



Programmatically Deploying Code on End User Devices: Seattle and Sensibility Testbed

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Observations from AIMS

Crowdsourcing provides a useful platform

- Buying hardware does not scale!
- User safety is paramount
 - Security / Performance isolation
 - Privacy Policies
- Bundling with apps is important

Experimenters want rich interaction

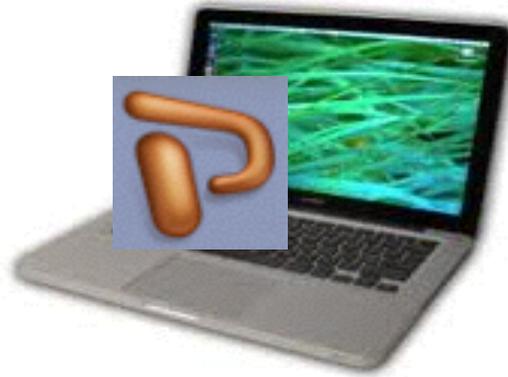
- Flexible expt type / timing / frequency
- Computation with a (**standardized?**) API
 - What abstraction?
- Does generality cause problems?

Our Vision



Securely Compute on Edge Devices

Our Vision



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Securely Compute on Edge Devices

Seattle Testbed

Open peer-to-peer application hosting

- Unknown users donate resources (VMs)
 - Performance isolated to 10%
- Unknown developers push code
 - Security isolated so “do no harm”
- Tit-for-tat like model for resource sharing
- Commonly used like a P2P PlanetLab

<https://seattle.poly.edu/>

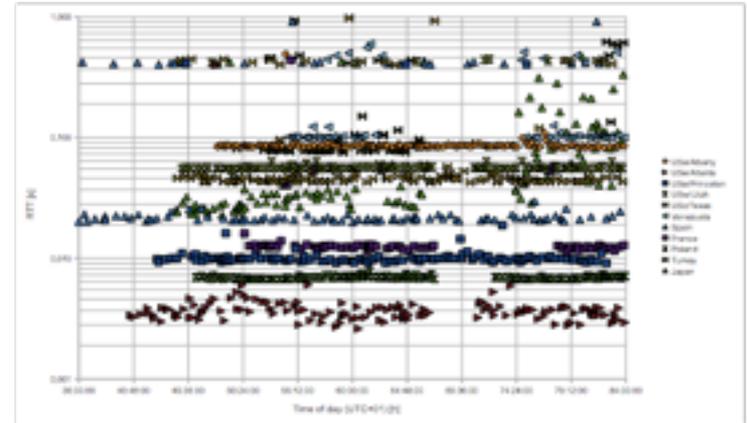
Practical use

- **Deployed services**

- Intelligent distributed storage
- Dynamic DNS remapping
- Transparent network optimization
- Censorship avoidance and measurement
- YouTube CDN mapping
- Etc.

- **Community support**

- Android / OpenWRT / Raspberry PI port
- Runs on PlanetLab, Emulab, GpENI, DOME, etc.
- GENI workshops, PyCon, etc.
- Port to Nokia N900 by Nokia
- NaCl integration by U Victoria / HP Labs
- iPad 2 port, tun / tap support, etc.

