IBM RESEARCH

A Model Mashup Environment for Healthcare Decision Support

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I'm back at IBM

and seeing the world in a different way!

We data folks thought we were really smart when we:

- **Made relational systems do high performance transactions**
- **Did data mining and business intelligence on transactional data**
- **Included unstructured data, web, text, …**
- **Included streams of data**
- **Scaled to terabyte / petabyte scale**
- **Added semantics, annotations….**
- **Exploited metadata**
- **…**

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But….

Understanding the world and deriving a model of its aspects by just analyzing data alone should be a last resort

We can understand SO much more if we make our analysis and predictions both model-driven as well as data driven

Especially when solving complex systems involving systems of systems

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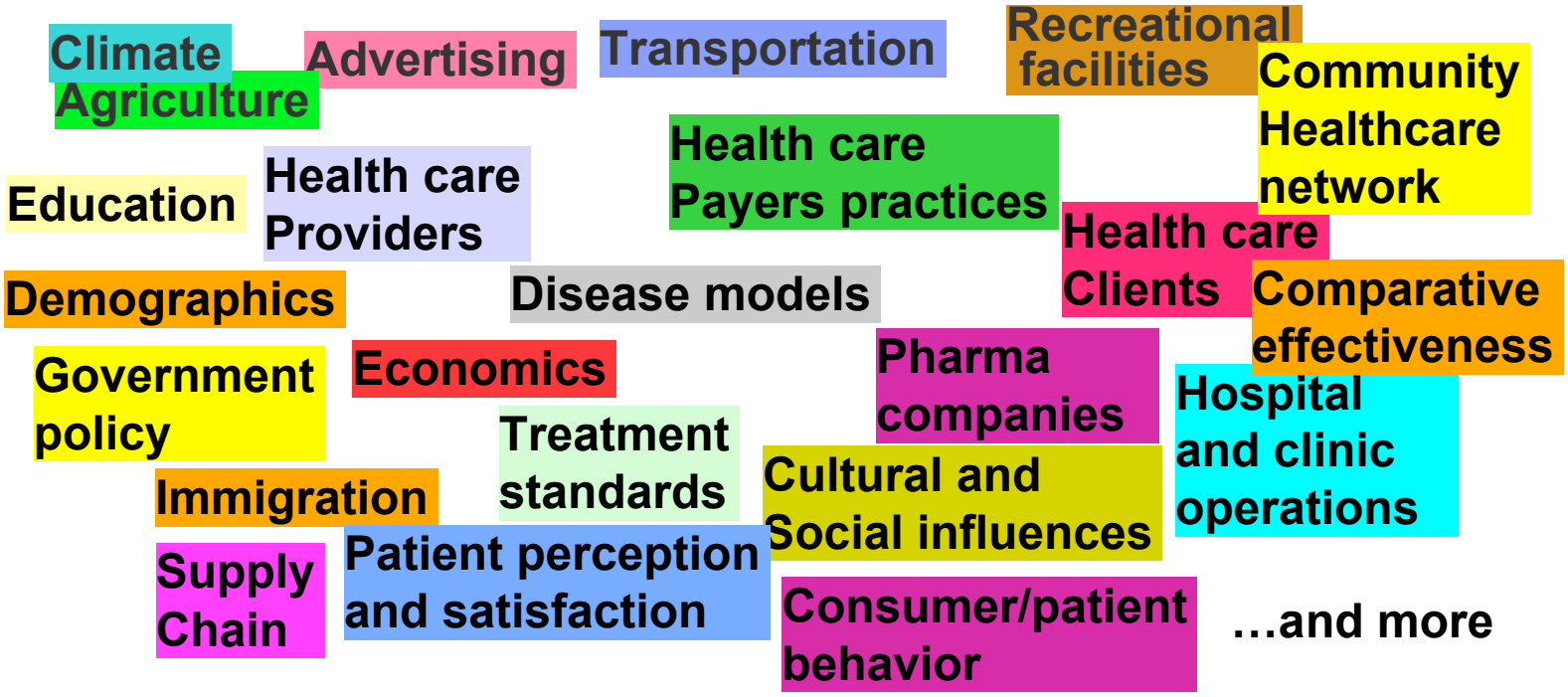
Healthcare: A complex "system of systems"

Many systems have been studied individually by domain experts, using statistical and simulation models



Need a platform and processes for integrating models and simulations for healthcare-related policy, investments, and planning

