

# Bianica (Pint) Pires

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## EDUCATION

### 2014 **Ph.D., Computational Social Science**

George Mason University, Krasnow Institute for Advanced Study, Fairfax, VA  
Dissertation: *When People Rebel: A Computational Approach to Violent Collective Action*  
Committee: Andrew Crooks (Advisor), Robert Axtell, William Kennedy, Richard Medina

### 2003 **M.A., Business Administration – International Business**

University of Florida, Warrington College of Business, Gainesville, FL  
Graduated First in Class

### 2002 **B.S., Industrial & Systems Engineering**

University of Florida, College of Engineering, Gainesville, FL  
Graduated with Highest Honors

## EMPLOYMENT

- 2017-Present **Research Scientist**, Social & Decision Analytics Laboratory, Biocomplexity Institute of Virginia Tech, Arlington, VA
- 2014-2017 **Postdoctoral Fellow**, Social & Decision Analytics Laboratory, Biocomplexity Institute of Virginia Tech, Arlington, VA
- 2012-2013 **Graduate Research Assistant**, Department of Computational Social Science, Krasnow Institute for Advanced Study, George Mason University, Fairfax, VA
- 2011-2012 **Embedded Analyst**, Palantir Technologies, McLean, VA
- 2008 **Graduate Research Assistant**, Department of Statistics, Volgenau School of Engineering, George Mason University, Fairfax, VA
- 2008-2011 **Managing Consultant**, IBM Global Business Services, Advanced Analytics & Optimization, Washington, DC
- 2005-2008 **Senior Consultant**, IBM Global Business Services, Advanced Analytics & Optimization, Washington, DC
- 2003-2005 **Consultant**, IBM Global Business Services, Advanced Analytics & Optimization, Washington, DC

## RESEARCH INTERESTS

My research interest involves understanding and exploring complex social systems using computational and quantitative methods, including agent-based modeling (ABM), social network analysis (SNA), and geographic information systems (GIS). Through the integration of ABM, SNA, and GIS, I have developed agent-based models that balance theory and empirical data in the creation of the environment and agents, including agents' communication networks and behavior. These

models explore such research areas as collective action, social influence, knowledge sharing, attitude formation, and diffusion processes.

## GRANTS

- 08/2016 – 08/2017 Army Research Institute (ARI) Early Career Award, *Proof of Concept: Development of a Framework to Model Dynamic, Multi-Level Interactions within an Organization*. (\$128,460).  
PI: **Pires, B.** Co-PIs: Goldstein, J., Molfino, E., Ziemer, K.
- 07/2017-10/2017 State Council of Higher Education (SCHEV), *Creating a Data Profile of Counties/Cities with High Percent of Population with No Secondary Education*. (\$15,000)  
PI: **Pires, B.**

## PUBLICATIONS

### Peer Reviewed Publications

- Pires, B.**, Goldstein, J., Higdon, D., Reese, S., Sabin, P., Korkmaz, G., Ba, S., Hamall, K., Koehler, A., Shipp, S., & Keller, S., 2017, *A Bayesian Simulation Approach for Supply Chain Synchronization*, in the post-proceedings of the 2017 Winter Simulation Conference (WSC), 3<sup>rd</sup> – 6<sup>th</sup> December, Las Vegas, NV.
- Pires, B.**, Goldstein, J., Molfino, E., & Ziemer, K., 2017, *Knowledge Sharing in a Dynamic, Multi-level Organization: Exploring Cascade and Threshold Models of Diffusion*, in the post-proceedings of the CSSSA's Annual Conference on Computational Social Science, 19<sup>th</sup>-22<sup>nd</sup> October, Santa Fe, NM.
- Ziemer, K. S., **Pires, B.**, Lancaster, V., Keller, S., Orr, M., & Shipp, S., 2017, A New Lens on High School Dropout: Use of Correspondence Analysis and the Statewide Longitudinal Data System. *The American Statistician*. Forthcoming.
- Pires, B.** & Crooks, A., 2017, Modeling the Emergence of Riots: A Geosimulation Approach. *Computers, Environment and Urban Systems*, 61, pp. 66-80.
- Pires, B.** & Crooks, A., 2016, *The Geography of Conflict Diamonds: The Case of Sierra Leone*, in the post-proceedings of the 2016 International Conference on Social Computing, Behavioral-Cultural Modeling & Prediction and Behavior Representation in Modeling and Simulation (SBP-BRIMS), 28<sup>th</sup> June – 1<sup>st</sup> July, Washington, DC, pp. 335–345.
- Pint, B.**, Crooks, A., & Geller, A., 2010, *Exploring the Emergence of Organized Crime in Rio de Janeiro: An Agent-Based Modeling Approach*, in the post-proceedings of the Second Brazilian Workshop in Social Simulation (BWSS), 24<sup>th</sup> – 25<sup>th</sup> October, São Bernardo do Campo, Brazil, pp. 7–14.

