Fall 2013   HDMA Lightning Talks (Oct. 30, 2013)

Human Dynamics

Spatial Science

Mobile Technology
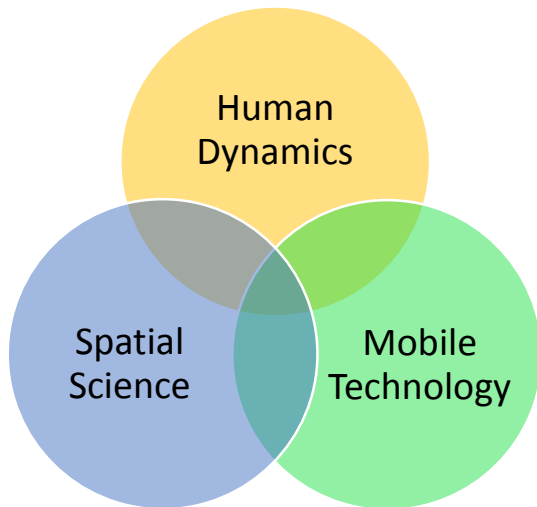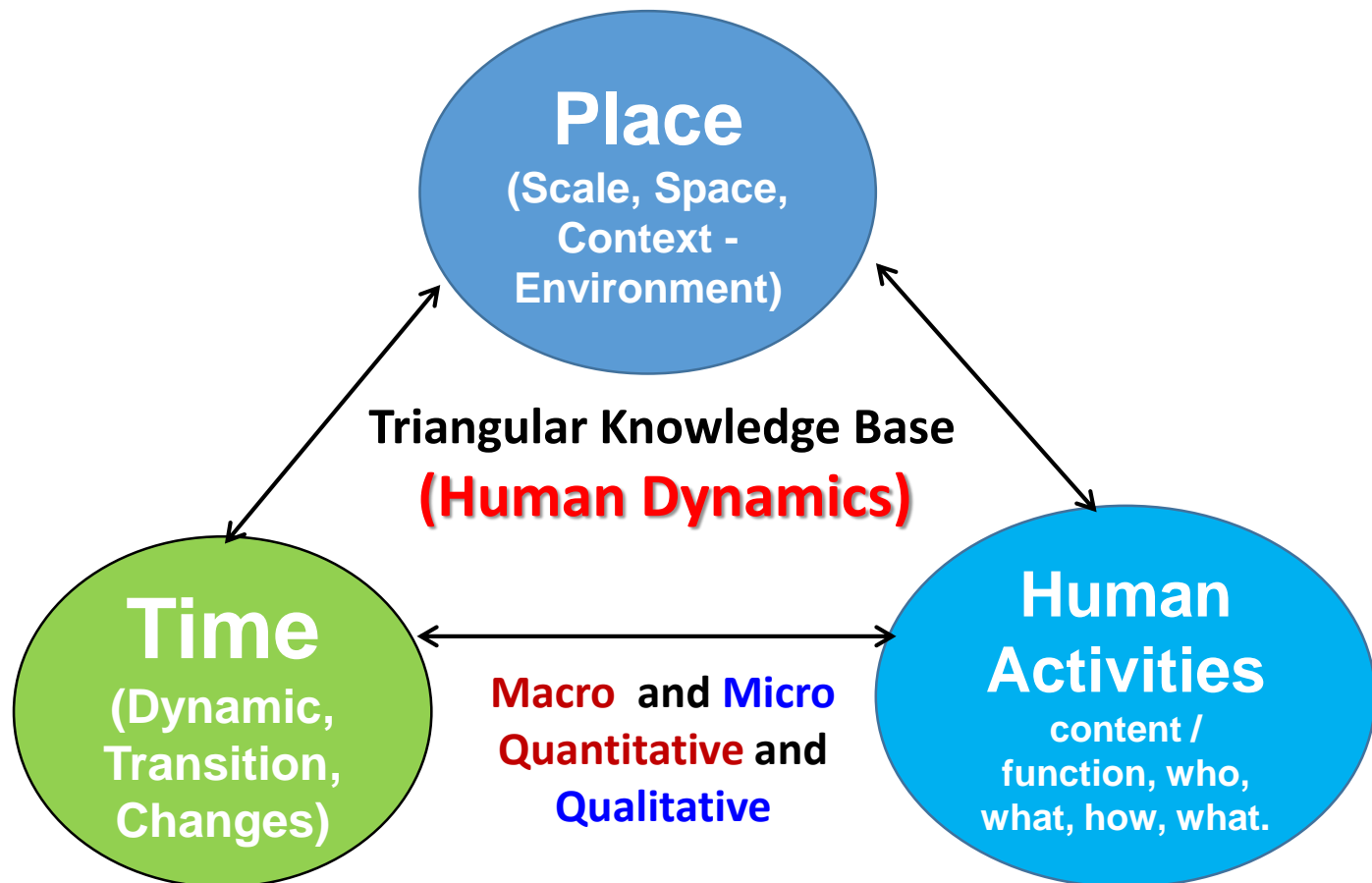
1. **Dr. Ming-Hsiang Tsou (Geography): The vision of Human Dynamics in the Mobile Age (HDMA)** *and NIH Big Data Center proposal Plan.*

