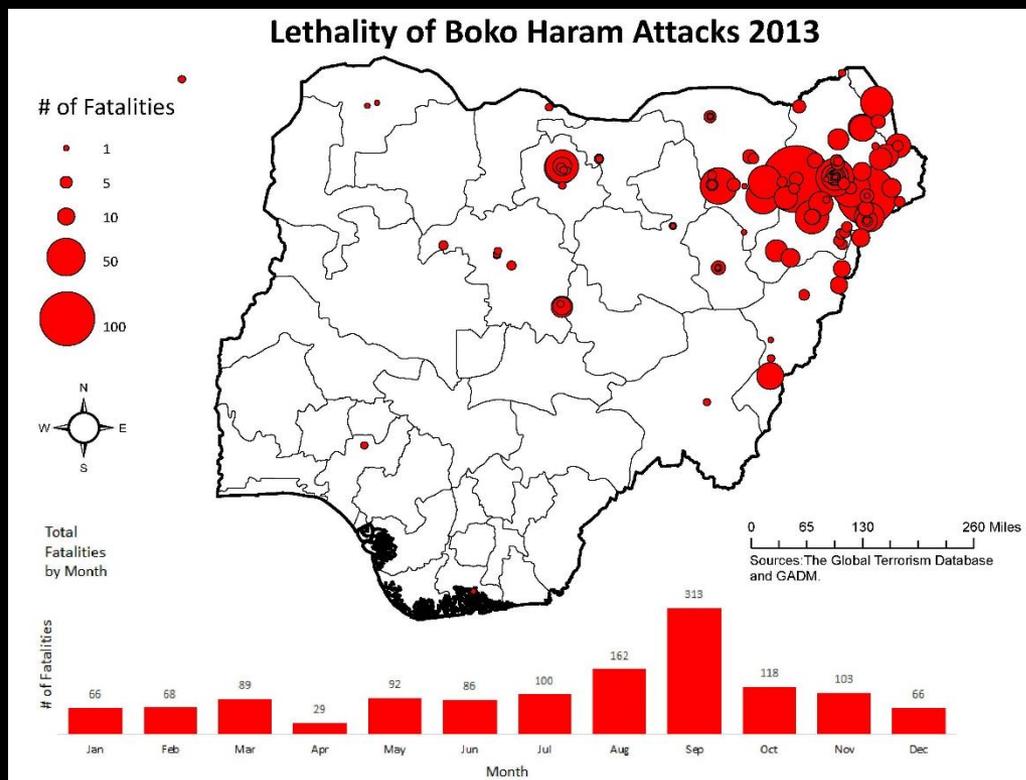


# Countering Boko Haram

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- Research questions:
  - What are Boko Haram's strengths and potential vulnerabilities?
  - What policies can be employed to counter BH's strengths and exploit its weaknesses?
  - What are AFRICOM options for engaging USG and foreign partners to deploy policies to counter BH?
- Methodology:
  - Literature review
  - Desk study
  - Field work
- Preliminary findings:
  - Over-reliance on military options
  - Corruption complicates all options
  - Delayed regional response



# Social Media Use During Disasters

## PURPOSE

Inform how agencies communicate with the public during disasters through assessing the effects of information source, form & demographics on publics' perceptions & intended responses to disaster information.

