

Actionable Data Visualizations

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ISE@SICE, IUB Graduate Student Orientation

August 13, 2018



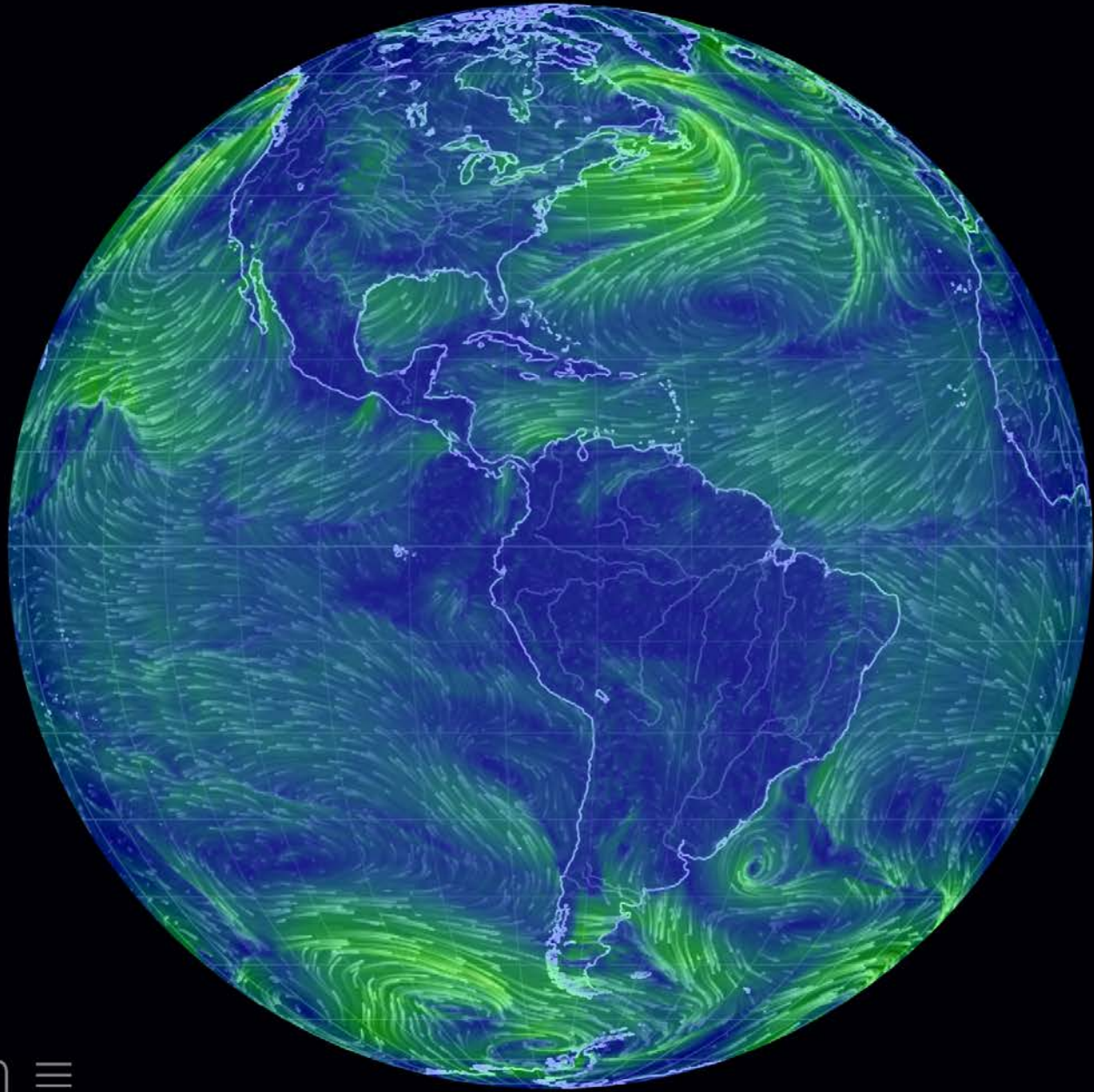


Welcome to ISE and IU!

