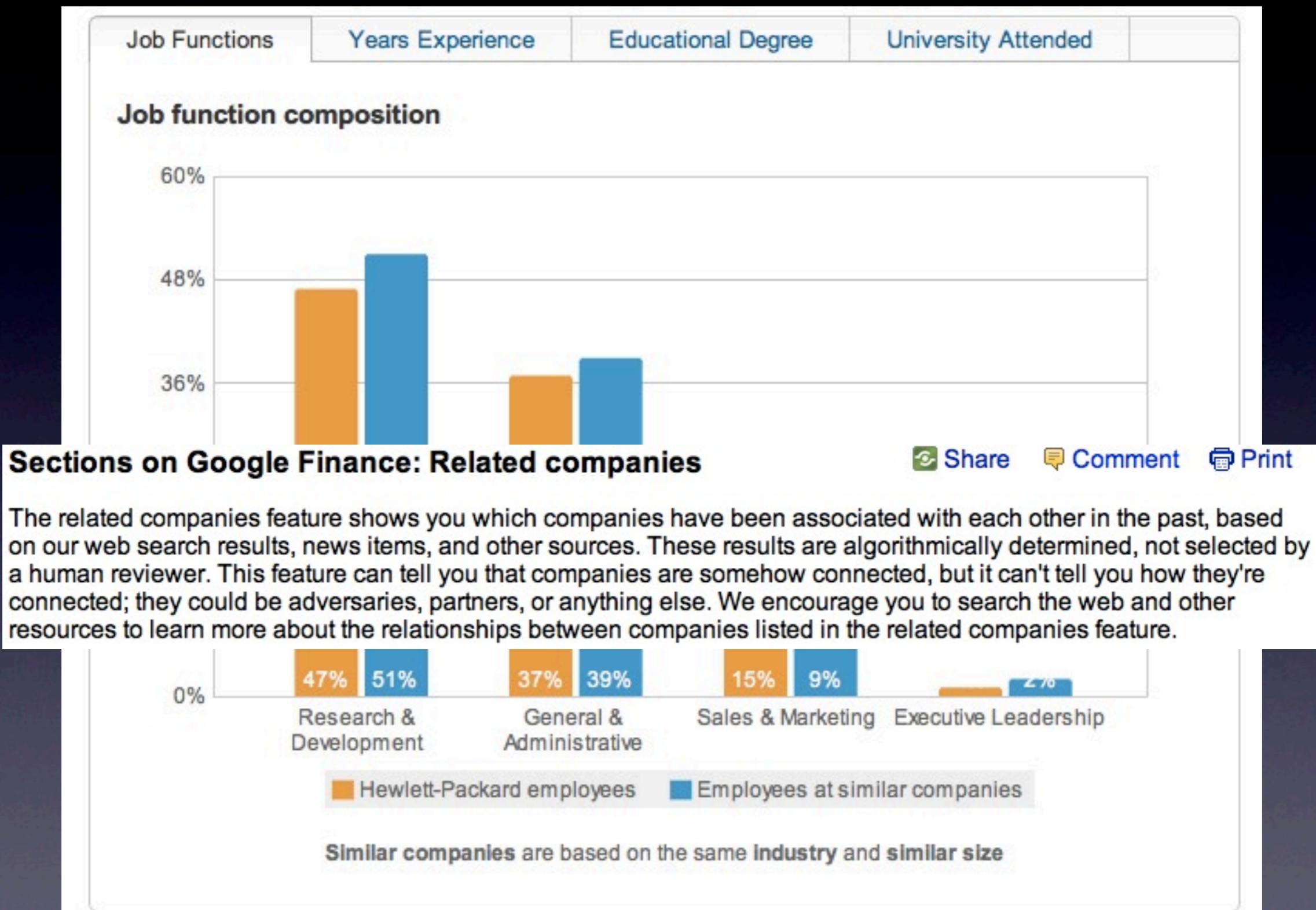
DYNAMO: Dynamic Network Analysis in Organizations
A place for discussing and sharing new scientific developments, tools, publications, and events focusing on the analysis of social network dynamics.
Owner: [Roberto Dandi](#) | 113 members | Share
Similar groups »
Join Group

Social Network Analysis Group
This group is for people interested in social network analysis research.
Owner: [John Yen](#) | 64 members | Share
Similar groups »
Join Group

