

# Open Government and the National Institutes of Health: Crowdsourcing the Research Enterprise

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National Cancer Institute

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# The National Cancer Institute



**NCI** was established by congress in 1937, is the leading Federal agency and world's largest organization solely dedicated to cancer-related research, training, and dissemination of information. **DCCPS** aims to reduce the risk, incidence, and deaths from cancer as well as enhance the quality of life for cancer survivors.

- **Cancer** = an incredibly diverse, complex set of diseases
- **500,000+** cancer-related deaths estimated to occur in 2011
- **≈50%** of cancer related deaths can be attributed to preventable behaviors and exposures (tobacco, diet, phys. activity, screening,...)
- **1% reduction in cancer deaths = \$400+ billion in savings**

# The National Cancer Institute



Division of  
Cancer Control and  
Population Sciences  
NATIONAL CANCER INSTITUTE

## Cancer Control Framework



U.S. DEPARTMENT OF  
HEALTH AND HUMAN SERVICES  
National Institutes of Health



***Reducing the cancer burden***

# What is Population Science?

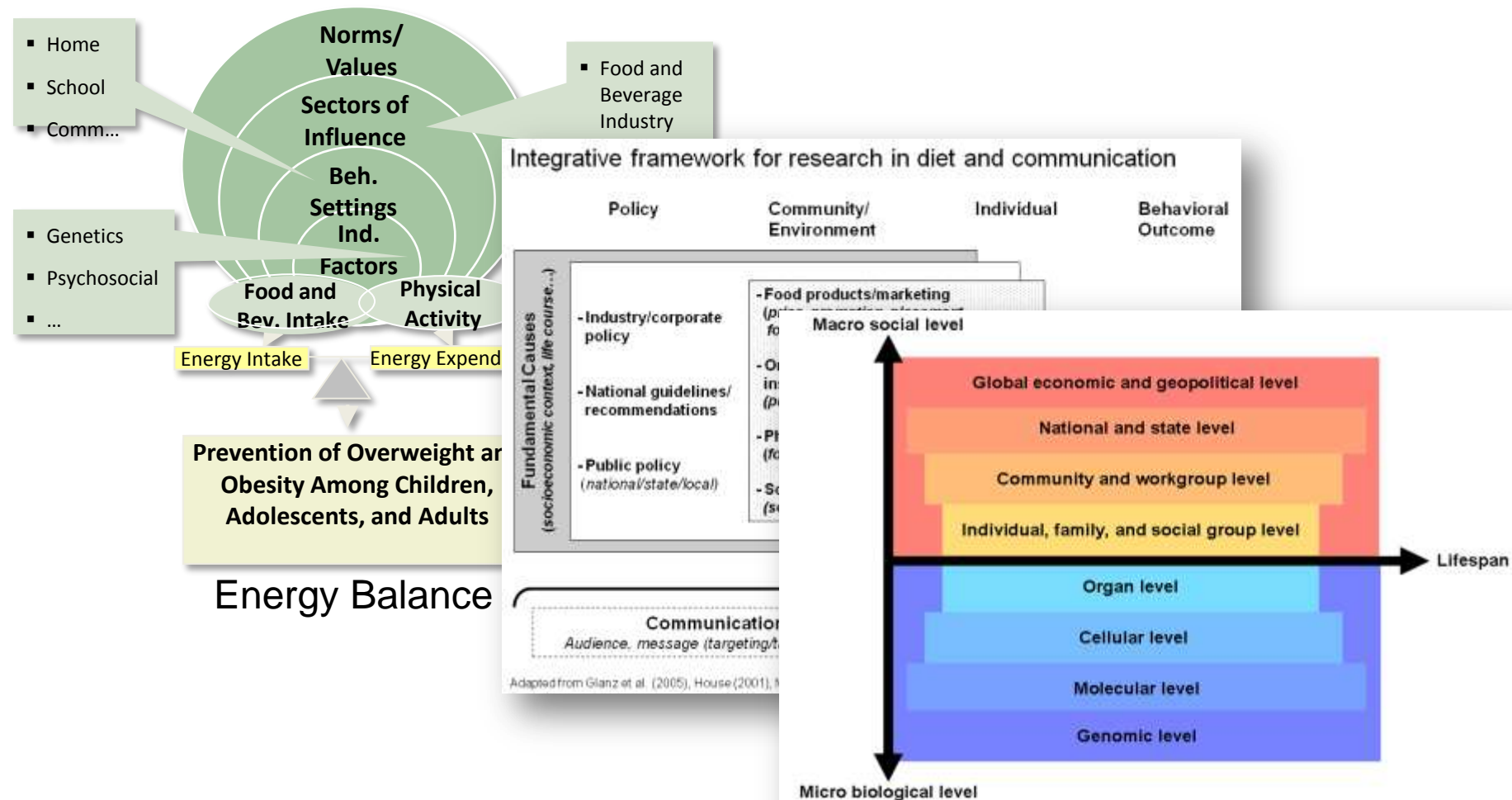
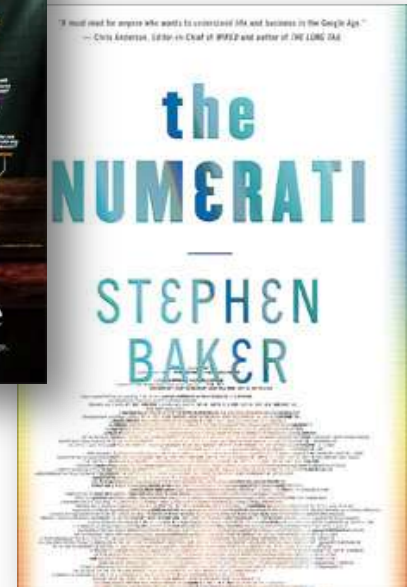


Figure 1. Health as a continuum between biological and social factors across the lifespan. (Adapted from Glass & McAtee, 2006).

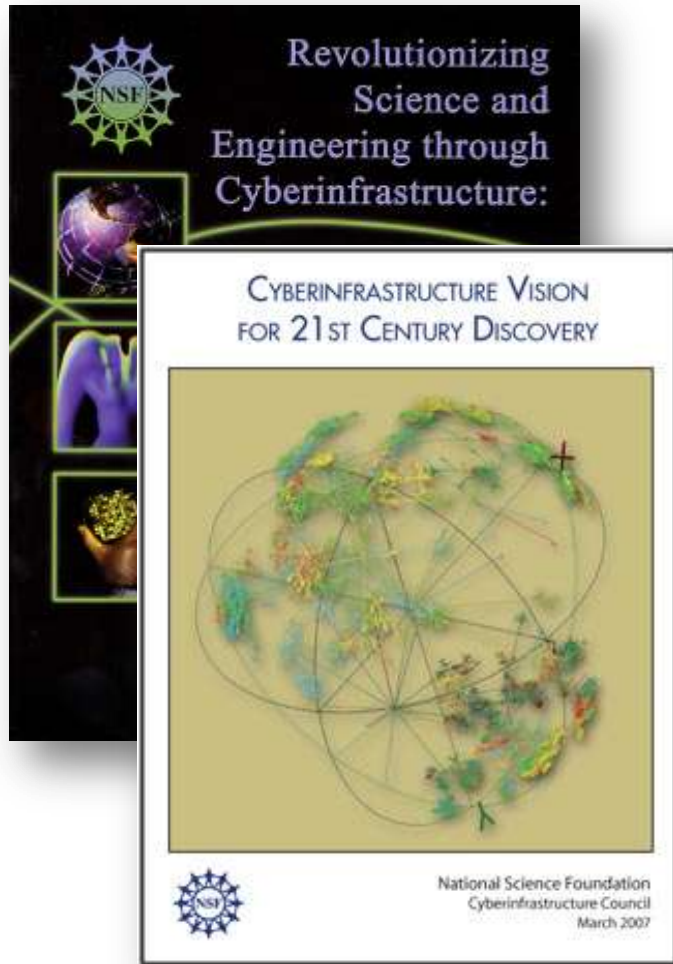
# In this age of 'Big Data'...

*...a grand experiment is unfolding on the utilization of data for public health impact.*





# The National Science Foundation



The Atkins Report (2003) & CDI (2007)

*"...five-year initiative to create revolutionary science and engineering research outcomes made possible by innovations and advances in computational thinking."*

- From Data to Knowledge
- Understanding Complexity
- Virtual Organizations

# Institute of Medicine and the National Academies of Science

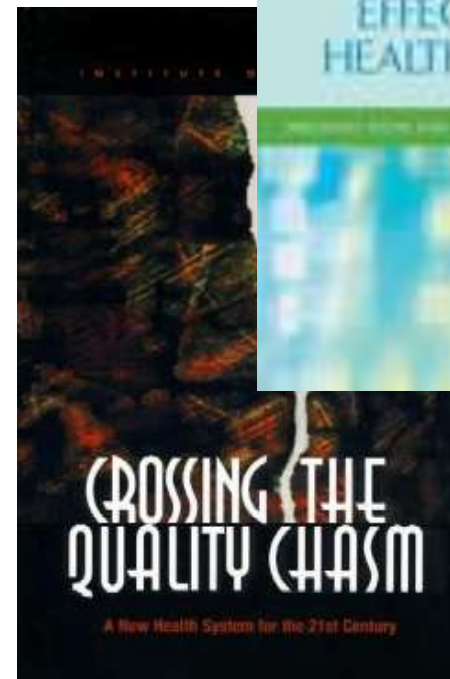
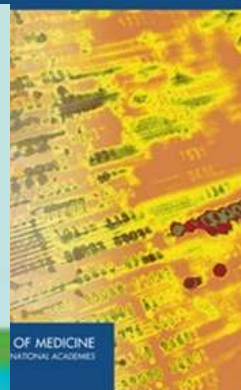
Computational Technology for Effective Health Care (2009)

The Learning Healthcare System (2007)

