Social Capital
in Online Communities
PhD Proposal

July 27, 2009

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DML
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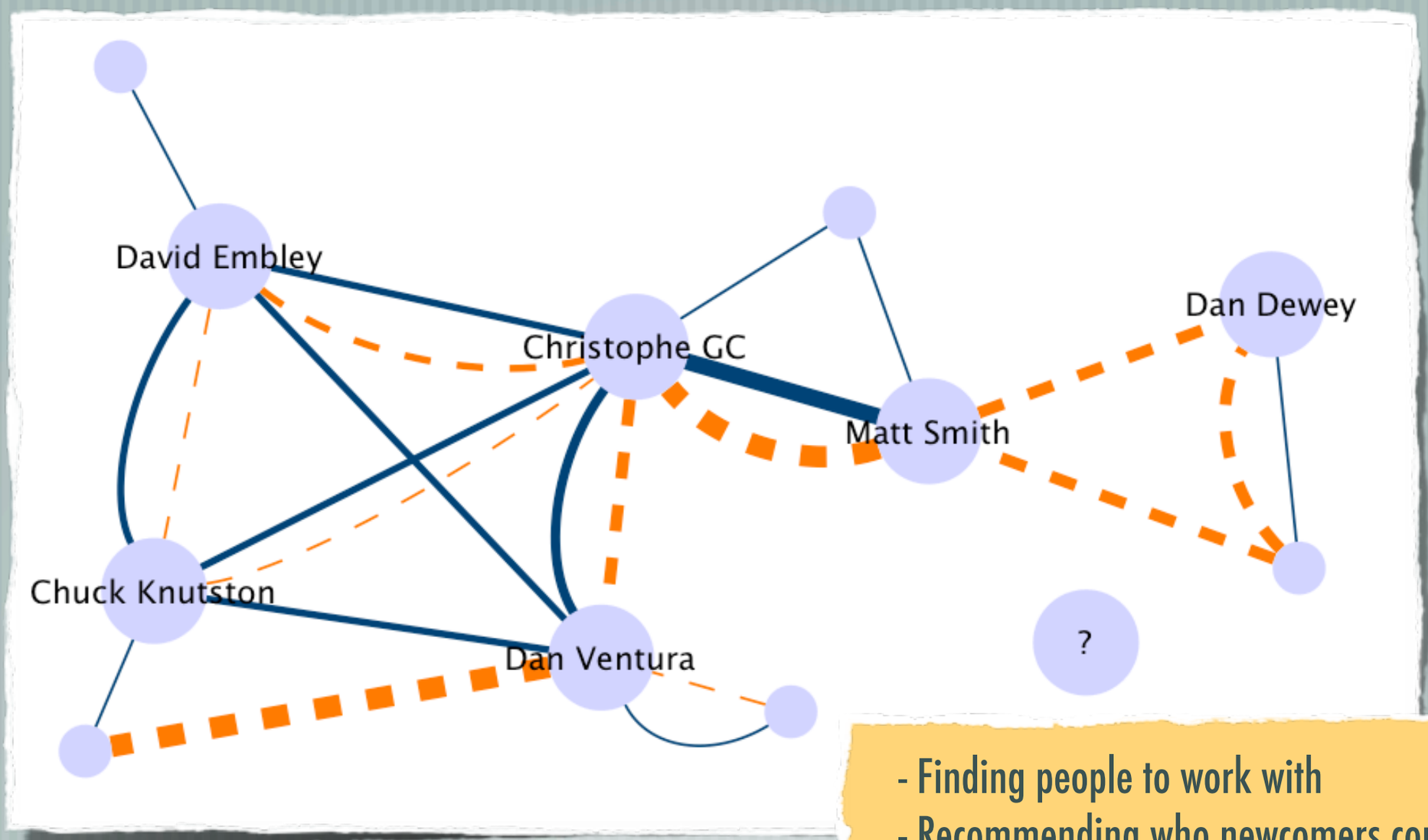
Introduction

- Online communities
- Prevalent shift in how people discover information
- Social networks dynamic and complex
- Social capital within these networks is poorly understood
- Rich social network data now available

Motivation



- Finding people to work with
- Recommending who newcomers could connect with
- Understanding how groups of people evolve

- What influence does an individual have upon online friends in terms of mobilizing them to act?
- Who should one connect with in order to gain access to additional resources?
- Which individuals tend to effectively mobilize social resources?
- How heterogenous is the network and what bo/bridging opportunities exist?

