The Future of Geography in an Emerging Information-Technology Society

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Geographic technologies

- Positioning on the Earth’s surface
  - GPS, RFID
- Acquisition systems
  - remote sensing
  - volunteered geographic information
- Data dissemination
  - geoportals
  - virtual globes
- Analysis
  - searching for patterns and anomalies
  - testing hypotheses, modeling change
Positioning technologies

• Navigation
  – sextant
  – chronometer
Dynamic geographic information

- Live feed to desktop
  - integrated with other map data
  - www.aircoach.ie
RFID

- Radio frequency identification
  - scanning without the laser
  - active or passive
- Tracking of objects
  - goods from production to retail display to sale
  - construction materials
  - pets, livestock, children, parolees
Enabling the GeoWeb

- Interoperable location referencing
  - coordinate transformations
  - geocoding addresses
  - point-of-interest databases

34 deg 24 min 42.7 seconds north, 119 deg 52 min 14.4 sec west
236150m easting, 3811560m northing, UTM Zone 11 Northern Hemisphere
National Grid reference 11SKU36151156
909 West Campus Lane, Goleta, CA 93117, USA
Mike Goodchild’s house
NYC Office of Emergency Management and NY Office of Cyber Security and Critical Infrastructure Coordination
Generic names for Soft Drinks
by county

Most Popular Term Used

Pepsi
30% - 50%
50% - 80%
80% - 100%

Coke
30% - 50%
50% - 80%
80% - 100%

Soda
30% - 50%
50% - 80%
80% - 100%

Other
30% - 50%
50% - 80%
80% - 100%
No Data

Map based upon 120,464 Respondants

Respondents through March 1, 2003

Map by Matthew T. Campbell
Spatial Graphics and Analysis Lab
Department of Cartography and Geography
East Central University (Oklahoma)

Map Template courtesy of www.mymaps.com

popvssoda.com
Eastern tip of Uluru

The base circumference of Uluru is about 9km — I walked solo around the rock in the early morning, stopping to photograph the long shadows and listen to the morning bird song. Uluru-Kata Tjuta National Park, Australia, 2006
Neogeography

- A breaking down of the traditional barriers between expert and non-expert
- The engagement of thousands of individuals in the production of geographic information
Analysis

- Mining spatial data for patterns and anomalies
- Making inferences about disease prevalence and transmission
- Testing hypotheses about cause
GeoPortalNI.com is an exciting new initiative designed to provide access to geospatial data and information in Northern Ireland. For help use the Quick Start Guide.

Data Categories
- Topographic Mapping and Imagery
- Administrative and Political Boundaries
- Elevation and Derived Products
- Positioning Infrastructure
- Transportation Networks
- Utility Networks
- Demographic and Societal
- Health and Social Services
- Business and Economic
- Agriculture
- Environment and Conservation
- Flora and Fauna
- Geological and Geophysical
- Planning and Land Use
- Inland Water Resources
- Built Environment
- Oceans and Estuaries
- Climate and Atmospheric Science
- Military and Intelligence

In support of mosaic

Before continuing, please read this disclaimer and privacy statement.

Please use the Contact Form for any questions or comments.
Flooded areas near the New Orleans CBD
Based on Ikonos data from 02 Sept 2005
Future prospects

• Knowing where everything is (at all times)
  – every mobile phone
  – every vehicle
  – every farm animal
  – every item in a store
  – every construction beam
  – every asset for emergency response
  – every victim of a disaster
Citysense

Citysense is an innovative mobile application for real-time nightlife discovery and social navigation, answering the question, "Where is everybody going right now?"

Citysense shows the overall activity level of the city, top activity hotspots, and places with unexpectedly high activity, all in real-time. Then it links to Yelp and Google to show what venues are operating at those locations. Citysense is a free demonstration of the Macrosense platform that everyone can enjoy.

Currently, local discovery depends on proactive searching for relevant locations. Users are challenged to input specific location data into mobile interfaces with small screens.

The role of the citizen

• Placenames, streets, social characteristics
• Early notification of change
• Early reports of damage from a disaster
• Both producer and consumer of geographic information
• The local expert
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<tr>
<th>Hits</th>
<th>Source</th>
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<tr>
<td>595673</td>
<td>Jesusita Fire (Ethan)</td>
</tr>
<tr>
<td>188308</td>
<td>SBC Jesusita Fire Santa Barbara, CA (Robert O'Connor - fire news blog)</td>
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<td>89214</td>
<td>Jesusita Fire Map (Randy - Independent.com)</td>
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<td>Jesusita Fire in Santa Barbara - LA Times map (Los Angeles Times)</td>
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<td>Map of burned homes in Santa Barbara (Los Angeles Times)</td>
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<td>26330</td>
<td>Jesusita Fire Evacuation Areas: Approximation (COSB)</td>
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<td>Jesusita Fire - Santa Barbara (lanewspace)</td>
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Lessons learned

• Authoritative information
  – sparse observer network
  – must be verified by officials
  – too slow for the Tea and Jesusita Fires

• Asserted information
  – dense observer network
  – carries risk of false positives
    • false rumor of a fire in Mission Canyon
    • some unnecessary evacuations
  – people are willing to accept false positives
  – lack of authoritative information amounts to false negatives
  – false negatives are far less acceptable than false positives
    • there were some posted false negatives
The third spatial dimension

• Representation of 3D structures
  – and positioning inside them
  – extending navigation to indoors

• How to acquire data?
A technology of dynamics

• Real-time, continuous monitoring
• The state of the world at all times
  – the state of the transportation network
  – the state of human health
  – the state of the environment
• Sensor networks
  – static
  – carried on moving objects
  – humans as sensors
The challenges of GIScience

- Representing the full range of conditions and phenomena on a dynamic Earth
  - 4D, unary and binary
- Providing simulations of real processes that are indistinguishable from reality
- Managing the flow of data from a host of sensors
- Communicating knowledge of abstract phenomena and uncertainty to the non-expert user
- Capturing the local geographic knowledge of citizens
- Making it possible to search efficiently over a distributed, global data resource
- Preserving what we know about the geographic world for future generations
Geography: a growing importance

• Empowering the citizen
  – through easy-to-use tools

• The importance of place
  – place-based decision-making

• A nervous system for the planet
  – in real time
The future of geography

• Representing the world
  – in the language of computers
  – in ways that are useful

• Knowing the world
  – making new discoveries about how the world looks and works

• Reflecting on the role of technology
  – in changing our ways of knowing the world
  – in raising issues of privacy, ethical behavior