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UNDERSTANDING USER INTERACTION PATTERNS IN HEALTH SOCIAL MEDIA

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Health Social Media

- Social media is used for health purposes by professionals and consumers…
  - Communicating health information
  - Sharing social support
  - Connecting with each other
- Significance of studying e-patient interactions
  - Reports show that internet use for health information is growing (Kielstra, 2009; PEW Research Ctr, 2006, 2009, 2010)
  - Online intervention programs are designed with social media features (i.e. Quitnet uses Facebook)

Online Health Social Networking

41%

read patient blog,
health newsgroup, or
health website

*"e-patients are looking for a
sense of community"*

-Wright & Bell, 2003

39%

used social
networking site

*"e-patients are looking for 'just-in-time
someone-like-me" health information"*

- Boase et al, 2006; Fox & Jones, 2009

12%

shared updates or
viewed updates

***E-patient*:** internet user that is looking for health information

Online Support Communities

- A support community is a place where individuals can share social support
  - Social Support = support that occurs through interactions, i.e. encouragement, advice, etc
- Members of the community
  - 'E-Patients' = internet users who seek, share, and create information about health
  - Typically 18 – 49 years of age.
  - Connect with "just-in- time, someone-like-me"
    - Consulting blog comments, doctor reviews, and podcasts
    - Posting comments, reviews, photos, audio, video or tags related to health care
    - Teaching each other about conditions and treatments.

Outline

1. Purpose

2. Significance

3. Approach

Purpose of Study

- Research Objectives
  - Reveal user interaction patterns in an online support community using Information Science techniques
    - Content of publicly exchanged messages between members
    - Relationship strength among members
  - Compare the interaction patterns among social media features
    - Three CMC formats - Forums, Journals, Notes
   - Different controls for access to write and read messages

Significance of Study

- Fill limitations in previous work
  - There are different types of relationship ties
  - CMC formats have different features
- Expand scholarly literature
  - More focused: compare CMC formats of **within** one online community
  - Use mixed techniques to find new patterns

Motivation for Research

(1) Different types of relationships (i.e. social roles)
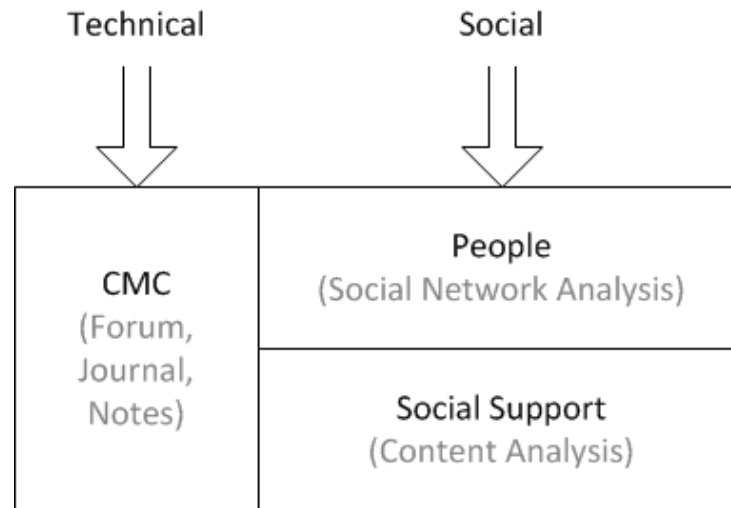
"The building blocks of a community"
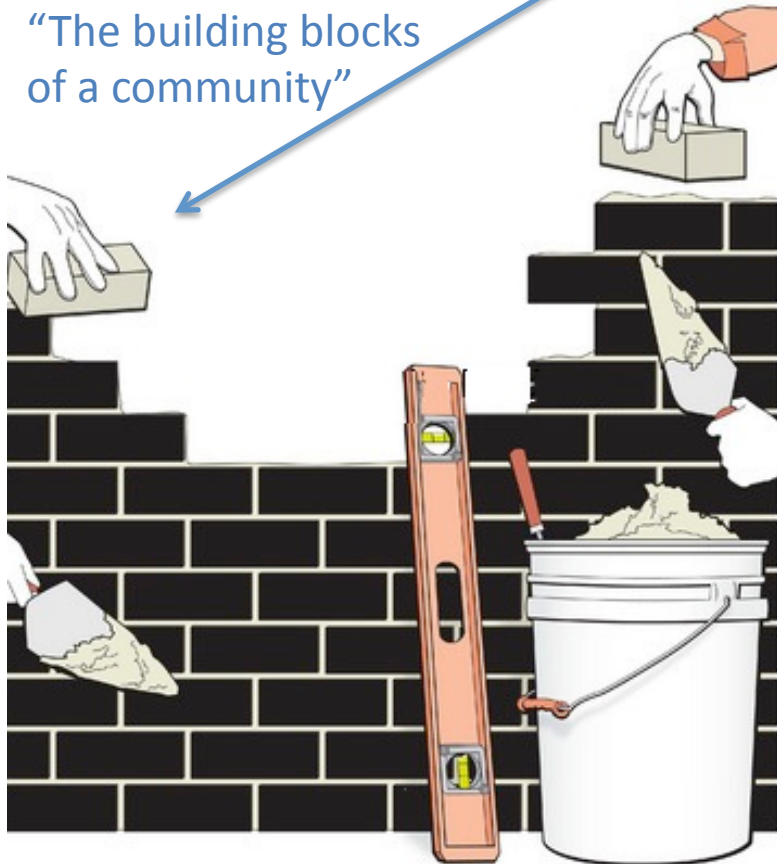
(2) CMC formats have different features