Similar companies



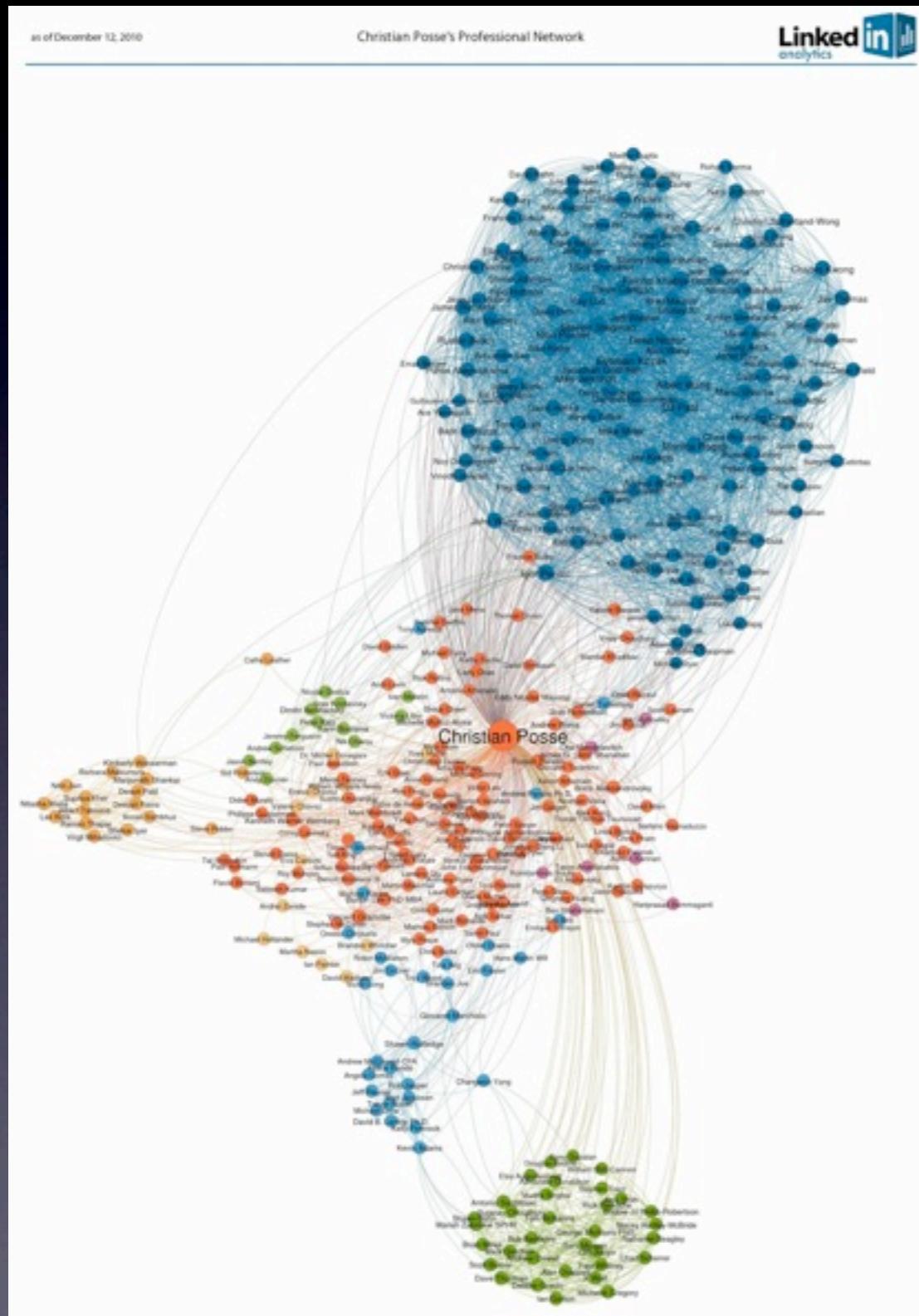
Similar companies



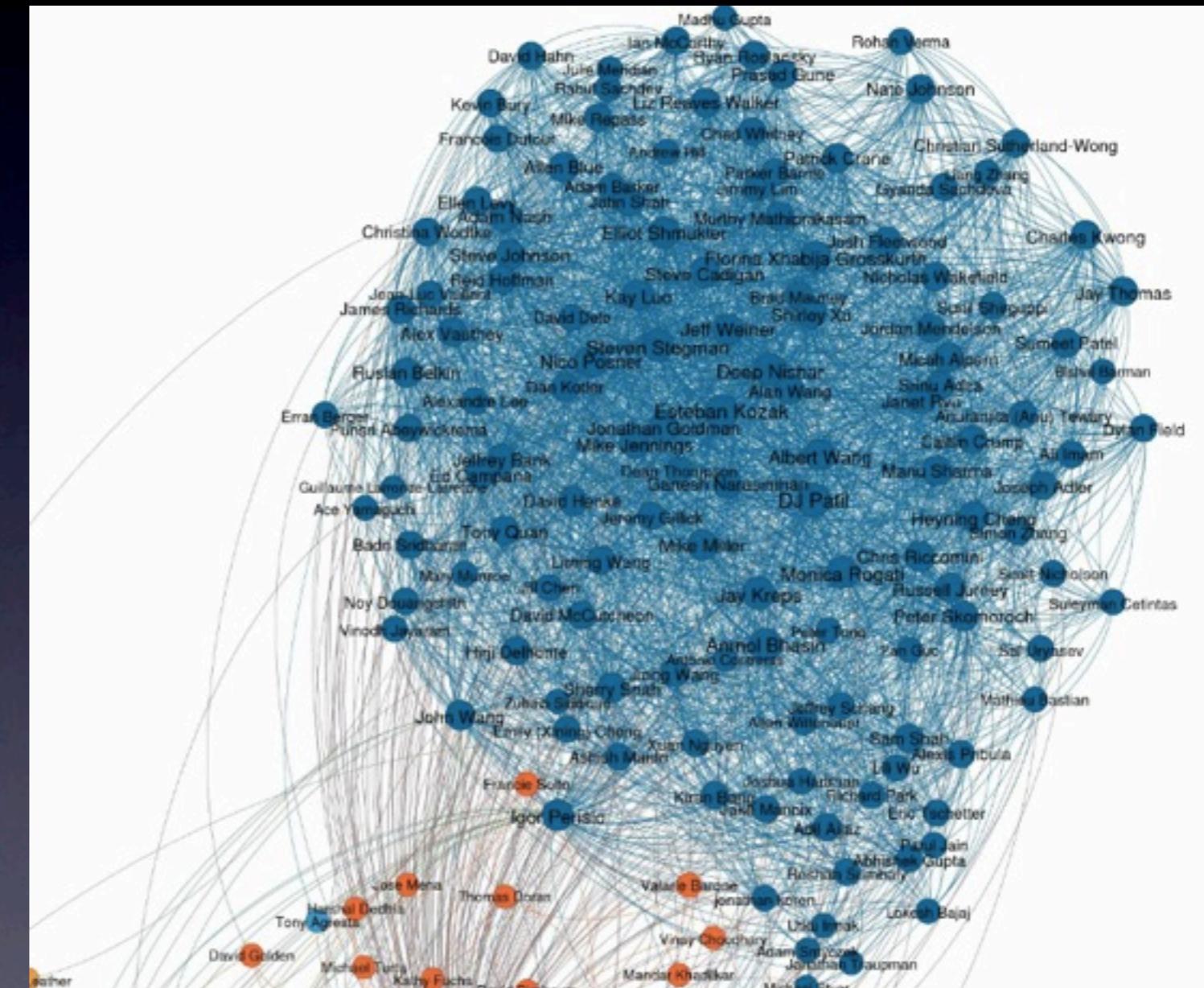
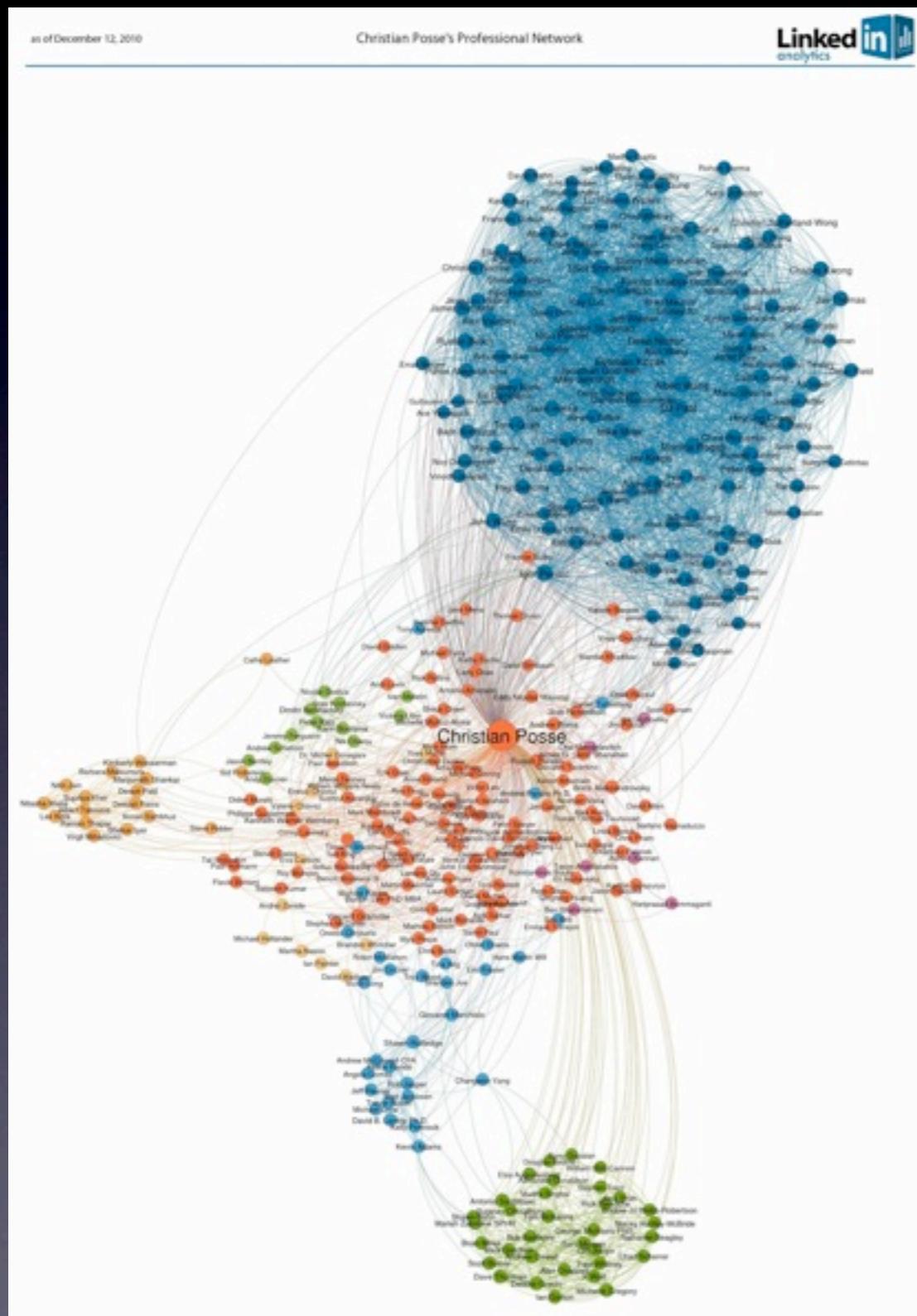
Case 4

Can a simple personalized recommender
be built leveraging my network?

