

GeoHealth – Toward an Integrated Community, Provider, and Insurer Perspective

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Topics



Health Geoinformatics Overview and Model

GeoHealth for Community, Insurer, and Provider

GeoHealth Integration and Directions

Example: Doctor Hotspot



<http://video.pbs.org/video/2070853636/>

A Conceptual Model for Health Geoinformatics

GIS has the capability to inform health through:

- Informing and educating professionals and the community
- Empowering decision making
- Planning for clinical cost effective decisions
- Prediction of health outcomes
- Determining priorities with limited resources
- Changing health and management practice
- Monitoring and analyzing changes

(Boulos, 2004, *International Journal of Health Geographics*)

GeoHealth Applications Platform

Mission:

Create a GeoHealth Applications Platform that utilizes real-time, spatially-enabled, health information to:

- Influence strategic resource healthcare planning,
- Support high-quality healthcare delivery, and
- Meet the healthcare needs of a diverse population

GeoHealth Applications Platform

Goals:

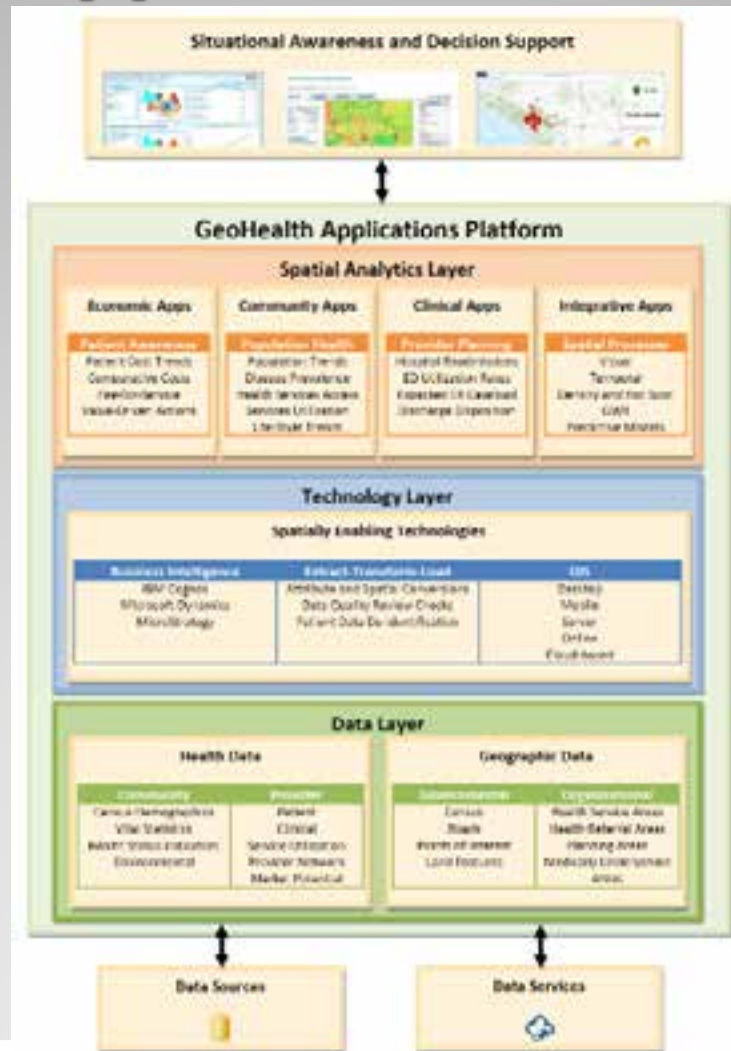
- Spatially identify regional health trends
- Identify spatially differentiated approaches to community based interventions in an effort to reduce unnecessary emergency room visits and readmissions
- Support health system and public health decision makers by integrating spatially-enabled community health information with clinical care information

GeoHealth Applications Platform

Drivers:

- Healthcare Reform (e.g., Affordable Care Act) emphasizing health services and community health connections (e.g., ACOs, Readmission Reimbursement Changes)
- Rise of holistic-health concepts, linking environmental, lifestyle, and health services approaches
- Movement toward data-driven, evidence-based approaches to public health and health services

GeoHealth Applications Platform



Conducting Health Geoinformatics

Advanced GIS Lab

The A-GIS Lab conducts Geographic Information Systems related research on Public & Environmental Health Issues, Transportation Safety & Humanitarian Disaster Response and Relief.