"The glue that holds the community together"

(3) Measure both together

Research Framework = Technical and Social factors

Online communities are a combination of technical and social factors (Latour, 1992; Preece, 2000).

Members communicate through text-based computer mediated communication (CMC) formats.
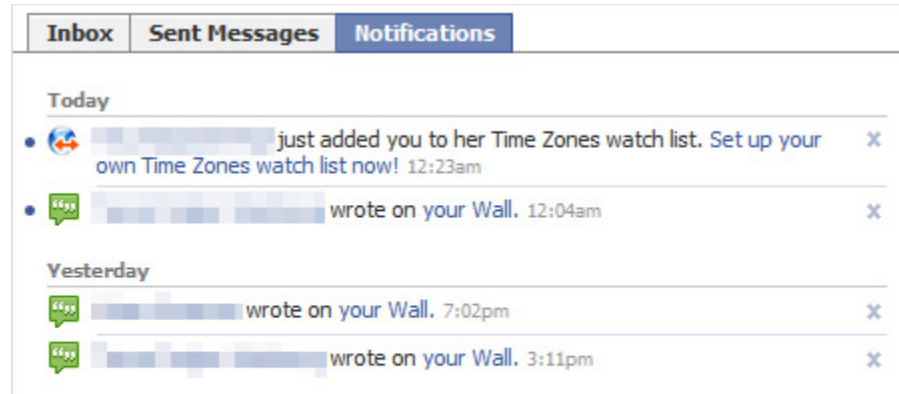
Support communities are composed of people who are building relationships and exchanging social support.

Social Networking Site Features

"Friending enables users to form and maintain connections"

- Ahn et al, 2007

Inbox | Sent Messages | **Notifications**

Today

- just added you to her Time Zones watch list. Set up your own Time Zones watch list now! 12:23am

- wrote on your Wall. 12:04am

Yesterday

wrote on your Wall. 7:02pm

wrote on your Wall. 3:11pm

"Private and public messaging allow for interpersonal communication"

