Value Sensitive Design and Security

- Value Sensitive Design overview
- Case study: UrbanSim
- Current VSD/mobile security projects:
  - Implantable Medical Devices
  - Cell phones for safety for teens
  - Transit traveler information systems
- VSD and cars project (workshop format)
  - Stakeholder analysis
  - Implicated values
  - Threat analysis
  - Value scenarios
  - Next steps

Using Value Sensitive Design in the UrbanSim Project

Role of Modeling and Simulation

- What if we …?
  - Built a new freeway or light rail line?
  - Established an urban growth boundary and zoned for increased density and mixed-use?
  - Changed the cost of parking, or adopted congestion pricing?
- Decisions politically charged, which often reflects underlying value conflicts among the diverse stakeholders.
- Simulation can provide an important tool for exploring policy alternatives and possible urban futures. To be effective, it must be integrated with the political process.

The UrbanSim System

- A disaggregate, behaviorally realistic simulation system for modeling the development of urban areas over periods of 20-30 years
- Developed by an interdisciplinary group at the University of Washington over the past decade
  - Paul Waddell, UC Berkeley (formerly Evans School)
  - Many other students, faculty and staff from Civil Engineering, Information School, Psychology, Statistics, Urban Design and Planning: Sam Clark, Janet Davis, Rob Duisberg, Bjorn Freeman-Benson, Batya Friedman, Dieter Fox, Peter Henry, Peter Kahn, Christoffer Klang, Travis Kriplean, Brian Lee, Peyina Lin, Justin Meyer, Michael Noth, Sebastian Pappert, Adrian Raftery, Hana Sevcikova, Soyoung Shin, Davis Socha, Liming Wang, …
- Project center of gravity has shifted south this year
- GNU Public License
- Available for download at www.urbansim.org

UrbanSim Deployment

- Deployment and operational use by regional planning agencies a major project goal
- Operational use:
  - Detroit, Houston, Seattle, Salt Lake City metropolitan areas
- Planned operational use or research and pilot applications:
  - Amsterdam, Brussels, Burlington, Durham, El Paso, Eugene, Honolulu, Lausanne, Melbourne, Paris, Phoenix, San Francisco, Tel Aviv, Zurich
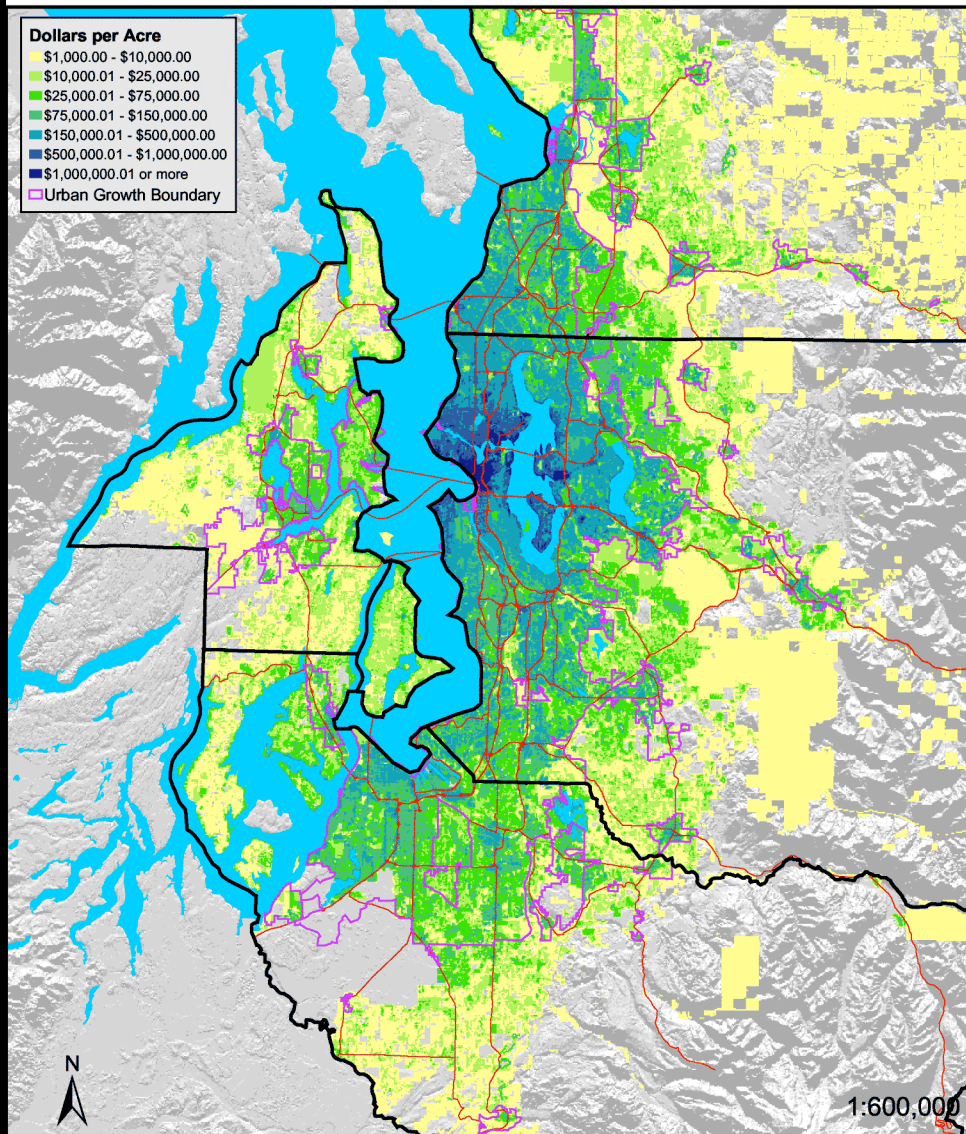- User community: Users Group meetings in U.S. and Europe, active email list

