

**BIOGRAPHICAL SKETCH**

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NAME: **Andrew G. Huff**

eRA COMMONS USER NAME (credential, e.g., agency login): **ANDREWHUFF**

POSITION TITLE: **Associate Vice President of Data & Technology / Scientist**

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
University of Minnesota	B.A.	05/2010	Psychology, Clinical Research
University of Minnesota	M.S.	08/2011	Engineering, Security Technologies & GIS
University of Minnesota	Ph.D.	01/2014	Public Health, Environmental Health

**A. Personal Statement**

As the Vice President of Data & Technology at EcoHealth Alliance, I am working to develop novel methods of biosurveillance, data analytics and visualization for disease detection, and unique methods to identify disease emergence. My research centers on the interaction of human disease reporting, machine learning of passive and active surveillance data streams, and the interaction of both engineered and natural systems. Additionally, I have been an active participant in government and private sector committees that work to establish effective policies for food systems and multiple aspects of public health. My diverse experiences in big data, public health, and software development make me uniquely positioned to supervise and lead the U01 BD2K grant.

While working at the University of Minnesota, I researched the human, environmental, and engineered aspects of global food systems and patented novel technologies to collect and fuse data from multiple disparate sources to determine which food systems are at risk, map global supply chains in near real-time, and to rapidly identify contaminated food products and supply sources (software development, big data integration, public health):

Huff, A. G., Kennedy, S. P., Kircher, A. L., & Hoffman, J. T. (2014). *U.S. Patent Application 14/212,749*. Available at: <https://www.google.com/patents/CA2846818A1>

At Sandia National Laboratories as a Senior Member of the Technical Staff, I lead interdisciplinary teams in developing novel methods of biosurveillance (big data, public health, software engineering), public health capacity building in foreign governments (public health, modeling), and modeled the effects of pandemics on interdependent infrastructure systems (big data, modeling, high performance computing):

Huff, A. G., Beyeler, W. E., Kelley, N. S., & McNitt, J. A. (2015). How resilient is the United States' food system to pandemics?. *Journal of Environmental Studies and Sciences*, 5(3), 337-347.

**B. Positions and Honors Academic**

2014-Present	Associate Vice President Data & Technology, EcoHealth Alliance
2014-Present	Adjunct Faculty, Columbia University
2013-2014	Senior Member of the Technical Staff, Sandia National Laboratories
2012	Teaching Assistant, University of Minnesota, School of Public Health
2012	Teaching Assistant, University of Minnesota, College of Science and Engineering
2011-2013	Research Fellow, University of Minnesota, Food Protection and Defense Institute

2008-2010      Research Assistant, University of Minnesota, Center for Interest Measurement Research  
2008-2010      Judicial Extern, State of Minnesota, Office of Administrative Hearings, Administrative Court

### **Other Experience and Professional Memberships**

2006-2009      Program Assistant/Manager, United States Department of Veterans Affairs  
2002-2010      United States Army & Minnesota Army National Guard, Infantryman

### **C. Contribution to Science**

I have always considered myself to be an interdisciplinary scientist, and over time I have become a strong and out spoken leader. By combining my military experience in war fighting, my training as an engineer, and my scientific experience I have the ability to effectively lead complex projects. I am not sure what my “greatest contribution to science” is, but the text that follows illustrates how I approach problems methodically and scientifically. Initially, investigating and developing solutions to improve security risk analysis and management intrigued me. After serving our country, I noticed that many of the risk-based decisions that the Department of Homeland Security were making seemed arbitrary and without any scientific basis. In my first attempt to make risk analysis more objective, I engineered a spatial modeling solution that analyzed big data from the National Neighborhood Crime Study, with a home built supercomputer, that could predict violent crime spatially in the U.S. with very high accuracy (tested by withholding data and Monte Carlo simulation):

- **Huff, A. G.** (2011). *Youth bulges, education, property crime, and income disparity: Utilizing geographic information systems to predict violence within the United States* (Master thesis). University of Minnesota, Minneapolis, MN.

After completing this work, I decided to continue improving the Risk Analysis methods employed by the government. Based on my excellent performance as a master student, I was appointed as a full salaried Research Fellow while earning my doctorate. As a Research Fellow, I was provided with all of the data used to evaluate national security risks in the United States’ food system. These big data were collected by subject matter experts and entered into software developed by DHS. This software, named FASCAT, also calculated risk and criticality scores for the government to allocate security mitigation resources. I suspected that there could be bias from SMEs during data collection so I created and implemented an observational study employing social science methods to identify potential biases:

- **Huff, A. G.**, Hodges, J. Kircher, A., & Kennedy, S. (2014). State officials’ perceptions of Food and Agriculture Sector Criticality Assessment Tool (FASCAT), food-system risk, and food defense funding. *Journal of Homeland Security and Emergency Management*, 0, 1-16.
- **Huff, A. G.**, Kircher, A., Hoffman, J., & Kennedy, S. P. (2013). The development and use of the Food and Agriculture Systems Criticality Assessment Tool (FASCAT), *Food Protection Trends*, 33, 218-223.

