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**OPEN SESSION**

**FOR INFORMATION ONLY**

(No formal action is requested at this time)

1. Data Science  
*Dr. Stan Ahalt, Director, Renaissance Computing Institute (RENCI) &  
Professor of Computer Science*
2. Rural Innovation Initiative  
*Dr. Giselle Corbie-Smith, Professor of Social Medicine and Medicine,  
UNC School of Medicine & Director, Center for Health Equity  
Research*

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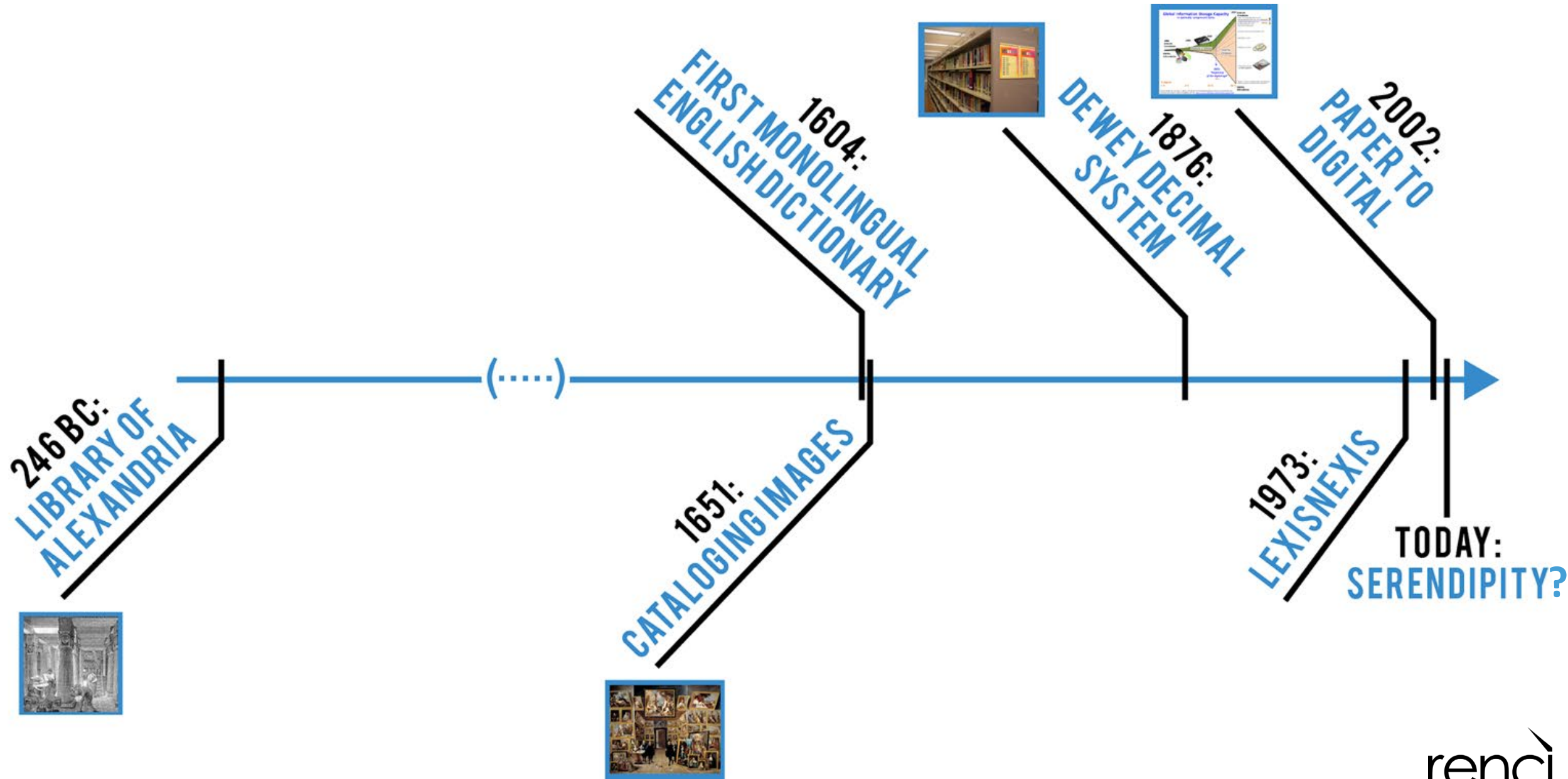
***Administrative Liaison:***

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# Data Science at RENCI *Today*

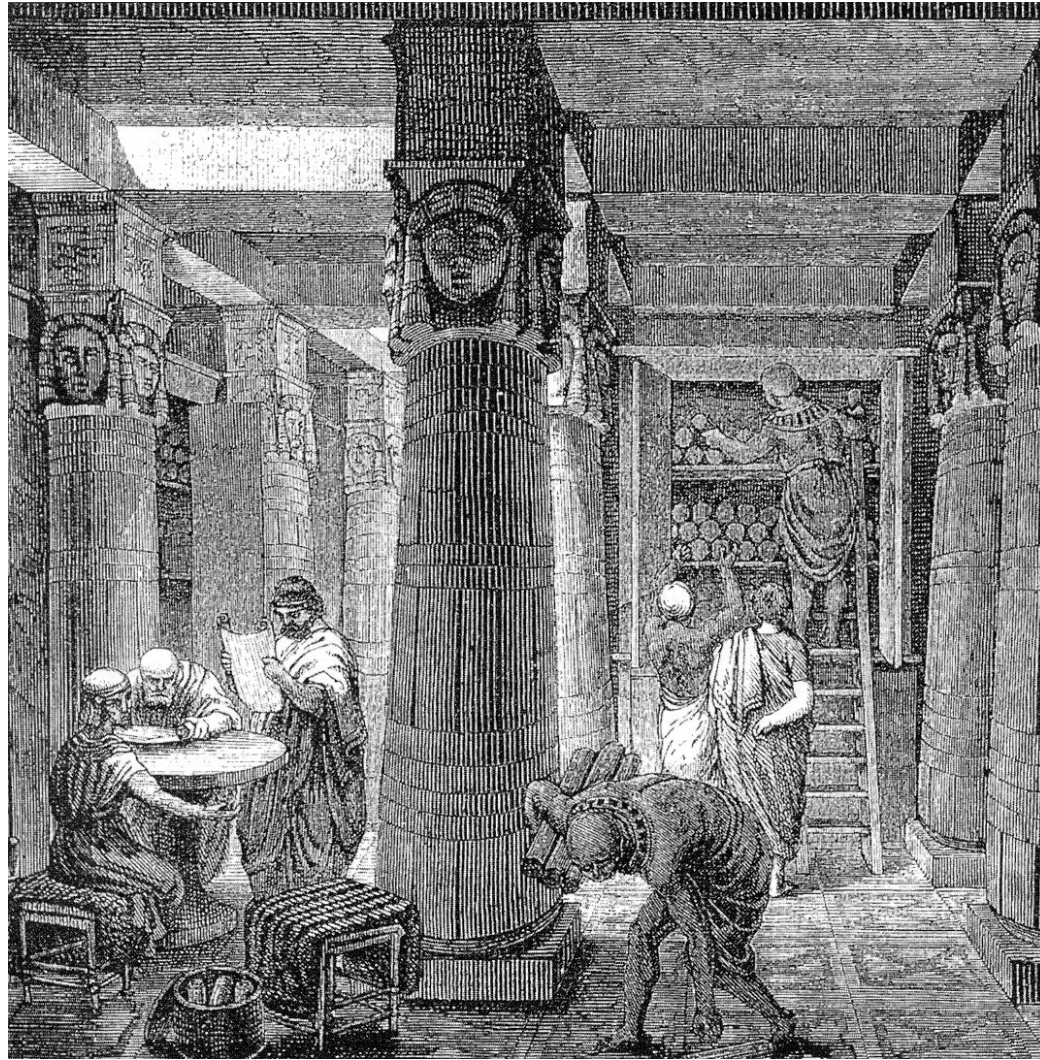
A presentation to the UNC Board of Trustees  
January 30, 2019  
Stan Ahalt, RENCI Director