CISAT Academic Programs



Advanced GIS Lab

Lab Research Methodology

- Design Science research orientation

Lab Research Focus Areas

- Public and Health Services
- Environmental Health Issues
- Humanitarian Disaster Response and Relief
- Transportation Safety



Lab Innovative Solutions

- SafeRoadMaps and CrashHelp
- Community Health Management Systems
- Community Livability and Social Capital Tracking

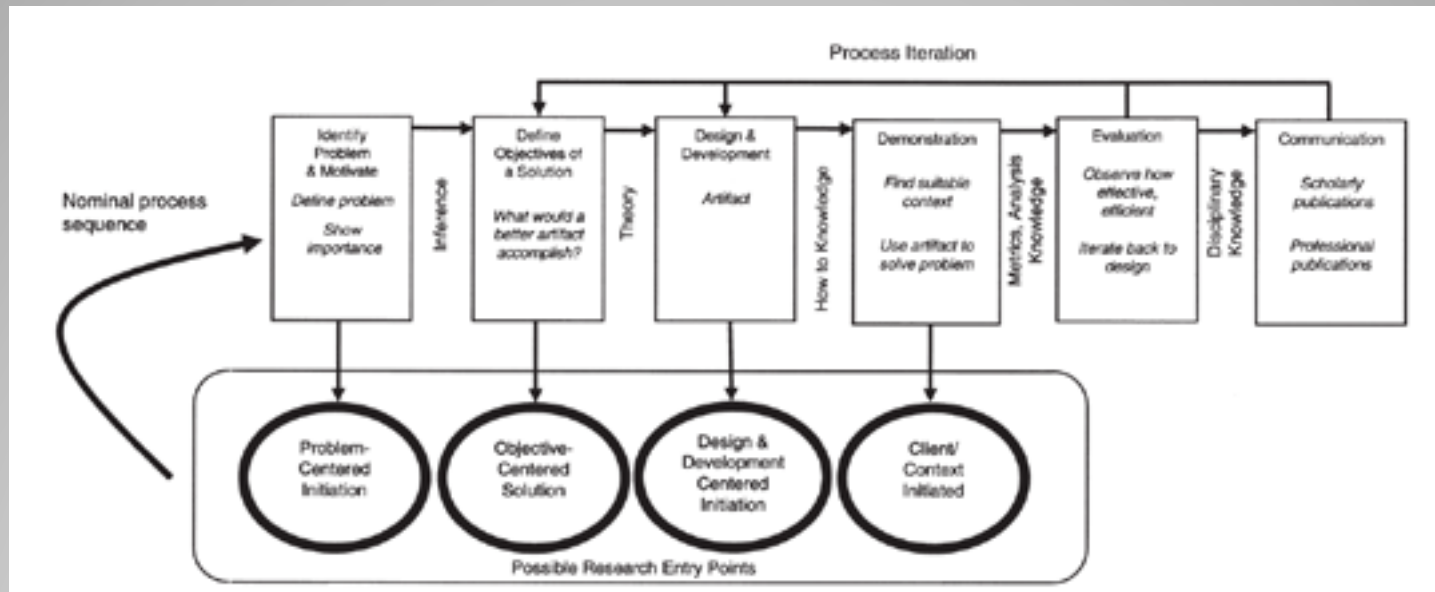
Esri Partnership and Esri Development Center (EDC)



The ESRI Development Center (EDC) confers special recognition to university departments with exemplary programs focused on educating students in the design and development of GIS applications using ESRI's geospatial technologies.

The Center for Information Systems and Technology (CISAT) is home to an inaugural EDC. This unique resource for Claremont Graduate University provides students and faculty with the capabilities to teach and develop state-of-the-art applications in the Advanced GIS Lab, provides ESRI training focused on GIS and related technologies, and honors students through an annual achievement award.

Design Science Research Methodology



Design Science is an outcome based information technology research methodology, which offers specific guidelines for evaluation and iteration within research projects.

Design science research requires the creation of an innovative, purposeful artifact for a special problem domain.

Design Science Research Methodology

Lab Research and Development Methodology

The artifact must be evaluated in order to ensure its utility for the specified problem. In order to form a novel research contribution, the artifact must either solve a problem that has not yet been solved, or provide a more effective solution.

Both the construction and evaluation of the artifact must be done rigorously, and the results of the research must be accepted from both presented effectively both to technology-oriented and management-oriented audiences.

