Department of Materials Design & Innovation

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University at Buffalo Council
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Background

Objective:

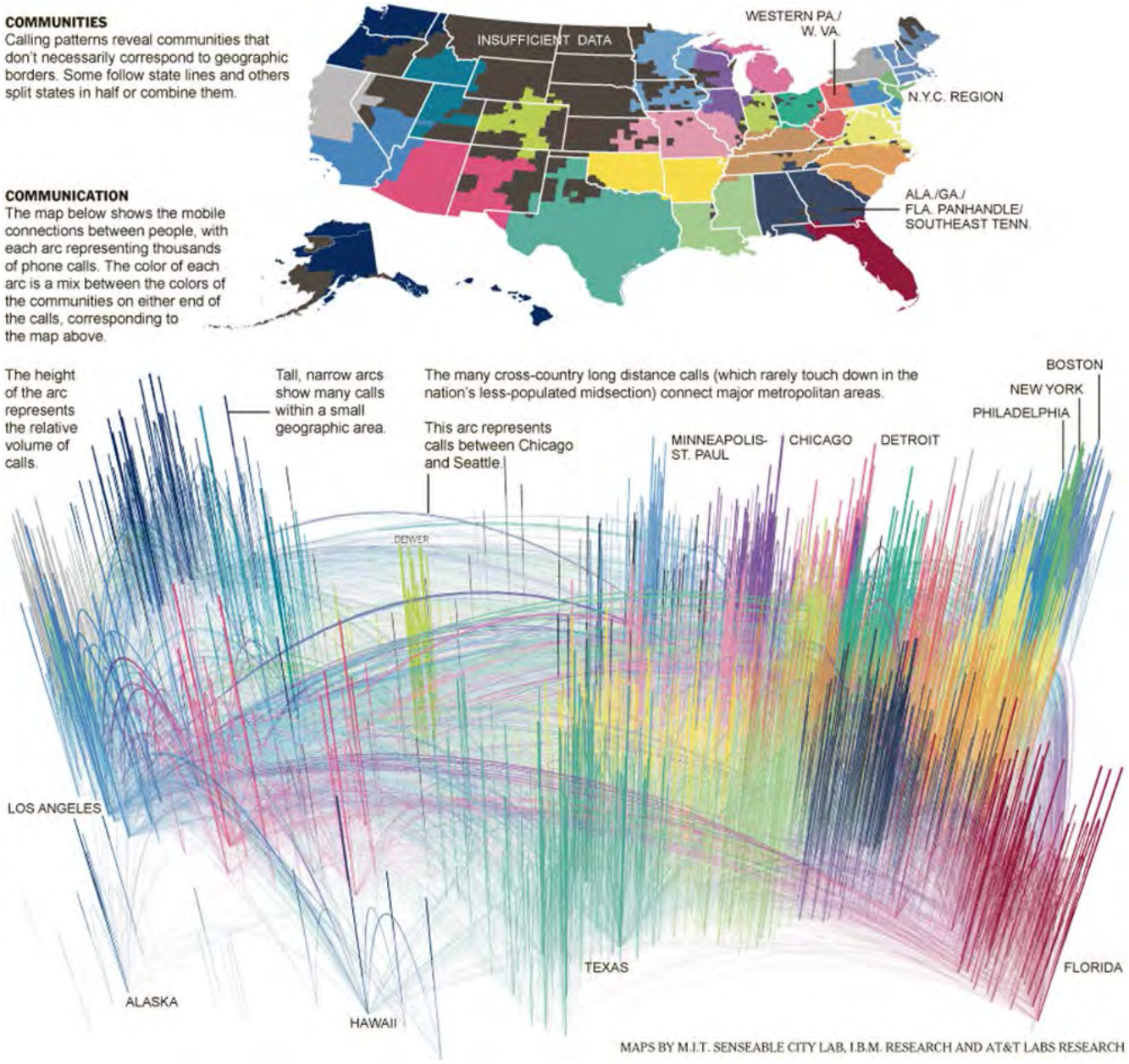
To build an interdisciplinary research and education effort that leverages UB's considerable existing assets in materials science, engineering and informatics to respond to national and state needs for expanded innovation in Materials and Advanced Manufacturing, and for increased NYS STEM education capacity.