### Non-Refereed Reports

- Pires, B.** & Goldstein, J. 2017. Proof of Concept: Development of a Framework to Model Dynamic, Multi-Level Interactions within an Organization.
- Keller, S., Shipp, S., Orr, M., Higdon, D., Korkmaz, G., Schroeder, A., Molfino, E., **Pires, B.**, Ziemer, K., & Weinberg, D. 2015. Leveraging External Data Sources to Enhance Official Statistics and Products. Social and Decision Analytics Laboratory in the Biocomplexity Institute of Virginia Tech.
- Haruta, A., Horvath, R., **Pint, B.**, & Zhang, J. 2011. High-end Talent Development and Retention in the ICT industry in Kenya. Nairobi: IBM Corporate Service Corps.

## Papers In Press

Keller, S., Shipp, S., Korkmaz, G., Molfino, E., Goldstein, J., Lancaster, V., **Pires, B.**, Higdon, D., Chen, D., and Schroeder, A. 2018. Harnessing the Power of Data to Support Community-Based Research. WIREs Computational Statistics.

## Papers Under Review

**Pires, B.**, Korkmaz, G., Ensor, K., Higdon, D., Keller, S., Lewis, B., and Schroeder, A. *Towards an in silico Experimental Platform for Air Quality: Houston, TX as a Case Study.*

## PRESENTATIONS (\*Denotes Speakers(s))

### Peer Reviewed Conference Presentations

**\*Pires, B.**, \*Goldstein, J., Higdon, D., Reese, S., Sabin, P., Korkmaz, G., Ba, S., Hamall, K., Koehler, A., Shipp, S., and Keller, S., 2016, *A Bayesian Simulation Approach for Supply Chain Synchronization*, Paper presented at the 2017 Winter Simulation Conference (WSC), 3<sup>rd</sup> – 6<sup>th</sup> December, Las Vegas, NV.

**\*Pires, B.** and Crooks, A. *The Geography of Conflict Diamonds: The Case of Sierra Leone*. Paper presented at the 2016 International Conference on Social Computing, Behavioral-Cultural Modeling & Prediction and Behavior Representation in Modeling and Simulation (SBP-BRIMS), 28<sup>th</sup> June – 1<sup>st</sup> July, Washington, DC.

**\*Pires, B.**, Korkmaz, G., Ensor, K., Higdon, D., Keller, S., Lewis, B., and Schroeder, A., 2015, *Towards an in silico Experimental Platform for Air Quality: Houston, TX as a Case Study*. Paper presented at the Computational Social Science Society of the Americas (CSSSA) 2015, 29<sup>th</sup> October – 1<sup>st</sup> November, Santa Fe, NM.

**\*Pint, B.**, Crooks, A., and Geller, A., 2010, *Exploring the Emergence of Organized Crime in Rio de Janeiro: An Agent-Based Modeling Approach*. Paper presented at the Second Brazilian Workshop in Social Simulation (BWSS), 24<sup>th</sup> – 25<sup>th</sup> October, São Bernardo do Campo, Brazil.

