

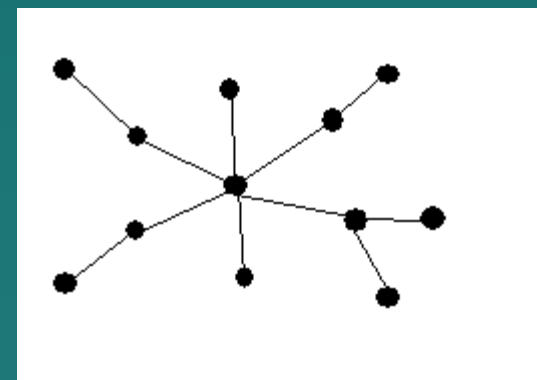
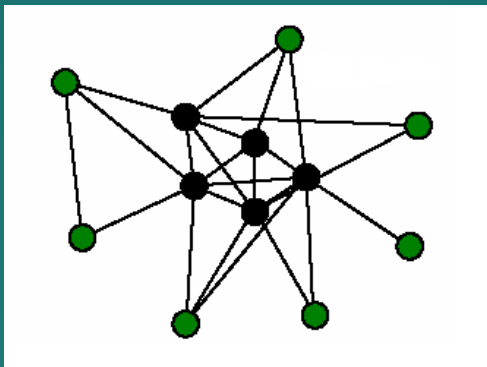
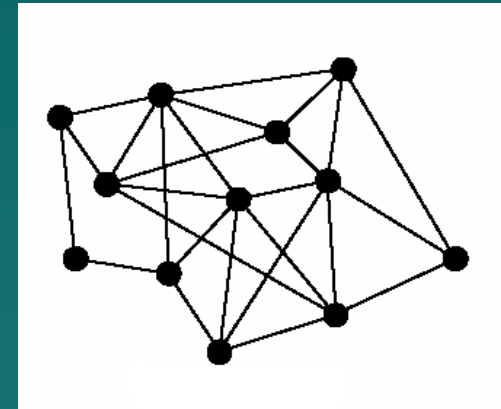
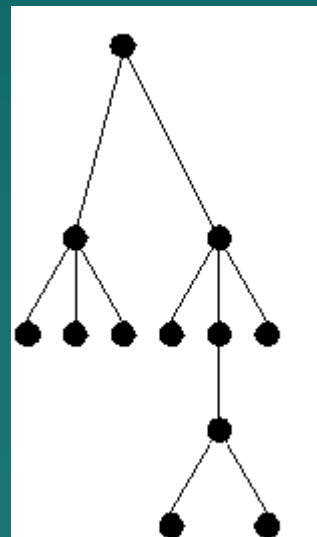
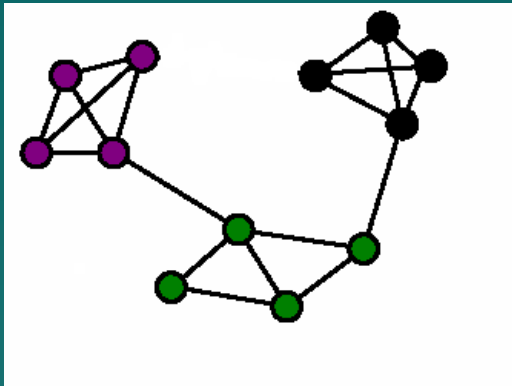
Social Network Analysis

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What is social network analysis?

Individuals are connected to one another in numerous ways. These patterns of connection form a *social space*. Social network analysis maps and analyzes this social space.

Social network analysis identifies the *relational structure* of a social network.