Strategic Motivations

- White House directive to use informatics to reduce discovery-to-market time from 10-20 years to 2-3 years, per Materials Genome Initiative
- SUNY "Network of Excellence in Materials and Advanced Manufacturing"
- One of the three major priorities of the WNY REDC, to encourage advanced manufacturing in the region, and ready to partner with the Advanced Manufacturing Institute due to launch in Buffalo in 1Q14
- "Innovation" theme of the Realizing UB2020.

Data driven discovery: the paradigm for the future

Navigating data for knowledge



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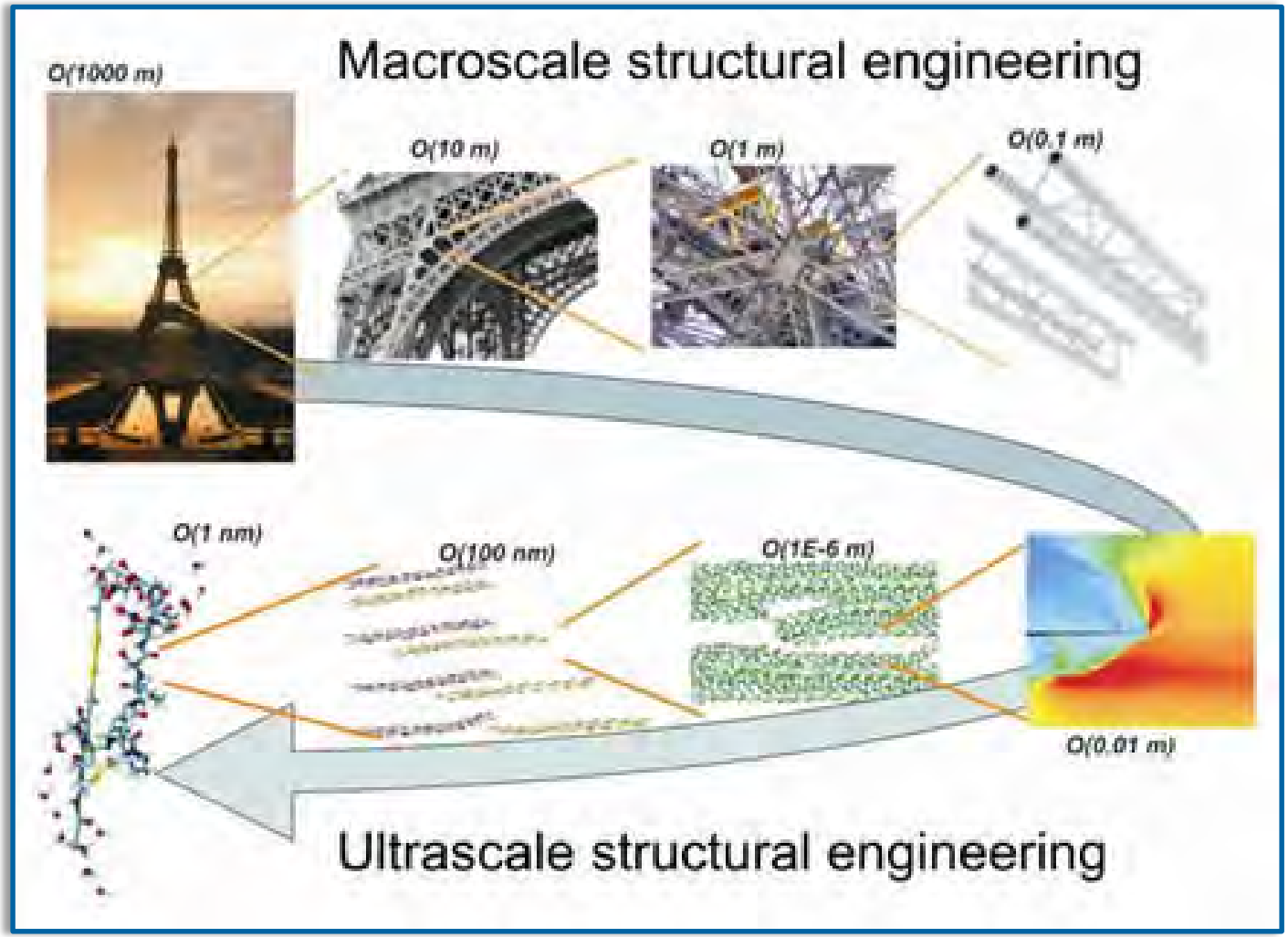