- Thellwall & WIlkinson, 2010

"SNS users expect to gratify their social-emotional needs"
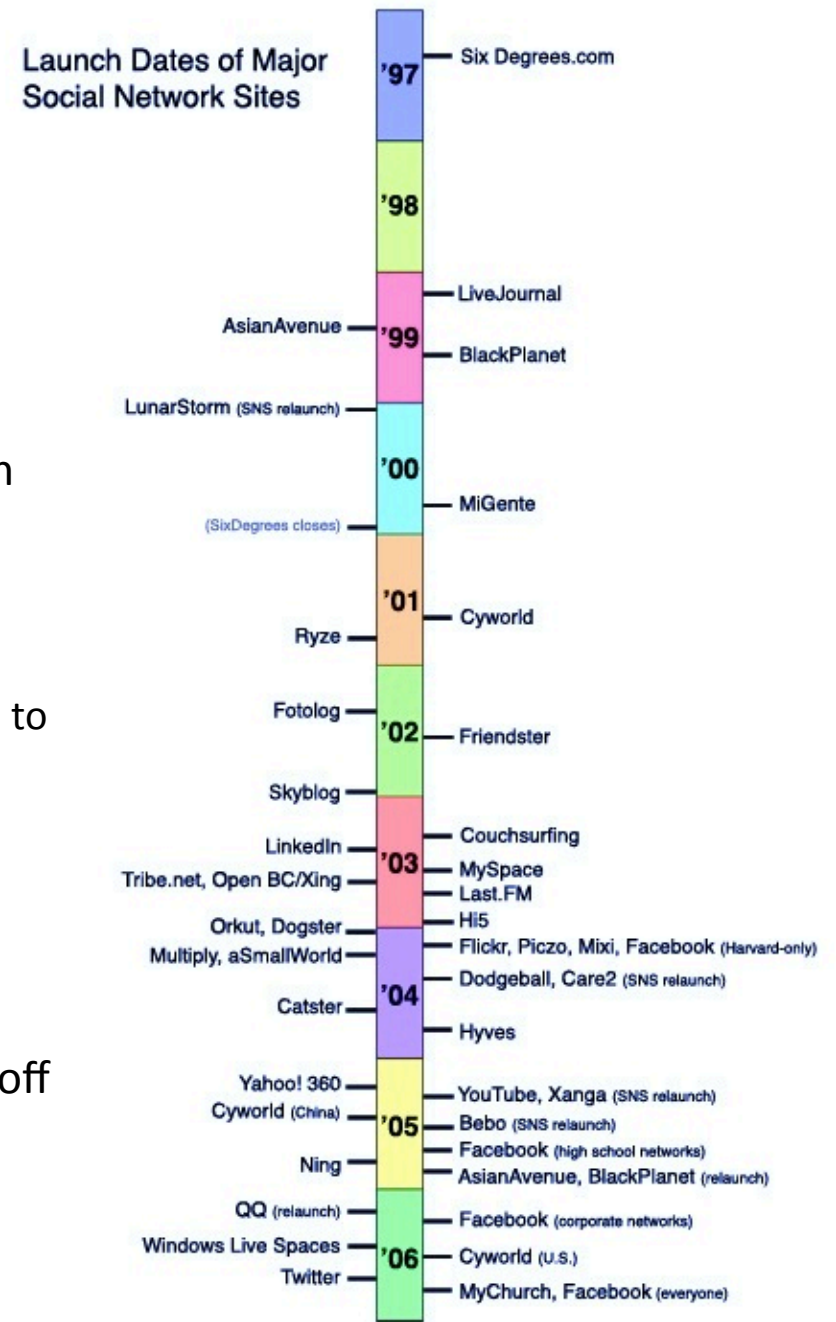
- Rau et al, 2008

"Positive comments are observed between MySpace friends"

-Thelwall & Wilkinson, 2010

Technical Trajectory – Social Network Sites

- Social media allows quick publishing
  - Photos, audio, video, etc
  - Easy to keep in touch or share information
- Evolution…
  - Started with UseNet (i.e. newsgroups).
    - No centralized servers for storing information nor dedicated administrators to moderate.
  - Two emerging tracks: RSS/BB & Dating sites
  - Merged in 2000s, more social features added
    - real-time status updates
    - news feed showing friend activity
- Niche communities allow building community off interests

(Boyd & Ellison, 2007)

Launch Dates of Major Social Network Sites

Year	Left entries	Right entries
'97		Six Degrees.com
'98		
'99	AsianAvenue	LiveJournal / BlackPlanet
'00	LunarStorm (SNS relaunch) / (SixDegrees closes)	MiGente
'01	Ryze	Cyworld
'02	Fotolog	Friendster
'03	Skyblog / LinkedIn / Tribe.net, Open BC/Xing	Couchsurfing / MySpace / Last.FM / Hi5
'04	Orkut, Dogster / Multiply, aSmallWorld / Catster	Flickr, Piczo, Mixi, Facebook (Harvard-only) / Dodgeball, Care2 (SNS relaunch) / Hyves
'05	Yahoo! 360 / Cyworld (China) / Ning	YouTube, Xanga (SNS relaunch) / Bebo (SNS relaunch) / Facebook (high school networks) / AsianAvenue, BlackPlanet (relaunch)
'06	QQ (relaunch) / Windows Live Spaces / Twitter	Facebook (corporate networks) / Cyworld (U.S.) / MyChurch, Facebook (everyone)