### Other Conference Presentations

**\*Pires, B.** and \*Goldstein, J., 2017, *Exploring Dynamic, Multi-level Interactions within an Organization: An Agent-based Modeling Approach*. Presentation at the Military Operations Research Society (MORS) Symposium, 19<sup>th</sup> – 22<sup>nd</sup> June, West Point, NY.

**\*Pires, B.**, Goldstein, J., Higdon, D., Korkmaz, G., Keller, S., Shipp, S., Hamall, K., and Koehler, A., 2016, *A Bayesian Simulation Approach for Supply Chain Synchronization*, Poster presented at the Winter Simulation Conference (WSC), 11<sup>th</sup> – 14<sup>th</sup> December, Arlington, VA.

**\*Pires, B.**, 2016, *Challenges and Opportunities for Modeling Violent Collective Action Computationally: Balancing Theory and Data*, Paper presented at the International Congress on Agent Computing, 29<sup>th</sup> – 30<sup>th</sup> November, Fairfax, VA.

**\*Pires, B.**, Korkmaz, G., Ensor, K., Higdon, D., Keller, S., Lewis, B., and Schroeder, A., 2016, *An in silico Platform for Environmental Coupling*. Poster presented at the Association for Public Policy Analysis & Management (APPAM), 3<sup>rd</sup> – 5<sup>th</sup> November, Washington, DC.

**Pires, B.**, Korkmaz, G., Ensor, K., Higdon, D., Keller, S., Lewis, B., and Schroeder, A., 2016, *An in silico Platform for Environmental Coupling*. Presentation at the International Society of Exposure Science (ISES), 9<sup>th</sup> – 13<sup>th</sup> October, Utrecht, The Netherlands.

- \***Pires, B.**, 2015, Crowd-Sourcing Big Data from Smartphone Apps for Transportation Research: Role of Statistics and Challenges. Panel conducted at the Joint Statistical Meetings (JSM), 8<sup>th</sup>-13<sup>th</sup> August, Seattle, WA. With: Feng Guo and Elaine Murakami.
- \***Pires, B.**, Korkmaz, G., Ensor, K., Higdon, D., Keller, S., Lewis, B., and Schroeder, A., 2015, *An in silico Platform for Environmental Coupling*. Poster presented at the International Symposium for Next Generation Infrastructure, 13<sup>th</sup> – 15<sup>th</sup> September, Washington, DC.
- Keller, S., Schroeder, A., Shipp, S., Higdon, D., Korkmaz, G., Molfino, E., Orr, M., **Pires, B.**, and \*Ziemer, K., 2015, *Data: The new asset class*. Poster presented at the International Symposium for Next Generation Infrastructure, 13<sup>th</sup> – 15<sup>th</sup> September, Washington, DC.
- \***Pint, B.**, Crooks, A., 2013, *The Impact of a Slum's Social Dynamics and Geospatial Landscape on the Emergence of Riots: The Case of Kibera*, Presentation at the Association of American Geographies (AAG) Annual Meeting, 9<sup>th</sup> – 13<sup>th</sup> April, Los Angeles, CA.
- \***Pint, B.**, \*Horvath, R., \*Zhang, S., and \*Haruta, A., 2011, *High-end ICT Talent Development and Retention*, Stakeholders Workshop on e-Government Strategic Plan, 9<sup>th</sup> – 10<sup>th</sup> March, Nairobi, Kenya.
- Pint, B.**, Levitt, T., and \*Laskey, K., 2008, *Inferring Threat Group From IED Incident Reports*, The Military Operations Research Society (MORS) Symposium, 10<sup>th</sup> – 12<sup>th</sup> June, New London, CT.
- \*Sutherland, S., Ni, H. and **Pint, B.**, 2007, *Canada Post Strategic Network Optimization Model*, Presentation at the Institute for Operations Research and the Management Sciences (INFORMS) Annual Meeting, 4<sup>th</sup> – 7<sup>th</sup> November, Seattle, WA.
- \***Pint, B.**, Cohen, J. and Ellison, L., 2003, *Case Study: Alpharma & the Brazilian Market*, in the post-proceedings of The Business Association of Latin American Studies (BALAS) Conference, 9<sup>th</sup> – 12<sup>th</sup> April, São Paulo, Brazil.