Sample Student Projects

- Spatial Applications in Health Services
- Spatial De-identification and EMS Response
- Personal Safety Algorithm and Application
- Tobacco Marketing and Teenage Smoking



Evolution of Healthcare

Fee-for-service model

- Reimbursement for services rendered on the basis on quantity

Value Based Purchasing / Accountable Care

- A shift toward quality - measured by patient outcomes and health

Rooted in government policy

- Deficit Reduction Act of 2005 and Accountable Care Act

GIS as a Business Intelligence Tool

Gartner: 8 essential components of BI

- Reporting
- Dashboards
- Ad hoc query
- Search-based
 - OLAP
- Interactive visualization
 - Scorecards
- Predictive modeling
 - Data mining

GIS is similar in that it:

- Provides highly robust capabilities in most of these areas, and extends visualization and predictive modeling beyond traditional BI systems
- Allows for the leveraging of the spatial component of data, which is not a native component of traditional BI systems
- Maps and other visualization can help tell a story that is otherwise difficult to realize in traditional scorecards, charts, tables, etc.

GIS and Healthcare

Healthcare organizations possess a vast amount of data about their customers, the community, and their own operations

Traditional healthcare IT systems largely underutilize or completely ignore the spatial component

GIS has been used in healthcare settings, but not at the provider or insurer level to inform decision making