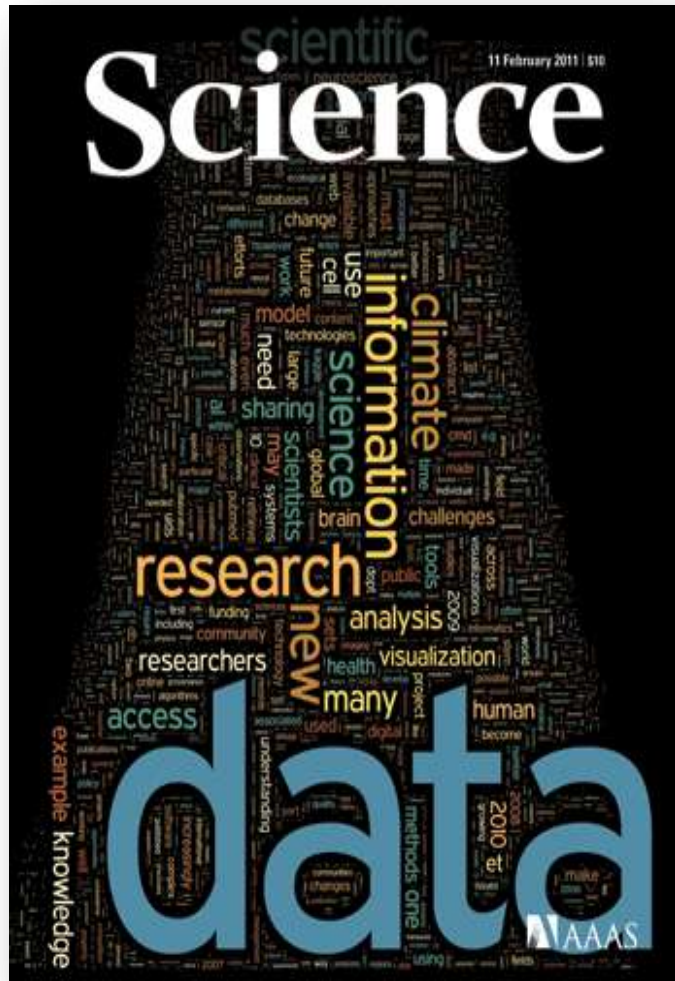
Crossing the Quality Chasm (2001)

*The digital information revolution = the “**structural inability**” of health practitioners to exploit the unprecedented amount of electronic health-related information that now lies at our fingertips.*

*- Institute of Medicine*



# Science (Feb. 11, 2011)



**Gary King (Harvard)**

*Social scientists need to continue to build a **common, open-source, collaborative infrastructure** that makes data sharing & analysis easy.*

**Peter Fox & James Hendler (RPI)**

*Visualization is not the end product of scientific analysis, but an **exploration tool** for hypothesis development in the continually more data-intensive scientific process*

*Challenge of modeling integrated data is exponentially harder = **systems-level perspectives & transdisciplinary science***



# PCAST - “Designing a Digital Future: Federally Funded R&D in NIT” (Dec. 2010)

**I. “Every Federal agency needs to have a BIG DATA strategy”**

**II. “Improvements in health & QOL...depend upon knowledge and information that can drive appropriate actions”**

- Comprehensive ‘life long’ **individual health records**
- From data to knowledge for empowering health (**scalable architecture**)
- Tools & apps for **personalized healthcare**

**III. “Democratization of research & education”**

**IV. HHS & NSF collaboration:**

- Data sharing & computation
- Environment and sensor data (contextualization)
- HCI and ‘human-NIT’ interactions



# Conceptual Framework for Cyberinfrastructure for Consumer Health

(Shaikh, Prabhu Das, Vinson, Spring, 2011)

## Information Ecology

### Established Data Sources

- Surveillance
- Research
- Administrative
- Medical
- Biological
- Genomic/proteomic
- Census
- Policy...

### Emerging Data Platforms

- EHRs/PHRs
- Mobile devices
- Sensors & GIS
- Data.gov
- Web 2.0 (blogs/microblogs/wikis, video/photos, social networks, PHRs,...)...

## Cyberinfrastructure (Grid and Cloud Computing)



## Applications for Population Health



- Apps
- Widgets
- EHRs
- PHRs
- Dashboards
- Medical devices & technologies...



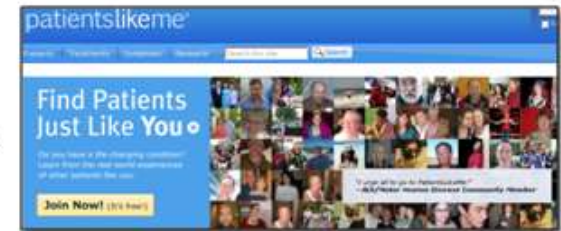
Re-Entry into the Information Ecology

# The Research Landscape

Source: Hesse BW, Hansen D, Finholt T, Munson S, Kellogg W, Thomas JC. Social Participation in Health 2.0. *IEEE Computer*. 2010;43(11):45-52.



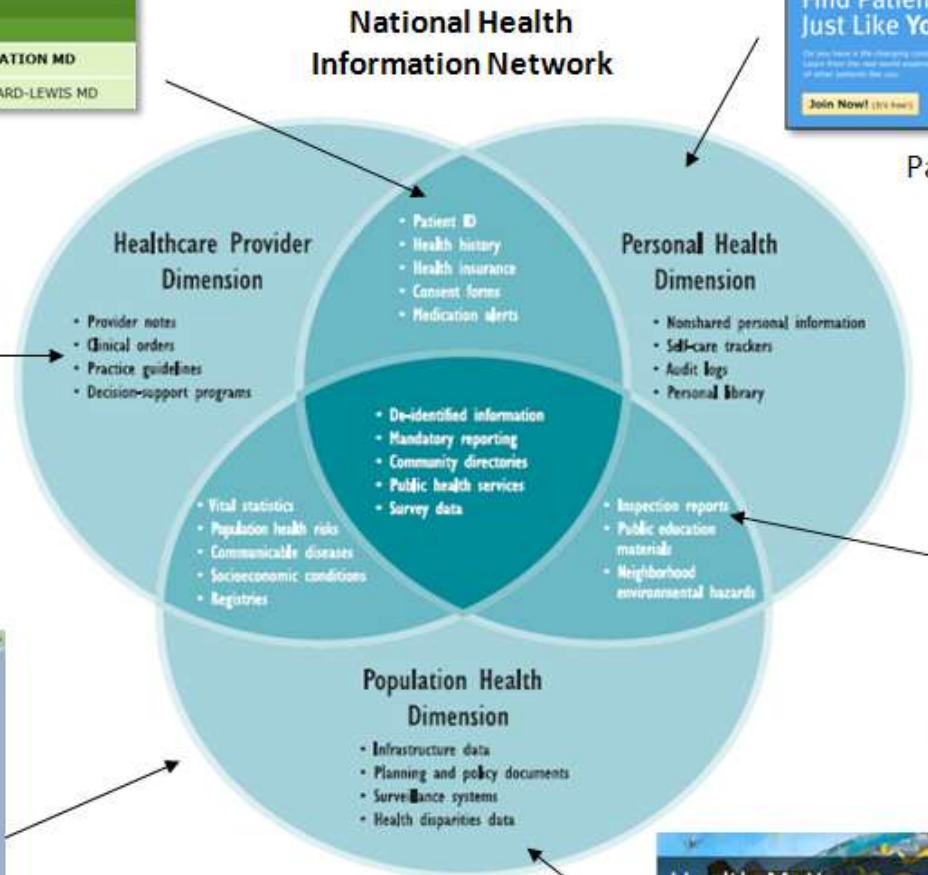
Physician Patient Partnerships



Patient participation sites



Physician Participation Sites



Mobile Access to Health Information



Disease outbreak maps, Infodemiology



Community Health Data

Slide attribution: Brad Hesse 2010

# Bench to Bedside...

**Abroms et al. (2011). iPhone Apps for Smoking Cessation: A content analysis. *American Journal of Preventive Medicine*, 40 (30), 279-85.**

- Apps rarely adhere to established guidelines for smoking cessation (e.g., pharmacotherapy, quit lines, counseling).
- Similar findings in other health-related/preventive behaviors
- NCI K-award (CA124579)

**= GAPS in translating science and disseminating for impact**



# 2010 NCI Developer Challenge



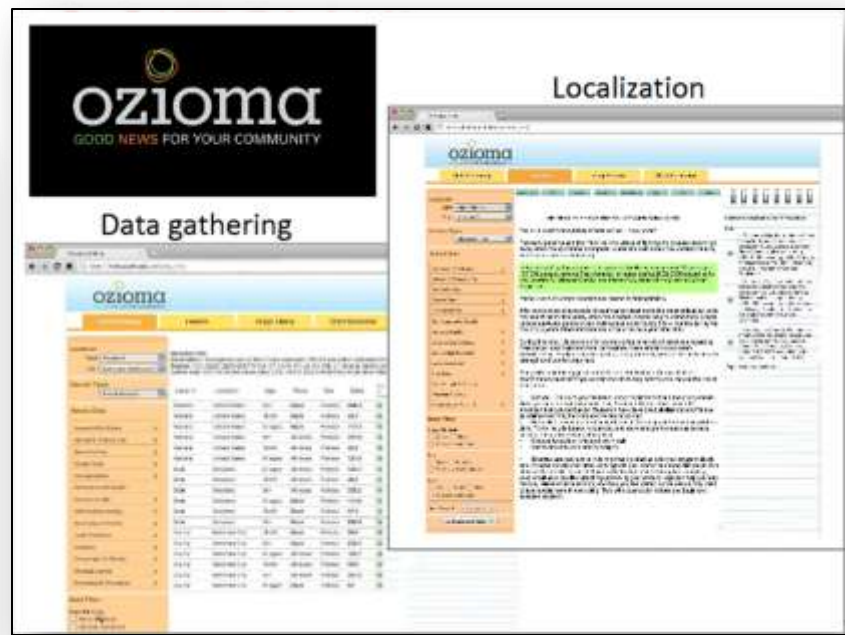
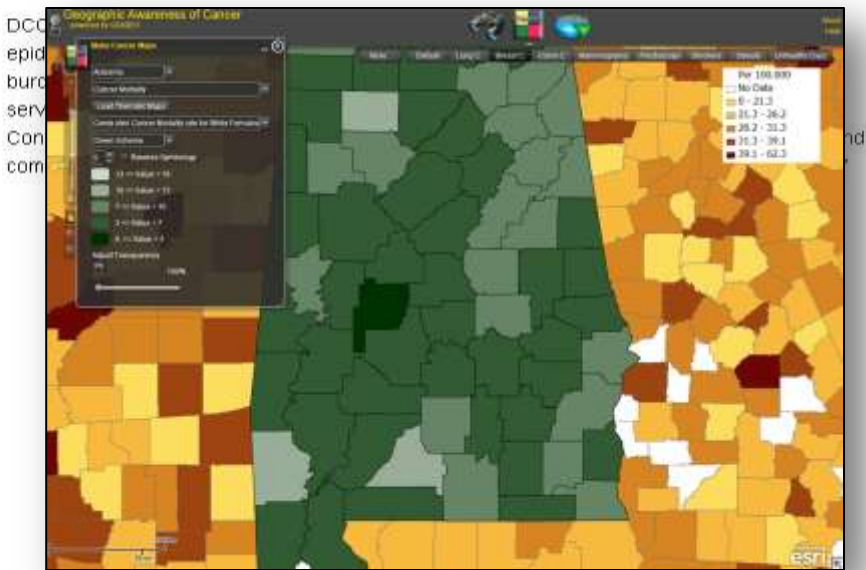
U.S. DEPARTMENT OF  
HEALTH AND HUMAN SERVICES  
National Institutes of Health



