CycleSense: Sensing and Mapping for Better Biking

Center for Embedded Networked Sensing, UCLA
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The CENS/CycleSense Project Team

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CycleSense Goals:

- Describe a new approach to collecting and analyzing existing ALR data types (GPS, accelerometers) using commonly available devices - mobile phones
- Describe collection of new data types for ALR
- Describe new transdisciplinary collaboration with mobile environmental and personal sensing professionals

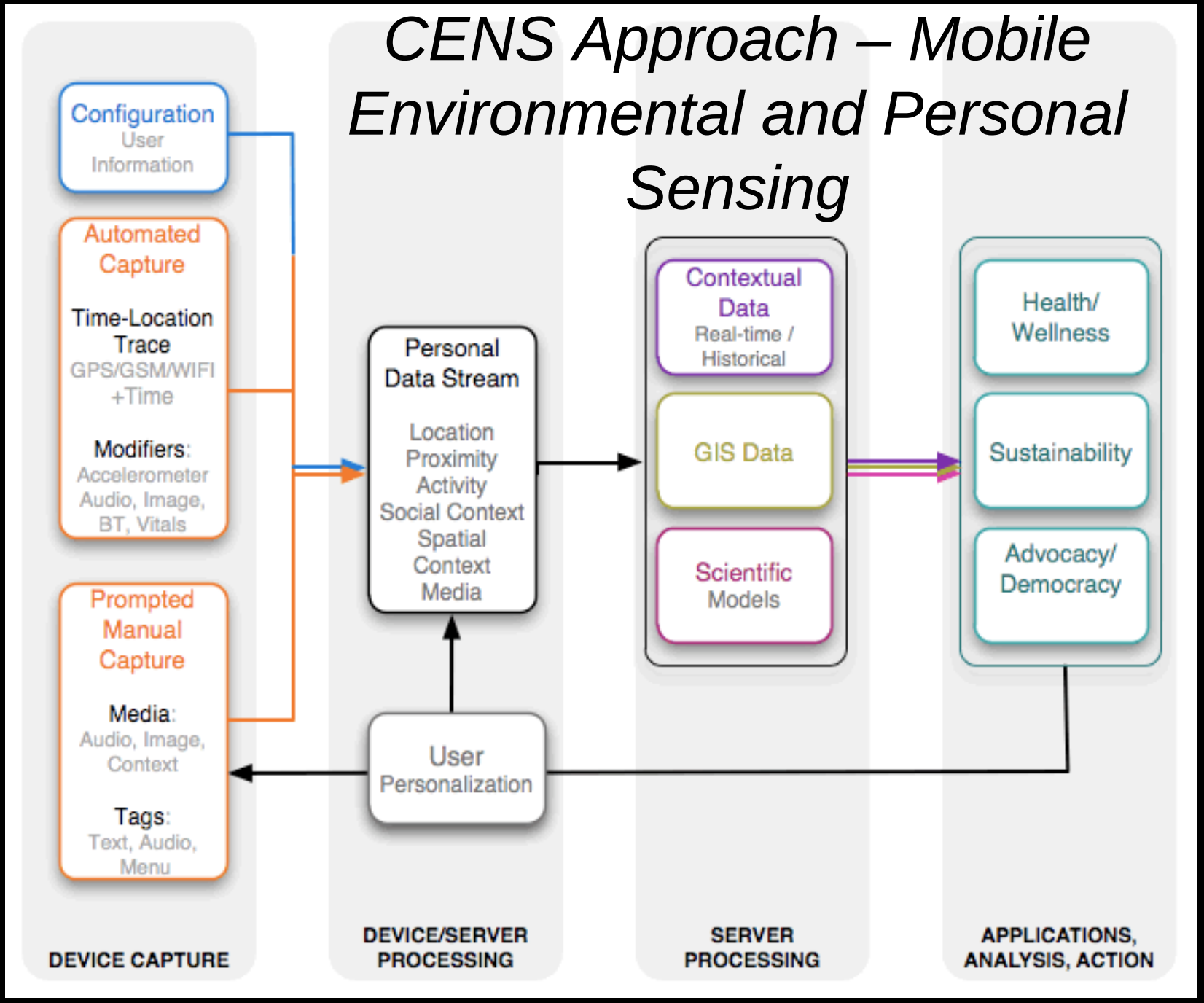
CENS

- Center for Embedded Networked Sensing
  - *Mobile Environmental and Personal Sensing*
  - NSF (STC) UC multi-campus, directed from UCLA
- Transdisciplinary
  - Computer Science and Engineering
  - Urban Planning, Statistics, Education

