

SevenBridges

**National Academies
Next Generation Researchers Initiative**

Dennis A. Dean, II, PhD

Sanofi Auditorium
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A little about me



Dennis A. Dean, II, PhD
Scientist

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Research Experience

- Analytics and Modeling Unit, BWH-HMS
- Machine Learning and Knowledge Discovery Group, UMASS
- Neuroscience Statistical Research Laboratory, MGH-MIT
- Programs for Sleep Epidemiology and Cardiovascular Medicine, BWH-HMS

Training

- Applied Statistics Certificate, Harvard Catalyst Postgraduate Education Program
- Insight Health Data Science Fellow, Inaugural Class

Seven Bridges Responsibilities

- Leads US VA Million Veteran Program CRADA
- Leads FDA collaboration efforts
- Leads Blood Profiling Atlas in Cancer (BloodPAC) efforts
- Leads ctDNA Workflow Team and Point of Care Collaboration

Biomedical Data Driven Knowledge Generation

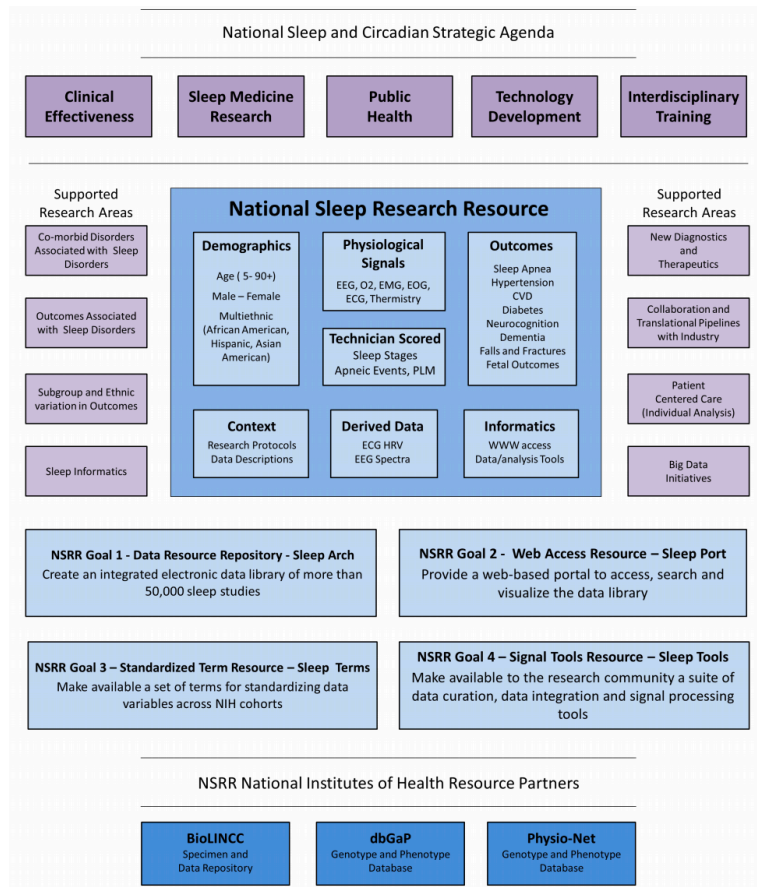
Post Doctoral Research Snapshot

A Systematic Assessment of the Association of Polysomnographic Indices with Blood Pressure: The Multi-Ethnic Study of Atherosclerosis (MESA) (Dean et al 2015)

- Systematic review of 2687 sleep variables
- Variable reduction through cluster analysis
- Blood pressure imputation for medication use
- Cross validated statistical model building

Scaling up Scientific Discovery in Sleep Medicine: The National Sleep Research Resource (Dean et al 2017)

- Design of sleep data resource
- Largest publically available source of sleep data