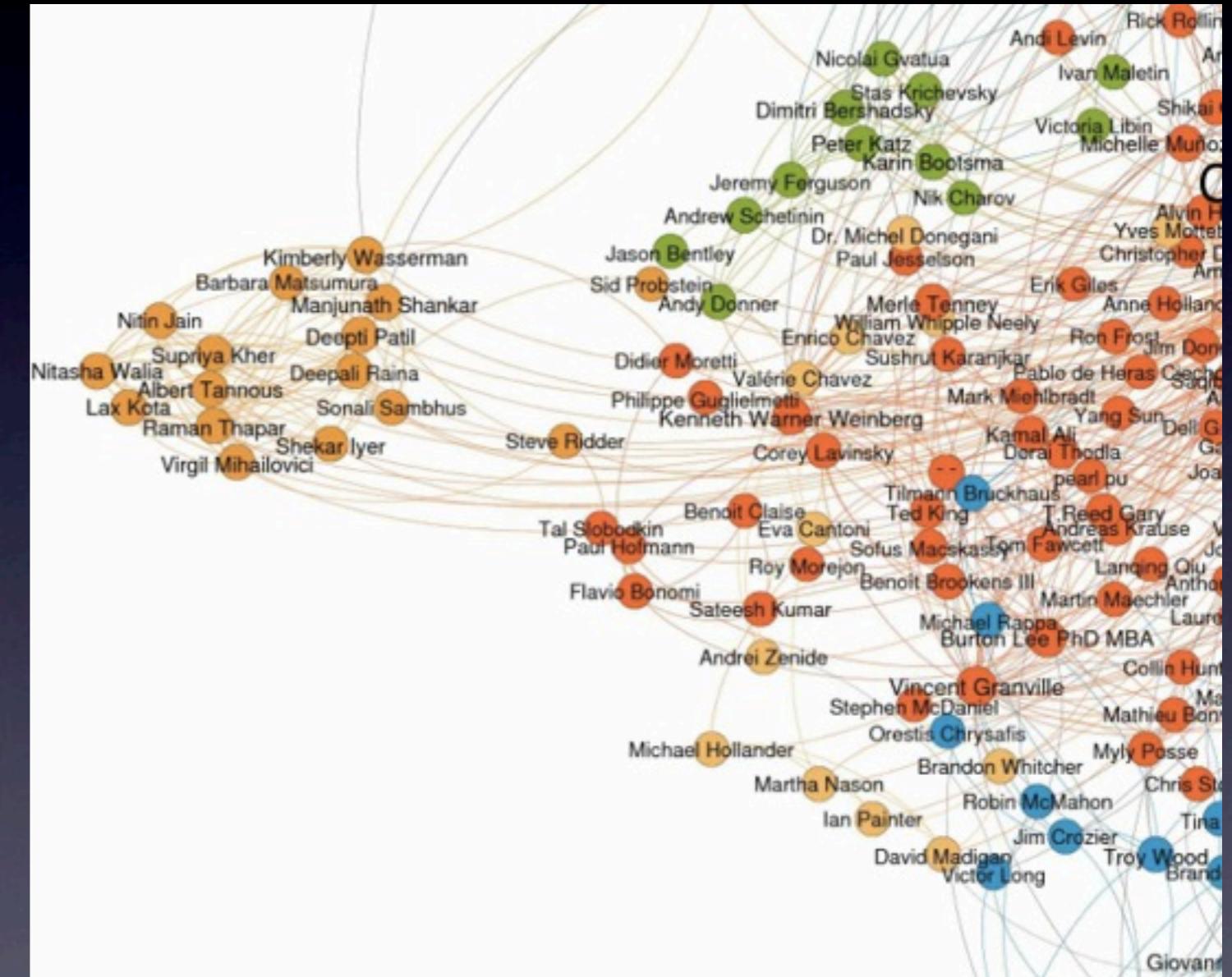
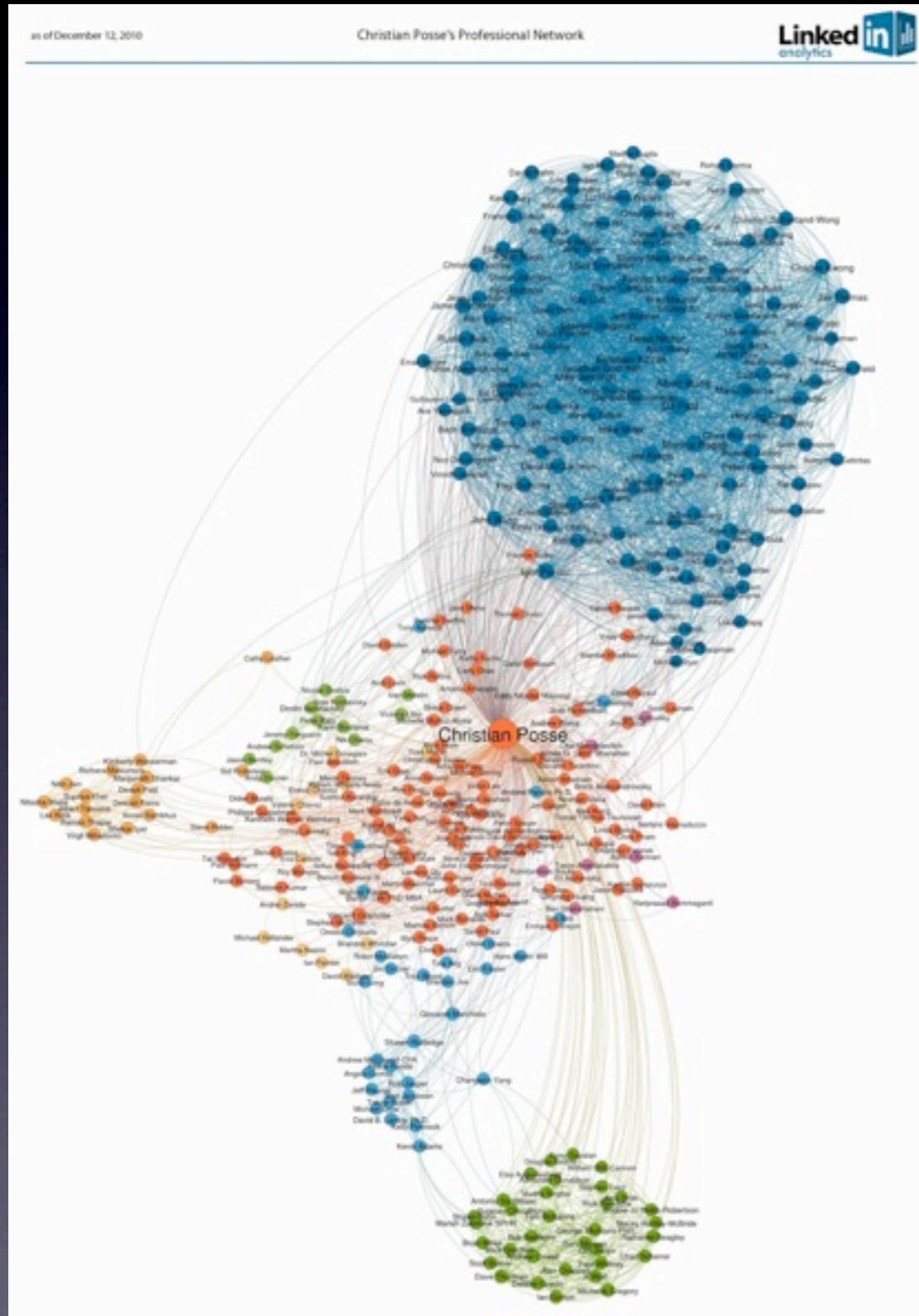
Let's look at my network



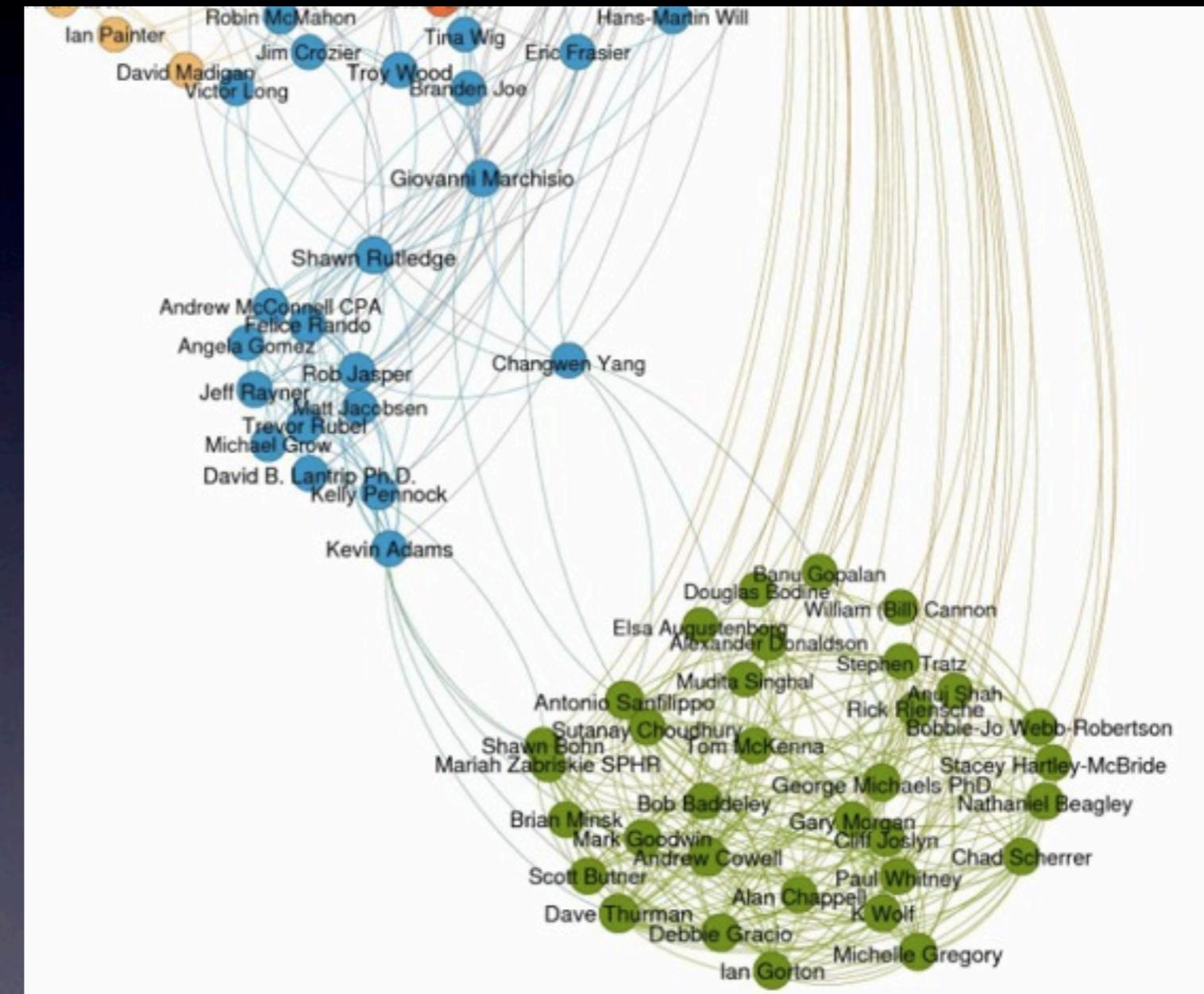
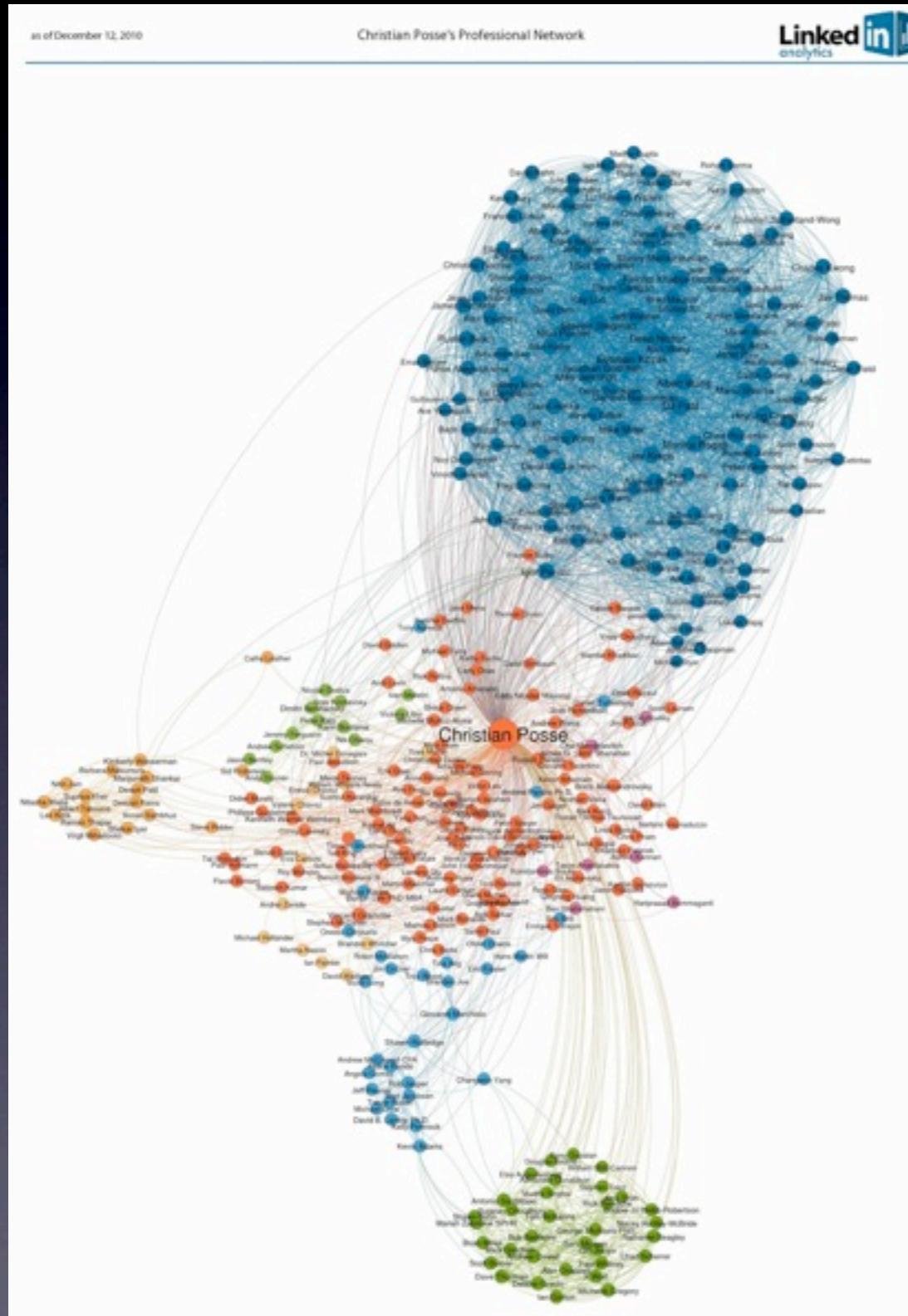
Let's look at my network