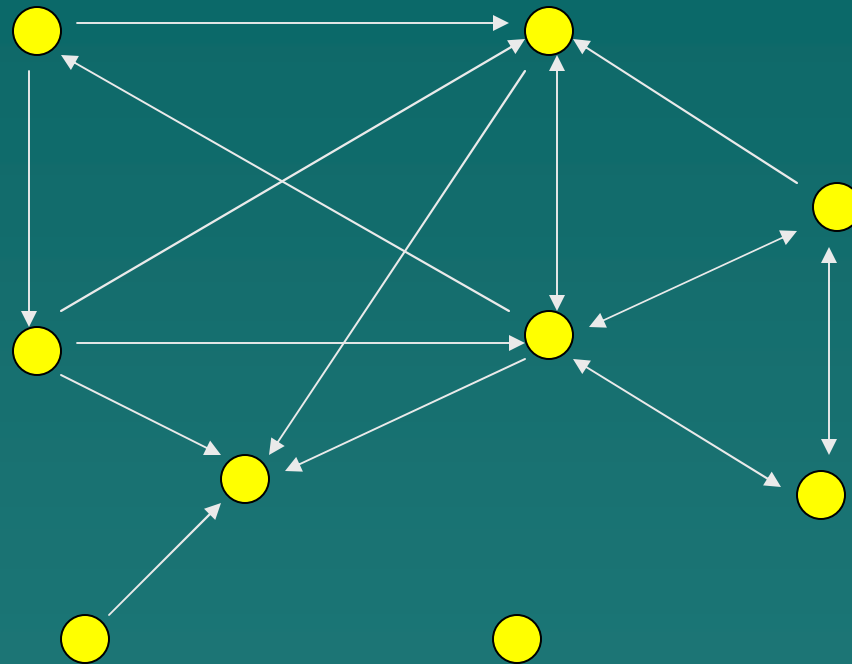


Why social network analysis?

A *huge* advantage of social network analysis is moving beyond individual perception.

Who are the friends of your friends' friends?

A **social network** is a set of actors and the relations among them.



Network Components

- ◆ **Nodes** (i.e. dots) are the actors in the network
 - **Content**
 - ◆ individuals, organizations, groups, etc.
 - **Provide an explicit boundary for the population of nodes**

Network Components

- ◆ **Lines** are the relations or ties between nodes
 - **Content: some form of social interaction**
 - ◆ *Multiplex*: department members, center affiliates, collaborators, play golf together, watch sports together, friends, sought advice, received help from or gave help to, etc.
 - **Strength**: weak \leftrightarrow strong
 - **Direction**
 - ◆ non-directional
 - ◆ directional

Principles of the Network Approach

- ◆ The focus is on the relations between actors rather than attributes of actors
 - Relational ties are transfer points for flow of resources (material and non-material)
- ◆ Actors are assumed to be interdependent rather than independent, autonomous units
- ◆ An actor's *location* in the network presents opportunities and imposes constraints on their behavior

(Barry Wellman 1988; Wasserman and Faust 1994)

Principles of the Network Approach

- ◆ Understanding a social network requires knowledge of all actors and all relations within the network
- ◆ Networks are emergent and dynamic
 - networks arise through social interaction among actors and change over time
- ◆ Networks are comprised of numerous *overlapping* groups

(Barry Wellman 1988; Wasserman and Faust 1994)

Common Research Questions

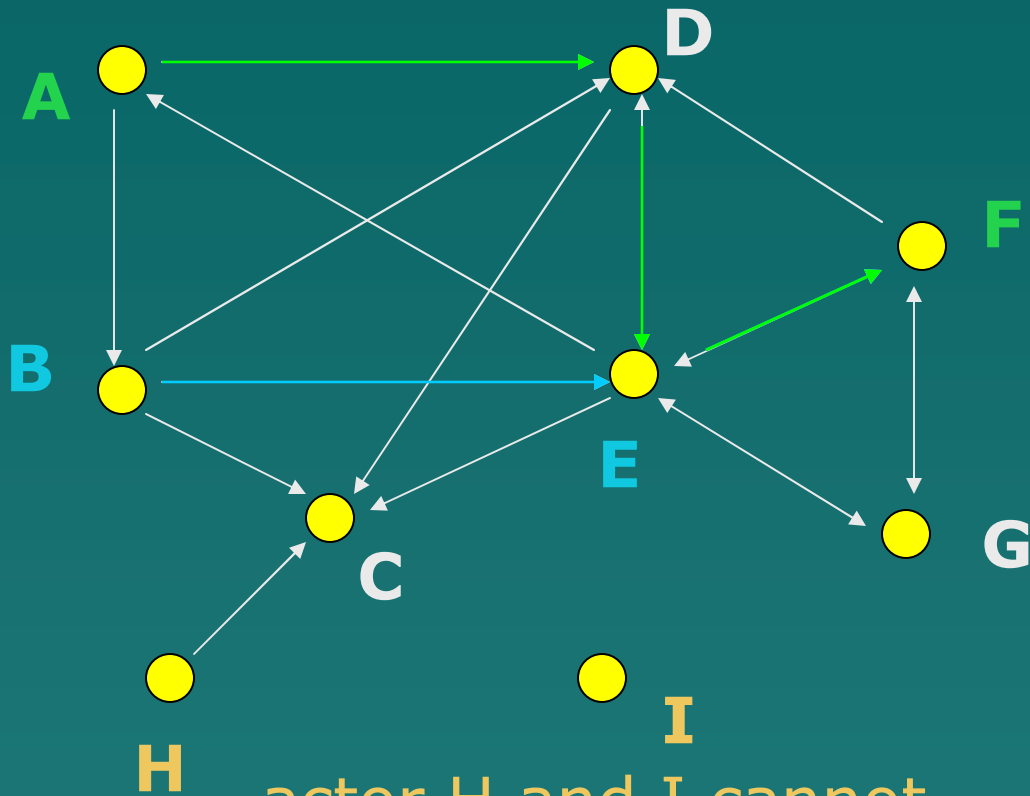
- ◆ How does network structure influence actor behaviors and outcomes?
 - Individual productivity, advancement, satisfaction and well-being
 - Group dynamics and productivity
- ◆ How does network structure or actor location within the network vary across actor attributes?
- ◆ What is the effect of an intervention on network structure?