CENS Approach

- We have adopted a lifestyle change already. . .
- Mobile phones as data collection device
- Millions with location capability (cell, GPS, WiFi), accelerometers, image, audio
- Previously unavailable spatial and temporal resolution as similar scales

CENS Approach – Mobile Environmental and Personal Sensing



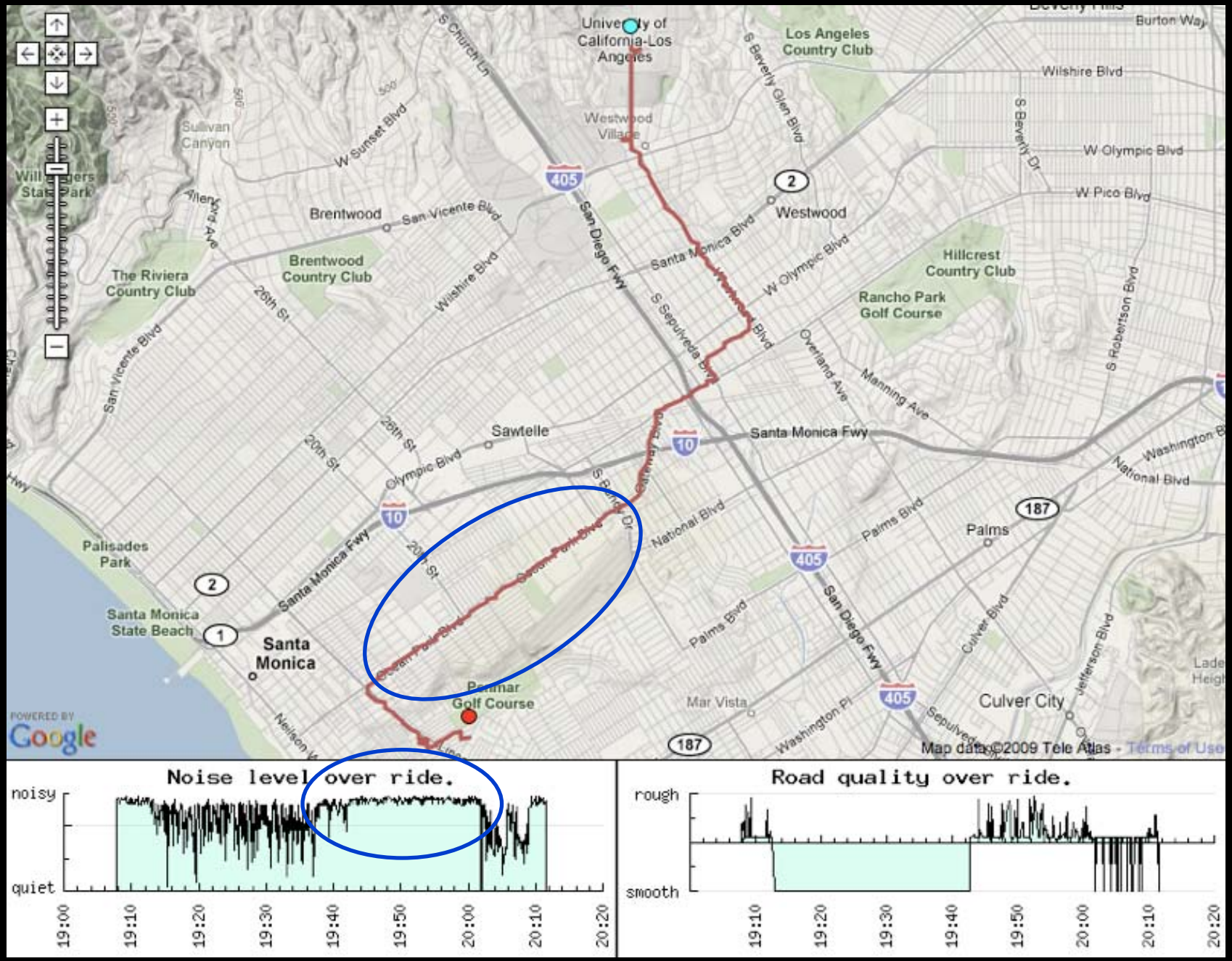
CycleSense

Capture: Phone uploads location, stops and starts, pavement roughness, sound samples, photos of route impediments or features