About Challenges Teams People Resources LIVE CODE! Partners Sponsor Gallery In the News Blog

## Enabling Community Use of Data for Cancer Prevention and Control

Using data available through the National Cancer Institute's (NCI) Division of Cancer Control and Population Sciences (DCCPS) and their partners, develop prototype web and/or mobile communication technology applications to enable communities' use of population data for cancer prevention and control.





# Initial Outcomes

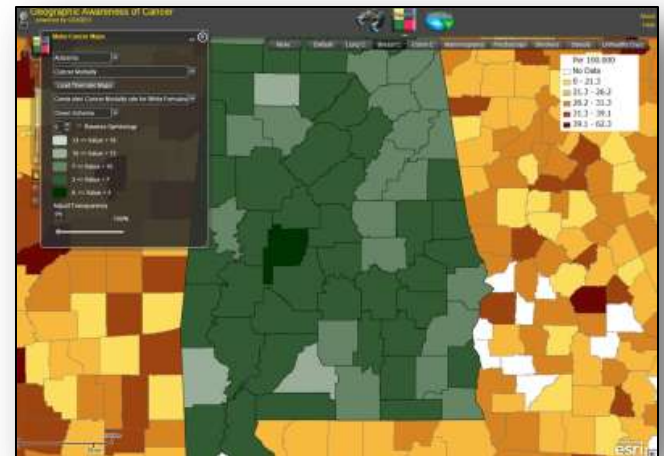
**Caburnay et al. (Washington University):**  
**OZIOMA** provides locally-relevant cancer data and statistics, resources, and graphics for media and PR professionals

- Aggregates multiple data sources (SEER, HINTS, BRFSS...) to enhance the relevancy of health related news stories
- NCI Centers grantee (CA-P50-95815)



*LocalHealthData.org*

**GSAREH (Austin, TX):** data visualization and multi-level GIS mapping app



# America COMPETES Act

**Dec 21, 2010: Act is re-authorized**

Congress grants authority to all Federal agencies to use prizes/challenges to

- Spur innovation
- Solve difficult problems
- Advance core missions



**Challenge.gov** = central platform for crowdsourcing Govt. competitions for open innovation



**ONC Investing in Innovations (i2)** = collaborate with HHS agencies to further agency missions, pay only for results, increase diversity of entities addressing challenges, and stimulate private sector investment,

**June 9 Health Data Initiative Forum**

# The Health Data Initiative: Turning HHS and our sister agencies into the “NOAA of health data”

## A Rapidly Growing Array of Innovative Products and Services That:

Health-related data from



**FUELS**

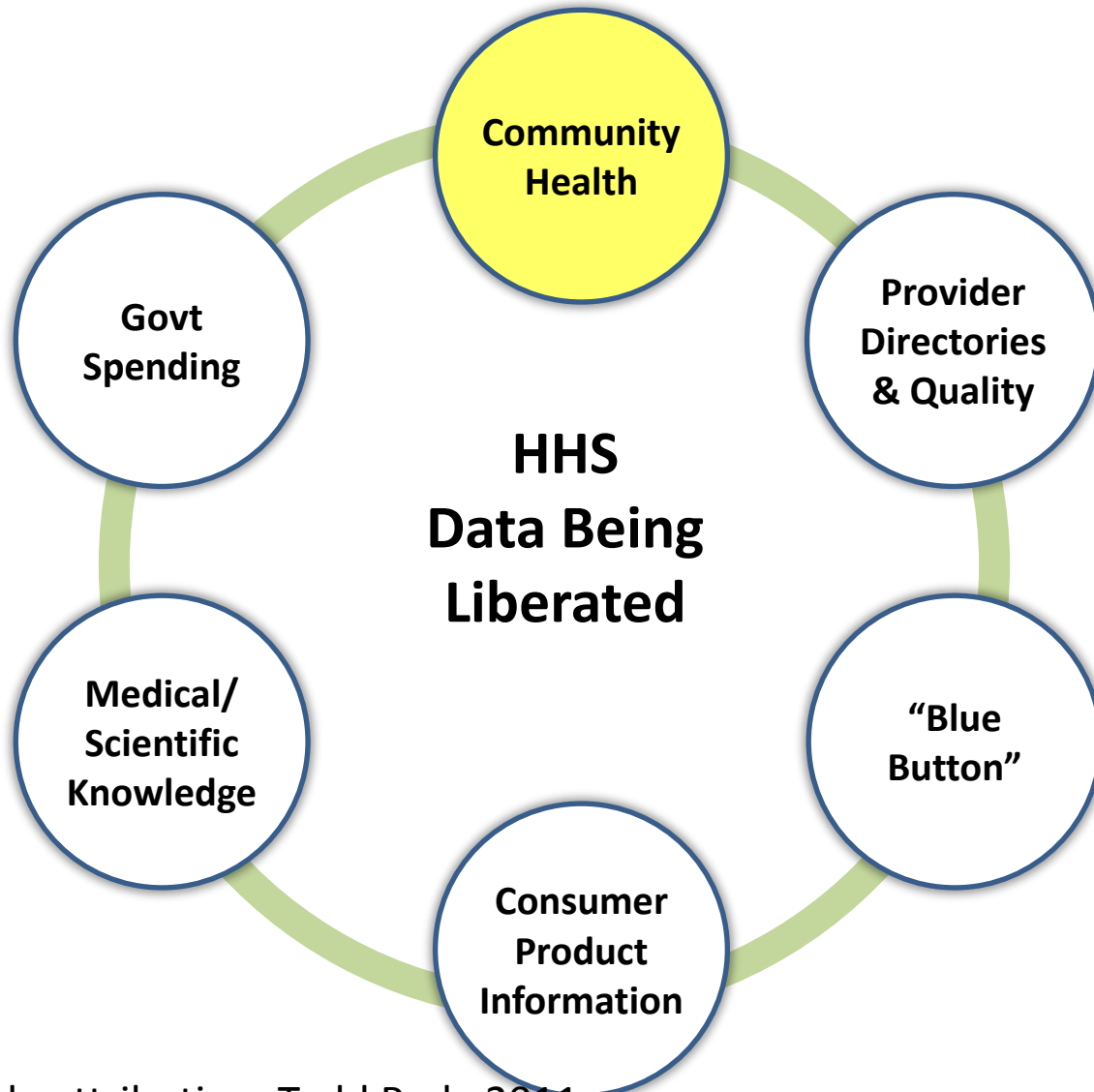
Made available to the public

- Help consumers take control of their health and health care
- Help employers promote health and wellness
- Help care providers deliver better care
- Help journalists shed light
- Help local leaders make better-informed decisions
- Support all of the above through “data intermediary” services
- And much more

# Health Data Initiative core activities: liberate data and catalyze innovation

1. **Publish brand new HHS data for public access** – while rigorously protecting privacy and confidentiality
2. **Make existing HHS data much more accessible** -- “machine-readable,” downloadable, accessible via application programming interfaces (APIs), free, much easier to find
3. **Energetically publicize our data to innovators** -- who can use it as raw material to develop applications and services that help improve health and health care