2. **Dr. Sheldon Zhang (Sociology):** *Using geomapping to establish a sampling frame for studying farmworkers in North Carolina.*

3. **Dr. Piotr Jankowski (Geography):** *Thematic Patterns in Georeferenced Tweets through Space-Time Visual Analytics.*

4. **Dr. Brian Spitzberg (Communication):** *An Integrative Conceptual Model for Predicting Idea Diffusion.*

Core Faculty:
- **Ming-Hsiang Tsou** (Coordinator of HDMA, Professor of Geography)
- **Sheldon Zhang** (The Past Chair of Sociology, Professor)
- **John Elder** (Distinguished Professor of Public Health, Founding Director of IBACH)
- **Piotr Jankowski** (The Chair of Geography)
- **Brian Spitzberg** (Senate Distinguished Professor, School of Communication), along with other **32** funding faculty members from **14** different departments in **5** colleges.

The Uniqueness of Human Dynamics

Human Dynamics is a **transdisciplinary research** field focusing on the understanding of dynamic patterns, relationships, narratives, changes, and transitions of **human activities, behaviors, and communications.** **(A preliminary definition by the HDMA Five Core Faculty, 2013).**

Place
(Scale, Space, Context - Environment)

Triangular Knowledge Base
(Human Dynamics)

Time
(Dynamic, Transition, Changes)

Macro and **Micro**
Quantitative and
Qualitative

Human Activities
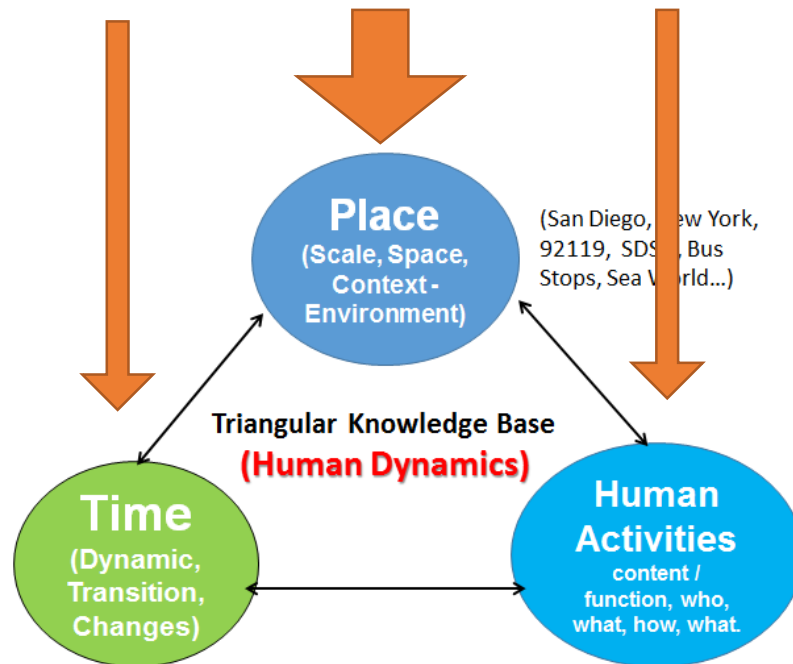**content / function, who, what, how, what.**

The Mobile Age
Enabling New Research Opportunity and Innovations

- GPS tracking devices, Wireless Sensors
- Wi-Fi Tracking, Cellular signal tracking,
- Smart Phone Apps and Tablets/iPad Apps
- Built-in Camera, Voice recorders, text inputs,
- Social media and crowdsourcing

But ... How can we analyze these BIG DATA generated by the mobile devices and wireless sensors?