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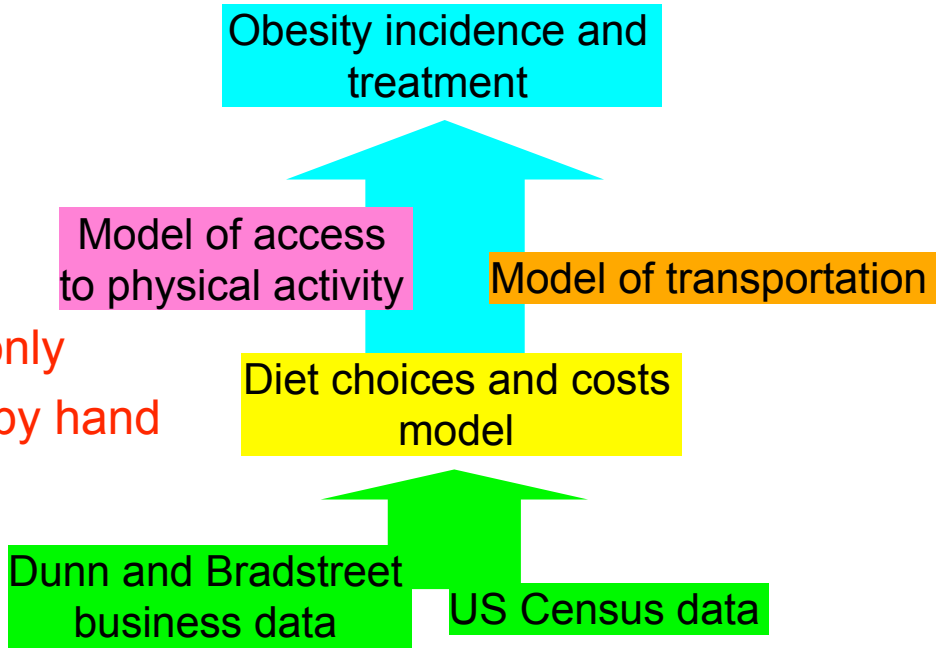
Example:

Public Policy Investment Decision Support



But:

Statistical models only

Results integrated by hand

Insight: Nearby location of large chain grocery stores reduced obesity rates

Tax incentives for chain stores to move to obesity "hotspots"?

10% incr. in fast food prices -> 3% incr. fruits and vegs -> BMI -10% in obese youth

Chaloupka FJ, Powell LM. Price, availability, and youth obesity: evidence from Bridging the Gap. Prev Chronic Dis 2009; 6(3). http://www.cdc.gov/pcd/issues/2009/jul/08_0261.htm

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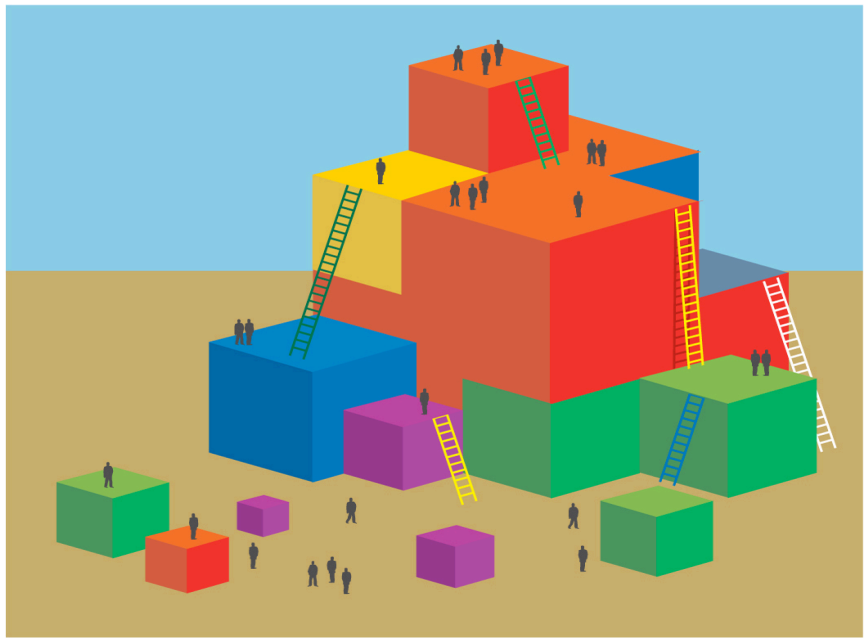
SPLASH! (Smarter Planet Platform for Analysis and Simulation of Healthcare)

A platform and service to “mash up” data, models, simulations

- Support complex decision-making for healthcare policy, planning, and investment
- Share, integrate, correlate deep-domain models and data with those of others
- Exploit the tools, models, simulations, data and analytics of others



Benefits

Significant new insights from mashing up proprietary and open models from multiple disciplines

High quality of results from collaboration, interoperability, and integration

Rapid exploration of a large number of alternative inputs and outcomes

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The Challenges of Integrating Models

Exploring the landscape of model combination

Not all models and simulations can be combined. Which ones can?

Need methodology for describing models so that we can determine which models are “compatible”

Building a shared framework with easy integration tools and connectors

Building a community of platform users

Must provide motivation to participate

Must build trust in the models and data

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We're Looking for Input and Partners

Model-integration technology

Scenarios and use cases

Simulation models

- Discrete-event, agent-based, system dynamics, differential-equation, …

Statistical models

- Regression, time series, decision/classification

Datasets

- Clinical, econometric, operational, …

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