National Institutes of Health
Office of Behavioral and Social Sciences Research

BEHAVIORAL & SOCIAL SCIENCES RESEARCH IN HEALTH

Elizabeth M. Ginexi, Ph.D., Health Scientist Administrator
National Institutes of Health, Office of Behavioral and Social Sciences Research

NIH Consists of 27 Institutes and Centers (ICs)

OD
NHLBI
NCI
NIMHD
NEI
NINR
NIGMS
NHGRI
CC
NIA
NIAAA
FIC
CIT
NIBIB
NIAID
CSR
NINDS
NICHD
NIDCD
NCATS
NIMH
NIDCR
NIDDK
NIAMS
NIDA
NIEHS
NCCIH
NLM

About OBSSR

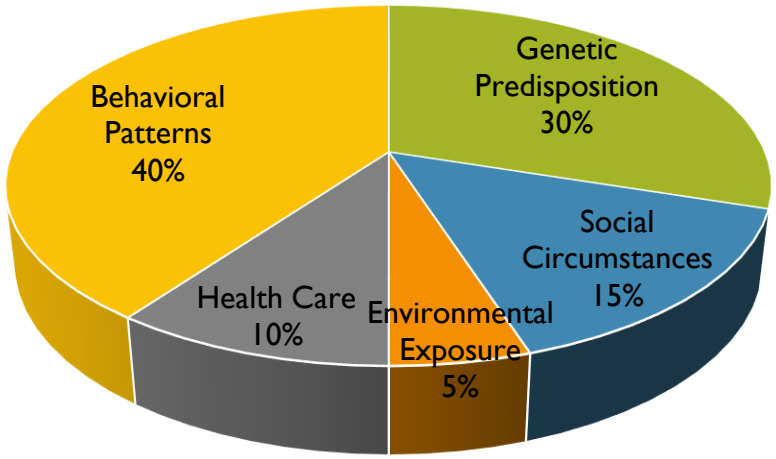
The Office of Behavioral and Social Sciences Research (OBSSR) opened officially on July 1, 1995. The U.S. Congress established the Office of Behavioral and Social Sciences Research (OBSSR) in the Office of the Director, NIH, in recognition of the key role that behavioral and social factors often play in illness and health.

https://obssr.od.nih.gov/

OBSSR Mission

- Enhance the impact of health-related behavioral and social sciences research
- Coordinate behavioral and social sciences research conducted or supported by the NIH and integrate these sciences within the larger NIH research enterprise
- Communicate health-related behavioral and social sciences research findings to various stakeholders within and outside the federal government

Contribution of Behavioral and Environmental Factors to Premature Death



Schroeder et al. (2007, *NEJM*)
McGinnis (1993, *JAMA*)

Figure 2. Social determinants of health. Types and subtypes of social factors that impinge on health outcomes.

Economic Stability	Neighborhood and Physical Environment	Education	Food	Community and Social Context	Health Care System
Employment	Housing	Literacy	Hunger	Social integration	Health coverage
Income	Transportation	Language	Access to healthy options	Support systems	Provider availability
Expenses	Safety	Early childhood education		Community engagement	Provider linguistic and cultural competency
Debt	Parks	Vocational training		Discrimination	Quality of care
Medical bills	Playgrounds	Higher education			
Support	Walkability				

Health Outcomes
Mortality, Morbidity, Life Expectancy, Health Care Expenditures, Health Status, Functional Limitations

Source: Heiman, H. J., & Artiga, S. (2015). ***Beyond Health Care: The Role of Social Determinants in Promoting Health and Health Equity*** *(Issue Brief). Menlo Park, CA: Kaiser Family Foundation.*

Multiple Levels of Influence

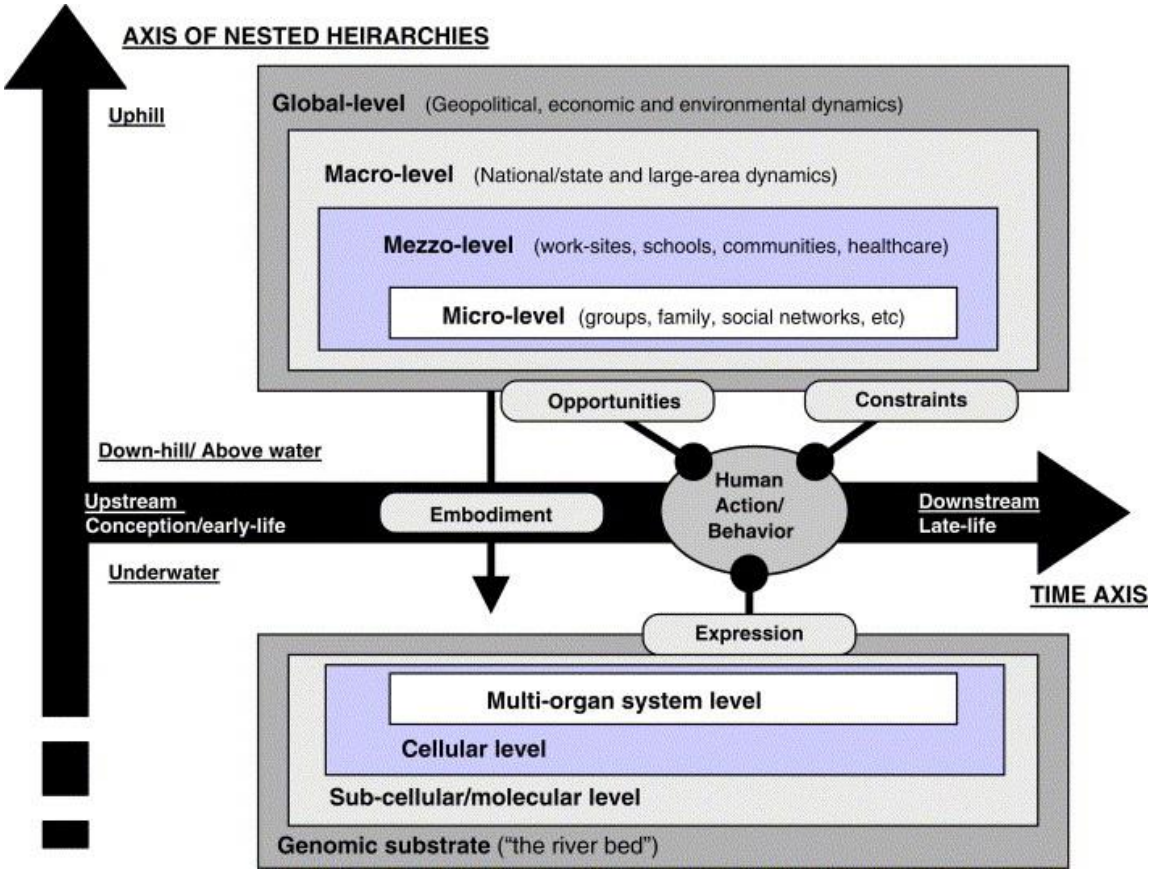
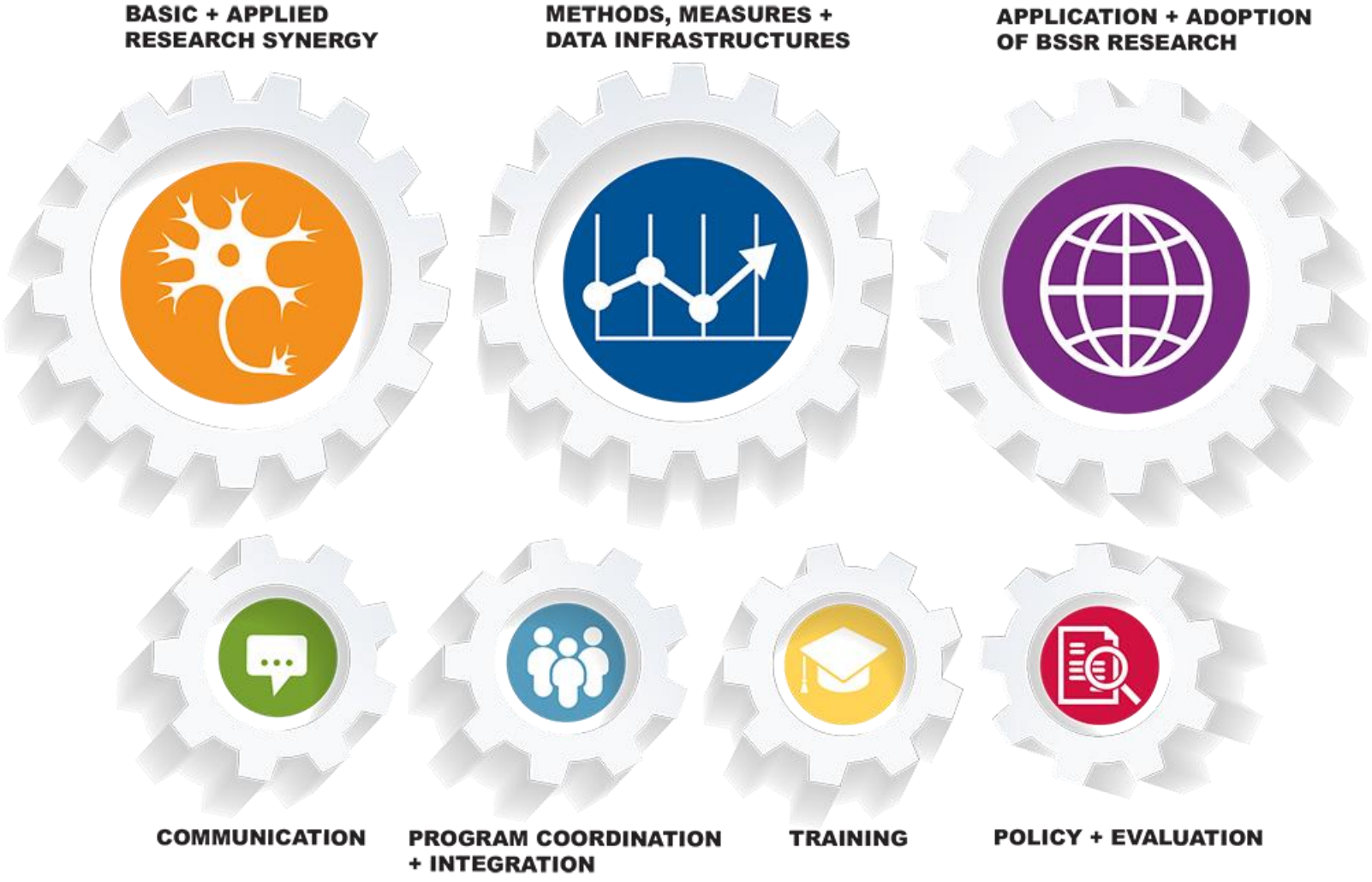