Explore: Web interface compares routes' roughness and noise level

Learn: Compare routes with air quality, traffic conditions & accidents

Share: Web interface shares information collected about routes with Los Angeles bike community


University of California-Los Angeles
Los Angeles Country Club
Burton Way
Wilshire Blvd
Westwood Village
S Beverly Glen Blvd
W Olympic Blvd
W Pico Blvd
Sullivan Canyon
W Sunset Blvd
Brentwood
San Vicente Blvd
Westwood
Santa Monica Blvd
Hillcrest Country Club
The Riviera Country Club
Brentwood Country Club
Wilshire Blvd
Rancho Park Golf Course
S Sepulveda Blvd
Overland Ave
Manning Ave
S Robertson Blvd
Sawtelle
Olympic Blvd
Santa Monica Fwy
National Blvd
Palms Blvd
Palms
Palisades Park
Santa Monica State Beach
Santa Monica
Mar Vista
Culver City
Jefferson Blvd
San Diego Fwy
Noise level over ride.
noisy
quiet
Road quality over ride.
rough
smooth
19:00
19:10
19:20
19:30
19:40
19:50
20:00
20:10
20:20
Google
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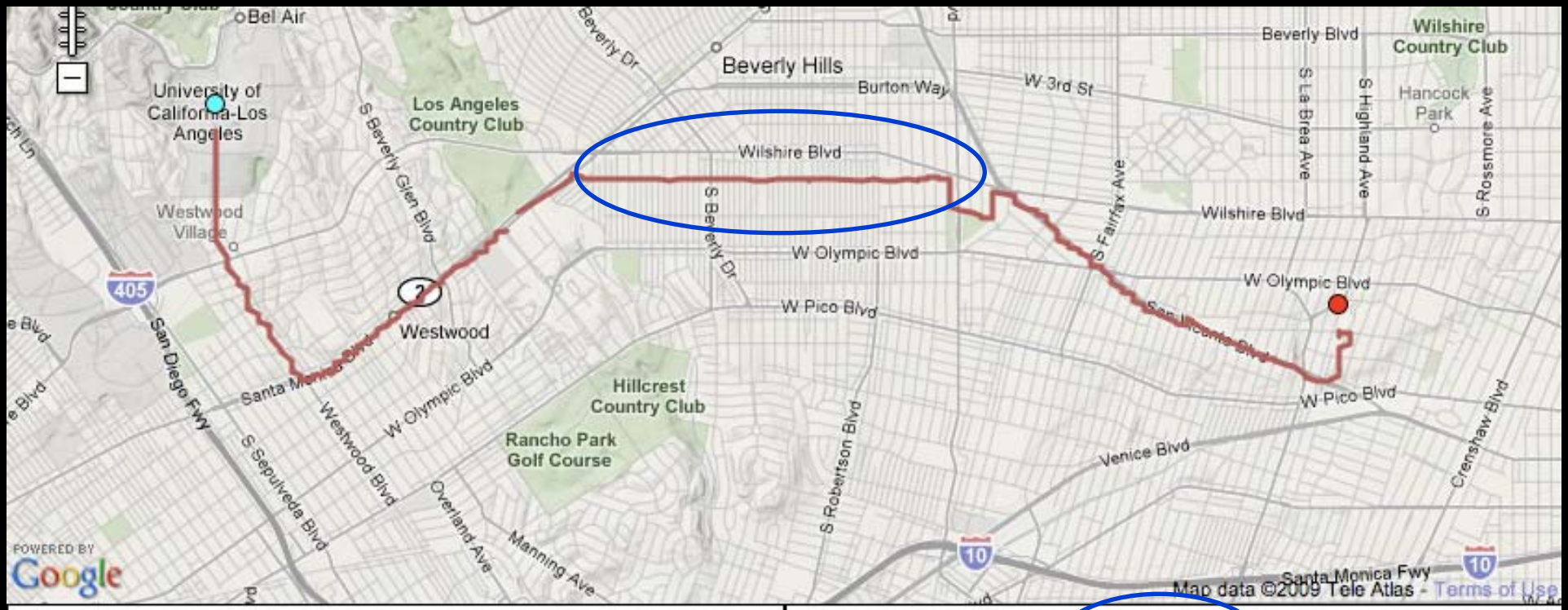
Bel Air
University of California-Los Angeles
Los Angeles Country Club
Beverly Hills
Burton Way
W 3rd St
Beverly Blvd
Wilshire Country Club
Hancock Park
Wilshire Blvd
Westwood Village
S Beverly Glen Blvd
S Beverly Dr
S Fairfax Ave
S La Brea Ave
S Highland Ave
S Rossmore Ave
W Olympic Blvd
W Pico Blvd
405
Westwood
San Diego Fwy
Santa Monica Blvd
Westwood Blvd
Hillcrest Country Club
Rancho Park Golf Course
S Sepulveda Blvd
Overland Ave
Manning Ave
S Robertson Blvd
Venice Blvd
Crenshaw Blvd
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Santa Monica Fwy
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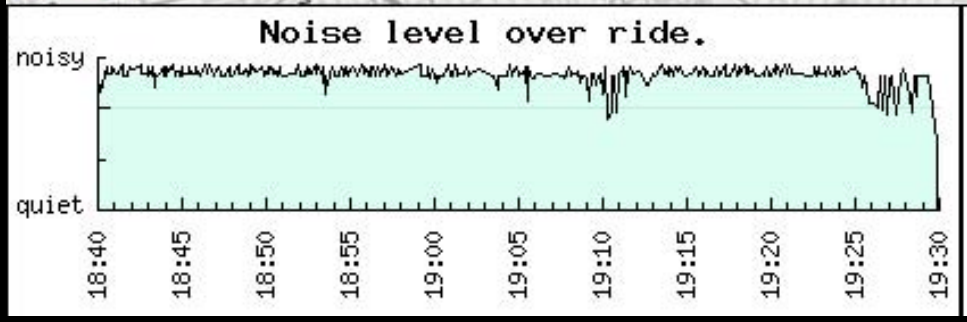
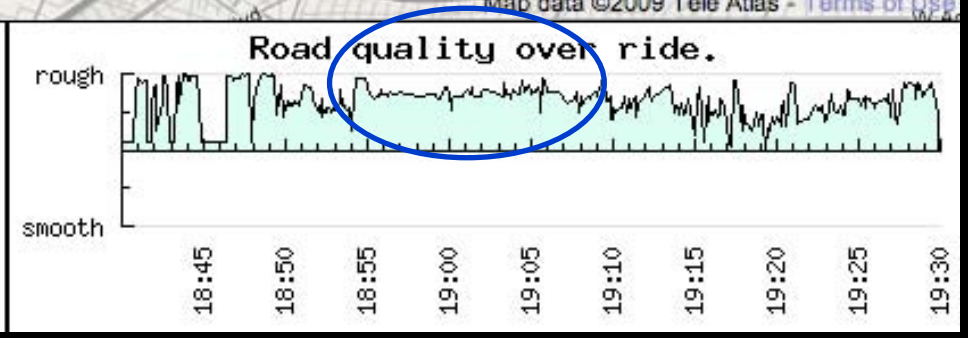
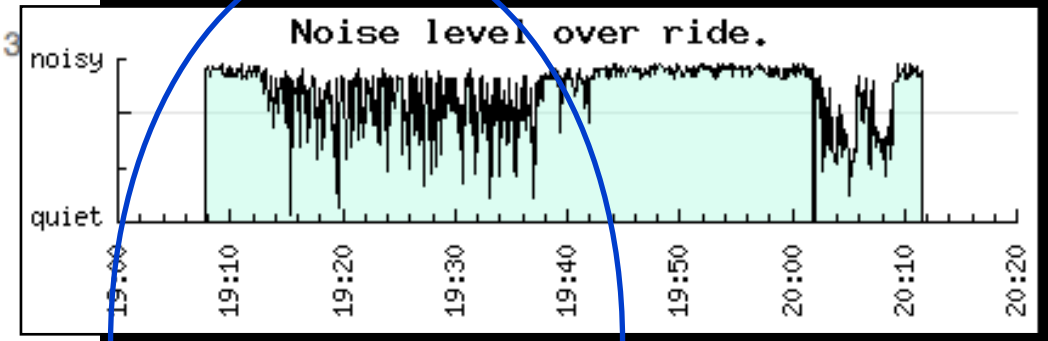