### Professional Presentations

- \***Pires, B.** & \*Goldstein, J., 2017, *Proof of Concept: Development of a Framework to Model Dynamic, Multi-Level Interactions within an Organization*, Interim project review presentation to Army Research Institute, 17<sup>th</sup> March, Fort Belvoir, VA.
- \*Keller, S., \*Shipp, S., Higdon, D., \*Korkmaz, G., \*Molfino, E., \*Orr, M., \***Pires, B.**, Schroeder, A., Weinberg, D., \*Ziemer, K., 2015, *Leveraging External Data Sources to Enhance Official Statistics and Products*, Final project presentation to U.S. Census Bureau, 18<sup>th</sup> December, Suitland, MD.
- \***Pint, B.**, 2013, *The Geography of Conflict Diamonds: The Case of Sierra Leone*. Krasnow Institute for Advanced Study, George Mason University seminar series, 8<sup>th</sup> February, Fairfax, VA.
- \***Pint, B.**, 2011, *Corporate Service Corp Experience in Kenya*. IBM Advanced Analytics & Optimization brown bag series, 10<sup>th</sup> June, Herndon, VA.
- \***Pint, B.**, \*Horvath, R., \*Zhang, S., and \*Haruta, A., 2011, *High-end ICT Talent Development and Retention*, Final project presentation to the Minister of Information Communications and Technology, 18<sup>th</sup> March, Nairobi, Kenya.
- \***Pint, B.**, 2008, *Activity-Based Costing at U.S. Customs & Border Protection*. IBM Operations Analytics brown bag series, 17<sup>th</sup> October, Fairfax, VA.

## SKILLS

### Research Methods/Techniques

Agent-based modeling, social network analysis, geographic information systems, large-scale data analysis, microsimulation, discrete-event simulation, database design and development, activity-based costing

### Software/Programming Languages

Java, SQL, R, Python, MASON, NetLogo, AnyLogic, ArcGIS, Palantir, UCINet, NetDraw, Gephi, PostgreSQL, VBA, MS Access, LaTeX

### Languages

Portuguese (proficient)

## RESEARCH EXPERIENCE

2017 – Present **Research Scientist**, Social & Decisions Analytics Laboratory, Biocomplexity Institute of Virginia Tech, Arlington, VA

Lead and contribute to research projects across industry and government. Write peer-reviewed publication and reports. Mentor and advise students and postdoctoral fellows. Selected projects include:

- Leading a project with the National Science Foundation to develop education and workforce pathways to STEM and STEM-enabled occupations.
- Led the completion of an Early Career Award for the Army Research Institute. Lead author on the final report and other associated publications.
- Led a project with the School Council of Higher Education in Virginia. The goal of this project was to understand why postsecondary attainment is low across certain communities. Lead author on the final report. Developing a short proposal to outline next steps and future work.

2014 – 2017 **Postdoctoral Associate**, Social & Decisions Analytics Laboratory, Biocomplexity Institute of Virginia Tech, Arlington, VA

Apply quantitative and computational methods (e.g., agent-based modeling, social network analysis, geographic information systems, discrete-event simulation) to large-scale health, industry, education, and organizational issues using R, Python, ArcGIS, and SQL. Write peer-reviewed publications and reports. Mentor high school and undergraduate summer students. Selected projects include:

- Principal Investigator for an Army Research Institute (ARI) Early Career Award. Developed an agent-based model using Python that simulates dynamic social networks within a hospital. Applied a computational model of cognitive theory to explore attitude formation and the spread of knowledge through an organization.
- Developed an agent-based model in Python for ARI that simulates attrition of military personnel over time.
- Developed a spatiotemporal model using R and PostgreSQL that integrates the population dynamics of 4.9 million synthetic residents of the Houston metropolitan area with ozone concentration levels obtained from 47 monitors.
- Developed an end-to-end data model for Procter & Gamble's (P&G) Supply Chain Synchronization project using R and PostgreSQL to repurpose vast amounts of disparate