Map of Scientific Collaborations from 2005-2009



Computed Using Data from Elsevier's Scopus

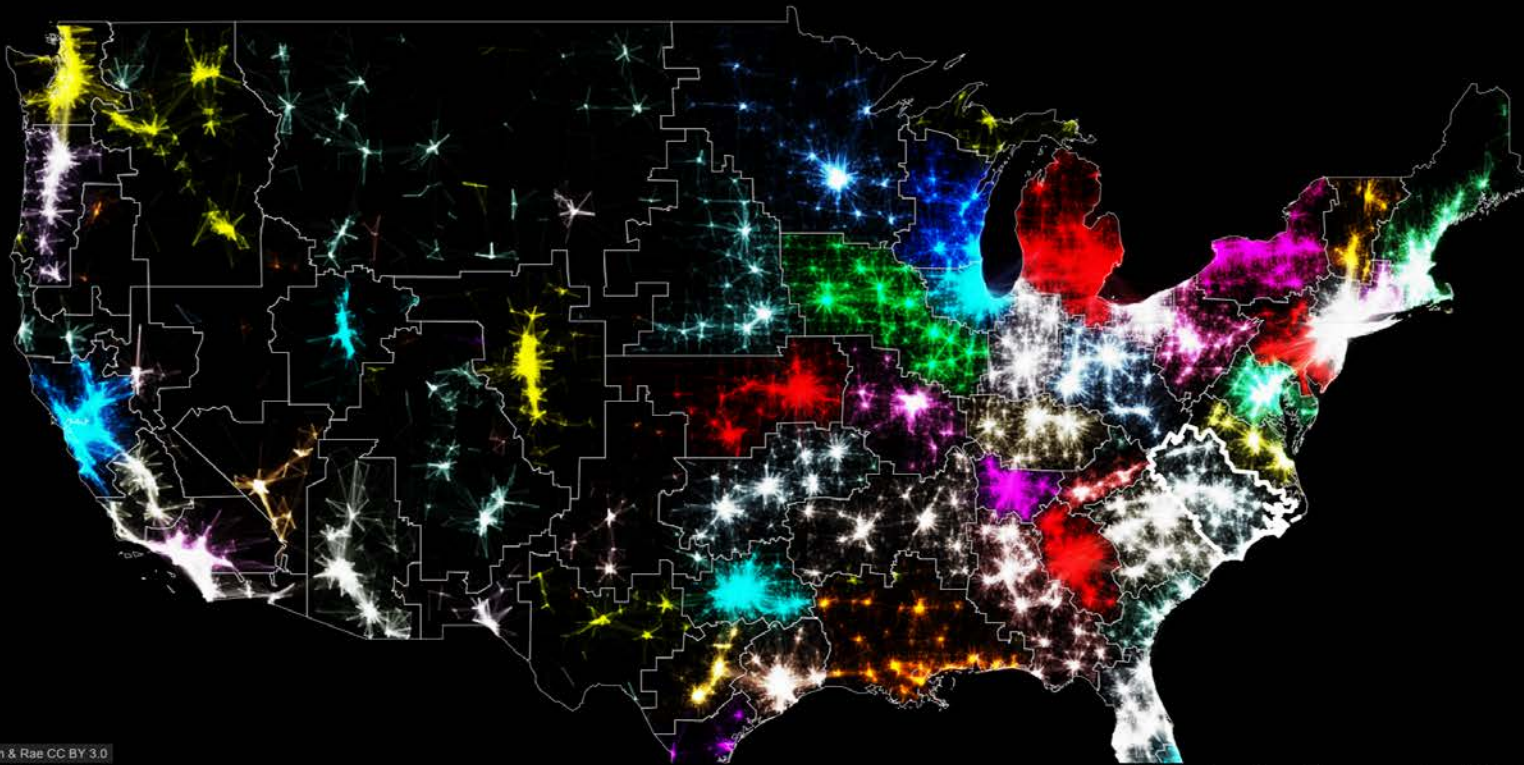


earth ≡

Earth – Cameron Beccario

THE MEGAREGIONS OF THE US

Explore the new geography of commuter connections in the US.
Tap to identify regions. Tap and hold to see a single location's commuted.



Leaflet | Nelson & Rae CC BY 3.0

This is the Roanoke (Raleigh) megaregion.

Maps of Science & Technology

<http://scimaps.org>



101st Annual Meeting of the Association of American Geographers, Denver, CO.
April 5th - 9th, 2005 (First showing of Places & Spaces)



University of Miami, Miami, FL.
September 4 - December 11, 2014.



Duke University, Durham, NC.
January 12 - April 10, 2015



The David J. Sencer CDC Museum, Atlanta, GA.
January 25 - June 17, 2016.