# Democratizing Data Science to Advance Society





# The Library of Alexandria: Grouping by shelves





# The archduke in his gallery: Documenting a collection by location



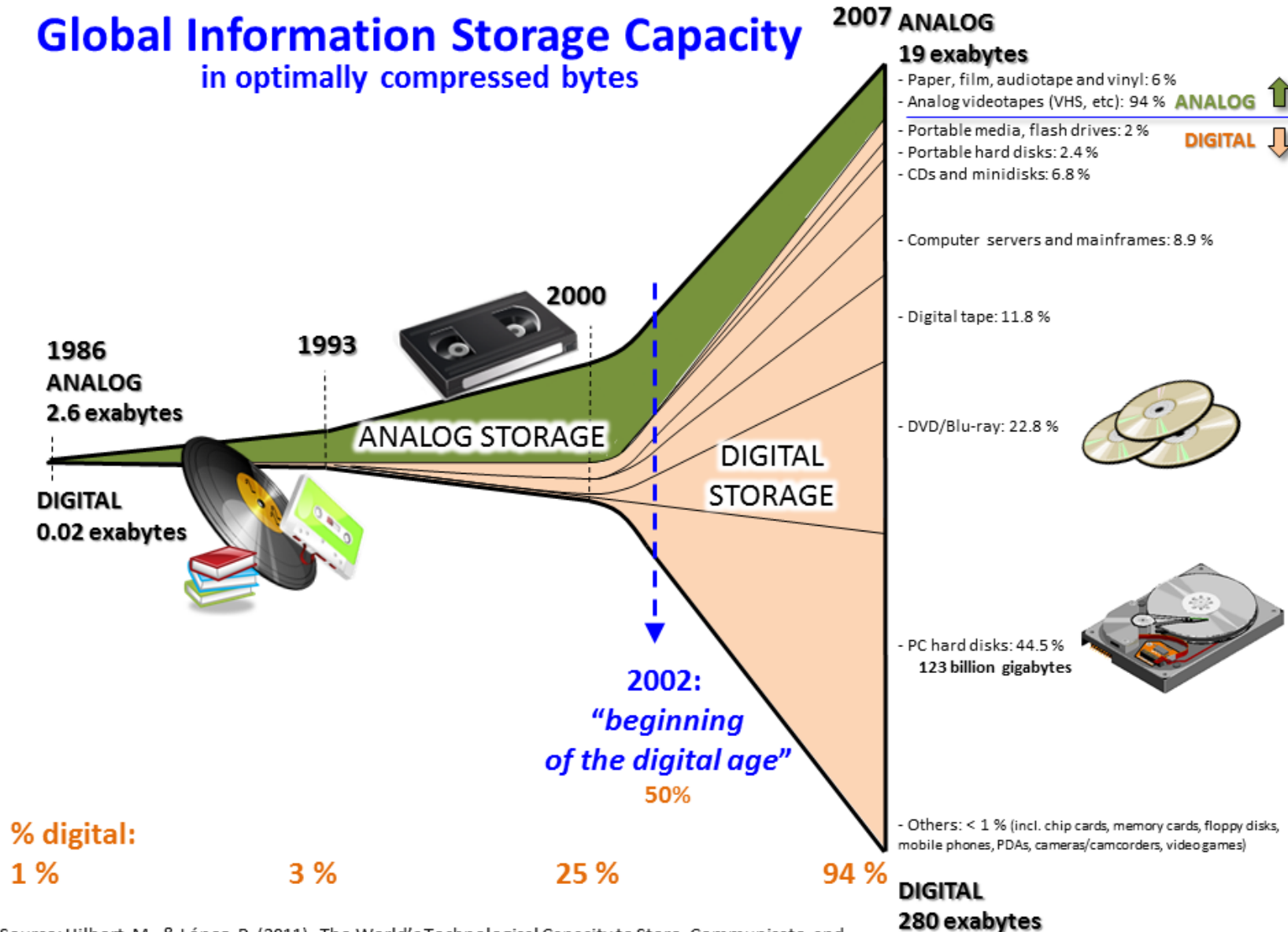


# The Dewey Decimal System: Organizing by shelf and labeling system



# 2002: Organization goes digital

## Global Information Storage Capacity in optimally compressed bytes



Source: Hilbert, M., & López, P. (2011). The World's Technological Capacity to Store, Communicate, and Compute Information. *Science*, 332(6025), 60–65. <http://www.martinhilbert.net/WorldInfoCapacity.html>



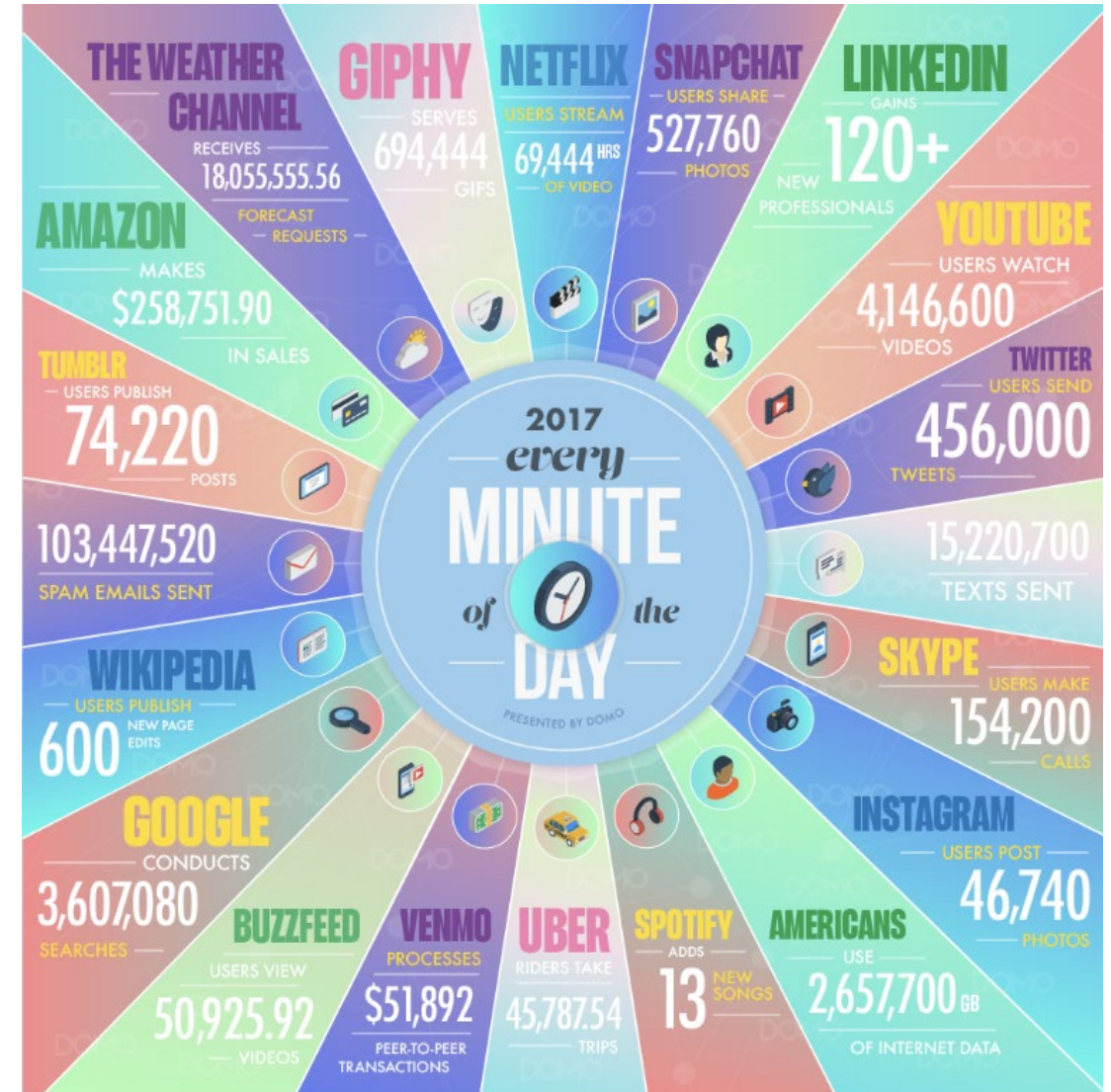
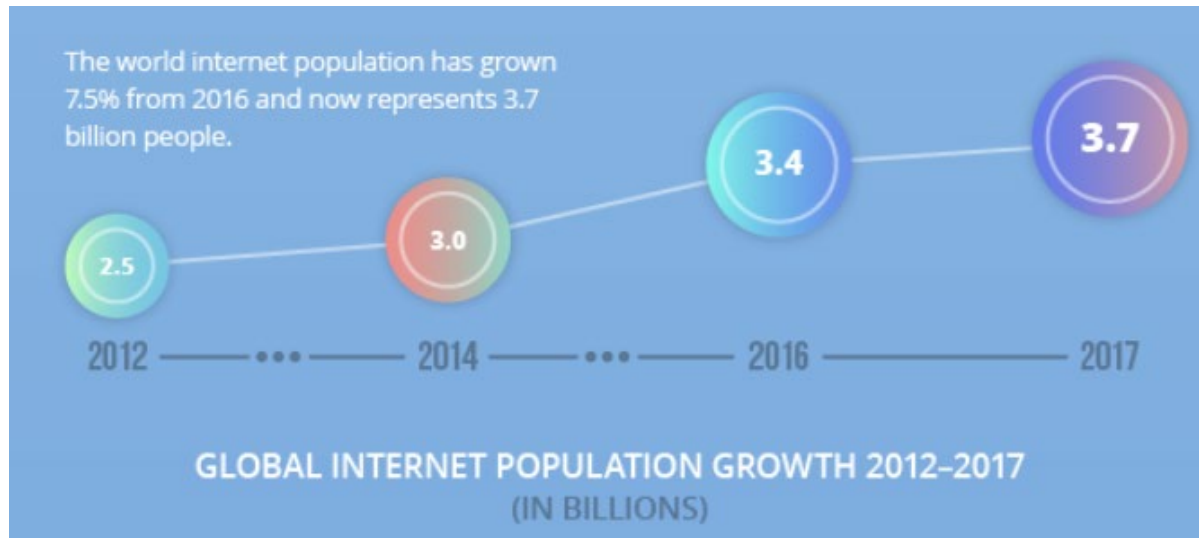
# Today: Data never sleeps