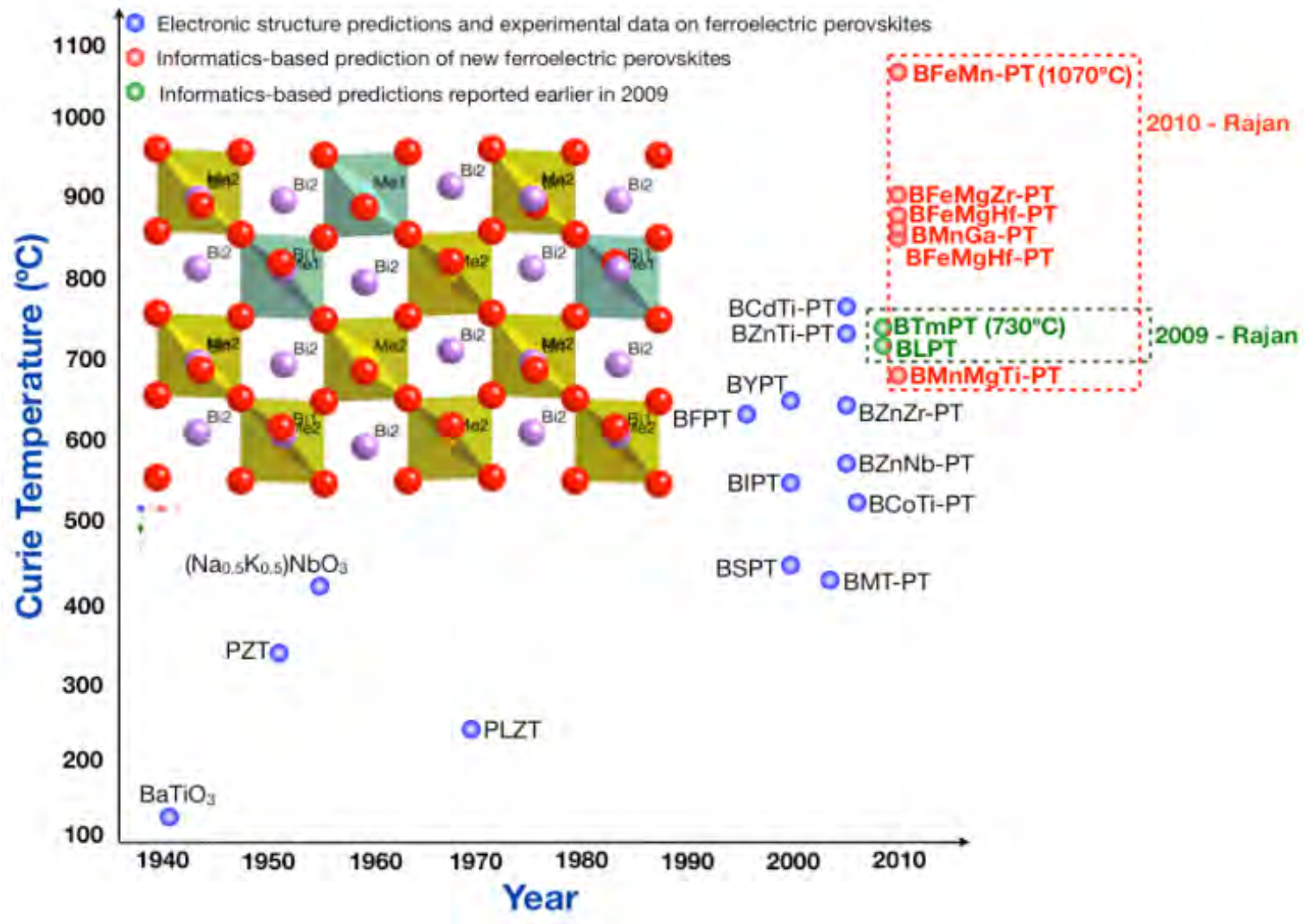
NEW YORK STATE CENTER OF EXCELLENCE
MATERIALS INFORMATICS

University at Buffalo
The State University of New York