Health Social Networking

- Social Networking Site (SNS)
  - a networked virtual space, registered users can create profiles & content
- Health Context…
  - Resource to help patients and caregivers to cope with health issues
    - Information resources
    - Similar patients
  - Hundreds of communities
    - Cancer, pregnancy, mental health, substance abuse, etc.
  - More features than old software:
    - Bulletin Boards (BB), email lists, discussion boards, blogs, etc.
    - 'Friending' and status updates, notes

Social Trajectory – Online Support Communities

Author	Data	Type
Preece (1999)	Torn Knee Ligament	Email List
Braithwaite et al (1999)	"Support Network"	Email List
Bambina (2007)	Support OnLine Cancer Forum	Email List (stored online)
Meier et al (2007)	10 cancer mailing lists	Mailing lists
Pfiel & Zaphiris (2007)	Depression/Seniors	Bulletin Board
Cunningham et al (2008)	Alcoholism	Bulletin Board
Eichhorn (2008)	Eating Disorder msg boards	Yahoo Discussion Groups
Coursaris & Liu (2009)	HIV/Aids	Bulletin Board
McCormack (2010)	Anorexia Bulletin Board	Bulletin Board
Selby et al (2010)	Smoking cessation	Web assisted tobacco intervention, bulletin board

Previous Research

- Bulk of previous research comes from different perspectives
  - Issues that concern Health Professionals
  - Issues that concern E-Patients
  - Issues that concern Health Informatics

- There are still gaps
  - Identifying link between social structure and supportive behaviors in social media

1. Issues Concerning Health Professionals

- Information Quality
  - Medical Information & Accuracy (i.e. webMD)
  - Experiential Knowledge, expert patients (online support groups)
- Health outcomes & evaluations
  - Behavior change through social support
  - Behavior targeting with social media
- What social content do users share with each other in an online support community?

2. Issues relating to E-Patients

- Participation influenced by social-psychological reasons…
  - information needs, desire to be altruistic, stigmas
  - Social Roles (i.e. caretaker, patient, nurse, friend, etc) or personal values.
- The more time people spend in an online group, the larger their online social network and the higher the satisfaction with the received support .
  - are a great source of social support from compassionate people who may have had similar experiences.
- How is social support influenced by an individual's social network structure?

3. Issues Concerning Health Informatics

- Main Focus: designing EHR, databases systems, or expert systems

- Patient communities:
  - identified patient expertise
  - support types from discussion forums
  - collective patient data.

- How can online support communities address social-emotional needs through software features?

Some Gaps in Related Research

- Computer-Mediated Communication (CMC) format differences in Social Media
  - Who is a friend? Who can write? read? Where is it stored?
- Identifying link between social structure and supportive behaviors in social media
  - Some users are more active, others lurk
  - Social roles (i.e. spouses, veteran patients, newbies)..
    - relational dynamics of support exchanged from an online support group based on social network site

The Study

Research Question

- RQ1: What social support patterns exist in messages exchanged by members of an online health community?
- RQ2: What social network structure patterns emerge in messages exchanged by members of an online health community?

Objective

- Study the patterns of social support exchanges of 3 CMC formats: Forums, Journals, Notes

Approach

- Descriptive Content Analysis
  - Coding: social support types for each message
- Social Network Analysis
  - Metrics: structural and positional

Medhelp.org

*"**connects people** with the leading medical experts and others who have similar experiences"*

"helping patients find answers to their questions"

"helping patients actively manage their health"

- Founded in 1994
  - Oldest online community
  - Pioneer of online health communities
- 10 mil monthly visitors

Profile Page contains…

- **Forum**: Public Q&A
- **Journals:** Diary Style
- **Notes:** Profile Posts
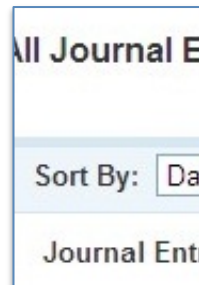

Forum

Journal

Notes

Medhelp Alcoholism Community
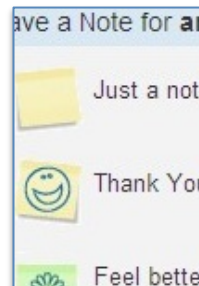
3 Months
June-Sept 2009

Forums (*n = 493*)

- [FP] 81 posts
- [FC] 412 comments

Journals (*n = 423*)

- [JP] 88 posts
- [JC] 335 comments

Notes (*n = 1180*)