100 maps and 12 macrosopes by 215 experts on display at 354 venues in 28 countries.

Data Visualization Literacy: Research and Tools that Advance Public Understanding of Scientific Data

NSF Org: [DRL](#)
[Division Of Research On Learning](#)

Initial Amendment Date: June 13, 2017

Latest Amendment Date: June 13, 2017

Award Number: 1713567

Award Instrument: Standard Grant

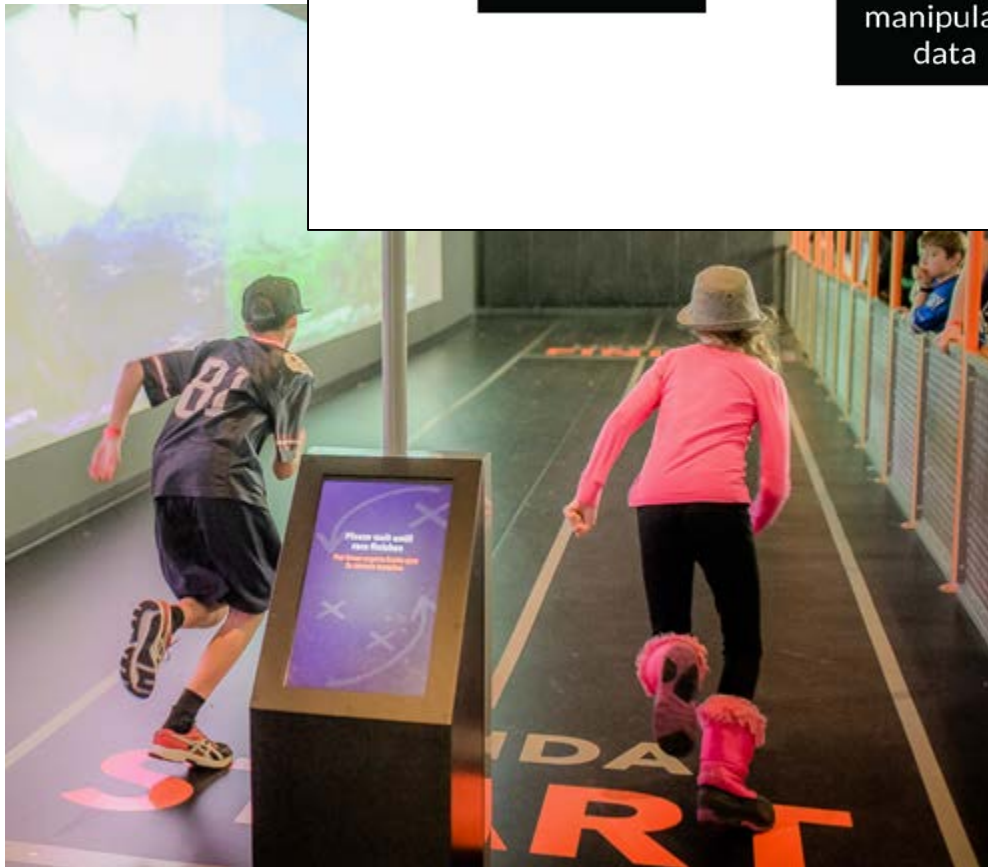
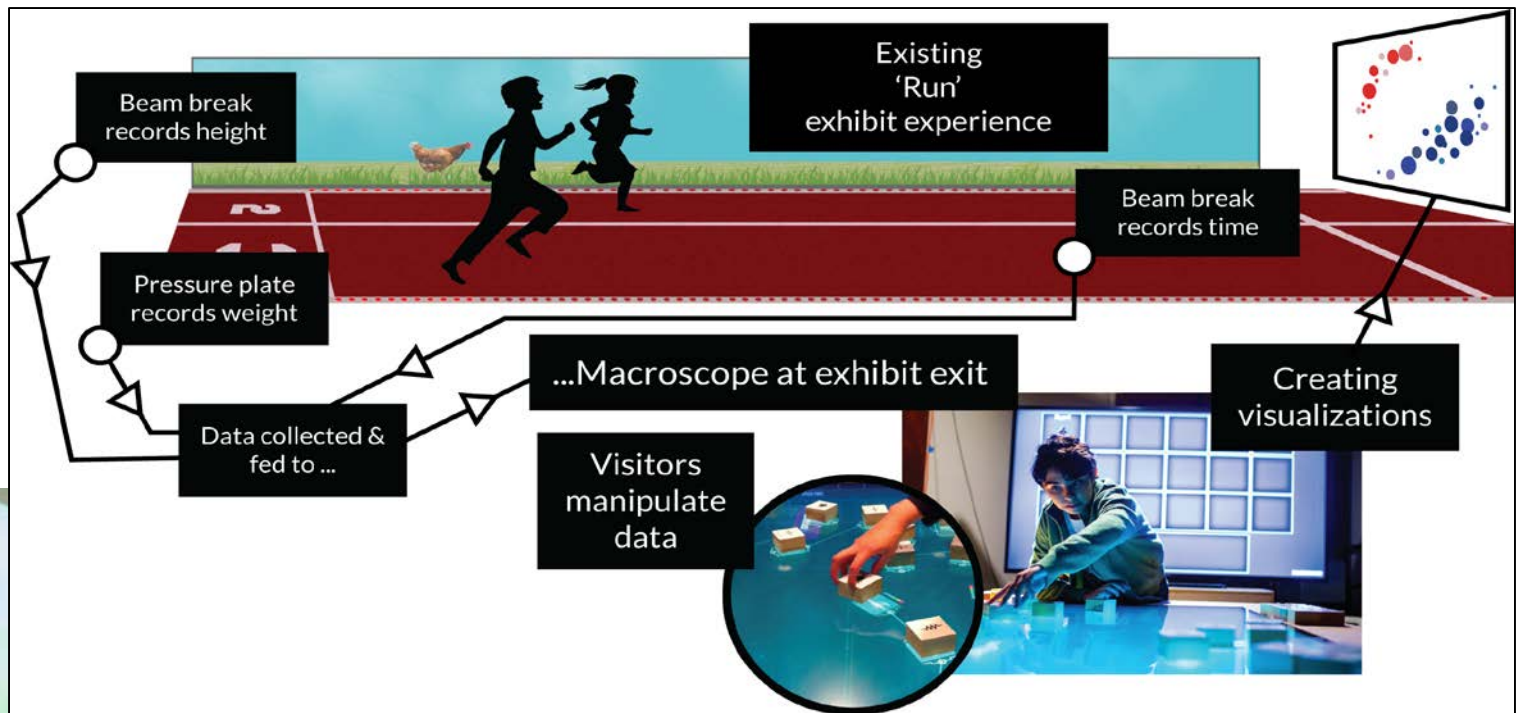
Program Manager: Arlene M. de Strulle
DRL Division Of Research On Learning
EHR Direct For Education and Human Resources