BUFFALO
MANUFACTURING
WORKS

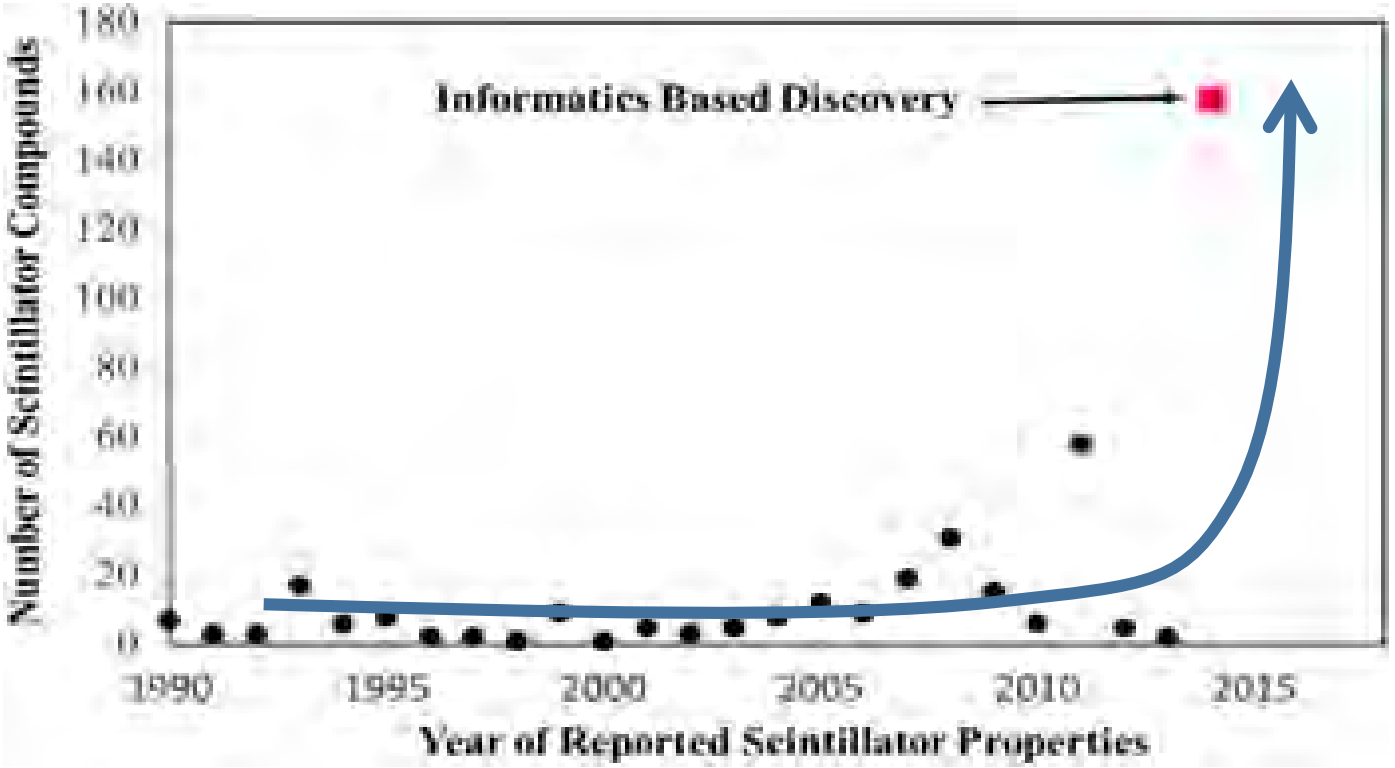
UB's RENEW Institute
Research and
Education
in e**N**ergy,
Environment
and **W**ater