The spatial component of healthcare data

Patient home addresses

Patient work addresses

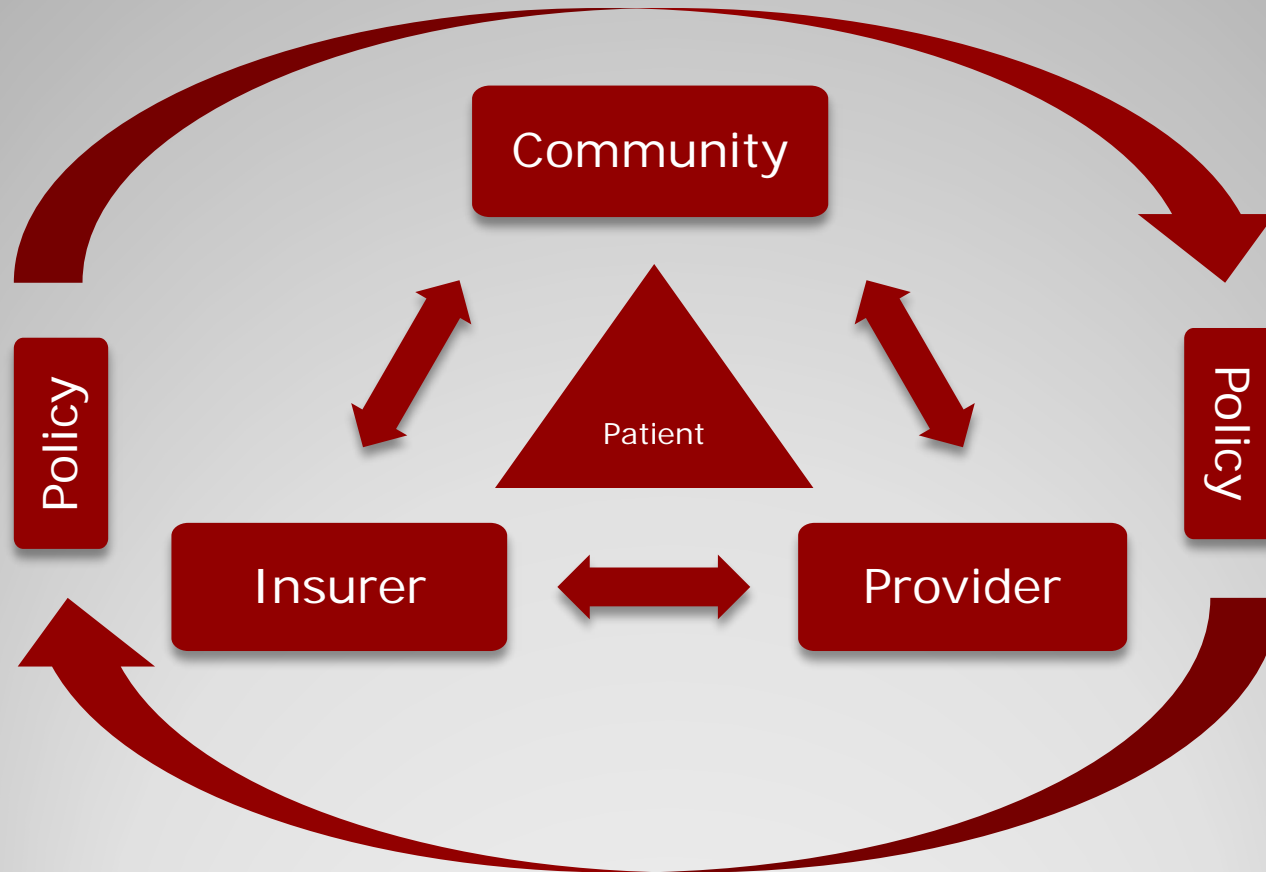
Healthcare facility locations

Information on local resources

Community health data

Demographic and environmental data

Dimensions of Healthcare



Research Questions

How can spatially enabled data inform healthcare decision making at the community and clinical service delivery level?

What current healthcare business imperatives could benefit from a spatial perspective?

What are the range of organizational decisions that might be affected by introducing GIS-based IT artifacts?

Methodology

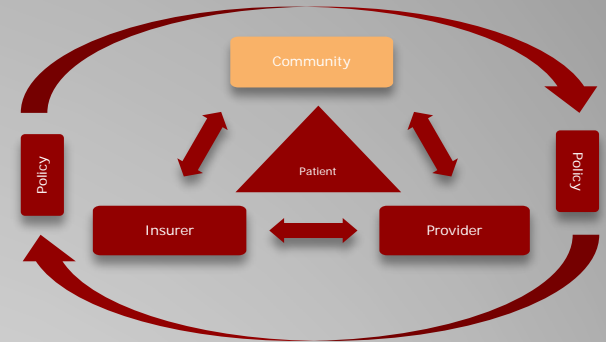
Action Design Research

Model specific business processes that have an impact on decision making

Use the identified processes and spatial data to build IT artifacts which showcase how geospatial technology can improve decision making

Extract, from those processes, datasets that have a spatial component

Economic Analysis



THE DARTMOUTH ATLAS OF HEALTH CARE

DATA BY REGION | DATA BY HOSPITAL | DATA BY TOPIC | TOOLS | KEY ISSUES | PUBLICATIONS | PRESS ROOM

Home Page | Data by Region | San Bernardino, CA (2010)

SAN BERNARDINO, CA (2010)

BASIC INFORMATION | MEDICARE SPENDING | HOSPITAL DISCHARGES | END-OF-LIFE CARE

Use the "Start a New Report" module on the right to look at additional measures for this hospital referral region.

START A NEW REPORT

TOPIC: [Select a Topic...]

INDICATOR: [Select an Indicator...]

VIEW ALL TOPICS [Submit]

STAY INFORMED

Enter email address to learn about site updates and news.

Your Email Address: []

[Join Notification List]