90% of all data existing today was created in the last two years.

We create 2.5 *quintillion* bytes of data *per day* .

The world internet population is 3.7 billion.

-domo.com

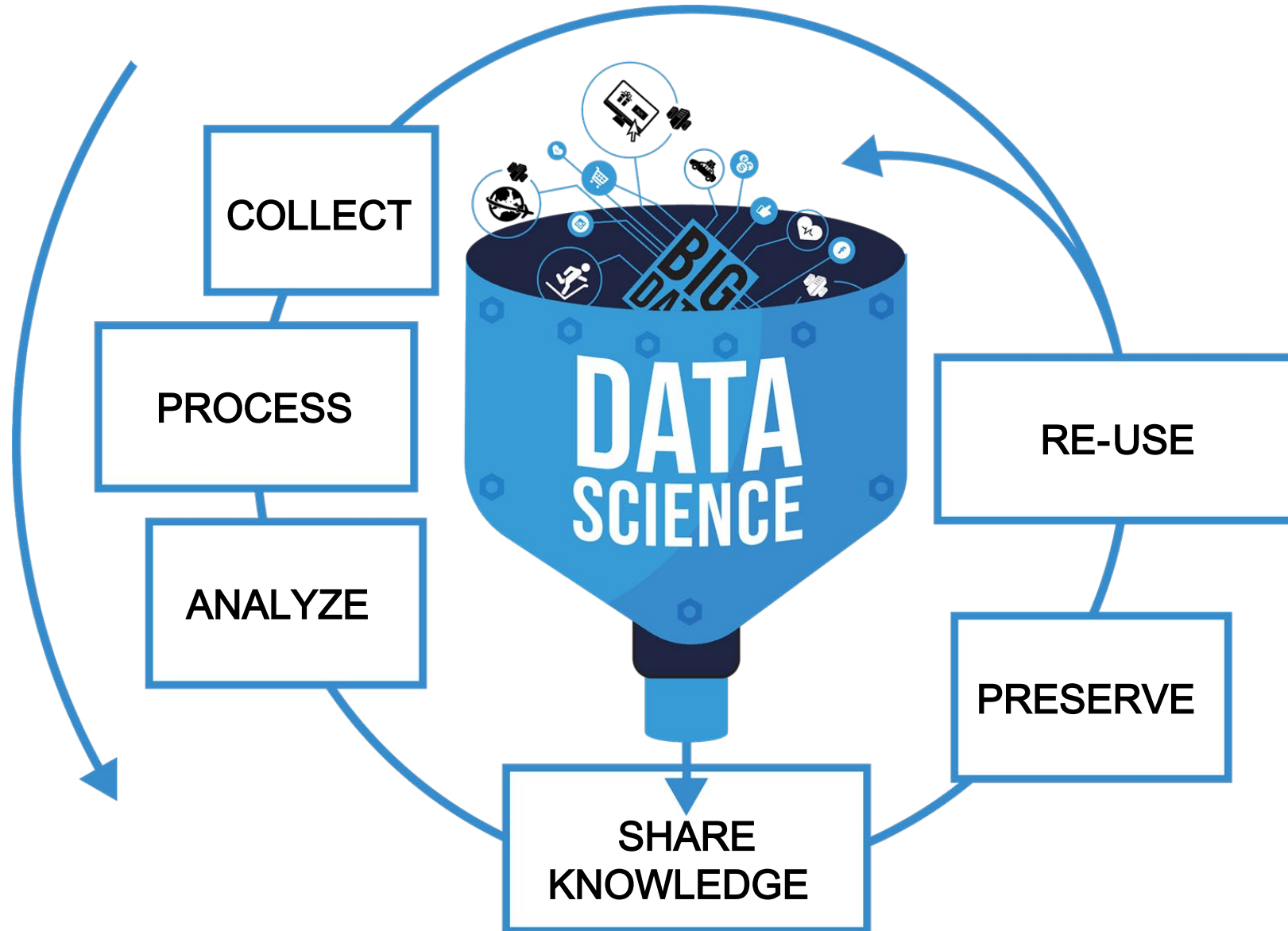




# What can we do with Big Data?



# But, what can we do with Big Data?



But...



# The hard societal problems (more later) require interdisciplinary science, and...



Journal  
**Creativity Research Journal** >  
Volume 26, 2014 - Issue 1

Submit an article

Journal homepage

Enter keywords,

574  
Views

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4  
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ARTICLES

## Interdisciplinary Research Boosted by Serendipity

Frédéric Darbellay , Zoe Moody, Ayuko Sedooka & Gabriela Steffen  
Pages 1-10 | Published online: 26 Feb 2014

Download citation  <https://doi.org/10.1080/10400419.2014.873653>  Check for updates

 Full Article  Figures & data  References  Citations  Metrics  Reprints & Permissions  Get access

## Abstract

Interdisciplinary research can be defined as the practice of discovering new objects of knowledge beyond disciplinary borders. It often operates through the cross-fertilization and hybridization of concepts, theoretical frameworks, and methodological tools to enable the description, analysis, and understanding of the

# Data science trends in North Carolina



Booz | Allen | Hamilton





# Data science trends in the UNC System



**NC STATE UNIVERSITY**

# Data science at UNC -Chapel Hill

## ONGOING

- Ph.D. and Graduate Certificate programs in Bioinformatics and Computational Biology [\[SOM\]](#)
- Professional Science Masters in Biomedical and Health Informatics [\[Several departments\]](#)
- Professional Science Masters in Data Curation [\[SILS\]](#)
- Post-Masters Certificate in Data Curation [\[SILS\]](#)
- M.S. & Ph.D. in Interdisciplinary studies in Statistics and Operations Research [\[STOR\]](#)
- Carolina Digital Humanities Initiative [\[Arts & Sciences\]](#)
- Data Matters, week-long summer training program [\[Odum Institute, RENCI\]](#)
- Odum Institute workshops, ranging from 2-14 hours of class time on quantitative, programming, and data-related topics [\[Odum Institute\]](#)

## IN THE WORKS

- Professional Science Masters in Data Science
- Graduate Certificate in Data Science
- Undergraduate Minor in Data Science
- Possible undergraduate major in Data Science
- Odum Institute MOOC on Data Management



# UNC-CH has committed to convergent science

## Convergent science:

- Problem-centered approach to research
- Draws together innovators from a large span of disciplines
- Highly interdisciplinary

*What if* we could use nanotechnology to extract minerals from water so effectively that mining is unnecessary?