Start Date: August 1, 2017

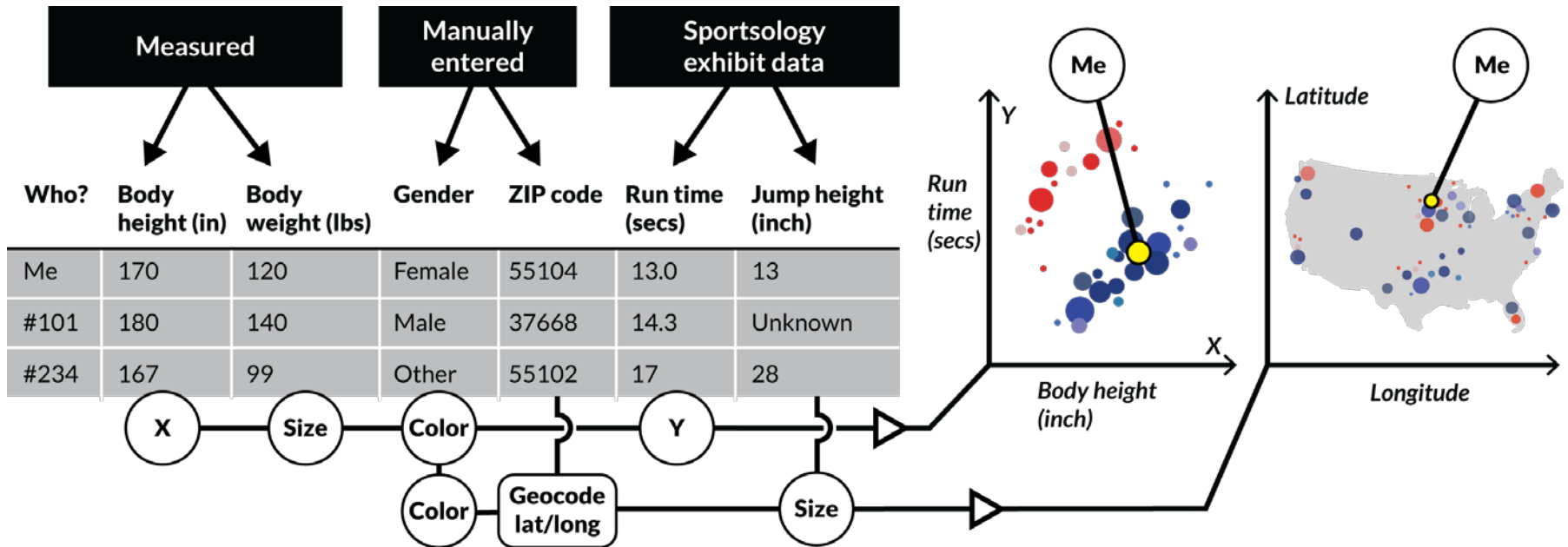
End Date: July 31, 2021 (Estimated)