UrbanSim geographic data:
150 square meter grid cells
& parcel data - Green Lake
neighborhood, Seattle
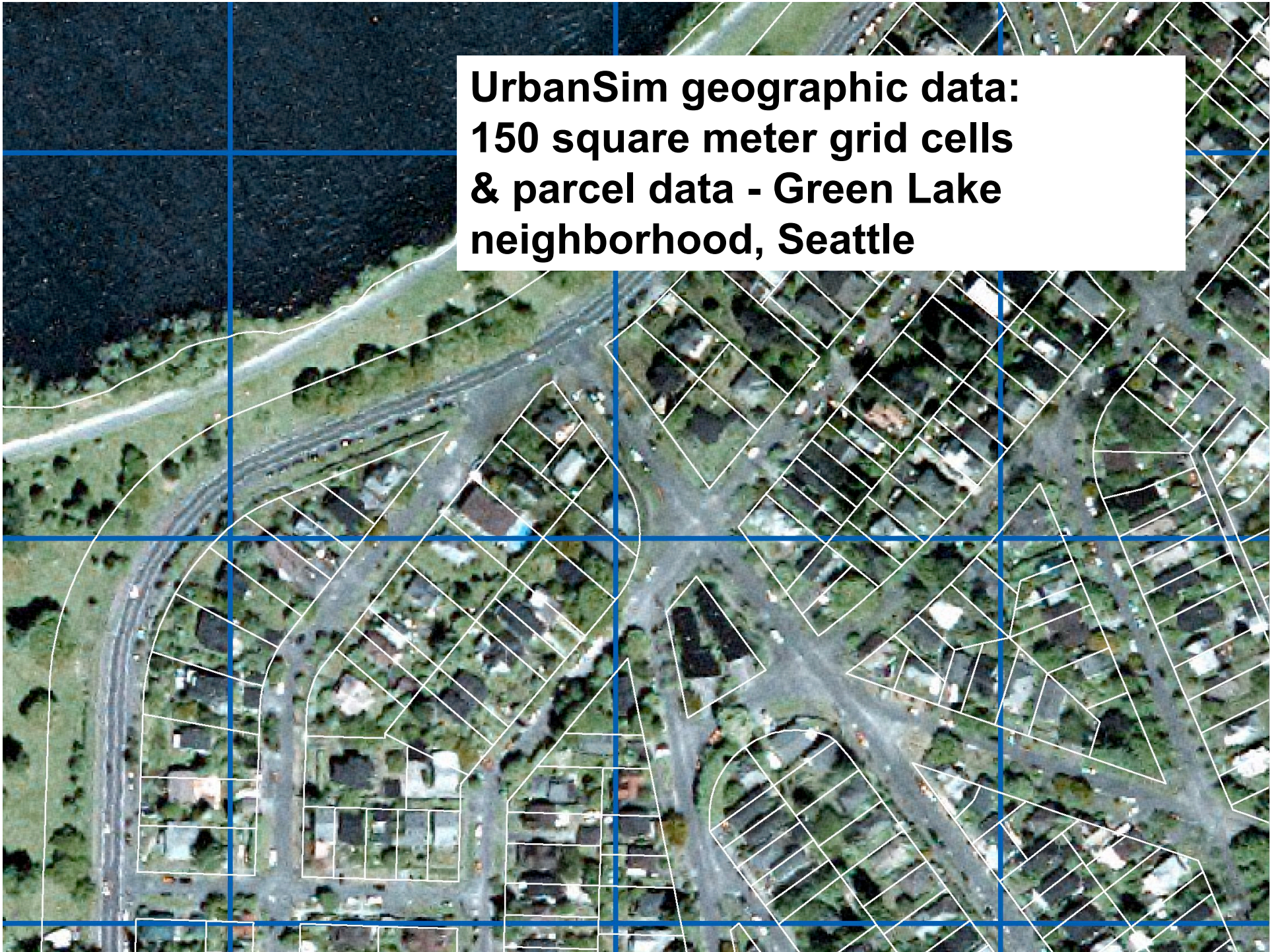
Indicators