Figure 1
The society-behavior-biology nexus as depicted in multidimensional space. Source: Glass, T. A., & McAtee, M. J. (2006). Behavioral science at the crossroads in public health: extending horizons, envisioning the future. *Social Science and Medicine, 62*(7), 1650–1671.

OBSSR STRATEGIC PLAN (2017-2021)

Strategic Plan Guiding Principles

- ***Integration*** of BSSR into the broader biomedical research efforts consistent with the NIH mission
- ***Coordination*** and collaboration with ICs
- Identify ***critical challenges*** that are barriers to advancement in BSSR (most impact to the largest proportion of behavioral and social science researchers)
- Focus on challenges that *OBSSR is* ***uniquely positioned to address***


BASIC + APPLIED RESEARCH SYNERGY
METHODS, MEASURES + DATA INFRASTRUCTURES
APPLICATION + ADOPTION OF BSSR RESEARCH
COMMUNICATION
PROGRAM COORDINATION + INTEGRATION
TRAINING
POLICY + EVALUATION

Scientific Priority 2: Enhance the Methods, Measures, and Data Infrastructures to Encourage a More Cumulative Behavioral and Social Sciences

- Objective 2.1: Encourage data integration and replication in the behavioral and social sciences
- Objective 2.2: Facilitate the development and testing of new measurement approaches
- Objective 2.3: Expand the repertoire of methods available to social and behavioral researchers

Research Design

Measurement

Data Collection Techniques

Analytic Methods

Health Research Paradigm Shift - Driven by Data

- Transition from *data-limited environment* (data prospectively obtained) to *data-rich environment* (data collected dynamically over time from multiple sources in digitally connected world)
- Increasing emphasis: precision medicine, personalized/tailored real-time (or "just in time") interventions
- Advances in medical informatics, electronic health records, big data analytics, mobile and wearable technologies, social media, web generated data, geospatial data, administrative data, and methods to curate & link data
- "Big data" in the behavioral and social sciences comes from mixed sources, generated dynamically over time, not necessarily designed to produce valid or reliable data for scientific analysis

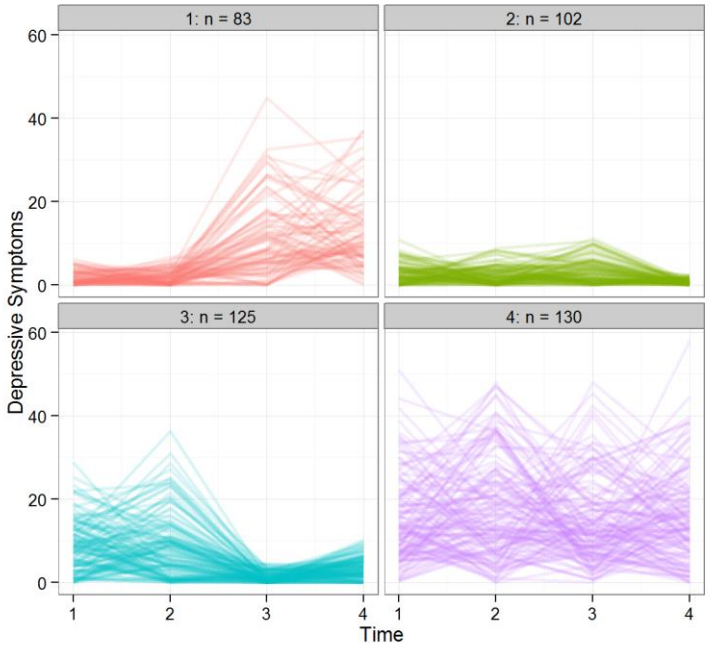
Complex Data More Easily Collected & Available, but Necessarily More Easily Analyzed

1. Intensive or voluminous longitudinal data
2. Internet, commercial, and administrative records data
3. High-density, large sample or population level agency databases

Ecological Momentary Assessment

- Experience Sampling Intensively Over Time
- Random or Event-Based Prompting
- Advantages of Incorporating with IRT
- Intensive Longitudinal Data
  - ✓ Reduces likelihood of missing critical changes in outcome
  - ✓ Increases power, especially within but also between
  - ✓ Allows for the dynamic analysis of mediators and outcomes
  - ✓ Potential for latent classes of different responses

Ecological Momentary Assessment

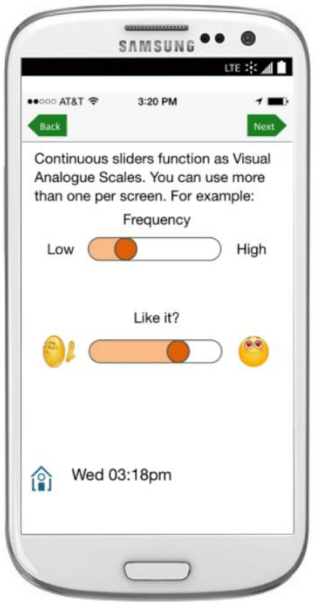


Growth Mixture Models: Elkhart Group Ltd

Ginexi EM et al. The Promise of Intensive Longitudinal Data Capture for Behavioral Health Research. *Nicotine & Tobacco Research,* 2014 16 (4): S73-S75.