Conceptual Levels

- ◆ The entire network
 - actor subsets (2 or more actors)
 - dyads, groups, etc.
- ◆ The location of an actor within the entire network or within a subset of actors

Network Concepts

- ◆ **Connectivity**: the degree to which actors in one part of the network are connected to actors in another part of the network
 - **Reachability**
 - ◆ Can actor A reach actor B?
 - **Distance**
 - ◆ If reachable, how far away?
 - **Independent paths**
 - ◆ If reachable, how many different ways?

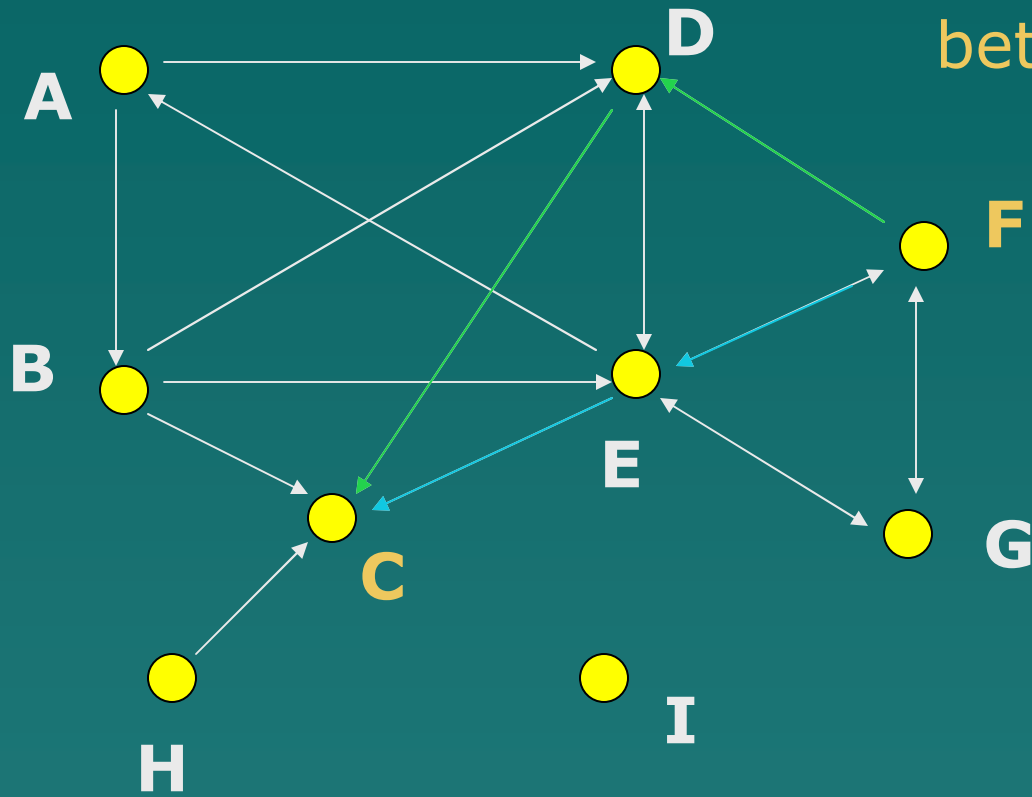


distance between actor A and F = 3

distance between actor B and E = 1

actor H and I cannot reach one another

independent paths
between C and F = 2



What is the probability a resource will pass from one actor to another?

- ◆ actors must be *reachable*
 - direct or indirect connection
- ◆ the probability *declines* as the *distance* between actors increases
 - one, two, three or four steps away
- ◆ the probability *increases* as the number of *independent paths* between actors increase
 - one, two, three or four independent paths

Who has more access to resources?