- Indicators provide the principal mechanism for summarizing results from the simulation. Examples:
  - Population density
  - Average household income
  - Acres of buildable land
  - Greenhouse gas emissions from transportation
- Several interrelated indicator projects
  - Results Manager section of GUI
  - Technical documentation for indicators
  - Indicator Perspectives
  - Household Indicators
- Interested both in supporting the technical modeling work, and in supporting public participation in the planning process
- The work on laying the groundwork for public participation strongly informed by Value Sensitive Design theory and methods

PSRC Region
2000 Total Land Value per Acre by Gridcell

Dollars per Acre
$1,000.00 - $10,000.00
$10,000.01 - $25,000.00
$25,000.01 - $75,000.00
$75,000.01 - $150,000.00
$150,000.01 - $500,000.00
$500,000.01 - $1,000,000.00
$1,000,000.01 or more
Urban Growth Boundary

1:600,000

Example simulation output: Map-based indicator display for Puget Sound region

Value Sensitive Design

- An approach to the design of technology that accounts for human values in a principled and comprehensive manner throughout the design process
- Interactional theory
- Consider both direct and indirect stakeholders
- Tripartite methodology:
  - Conceptual, empirical, technical investigations

Values Examples from Urban Simulation

- Is the model a black box?
  - Implicated values: democracy, accountability
- Can you model walking as a transportation mode? (Doing so is technically more difficult than modeling driving because of scale and neighborhood characteristics.)
- How do you value people's time?
- Can you answer questions about resource consumption and sustainability?

Direct and Indirect Stakeholders

(This is for the current implementation of UrbanSim – in the future more stakeholders will move from indirect to direct)

- Direct: interact with UrbanSim and its outputs
  - Initially: planning staff at regional government agency, and larger local governments (with their own planning staff)
- Indirect: affected by the decisions made using the output from UrbanSim
  - staff at smaller local governments
  - elected officials
  - members of advocacy groups, neighborhood associations, business associations, and the like
  - other citizens of the region
  - other citizens in nearby regions

Applying VSD to UrbanSim – Conceptual Investigations

- How do we deal with the multitude of strongly held and often conflicting values held by different stakeholders? We distinguish:
  - Explicitly supported values
  - Stakeholder values

Explicitly Supported Values

- These are taken as given, and are explicitly supported by the system as well as possible

- Principal values:
  - Support for democratic process
    - Provide infrastructure that allows users to articulate and investigate values that are of greatest importance to them
  - Fairness (and specifically freedom from bias)
    - As far as we are able, do not privilege one mode of transportation, policy, etc over another
  - Openness and accountability

Example Stakeholder Values

- Sustainability (including more specific concerns such as reducing greenhouse gas emissions, preserving open space, etc)
- Economic growth
- Housing affordability
- Individual property rights
- Low taxes
- Social equity
- Transportation options for disabled people
- Walkable neighborhoods

Stakeholder Values (2)

- Stakeholder values may be in conflict
- A particular choice or weighting of these values should <u>not</u> be built into the system
- Being able to answer questions about certain stakeholder values may have significant design implications (e.g. biodiversity)
- If a significant number of stakeholders care about a value, or if it has moral import, we want to try to provide indicators for it

