2015 System Dynamics Conference Lightning Talk

Diabetes Geodynamics Information System: An Interdisciplinary Approach to Data Analytics

Carson Tao

for

University at Albany

July, 2015

UALBANY
State University of New York
System Dynamics Group

Author Team

Carson Tao, Mahdi Abadi, William A. Augustine,

Babak Bahaddin, Felippe Cronemberger,

Katrina A. Hull, James P. Houghton, Smita Sharma,

Jack Homer, Luis Luna-Reyes, Eliot Rich,

David F. Andersen, Reza Feyzi Behnagh, Mei Chen,

Susan Howick, Rod MacDonald, Karl Rethemeyer,

Jianping Xu

UALBANY State University of New York | System Dynamics Group

At the beginning…

- An experiment integrating multiple open source tools:
- What can be done with open health data and analytic techniques?
  - Calibrate a world class model to local level
  - Open data from US State and Federal sources
- PySD Python System Dynamics library [Houghton, 2014]
- A user-friendly platform / interface

Our Policy Motivation

- The New York State DSRIP* is an $6.4 Billion agreement with the federal government to reduce operating costs.
- Policy effects must be visualized and implemented in very local terms (or more generically through stakeholder networks).

* Delivery System Reform Incentive Payment (DSRIP) Program

Phase I & II

Project Components	Phase I (Complete)	Phase II (by Aug 2015)
Scope	Preliminary Proof-of-concept	Running prototype
Phase Purpose	Technical demo to think about possibilities	Advanced demonstration with policy display
Data	Open SPARCS data: 2009-13, 3 digit zip code; NHANES and BRFSS for model calibration	No additional enhancements
Domain	DCP model partially recalibrated to Albany County with policy sets to 2015	Calibration to Albany County complete. Full policy sets through 2030
Provider Network	Medicaid vs. Non-Medicaid provider networks emulated from SPARCS	No additional enhancements
Technical Infra-Structure	Components with artisan crafting and proprietary software	Work toward all components within Python / Open Tools
Geo-animations	Emulated by scrolling through screen shots	Animate through Python

Phase I Demonstration

python

JamesPHoughton / pysd

Simulating SD Models in Python

Vensim

VENTANA systems, inc.

NEW YORK STATE

Department of Health

Information for a Healthy New York

HTML5 + CSS3 + JS JavaScript

plotly

UALBANY State University of New York

System Dynamics Group

Phase II Design

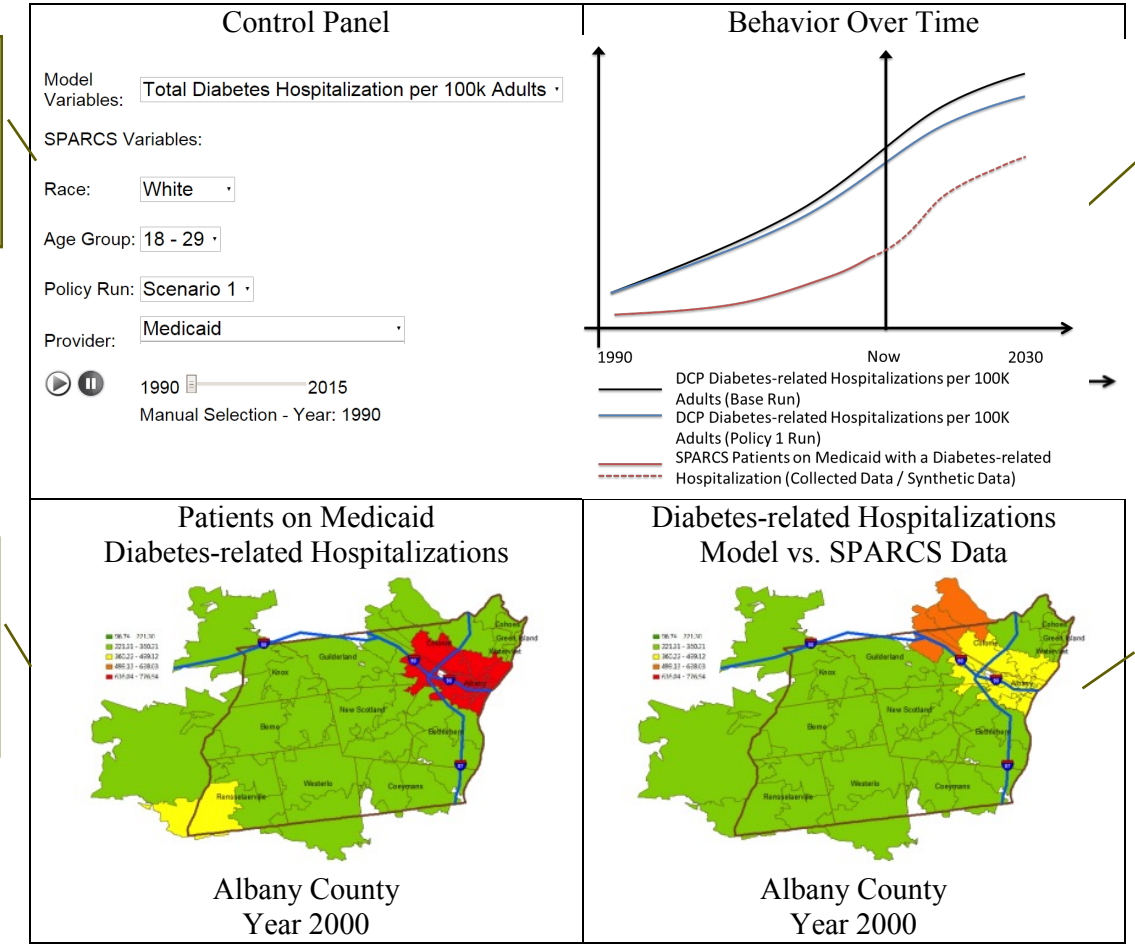
Phase 2 Simulation: Diabetic Hospitalizations over time to 2030

Variable / scenario selection

Dynamic History/ Simulation Projection

SPARCS Heat Map

Simulation vs SPARCS Heat Map



UALBANY State University of New York

System Dynamics Group

4-Phase Plan

Project Components	Phase I (Complete)	Phase II (by Aug 2015)	Phase III (One vision of where this is going)	Phase IV (Blue Sky vision)
Scope	Preliminary Proof-of-concept	Running prototype	Prototype exploring geo-dynamics of Diabetes in Albany County	You Name It!!!
Phase Purpose	Technical demo to think about possibilities	All technical pieces working together	Diabetes Geo-Dynamic Information System	??
Data	Open SPARCS data: 2009-13, 3 digit zip code; NHANES and BRFSS for model calibration	No additional data at this point in time	SPARCS data by 5 digit zip code; annual data 1990-2013. First synthetic data for future policy runs	??
Diabetes Simulation	DCP model partially recalibrated to Albany County with policy sets to 2015	Calibration to Albany County complete. Full policy sets through 2030	No additional enhancements	??
Provider Network	Medicaid vs. Non-Medicaid provider networks emulated from SPARCS	No additional enhancements	No additional enhancements	??
Technical Infra-Structure	Components with artisan crafting and proprietary software	Work toward all components within Python / Open Tools	All simulations, data synthesis, and geo-dynamic automated	??
Geo-animations	Emulated by scrolling through screen shots	issue of how to animate from Python	Geo-animation problem solved	??

2015 System Dynamics Conference Lightning Talk

Diabetes Geodynamics Information System: An Interdisciplinary Approach to Data Analytics

Carson Tao

for

University at Albany

July, 2015

UALBANY
State University of New York
System Dynamics Group