# Implementation Science: Operationalizing One Health Data

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CREID
Centers for Research in Emerging Infectious Diseases

CREATE-NEO

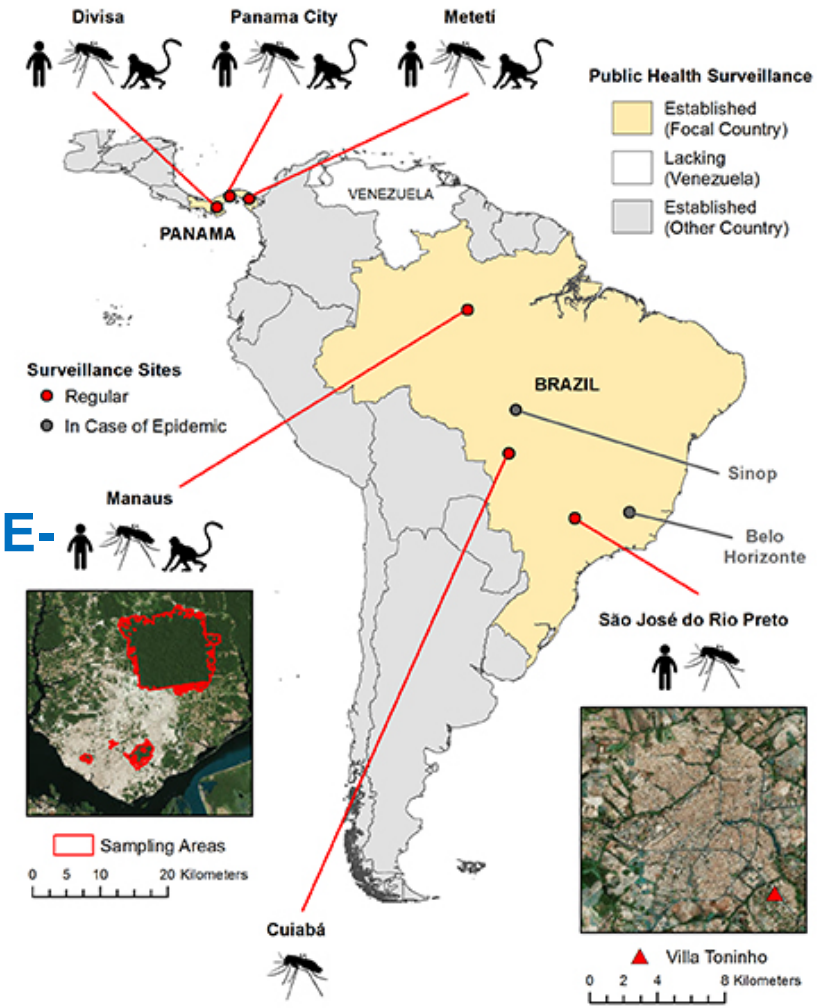
# COORDINATING RESEARCH ON EMERGING ARBOVIRAL THREATS ENCOMPASSING THE NEOTROPICS

*CREATE-NEO provides a nimble and flexible network of surveillance sites in Central and South America coupled to cutting-edge modeling approaches in order to anticipate and counter emerging arboviruses (and SARS-CoV-2)*

UFAM Universidade Federal do Amazonas

UFMG Universidade Federal de Minas Gerais

**CREATE-NEO**

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# A GLOBAL NETWORK OF NETWORKS

**A2CARES**
**UC Berkeley** – 10 Partners, 5 Countries

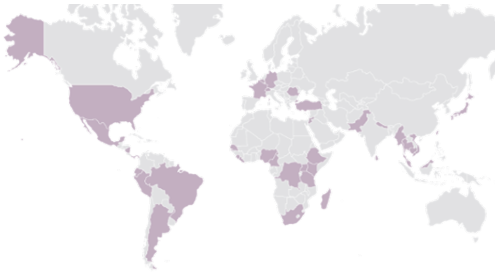
**CREATE NEO**
**UTMB** - 7 Partners, 3 Countries