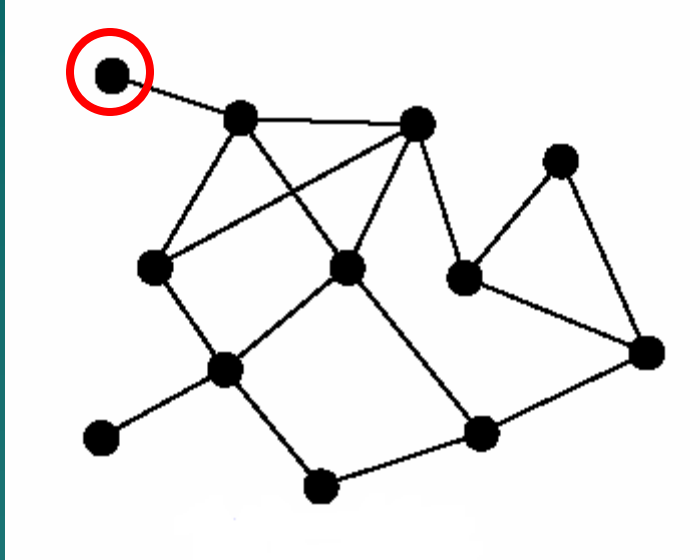
- ◆ actors with a larger number of reachable actors in their network
- ◆ actors with a shorter average distance to all reachable actors
- ◆ actors with a higher average number of *independent paths* to all reachable actors

Who are you connected to?

Network Concepts

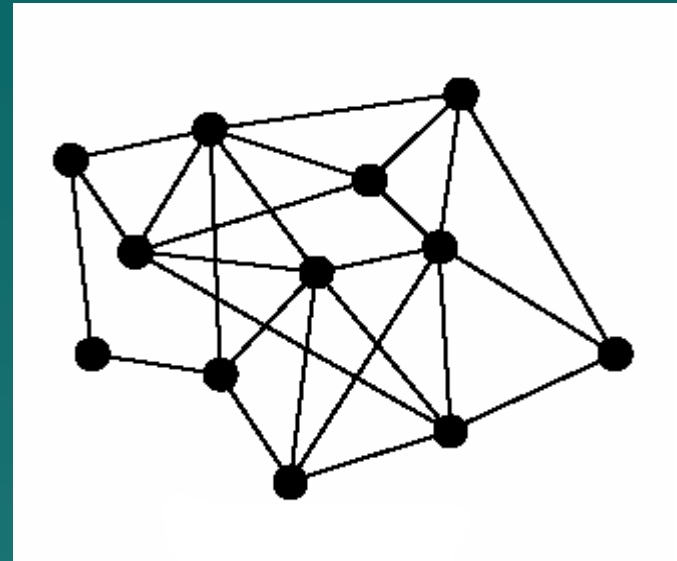
- ◆ **Cohesion:** the degree to which actors are interconnected within the network
 - **Density**
 - ◆ the number of possible ties that are actual ties within the entire network or a subset of actors in the network