Noise level over ride.
noisy
quiet
18:40
18:45
18:50
18:55
19:00
19:05
19:10
19:15
19:20
19:25
19:30

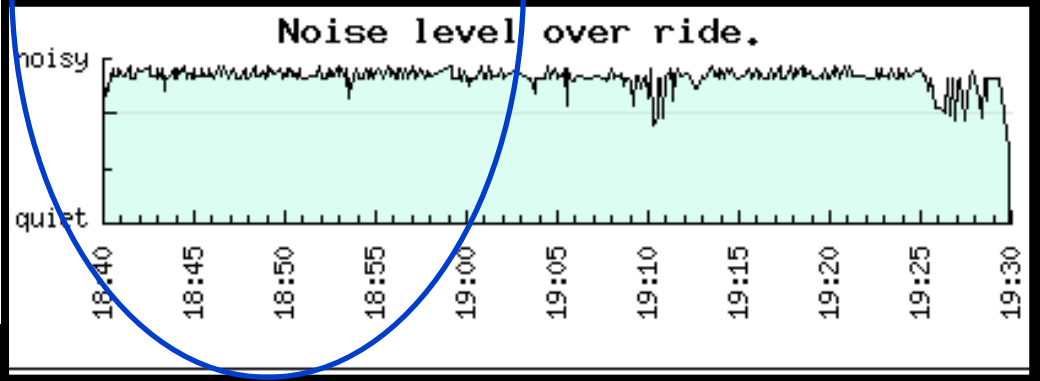

Road quality over ride.
rough
smooth
18:45
18:50
18:55
19:00
19:05
19:10
19:15
19:20
19:25
19:30

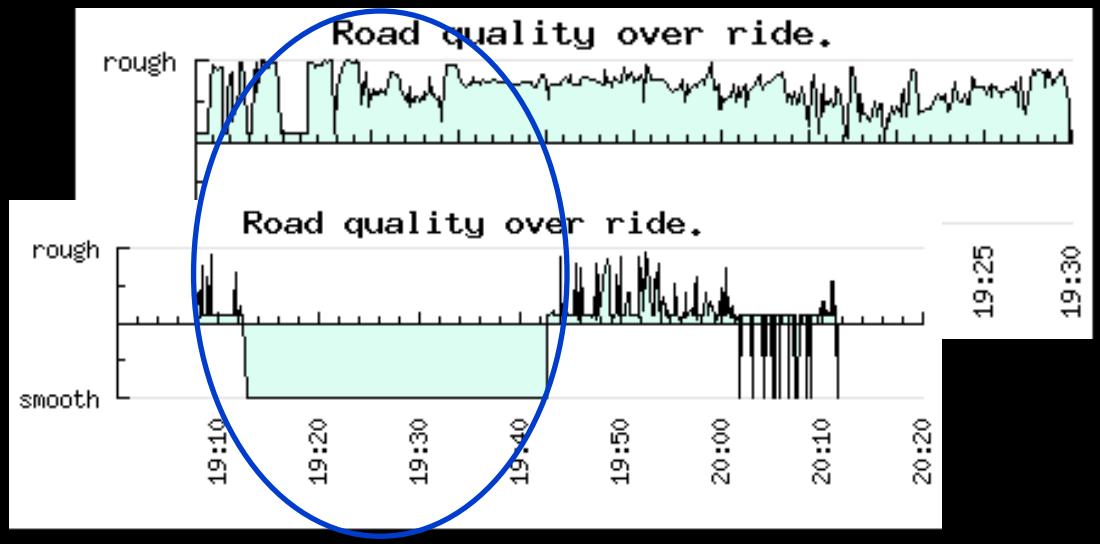
Variation in Elevation over route: 0 meters
Average duration of stops (e.g. for traffic light): 0:0:13
Total duration of all stops: 0:10:51
Number of stops: 50.0
Total distance: 9.15 miles
Total duration: 0:49:46
Zipcodes covered:

90024	56
90025	50
90019	79
90067	18
90036	7
90048	27
90211	50
90095	20
90212	41

Average noise level: 33.27
Average road quality: 0.61







Methods for Active Living

- Challenges
  - Security and Privacy
  - Universal device capability
    - Battery, sensors beyond core function
  - Equal population distribution

