

## **Social Network Monitoring of Al-Qaeda**

Matthew Webb  
Department of Mathematical Sciences  
United States Military Academy  
West Point, NY 10996

Advisor: MAJ Ian McCulloh

### **ABSTRACT**

Social network monitoring is the application of statistical process control charts to changing social network measures over time. Quality engineers use control charts to detect slight changes in industrial manufacturing processes. Once detected, the quality engineer will identify a maximum likely change point, when the process began to change, and search for the specific cause of the change. These tools allow quality engineers to quickly identify changes before they cause significant financial loss to the manufacturing company. In the same manner, analysts can use control charts to detect slight changes in dynamic social network measures.

A cumulative sum (CUSUM) control chart is applied to a dynamic social network data set of the Al-Qaeda terrorist organization. The data set ranges from 1988 to 2004. The CUSUM identifies a shift in several network measures in the Al-Qaeda network between 2000 and 2001. The CUSUM most likely change point for all measures is 1997. This example suggests that if analysts were to use social network monitoring to monitor terrorist networks, dangerous shifts in the network might be detected before they become a problem. Furthermore, the specific cause of change could be identified, allowing analysts to exploit positive changes in a terrorist organization and mitigate negative changes.

**KEY WORDS:** Social network monitoring, statistical process control, control charts, CUSUM, social network analysis, Al-Qaeda, terrorism.

**CONTACT:** CDT Matthew R. Webb, United States Military Academy, West Point, NY,  
Tel: (845) 515-4791, Email: [Matthew.Webb@usma.edu](mailto:Matthew.Webb@usma.edu)