Overview

- Project Description
  - Modeling
  - Experimental Areas
- Validation - Experiments
- Conclusion

Modeling

1. Use relationships, attributes, and social resources
2. Identify set of measurable social resources
3. Formalize notion of accessible/mobilized social resources
4. Run experiments to validate formal SC models

Data Availability

- Social networking data generated at unprecedented level
  - Popular sites: Facebook, MySpace, LinkedIn, Blogger, and Twitter
  - Millions of users are contributing to these sites everyday
  - Includes ESN, IAN, and some potentially measurable social resources
- Data available for public consumption
  - Most Twitter data is available, public Blogs are entirely available
  - Personal Facebook data is available – more may become more available

Project Description

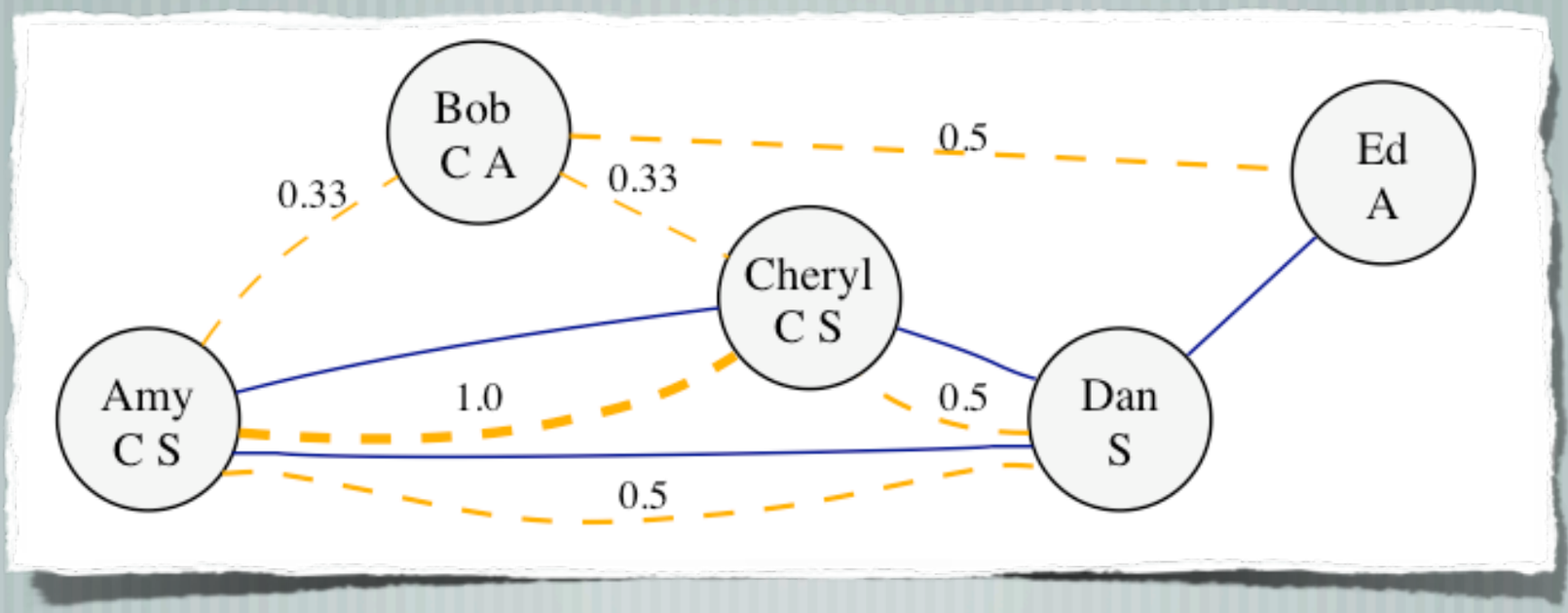
Modeling so far...