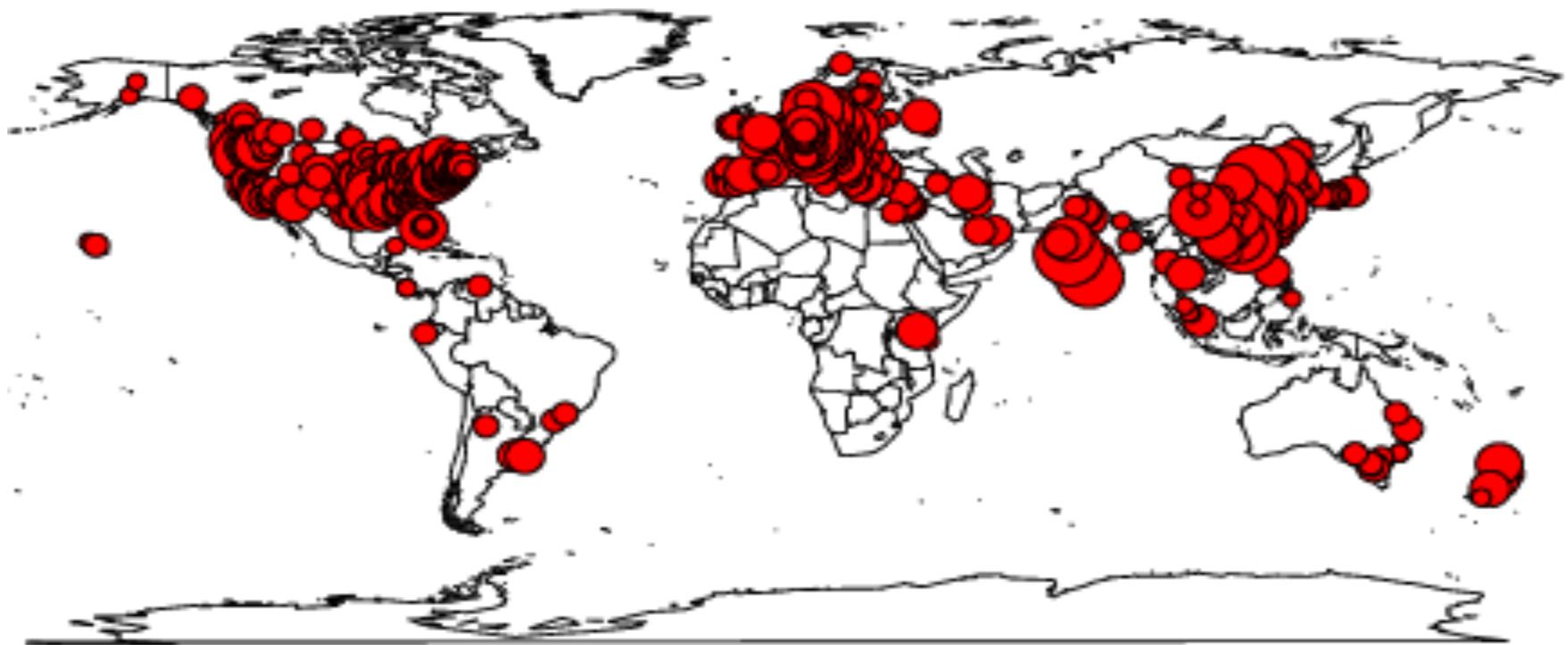


Educational use

- **Classroom experience**
 - Released in **Spring 2009**
 - Used in **>50** classes (so far)
 - 3 tutorials, 3 library references, etc.
 - 11 battle tested assignments (**Networking and Security**)
 - **Overlay routing, flow control, NAT / Non-transitive connectivity, Chord (DHT), web / chat servers, reference monitors, NAT tunneling, etc.**
 - OS classes are coming
- **Community support**
 - Supported by educational groups
 - NWDCSD, HandsOnSecurity
 - 2 SIGCSE papers, 3 CCSC workshops, etc.
 - Top ranked SIGCOMM Educational Resource
 - Coming in Computer Networking by Kurose & Ross
 - Most popular networking book!