Awarded Amount to Date: \$1,355,236.00

Investigator(s): Katy Borner katy@indiana.edu (Principal Investigator)
Kylie Pepler (Co-Principal Investigator)
Bryan Kennedy (Co-Principal Investigator)
Stephen Uzzo (Co-Principal Investigator)
Joe Heimlich (Co-Principal Investigator)



Sketch of the *Run* exhibit including data collection (top) and macroscope add-on that lets interested visitors explore more complex data visualizations using table-top displays.



xMacroscope general setup and activity—Raw data on left is converted to visualization on right by dragging and dropping (or connecting) column headers to axes, paint buckets, size, and shape.

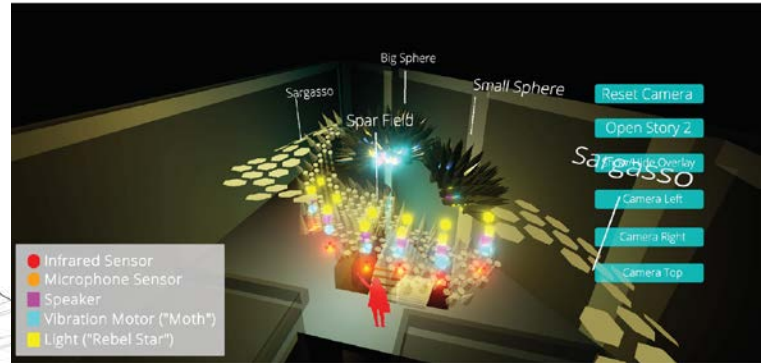
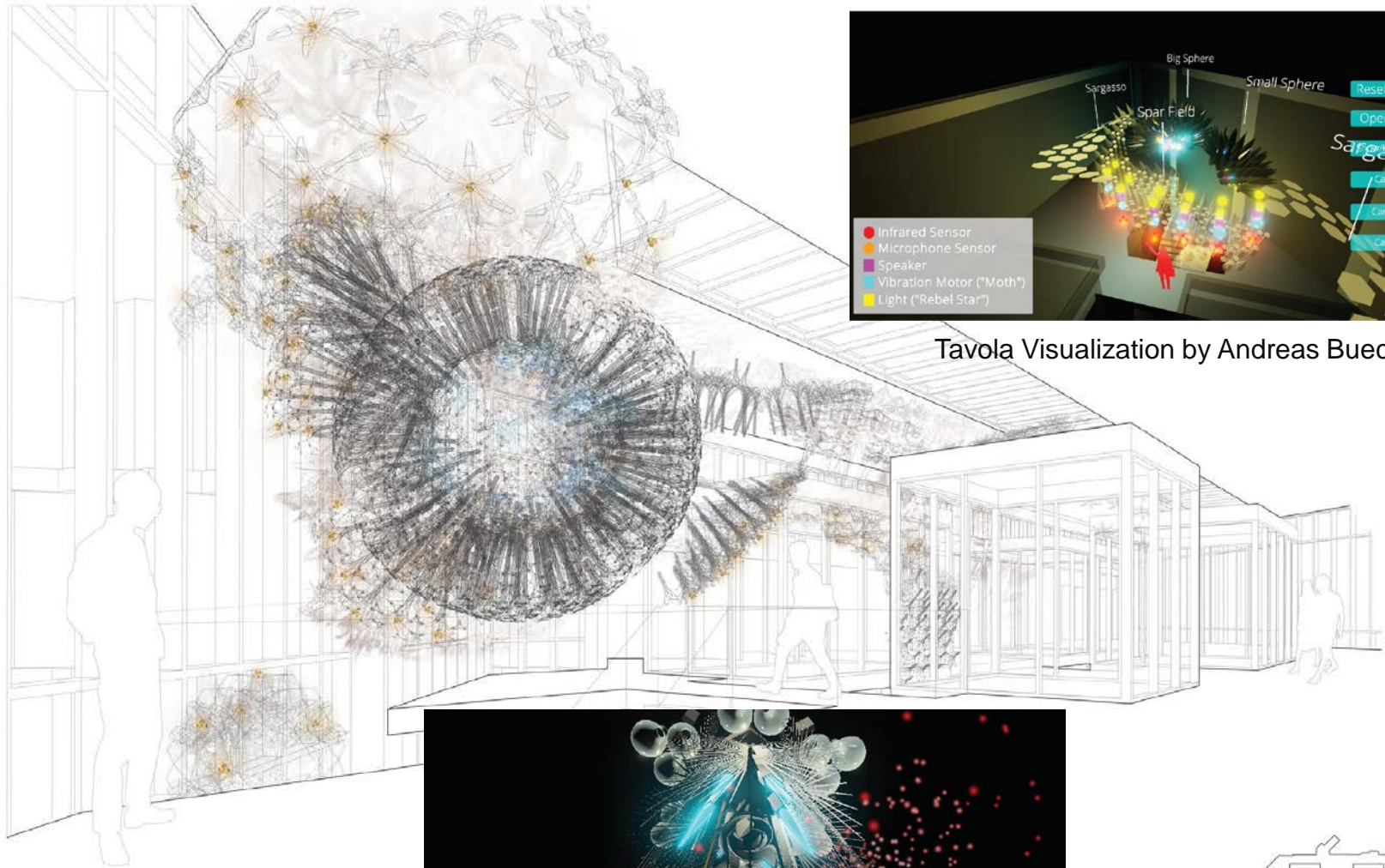
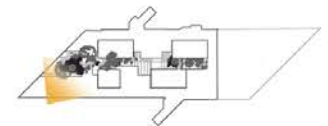
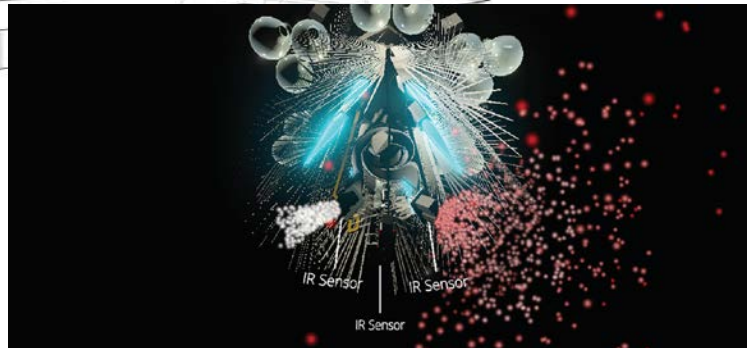