- Has focused on: relationships and attributes
- The distinction between potential and realized SC
- Bonding and bridging SC are not reciprocal (Putnam's Puzzle)
- The model is applied to some available community data

Work Published in ITM Journal
Smith M., Giraud-Carrier C., Purser N. (2009)

Potential vs Realized Social Capital

ESN Link \ IAN Link	Yes	No
Yes	Realized Bonding	Realized Bridging
No	Potential Bonding	Potential Bridging



Potential Bonding & Bridging

Individual

$$pb(i) = \sum_{j \in N, j \neq i} s_{ij}^{IAN}$$

$$pbr(i) = \sum_{j \in N, j \neq i} (1 - s_{ij}^{IAN})$$

Network

$$pb = \frac{\sum_{i \in N} pb(i)}{2}$$

$$pbr = \frac{\sum_{i \in N} pbr(i)}{2}$$

Realized Bonding & Bridging

Individual

$$b(i) = \sum_{j \in N, j \neq i} s_{ij}^{IAN} s_{ij}^{ESN}$$

$$br(i) = \sum_{j \in N, j \neq i} (1 - s_{ij}^{IAN}) s_{ij}^{ESN}$$

Network

$$b = \frac{\sum_{i \in N} b(i)}{2}$$

$$br = \frac{\sum_{i \in N} br(i)}{2}$$

Normalized Metrics

Potential (normalized by possible connections among individuals)

$$npb = \frac{2}{N(N-1)}pb \qquad npbr = \frac{2}{N(N-1)}pbr$$

Diversity
metric could be used to compare network diversity without regard to network size

Realized (normalized by potential)

$$nb = b/pb \qquad nbr = br/pbr$$

Realized
the potential social capital realized within the network

Social Resources

- Material Goods
  - land, houses, car, and money
- Symbolic Goods
  - education, memberships in clubs, honorific degrees, nobility or organizational titles, family name, reputation, or fame

From: Lin 2001, Social Capital: A Theory of Social Structure and Action

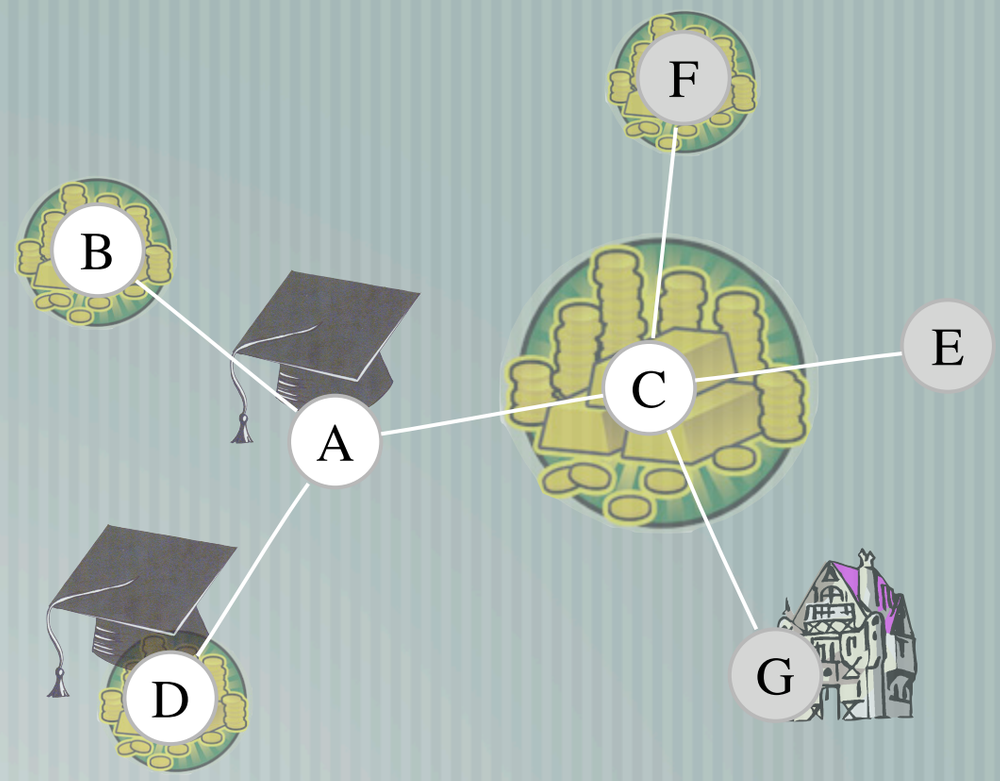
Social Resources

Why?