Map: ZIP codes within this region

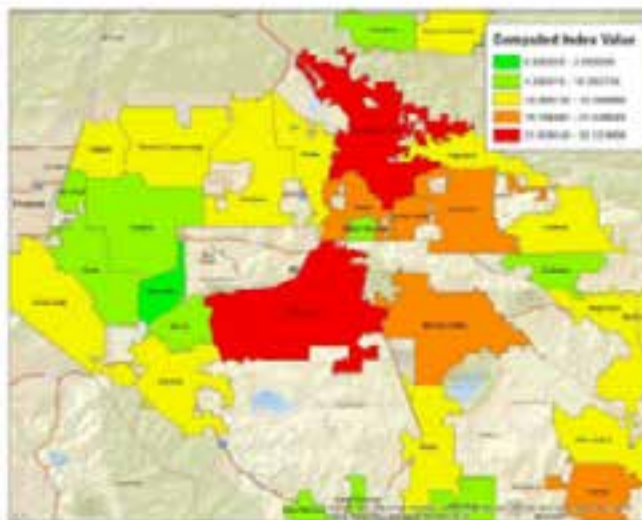
San Bernardino, CA

Community Analysis

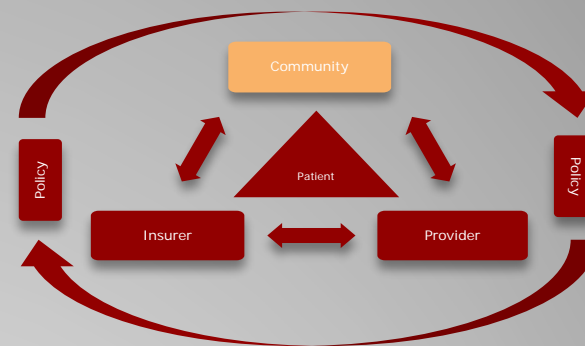
Global Health Needs

Areas of Greatest Need

San Bernardino City Riverside City

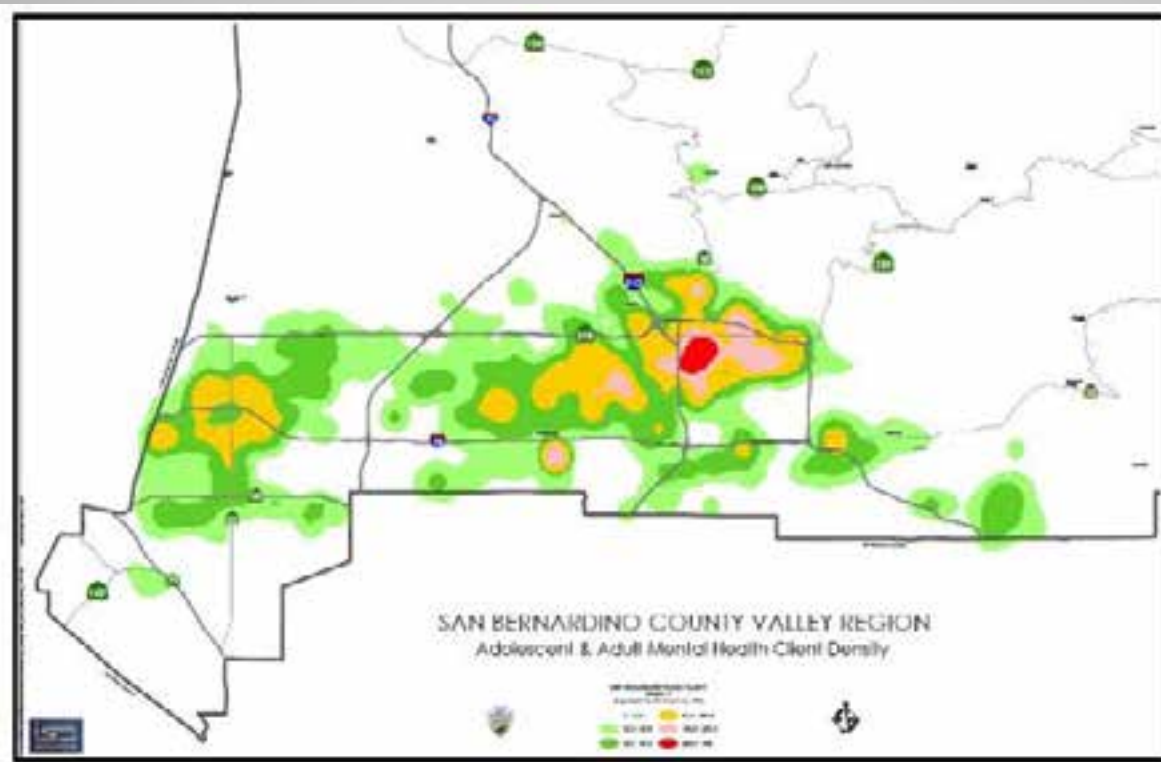
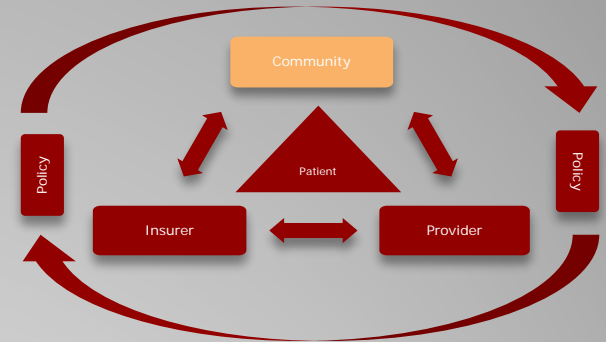