Learning to succeed by failing quickly

Inaugural Insight Health Data Science Fellows Class



Insight Data Science

- Model for training PhDs to take data science rolls
- 750+ Alumni at 200+ since 2012
- Free to fellows

Program Structure

- Program
 - Project (4 weeks) + Study (4 weeks)
- Industry and Alumni Mentors
- Community Mentors
- Exposure to wide range of opportunities

NATIONAL SCALE BIOMEDICAL DATA ANALYSIS SOLUTION

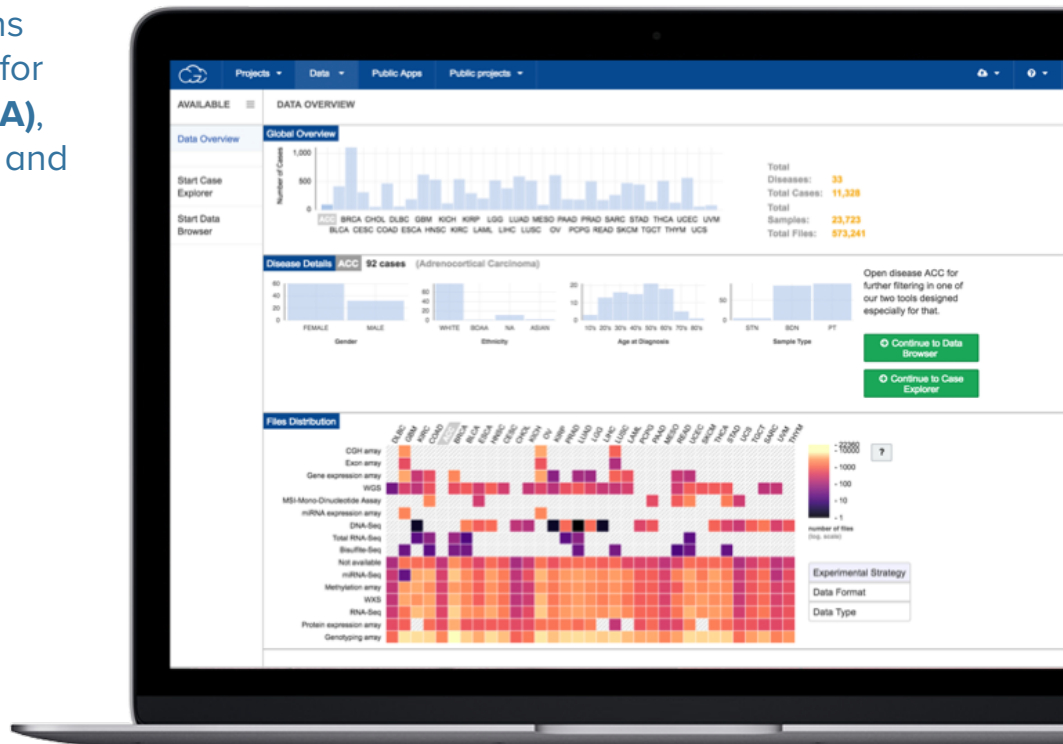
Seven Bridges was one of three organizations selected to develop a cloud-based platform for analysis of **The Cancer Genome Atlas (TCGA)**, a 1+ PB database of genomic, transcriptomic and clinical data for 11,000 cancer patients

cancergenomicscloud.org



“The ability to analyze TCGA data in the cloud is opening up a world of new research opportunities for my lab’s work on breast cancer and for cancer researchers everywhere”

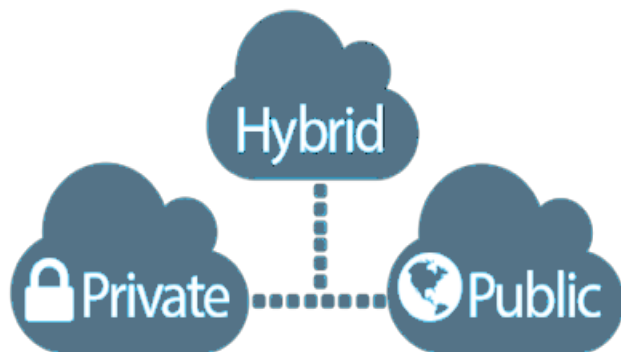
Jeffrey Chuang, Assoc. Prof. Computational Biology
Jackson Laboratory for Genomic Medicine