*What if* we could develop a brain implant that prevents the chemical imbalance that leads to degenerative nerve damage?

*What if* we could generate, store, and retrieve energy on scales that make the electric grid obsolete?



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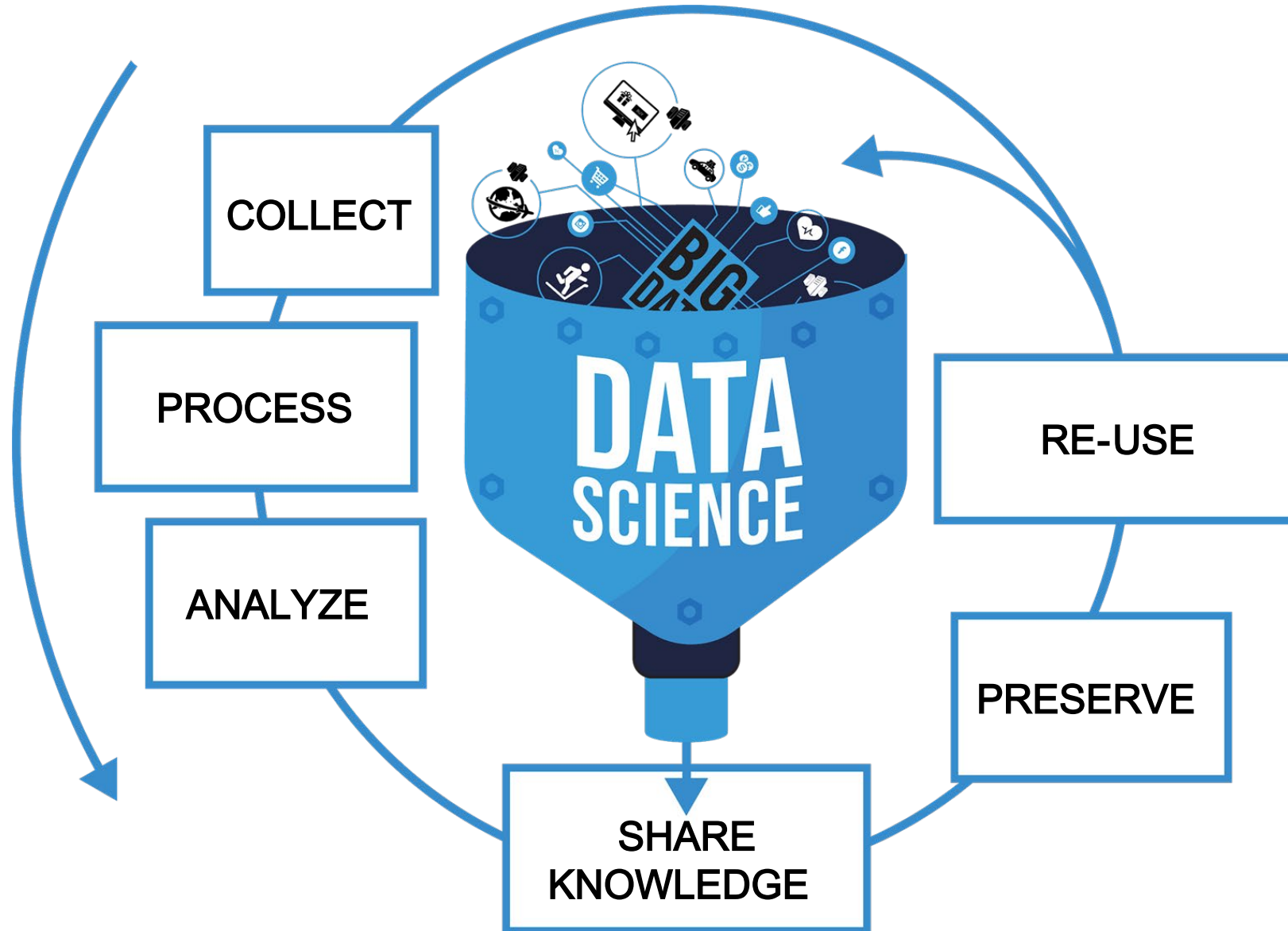
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**DATA SCIENCE**

