**Brief Description:**
**Mapping Cyberspace to Realspace**[1]

**PI Ming-Hsiang Tsou** (Geography)
**Co-PI Dipak Gupta** (Political Science)
**Co-PI Jean Mark Gawron** (Linguistics)
**Co-PI Brian Spitzberg** (Communication)
**Senior Personnel Li An** (Geography)
**San Diego State University**

The spread of ideas in the age of the Internet is a double-edged sword; it can enhance our collective welfare as well as produce forces that can destabilize the world. This project aims at understanding the process by which the impact of a single event or idea disperses throughout the world over time and space.

Traditional approaches to understanding the spread of impacts of ideas or events are based on 20th century media—such as newsletters, advertisements, physically proximal group meetings, and telephone conversations. With new media, however, it is possible there are geographic and chronological patterns that coincide to reveal the nature of significant events and the ways in which information about these events is consumed and used by those engaged with such media. Dramatic events, especially when reported through the new media of cyberspace, have the potential to transform ideas into realities, in ways that can either inform or inflame the public passions. This project can be explained with the help of a few key examples.

The news of an obscure preacher's intention to burn Koran spread like wildfire in various media throughout much of the world in general, and in the Islamic world in particular. This singular announcement by a solitary person touched off violent protests that took the lives of many and threatened further escalation of tensions and rifts between the West and the Islamic world. This episode illustrates the potential of relatively isolated events for destabilizing the world in unforeseen ways and with far reaching consequences.

Today the biggest security threat to the United States comes not from the Arab fighters of the al-Qaeda central headed by bin Laden, as it did in 2001, but from Western youths inspired by his call for jihad against the US and the West. All of these messages propose the central idea that Islam is under attack from non-believers. As a result, each incident is picked up by the numerous web sites and discussion groups, which call their various audiences, mostly youth, to arms.

However, not all the sites that report or discuss the events are the recruiting tools for the "Jihadis."

In the aftermath of Katrina, H1N1 outbreaks and immunization campaigns, and the BP oil disaster, the societal absorption and utilization of cyberspace resources becomes an increasingly critical factor in facilitating public and political response to such crises. The public is increasingly merging its reliance on the traditional media of television, radio and newsprint with its use of the World Wide Web and Internet. Understanding information diffusion (e.g., searching, sending) and acquisition patterns in response to such disasters may significantly facilitate intervention responses, and eventually, prevention responses.

One of the key goals of this project is to find semantic maps—words, phrases and patterns of language use—which characterize the seed sites in the spread of ideas. These are the most influential sites that frame the issues, set the agenda, and lead the first wave of reaction. In the example of sites discussing Koran burning, it would find, among the seed sites, groups that truly are recruiting tools for the Jihadis. The first phase of the project will develop basic language analysis tools creating semantic maps. Using these maps to guide web searches will provide a detailed picture of how seed sites are reporting an event. By using this linguistic framework, a sophisticated web search will indicate how these groups are reporting an event and influencing each other. In the second phase of the project, data will be collected on the spread of these web sites over time and space. By mapping these sites on a world map, visualization will be provided regarding how the ideas are spreading. The plotted path should reveal that the spread of ideas is not random. That is, there are places that are more prone to host these sites (and accept an idea) than others. In the third phase of the project, statistical analyses will seek to understand the reasons for a particular course along which an idea spreads. In other words, potential factors that cause "susceptibility" to and "immunity" from a particular set of ideas will be identified. This project will continue for four years collecting and analyzing data and thereby developing a theoretical structure on the spread of ideas.

The methodology developed by this project will have many applications other than homeland security. For instance, it can be used it in the area of public health, where after the outbreak of small number cases of an infectious disease in one part of the world, other parts will start reporting its occurrence. By mapping and understanding the causes of "susceptibility" and "immunity" a deeper understanding of the causes of the spread of such a disease may be gained.

 It may assist disaster planning and response by clarifying the role of new media in distributing information and influencing public understanding of impending risks. This methodology can also be used in the private sector, where the acceptance of a new product can be traced over time and space giving new tools for marketing strategies.

In summary, this project seeks to map both the geography and the chronology of ideas over cyberspace, as the ripples of information usage radiate outward from a

given event epicenter. By mapping and analyzing such ripples, new insights will be provided into the role of new media in biasing, accelerating, impeding, or otherwise influencing personal, social and political uses of such information.
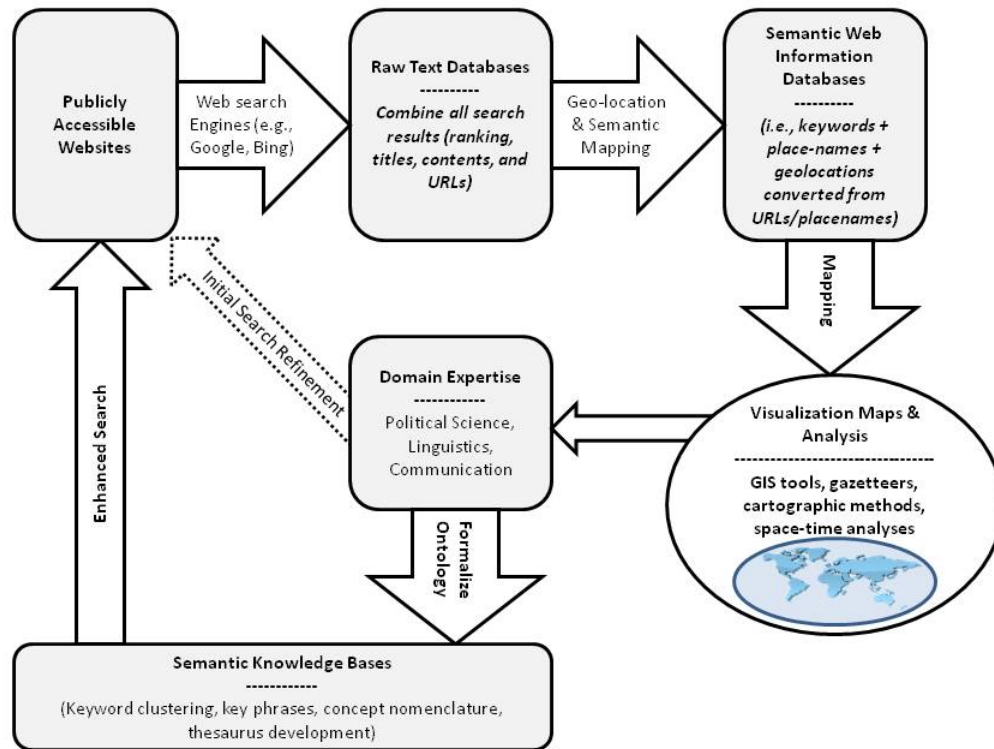


The Semantic Web Automatic Reasoning and Mapping System (SWARMS) framework (Ming-Hsiang Tsou, Jean Mark Gawron, Dipak Gupta, Brian Spitzberg, San Diego State University, 2010®)