Day 3- April 5, 2006

Assessing Threats and Risks: A Wickedly Complex Problem - Nancy Hayden, Sandia National Laboratory

Hayden suggested that any effort to develop models to assess threats and risks should take the analyst's perspective into account, as in how the analyst can achieve their mission and how the models can be useful in making sense of large quantities of data. The increasing awareness of these types of efforts is reflected in the QDR. "Strategic communication" and "risk management" for decision making regarding threats and risks was not mentioned in the 2001 QDR, while those terms appeared 8 times in the 2006 version. The central issue is that we need to understand the complexity associated with conducting assessments of threats and risks. Local issues can drive larger problems and attempting to solve one problem (threat) may give rise to another, or be symptomatic of a deeper rooted problem. To this end, we need to better understand the structural complexity of threats. Complexity science, then, has much to offer in this vein.

The notions of emergent behaviors (surprises, outliers, etc.), multiple scales and time frames, and the meaning of structures (sociological meanings) and their associated challenges should also be considered. The purpose of any analysis has to be thought out. Is it at a systems level or a smaller level? Are we looking at current issues or impact for the future? When conducting analysis, we need to know whether we are looking to describe, interpret, explain, explore, or project. Any methods used will be largely impacted by the intent of the analysis. We also need to consider whether the analysis is for academic purposes or is being conducted at a more operational level.

Hayden then discussed terrorism as an example of this emergent phenomenon where threats and risks need to be considered using these methods. She suggested several tools that have or could be useful in conducting these assessments: agent based modeling, cognitive modeling, and ideological trend analysis. A quick review of one year of peer reviewed literature in the social sciences suggested that only a few theoretical social network analysis and agent based modeling research efforts had been conducted

with terrorism in mind in academic contexts (this did not cover work in the Department of Defense or in the intelligence community). This would suggests why we don't have the knowledge required to adequately remove unnecessary complexity and gain clarity needed for insight and action on the terrorism front.