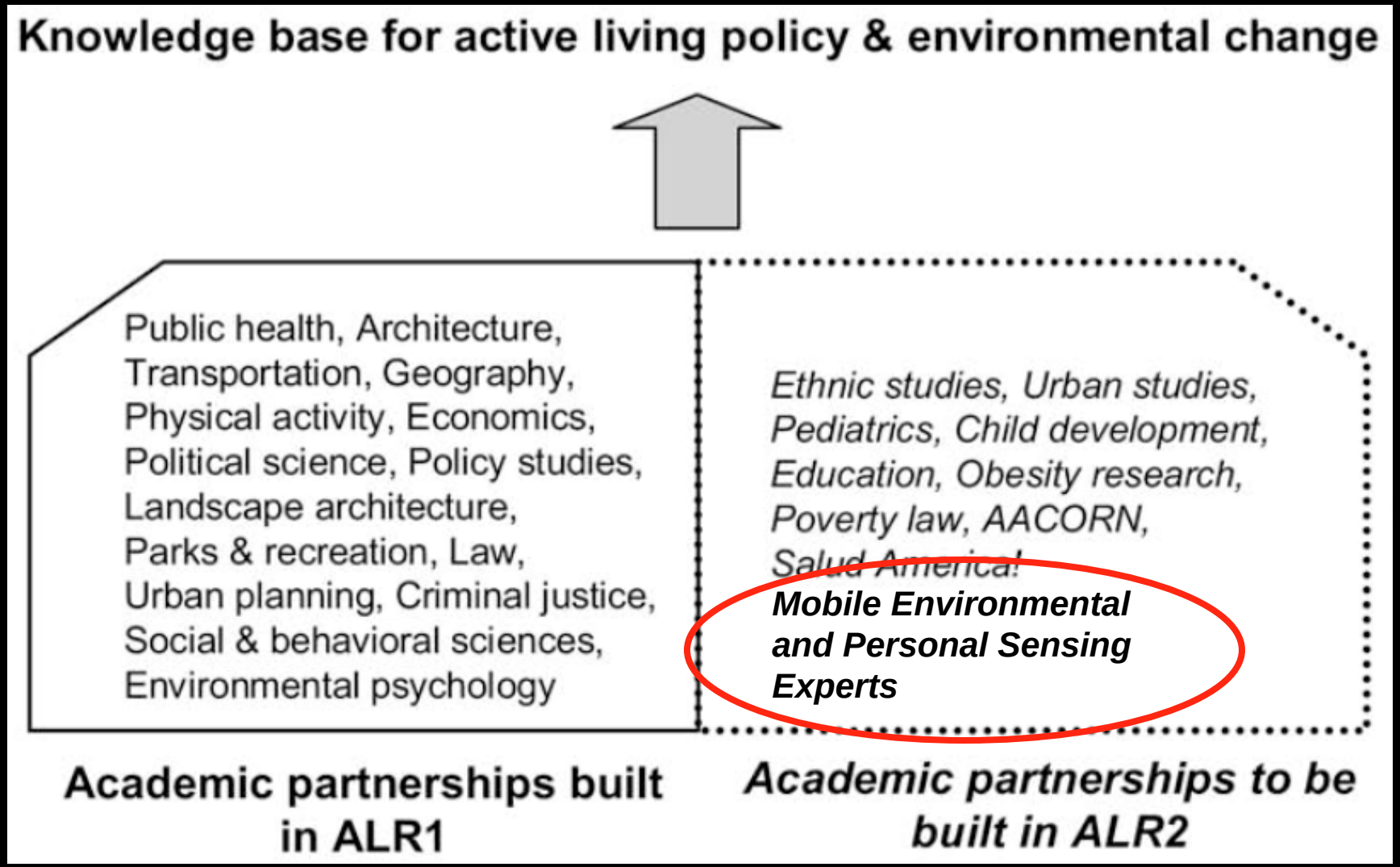
Methods for Active Living

- New Opportunities:
  - Measure what was previously impossible
  - Using existing devices and lifestyle - mobile phones
  - Distributed and easy to distribute - “apps”
  - Collaboration with existing professionals and experts - “robust and scalable”

Applications

- City bike planning - CycleSense
- PEIR (Personal Environmental Impact Report)
  - Air quality, fast food exposure
- Community assessment “campaigns”
  - Garbagewatch, Walkability audits
- Self-assessment

Glendale
Burbank
West Hollywood
Beverly Hills
Westwood
Los Angeles
Santa Monica
Culver City
Marina del Rey
Inglewood
Huntington Park
Bell
Cudahy
South Gate
Lynwood
Santa Monica Bay
Map data ©2009 Tele Atlas



Sallis et al. “The Active Living Research Program: Six Years of Grantmaking.” American Journal of Preventive Medicine (2009) vol. 36 (2) pp. S10-S21

CENS online

- http://urban.cens.ucla.edu/projects/cyclesense/
- http://research.cens.ucla.edu/
- http://urban.cens.ucla.edu/
- http://urban.cens.ucla.edu/projects/peir/