## METHODOLOGY

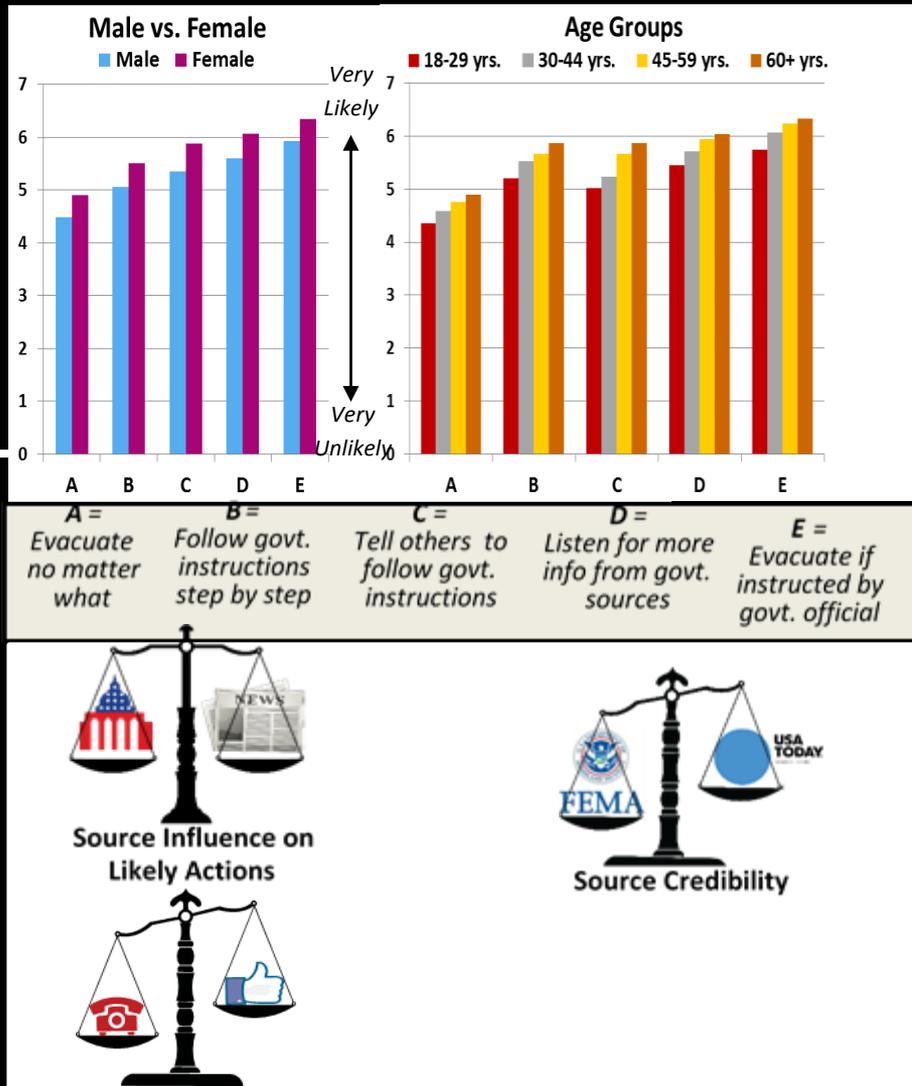
- Extensive Literature Review
- Campus Pilot Experiment
- National random sample of 2,015 adult U.S. residents
- Hypothetical multiple coordinated terrorist attacks scenario

## KEY FINDINGS



The public may be more likely to take recommended actions if they closely followed the media coverage of a recent, similar disaster.

## Likelihood of Taking Protective Actions



# Mobile Radiation Detectors: Threat Perception and Device Acceptance

## RESEARCH OVERVIEW

**Mobile radiation detectors** are both cost efficient and effective in their ability to monitor radiological and nuclear (RN) particles. Implementing mobile technology, however, requires assistance from **novel** populations who are not familiar with RN technology.

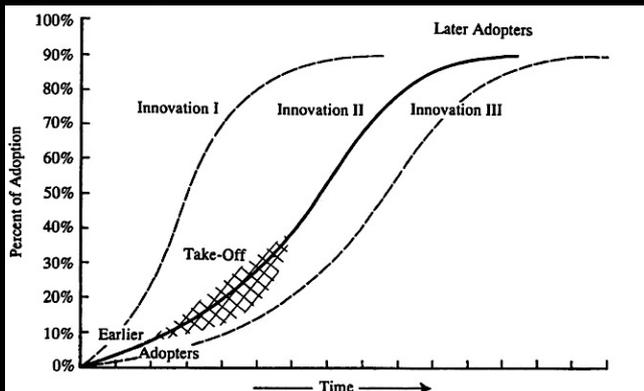
Currently, START is working to understand:

- RQ1:** What is the likelihood of adoption of RN technology?
- RQ2:** How should detectors be designed to best meet participant needs?
- RQ3:** What are the most amenable subpopulations for adoption of this technology?
- RQ4:** What incentives are required to persuade eligible persons to carry a detector?