Department A
Density=25%



mistrust and instability

Department B
Density=40%



trust and cooperation

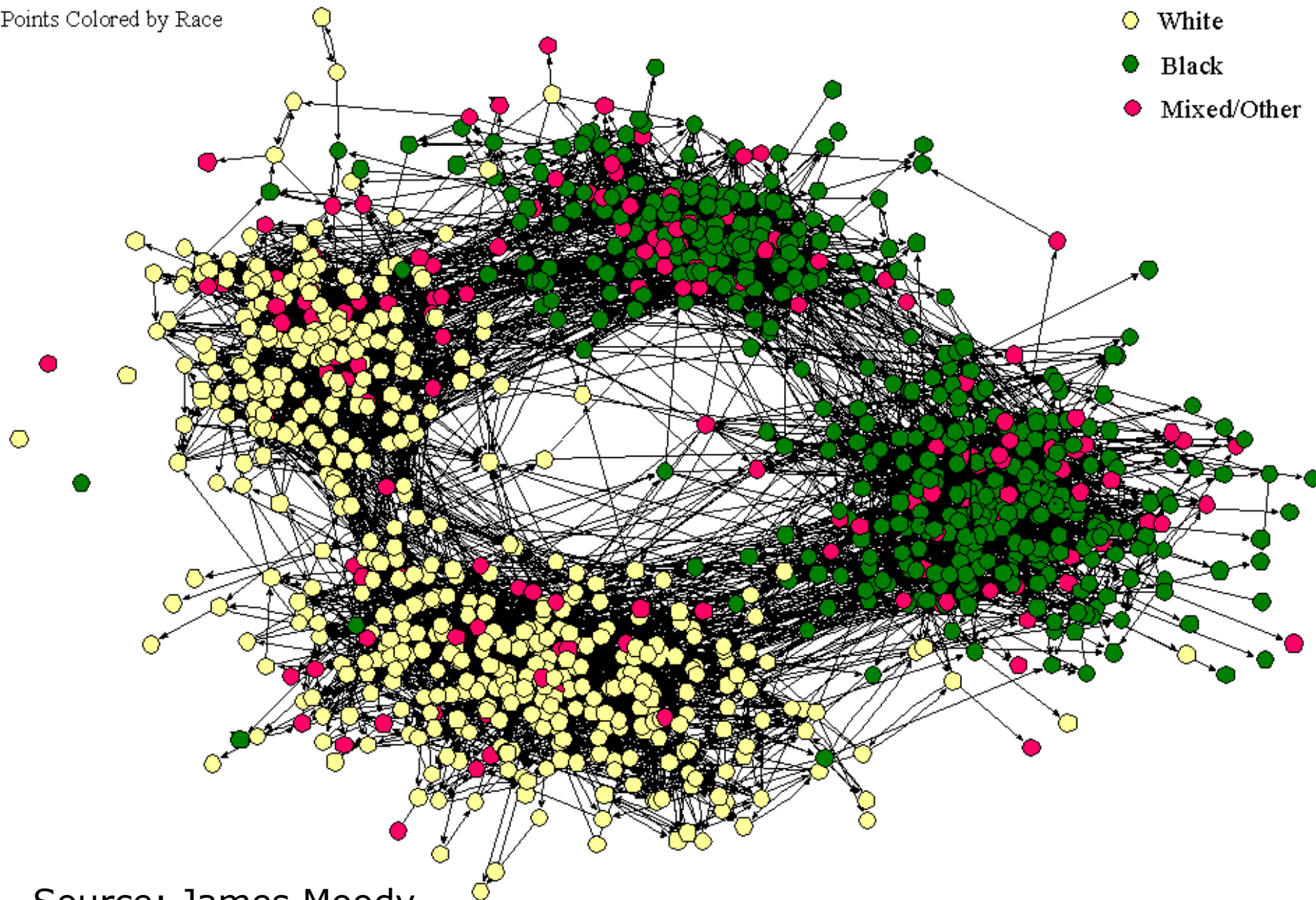
actor conformity to norms and the groups
ability to regulate/enforce norms

Network Concepts

- ◆ **Clustering**: the degree to which a network is segmented into partitions or subgroups based on actor commonalities
 - **Actor attribute based partitions**
 - ◆ relations are higher among actors with similar attributes
 - **Cohesive subgroups**
 - ◆ a set of actors with more relations occurring inside the group than outside the group

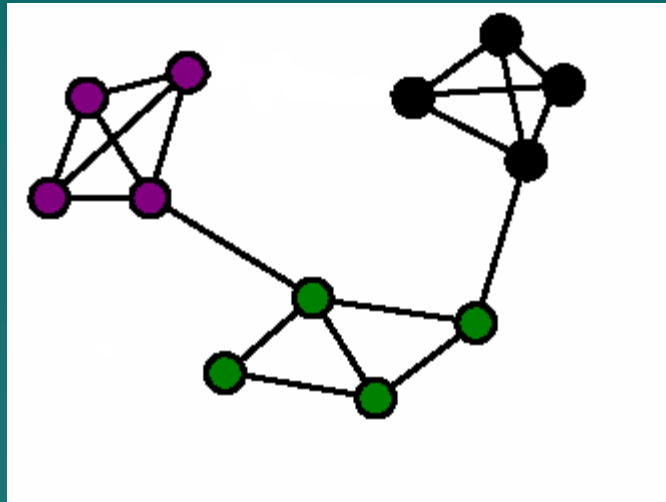
The Social Structure of “Countryside” School District

