Identifying Cohesive Subgroups in Emergency Response Networks

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Context

National Public Health Emergencies in Korea

- MERS 2015
  - May 20 – December 23
  - 186 confirmed cases
  - 38 deaths

- Response Networks of Organizations
  - 1,395 organizations and 4,801 edges
  - 80% government organizations and 20% non-governmental organizations
  - Average degree: 3.44, but six organizations coordinated with more than 100 others

Motivation

☐ Subgroups matter in disaster response networks

- Can hinder information flow across sub-groups (Comfort & Haase, 2006)
- Develop recurring patterns of interaction in the conduct of disaster operations; important in understanding the constraints on the network (Kapucu et al., 2010)
- Can show lack of cross-jurisdictional, cross-sectoral organization integration (Hossain & Kuti, 2010)

Public organizations tend to interact more frequently with other public organizations in specific geographic locations
(Butts, Acton, Marcum, 2012; Hossain & Kuti, 2010; Kapucu, 2005; Tang, Deng, Shao, & Shen, 2017)

Network Data Source and Collection

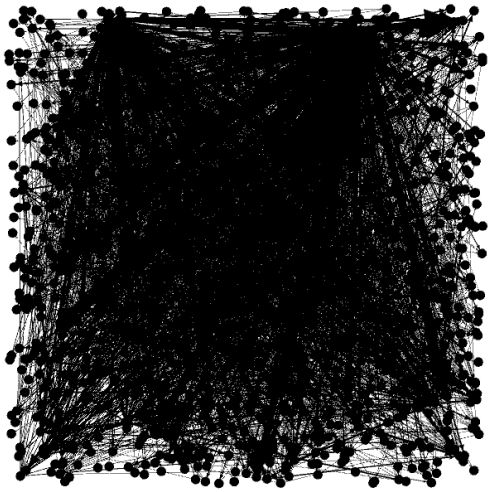
- **News articles during the epidemic (May 20, 2015 ~ December 31, 2015) from four major newspapers in Korea**
  - Collected using an online tool by the Center
  - 6,187 news articles reviewed
- **The MERS White Paper by the government (2016)**
  - 488 pages + appendices
- **All activities and relations in the data sources were collected and multiple cleaning processes were performed between August 2016 and September 2017**

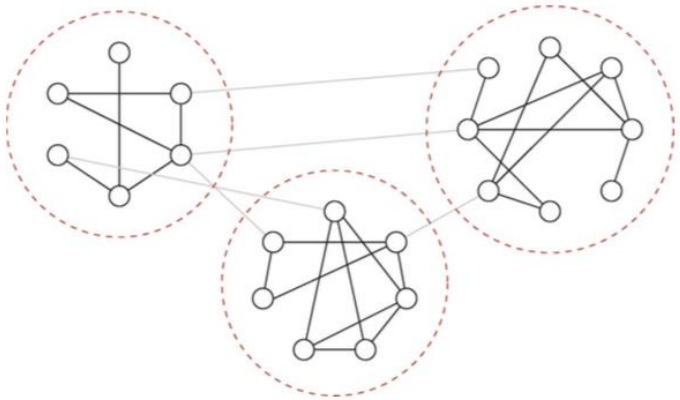
Community Detection

community

- "groups within which the network connections are dense, but between which they are sparser"

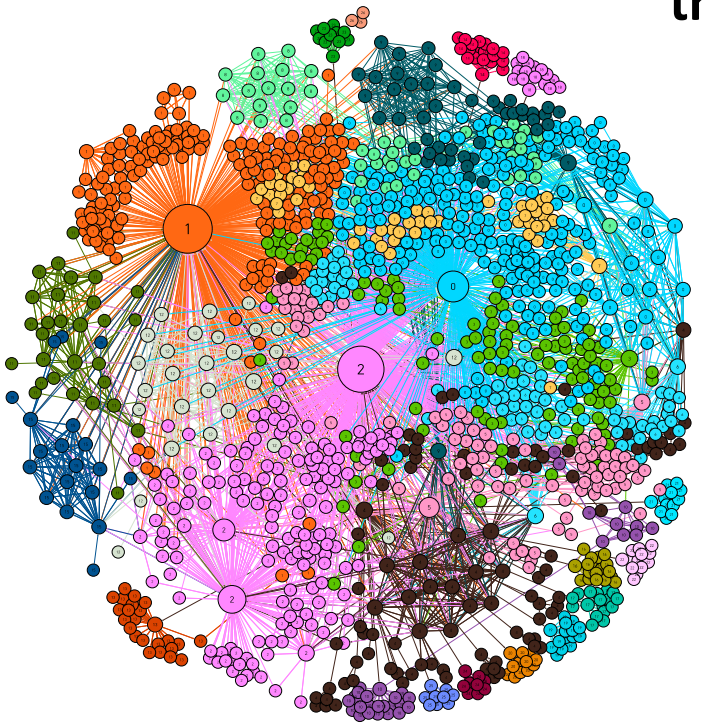
  (Newman & Girvan, 2004, p. 69)



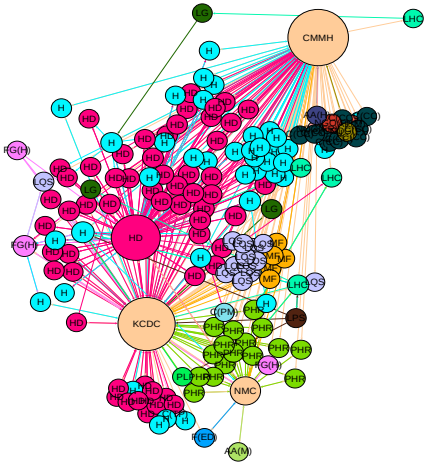


Results

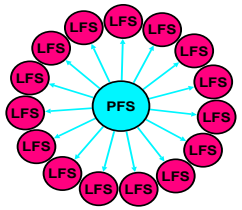
The MERS response network split largely into two groups: *core response communities* in one group and *supportive functional communities* in the other



1,395 organizations and 4,801 edges
27 communities, Q=0.548 (Leiden algorithm)



Community 2
(Led by Health Authorities)



Community 18
(Fire Organizations
in South Chungcheong Province)