# But, what can we do with Data Science?





# RENCI & Data Science

## Data Science Cyberinfrastructure



**DATA COMMONS**  
Data Management



**DATA STAGE**  
Data Management  
Instance



**DATA TRANSLATOR**  
Knowledge  
Management



**DATA REASONER**  
Machine  
Learning

## Data Science Coordination



**DATA STAGE CC**  
Operationalization



**HIVE CC**  
Operationalization

## Data Science Engagement



**National Consortium  
for Data Science**  
Consortium



**South Big  
Data Hub**  
Consortium

# RENCI & Data Science

## Build It



### DATA COMMONS

Data Management



### DATA STAGE

Data Management  
Instance

## Use It



### DATA TRANSLATOR

Knowledge  
Management



### DATA REASONER

Machine  
Learning

## Run It



### DATA STAGE CC

Operationalization



### HIVE CC

Operationalization

## Share It

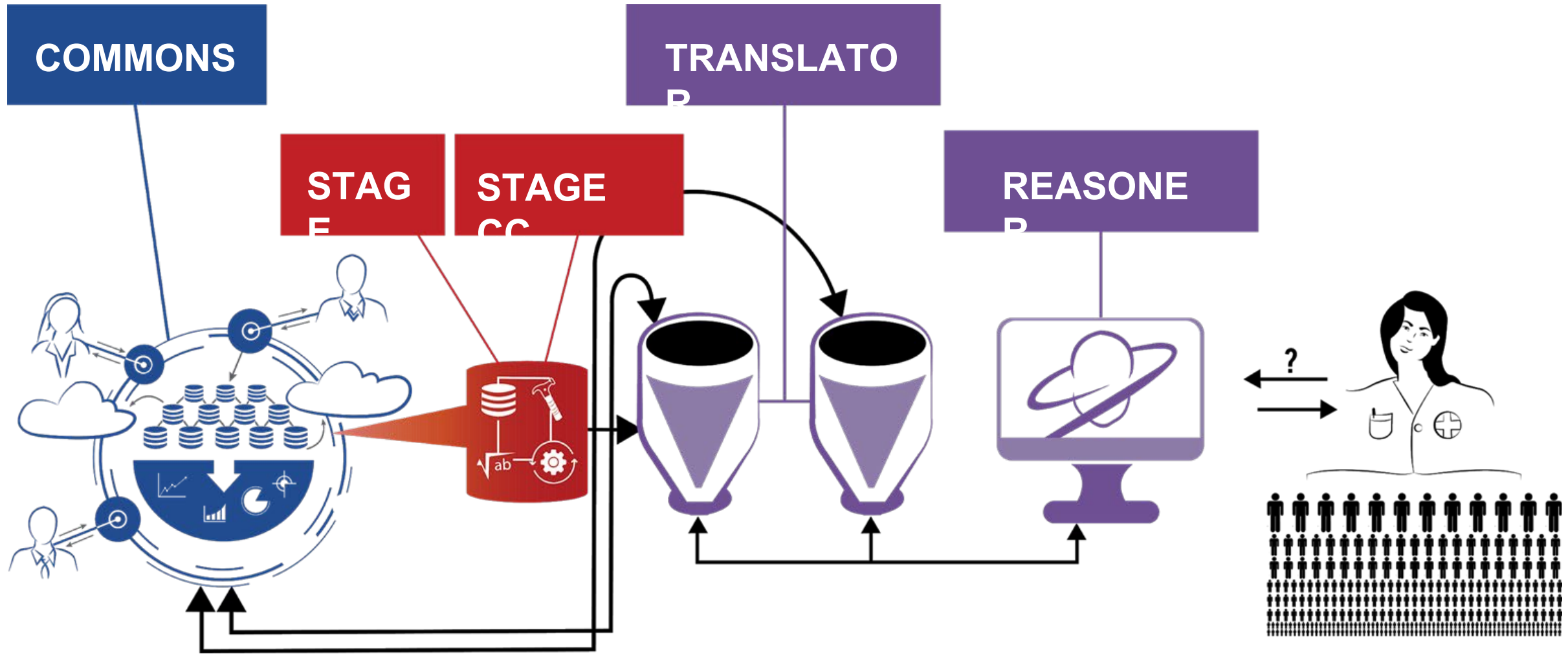


National Consortium  
for Data Science  
Consortium



South Big  
Data Hub  
Consortium

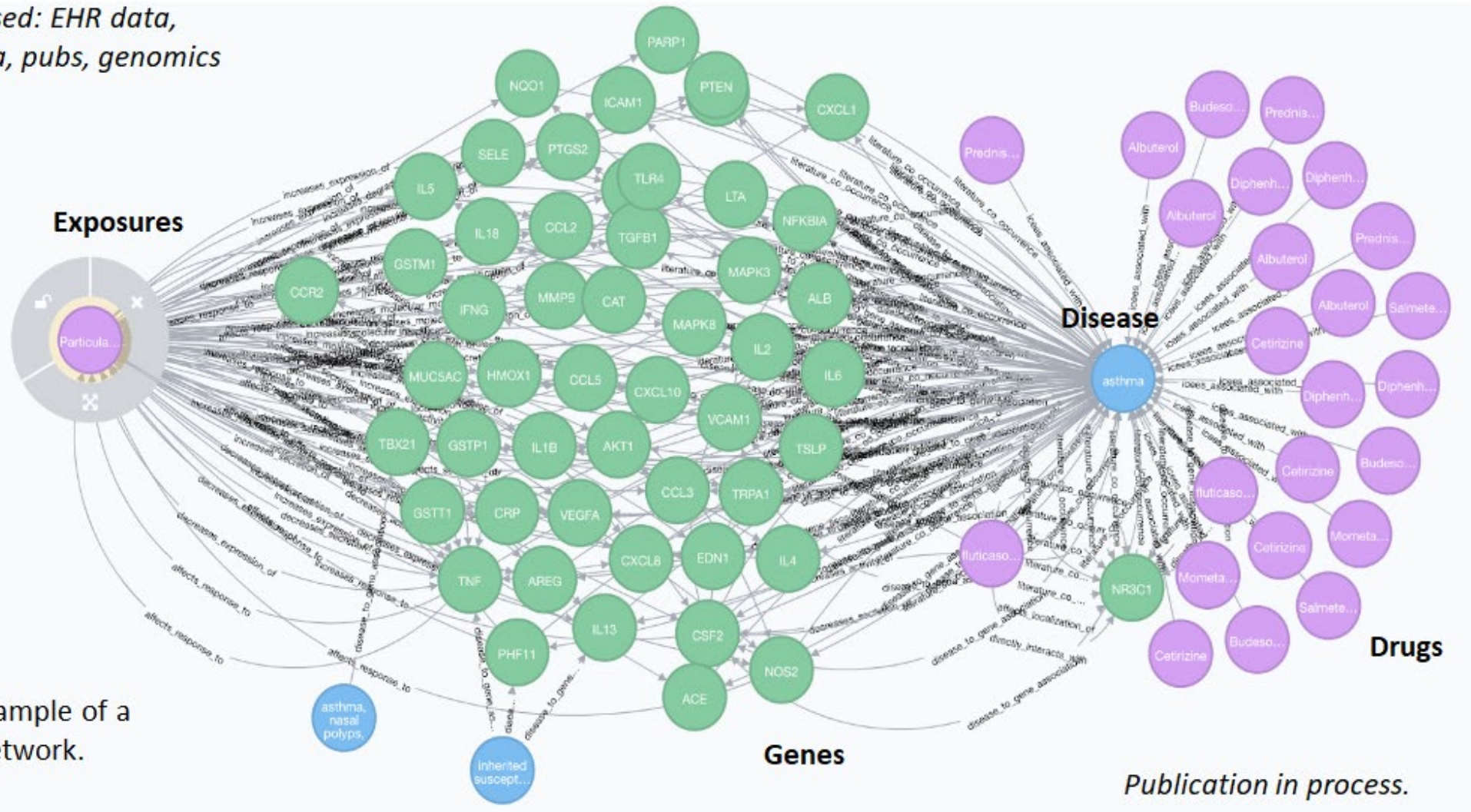
# Biomedical Serendipity





# Asthma Research

Here we've used: EHR data, exposure data, pubs, genomics data, etc.



This is one example of a knowledge network.