Risk communication campaigns that aim to incentivize the public to engage in disaster prevention **behaviors often fall short of their ambitious goals because of inadequate foundational research.**

- Likelihood of adoption is dependent upon:**
1. The innovation
  2. Communication channels
  3. Time
  4. Social systems

**Figure 1: Rogers' Diffusion Process<sup>1</sup>**



## TECHNICAL APPROACH

**Phase 1.** START completed a (1) research summary, (2) target population analysis, and (3) 10 focus groups in **the Washington, D.C. metro area.**

**Phase 2.** Analyze (1) focus group data and (2) and create surveys with findings for adopter populations.

**Phase 3.** Combining the results from phases 1 and 2, phase 3 will (1) analyze survey data and (2) provide final insights on recommended populations to include in a to be developed pilot program.

## INITIAL FINDINGS

**Research summary.** Phase 1 was completed August 29. Based on this research summary, we know that:

- **We must address barriers** such as functionality, cost, false positives, lack of transparency, and training
- **Adoption could be increased** by using clear communication surrounding the target population and user benefits, creating an “easy” process for participating adopters (including product trials), and providing access to experts

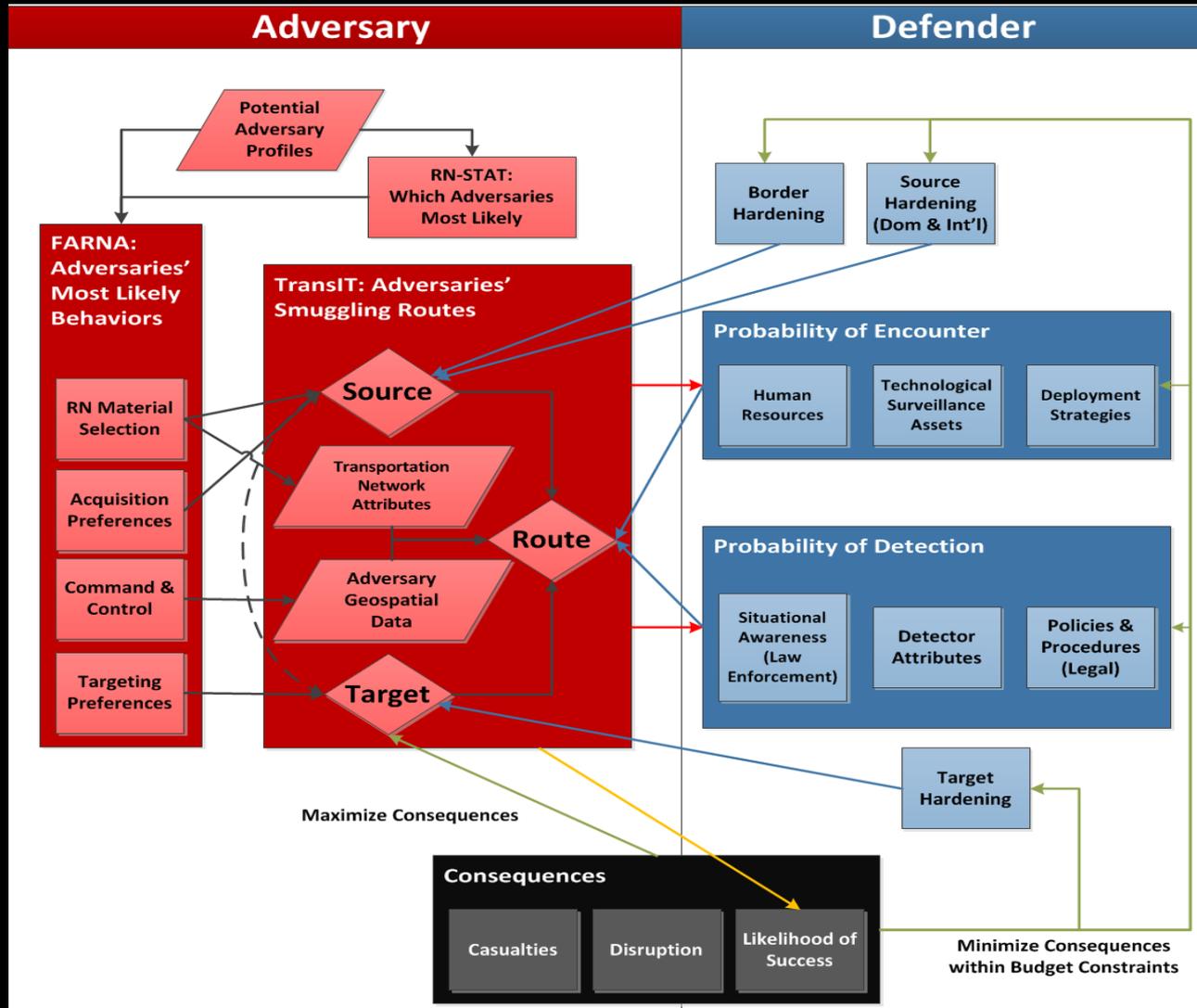
PI Dr. Gary Ackerman, Co-PIs Dr. Brooke Liu and Dr. Elizabeth Petrun