Points Colored by Race



Source: James Moody

Cohesive Subgroups

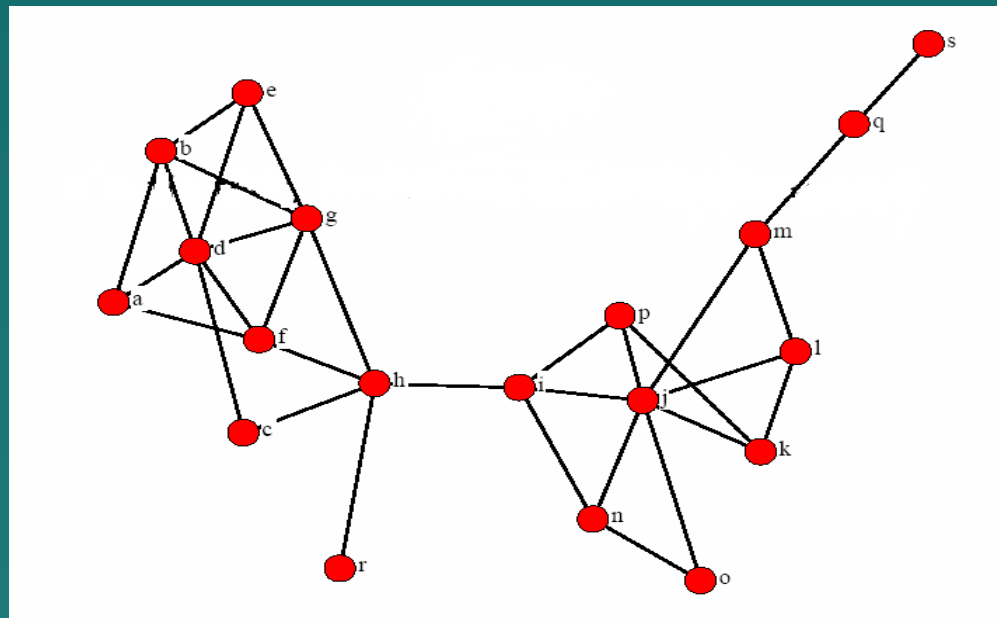


factions

Network Concept

◆ Bridge

- two actors form a bridge when the tie between them connects two disconnected groups

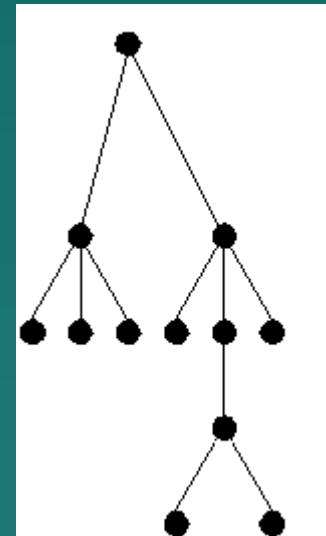


Network Concept

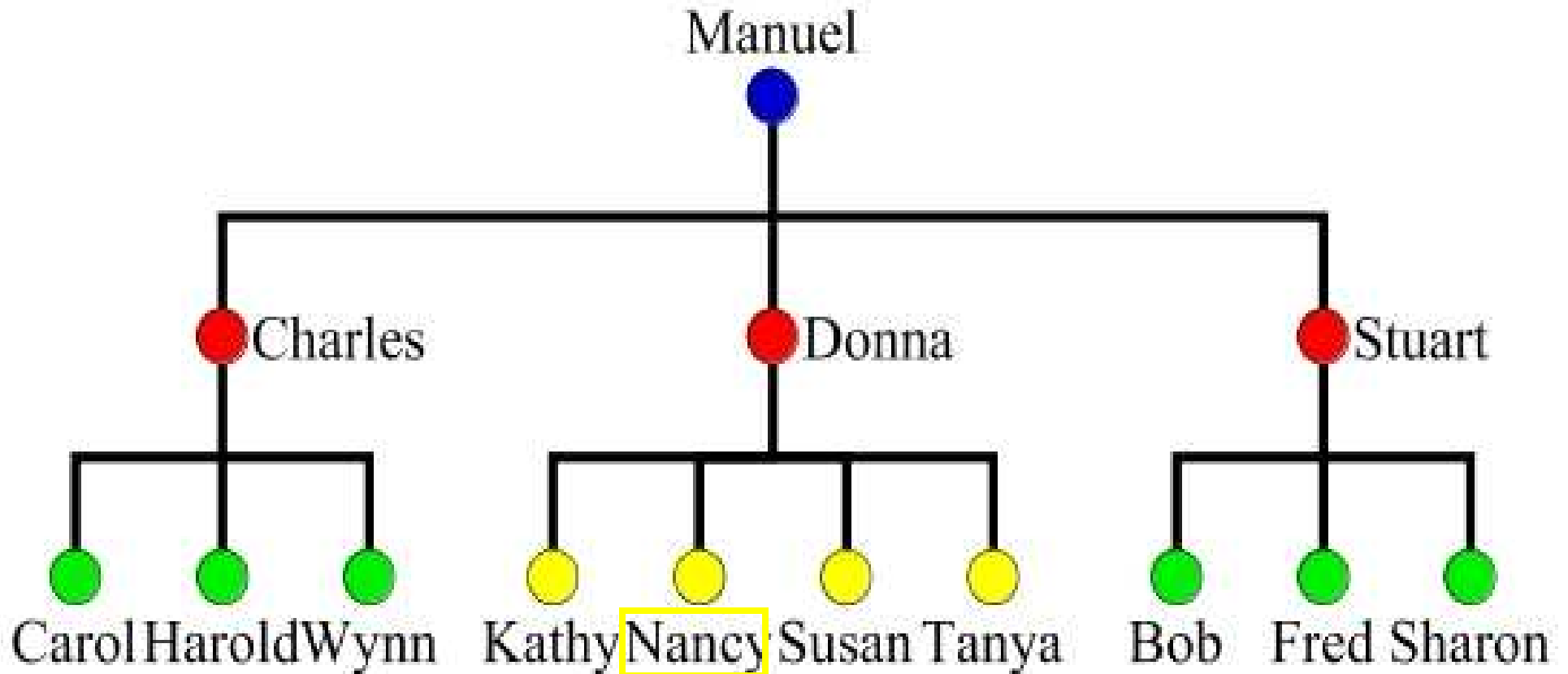
- ◆ **Hierarchy:** the degree to which the network mimics a formal hierarchy