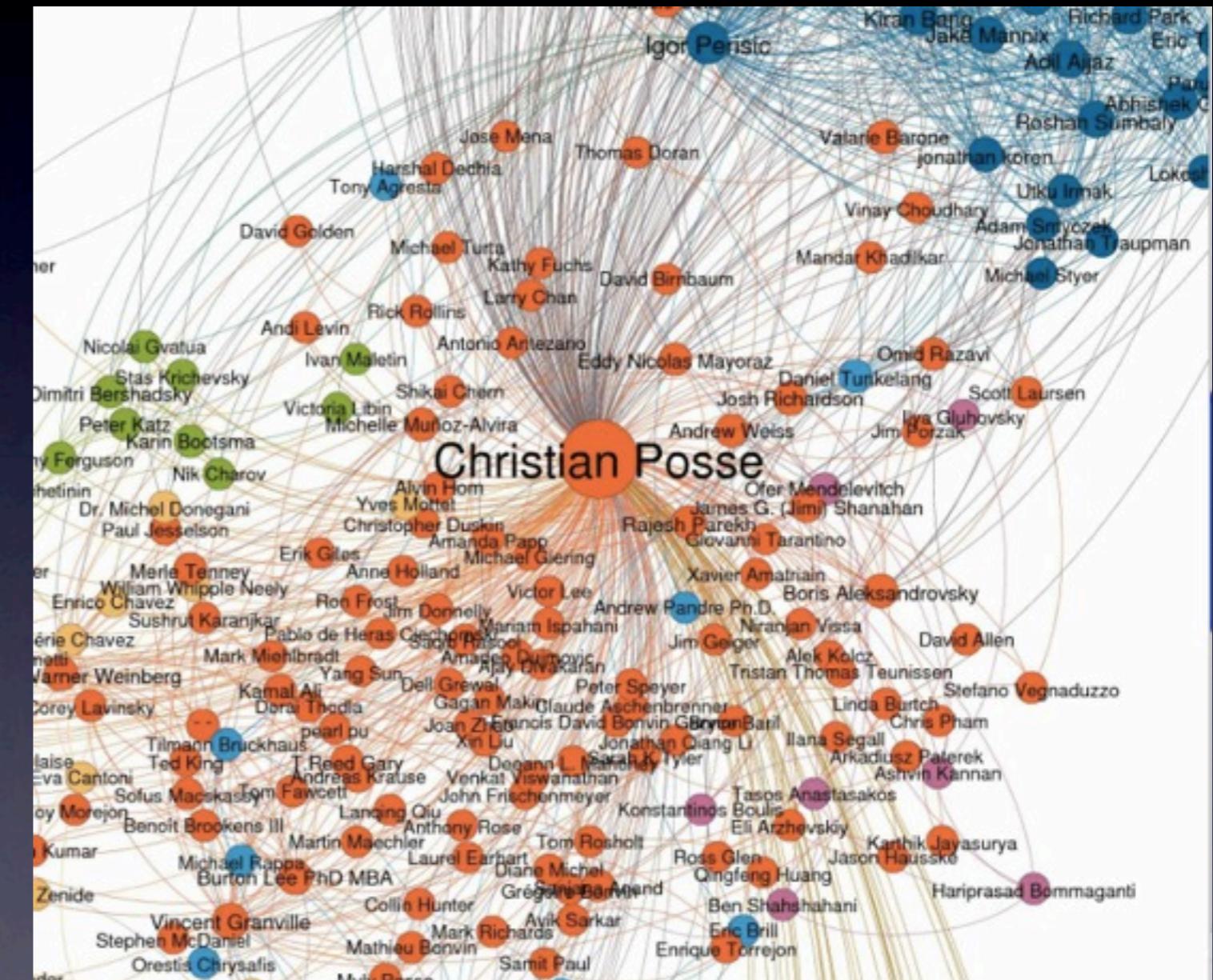
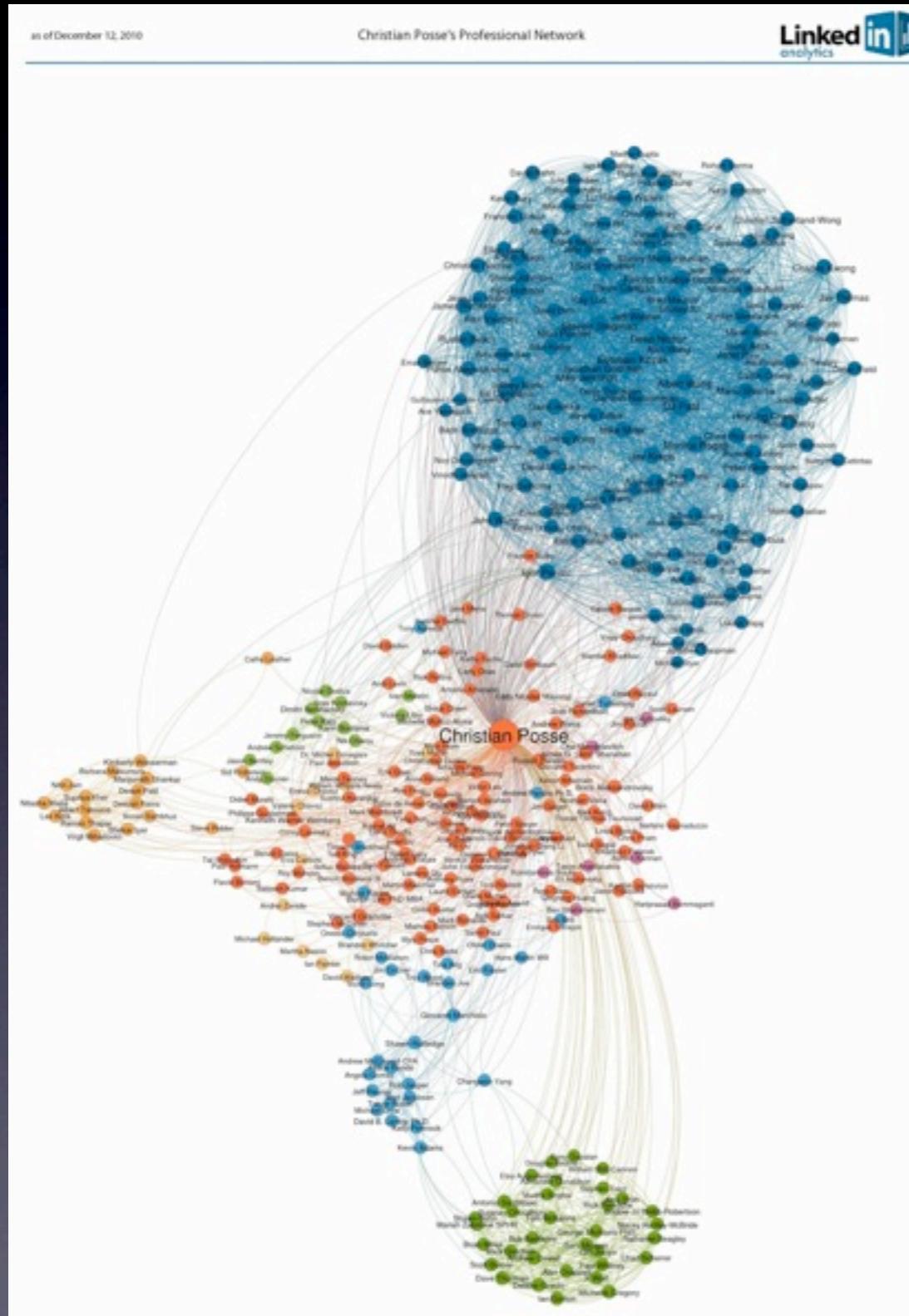
Let's look at my network