- transactional data. The data model included screening, cleaning, and restructuring of the data as well as understanding table linkages and relationships. Developed a discrete-event simulation of the shipping and transportation processes. Trained the P&G team on the models developed and provided guidance on how to operationalize this research.
- Developed expertise in state sources of education data, especially Statewide Longitudinal Data Systems (SLDS). Conducted comparative analysis in R of SLDS data to U.S. Census Bureau's American Community Survey data. Conducted logistic regression on special topics, e.g., high school dropouts and English proficiency of students, and co-authored a Census Bureau report.
- 2012 – 2013    **Graduate Research Assistant**, Department of Computational Social Science, Krasnow Institute for Advanced Study, George Mason University, Fairfax, VA
- For the Office of Naval Research's Mason-Yale Project on Computational East Africa, developed an ABM that integrates SNA and GIS using MASON, a multi-agent simulation library core in Java, to explore opinion formation and the onset of riots in a Kenyan slum.
- 2008    **Graduate Research Assistant**, Department of Statistics, Volgenau School of Engineering, George Mason University, Fairfax, VA
- For the Department of Defense's Joint IED Defense Organization, developed a Bayesian Network Classifier to infer threat group based on the features associated with an Improvised Explosive Device (IED) incident.
- Mentored and oversaw the work of two undergraduate students.

## PROFESSIONAL EMPLOYMENT

- 2011 – 2012    **Embedded Analyst**, Palantir Technologies, McLean, VA
- Led on-site training courses and created training materials for Immigration & Customs Enforcement (ICE) analysts.
- As Project Manager, worked with developers and the business team to ensure the successful implementation of Palantir at U.S. Customs & Border Protection (CBP) field offices across the country.
- Met prospective clients in Brazil's law enforcement community. Delivered product demos and led follow-up conference calls.
- 2003 – 2011    **Managing Consultant**, IBM Global Business Services, Advanced Analytics & Optimization, Washington, DC
- As part of IBM's Corporate Service Corp, created recommendations for developing and retaining high-end Information and Communications Technology (ICT) talent in Kenya.
- As Project Manager at U.S. Customs & Border Protection (CBP), was accountable for IBM internal financial and business controls on the project, as well as for managing, overseeing, and distributing project deliverables.
- Developed a microsimulation for CBP's Budget office that used employee-level data to project the agency's salaries and benefits costs, totaling \$6 billion a year.
- Lead analyst for Canada Posts' Strategic Optimization of Processing Network project.
- Interviewed clients to understand their operations, identify and collect data, and evaluate data deficiencies. Designed and developed a database in MS Access to house the model's data needs.

Led and coordinated the U.S. Postal Service's simulation modeling effort. Developed a tool in MS Access and VBA to automate the population of the input data into seven different discrete-event simulation models.

## **AWARDS AND RECOGNITIONS**

Best presentation nomination at the Military Operations Research Symposium (MORS), 2017

George Mason University funding to attend The Association of American Geographers (AAG) annual meeting, 2013

Palantir Technologies award for full tuition costs, 2011

IBM award for full tuition costs, 2007-2011

IBM Corporate Service Corp, 2011

Profiled on IBM.com, 2008

IBM Service Excellence Award, 2008

IBM BRAVO! Award, 2008

IBM Operations Analytics King of Delivering Value to the Client Award, 2007

IBM BRAVO! Award, 2005

U.S. Postal Service Account Excellence Award Winner, 2005

IBM Operations Analytics Hardest Worker Award, 2005

University of Florida funding to attend The Business Association of Latin American Studies (BALAS) Conference, 2003

## **PROFESSIONAL MEMBERSHIPS**

2015 – present      Computational Social Science Society of the Americas (CSSSA)

2016 – present      The Institute for Operations Research and Management Sciences (INFORMS)

2015 – 2016          American Statistical Association (ASA)

Referee/Reviewer: Transactions in GIS