**CREID ECA**
**Wash. State U** – 8 Partners, 7 Countries

**CREID ESP**
**Washington U** – 7 Partners, 5 Countries

**EID SEARCH**
**EcoHealth** – 6 Partners, 4 Countries

**NIAID**



**Coordinating Center**
**RTI International & Duke U**
24 Partners, 21 Countries

**EpiCenter**
**UC Davis** – 5 Partners, 3 Countries

**PICREID**
**Institute Pasteur** – 8 Partners, 7 Countries

**UWARN**
**U Washington** – 9 Partners, 7 Countries

**WAC EID**
**UTMB** – 6 Partners, 4 Countries

**WARN ID**
**Scripps** – 6 Partners, 5 Countries

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# NETWORK BY THE NUMBERS


**1** Coordinating Center

**10** Research Centers

**380+** Investigators & Staff

**39** Countries

**115+** Research Sites

**70** Active Studies

**27** Stakeholders

**20+** Viral Families Studied

**400+** Publications to date

**237** Policies Citing CREID Work

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# What is Implementation Science?

**The study of methods and strategies that facilitate the adoption of evidence - based practices or policies**

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# HOW DATA ARE TO BEST HANDLED?

**“An ideal model would be one in which data were stored by the originating institutions, rather than in a centralized repository, but could be retrieved and analyzed by members of the global research community using widely applicable but secure methods.”**

**Sharing Clinical and Genomic Data on Cancer — The Need for Global Solutions. NEJM 376:2006-2009; 2017**

# GRAND CHALLENGES IN DATA FOR ONE HEALTH

**Diversity** *

- Type
- Structure
- Scale
- Volume
- Quality
- Level
- Periodicity

**System** *

- Human
- Animal
- Environmental
- Ecological
- Biological
- Molecular
- Genomic
- Clinical
- Spatial

**Accessibility** *

- Regulatory/compliance
- Limits to access
- Manual or automated
- Periodic or ongoing
- *How* accessible (language, format)
- **Affordability**