Let's look at my network

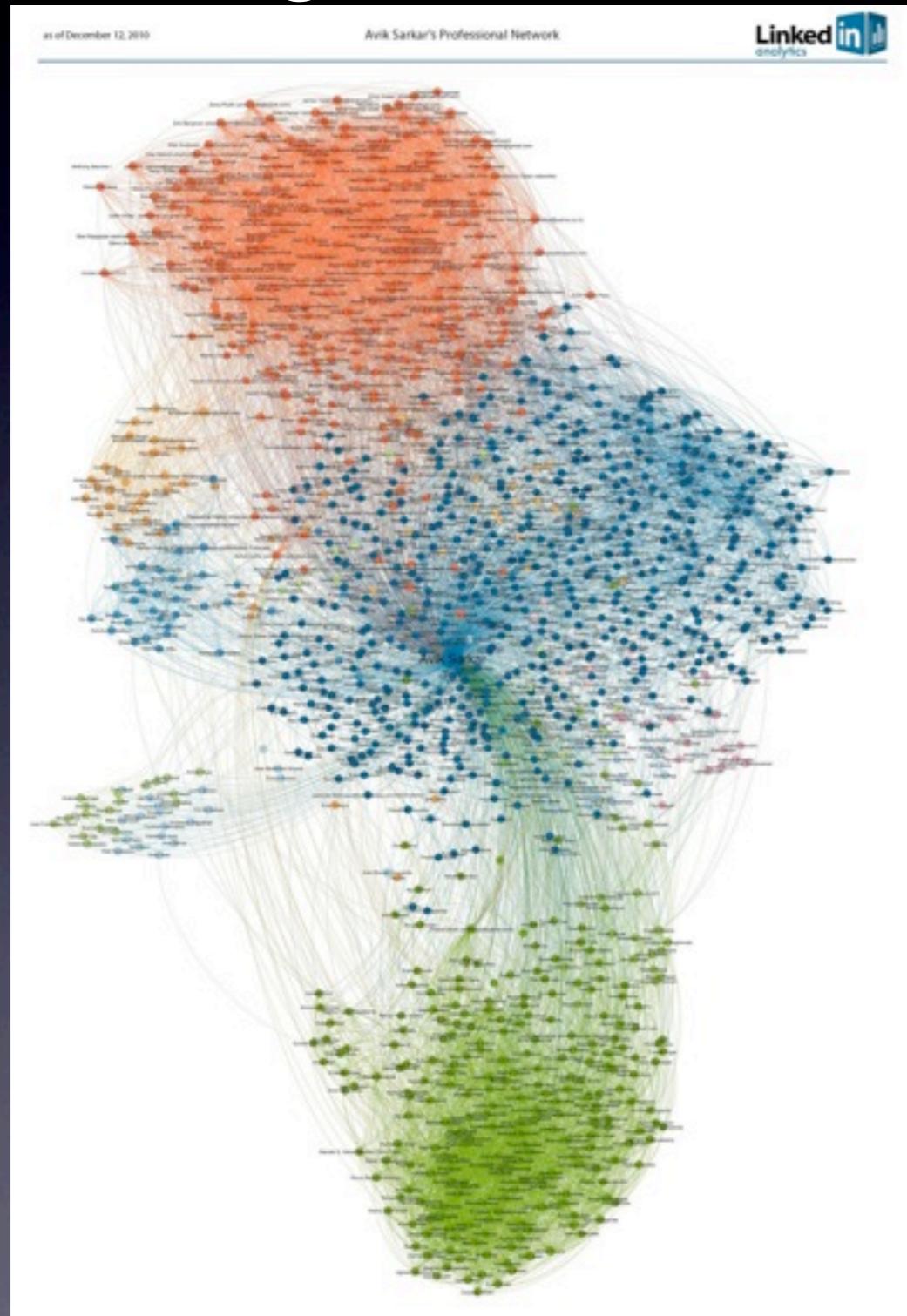


Let's look at my network



... and at a few others

Larger network



smaller network



- Issues to deal with (ideally)
 - account for the presence of communities
 - Normalize counts wrt community size
- Open questions
 - Explicit or implicit communities? ... or both?
 - How often do we need to update the communities?
 - What about engagement?
- Data jujitsu
 - NB-P data element(s) integrated in a more general recommender ranker

Personalized groups recommendations

LinkedIn®

Mary,

Joining a LinkedIn group makes it easy to stay up-to-date with classmates, colleagues and other professionals.

Here are some groups your connections have joined.

 [South Central Chapter/Medical Library Association](#) 

 [North Suburban Librarians \(Chicago\)](#) 

 [Nerinx Hall High School Alumnae](#) 

 [NSLS Marketing CoP](#) 

Interested in joining more groups?

[See More Groups You May Like](#)

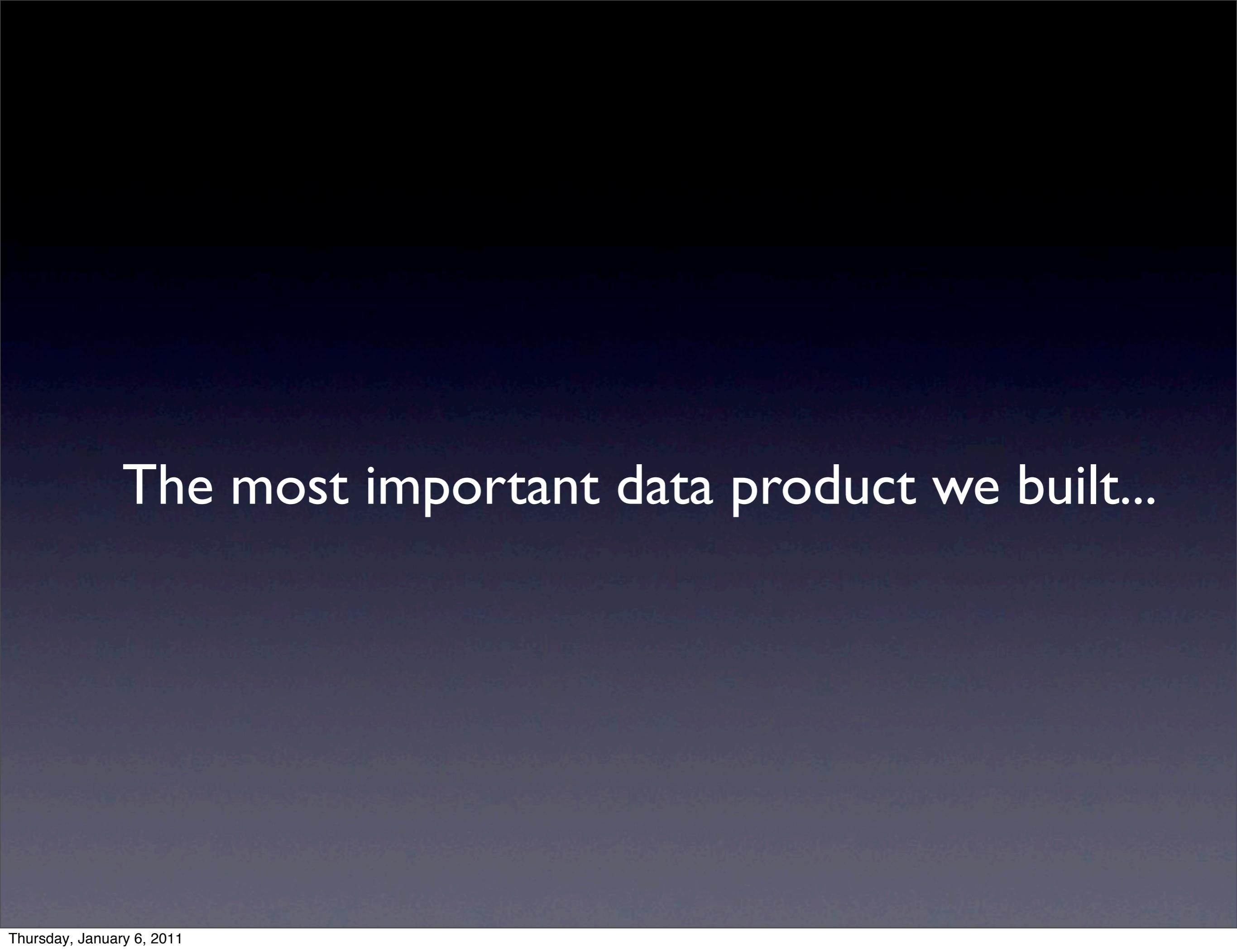
© 2010, LinkedIn Corporation

This message is part of an occasional mailing to help you get the most out of LinkedIn. If you prefer not to receive these messages, change your [settings](#).

LinkedIn 2029 Stierlin Ct., Mountain View, CA 94043 USA

Case 5

Helping you build your web of trusted
relationships



The most important data product we built...