Indicator Perspectives (1)

NORTHWEST ENVIRONMENT WATCH

Cascadia Scorecard perspective on UrbanSim indicators
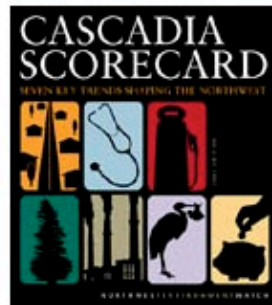
The 🌐 Cascadia Scorecard is Northwest Environment Watch's new gauge of regional progress. The Scorecard puts a spotlight on the long view and the questions that most matter over time: Are we living longer, healthier lives? Are we building strong human communities? Are we handing down to our children a place whose ecosystems are regenerating?

In modeling sprawl, one of the seven key trends monitored by the Cascadia Scorecard, UrbanSim helps us to evaluate possible futures for our cities in comparison to historical trends and where we stand today. By better understanding the impact of public policy on sprawl, we can make better choices for a sustainable future.

Why Is Sprawl an Issue?

Sprawl—dispersed, automobile-oriented urban development—figures into the Scorecard because it contributes to a distressing array of ills. Sprawl locks northwesterners into an auto-dependent

Indicator Perspectives (2)

King County

King County Benchmarks

Perspective on UrbanSim Indicators

Since 1996, the ⊕ King County Benchmark Program has published annual reports on progress in meeting the goals outlined in the ⊕ Countywide Planning Policies (CPPs). As a complement to these progress reports, we provide links to indicators produced by UrbanSim, a tool for modeling the future impacts regional land use and transportation decisions. UrbanSim helps us to evaluate possible futures for our cities in comparison to historical trends and where we stand today.

Follow this link to learn more about Benchmark Indicators produced by UrbanSim in key areas of King County's growth management policy.

- Land Use

The King County Benchmark Program also includes indicators in the following additional categories. We plan to add information about these as well, as new indicators are implemented in UrbanSim.

- Economics
- Affordable Housing
- Transportation
- Environment

Benchmarking as a Strategy for Change

As one of the first and most durable efforts at monitoring outcomes in the public sector, the King County Benchmark Program demonstrates how measurement of broad quality-of-life outcomes can help determine if public policy and programs are making a difference. The purpose of King County's Benchmark Program is to provide the King County Growth Management Council and other users with a method for:

- Evaluating the progress of the County and its jurisdiction in managing growth, and
- Encouraging and measuring the implemention of the goals outlined in the Countywide Planning Policies

Public outcome monitoring is a strategy for a change: it alerts us to what we are doing well, and to where we need to do better. It is closely connected to both the policy goals that it monitors, and to the strategic planning, programs, and services

Indicator Perspectives (3)

Washington REALTORS®

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QUALITY Life

REALTORS® recognize the need to sustain and enhance the quality of life enjoyed by Washington's citizens. We believe we can build better communities by supporting quality growth and seeking sustainable economies and housing opportunities that embrace the environmental qualities we cherish, while protecting a property owner's ability to own, use, buy, and sell property.

The Washington REALTORS®' Quality of Life Program is based on the principles that Washington residents have told us are important for building better communities. REALTORS®, like other residents who live and work in the community, want a strong economy, plenty of housing opportunities, good schools and parks, safe neighborhoods and great transportation choices.

The Quality of Life Project is about creating communities where everyone thrives. Quality of life starts with a good job. It means having a roof over your head – and a range of choices in housing design, style, and price. It means the opportunity to live in communities with clean, safe neighborhoods, good schools, and efficient transportation. Our Quality of Life Project is designed to impact public policy in order to ensure economic vitality, provide housing opportunities, and preserve the environment that we cherish here.

REALTORS® are taking the lead in developing policy proposals that reflect our Quality of Life Principles.

In the Puget Sound region, UrbanSim is being used to simulate the long term effects of different transportation and land use plans in order to provide useful information for the discussion of the proposals. Below we explain how UrbanSim can help evaluate such alternatives with respect to one of the Quality of Life principles: *Providing Housing Opportunities*.

Providing Housing Opportunities

REALTORS® understand that home ownership is the cornerstone of the American Dream and deserves consideration as a top priority when it comes to quality of life. Home ownership contributes to community responsibility; civic, economic, business and employment stability; family security and well being.