**Contact:** Dr. Petrun (epetrun@umd.edu) • [www.start.umd.edu/](http://www.start.umd.edu/)

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 1. Rogers, E. (2003). *Diffusion of innovations* (5th ed.). New York, NY: Free Press.

# Modeling Adversary Decisions and Strategic Response

Dr. Hamid Mohtadi, mohtadi@uwm.edu



# Modeling Adversary Decisions and Strategic Response

(PI: Mohtadi, RA: Bryan Weber)

Dr. Hamid Mohtadi, mohtadi@uwm.edu

- Research Design & Goal:
  - Develop sequential Stackelberg game to analyze the conflict between governments and adversaries.
- Methodology and Contribution:
  - Game theoretic framework
  - Extreme value statistics and asymmetric information
  - Recognize heavy tail distributions of catastrophic but rare terrorist attacks.
- Research Plan:
  - Develop the analytical model
  - Calibrate from the distribution that best fits the data
  - Iterate for the equilibrium values
- Preliminary Findings:
  - CBRN data is dramatically more heavy tailed (in terms of casualty) than conventional attacks (Fig 1)
  - The equilibrium of the game, solved for the adversary and government effort levels and calibrated for the *hardness* of attack sites, implies that at higher quantiles of casualty, a rational adversary chooses CBRN strategies and sites that are increasingly harder to attack but entail greater reward (in terms of casualty) if successful (Fig. 2). Quantiles of casualty are derived from the respective heavy tailed distributions that are fitted for CBRN and conventional attacks at different sites.