People You May Know

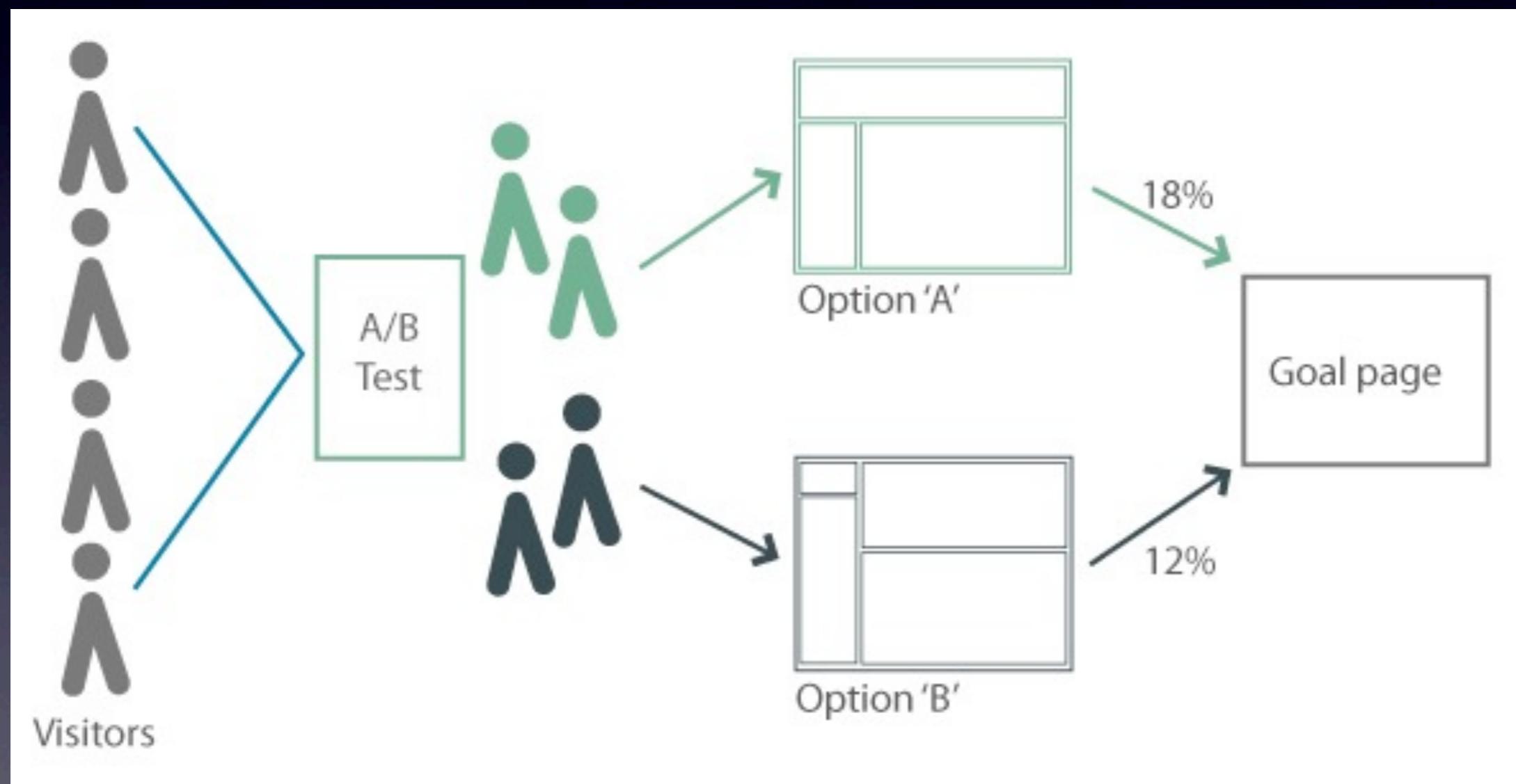
People You May Know

-  **Kevin Droege**, Principal Architect, Operations at... X
[Connect](#)
-  **Jared Fliesler**, Executive Producer/GM at Slide X
[Connect](#)
-  **Kevin Eggleston**, Finance Manager Consultant at LinkedIn X
[Connect](#)

[See more »](#)

How do we assess the constant
improvements we are making to this
product?

A/B testing



Does someone's network topology
affect the impact of PYMK?

Yes

... If you are not the outbound type (LION, recruiter,...)

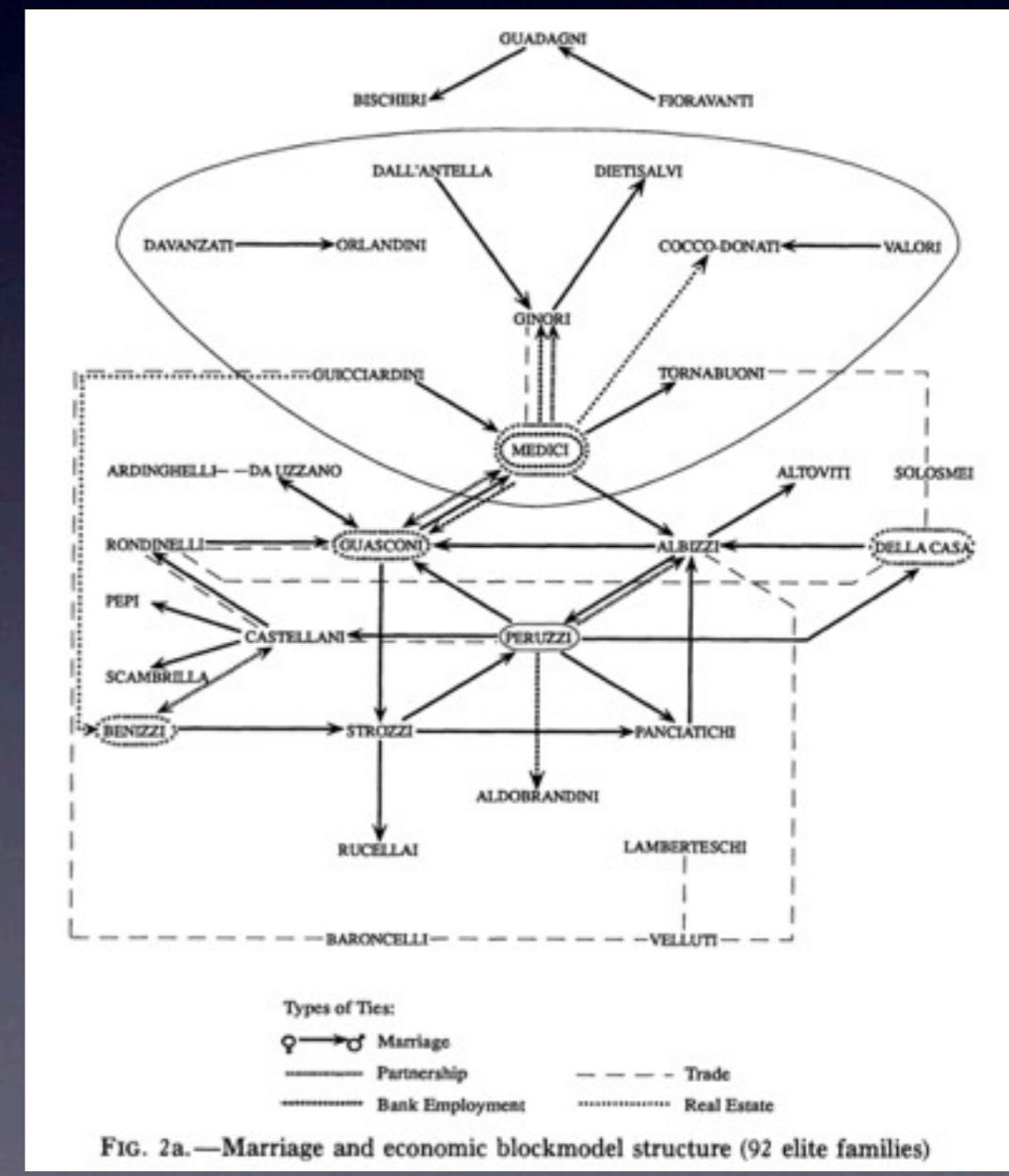
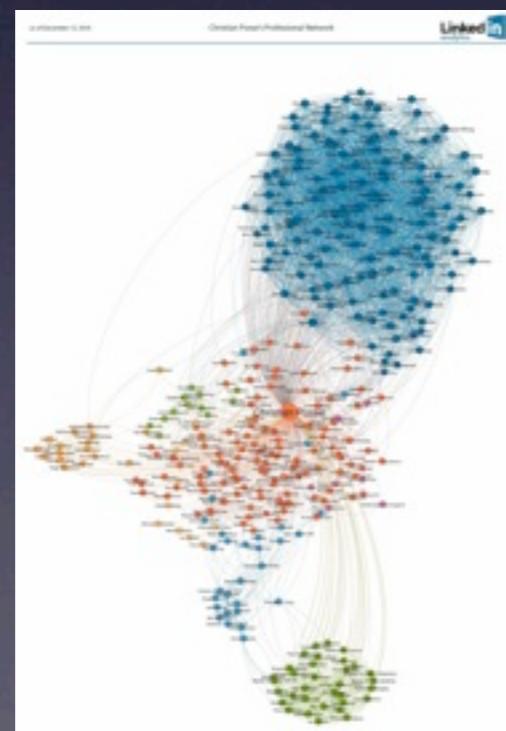
- **Degree** matters
- Natural boundary

“The number of people a person will know in their lifetime ranges between 300 and 3000.”

Tipping Point
- Sweet spot where PYMK engagement goes ballistic

Does someone's network topology affect the impact of PYMK?

- Need to explore the impact of **structural holes** (**effective size, efficiency, constraint**) *within communities*
- Linked to *social capital*



Case 6

Helping you participate in the
professional dialogue

Groups You May Like

My Groups Following **Groups You May Like** Groups Directory Create a Group FAQ

Search Groups

Keywords
All categories
Choose...
Search

Create a Group

Groups You May Like

Business Analytics
Unleashing the Power of the Mind...
business analytics, data mining, artificial intelligence, visualization tools, and predictive modeling.
Yesterday's Activity: Discussions (4) Jobs (8)
Owner: Alberto Roldan | 15,048 members | Share

Similar groups »
Join Group

Hadoop Users
A group for Hadoop users.
Yesterday's Activity: Jobs (2)
Owner: Jay Kreps | 3,629 members | Share

Similar groups »
Join Group

Suggest relevant groups
that you are more likely to participate in

Data jujitsu: Multi-layer scoring approach

1. Find **relevant** groups
2. For each group, determine the **propensity for you to participate** in the group
3. **Re-order** relevant groups based on their propensity score

Data jujitu x 2: SNA based propensity score

Social learning

“People learn new behavior through observational learning of the social factors in their environment.