EMA Platforms - Smartphone Apps & Text Messaging

mEMA

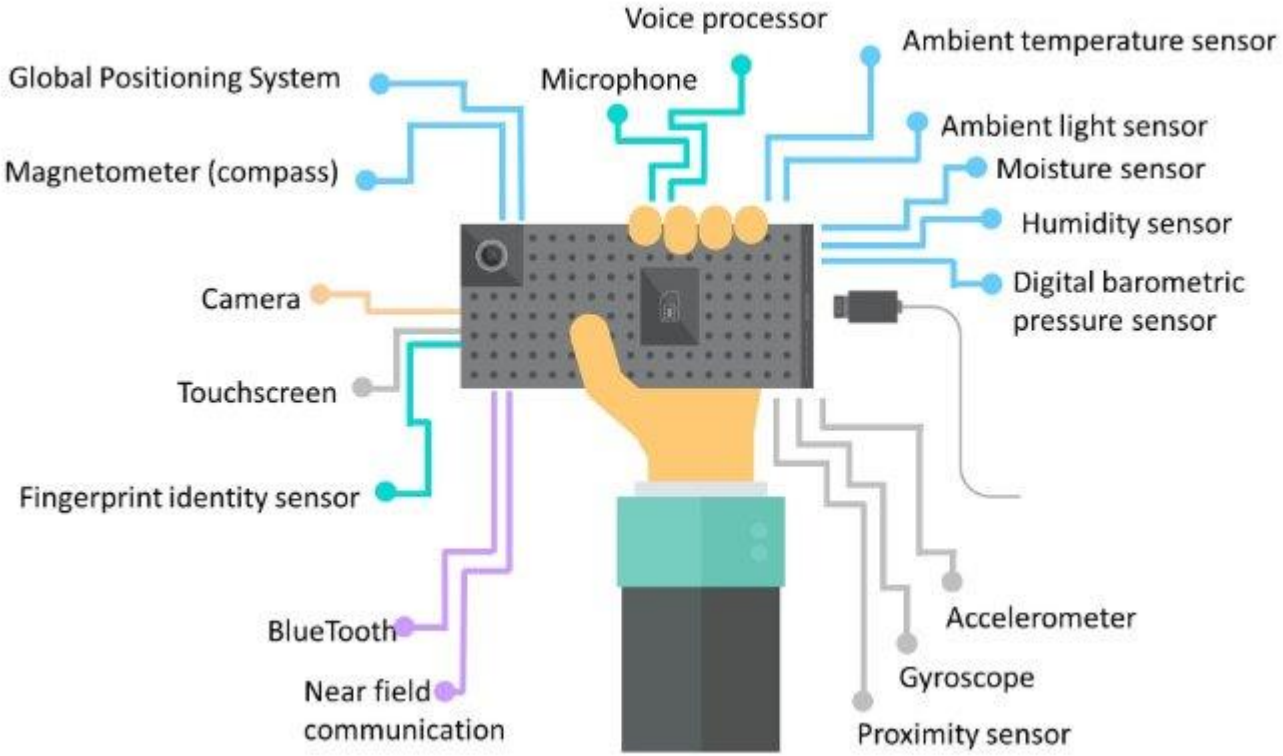


REDCap

REDCap Integration

Mosio improves the usefulness of the REDCap system by enabling research teams to add dynamic text messaging functions to improve study participant engagement and data collection efforts.

Smartphone Sensors – Becoming Ubiquitous



Wearable Sensors

Wearable
Activity Tracking
Quantified Self

http://amiigo.co/

ION Glasses

Angel

Acoustical
Optical
Acceleration
Temperature

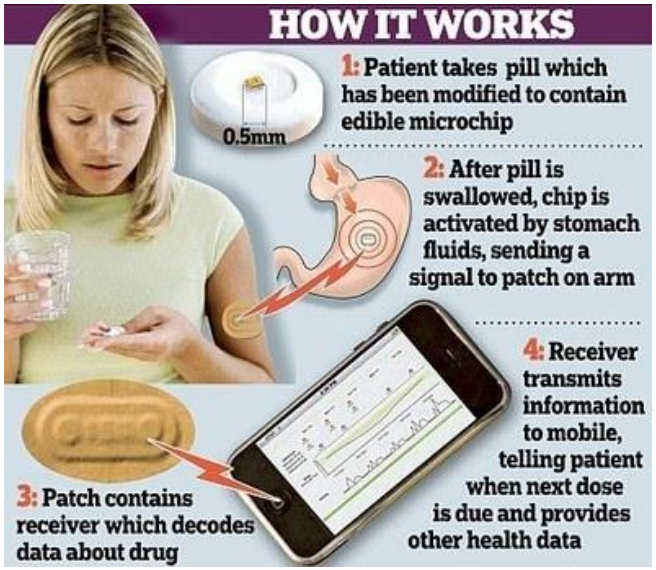
Fitbit

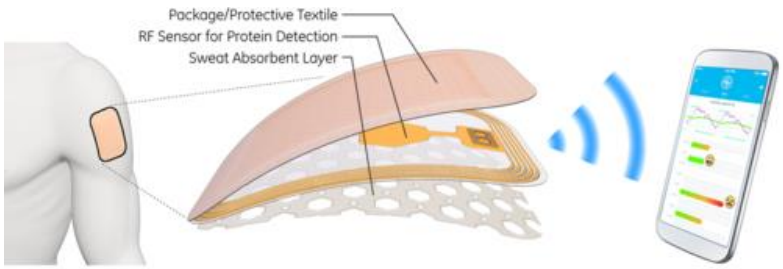
Heart rate
Skin temp.
Blood oxygen
Physical activity