Messages contain:
-No support
-Information
-Nurturant
-Both support

Social Support Types

Information: expressions that can directly help the situation

Advice	suggests actions to deal with situation
Fact	reassesses the situation and presents facts.
Personal experience	stories about person's experiences or incidents as a way of presenting information.
Opinion	a view or judgment formed about something, not necessarily based on fact or knowledge
Referral	refers the recipient to a resource

Nurturant: expressions that focus on comfort of recipient

Esteem	positive comments intended to praise support seekers abilities or to alleviate their feelings of guilt.
Network	messages to help support seeker from feeling alone.
Emotional	providing understanding of situation, express sorrow, provide with hope and confidence.

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Part 1: Content Analysis Results

1 – High amount of msgs offered informational support
2 – High amount of msgs offered nurturant support
3 – Low amount of msgs requested supports
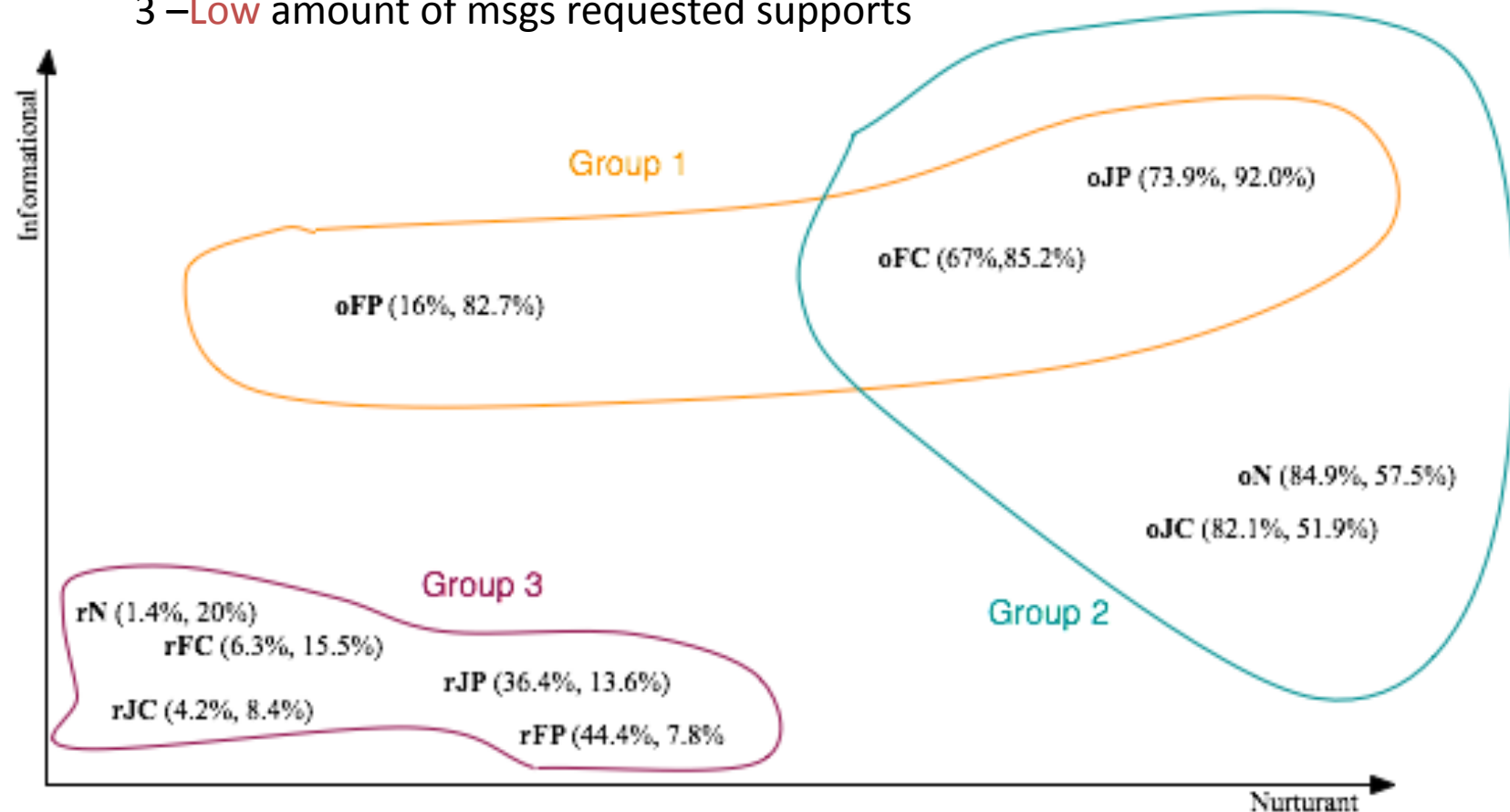
Similar Studies (Nurturant Support)

