

# Dr. Edwin Alvarado-Mena

Policy Data Scientist | Data Engineer | Computational Social Scientist

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## Profile

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Policy data scientist, data engineer, and computational social scientist with more than 12 years of experience across government, public policy, and applied research in the United States, Central America, and South America. Five years of experience advising the Government of Costa Rica, followed by five years of doctoral training at the University of Arizona. His research focuses on how organizations can leverage LLM-augmented work and human-AI collaboration.

## Areas of Practice

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Policy Data Science • Policy Analysis and Governance • Data Engineering and Reproducible Research • Computational Social Science • Causal Inference • Bayesian Statistics • Applied Natural Language Processing • Knowledge Graphs and Ontology Engineering • Generative AI and Large Language Models • Research Design • Data Literacy and Programming Training

## Relevant Professional Experience

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**Founder | Policy Data Science Consulting LLC** 2026–Present

- Founded an Arizona-based consulting practice focused on organizational improvement, implementation, technology review, and strategic investigations.

**Research Assistant | NSF Project on Coupled Natural Human Systems** 2024–2025

- Designed end-to-end data infrastructure, NLP pipelines, SQL and NoSQL (graph) databases, and human-in-the-loop validation workflows in Python and R to transform unstructured policy documents into reliable, analysis-ready governance data and analytical tools.

**Government Advisor | Housing Ministry, Republic of Costa Rica** 2016–2021

- Advised senior government leaders on governance, legislative strategy, compliance, crisis response, and institutional risk; served as Chief of Staff to the Vice Minister; coordinated multidisciplinary and interagency teams; chaired an interinstitutional commission addressing complex housing and governance challenges for the country's largest informal settlement.

**Instructor | University of Arizona** 2023–2026

- Designed and delivered courses in public administration and criminal justice while mentoring students and strengthening research design, analytical reasoning, and data literacy.

**Data Science Ambassador | Data Science Institute, University of Arizona** 2023–2024

- Designed and delivered interdisciplinary training in quantitative methods and R and Python programming while collaborating on data science curricula and educational initiatives.

**Roots for Resilience Fellow | Arizona Institute for Resilience, University of Arizona** Fall 2024

- Delivered Open Science workshops and developed a Quarto resource website and model GitHub repository to strengthen reproducibility and computational literacy among doctoral researchers.

**Research Assistant | U.S. Department of Defense Project on Armed Non-State Violence** 2021–2022

- Managed data collection infrastructure for research on governance and security in Colombia and conducted stakeholder mapping of criminal violence in Mexico.

**Instructor | University of Costa Rica** 2020–2021

- Designed and delivered courses in public affairs and comparative politics and supported student research in qualitative and quantitative methods.

- Designed and delivered graduate-level instruction in case study methodology, qualitative research design, and applied policy analysis for public administration professionals.

## Selected Research and Applied Projects

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### Doctoral Research | University of Arizona

Developed computational methods for studying policy beliefs and governance, combining ontology engineering, large language model-assisted text analysis, human-in-the-loop evaluation, and knowledge graphs.

### The Manifold: AI for Policy Data Science

Developing an AI-powered research ecosystem that combines public policy and ontology engineering to transform unstructured documents into structured, policy-relevant knowledge; modules include VARONA for regulatory landscapes, Upon for organizational networks, Racconto for policy-relevant events, and Simonizer for policy beliefs and narratives.

### Current Applied Research

Research interests include regulatory monitoring for the data center industry, responsible and effective LLM-augmented work, and scalable human evaluation of AI outputs.

## Education

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### PhD in Government and Public Policy

University of Arizona, USA

Major: Public Policy and Management | Minor: Research Methods

2021–2026

Dissertation: *The Governance of Invasive Species Management: A Computational Social Science Approach*

### MSc in Data Science

University of Arizona, USA

2024–2026

### Graduate Certificate in Computational Social Science

University of Arizona, USA

2023–2026

### MSc in Public Policy

Latin American Faculty of Social Sciences (FLACSO), Ecuador

2014–2016

### BA in Political Science (With Distinction)

University of Costa Rica

2010–2014

## Technical Skills

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**Programming and Data:** Python, R, SQL, MySQL, MongoDB, Neo4j (Cypher).

**AI and NLP Tools and Platforms:** OpenAI API, Hugging Face, spaCy.

**Research and Development:** Git, GitHub, Docker, Bash, L<sup>A</sup>T<sub>E</sub>X, Quarto, Shiny.

**Working Knowledge:** JavaScript, Stata, Julia; ArcGIS, QGIS.

**Web Analytics and Operations:** Google Analytics 4 (GA4), Google Search Console.

## Selected Publications and Research Outputs

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Milward, H. Brinton, Angel Saz-Carranza, Yotam Shmargad, Edwin Alvarado-Mena, and Juan Garcia-Nieto. “Institutional rules, boundary objects, and LLMs: A proof-of-concept for large-N research on the governance of purpose-oriented networks.” Under review at *Public Management Review*.

Alvarado-Mena, Edwin. 2016. “Participación por compensación: Theory-testing y análisis inferencial bayesiano de la participación de los empresarios en política pública.” Master’s thesis, Latin American Faculty of Social Sciences (FLACSO Ecuador). Citation of Excellence.

Nicolás Alvarado, Yagnna, Edwin Alvarado-Mena, Allan Abarca Rodríguez, and Jeff Rodríguez Alvarado. 2015. “Las promesas electorales de los candidatos a la Presidencia de la República de Costa Rica divulgadas en medios de prensa escrita, 2014.” *Revista de Ciencias Sociales de la Universidad de Costa Rica*, No. 147 (I).

### **Selected Recognition and Service**

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- Dissertation Research Grant, Social and Behavioral Sciences Research Institute, University of Arizona, 2026.
- Roots for Resilience Fellowship, University of Arizona, 2024.
- Data Science Ambassador, University of Arizona, 2023–2024.
- Carpentries Certified Instructor.
- Presenter, Midwest Political Science Association Annual Conference, 2026.

### **Languages**

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Spanish (Native) • English (Fluent)

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