Accelerated + "Rational" Discovery



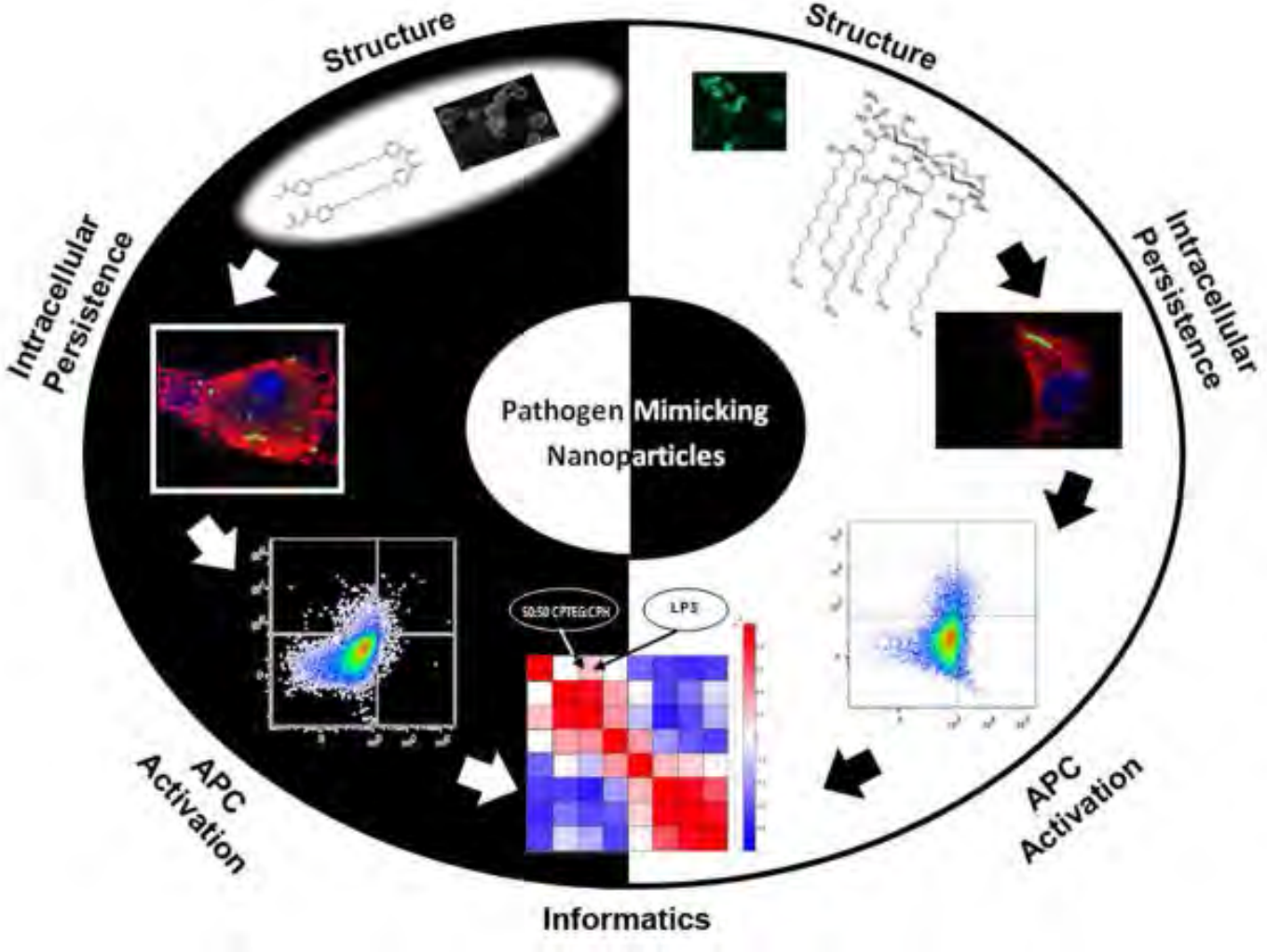
Balachandran, Broderick & Rajan, *"Identifying the 'inorganic gene' for high temperature piezoelectric perovskites through statistical learning,"* Proceedings of the Royal Society A (March 2, 2011). doi: 10.1098/rspa.2010.0543.