# What kinds of data are we liberating?

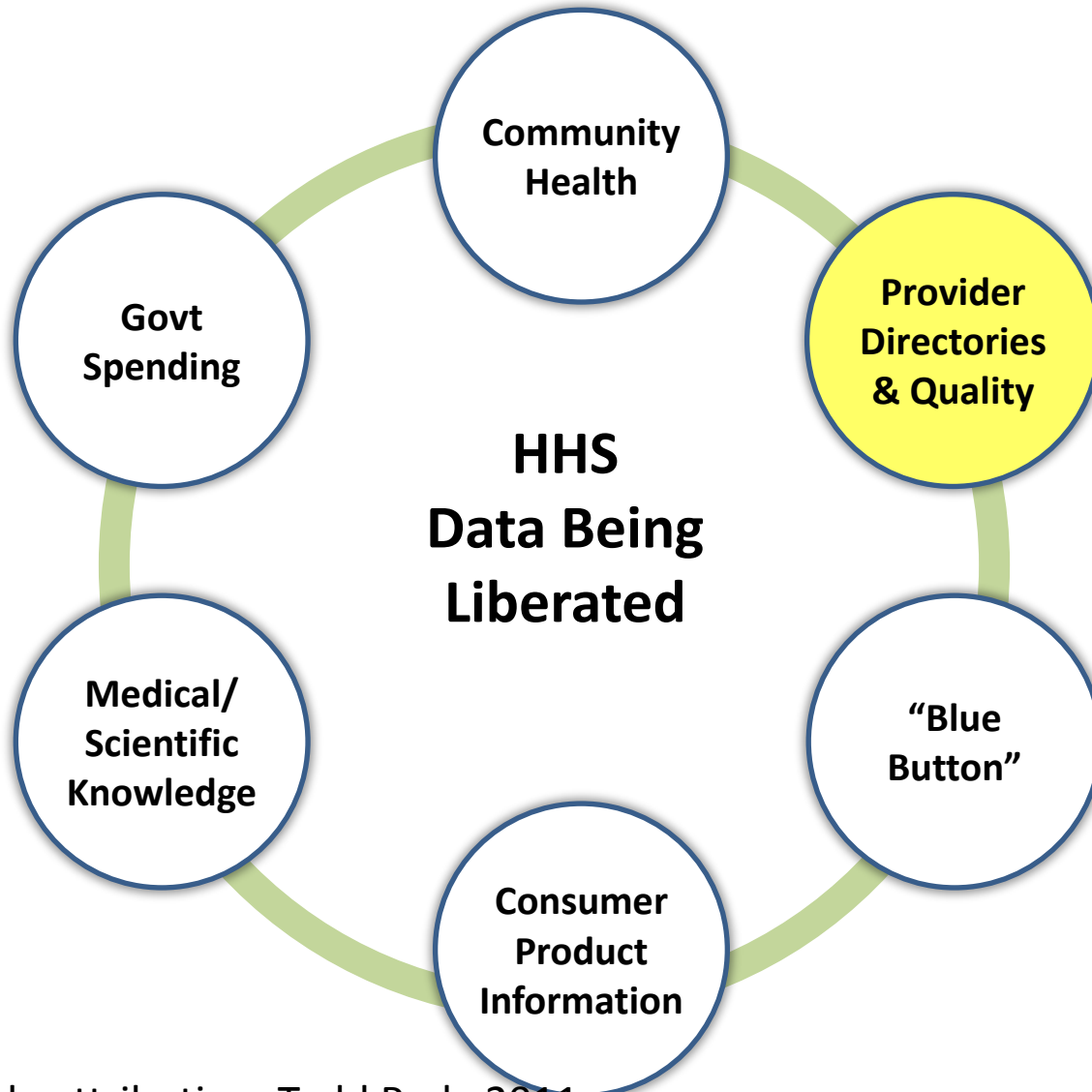


## Community Health Data Example:

- Health Indicators Warehouse, at [healthindicators.gov](http://healthindicators.gov)
- 1,170 metrics of community health and health care performance
- Launched 2/2011



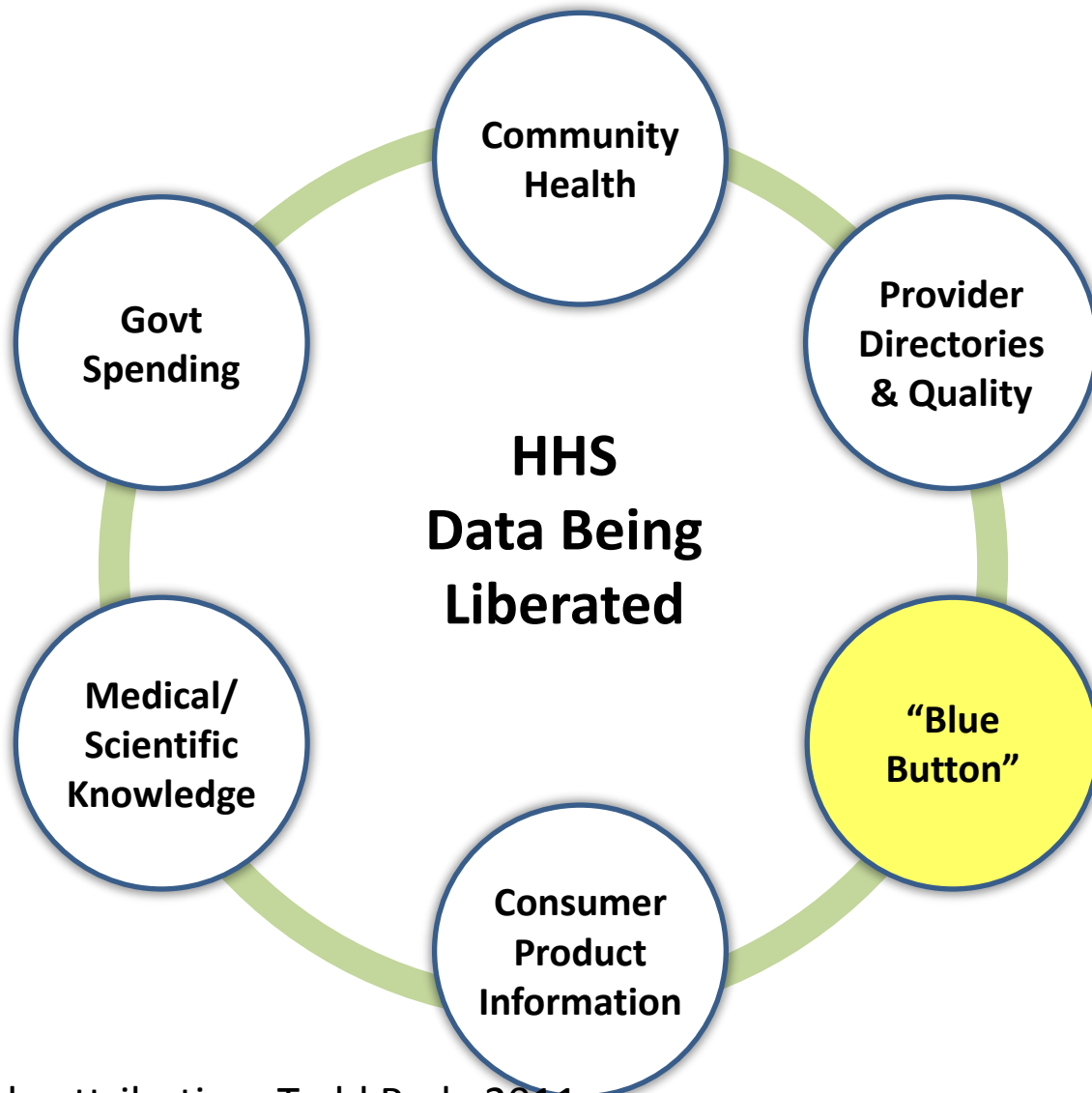
# What kinds of data are we liberating?



## Provider Directories & Quality Data Examples:

- Nationwide directories of care providers
- Provider quality COMPARE APIs at [data.medicare.gov](http://data.medicare.gov), launched 9/2010
- Medicare claim files for provider quality measurement, coming 1/2012

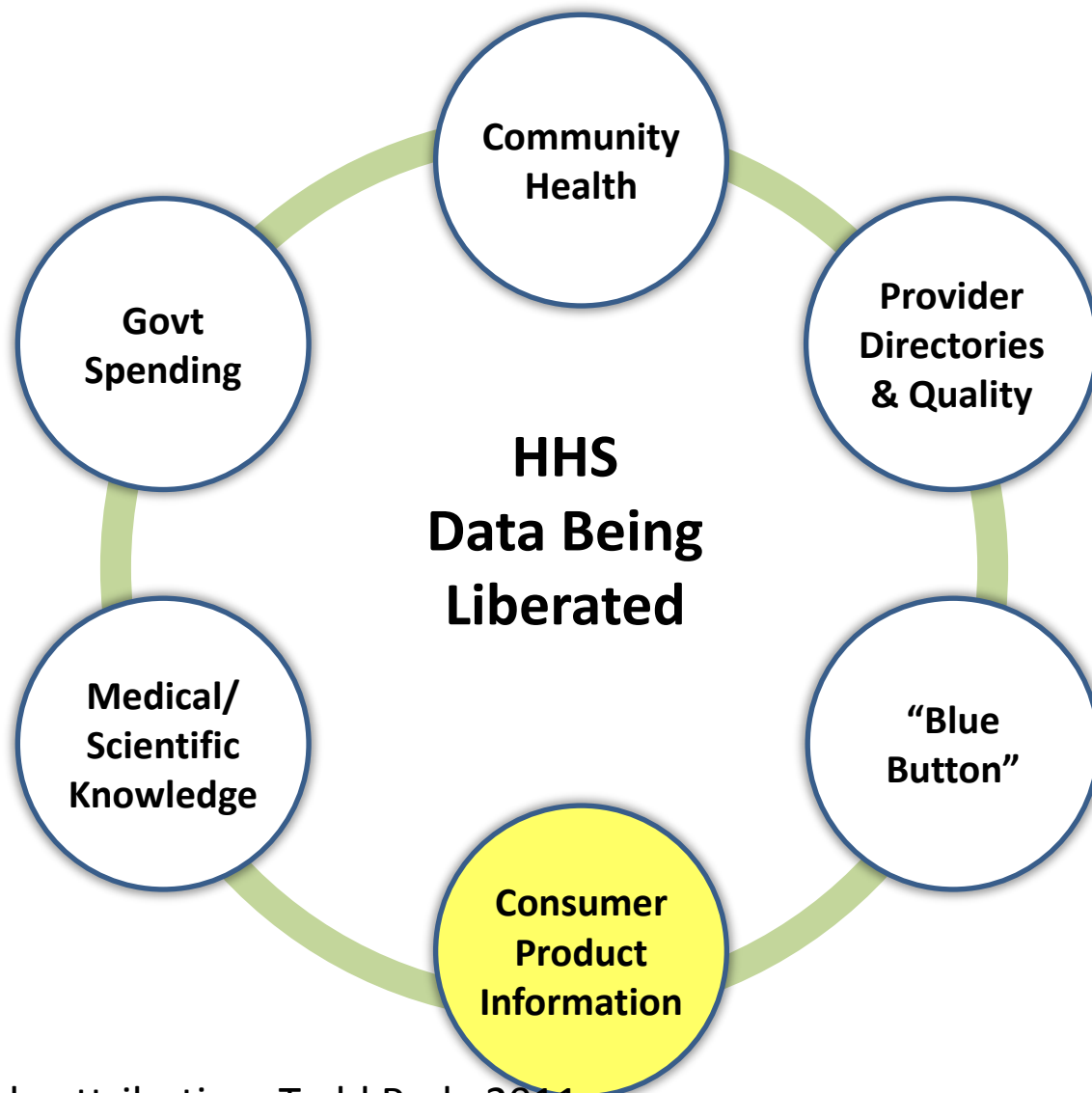
# What kinds of data are we liberating?