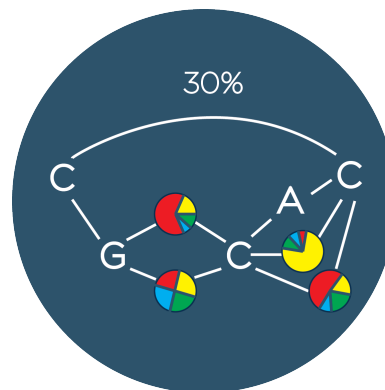
Let's think about national scale analysis

Collaborative Research Agreement with the VA Million Veteran Program

Hybrid Cloud



Genotype-Phenotype Engine



Data: Genomics data captured with multiple technologies and includes clinical data

Goal: Graph Driven Genotype-Phenotype Association Studies

Demystifying Leadership

Partnership year long Bio-Diversity Fellows Program

Supporting Next Generation Researchers Discussion

Personnel Development

- Developing context by participating in business rotations
- Continuing education opportunities (Knowledge and Skill Based)
- Creating Internal and external mentoring opportunities
- Developing communities for personnel accountability

Environment and Policy

- Identifying best practices for industry, government, and academic partnerships
- Standardizing large-scale clinical data sharing agreements for industry partners
- Creating academic-industry partnerships for longer term trainee development

Global Perspective

- Identifying best practices for building a diverse work force
- Identifying best practices for international collaborations (internal and consortium)

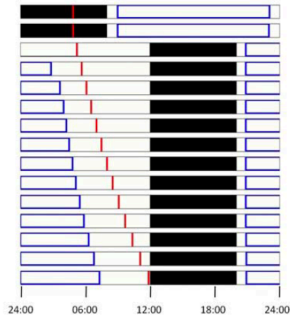
Thank You !

Doctoral Research Snapshot

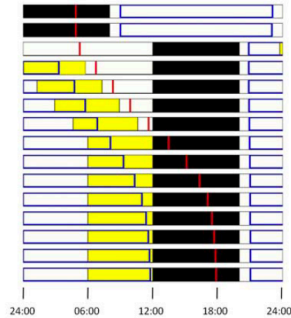
Without Countermeasures

With Countermeasures

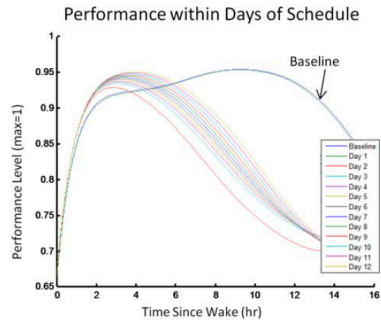
A1



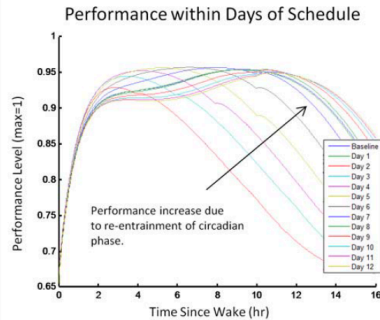
A2



B1



B2



Taking the Lag out of Jet Lag (Dean et al 2009)

Taking the Lag out Jetlag

- Automatic scheduling of light to accelerate physiological adaption shift in sleep wake
- Designed to automate NASA crew schedules
- Prototype reduced manual simulated analysis from days to seconds

Analytical components

- Builds on 12 differential equations that describes the relationship between internal body clock, sleep and human performance
- Schedules represented as a regular language
- Light (intervention) optimization algorithm