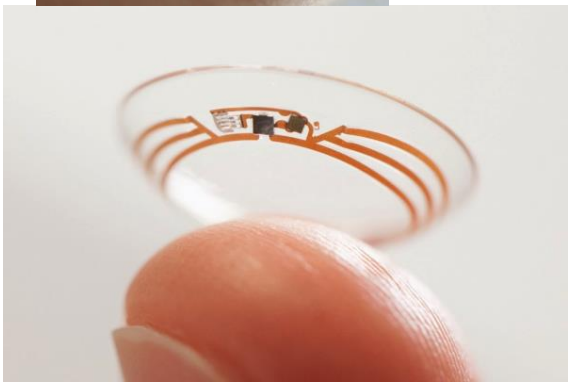
@idezo_ch

#fec14

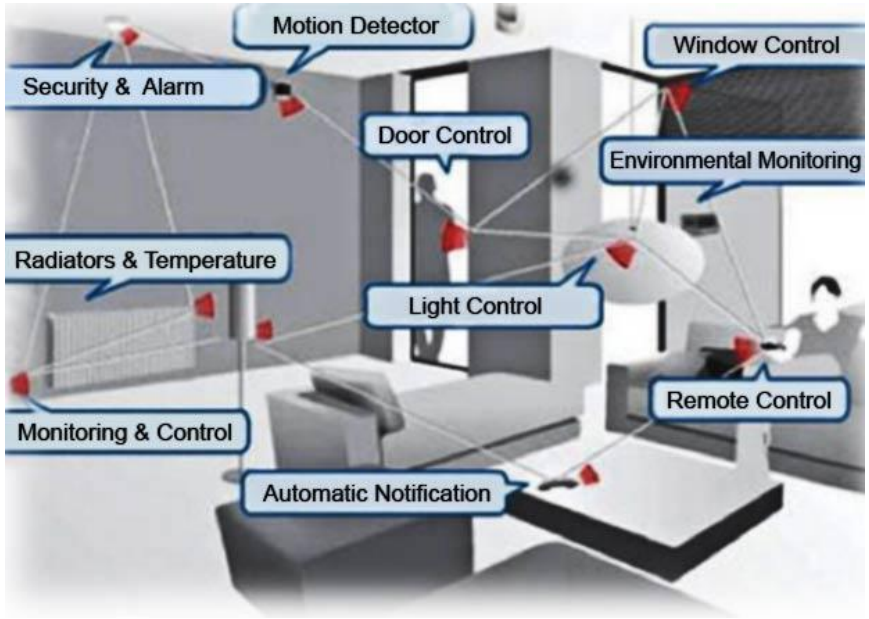
Wearable Sensors



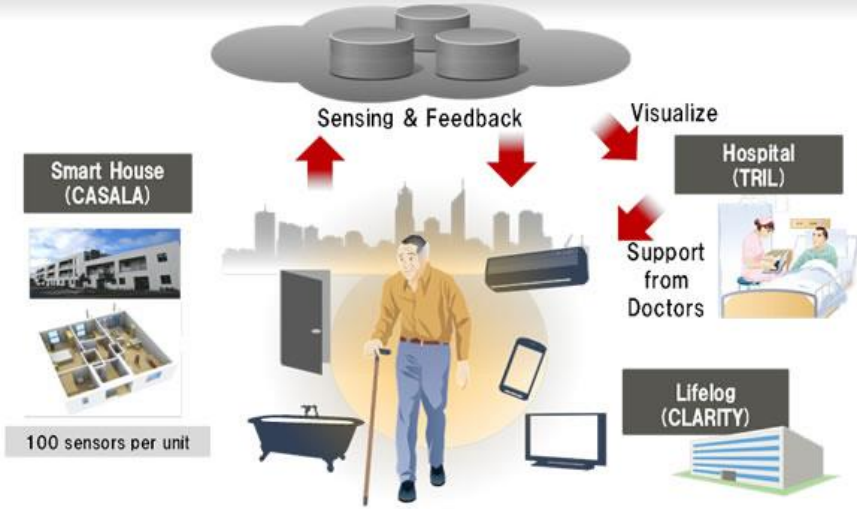




Home-based Sensors



- Joint project with hospital and smart house
- Monitoring and assisting independent living for senior citizens and patients
- Application of various sensing technologies on Fujitsu Laboratories' processing platform