- identifies the status or ranking of individuals or groups within the network

- ◆ informal leaders

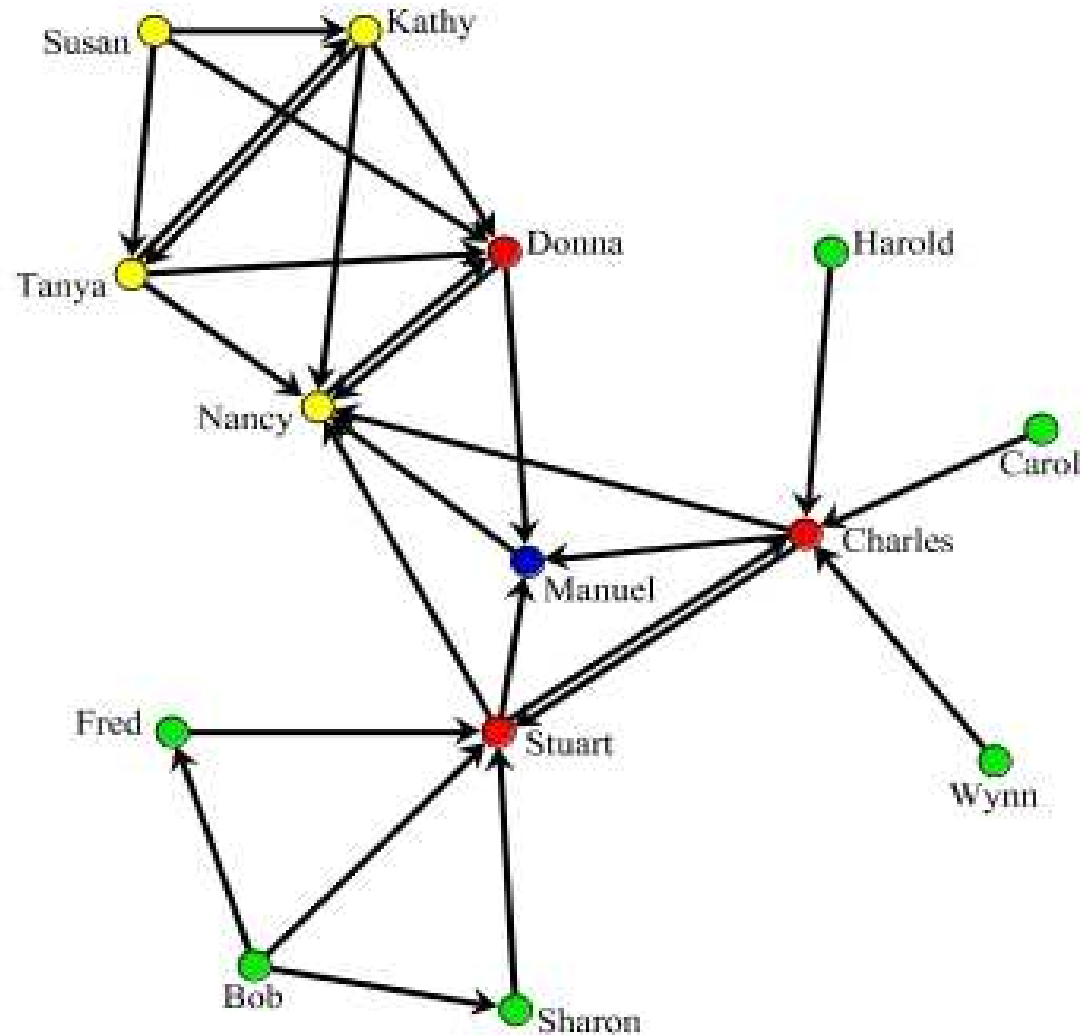


Formal Organizational Ties



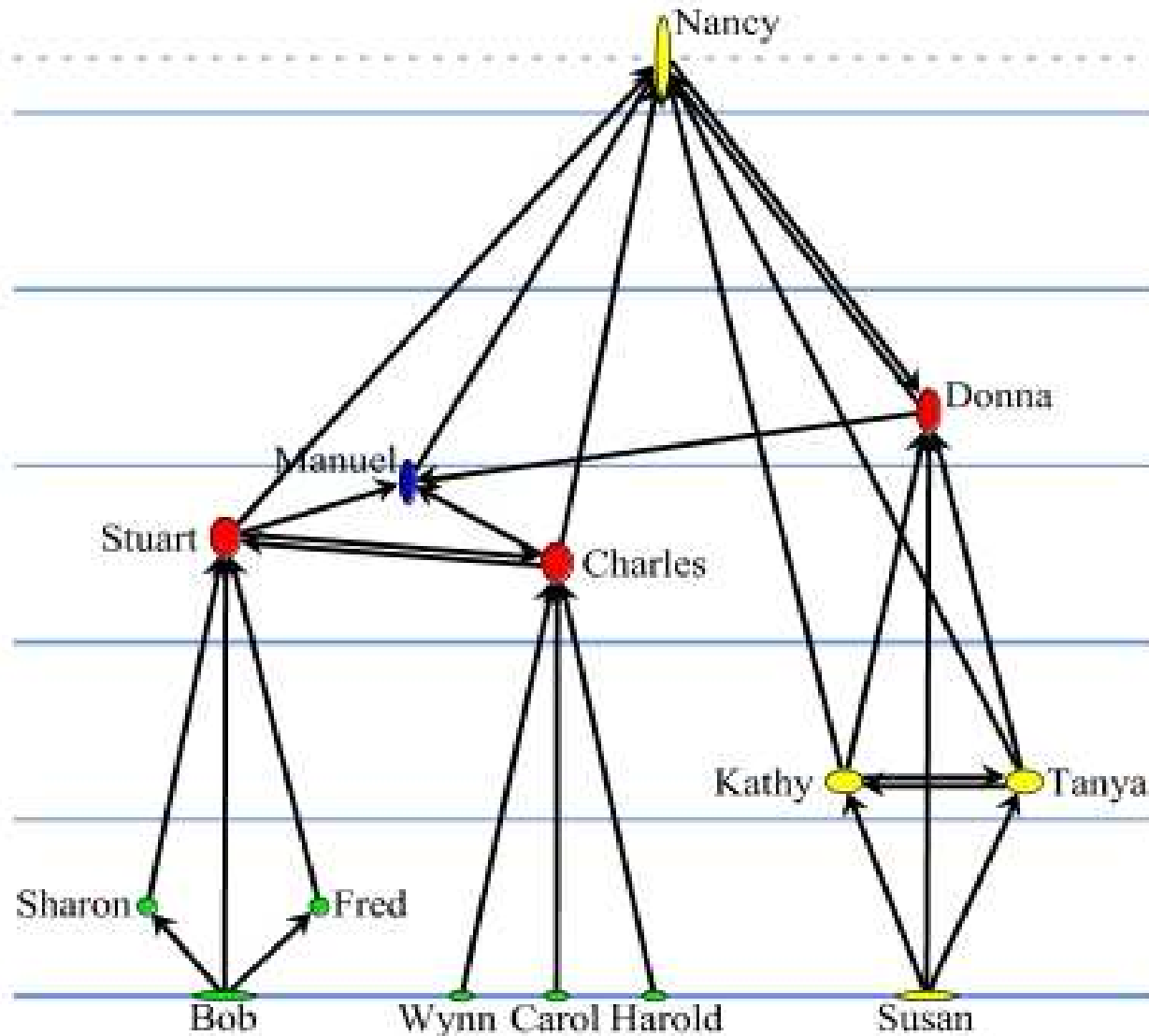
SOURCE: Brandes, Raab and Wagner (2001)

Advice Seeking Network



SOURCE: Brandes, Raab and Wagner (2001)

The “Real” Hierarchy!



SOURCE: Brandes, Raab and Wagner (2001)

The End