Year	Author	Data	Architectural Elements	Patterns
1999	Preece	Torn Knee Ligament, 500 msgs, April 1996 – April 1997	Email List	Nurturant > Information (no distinctions)
1999	Braithwaite et al	"Support Network" 42 users, 1472 messages	Email List	EM > EST > NET
2007	Bambina	Support OnLine Cancer Forum 84 members.1149 messages (unmoderated)	Email List	NET > EM
2007	Meier et al	10 cancer mailing lists hosted by the Association of Cancer Online Resources (5 months)	Mailing lists	Nurturant > Information (no distinctions)
2007	Pfiel & Zaphiris	Depression/Seniors	Bulletin Board	NET > EM > EST
2008	Cunningham et al	Alcoholism 10 months; 474 Posts (moderated)	Bulletin Board	EM > EST
2008	Eichhorn	5 Eating Disorder msg boards 490 messages	Yahoo Discussion Groups	EM > NET> EST
2009	Coursaris & Liu	HIV/Aids 5000 messages	Bulletin Board	EM > NET > EST
2010	McCormack	Anorexia Bulletin Board	Bulletin Board	EM > NET > EST
2010	Selby et al	Smoking cessation	Web assisted tobacco intervention, bulletin board	EST > EM

Part 2: Social Network Analysis

- Centrality Measures: gives a rough indication of a person's "connectedness" the network.
  - In Degree: the number of people that talk to him/her
  - Out Degree: the number of people he/she talks to

MedHelp Social Network Structure

The Pearson correlation coefficient was computed for the in-degree and out-degree of users between each pair of CMC formats, for following research hypotheses:

- H1: The in-degree of users in forum is related to the in-degree of users in journal.
- H2: The in-degree of users in forum is related to the in-degree of users in note.
- H3: The in-degree of users in journal is related to the in-degree of users in note.
- H4: The out-degree of users in forum is related to the out-degree of users in journal.
- H5: The out-degree of users in forum is related to the out-degree of users in note.
- H6: The out-degree of users in journal is related to the out-degree of users in note.

	Forum	Journal	Note
Forum (365 active nodes)		H1:Null	H2:0.089
Journal (226 active nodes)	H6:0.736		H3: 0.672
Note (384 active nodes)	H5:03.87	H4:0.148	

Network Structure Results

- Those who receive a message on one format may not receive on another.
- Users are active on different formats

- H1: users receiving messages in forum may not receive in journals
- H2: users receiving messages in forum also likely receive in notes
- H3: users receiving messages in journal is related to users receiving notes
- H4: users posting to forums are likely to also post to journal
- H5: users posting in forums is likely to also post in notes
- H6: users posting in journals is likely to also post notes