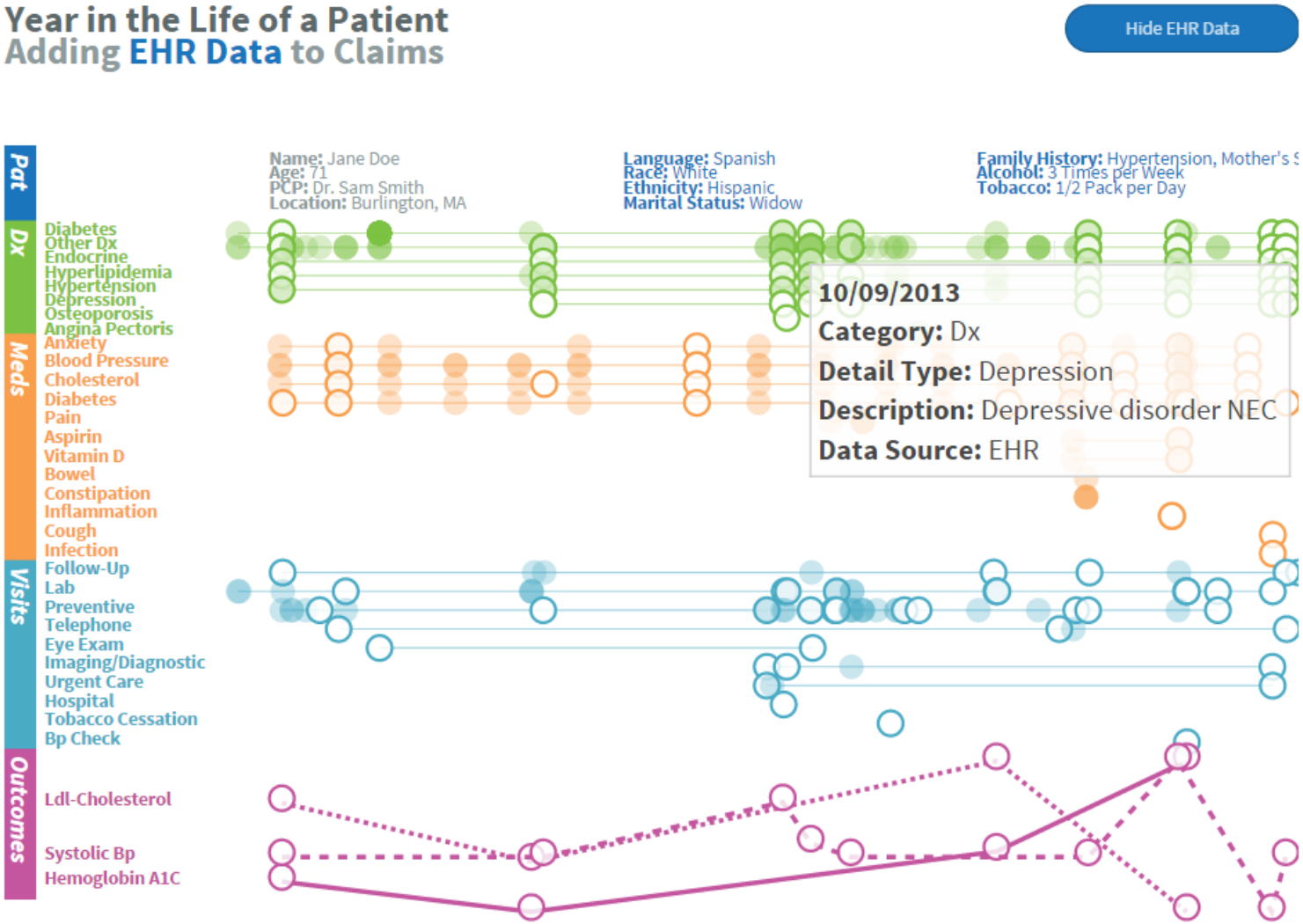


Archival "Big Data" Sources

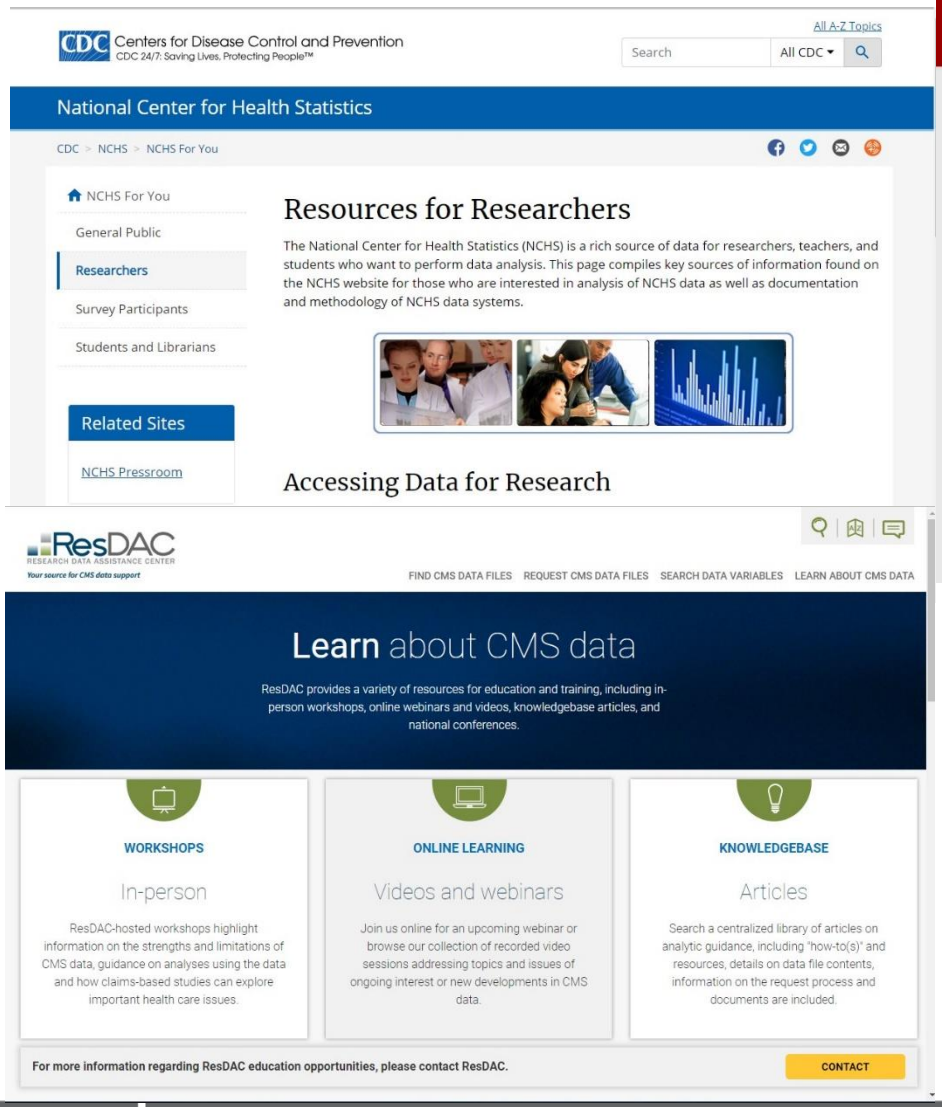
- Behavioral Data Traces gleaned from consumer-based data sources
- Social Media (Twitter, Facebook)
  - Twitter opens 200 million users with 500 million tweets per day to researchers (2/10/2014)
- Internet Searches (Google)
- Cell phone Use (# calls and texts)
- Cable Box Data (hours of TV)
- Auto Black Box data (miles driven, seat belt use)

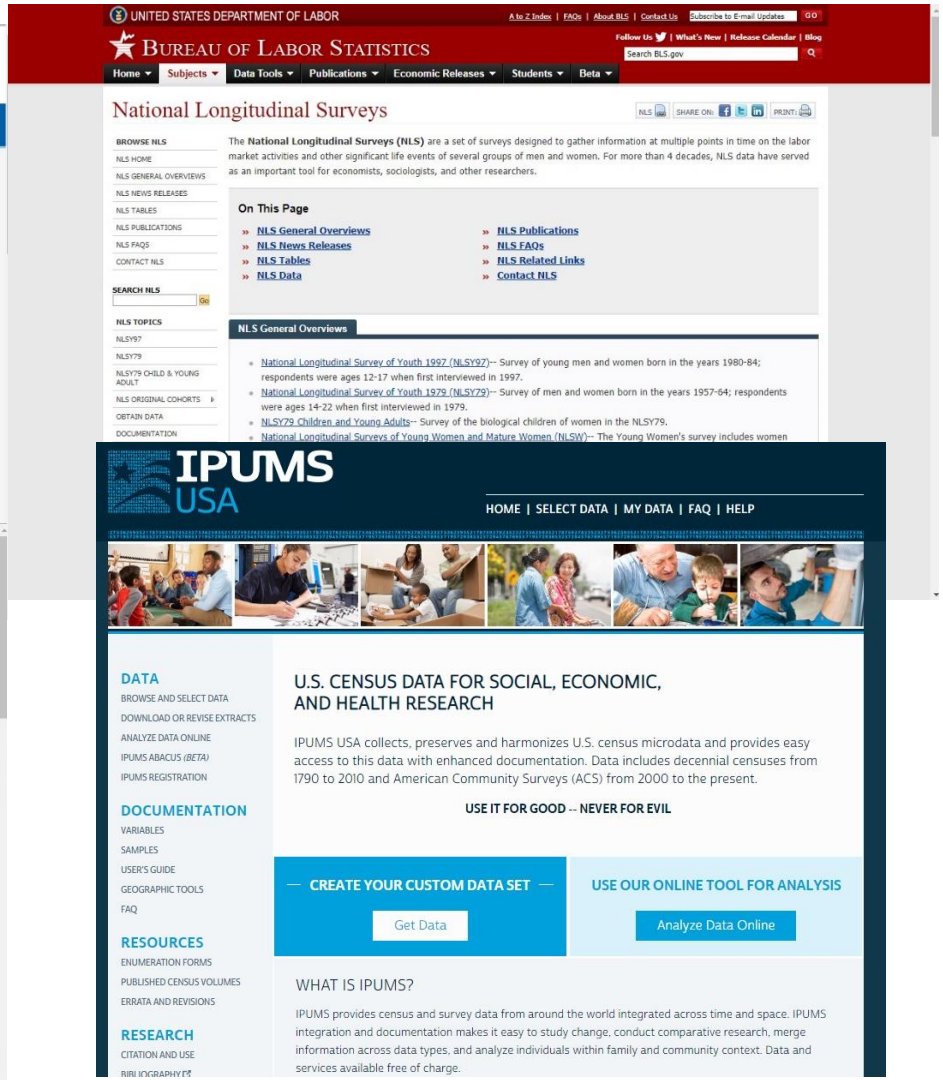
National Institutes of Health
Office of Behavioral and Social Sciences Research