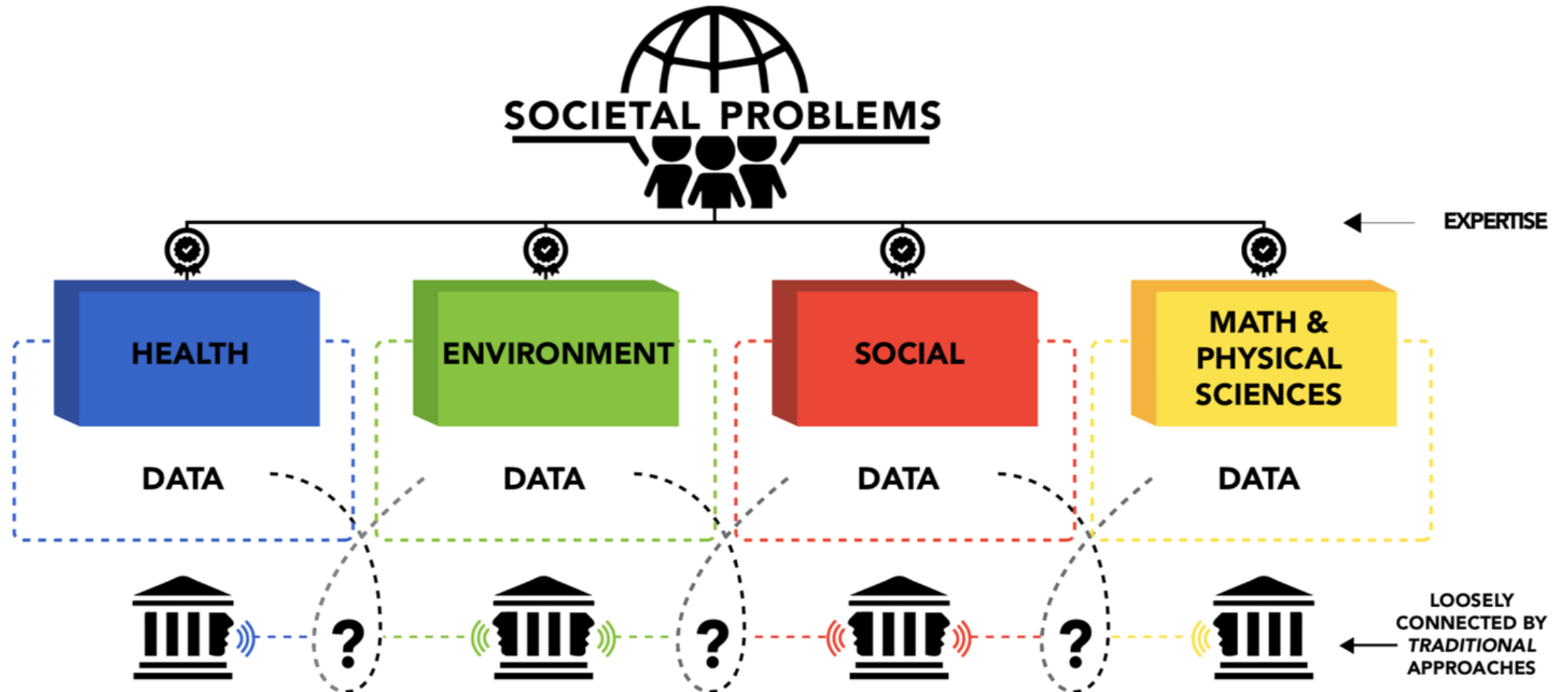
# RENCI & UNC -Chapel Hill

## RENCI Projects

- COPD Gene
- Evryscope
- Coastal Hazards and Risk Research
- ADCIRC Storm Surge and Wind-Wave Model
- GenX Study
- NC TraCS Informatics and Data Science
- Virtual Institute for Social Science Research
- BRAIN-I
- Obesity Hub
- Secure Networking & Research
- DataBridge ("Facebook for Scientists")
- Man to Molecule to Man



# Data Science provides solutions to





**Thank you!**

# UNC INSTITUTE ON RURAL INNOVATION



UNC  
CENTER FOR HEALTH  
EQUITY RESEARCH

UNC BOARD OF TRUSTEES COMMITTEE ON STRATEGIC FRAMEWORK

GISELLE CORBIE-SMITH, MD, MSC  
KENAN-DISTINGUISHED PROFESSOR  
DEPTS. OF SOCIAL MEDICINE AND MEDICINE  
JANUARY 30, 2019  
CAROLINA INN

# OVERVIEW

- Professional background and key accomplishments in rural NC
- State of rural NC health
- Proposed UNC Institute on Rural Innovation



# GETTING HERE

## **Leadership, infrastructure development, and capacity building**

- Early leadership at Sheps and NC TraCS
- Director of UNC Center for Health Equity Research
- Co-Director of the Robert Wood Johnson Clinical Scholars program

## **Research, community engagement, and improvements in health outcomes**

- Established Project GRACE in 2005
- Grant-funded chronic disease translational and implementation intervention research
- R24MD001671, 2005-2014; K24HL105493, 2010-2021; R01HL120690, 2014-2021



Heart Matters

**Aim:** Adapt, conduct small randomized trial, and evaluate proven intervention to reduce cardiovascular disease risk in rural African American communities

## Collaboration

- Project Momentum, Inc. (Wynn), James McFarlin Community Development (McFarlin)
- Community Input → modify intervention and inclusion criteria

## Heart Matters Participants and Benefits

- Recruited 143 African American adults
- Significant improvements in blood pressure, exercise, and self-efficacy for diet and exercise change

### STUDY PROTOCOL

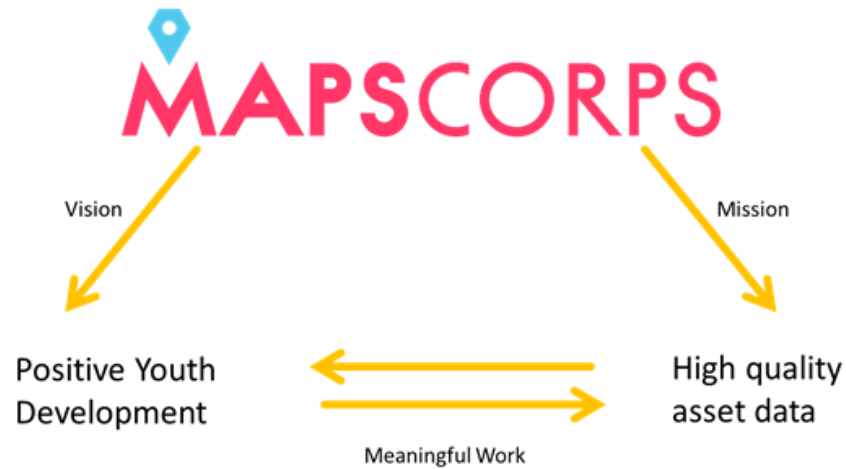
### Open Access



Heart Matters: a study protocol for a community based randomized trial aimed at reducing cardiovascular risk in a rural, African American community



Giselle Corbie-Smith<sup>1\*</sup>, Crystal Wiley-Cene<sup>1</sup>, Kiana Bess<sup>1</sup>, Tiffany Young<sup>1</sup>, Gaurav Dave<sup>1</sup>, Katrina Ellis<sup>1</sup>, Stephanie M. Hoover<sup>1</sup>, Feng-Chang Lin<sup>1</sup>, Mysha Wynn<sup>2</sup>, Shirley McFarlin<sup>3</sup> and Jamie Ede<sup>1</sup>



**Aim:** Train youth to produce high quality data about community assets that everyone can use to improve rural living

**Collaboration:** U Chicago (Lindau), Project Momentum (Wynn), and Opportunities Industrialization Center, Inc.

## Participants and Benefits

- 36 youth mappers and 11 college interns present their work at Scientific Symposium
- 24% of total active places were not available from Google, Yelp, or Dun & Bradstreet
- Accessible on [mapscorps.org](http://mapscorps.org)





# STATE OF RURAL HEALTH

- Rural North Carolinians suffer from worse health outcomes and higher rates of chronic conditions than urban residents
  - Disproportionately older, lower income, unemployed and lower levels of educational attainment
  - Disproportionately die due to heart disease, diabetes, lung disease, unintentional injuries, and suicide
- Nearly a two year difference between average life expectancy of rural vs. urban North Carolinians: 76.9 years vs. 78.7 years

# STATE OF RURAL HEALTH

- **Health Behaviors**

Less likely to get recommended physical activity, fruits and vegetables, and maintain healthy body weight; more likely to smoke.