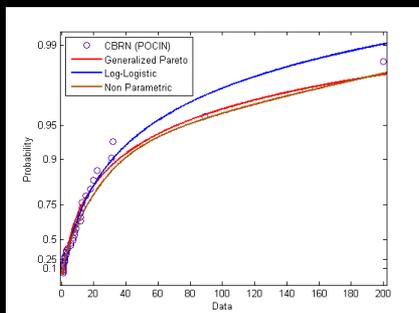


Fig 1

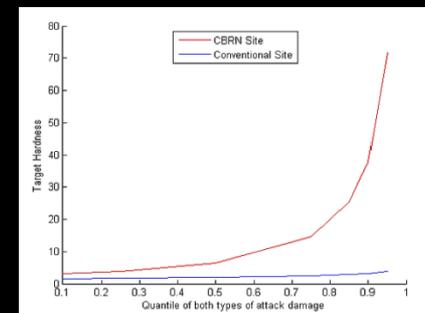


Fig 2

# Biological Threat Characterization Project

Gigi Kwik Gronvall and Gary Ackerman

Crystal Boddie, Matt Watson, and Michelle Jacome

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- The Biological Threat Characterization Program (BTCP) at DHS has a mission to “conduct studies and laboratory experiments to fill in information gaps to better understand biological threats.”
  - The majority of federal BTC research is conducted at the National Biological Analysis and Countermeasures Center (NBACC), in Frederick, MD.
- This project aims to:
  - Understand the need for threat characterization by the USG
  - Recommend principles, criteria, and decision-making processes that should be considered when initiating BTC work
  - Inform decisions about conducting BTC work in the future
- Research approach:
  - Interviewed more than 40 experts in biological sciences, intelligence, biodefense policy, and national security
  - Held a meeting to discuss the need for and essential elements of BTC
  - Currently conducting a Delphi study to systematically obtain expert opinion
  - Will provide DHS and the interagency with a framework to help guide policy and process surrounding BTC

# Countering the Radicalization of CBRN Scientists

## RESEARCH OVERVIEW

**Purpose.** To enhance current efforts by the Department of State to reduce the susceptibility of MENA scientists in CBRN-relevant technical fields to radicalization. We seek to:

- Determine the specific socio-cultural vulnerabilities of the scientific/technical community in MENA to exploitation by terrorists/other VNSAs
- Identify relevant insights from other START and non-START research on radicalization, de-radicalization, and counter-radicalization
- Recommend changes based upon these insights to an existing CTR program in MENA
- Analyze extent of enhancements to the existing CTR program

### Research Plan.

- Literature review
- Interview radicalized and non-radicalized scientists
- Develop a model of scientist radicalization/non-radicalization
- Evaluate an existing CTR program
- Recommend changes to the CTR program to enhance its counter-radicalization effectiveness
- Demonstrate that counter-radicalization effectiveness has been enhanced

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## CURRENT STATUS

**Progress.** We have completed the literature review, are finalizing IRB approval, and are making plans to construct the radicalization/non-radicalization model and to interview radicalized and non-radicalized scientists

### Initial Conclusions.

- When looking at counter-radicalization, it is important to consider the distinct influences of motivation, ideology, and social factors
- De-radicalization, disengagement, and counter-radicalization programs should all include assessments (preferably looking at evidence longitudinally) of their effectiveness
- When researching a specific topic, utilize what is already known from a very wide variety of related topics (e.g., radicalization, non-radicalization, de-radicalization, counter-radicalization, disengagement, personnel security, insider threat, scientist personality, psychology of motivations, nonproliferation...)
- Expect the unexpected when it comes to IRB approval
- In exploring how to prevent radicalization from occurring, one must take into consideration not only why people radicalize but also why they do not



# Anatomizing Chemical and Biological Non-State Adversaries

## RESEARCH OVERVIEW

**Purpose.** To improve understanding of, and more effectively identify, perpetrators and potential perpetrators of attacks employing CB agents.

- Identify indicators of VNSA's potentially changing CB predilections and capabilities;
- Improve our understanding of potential VNSAs by identifying salient characteristics of past CB adversaries, including linkages between their strategic concerns, targets and tactics;
- Embed findings into a Bayesian analytical tool that can assist policy makers preparing responses to this phenomenon.

The goal was to enhance the capability of defense practitioners to protect the U.S.A. by including more detailed specifications of the threat component in risk assessment calculations.

### Research Plan.

- Literature review
- A qualitative analysis
- A quantitative analysis
- Conduct an expert elicitation.
- Develop a set of adversary threat rankings for the most likely non-state CB adversaries in the next decade
- Prepare in-depth behavioral profiles of the tactics, techniques and procedures that a sample of actors drawn from the threat rankings would likely utilize in the event that they actually attempted a CB attack.
- Prepare a Bayesian Network Analytical tool.