Administrative Data Sources



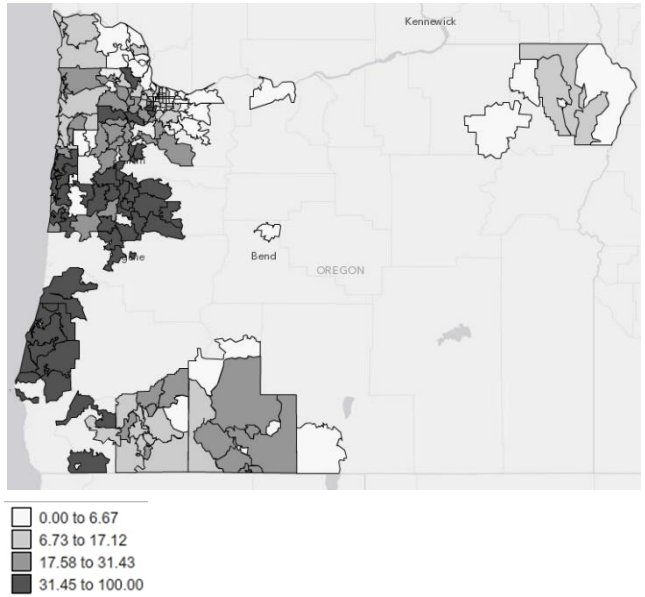
Population Level Data Sources



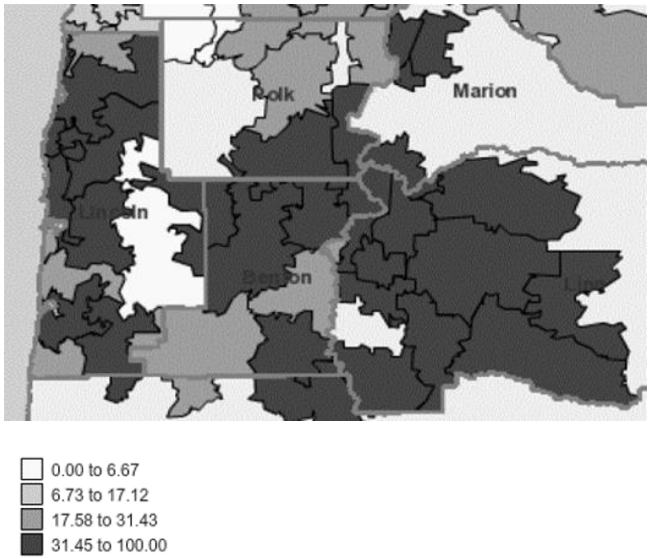


Bring SDOH data into the Electronic Health Record & Using Geospatial tools to aggregate clinical & community data

Percent of children without insurance: 0-18 years of age with at least one visit to an OCHIN PBRN clinic in 2011



Areas with High Rates of Children without Insurance in OCHIN and Median Household Income Rates by Oregon County (Lincoln, Polk, Benton, Marion)



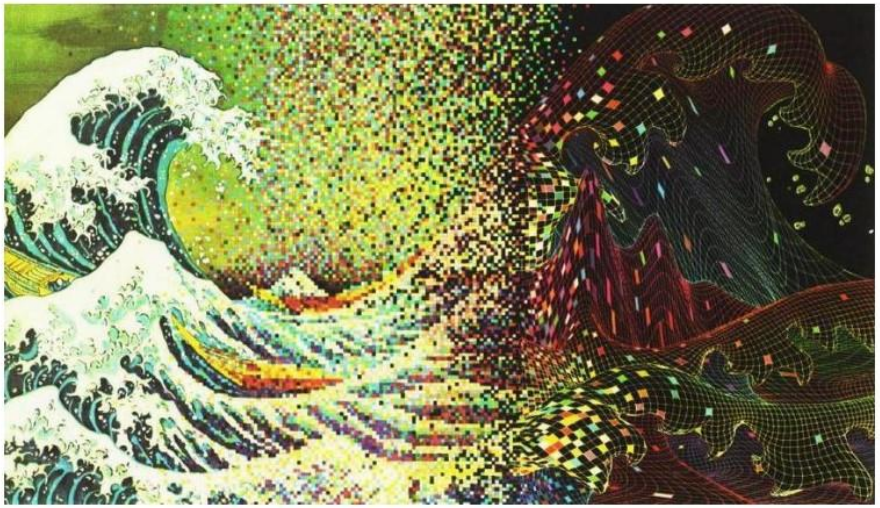
Angier H, Likumahuwa S, Finnegan S, Vakarcs T, Bazemore A, Carrozza M, DeVoe JE. (2014) Using Geographic Information Systems to Identify Communities in Need of Health Insurance Outreach within the OCHIN Practice-based Research Network. J Am Board Fam Med. 2014 Nov-Dec;27(6):804-10.

Computational modeling routinely applied in the natural sciences (e.g., physics, meteorology)

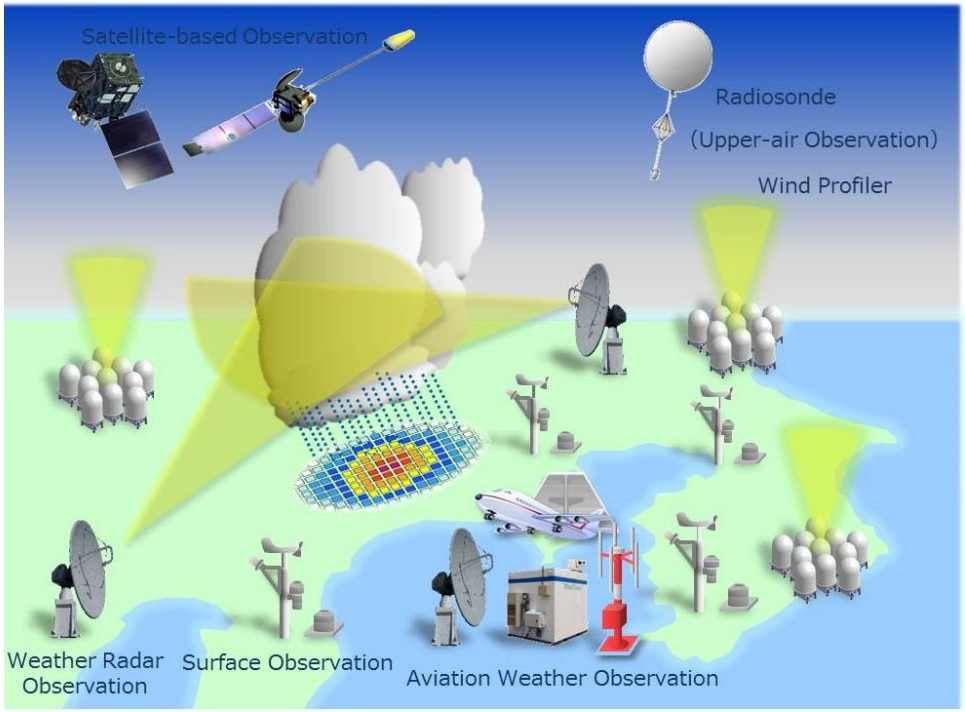
WHAT IS COMPUTATIONAL PHYSICS?

by **justscience** | 18 Jul,2017

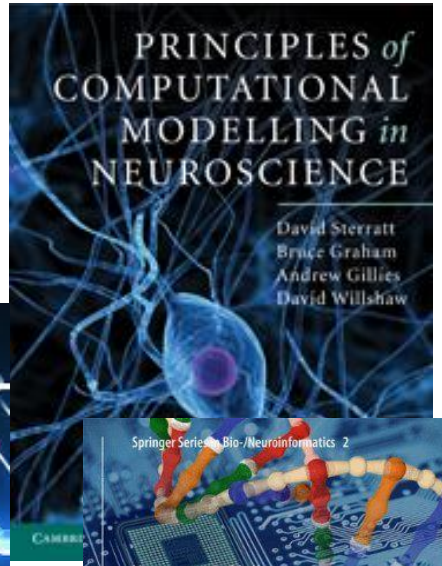
Computational physics is the study and implementation of numerical analysis to solve problems in physics for which a quantitative theory already exists.

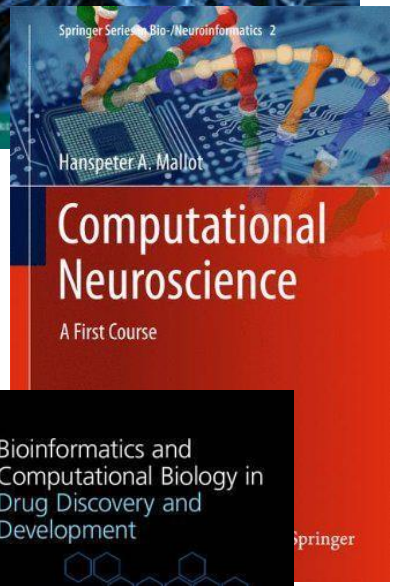


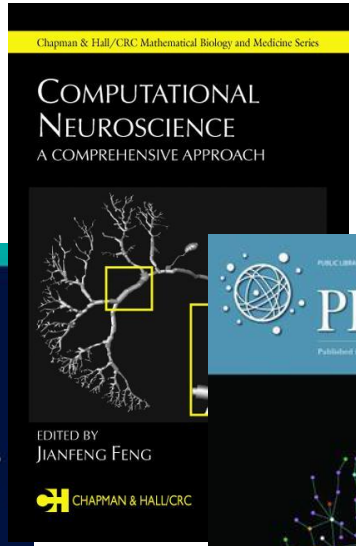
Computational physics can be stated as the study and the implementation of the numerical analysis for solving problems in physics for which there is the existence of a quantitative theory. Some time ago, computational physics was used as a application of modern computers in the field of science but now, it has become a subset of computational science.