If people observe positive, desired outcomes in the observed behavior, then they are more likely to model, imitate, and adopt the behavior themselves.”

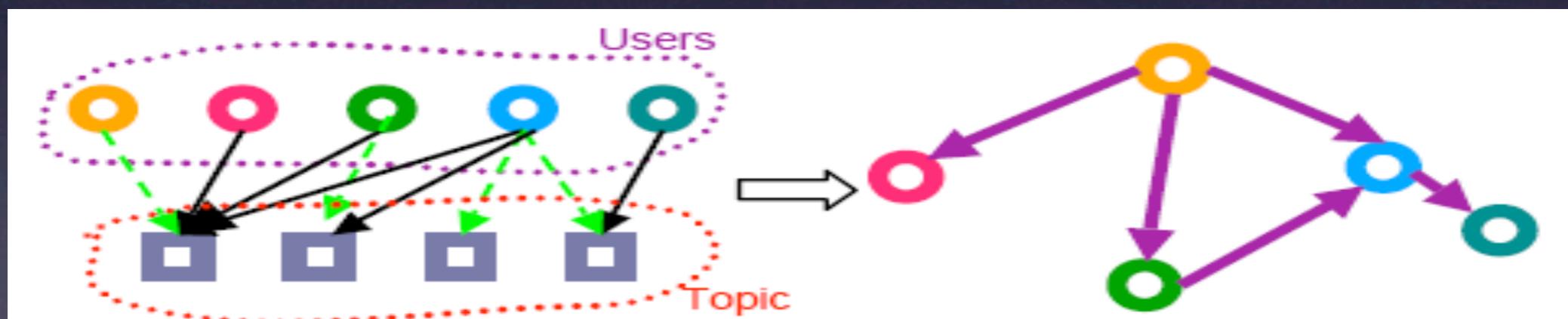
Facebook 2009 Study

“Newcomers may not recognize the value of contribution. [...] We find support for social learning: newcomers who see their friends contributing go on to share more content themselves.

Burke et al: “Feed Me: Motivating Newcomer Contribution in Social Network Sites,” CHI’09

One idea borrowed from **expertise networks in online communities**

- Group = **Directed Graph(V,A)**
- **V** = group members + (?) RSS feeds
- **i → j** if **j** comments on **i**'s initial posting



CEN: Communities Expertise Networks

→ CEN: Communities Engagement Networks

- Given a CEN, consider the distributions of
 - the indegree (prestige) - engaging more is more prestigious
 - the outdegree - initiating the dialogue
- For CENs large enough, such distributions usually follow a **power law distribution**

$$P(d_{in}) \propto d_{in}^{-\alpha}$$

$$P(d_{out}) \propto d_{out}^{-\beta}$$

⇒ Group propensity score = $F(\alpha, \beta)$

- Alternatively, similar results can be obtained by considering the distance between the node distribution and the uniform distribution
- Group propensity score = $F(!, ")$

where

- $! = \text{dist}(P(d_{in}), U(d_{in}))$
- $" = \text{dist}(P(d_{out}), U(d_{out}))$
- $U(d) = I / |V|$

Case 6

Network visualization

The Open Graph Viz Platform

Gephi is an interactive visualization and exploration platform for all kinds of networks and complex systems, dynamic and hierarchical graphs.

Runs on Windows, Linux and Mac OS X. Gephi is open-source and free.

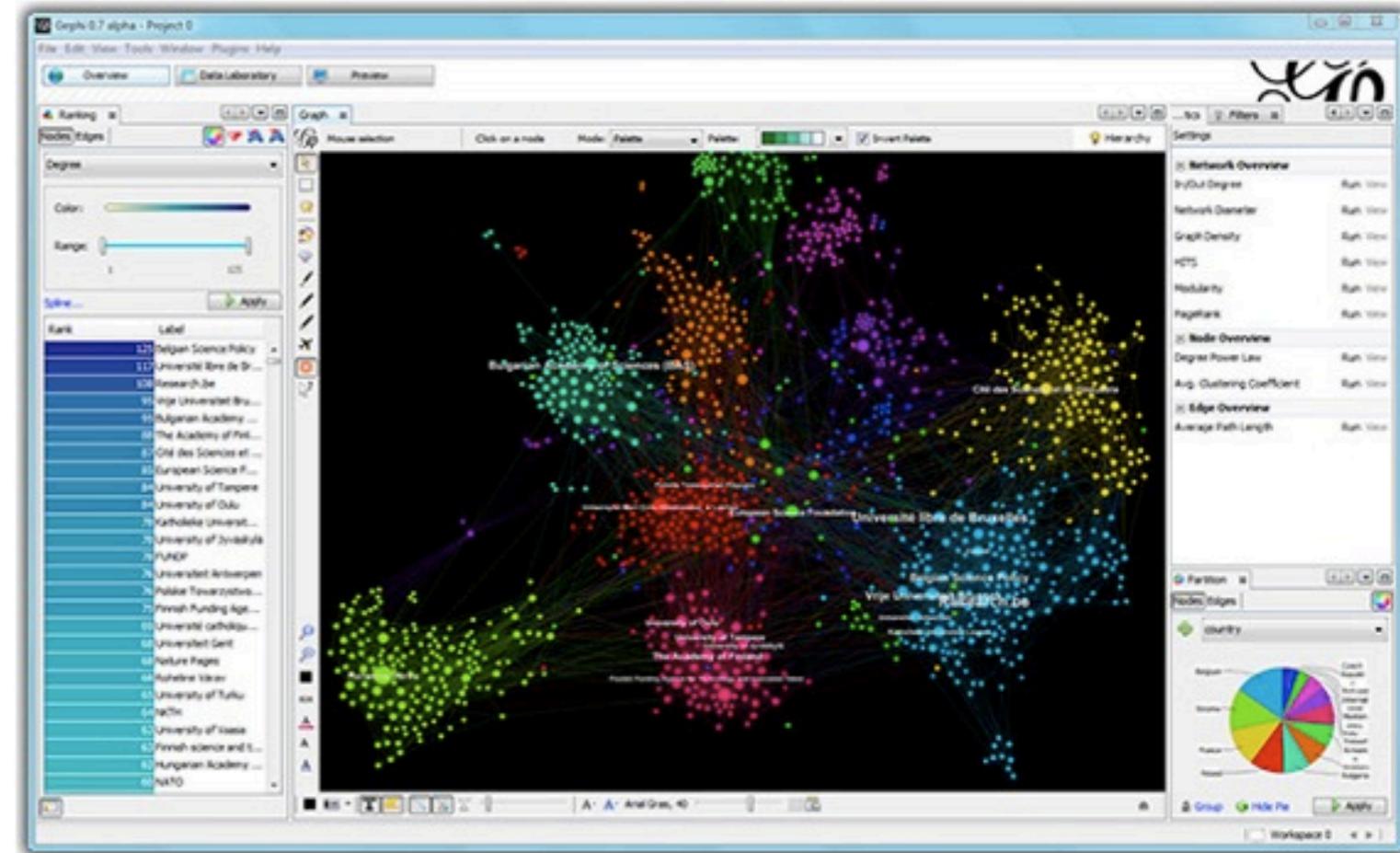
[Learn More on Gephi Platform »](#)



[Release Notes](#) | [System Requirements](#)

► [Features](#)
► [Quick start](#)

► [Screenshots](#)
► [Videos](#)



Gephi 0.7 beta is out! Congratulations to the core developers and the Google Summer of Code students. It brings many awaited features, complete support for longitudinal networks, and fixes more than 80 bugs!

[Learn More »](#)