Tavola Visualization by Andreas Bueckle

Luddy Hall Installation
 Indiana University Bloomington
 April 29 2017



Philip Beesley • Living Architecture Systems

Tavola Visualization by Andreas Bueckle

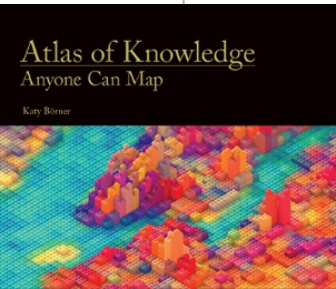


Register at <http://ivmooc.cns.iu.edu> or take E583 in Spring 2019

Tasks

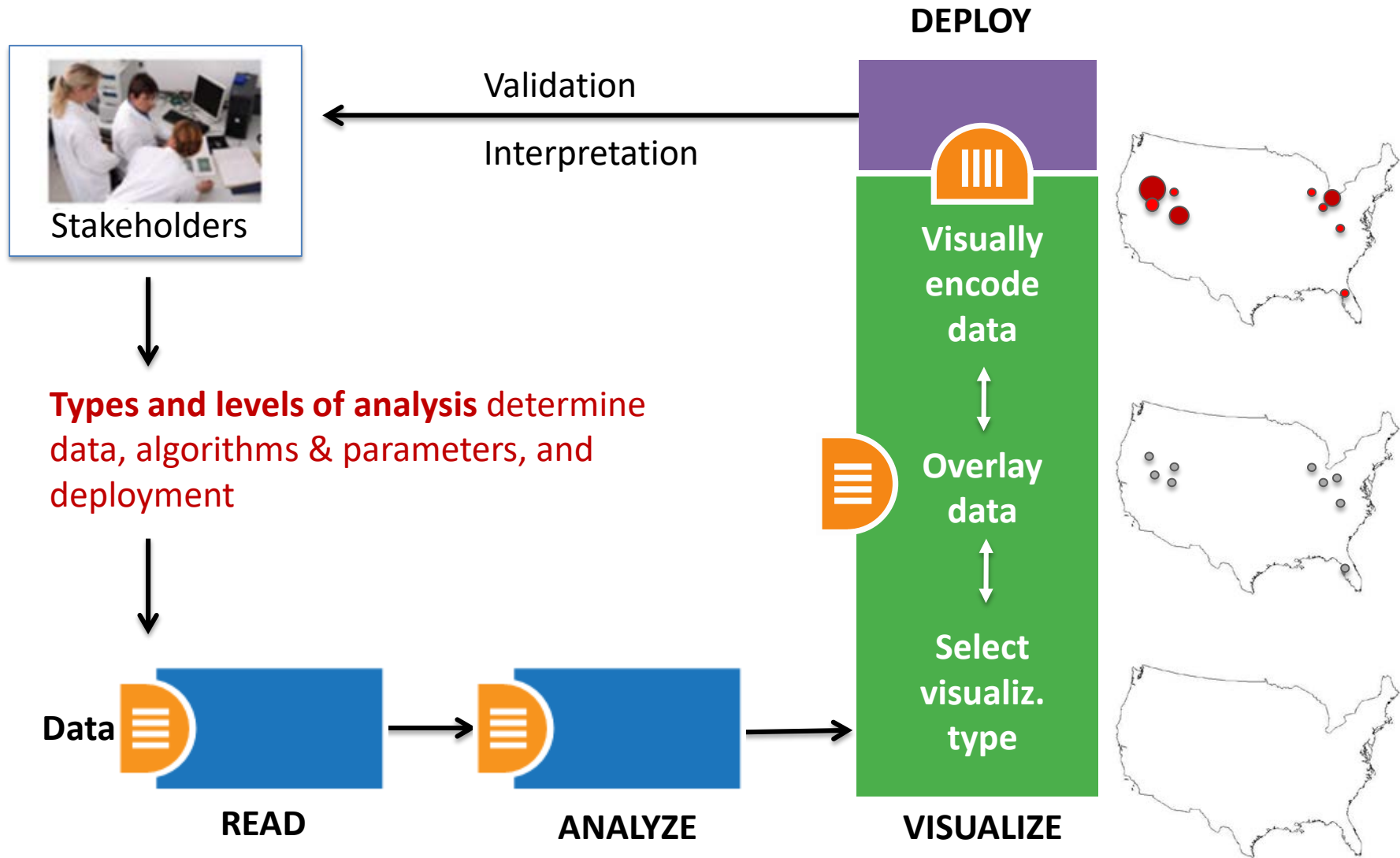
LEVELS

	MICRO: Individual Level about 1–1,000 records page 6	MESO: Local Level about 1,001–100,000 records page 8	MACRO: Global Level more than 100,000 records page 10
TYPES			
Statistical Analysis page 44	 Knowledge Cartography page 135	 Productivity of Russian life sciences research teams page 105	 Science and Society in Equilibrium Number of scientists versus population and R&D costs versus GNP. page 103
WHEN: Temporal Analysis page 48	 Visualizing decision-making processes page 95	 Key events in the development of the video tape recorder page 85	 Increased travel and communication speeds page 83
WHERE: Geospatial Analysis page 52	 Cell phone usage in Milan, Italy page 109	 Victorian poetry in Europe page 137	 Ecological footprint of countries page 99
WHAT: Topical Analysis page 56	 Evolving patent holdings of Apple Computer, Inc. and Jerome Lemelson page 89	 Evolving journal networks in nanotechnology page 139	 Product space showing co-export patterns of countries page 93
WITH WHOM: Network Analysis page 60	 World Finance Corporation network page 87	 Electronic and new media art networks page 133	 World-wide scholarly collaboration networks page 157



