## IkeNet: Social Network Analysis of USMA Cadets and Officers

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The United States Army Research Institute (ARL) is sponsoring a Basic Research project to examine how officers' organizational networks change over time using Dynamic Network Analysis (DNA). This project investigates the feasibility of using email and cellular phone data within a military organization to study social networks and provide new management tools for the information age. In addition, new methods are developed to statistically detect changes in social networks in real time to provide early warning and inform organizational policy.

Approach:
Our IkeNet project is currently in the third year of our research effort. Funding is used to equip officers in the Eisenhower Leadership Development Program (ELDP), as well as cadets serving in the chain of command within a cadet regiment, with blackberries in exchange for their agreement to allow the principal investigator to monitor their email and cell phone communication traffic.
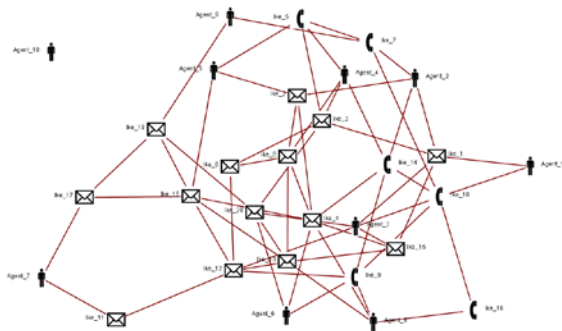
Social network email data is collected over the course of the year-long program. The cadets in the chain of command are surveyed weekly during the Spring semester, reporting the time they spend with other group members, their ranking of friendship, their trust, and for select members, their geo-spatial data. The multiplex relations among the agents in the network are analyzed against each other as well as longitudinally.

Multi-agent simulation is used to model agents within an Infantry company and to generate longitudinal social networks. Changes are introduced at known points in time in the simulation, in order to create a controlled environment to explore network change detection. Multiple change detection approaches are compared.

Methods for handling periodicity in data are developed using wavelets and the Fourier transform. In addition, change detection methods are automated in a social network package, ORA, under a grant from ARL.

Impact:
Prior to organizations successfully carrying out some activity or event, there exists a change in the social network of the organization as members plan and resource the activity. Social network change detection may allow an analyst to detect the network change prior to the event, allowing a commander to get inside the decision cycle and influence the outcome.

These methods also can be used by intelligence agencies to monitor terrorist and drug organizations for significant changes in behavior in real time. Social scientists will use these methods to identify organizational change when investigating social network evolution and organizational dynamics.