Every citizen should have the opportunity to purchase an affordable, safe, and decent home near where they work, shop and play. Choice in style, price and location is critical to increasing home ownership. These objectives should be met through market-driven approaches that foster a wide-range of urban, suburban and rural housing choices at all prices.

> *When there is sufficient housing to accommodate growth in a community, it relieves pressures on housing prices and provides the opportunities of home ownership for all.*

Home prices skyrocket when housing is not available where jobs are located – that causes people to buy homes further away from where they work, exacerbating traffic problems. Providing affordable housing choices close to where people work, live and play prevents long commutes and increased traffic on our roads. A community should

Indicator Perspectives Evaluation

- Primary purpose of the design:
  - Support the activities of both value advocacy and access to technical information in a complex system
- Other major goals:
  - System as a whole should be perceived as reasonably unbiased
  - Support a diversity of political views
- Empirical evaluation
  - Questionnaire, semistructured interviews, and task activities with 20 Seattle residents
  - Value-oriented interview questions and activities drew on prior research by Friedman et al. (e.g. "Watcher and the Watched" study)

Indicator Perspectives Evaluation (2)

- Investigated different elements and combinations of elements:
  - Northwest Environment Watch Perspective alone
  - King County Perspective alone
  - Realtors Association Perspective alone
  - The Indicator Perspectives framework (which includes the current 3 perspectives, plus others as needed)
  - Technical Documentation
  - "System-as-a-Whole" (all of the above)

Indicator Perspectives Evaluation – Quantitative Data

- Most participants viewed each grouping as coherent and informative
- Most participants viewed the system-as-a-whole as useful for:
  - Supporting diverse opinions
  - Advocating for certain views or values
  - Supporting the democratic process
- Key trend:
  - As the design provides increasing support for diverse perspectives alongside technical information (i.e. adding additional elements), more participants judged the system as supporting legitimation

Indicator Perspectives Evaluation – Qualitative Data

- The qualitative data also supports this trend of increased support for legitimation by the system-as-a-whole. Primary kinds of justifications:
  - Balance between technical and advocacy information, and balance among the diverse viewpoints
  - Relative completeness of indicator set
  - System's extensibility
- This is not to say that all participants views the system-as-a-whole as complete! Some missing aspects:
  - Common language across constituencies
  - Public comment tools and other participation mechanisms
  - Access for less organized groups
  - Potential for use in strategic communication

Filling in the Gaps: Prioritizing the Implementation of Additional Indicators

- Triangulation among priorities from 3 sources:
  - Coverage of the space of potential indicators
    - Has a strong theoretical grounding – builds on earlier work by our group on typologies of what people value in urban environments
  - Organizational and stakeholder concerns
    - If a partner organization wants a new indicator or model, that represents a significant priority
  - Pragmatics
    - Implementation ease or complexity, data availability, legal requirements, funding, …
- 13 new indicators. Examples:
  - Percent of population living in compact neighborhoods
  - Greenhouse gas emissions indicator
  - Transportation indicators (e.g. percent trips by car, transit)

Current VSD/mobile security projects

- Implantable Medical Devices
- Cell phones for safety for teens
- Transit traveler information systems
  - Many use OneBusAway
  - Group of particular current interest: deaf blind riders
- Up next: cars?
- Future: social media?

Some VSD Techniques

- Empirical investigations
  - Semi-structured interviews
  - Surveys
  - Futures Workshops
  - Considering both direct and indirect stakeholder role for same person (used in Phones project)
  - Many other techniques from the social sciences
- Value scenarios
- Value dams and flows
- Value tensions analysis
- Mockups (used in IMD project)
- Co-evolving technology and policy

VSD and cars - activities

- Stakeholder analysis
- Implicated values
- Threat analysis
- Value scenarios
- Brainstorm next steps

Value Scenarios

- Scenario-based design a well-established technique in HCI
- Value scenarios is a related technique, designed to provoke discussion around the value implications of a technology
- Heuristics for writing value scenarios
  - Tell a story
  - The collection doesn't need to cover the whole space (that's too hard), but should show an interesting range
  - Bring out the range of stakeholders (Roles? Gender? Ethnicity? Age?)
  - Probe different values that are at stake
  - Different timescales
  - Consider "Design Noir" scenarios