## **"Blue Button" Data**

- VA, HHS, DoD joint venture
- Allows veterans, Medicare beneficiaries, and active duty military to download their own claims or personal health information
- Launched 10/2010

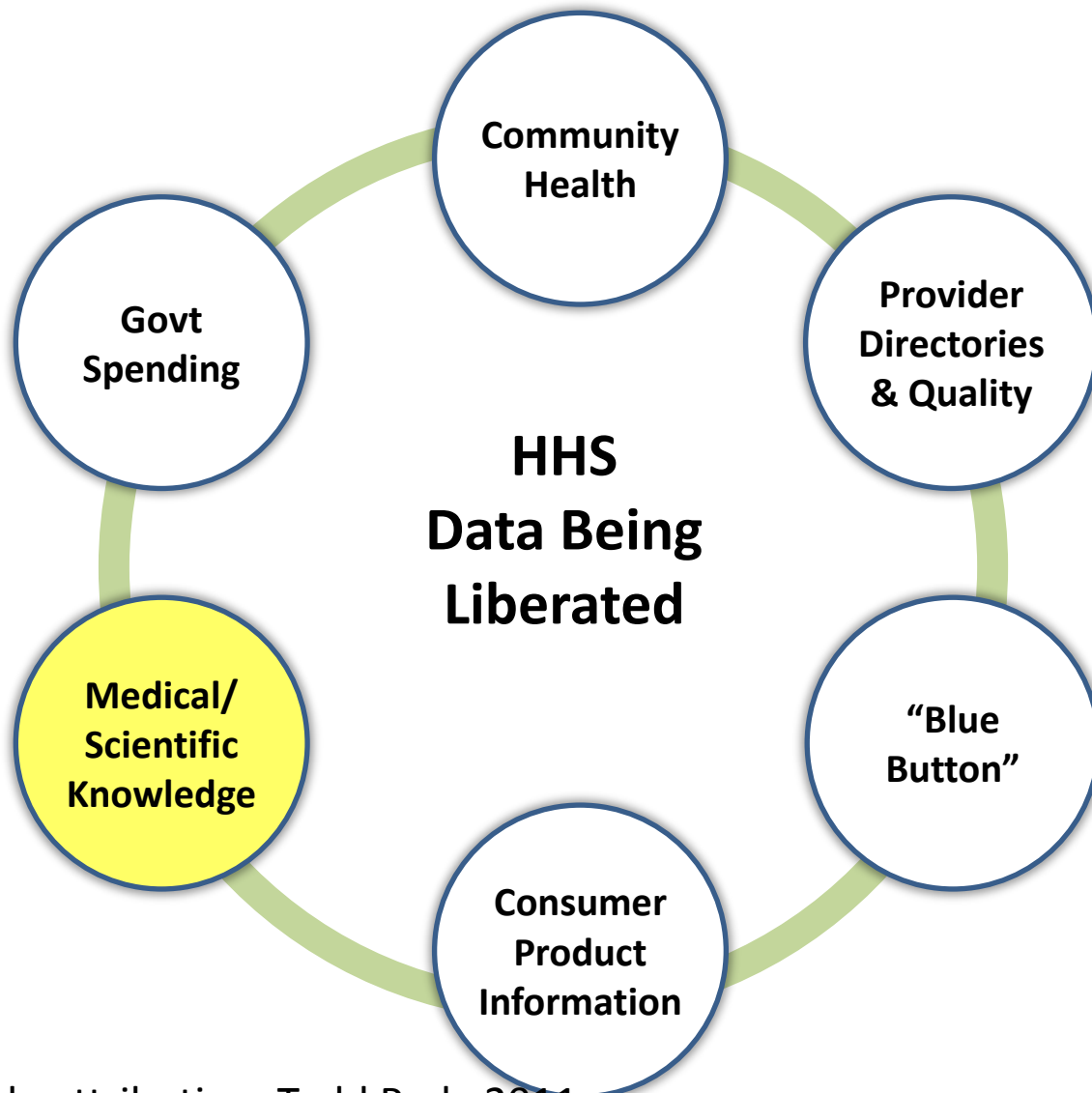
# What kinds of data are we liberating?



## Consumer Product Information Examples:

- FDA recall (drugs, devices, food) data in downloadable XML format --published 10/2010
- Health insurance products available in the individual and small business markets across the U.S. – made available via downloadable files 8/2011

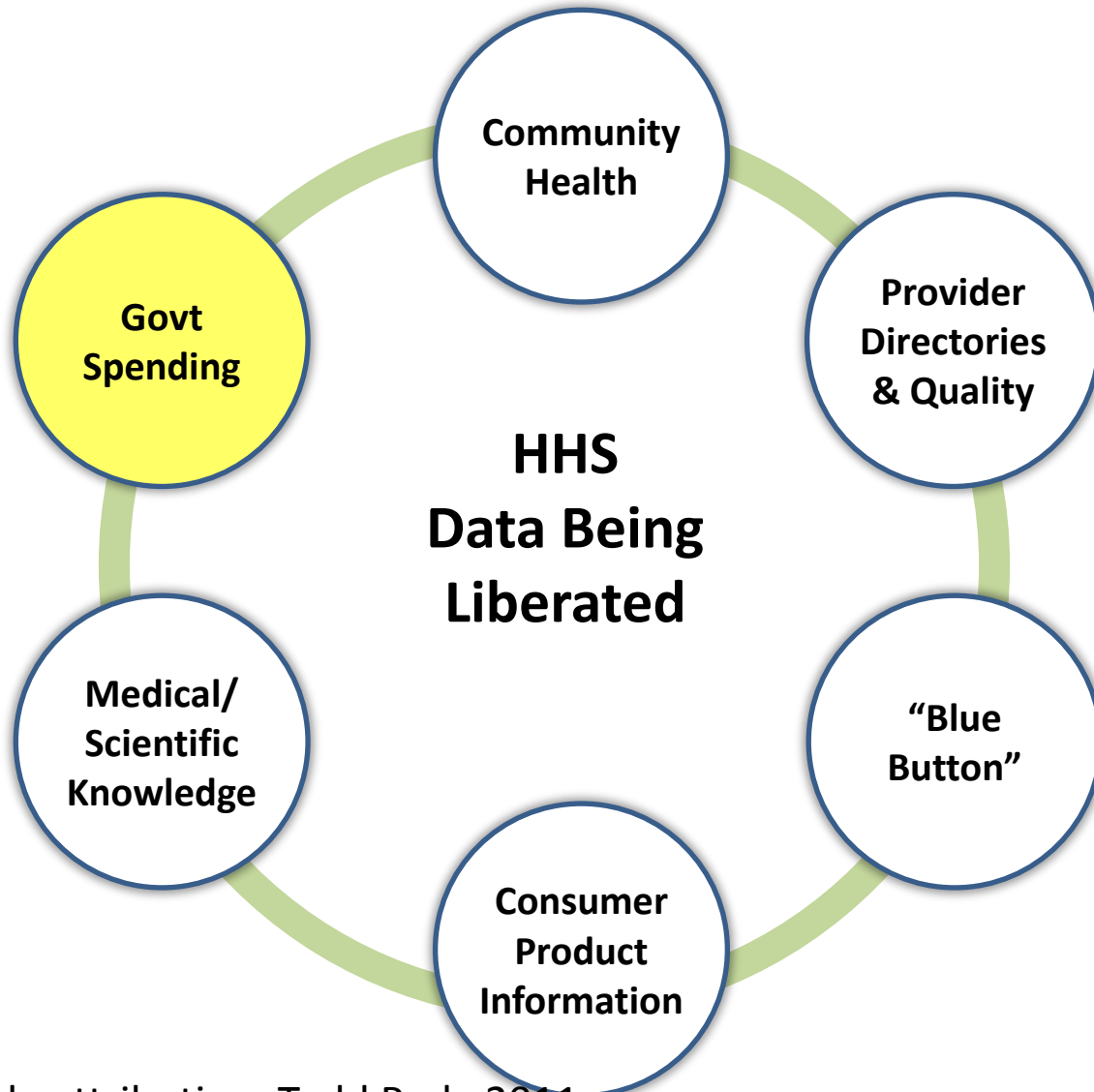
# What kinds of data are we liberating?



## Medical/Scientific Knowledge Examples:

- National Library of Medicine API Portal, deployed 9/2010, including ClinicalTrials.gov and Pillbox APIs
- Medline Plus Connect, launched 11/2010

# What kinds of data are we liberating?



## Govt Spending Data Example:

- Medicare claims "basic standalone files" – first-ever claim-level files ("slimmed" for privacy protection), available for free public download for all major types of care as of 5/2011



# Bringing it all together: Health.Data.gov, the one-stop place to get all of our free, publicly available data (launched 2/2011)

## Welcome to the Health Data Community

You've found a public resource designed to bring together high-value datasets, tools, and applications using data about health and health care to support your need for better knowledge and to help you to solve problems. These datasets and tools have been gathered from agencies across the Federal government with the goal of improving health for all Americans. Check back frequently because the site will be updated as more datasets and tools become available.

[More Information](#)

### Special Features

## Health Data Initiative Forum

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[Data.gov » All Communities](#)

### Recent Blog Post



### What's New



### Challenges



# Publicizing our data to innovators across America

- Challenges and “code-a-thons” (Health2Challenge.org, Challenge.gov)
- Many innovator “meetups” and conferences
- Annual “health datapaloozas”



2011 Health 2.0 DEVELOPER CHALLENGE

[About](#) [Online Challenges](#) [Live Challenges](#) [People](#) [Resources](#) [Sponsor](#) [Partners](#)

## ONLINE CHALLENGES

Healthcare has big challenges. And technology might not solve them all. But we believe in progress one app at a time. Have a technical problem that needs working out? An app you wish existed? Data that's sitting on the shelves getting dusty that could be made more useful? You will be amazed by what's possible. Read the [FAQs here](#).