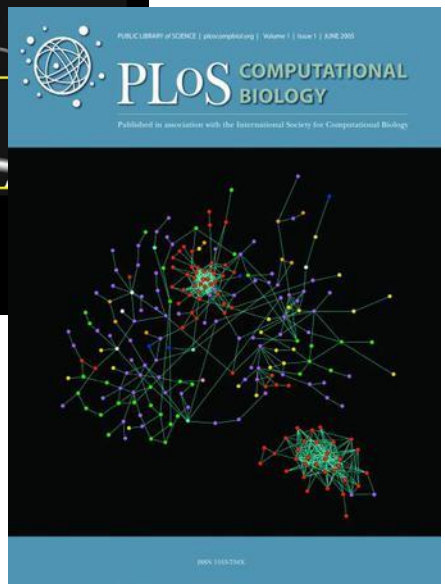


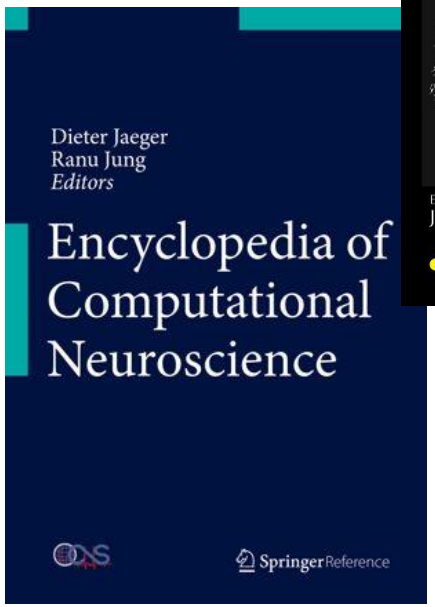
Computational modeling approaches in the biological sciences

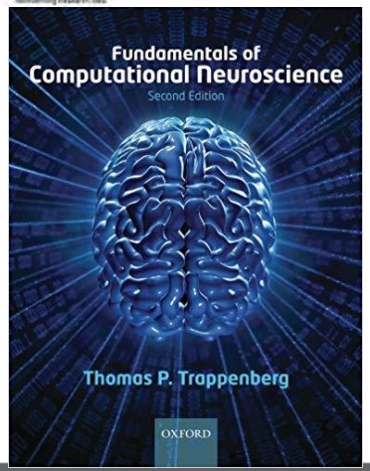


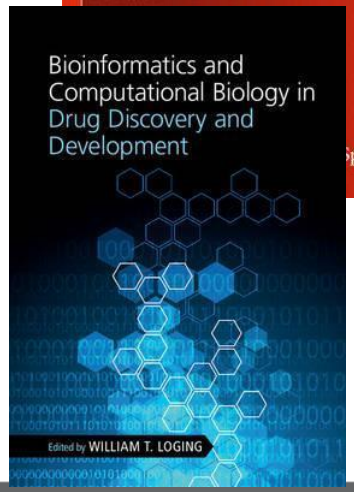












Computational Behavioral & Social Sciences?

Methodology training offered in degree programs for behavioral & social sciences has remained essentially unchanged for the last four decades

Friedrich, Childress, & Cheng (2018 in *Teaching of Psychology*) Survey on Statistical Training Undergrad Psych

- Replication of 1990 survey of statistics instruction in undergraduate psychology programs
- Other than increases in effect size coverage, statistics instruction has changed relatively little over nearly two decades, with significant attention often reserved for a rarely offered second-level, advanced class

Aiken & West et al. (1990, 2008 in *American Psychologist*) Survey of PhD programs in N. America

- Current PhD students are receiving traditional training in methodology and statistics that primarily supports laboratory rather than field research
- Training in new techniques and methodologies is generally unavailable within the psychology curriculum
- Substantial lack of awareness about resources on campus that may provide quantitative training for students, even though such training is sorely needed

What Should the BSSR PhD Curriculum Look Like?

- Current Curriculum
  - Focus primarily on training professors
  - Disciplinary focused
- Methods
  - Original small sample data collection & NHST
  - Non-harmonized measures
  - Emphasis: inferential & sample statistics (ANOVA, regression)

- Curriculum for the Future
  - Trains for a range of job opportunities
  - Team science, prepare for multidisciplinary work
- Broader Toolbox of Methods
  - "Big data;" "Data science"
  - Harmonized measures; data linkage; data curation
  - Pattern recognition; machine learning
  - Computational models
  - Causal inference

Scientific Inquiry: Linear

Kevin C. Elliott, Kendra S. Cheruvelil, Georgina M. Montgomery, Patricia A. Soranno, Conceptions of Good Science in Our Data-Rich World, BioScience, Volume 66, Issue 10, 01 October 2016, pp. 880–889.

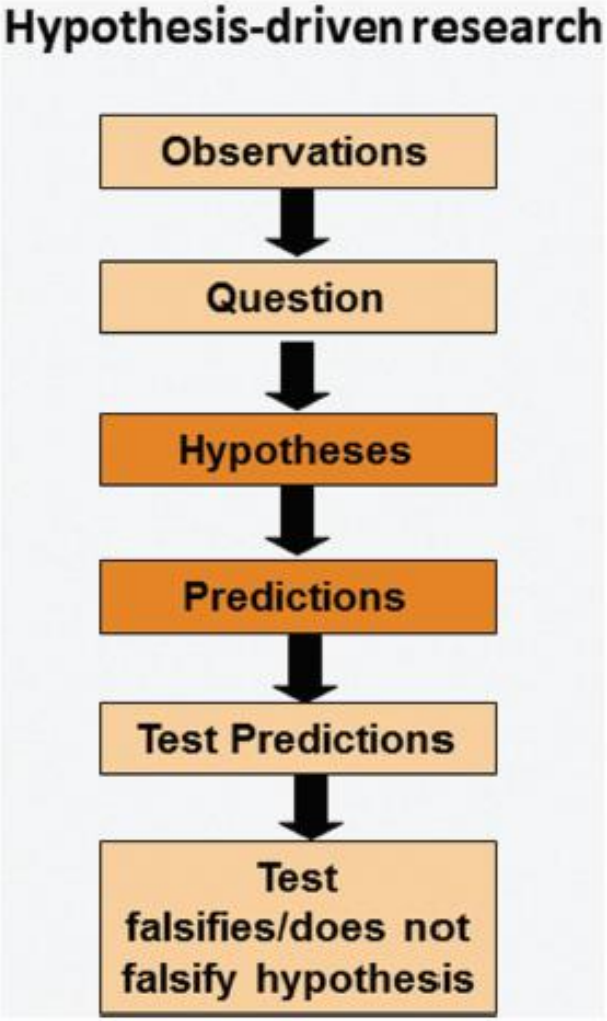


Figure 1. Linear account employed in many descriptions of the scientific method.

Scientific Inquiry: Iterative process with many approaches

Kevin C. Elliott, Kendra S. Cheruvelil, Georgina M. Montgomery, Patricia A. Soranno, Conceptions of Good Science in Our Data-Rich World, BioScience, Volume 66, Issue 10, 01 October 2016, pp. 880–889.