## CURRENT STATUS

**Progress.** Project completed in January 2014.

### Findings.

- Methodologically, applying three methodologies more or less independently to the same problem space lent greater credence to findings that were concordant across approaches, while singling out areas of divergence for closer examination.
- A consistent finding across the three research streams was that the threat of non-state chemical or biological weapons pursuit and use lies heavily with jihadists of all stripes,
- Lone disgruntled actors (especially insider technicians or scientists), apocalyptic millenarian & domestic right-wing groups are potential threats capable of causing significant harm with CB agents.
- Criminals (groups or individuals) are a potential chemical threat, in the '2<sup>nd</sup> tier' of both the qualitative and elicitation analyses.

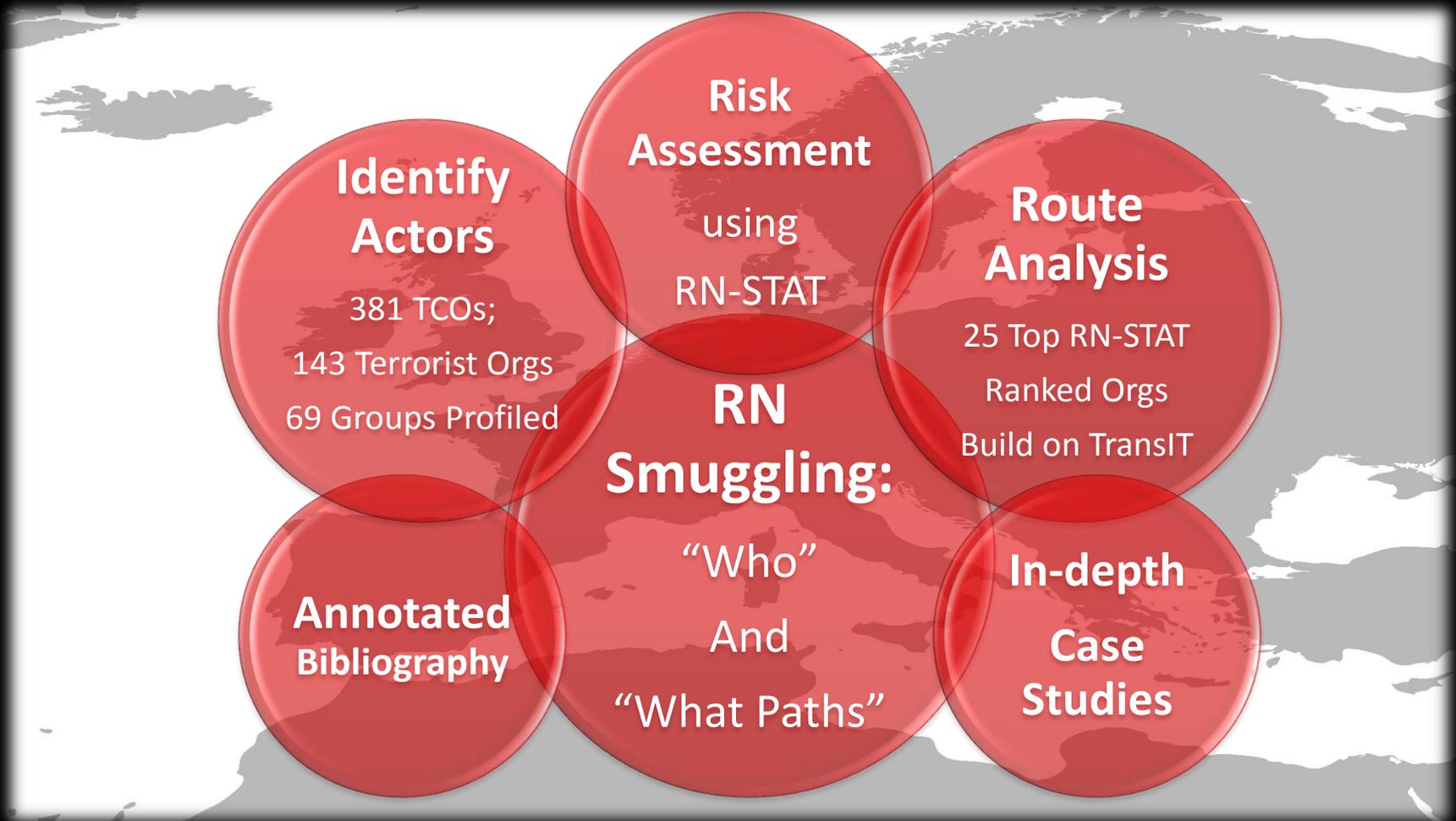
### Future research.