[Submit a challenge](#) | [Sponsor a challenge](#)

## LIVE CHALLENGES

Want to connect, collaborate and build real-time? That's what the [Code-a-thon](#) is all about. Whether you're a developer, a designer, a researcher, a physician or a patient – your important viewpoint that we'd love to share and be a part of the project. **Check back soon to learn more about our 2011 schedule.**

Want to sponsor a Code-a-thon? [Learn more](#)



Amanda

# The June 9, 2011 Health Data Initiative Forum

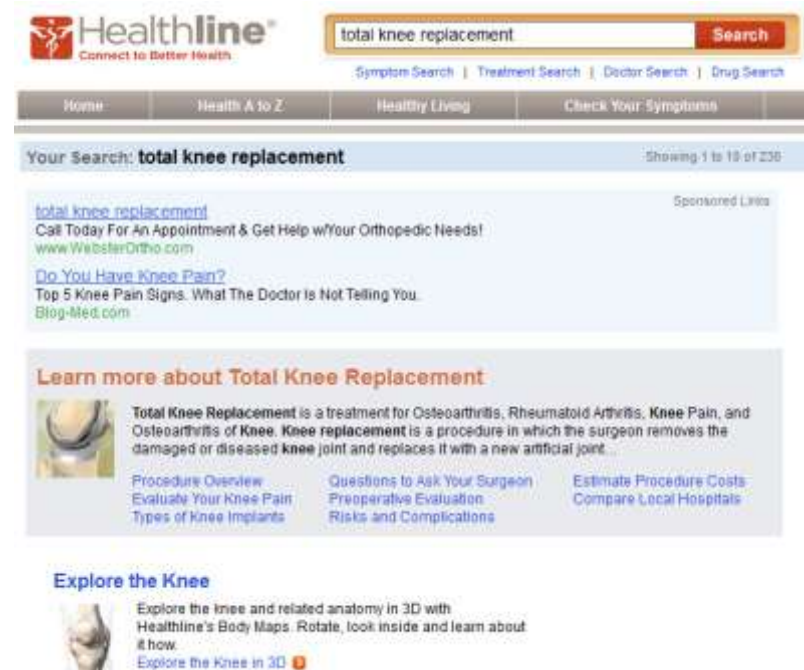
- 2<sup>nd</sup> annual “health datapalooza” -- sponsored by the Institute of Medicine and HHS
- Showcased 50 of the best innovations developed by companies that help consumers, care providers, employers, and communities improve health and health care
- Featured major announcements by nearly 20 additional companies and other organizations





# Examples: helping consumers take control of their health and health care

- iTriage
- Healthline
- Castlight
- Patients Like Me
- Asthmapolis
- Food Oasis



# Examples: helping care providers deliver better care (and succeed as accountable delivery systems)

- Aetna
- Essence Group/Lumeris
- Doximity
- Press Ganey
- Rise Health
- ElizaLIVE



# Examples: helping communities improve health

- Ozioma
- ESRI
- Network of Care for Healthy Communities
- Palantir/CDC





# Selected announcements at the Forum

- **Walgreens 2.0 + challenge**
- **Aetna Foundation challenge**
- **Sanofi Aventis diabetes challenge**
- **NCIIA Nursing Home of the Future “invent-a-thon”**
- **University of Michigan: nation’s first consumer health informatics masters degree program**
- **Startup Health: new health startup “seed accelerator/entrepreneurship academy”**
- **New “Health Data Consortium”**



# Founding members of the Health Data Consortium

- **Academy Health**
- **California HealthCare Foundation**
- **Consumers Union**
- **ESRI**
- **Gallup-Healthways Well-Being Index**
- **Grantmakers in Health**
- **Health 2.0**
- **InnoCentive**
- **Institute of Medicine**
- **Lucile Packard Foundation for Children's Health**
- **Mayo Clinic Center for Innovation**
- **National Association of Counties**
- **O'Reilly Media**
- **Robert Wood Johnson Foundation**
- **U.S. Department of Health and Human Services**



# Key Next Steps for the Health Data Initiative

- **With the support of the new Health Data Consortium, continued campaign to connect innovators to our data**
  - Challenges and “code-a-thons”
  - Innovator “meetups”
  - More roving “health data evangelists”
  - 2012 Health Data Initiative Forum
- **Launch of semi-annual data reviews and brainstorming sessions with each HHS agency**
  - Data access improvements made over the past 6 months and planned over the following 6 months
  - Brainstorming about how we can connect innovators to each agency’s data to help advance their mission
  - Expansion to include “semi-open” data

# NCI's Challenge Team



The Office of the National Coordinator for  
Health Information Technology



**The Kay Center**  
FOR E-HEALTH RESEARCH

**NCI:** Abdul Shaikh, Glen Morgan, Lila Rutten, Paul Courtney, James McClain, Gordon Willis, Bob Wagner, Zaria Tatalovich, Patti Weber, Sana Naveed, Amy Sanders, Heather Edwards, Brad Hesse

**ONC:** Wil Yu, Adam Wong

**CGU:** Tom Horan, Sue Feldman

**U. Hawaii:** Bill Chismar

**RPI:** Deborah McGuinness et al.

**Northwestern:** Noshir Contractor et al.

**Health 2.0:** JL Neptune, Lizzie Dunklee, LeAnna Carey, Indu Subaiya, Matt Holt

# **2011 NCI/ONC Challenge:** *Using Public Data for Cancer Prevention and Control: From Innovation to Impact*

Encourage development of innovative apps that:

1. Use **public data** relevant to cancer
2. Have the potential to integrate with existing **technology platform(s)**
3. Addressing challenges faced by consumers, clinicians, or researchers at one or more points on the **cancer control continuum**

# THE CANCER CONTROL CONTINUUM

## PREVENTION

Tobacco control  
Diet  
Physical activity  
Sun exposure  
Virus exposure  
Alcohol use  
Chemoprevention

## DETECTION

Pap test  
Mammography  
FOBT  
Sigmoidoscopy  
PSA

## FOCUS DIAGNOSIS

Informed  
decision-  
making

## TREATMENT

Health services  
and outcomes  
research

## SURVIVORSHIP

Coping  
Health promotion  
for survivors

Multi-level peer  
support,  
consumers/clinicians,  
information,  
monitoring

Decision support, care  
coordination,  
collaboration

Follow-up and  
decision support, care  
coordination, patient  
engagement

Compliance, care  
coordination,  
collaboration,  
reminder systems

Transition to 1°,  
surveillance, health  
promotion, end-of-life



# Key Dates

**Phase I:** 4 semi-finalists each receive \$10,000 at Health 2.0



**Phase II:**

Final submissions due Nov. 18 2011

**Winners notified:** Nov. 30th 2011

**Awards Presentation:** 2 winners each receive \$20,000 at HICSS Symposium Jan. 4th, 2012

# Judges



Jessie Gruman,  
Center for Advancing  
Health



Mike Gillam,  
Microsoft



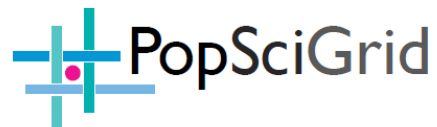
Adam Clark,  
FasterCures



Vic Strecher,  
University of  
Michigan

# NCI Investments in HIT, Innovation, and Population Science

- **Journals & Knowledge Products** (AJPM, TBM)
- **PopSciGrid Community Health Data Portal** (proof of concept for data harmonization and visualization)
- **GEM & HINTS-GEM** (Grid-Enabled Measures Platform)
- **Informatics for Consumer Health**
- **CECCRs** (e.g., RCT for web-tailored smoking cessation; EMR promotes screening adherence)
- **Funding Opportunities**



# Recent NCI Knowledge Products: Cyberinfrastructure, data liquidity & systems science



Shaikh, A.R., Prabhu Das, I., Vinson, C., Spring, B. (eds.).

**Cyberinfrastructure for Consumer Health.** American Journal of Preventive Medicine, 2011: 40(5).

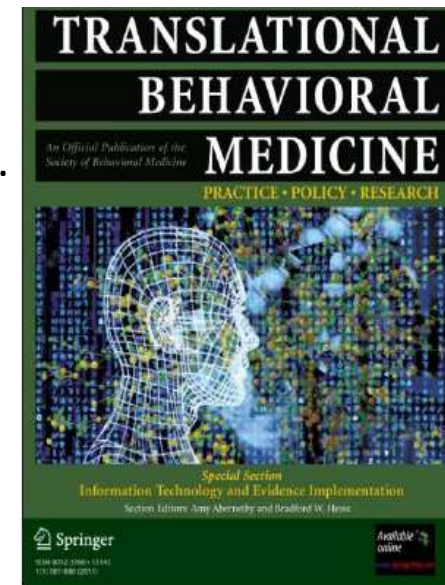
*Making Sense of the Data Explosion: The Promise of Systems Science (Mabry)*

*Infodemiology and Infoveillance: Tracking Online Health Information and Cyberbehavior for Public Health (Eysenbach)*

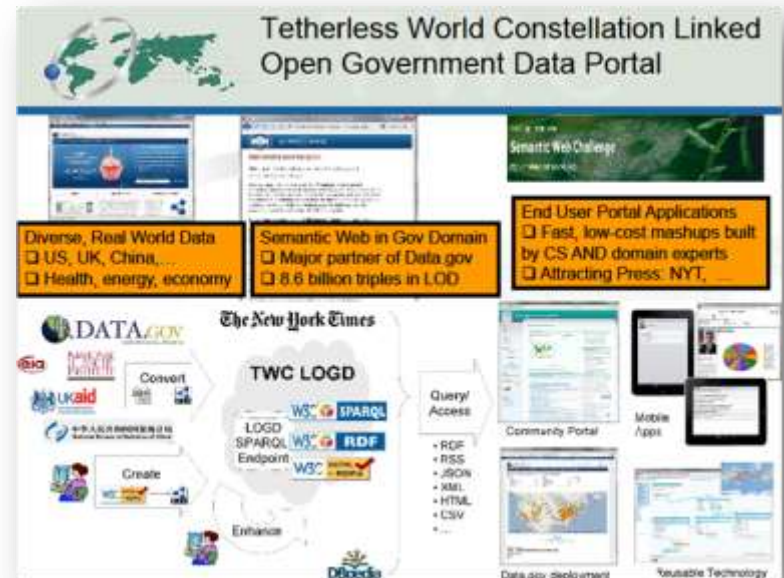
Abernethy, A., Hesse, B., Spring, B (eds.). **Information Technology and Evidence Implementation.** Translational Behavioral Medicine, 2011: 1(1).