→ **Spatial Science**

(GIS, Cartography, Visualization, Spatiotemporal Statistics, Remote Sensing, Cognitive Science)

Place (Scale, Space, Context - Environment) (San Diego, New York, 92119, SDS, Bus Stops, Sea World...)

Triangular Knowledge Base (Human Dynamics)

Time (Dynamic, Transition, Changes)

Human Activities content / function, who, what, how, what.

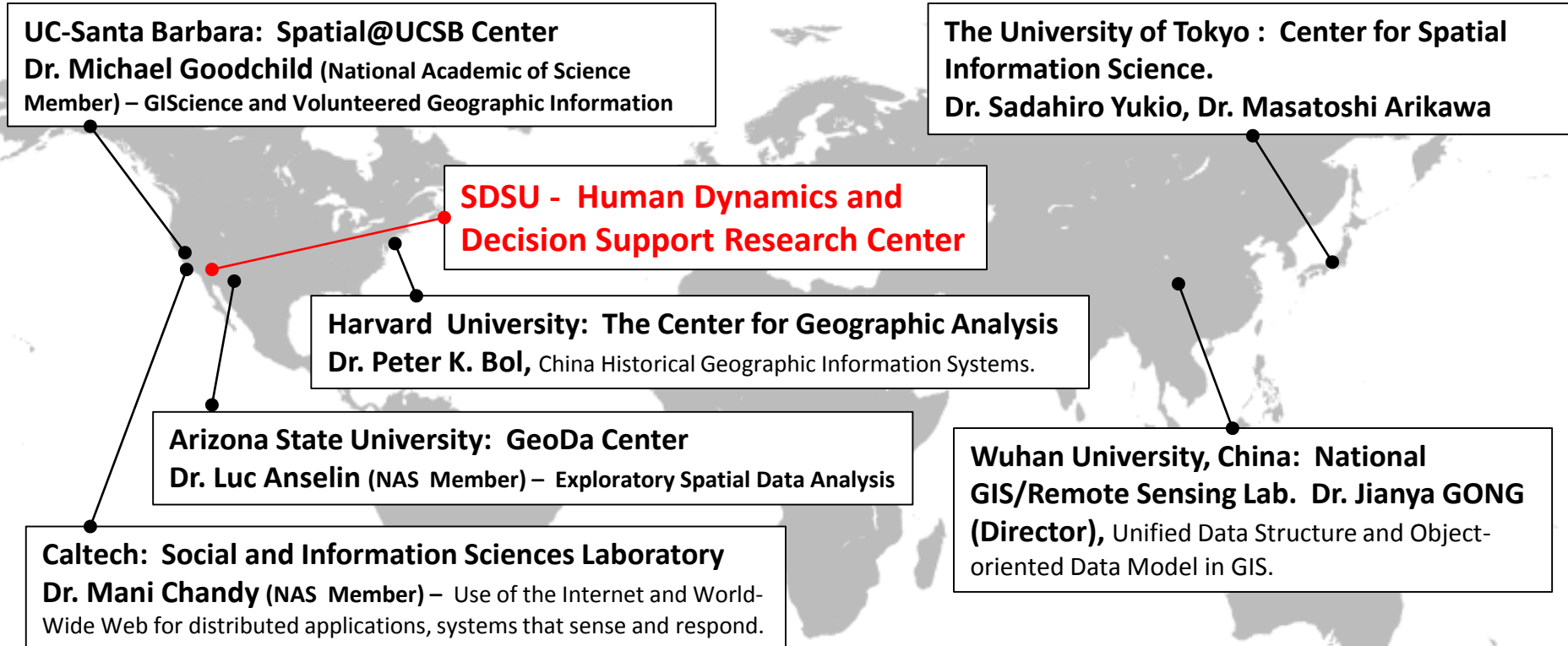# Current and Potential Funding Opportunities

- **Public Sector:**
  - **NSF**: Dynamics of Coupled Natural and Human Systems, Big Data Initiative (BIGDATA), CIF21, IGERT, DASPOS.
  - **DHHS**: Centers for Disease Control and Prevention (CDC), **NIH** (NHLBI , National Cancer Institute, NIDDK)
  - DoD, DHS, **NIJ**, **HUD**, EPA, and more.
  - Regional and Local: State of California, City of San Diego