**Outbreak unknowns**

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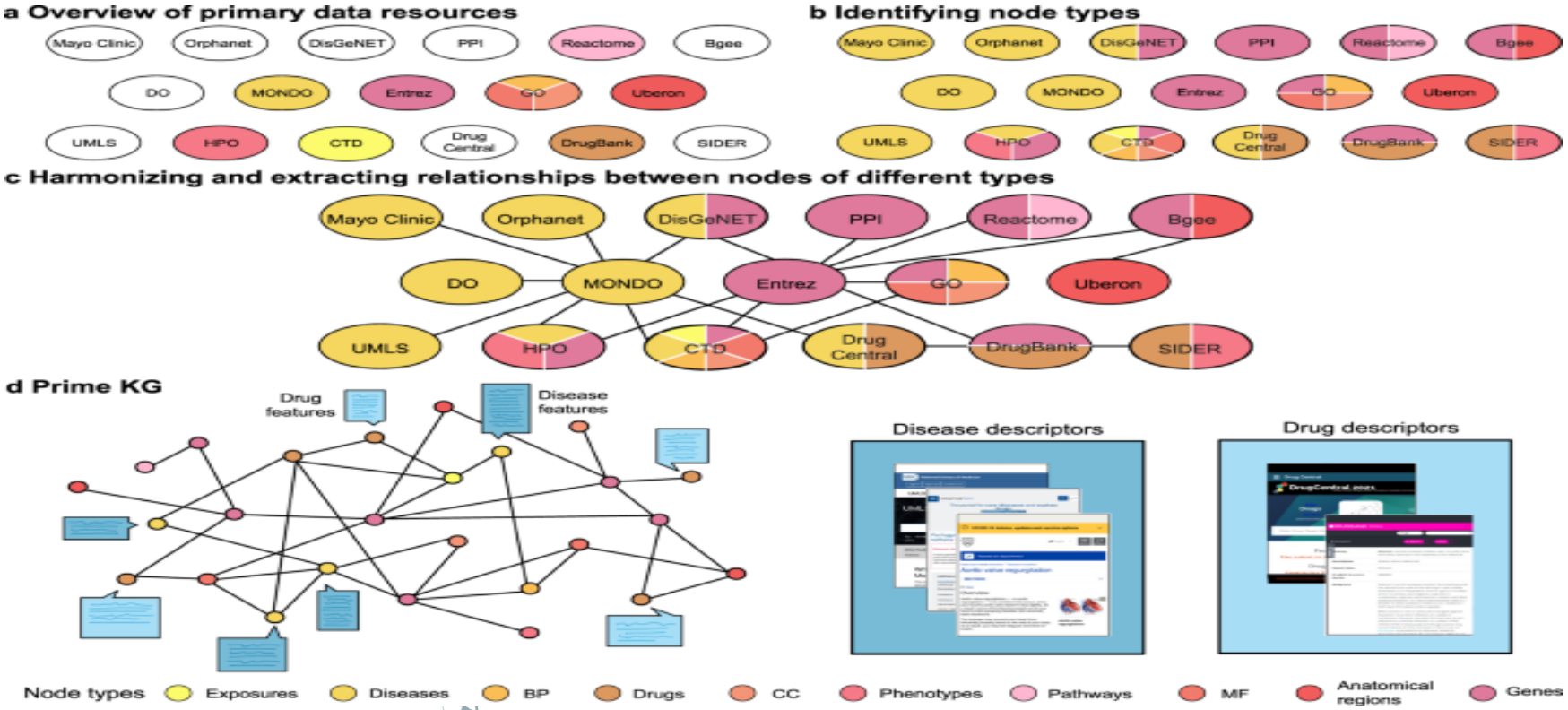
# Semantic Technology for One Health : Knowledge Graphs




Chandak, P., Huang, K. & Zitnik, M. Building a knowledge graph to enable precision medicine. *Sci Data* **10**, 67 (2023). https://doi.org/10.1038/s41597-023-01960-3

# Knowledge graphs for ecological systems

Hailey Robertson, Ellie Graeden[1*], Adrian A. Castellanos[2], David Rosado[1], John M. Drake[3] , Barbara A. Han[2]

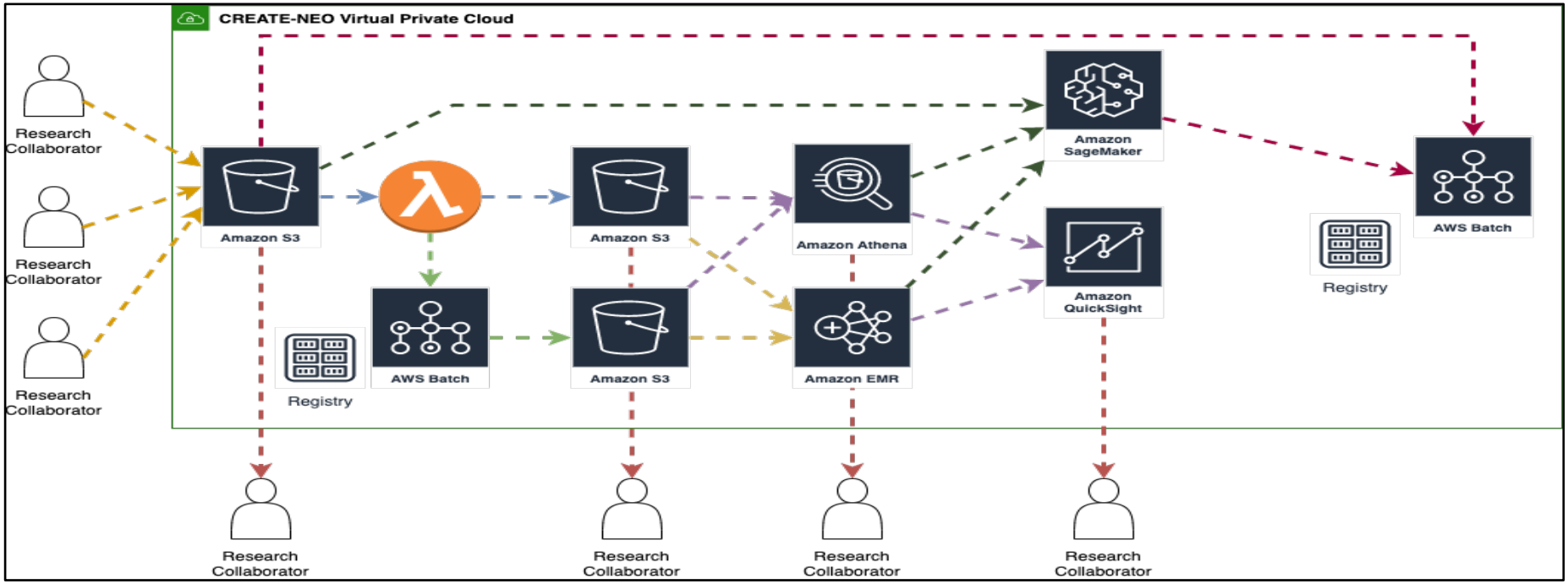
[1] *Center for Global Health Science and Security, Georgetown University, Washington DC*