Similar Network Structure Studies

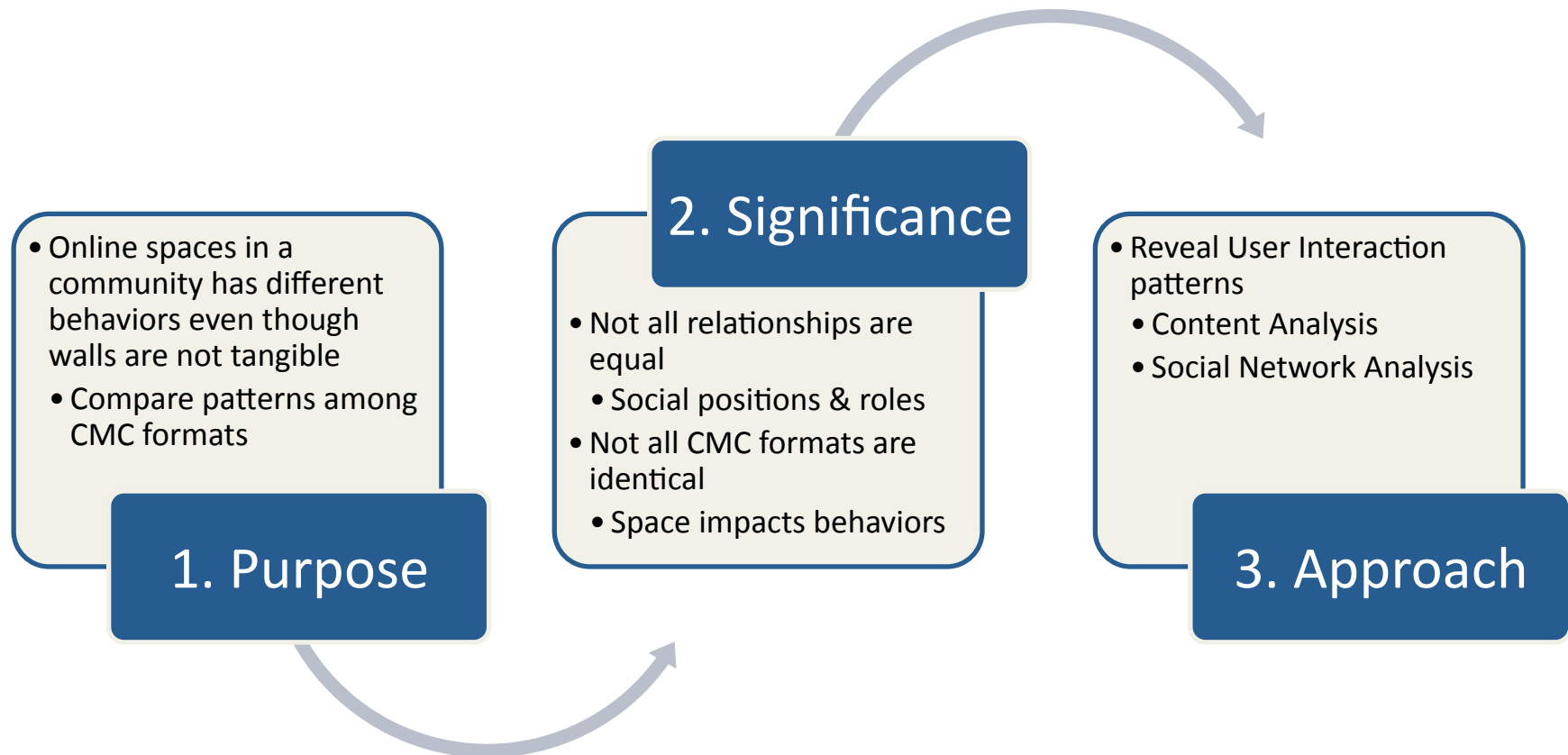| Study	Sample	Messages	Social Network Analysis	Software
Bambina, 2007	Support OnLine Cancer Forum 1st two weeks of March 2000. 84 members.	1149 messages	• Network Centralization in and out degree • Actor centrality in and out degree • Blockmodeling	• UCINET 6 • CONCOR
Chang, 2009	PTT.CC – Psychosis 344 users.	558 posts, 168 threads	• Size • Density • Cliques • Network centralization	• UCINET 6.96
Pfiel & Zaphiris; 2009	SeniorNet – depression 47 members. 6th Aug 2000 - 14th Feb 2002	400 messages	• Density • Inclusiveness • Reciprocity • Cliques	• Cryam NetMiner II, version 2.5.0
Takahashi et al; 2009	Japanese SNS log files Questionnaires 105 participants.	N/A	• Centrality: degree, closeness, betweenness	• UCINET 6.1 • Pajek 1.20

Contributions

- Multiple techniques to find new patterns in use of CMC formats
  - Communication technology design factors
  - Supportive communication behavior
- Focused objectives:
  - Expand Scholarly Literature of alcoholism communities and social support
  - Compares multiple CMC formats **within** an online community (rather than across communities)
  - Support studies of online alcoholism communities

Implications

- Recommendations to design online intervention program

- Promote healthy behaviors

- Show that people still behave in a way parallel to offline world

Summary

1. Purpose

- Online spaces in a community has different behaviors even though walls are not tangible
  - Compare patterns among CMC formats

2. Significance

- Not all relationships are equal
  - Social positions & roles
- Not all CMC formats are identical
  - Space impacts behaviors

3. Approach

- Reveal User Interaction patterns
  - Content Analysis
  - Social Network Analysis

Tentative Timeline