- Measure obtainable benefit

How?

- Identify set of measurable social resources accessible within online communities (e.g., web traffic, comments, group affiliations, education, net worth)



Validation - Experiments

Language Acquisition Experiment

- Apply the proposed SC models on Language Acquisition (LA) studies (currently being performed by the BYU Linguistics department)
  - Studies centered upon effects of social networks
  - They will use traditional social scientific approaches while we analyze independently
- Analyses will then be compared and contrasted

Twitter Experiment #1

- Generate *j* ego networks (for an assortment of individuals where relative bonding/bridging is known, or at least agreed upon by *k* individuals)
- Model individual social capital
- Compare results using the non-parametric Mann-Whitney rank-sum test

Twitter Experiment #2

- Setup a set *A* of new Twitter accounts
  - Each assigned following strategy: random, maximize bonding, maximize bridging, having b. and br. nearest 50%
  - Accounts will behave identically (except for their following strategy)
- Let U, be a set of sampled Twitter users (from the public timeline)
  - Status updates for these users will be collected
- Compare stats: followers, click-thrus, website click-thrus, b. & br. capital
- Test if choosing a b./br. strategy produces significantly higher returns

Medical Blogs Experiment

- Select *m* known medical blogs to seed a network focused on a particular ailment (e.g., autism, alcoholism, cancer)
- Extend network of study (to the ESN *n* degrees of freedom away from the seed blogs)
- Track ESN and IAN overtime – analyze using the proposed quantitative network SC modeling
- Identify meaningful qualitative examples

Conclusion

Conclusion

- Mathematical model of social capital that incorporates
  - prior social sciences research
  - explicit social network, implicit affinities, social resources
  - rich online data providing opportunities to validate
- Offers new and novel social network analytics

Questions & Comments

Ask me now:

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Additional Slides

Approximate Schedule

March-April 2009	Submission of proposal to advisor (first and second drafts)
May-Jun 2009	Submission of proposal to committee members (final draft)
Jun 2009	Schedule Dissertation Proposal
May-Jun 2009	Collect relevant data for Twitter and blog experiments
	Develop social capital modeling and research
	Assist in developing language acquisition experiments
July-September 2009	Perform Twitter and blog experiments
September 2009	Perform analysis on language acquisition study
	Perform analysis on Twitter and blog experiments
October 2009	Prepare dissertation with latest results and findings
December 2009	Submit dissertation to advisor (first and second drafts)
January 2010	Submit dissertation to committee members (final draft)
February 2010	Schedule Dissertation Defense
March 2010	Dissertation Defense

Publications

Smith, M., Giraud-Carrier, C., and Purser, N. (2009). **Implicit Affinity Networks and Social Capital**. Information Technology and Management Journal. Springer.

Smith, M. (2008). **Social Capital in Online Communities**. In PIKM '08: Proceeding of the 2nd PhD workshop on Information and knowledge management, pages 17-24, New York, NY, USA. ACM.

Smith, M., Purser, N. and Giraud-Carrier, C. (2008). **Social Capital in the Blogosphere: A Case Study**. In Papers from the AAAI Spring Symposium on Social Information Processing, K. Lerman et al. (Eds.), Technical Report SS-08-06, AAAI Press, 93-97.

Potential Papers

Submission Date	Description
Jun 2009	*Twitter Capital*
	WBBTmine: Wikis, Blogs, and Bookmarking Tools (ECML/PKDD)
Nov 2009	*Measuring Social Resources in Online Communities*
	SBP: Social Computing, Behaviour Modeling, and Prediction
	WWW: World Wide Web Conference
Jan 2010	*Social Capital through Social Media*
	ICWSM: Conference on Weblogs and Social Media
	KDD: Knowledge Discovery and Data Mining
May 2010	*The Latent Value in Social Networks*
	SocialCom: IEEE International Conference on Social Computing
	SNA-KDD: Social Network Mining and Analysis