Accelerated + "Rational" Discovery



Broderick & Rajan, *"Informatics derived materials databases for multifunctional properties,"* Science and Technology of Advanced Materials 16:1 (January 13, 2015)

MDI : Impact on Biology and Medicine



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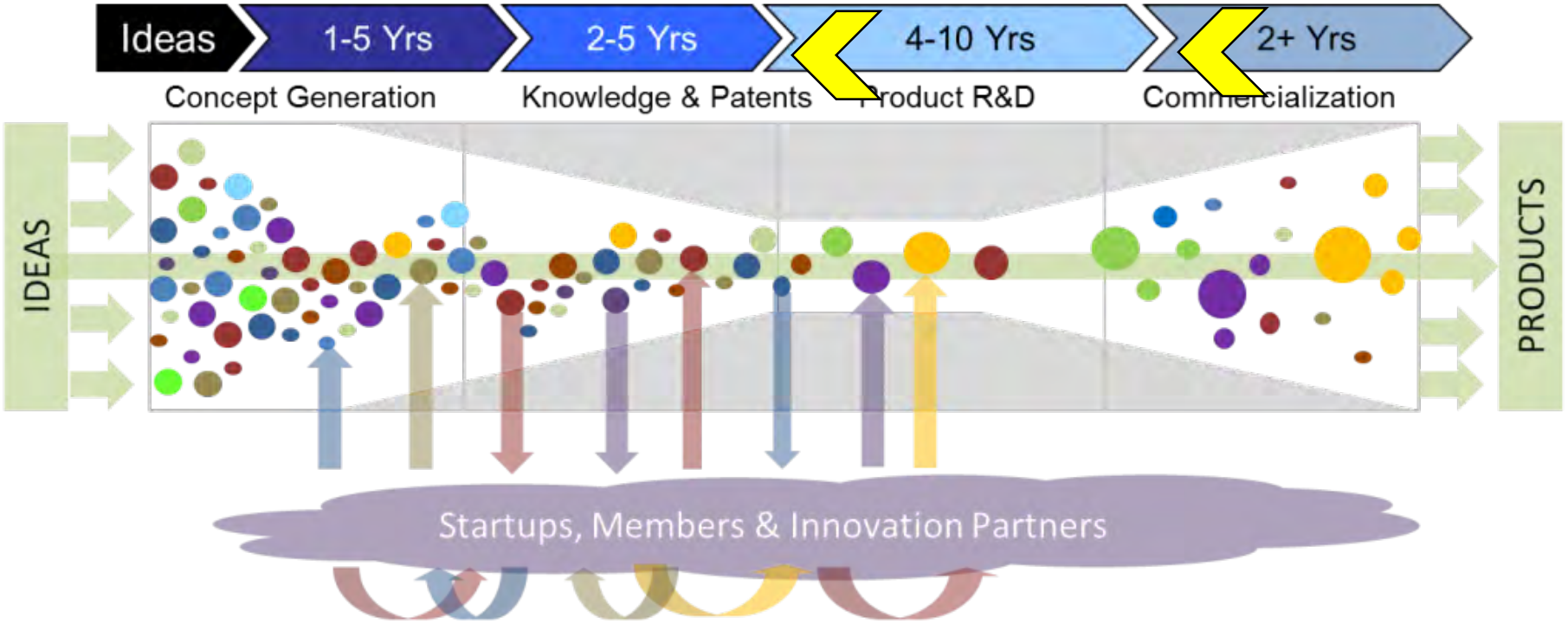
HAUPTMAN-WOODWARD MEDICAL RESEARCH INSTITUTE

BioXFEL

Ulery, Petersen, Phanse, Kang, Broderick, Kumar, Ramer-Tait, Carillo-Conde, Rajan, Wannemuehler, Bellaire, Mertzger & Narasimhan, *"Rational Design of Pathogen-Mimicking Amphiphilic Materials as Nanoadjuvants,"* Scientific Reports 1:98 (December 16, 2011). doi: 10.1038/srep00198.