- **Private Sector:**
  - **ESRI** (Biggest GIS Company, located in Redland, California). ESRI annual International User Conference in San Diego every year.
  - **QUALCOMM** (Telecommunication and wireless mobile technology company, located in San Diego).
  - **Apple** (developing iPhone, iPad, and iOS for mobile apps, located in California).
  - **Google** (developing Android platform for mobile apps, located in California)

- **Building Partnerships with Public/Private & University Startups**

SDSU will build the Leadership in HDMA with international research collaborations

UC-Santa Barbara: Spatial@UCSB Center
Dr. Michael Goodchild (National Academic of Science Member) – GIScience and Volunteered Geographic Information

The University of Tokyo : Center for Spatial Information Science.
Dr. Sadahiro Yukio, Dr. Masatoshi Arikawa

SDSU - Human Dynamics and Decision Support Research Center

Harvard University: The Center for Geographic Analysis
Dr. Peter K. Bol, China Historical Geographic Information Systems.

Arizona State University: GeoDa Center
Dr. Luc Anselin (NAS Member) – Exploratory Spatial Data Analysis

Wuhan University, China: National GIS/Remote Sensing Lab. Dr. Jianya GONG (Director), Unified Data Structure and Object-oriented Data Model in GIS.

Caltech: Social and Information Sciences Laboratory
Dr. Mani Chandy (NAS Member) – Use of the Internet and World-Wide Web for distributed applications, systems that sense and respond.

The new HDMA Center will organize International Conferences, Specialist Meetings, and Workshops in the future.

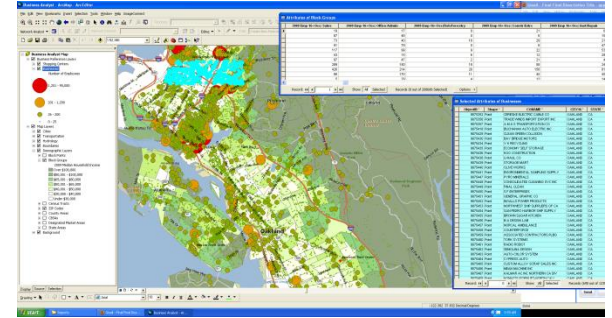# *Center for Human Dynamics and Decision Support (H2D)*

Existing Built Form: Neighborhood/Street Design

+

Public Processes

+

Future Land Use/Transportation Scenarios

Informing Policy and Urban Design Decisions, Public Health, Social Issues.

Collaboration with
- San Diego Regional Data Library
- San Diego Regional Task Force on the Homeless
- SANDAG and SanGIS.
- Office of Emergency Services (OES), San Diego County

NIH commits $24 million annually for Big Data Centers of Excellence

Efforts will harness power of complex datasets to improve health, aid discovery, reduce duplication

The National Institutes of Health will fund up to $24 million per year for four years to establish six to eight investigator-initiated Big Data to Knowledge Centers of Excellence. The centers will improve the ability of the research community to use increasingly large and complex datasets through the development and distribution of innovative approaches, methods, software, and tools for data sharing, integration, analysis and management. The centers will also provide training for students and researchers to use and develop data science methods.

Centers of Excellence for Big Data Computing in the Biomedical Sciences (U54) http://bd2k.nih.gov. HDMA group members from the Graduate School of Public Health, IBACH, School of Communication, Geography, Linguistics, Sociology to establish a multidisciplinary research team at SDSU to write a proposal for the NIH Centers of Excellence **during the Spring 2014.** This project will also collaborate with UCSD faculty in Global Public Health Program and University of Iowa to develop innovative software solution for protecting privacy in public health big data. The 2014 proposal due date will be around November 20, 2014 (estimated). Requested funding: $2 millions (plus in-direct cost) per year x 4 years = **$8 million** (plus 49% in-direct cost) = $11.9 millions.

Research Agenda in the NIH Big Data Center at SDSU::

1. **The main goal of this new Big Data Center is to use the GIS technology and Data mining tools to provide a comprehensive SOLUTION to tackle the "privacy" problems in Public Health Big Data Sharing.**

2. Develop Web-based **Visualization Tool and Online Data Mining tools, GIS analysis tools** for Public Health Researchers.

3. **Linking (cross-reference) Public Big Data** (Web, news, social media) to the Hospital Records Data (**Private Big Data**) for various research topics. Disease Outbreak surveillance and prediction model (for flu and other outbreak diseases).