Supporting implementation of evidence-based behavioral interventions: the role of data liquidity in facilitating translational behavioral medicine (*Abernethy et al.*)

CYberinfrastructure for COmparative effectiveness REsearch (CYCORE): improving data from cancer clinical trials (*Patrick et al.*)



# PopSciGrid Community Health Data Portal: A proof of concept & exploratory tool



<http://logd.tw.rpi.edu/project/popscigrd>

<http://cancercontrol.cancer.gov/hcirb/cyberinfrastructure/popsci.html>

**Smoking prevalence:** Percentage US adults who currently smoke (BRFSS 1991-2007) \*\*

**Smoke free bars (%):** Percentage of population affected by the smoke-free policy for bars \*

**Smoke free workplace (%):** Percentage of population affected by the smoke-free policy for workplaces \*

**Smoke free restaurant (%):** Percent of population affected by the smoke-free policy for restaurants \*

**Price per pack in dollars (\$):** Average price per pack of cigarettes adjusted for inflation (1991 dollars) \*\*

**Tax per pack in dollars (\$):** State excise tax per pack of cigarettes adjusted for inflation (1991 dollars) \*\*

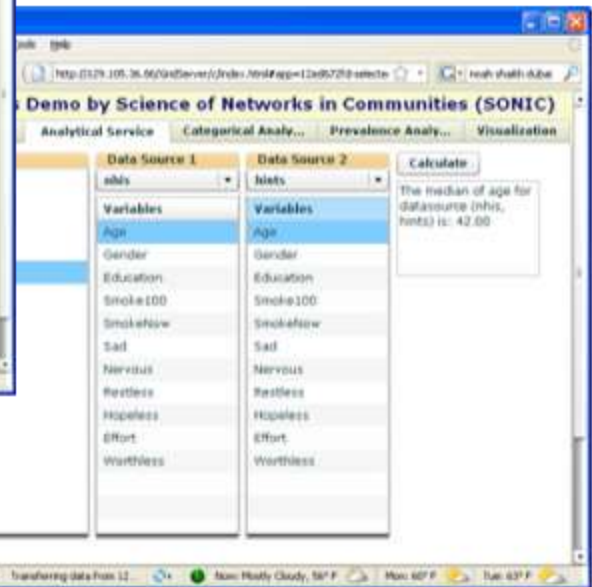
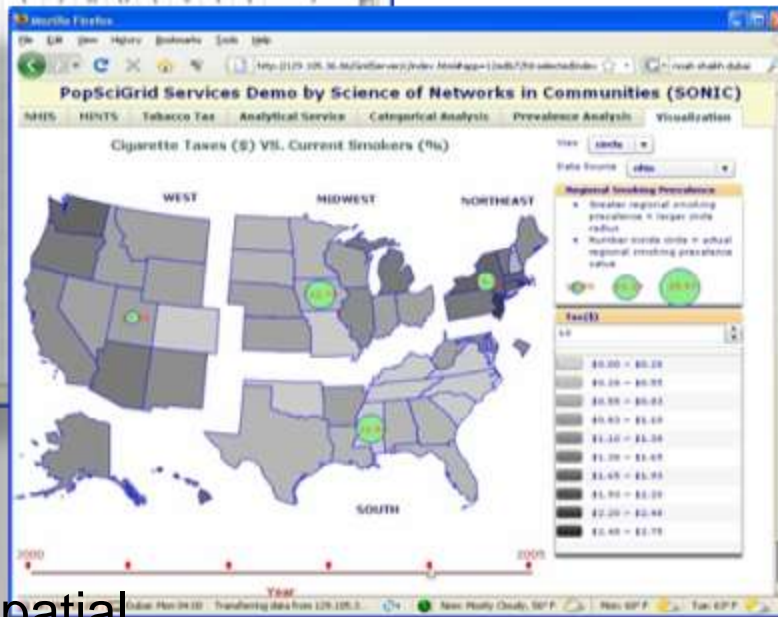
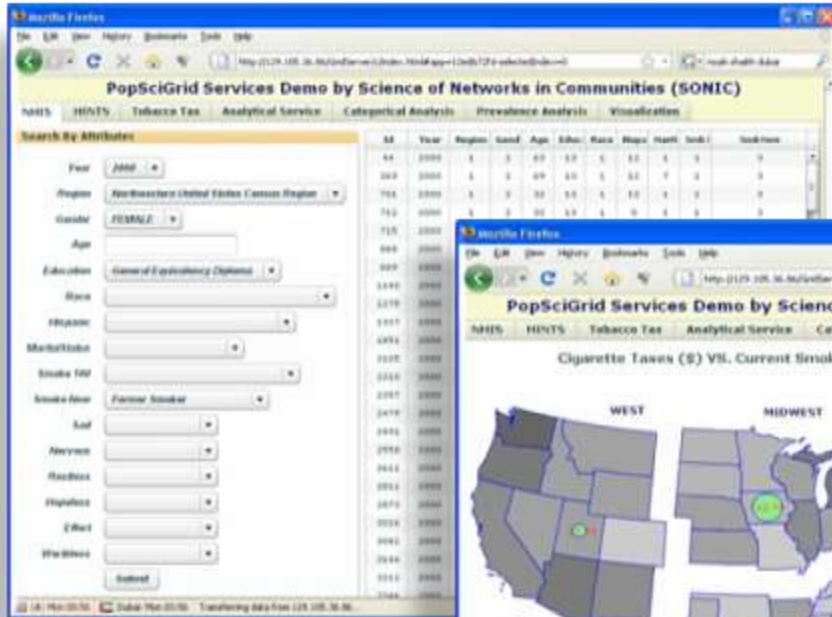
\* Tatalovich, Mariotto, Hunt, Howlader, Marcus & Stinchcomb. "Reconstructing the spatio-temporal patterns of tobacco policy coverage in the United States" (forthcoming)

\*\* <http://www.impacteen.org/tobaccodata.htm>



# PopSciGrid Original Proof of Concept

- 14 datasets spanning 6 years
- Real-time access/analysis of public health and economic data

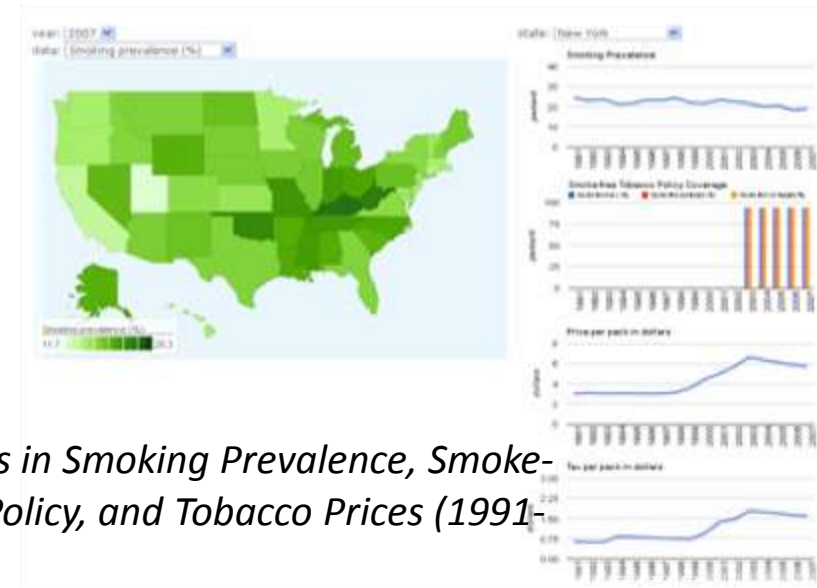


- Prospective geo-spatial analytics
- Dr. Noshir Contractor and SONIC Lab

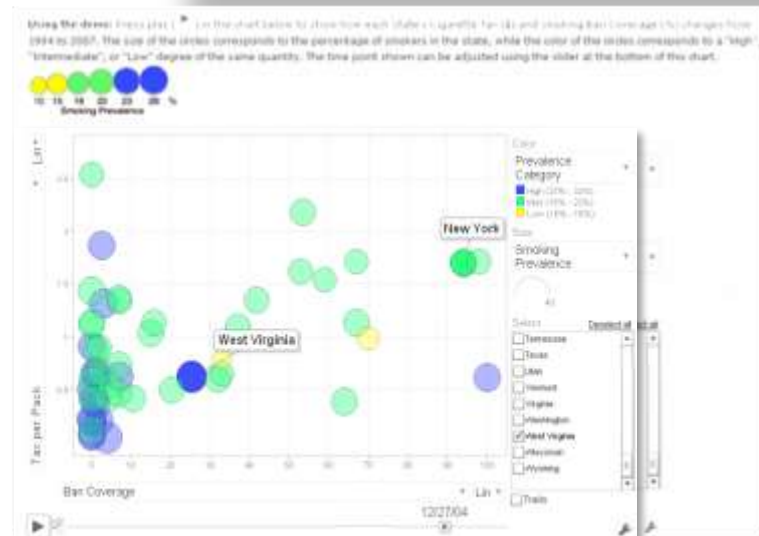
Shaikh AR, Contractor N, Moser R, et al.. PopSciGrid: Using cyberinfrastructure to enable data harmonization, collaboration, and advanced computation of nationally representative data. American Public Health Association Annual Meeting; November 11, 2009; Philadelphia, PA.