From these studies I found that there was likely biases introduced by SMEs during the data collection process. After these studies were collected, I analyzed the big data collected from the software to determine if any biases or problems with the software could be identified statistically.

- **Huff, A. G.**, Hodges, J. S., Kennedy, S. P., & Kircher, A. (2015). Evaluation of the Food and Agriculture Sector Criticality Assessment Tool (FASCAT) and the Collected Data. *Risk Analysis*.

After conducting this comprehensive analysis of the FASCAT software, the research indicated that a new software system should be created to evaluate risk, since the software and the SMEs were introducing biases into the final risk scores. From these studies, I learned how I could engineer a system to remove these biases and improve the accuracy of the risk estimates. However, one of the major challenges of creating a bias free risk analysis system was that these analyses always required humans to enter data that would describe the supply chain for thousands of food products – an arduous and impossible task. From analyzing thousands of food production systems in the world I learned that the vast majority of companies used *enterprise resource planning* software to track the purchase and sale of food products and ingredients. I then had the idea of extracting the time and location in sales records for each company’s record of purchases (food ingredients) and sales (processed food products). I then created software to automatically “link” each company’s purchases

and sales to reveal what the nations food supply looked like. The software created visualizes the relationships between food companies and their food products up and down the supply chain, from “farm to fork”, globally. Lastly, algorithms were devised and applied to data to quantify risk objectively. This resulted in a utility patent that is under evaluation and a significant change to how data is collected and analyzed in supply chains:

- **Huff, A. G.**, Kennedy, S. P., Kircher, A. L., & Hoffman, J. T. (2014). *U.S. Patent Application 14/212,749*. **Available at:** <https://www.google.com/patents/CA2846818A1>

## D. Research Support

### Ongoing Related

- **2015-2017**      **Defense Threats Reduction Agency (DTRA)**      **Principle Investigator**  
**Global Rapid Identification of Threats**      **HDTRA1-15-C-0041**  
The purpose of this project is to forecast emerging infectious diseases by combining near real time big data from natural language processing, field collected infectious disease surveillance data, and environmental data.
- **2014-2019**      **USAID**      **Key Member**  
**PREDICT 2 – Modeling and Analytics**      **GHN- A-00-09-00010-00**  
The purpose of this project is to build and test models, from field-collected data (humans and animals) to predict the emergence of viruses with pandemic potential spatially.

### Completed Related

- **2014-2015**      **Defense Threats Reduction Agency (DTRA)**      **Principle Investigator**  
**Global Rapid Identification of Threats**      **HDTRA1-13-C-0029**  
The goal of this project is to develop software to diagnose emerging infectious diseases with bag data using natural language processing and novel algorithms.
- **2014-2015**      **Department of Agriculture (USDA)**      **Principle Investigator**  
**Mantle: Global Ranavirus Reporting System**      **14-JV-11261953-052**  
The goal of this project was to develop a software system containing a user friendly graphic user interface, to merge, join, and share disparate tabular infectious disease datasets for amphibian diseases.
- **2010-2013**      **Department of Homeland Security**      **Key Member**  
**Criticality Spatial Analysis**      **2010-ST-061-FD0001**  
In this project, a complex software system was developed to ingest and fuse supply chain big data from multiple companies automatically, to identify and display risks within and across the supply chain.

### Ongoing Unrelated

- **2014-2019**      **USAID**      **Key Member**  
**PREDICT 2 – Liaison to Jordan and Sudan**      **AID-O-AA-A-14-00102**  
I am responsible for overseeing zoonotic infectious disease surveillance in Jordan and Sudan as it relates to emerging pandemic threats (e.g., MERS virus).

### Completed Unrelated

- **2013-2014**      **Department of Homeland Security**      **Principle Investigator**  
**Supply Chains, bioterrorism, and pandemics**      **Sandia National Laboratories**  
Details are classified. Software development, big data fusion, and modeling.
- **2013-2014**      **Department of Veterans Affairs**      **Key Member**  
**Pandemic Influenza HPC modeling**      **Sandia National Laboratories**  
Details are Official Use Only. Details are classified. Software development, big data fusion, and modeling.
- **2013-2014**      **Defense Threats Reduction Agency (DTRA)**      **Principle Investigator**  
**Animal Movement Models and Bioterrorism**      **Sandia National Laboratories**  
Details are classified. Software development, big data fusion, and modeling.