See *Atlas of Science: Anyone Can Map*, page 5

Needs-Driven Workflow Design



Graphic Variable Types Versus Graphic Symbol Types

			Geometric Symbols					
			Point		Line		Area	
Spatial	x	quantitative						
	y	quantitative						
	z	quantitative						
Retinal	Form	Size	quantitative	NA (Not Applicable)				
		Shape	qualitative	NA				
		Rotation	quantitative	NA				
		Curvature	quantitative	NA				
		Angle	quantitative	NA				
		Closure	quantitative	NA				
	Color	Value	quantitative					
Hue		qualitative						
Saturation		quantitative						

ENGR-E484/E584 | Fall 2018

Scientific Visualization

Instructor: William R. Sherman, shermanw@indiana.edu

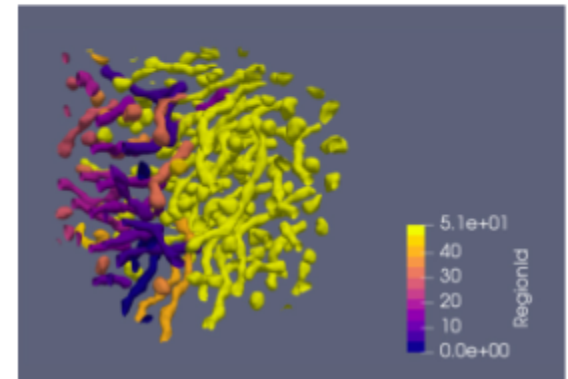
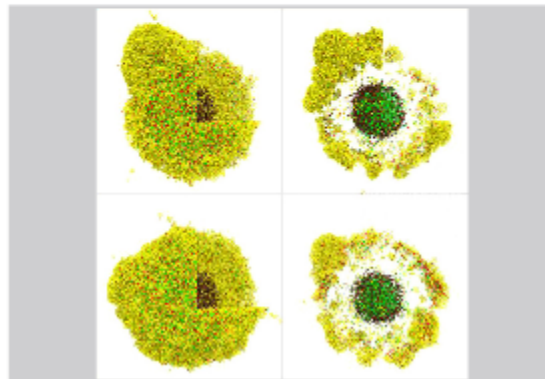
Monday/Wednesday 4:00–5:15 p.m.

Visualization Lab, Luddy Hall 4012

This 3-credit course teaches basic principles of human cognition and perception; techniques and algorithms for designing and critiquing scientific visualizations in different domains (neuro, nano, bio-medicine, IoT, smart cities); hands-on experience using modern tools for designing scientific visualizations that provide novel and/or actionable insights; 3D printing and augmented reality deployment; and teamwork/project management expertise.

When students complete this course, they will have:

- An understanding of issues involved in designing effective scientific visualizations
- Hands-on laboratory experience designing advanced scientific visualizations
- Knowledge of research challenges and important application areas that drive research and development
- Skills in teamwork with peers working on real-world client projects



Open Hourly Positions at CNS

- JavaScript Web App Developer
- Java Programmer

- IoT Kit Assistant




We work closely with clients to provide custom-made data, visualization, and software solutions

Research

 **Open Data and Open Code for Big Science of Science Studies**


Latest News

 **Put your money where your citations are: a proposal for a new funding system (website accessed 9/05/13)**


Upcoming Events

- OCT 1** Katy Börner attends PIUG 2013 Northeast Conference
- 10.13** Katy Börner presents Mapping Science Exhibit at WSSF
- 10.15** Ted Polley & Google Team present IVMOOC at EDUCAUSE
- 10.22** Katy Börner presents at the SciELO 15 Years Conference


Development

 **Behind the scenes of the design and development of *AcademyScope***


Outreach

 **See some of the most fascinating data visualizations in the world.**


Videos

 **Watch Katy Börner's full presentation from TEDxBloomington**

Teaching

 **Successful IVMOOC will be offered again in January of 2014**

Our Products

 We work closely with clients to provide custom-made data, visualization, and software solutions

All papers, maps, tools, talks, press are linked from <http://cns.iu.edu>

These slides are at <http://cns.iu.edu/presentations.html>

CNS Facebook: <http://www.facebook.com/cnscenter>

Mapping Science Exhibit Facebook: <http://www.facebook.com/mappingscience>