- Analysis can serve as the baseline for future research and can be revisited as new actors appear and current actors evolve.

Research Team: Dr. Gary Ackerman, Dr. Jeffrey M. Bale, Dr. Victor Asal, Dr. R. Karl Rethemeyer, Dr. Amanda Murdie, Dr. Paul Whitney, Mr. Markus Binder, Ms. Mila Johns.  
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# Organized and/or Transnational Criminal Cartel Nexus with Illicit Radiological/Nuclear (RN) Trade, Smuggling and/or Terrorism in Europe and North, Sahelian and West Africa

Dr. Steve Sin, sins@umd.edu



# New Analytic Methods for the Exploitation of Open-Source Structured Databases on the Pursuit of WMD Terrorism

Research Team: Drs. Ronald Breiger, Gary Ackerman, Victor Asal, H. Brinton Milward, and R. Karl Rethemeyer  
breiger@email.arizona.edu

## RESEARCH OVERVIEW

**Purpose.** To enhance and leverage existing human terrain datasets relevant to violent non-state actors in order to develop new analytical approaches to model human networks engaged in the pursuit of chemical, biological, radiological, and nuclear (CBRN) weapons.

### Research Tasks. (for Option Year).

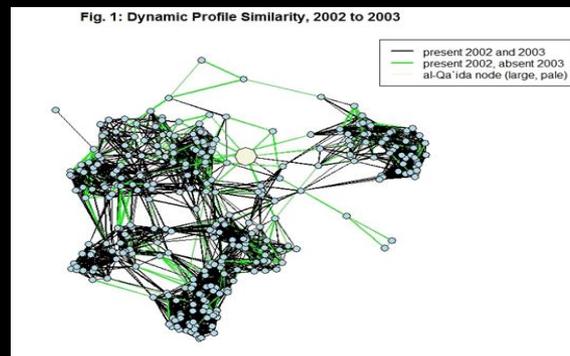
Formulation of a theoretical framework to guide *longitudinal* analysis of CBRN activities and trajectories by building on previous work to develop dynamic models of profile similarity.

- Validation, initial testing, and proof of concept applications of the longitudinal framework.
- Updating and quality control of Profiles of Incidents Involving CBRN by Non-State Actors (POICN) database
- Relation of analytical results to the CBRN domain.