Mathieu Bastian 

Data Scientist at LinkedIn

San Francisco Bay Area | Computer Software

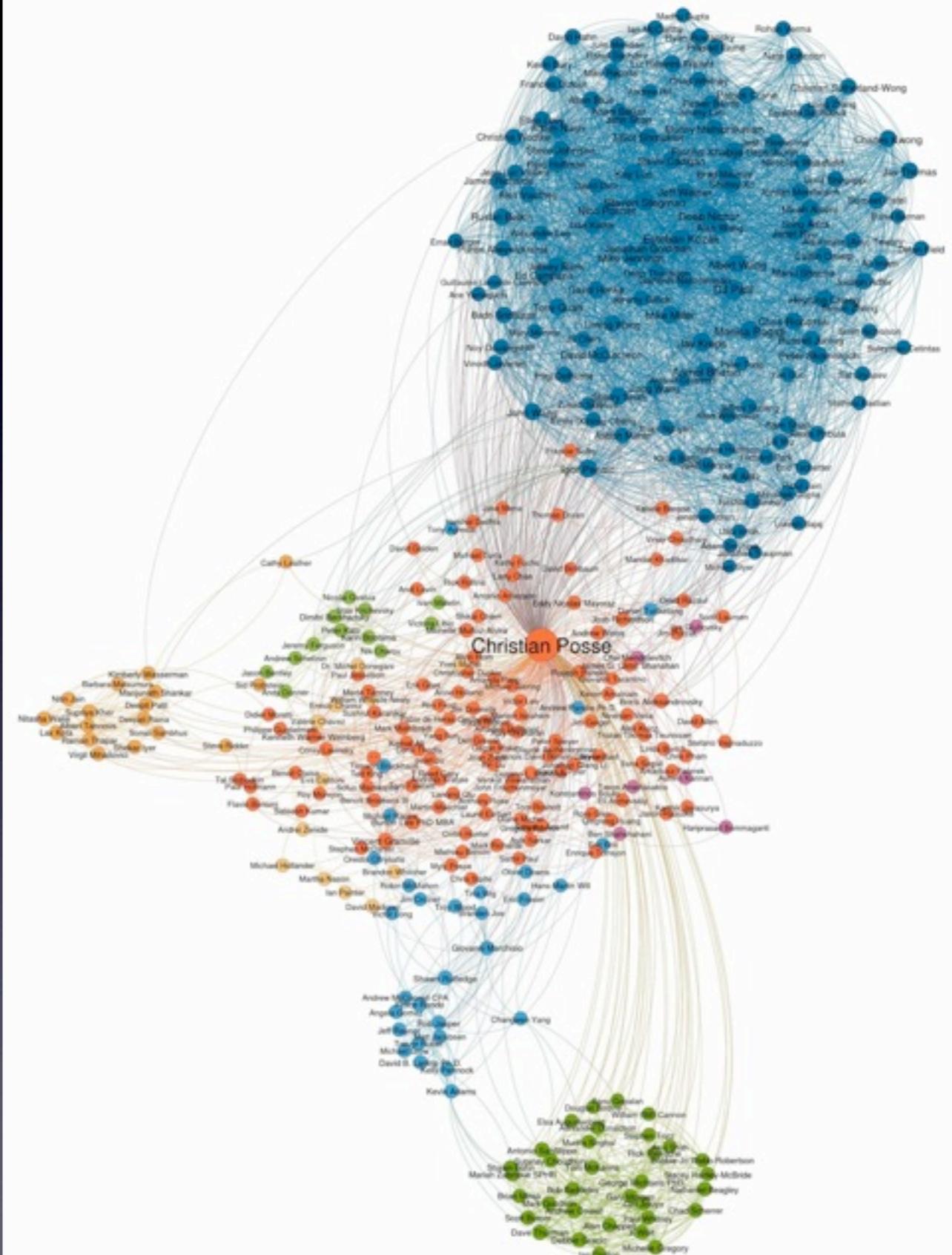


Blondel V, Guillaume J, Lambiotte R, Mech E (2008) Fast unfolding of communities in large net- works. *J Stat Mech: Theory Exp* 2008:P10008.

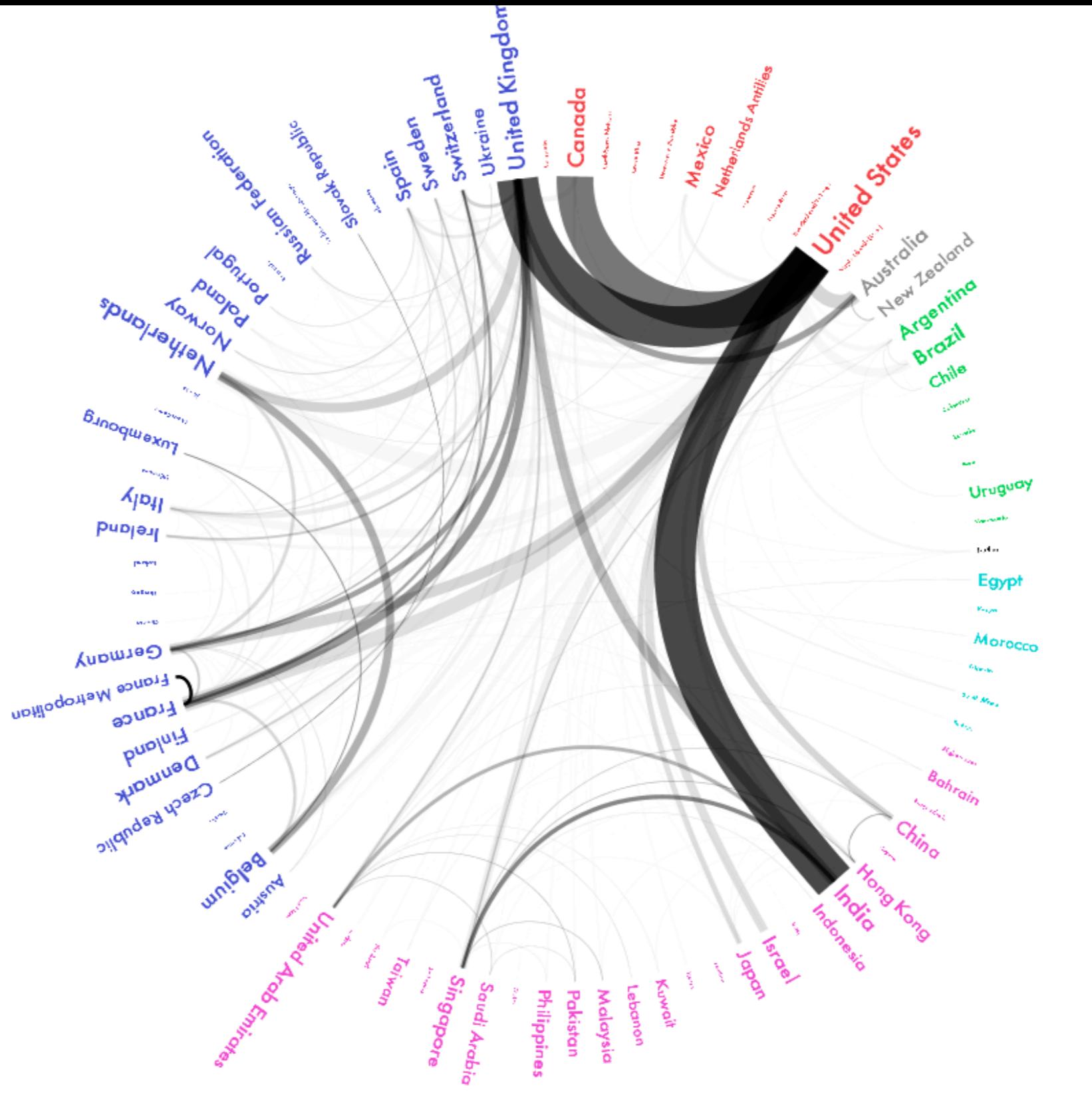
Coming soon!

as of December 12, 2010

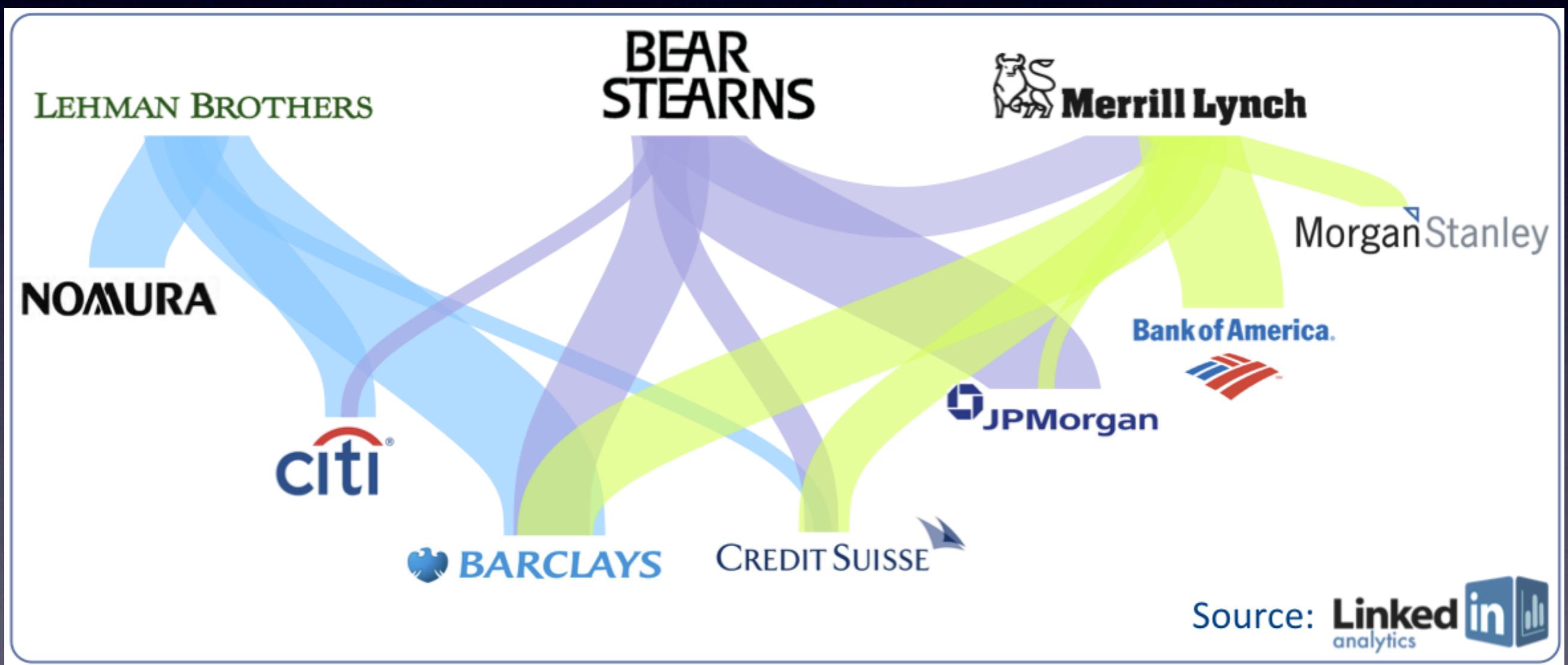
Christian Posse's Professional Network



Block Modeling Analysis



Evolution of communities



Thank You!