[2] *Cary Institute of Ecosystem Studies, Millbrook, NY*

[3] *Odum School of Ecology and Center for the Ecology of Infectious Diseases, University of Georgia*

- Synthesize fragmented human epi, zoonotic risk, and environmental data
- Identify critical knowledge gaps
- Help generate hypotheses (ex: for spillover/spillback events)
- Couple with advances in machine learning to understand epidemiologic models, identify vulnerabilities, and help inform public health responses
- **Open data access is essential**

# DATA LAKEHOUSE: PRIMARY STORAGE, ACCESS & INTERROGATION

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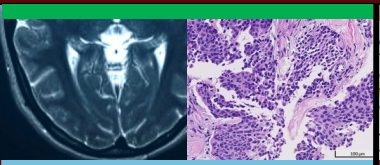
# Data Integration, Accessibility & Utility

## Ideas to Datasets as Efficiently as Possible

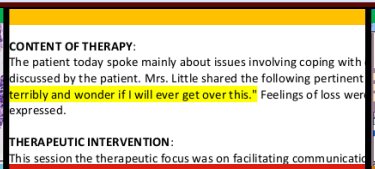
## Data Users

**Stakeholders (policy, public, private), Researchers, Clinicians, Operations**



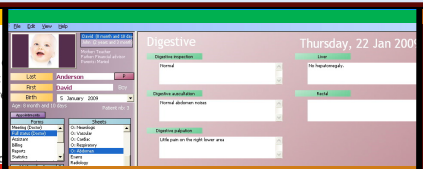
### Imaging

Radiology, Digital Path




### Text

Clinical Notes Reports, Interps

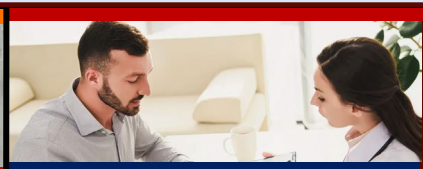



### EMR

Lab Results, Diagnoses

### Biobank

Tissue Specimens, Molecular



### Consent

Agreements for Research Use

# WHERE WE GO FROM HERE?

- ✓ Gaps remain
  - ✓ Affordability
  - ✓ Access
  - ✓ Barriers for sharing (mostly regulatory)
  - ✓ Consultation with end users, stakeholders
  - ✓ Lack of comprehensive and effective programs for acquisition as well as stakeholder engagement

# Acknowledgements

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