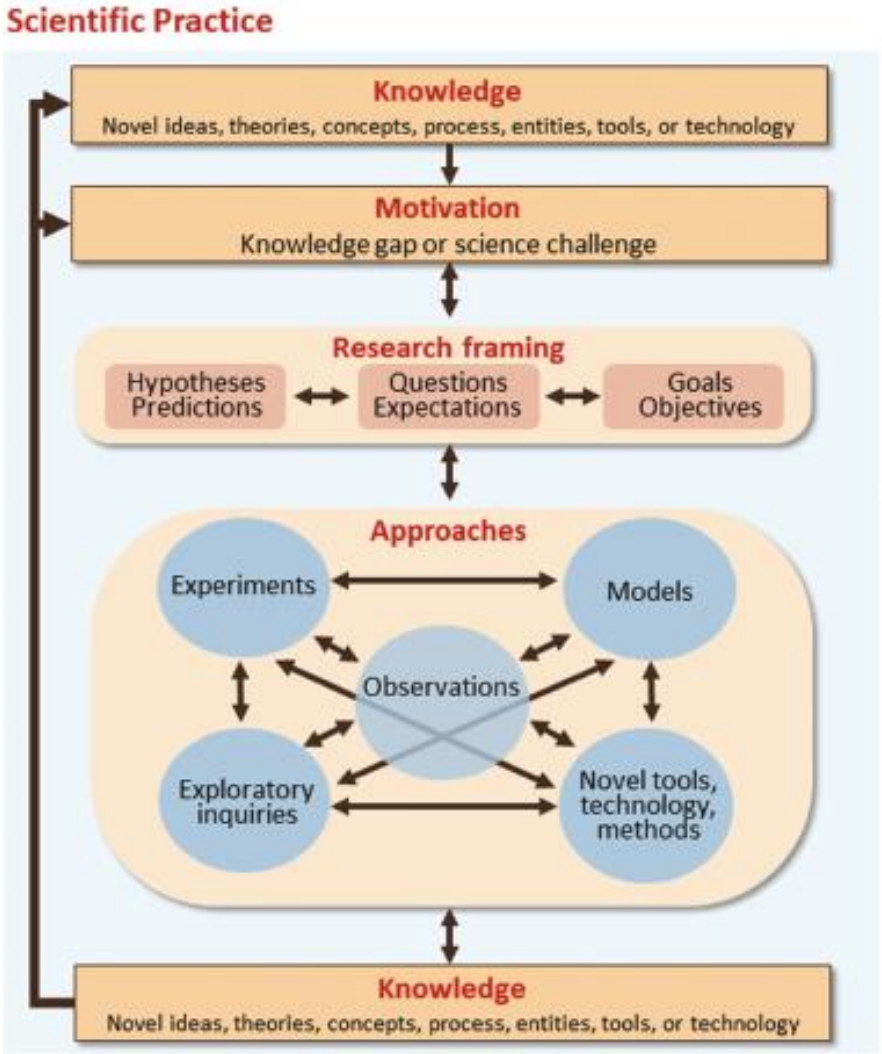


Figure 3. A representation of scientific practice as an iterative process, with many approaches and links (as depicted by two-way arrows). The evaluation or assessment of scientific practices is based on the importance of the knowledge generated, the importance of the gap or challenge addressed, and the alignment of the approaches and methods used to conduct the science.

Who wants change?
Who wants *to* change?
Who wants *to* ***lead the*** change?

Strategic Plan Guiding Principles

- ***Integration*** of BSSR into the broader biomedical research efforts consistent with the NIH mission
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- Identify ***critical challenges*** that are barriers to advancement in BSSR (most impact to the largest proportion of behavioral and social science researchers)
- Focus on challenges that *OBSSR is* ***uniquely positioned to address***

Training Home
Training Supported by the OBSSR
Online Training Resources

Training Supported by the OBSSR

The Office of Behavioral and Social Sciences Research (OBSSR) supports a variety of in-person training experiences to encourage the application of innovative methods and enhance the research capabilities of investigators conducting health-relevant behavioral and social sciences research.

OBSSR hosts the Training Institute for Dissemination and Implementation Research in Health (TIDIRH). The training is open to researchers with interests in studying D&I across health care, public health, and community settings.

These training opportunities are primarily Summer Training Institutes, most of which are supported by an RFA on Short Courses on Innovative Methodologies in the Behavioral and Social Sciences (R25).

Summer Training Institutes via Contracts or Supplements

- Randomized Behavioral Clinical Trials (with NHLBI)
- Training Institute for Dissemination and Implementation Research in Health (TIDIRH) (with NCI)
- Training on Optimization of Behavioral and Biobehavioral Interventions (Collins P50 NIDA supplement)

Short Courses on Innovative Methodologies in the Behavioral and Social Sciences (R25 grants)

- CBPR: Enhancing Capacity to Use Innovative Methodologies (Chris Coombe)
- Dynamic Systems Modeling for Public Health (Elizabeth Bruch)
- Master Course on Power for Multilevel and Longitudinal Health Behavior Studies (Keith Muller)
- Mixed Methods Research Training Program (Joseph Gallo)
- Multi-Platform Educational Program in Innovative Methods for the Behavioral and Social Sciences (Lisa Bates)
- Strengthening Causal Inference in Behavioral Obesity Research (David Allison)
- Training Institutes for Mobile Health (mHealth) Methodologies (Vivek Shetty)
- Quick Start: A Short Course for Stimulating Innovative Collaborative Research on Breast Cancer (Marion Kavanaugh-Lynch)

Expanding OBSSR Training Opportunities

- K18 - Short-term Mentored Career Enhancement Awards in Mobile and Wireless Health Technology and Data Analytics: Cross-Training at the intersection of Behavioral and Social Sciences and STEM Disciplines

https://grants.nih.gov/grants/guide/pa-files/par-18-882.html
https://grants.nih.gov/grants/guide/pa-files/par-18-881.html

- R25 - Short Courses on Innovative Methodologies and Approaches in the Behavioral and Social Sciences

https://grants.nih.gov/grants/guide/rfa-files/RFA-OD-19-012.html

- T32 - Predoctoral Training in Advanced Data Analytics for Behavioral and Social Sciences Research (BSSR) - Institutional Research Training Program

https://grants.nih.gov/grants/guide/rfa-files/rfa-od-19-011.html

Pilot Program: OBSSR T32 Predoc Training Concept

- RFA Funding Opportunity: Predoctoral Training in Advanced Data Analytics for Behavioral and Social Sciences Research (BSSR) - Institutional Research Training Program (T32)

- Vision: Support the development of a pilot program cohort of specialized BSSR predoctoral candidates pursuing careers in health-related research who will possess advanced competencies in data science analytics

- Purpose: Solicit applications for new BSSR predoctoral training programs that focus on innovative computational and/or data science analytic approaches and their incorporation into training for the future BSSR health research workforce

OBSSR Annual Methodology Seminars for NIH Staff

2019
OBSSR Methodology Seminar: Text Mining for Behavioral and Social Sciences Research
August 9, 2019
National Institutes of Health, 6001 Executive Blvd, Conf Room A1/A2

2018
OBSSR Methodology Seminar: Predictive Modeling for Behavioral and Social Sciences Health Research
October 12, 2018
National Institutes of Health, Porter Neuroscience Research Center, Bldg. 35A

2017
OBSSR Methodology Workshop: Emerging Non-Traditional Survey Data Collections
August 25, 2017
National Institutes of Health, Porter Neuroscience Research Center, Bldg. 35A

Questions, Comments, Ideas?

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