2013 COMMUNITY HEALTH NEEDS ASSESSMENT 102

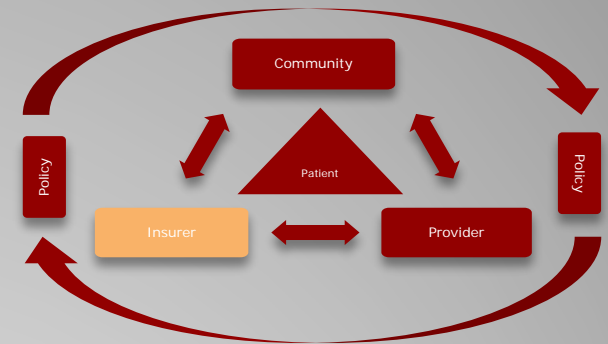


Community Analysis

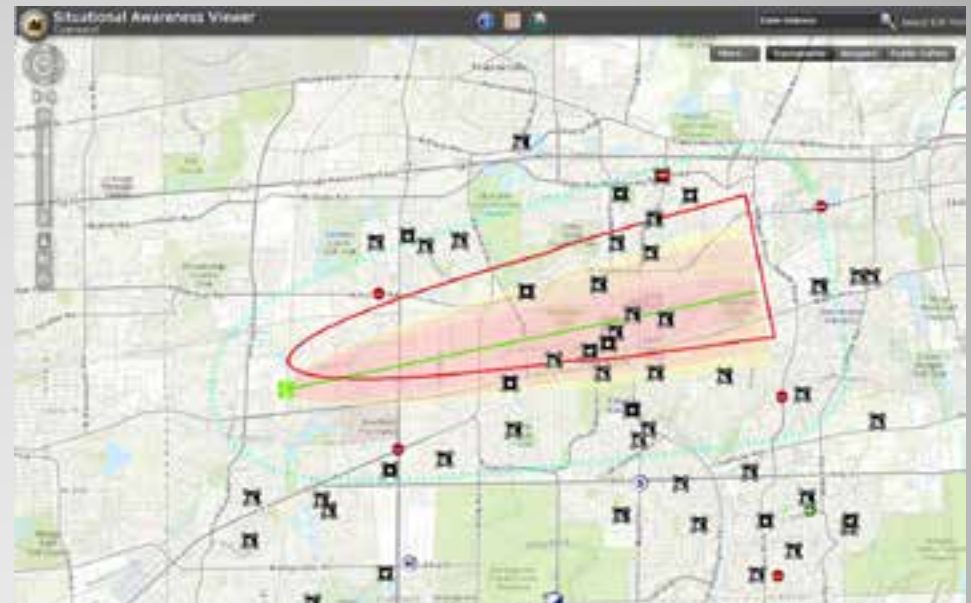
Community Service Needs



Insurer Compliance



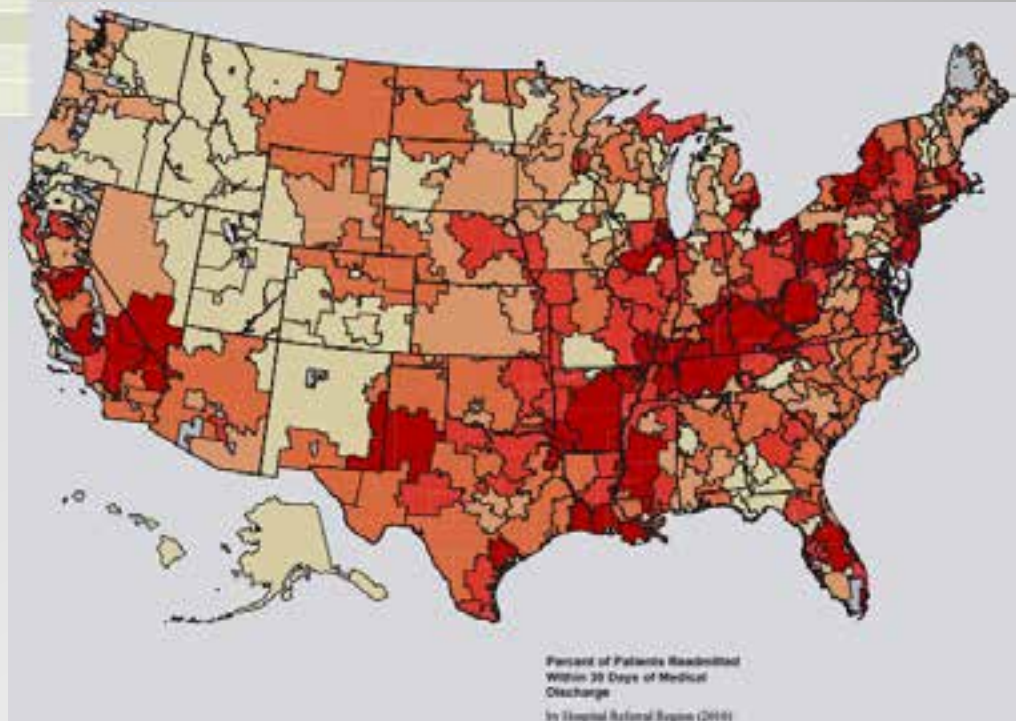
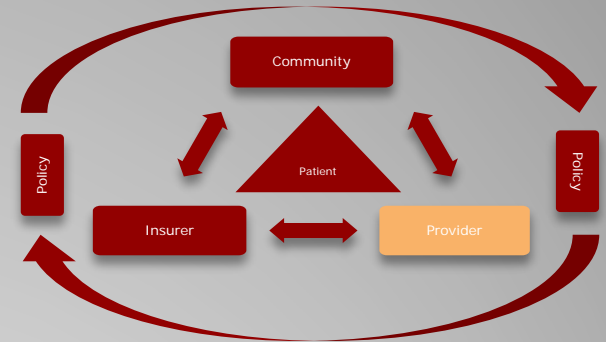
- Application to show locations of providers
 - Primary Care Physicians
 - Specialists
- Ensure compliance with requirements
 - Physician to patient ratios
 - Access within geographic regions
- Will for proactive planning
 - Where providers are needed
 - Which at-risk patients have low access