MDI as an Enabler for Economic Development

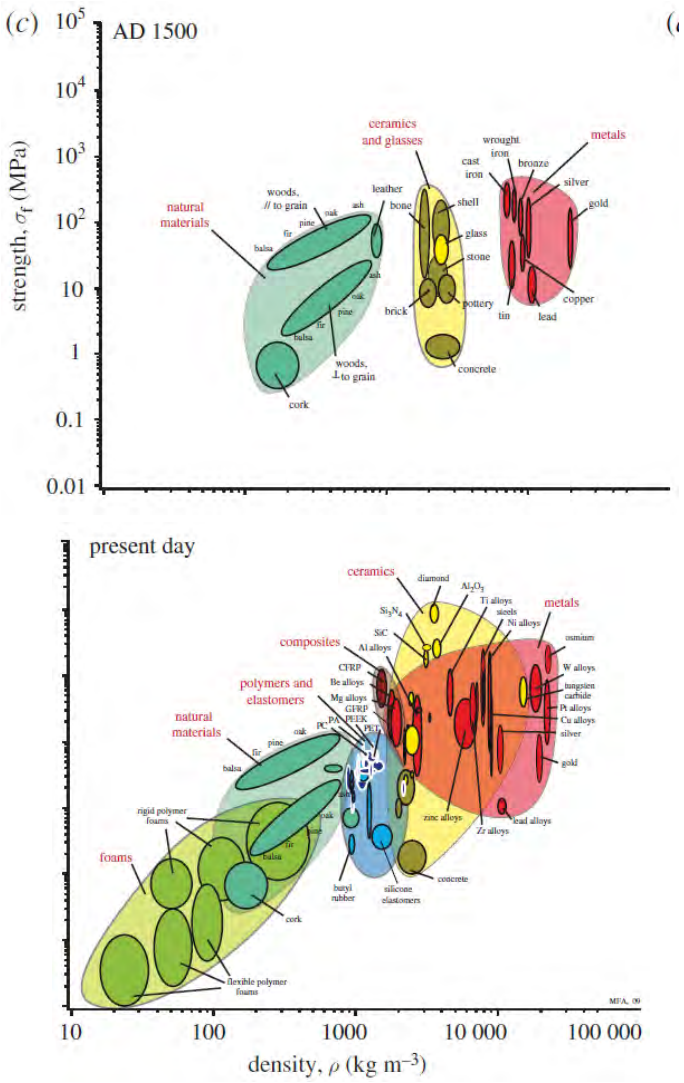
The Data "EDGE" for Economic Development



http://www.cbirc.iastate.edu/biobased-foundry/innovation-ecosystem/

MDI: Meeting the needs for accelerated growth

Past and Present

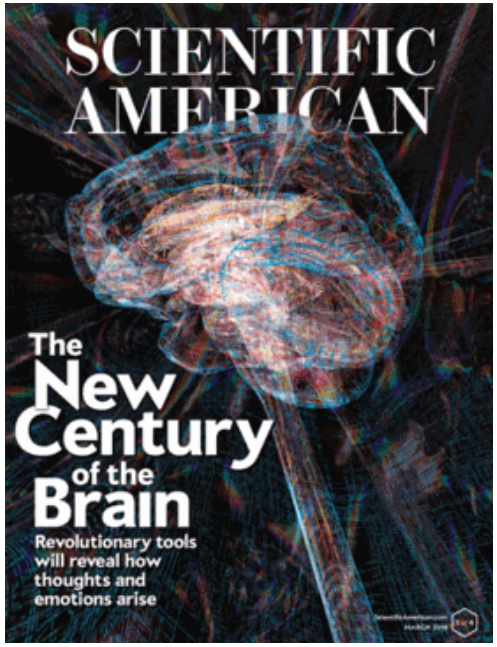


Fleck et.al 2010

Future : MDI paradigm

Building the "Materials Brain" to enable accelerated innovation: explore, connect and process information for functionality

+



MDI: new foundation for research and education

Science was originally empirical, like Leonardo, making wonderful drawings of nature. Next came the theorists who tried to write down the equations that explained the observed behaviors, like Kepler or Einstein. Then when we got to complex enough systems like the clustering of a million galaxies, there came the computer simulations, the computational branch of science. Now we are getting into the

data exploration part of science,

"which is kind of a little bit of them all"

……Materials Design & Innovation

Dr. Alex Szalay: Virtual Observatory Project, *The New York Times*, May 20, 2003