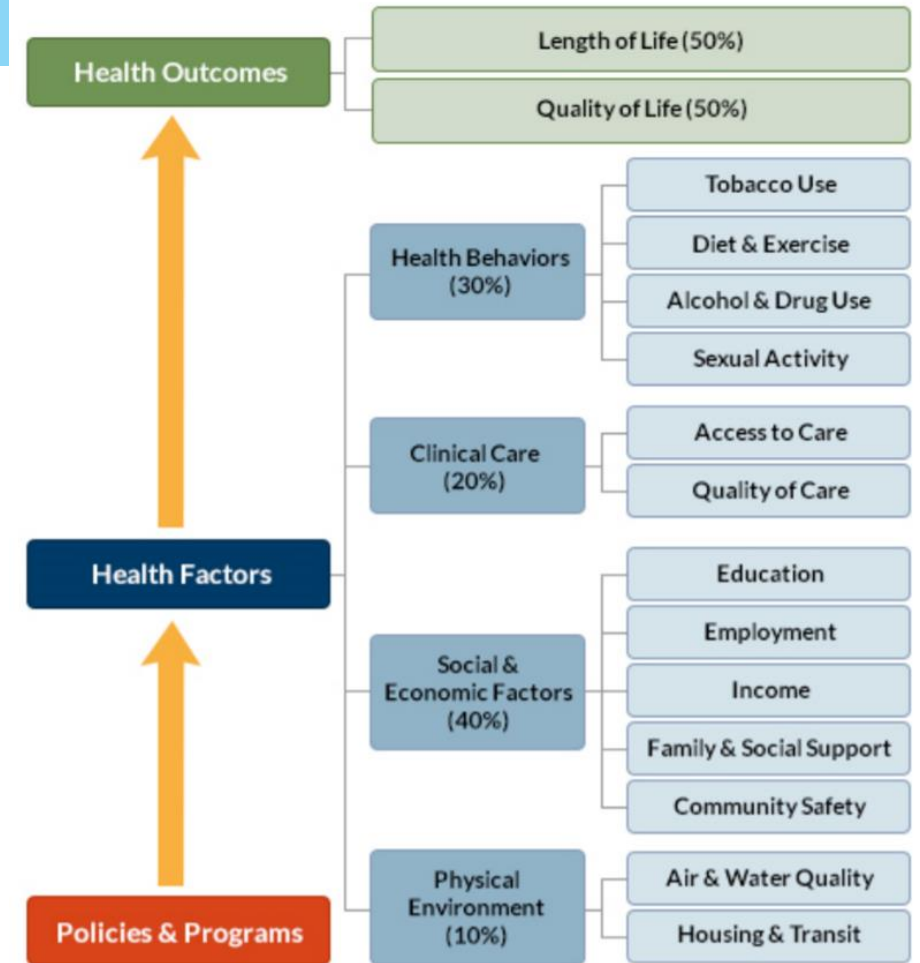
- **Clinical Care**

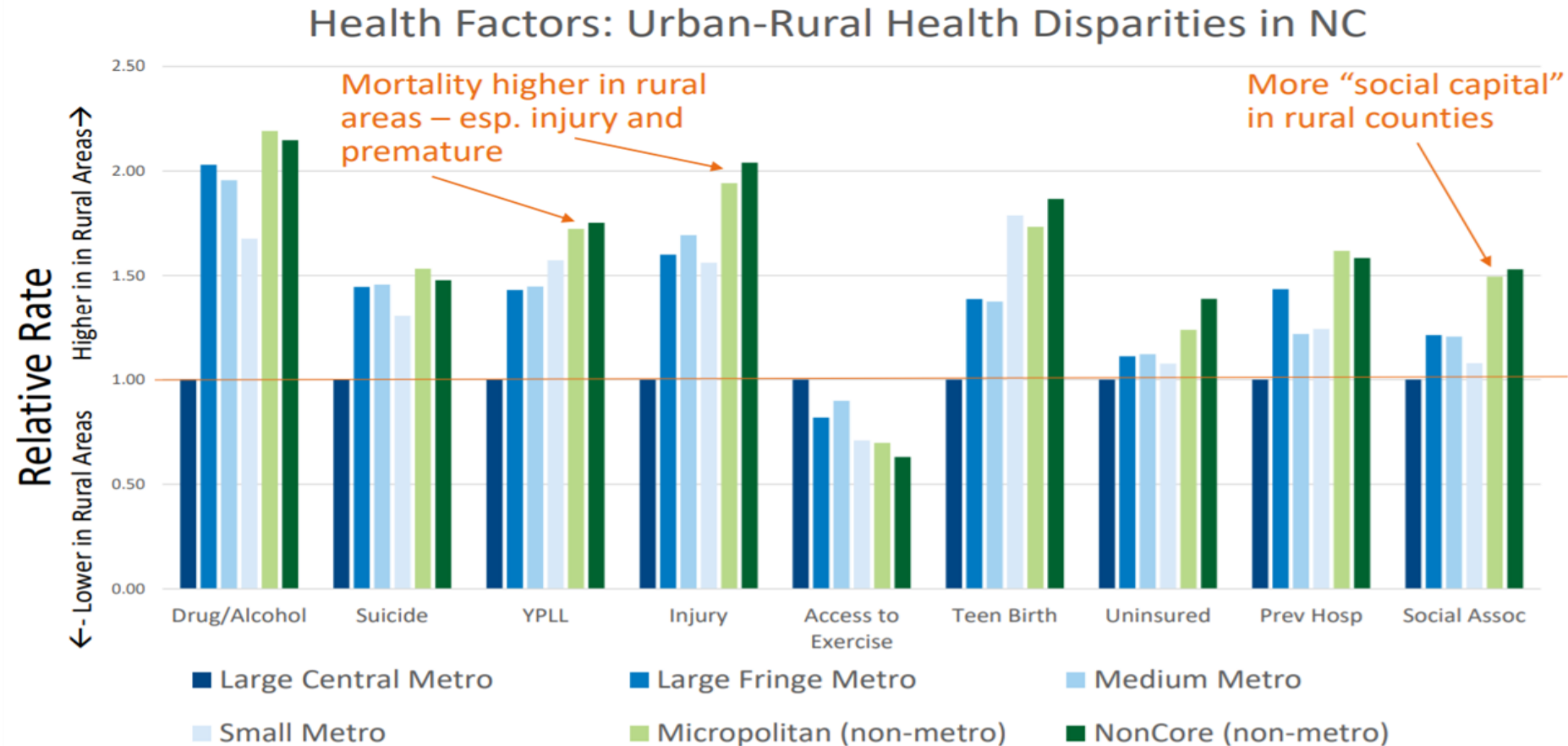
More likely to not seek care due to cost, less likely to be insured