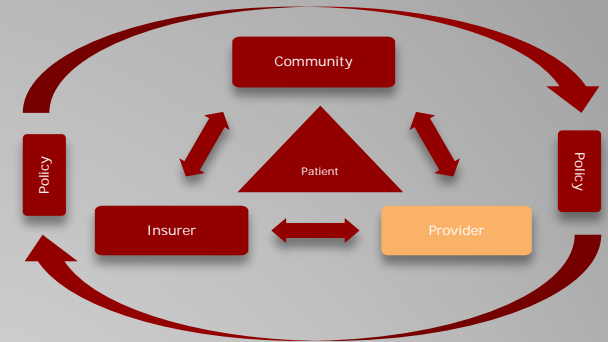
Clinical Analysis

Table 3. Change in 30-day readmission rates following discharge for five causes of hospitalization, 2008 to 2010

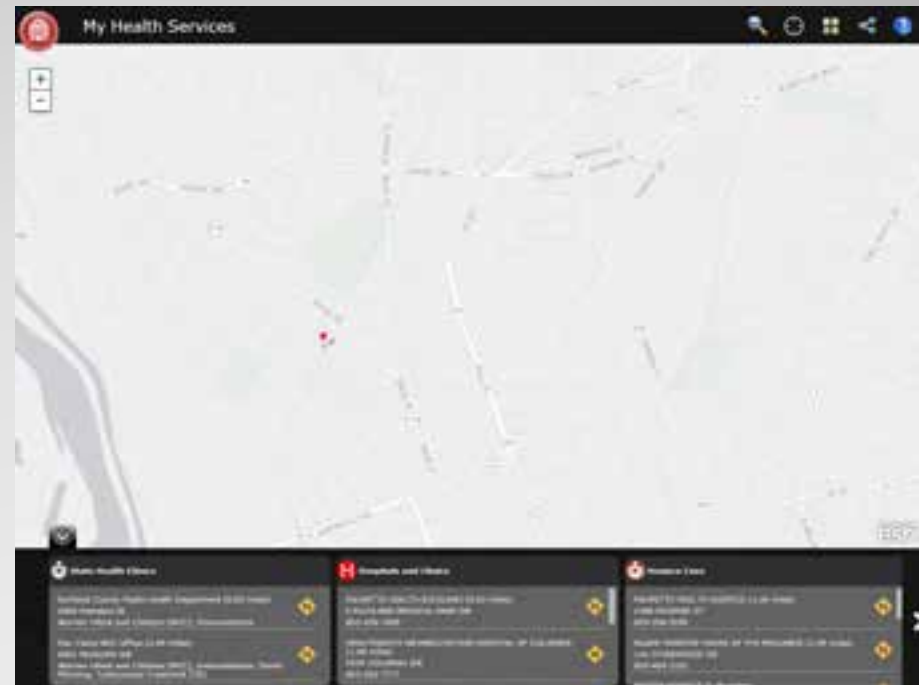
Condition	% Readmission		Relative change (%)	Absolute change (%)
	2008	2010		
Medical	16.2	15.9	-1.7	< 0.5
CHF	21.4	21.1	-1.4	< 0.5
AMI	18.7	18.1	-3.2	< 0.5
Pneumonia	15.3	15.3	< 0.5	< 0.5
Surgical	12.7	12.4	-3.0	< 0.5



