1106-AE-1226 **Jennifer B. Webster*** (jennifer.webster@pnnl.gov), Richland, WA 99352, and **Zoe N. Gastelum** (zoe.gastelum@pnnl.gov), Richalnd, WA 99352. *Mathematical Formulation of "Fuzzy" Problems for Signature Discovery.*

Applying the scientific method to social science problems for the facilitation of machine learning and graph analysis methods can present unexpected challenges to many researchers. As with most interdisciplinary research, translation between the technical approach and the application domain is critical, beginning early in the problem definition, and permeating throughout the research process. Questions like "find me the liars in this data set" are not easily (nor consistently) translated to a "find me the outliers" problem. In addition to interaction between domain purpose and mathematical formulation, there can also be problems related to data such as quality, clarity and domain-specific nuances. In this presentation, we will discuss problems in both mathematical formulation and data with regards to a business intelligence problem – namely, can we identify and characterize procurement networks within a commercial international shipping data set? This will include the definition of a mathematical basis for addressing a business intelligence tasks, identification and development of mathematical tools necessary for working with the problem, the data pre-processing required for these tools to be useful, and the exploratory data analysis required to make all of this possible. (Received September 11, 2014)