Geospatial Technology and Agent-based Modeling

Transnational criminal organizations (TCOs) are a growing concern for the United States due to the fact that these groups have “expanded dramatically in size, scope, and influence”, and exploit financial markets and technological innovations, such as cryptocurrency, ease of mobility, and improved communications. The cost of TCOs is estimated to be 3.6% of the global economy; meanwhile, these organizations are generating lucrative revenue streams through their transnational criminal activities: $750 billion to $1 trillion for narcotics trafficking, $21 billion in human trafficking, and $170 to $320 million for weapons trafficking. Further, TCOs are diversifying their criminal activities (e.g., bribery, embezzlement, money laundering, violence), and it is believed that they commit these crimes at a higher rate than those not involved in TCOs. For these reasons, combatting transnational organized crime is both a challenge and a priority for the United States. Combatting transnational organized crime is one of the highest priorities of Federal law enforcement agencies (LEA).

Emerging literature on this topic suggests that the formation and disruption of TCOs by LEAs can directly or may potentially affect quality of life among community members. For instance, Tita and Ridgeway explored gang effects on census block-groups and found that blocks experiencing a significant increase in gang formation were more likely to experience shots fired and drug-related police calls-for-service. A study conducted by Smithson, McFadden and Mwesigy directly examined the correlation between heroin seizures conducted by the Australian Federal Police (AFP) and subsequent trends in street-level heroin. The author(s) concluded that large-scale heroin seizures by the AFP resulted in a reduction in the street-level supply of heroin that lasted at least several months. Similarly, Orrenius and Coronado studied trends in border enforcement and crime trends in the 1990s along the U.S.-Mexico border. This study found that heightened border enforcement in urban areas resulted in lower property crime, and they suggested that higher border enforcement was associated with less violent crime.

Given that knowledge regarding the effect of DHS investigations on community outcomes is still developing, this study conducts in its first stage a synthesis of the literature to identify relevant studies and analyze available data on the effect of federal LEA efforts to combat TCOs on quality of life among the public. With this information, we will develop simulation models in year 2 that will provide a platform for assessing how specific types of investigations will impact American communities. How do specific types of investigations affect victimization in a community, as well as social and economic outcomes? Given limited resources, what types of investigations will produce the most desirable community outcomes? This project takes advantage of innovative geospatial and simulation tools to provide methods for estimating impacts of past and potential future DHS investigations on communities.

The project seeks to develop an agent-based model (ABM) that will allow estimation of community impacts of Department of Homeland Security (DHS) investigations that have disrupted and dismantled transnational organized crime networks. Those outcomes will focus on health and quality of life within communities, including crime, victimization, illicit substance

use, employment, and residential stability. The ABM will use a simulation approach to estimate both impacts on individuals in a community and on different neighborhoods within the landscape developed. We will develop the ABM in a landscape based on the characteristics of a city that has been significantly affected by HSE investigations. We have tentatively identified Baltimore, Maryland as our landscape because of the rich data environment it presents and hope to finalize the landscape selection with DHS over the next two months. There have been a number of studies of crime and public health in Baltimore, and one of our consultants (Professor Daniel Hamilton from Johns Hopkins University) has been heavily involved in such research. Most importantly, the Center for Evidence Based Crime Policy at Mason has access to rich data on investigations and social and health outcomes through partnerships and research in the center. Key to our work is information on DHS investigations available through the Baltimore/Washington HIDTA (which is housed in part at the Center for Evidence Based Crime Prevention at George Mason University, see below) which tracks investigations and collects crime and social data in Baltimore. Finally, the CEBCP has rich health, social and economic data on a sample of streets in Baltimore. The availability of these data makes Baltimore a credible site for building and assessing the simulation models.

Based on findings from the ABM, we will construct an intervention assessment tool. The purpose of this tool is to assist DHS in estimating the impact of prior DHS investigations, as well as to guide DHS in allocating resources and understanding the potential community impacts of future investigations. Possible extensions of our approach for future funding in years 3 and 4 will include further refining the intervention assessment tool. This would include assessing the performance of the intervention assessment tool across different cities and making refinements to the tool based on these results. We would also work to create a more user-friendly interface with the intention of DHS deploying the tool among HSE stakeholders. The analysts are the primary and short-term users of the tool. The long-term users are the investigators and resource allocation decision-makers. Finally, we would also propose to scale up our approach to assess spatial and temporal impacts across larger aggregates of cities for regional impacts. The tool would also be expected to be relevant to the larger community of stakeholders, including Congress, in illustrating how DHS investigations improve American communities.