Local Resource Map

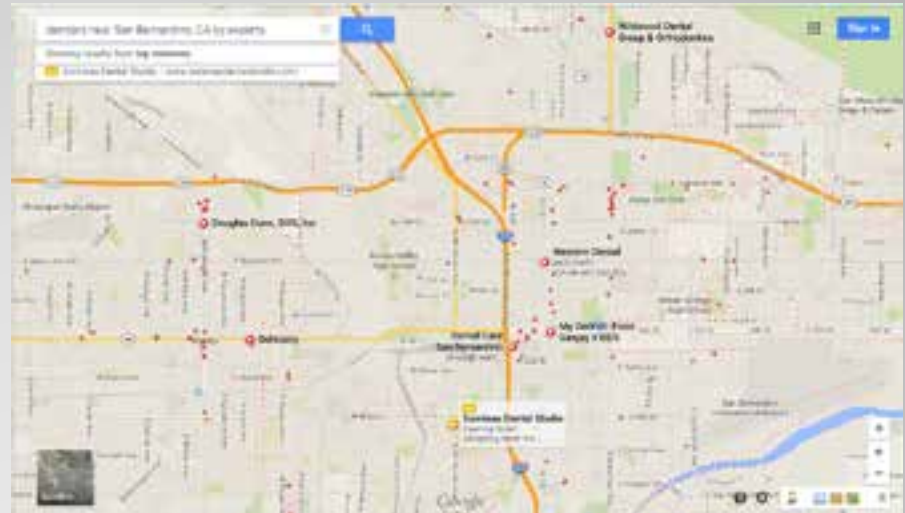
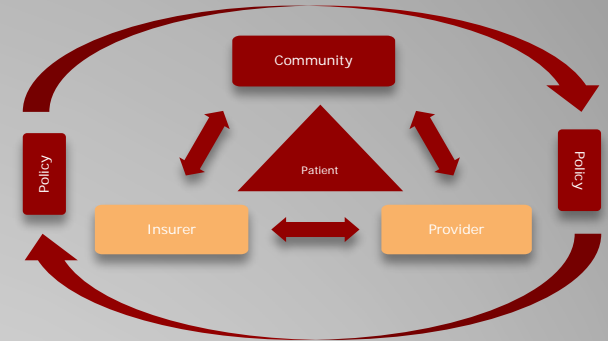


- Local resource identification
 - Doctor's offices
 - Pharmacies
 - Shelter
 - Food
 - Transportation
- Key factor in reducing readmissions, and directing patients to appropriate resources at discharge

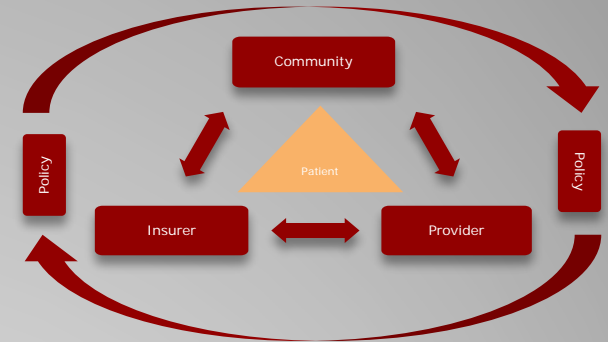


Provider Quality

- Ability to visualize providers in various ways
 - By type
 - By geographic area
- Symbolize or filter by quality metrics
 - Cost
 - Patient visit rates
 - Childhood immunization rates
- Better oversight and accountability
 - Between providers serving similar populations
 - Leads to long term health improvements



Patient



- Transportation Planning
- High value consideration for low income individuals without personal transportation
- A number of different applications
 - Assignment of PCPs
 - Access to local resources
 - Doctor visit compliance



GeoHealth Directions

–COMMUNITY

Homeless Population Tracking
Asthma Risk Map

–INSURER

Member Historical Utilization Tracking
Pharmacy Over-Utilization
Market Penetration and Outreach

–PROVIDER

Geo-enabled Discharge Instructions
Route Optimization for At-Home Services

–INTERGRATION/PATIENT

Community Resource Map
Community Health Intervention



CISAT

CENTER FOR INFORMATION SYSTEMS AND TECHNOLOGY

For More Information



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Questions and Discussion