# NCI's PopSciGrid Community Health Data Portal – An Exploratory Tool

- Builds on the original PopSciGrid proof of concept (2007) for data sharing, collaboration, communication.
- Exploratory tool for:
  - **Health science:** communicating health info online, policies (taxation, smoking bans, etc) impacting health; visualizing complex data; support cancer prevention and control
  - **Computer science:** use semantic technologies, tools to enable developers/public to build demos and interpret data, facilitate collaboration and make applications 'go viral.'



*Trends in Smoking Prevalence, Smoke-Free Policy, and Tobacco Prices (1991-2007)*



# GEM Grid Enabled Measures Database

**[www.gem-beta.org](http://www.gem-beta.org)** - A grid-enabled, interoperable, dynamic website for behavioral and social science theoretical constructs and measures



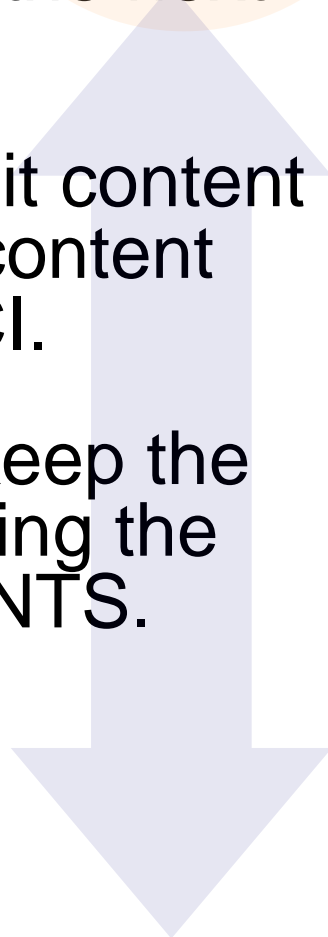
The screenshot displays the GEM Grid-Enabled Measures Database interface. The top navigation bar includes links for Constructs, Measures, Datasets, News, and About GEM. Below this, a secondary navigation bar offers options like General Information, Author Information, History, References & Publications, Other Details, and Upload File. A yellow highlighted section prompts users to provide general information about the measure being submitted, with fields for Measure Name, Measure Type, Construct, and Research Areas(s). The main content area shows a table of constructs, with a yellow highlight on the 'Add New Construct or Definition' button. The table lists constructs such as Nicotine Dependence, Self-efficacy, and Smoking Behavior, along with their definitions, theoretical foundations, and synonyms.

Construct	Definition	Theoretical Foundation	Construct Synonyms
<a href="#">Nicotine Dependence</a>	pending		Synonym 1
<a href="#">Self-efficacy</a>	Self-efficacy pertains to a sense of control over one's environment and behavior. Self-efficacy beliefs are cognitions that determine whether health ...	Theoretical Foundation 1	Synonym 2
<a href="#">Self-efficacy</a>	Intention is the most proximal predictor of behavior. Cognitions that affect a specific intention are attitudes, subjective norms, and perceived behavioral control ...	Theoretical Foundation 2	Synonym 3
<a href="#">Smoking Behavior</a>	pending		Synonym 4

Page 1 2 3

## HINTS-GEM

Engage the public in content generation for the next iteration of HINTS.

- Participants have the opportunity to submit content for consideration, rate, and comment on content proposed by other participants and by NCI.
  - HINTS-GEM also serves as a vehicle to keep the public updated on the survey process during the modular roll-out of the next iteration of HINTS.
- 
- A large, light blue arrow pointing downwards, spanning the right side of the slide.

# HINTS-GEM: Using Science 2.0 for Public Solicitation/Vetting of Survey Items

The image displays three overlapping screenshots of the HINTS-GEM web application, illustrating the process of public solicitation and vetting of survey items.

**Top Screenshot (HINTS-GEM Phase I):** This view shows the 'Construct' tab. It features a list of constructs on the left, including 'Access to Internet', 'Ambiguity', 'Awareness of medical tests', 'Beliefs about cancer', 'Beliefs about smoking risks', 'Breast cancer knowledge', 'Breast cancer screening behavior', 'Cancer history/cancer experiences', 'Cancer information seeking', 'Cancer knowledge', 'Cancer survivorship', 'Cancer worry', 'Cervical cancer knowledge', 'Cervical cancer vaccine', and 'Cervical and cancer screening behavior'. The main area is titled 'HINTS-GEM Phase I: Add new constructs and items for consideration'.

**Middle Screenshot (HINTS-GEM Phase II):** This view shows the 'Item' tab. It displays 'Item Details' for a specific item, including 'Item Wording', 'Construct(s)', 'Response Options', 'Source', 'Used in large-scale survey?', 'Target population', and 'Asked in previous HINTS? (year)'. Below this is a 'Comments' section with a text area for user feedback.

**Bottom Screenshot (HINTS-GEM Phase III):** This view shows the 'Item' tab with a 'Comments & Ratings' modal window open. The modal asks, 'How much would you like to see this item on HINTS?' and shows a rating of 90%. The modal includes 'Save' and 'Cancel' buttons.



# Informatics for Consumer Health

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**InformaticsForConsumerHealth.org** is a federally supported initiative that:

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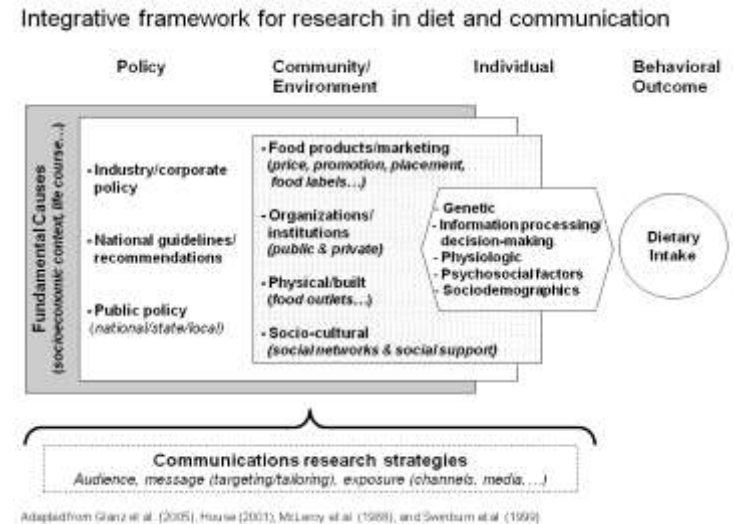




# Previous NIH FOAs

PA-08-239: Impact of Health Communication Strategies on Dietary Behaviors (R01, R21)

NCI Program Contact: Tanya Agurs-Collins  
([collinsta@mail.nih.gov](mailto:collinsta@mail.nih.gov))



NIH Challenge Grant 10-CA-101:  
Cyberinfrastructure for Health: Building  
Technologies to Support Data Coordination  
and Computational Thinking

SBIR FY2010 Topic: Data Harmonization  
and Advanced Computation of  
Population Health Data



# Current NIH FOAs

## **PAR 10-145: Social Network Analysis and Health (R01)**

*e.g., theories, interactions & processes, health behaviors, methodologies & technologies*

## **PA-11-238: Spatial Uncertainty: Data, Modeling, & Communication (R01, R21, R03)**

*e.g., development of visualization techniques that communicate about uncertainty in people's environmental exposure patterns and association b/t disease and environmental exposure*

## **PA-11-063: Translating Basic Behavioral and Social Science Discoveries (R01)**

*e.g., network analyses, systems dynamics approaches for systems-level interventions for healthy behaviors (how/when/where interventions should target systems for benefit)*

*Also see Patty Mabry's resource list (NIH OBSSR):*

[http://obssr.od.nih.gov/scientific\\_areas/methodology/systems\\_science/Funding\\_opportunity\\_Announcements\\_in\\_systems\\_science\\_August\\_2011.pdf](http://obssr.od.nih.gov/scientific_areas/methodology/systems_science/Funding_opportunity_Announcements_in_systems_science_August_2011.pdf)

# Strategic Research Questions

- ☑ What are the social psychological principles that will best guide development of “*technology-mediated social participation (TMSP)*” systems in cancer control?  
[source: Kraut R, Maher ML, Olson J, Malone TW, Pirolli P, Thomas JC. Scientific Foundations: A Case for Technology Mediated Social Participation Theory. *IEEE Computer*. 2010;43(11):22-28.]
- ☑ What are the innovations in *information visualization* needed to communicate data effectively to practitioners and patients in high throughput data environments?  
[source: Nelson DE, Hesse BW, Croyle RT. *Making Data Talk: Communicating Health Data to the Public, Policy, and the Press*. New York, NY: Oxford; 2009 (see Chapter 8)]
- ☑ How can the “always-on, always proximal” interfaces of mobile devices be used to engage individuals: (a) in healthy behaviors and (b) in participatory science?  
[source: Fox S. Cancer 2.0: A Summary of Recent Research. Washington, DC: Pew Research Center; 2010. *Report presented to the President’s Cancer Panel, December 14, 2010*].

# Looking Ahead in Open Innovation and Data

- Continue building ecology of developers, entrepreneurs, scientists with public-private partnerships (e.g., Health Data Consortium, HICSS, challenges)
- Work with NCI SBIR Development Center to fund innovative, evidence-based apps
  - Commercializing HIT for consumer and clinical health outcomes; potential Phase II fast track; encourage small and large business collaboration;
- Expand NIH Crowdsourcing and Open Innovation efforts (e.g., July 18<sup>th</sup> mtg with Tim O'Reilly, Karim Lakhani,...)
  - HHS.gov challenge platform:  
<http://www.hhs.gov/open/initiatives/challenges/index.html>
- Inter-agency and public-private collaborations.
  - US Ignite - White House OSTP and NSF next-generation, gigabit/advanced technology network applications
  - 2013: NIH-NSF joint solicitation for Big Data and Health
  - Encouraging multi-disciplinary applicants to apply for NIH/NCI funding



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