- **Social, Economic, and Environmental Factors**

When ranked by health outcomes and health behaviors

**10 of 12 “least healthy” NC counties are rural counties**



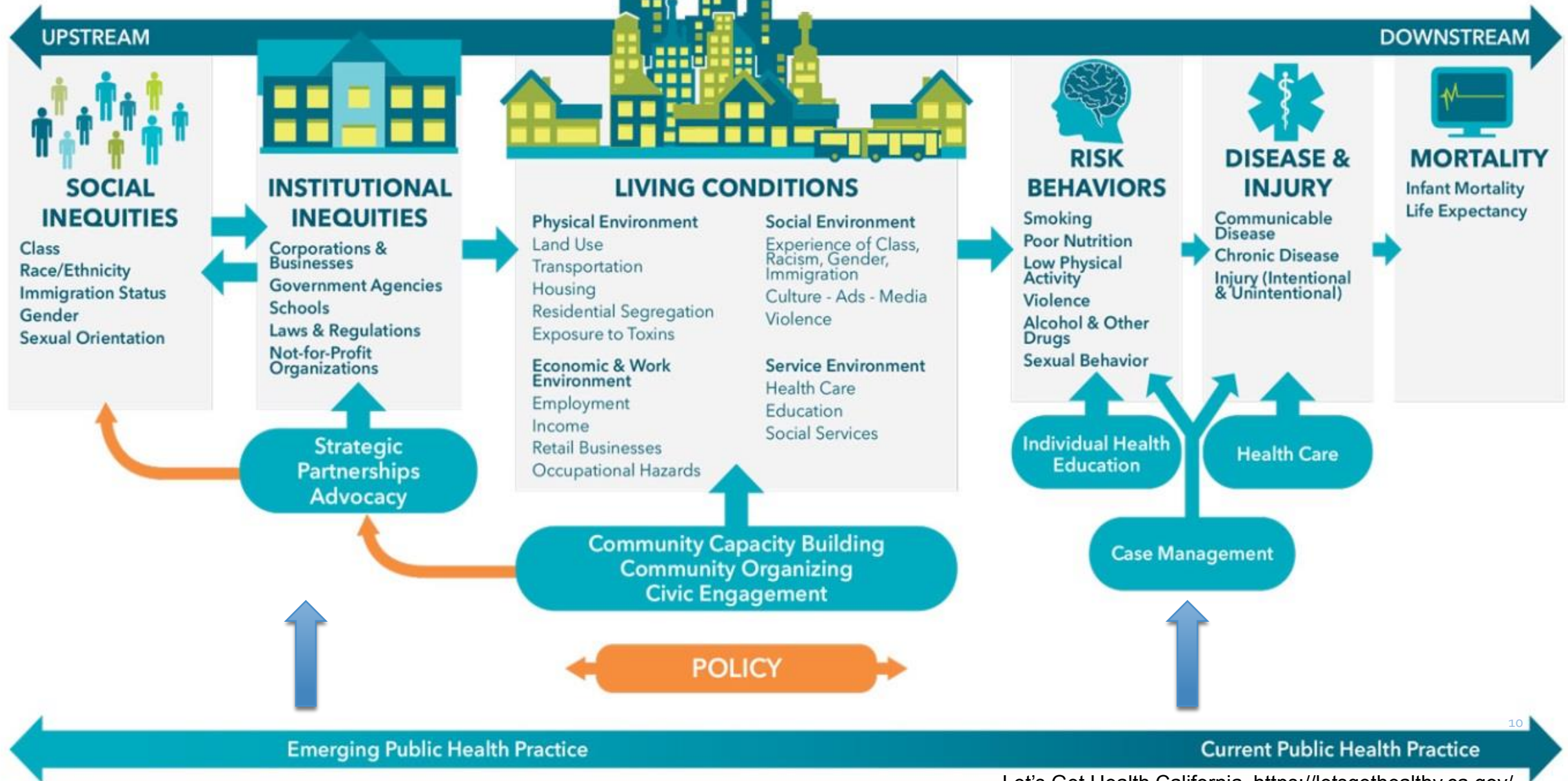


CDC: 5 county types: **Large central** (Wake, Mecklenburg); **Fringe of large** (e.g., Union, Lincoln); **Medium metro** (e.g., Guilford, Macon, etc.); **Small metro** (e.g., Pitt, Onslow+Jones); **Micropolitan** (e.g., Harnett, Tyrrell); **NonCore/Rural** (e.g., Columbus, Ashe)

5

# A PUBLIC HEALTH FRAMEWORK FOR REDUCING HEALTH INEQUITIES

## BAY AREA REGIONAL HEALTH INEQUITIES INITIATIVE





# PROPOSED UNC INSTITUTE ON RURAL INNOVATION

## **VISION**

- To be a catalyst for the well-being and prosperity of rural North Carolina through innovation in stakeholder-driven education, advocacy, research and practice.

## **MISSION**

- To collaboratively identify, develop and implement solutions through a robust network of community-academic partnerships focused on concerns of rural communities in North Carolina.

# WHY UNC?

## Catalyst for meeting strategic plans

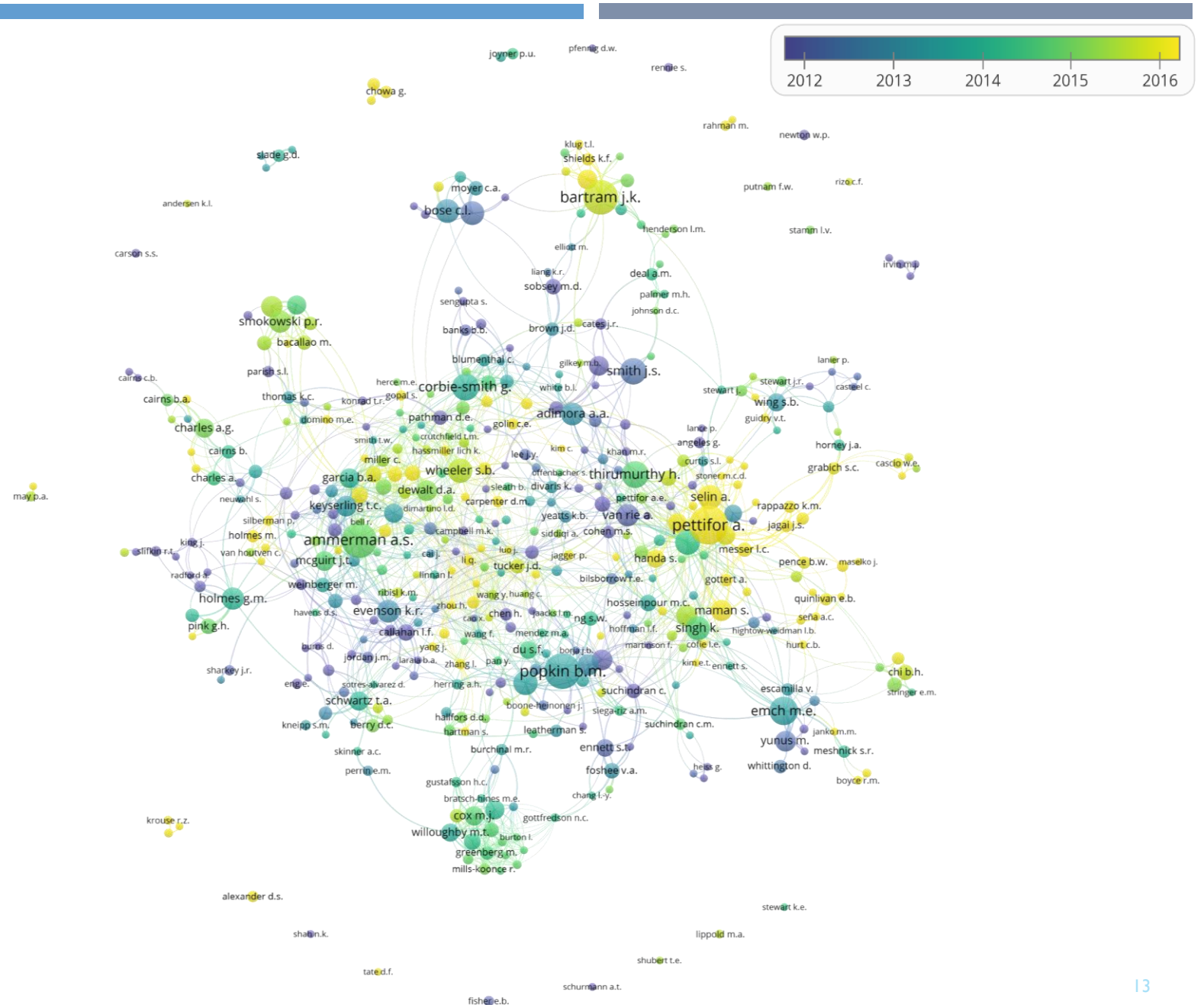
- UNC System's Higher Expectations
- UNC-Chapel Hill's The Blueprint for Next
- UNC School of Medicine Strategic Plan



ECONOMIC IMPACT AND  
COMMUNITY ENGAGEMENT



# UNC NETWORK OF RURAL RESEARCHERS



# USING A STAKEHOLDER DRIVEN APPROACH

- Reframing with strengths-based approach
- Prioritizes needs and wants of those we hope to serve
- Democratized process to include direct participation by the stakeholders, giving a meaningful voice
- Design and evaluation of impact of programs according to stakeholder outcomes
  - Applies principles and methodology of human-centered design
- Acknowledges particular expertise of stakeholder is critical to solving complex problems
- Better process and outcomes by integrating and highlighting diverse perspectives
- Evidence of...
  - Improved outcomes
  - Sustained partnerships
  - Policy change



# GOALS

## Convene to Prioritize

Establish a governing structure and internal advisory committee representative of diverse disciplines, professions and communities to prioritize issues and inform policy-based solutions impacting rural North Carolinians

## Train to Innovate

Build capacity of and train the next generation of rural innovation leaders to address unmet needs and build on the strengths of rural North Carolina communities

## Harmonize to Analyze

Develop a democratized data infrastructure that facilitates access to data, identification of and deployment of novel solutions to address priority issues facing rural North Carolinians

## Resolve to Elevate

Foster a stakeholder-driven research environment through seed funding and consultation services that focuses on rural North Carolina communities

## A STAKEHOLDER ENGAGED APPROACH

- Identify and recommend stakeholders for external advisory committee
- Convene stakeholders and community members for “listening tour” to learn local community concerns and priorities for socioeconomic vitality and health
- Facilitate strategic planning and action planning meetings
- Make stakeholder driven recommendations to strengthen capacity, infrastructure, and efficient use of resources to fulfill aims

# PROGRAMS

## Convene to Prioritize

Regional and initiative-wide strategic plan  
Establish advisory committee and governing structure

## Train to Innovate

Develop and host leadership training program  
Collaborate with existing initiatives to extend reach

## Harmonize to Analyze

Establish platform for data hub and evaluation dashboard  
Solicit and support projects using data hub

## Resolve to Elevate

Establish consultation structure  
Launch seed funding RFAs





Thank you