## CURRENT STATUS

**Progress.** First phase completed. Option year underway.

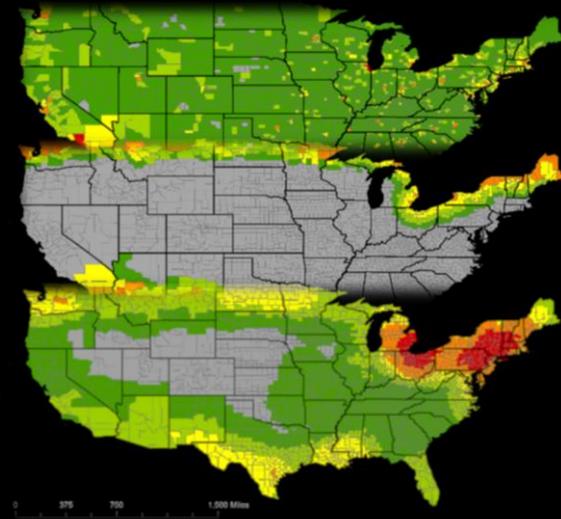
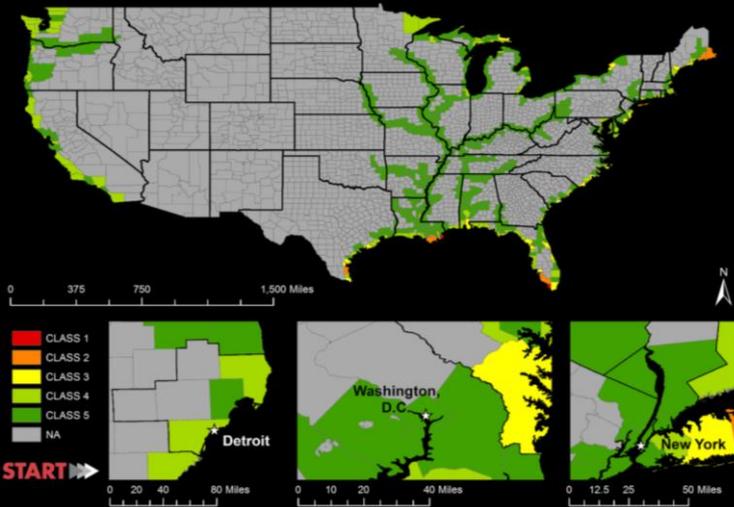
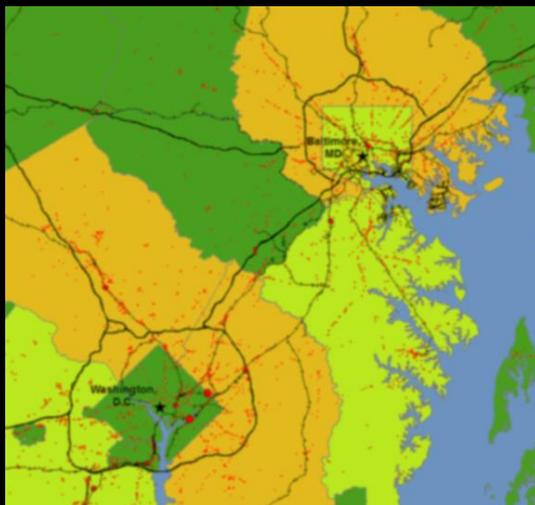
- Optimized existing, structured, open-source human terrain databases for WMD analysis;
- Expanded the analytic focus from factors to actors in the analysis of the optimized databases, including predicting terrorist group pursuit of CBRN weapons
- Developed procedures that identify multiple configurations of organizational traits that predict CBRN use by means of Boolean analysis
- Regression coefficients should—and can—be used to investigate the possibility of multiple causal relations within relevant subsets of the data, rather than be mistaken as “average” effects that apply uniformly to all the data points.



# RND Capability Development Framework Mapping Project

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- Objective: Further the development of domestic portion of the GNDA by identifying highest risk areas with the greatest capability gaps
  - Validate/Update CDF
  - Qualitative & Geospatial Data
  - Mapping Tool
- Emphasis on “Transit” and “Target” Risks
  - 5 pathways
  - 5 risk levels
  - Pathways between potential RN sources and targets to develop a layered-defense approach



# Integration of International Architecture Analyses: Ontology Task

Completed

- Literature Overview of Global Nuclear Detection Architecture (GNDA) relevant risk factors and capabilities

Draft Submitted

- Comprehensive conceptual framework of identified risk factors and capabilities

In Progress

- Ontology to identify and map data types and sources, how they are related, and how they support GNDA analysis

In Progress

- Import ready-made datasets and code architecture reports

In Progress

- Data integration tool including data noted above