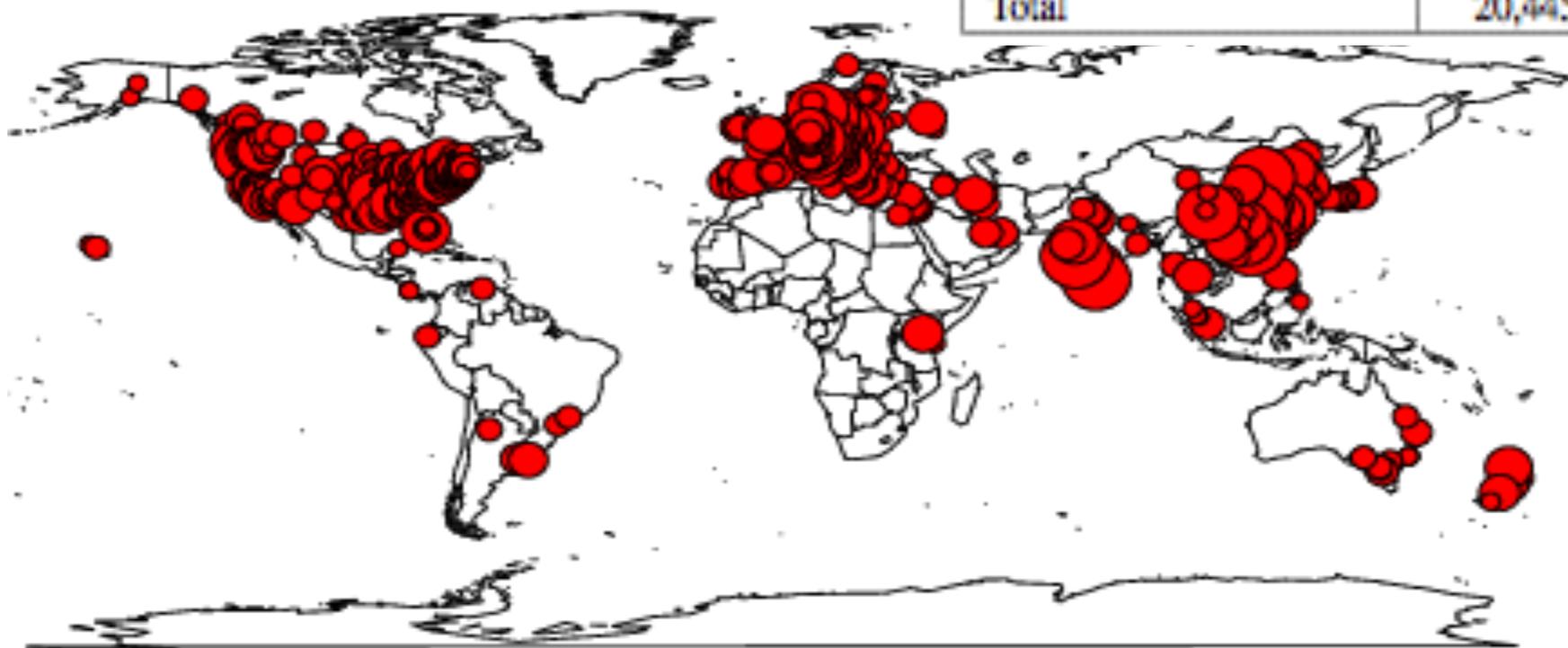


What Our Current Status?



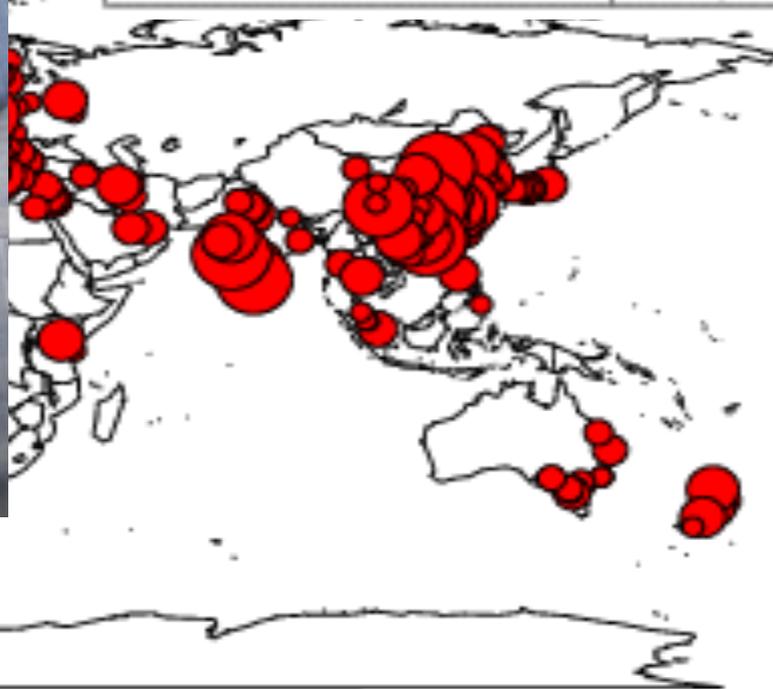
What Our Current Status?

Node Type	Quantity
University nodes	3,510
Home machines	7,594
Other Testbeds (PlanetLab, Emulab, etc.)	859
Phones	505
Unclassified	7,977
Total	20,445

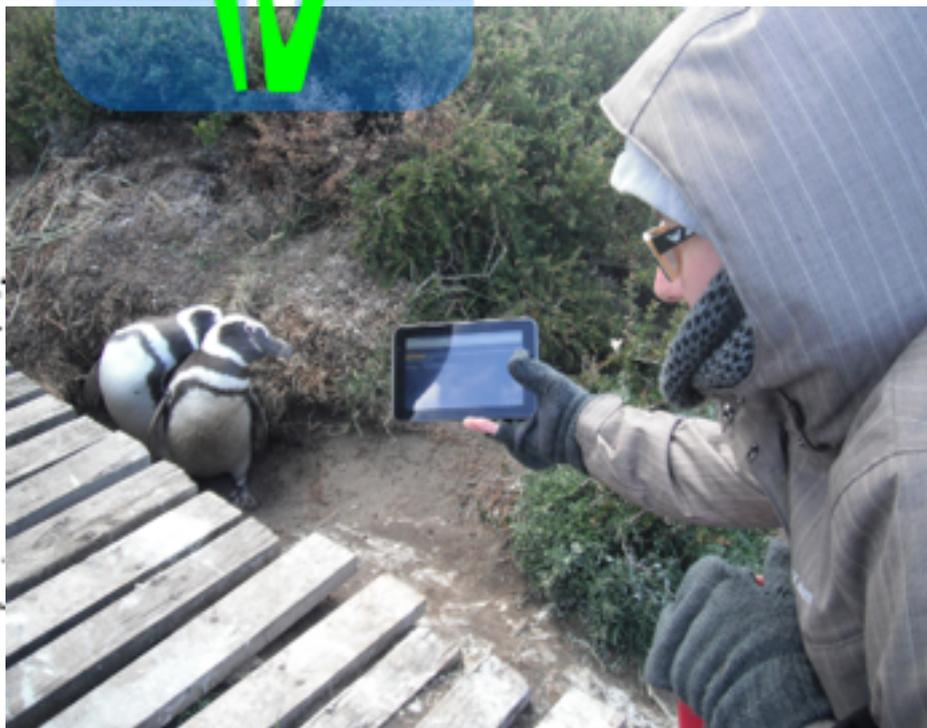


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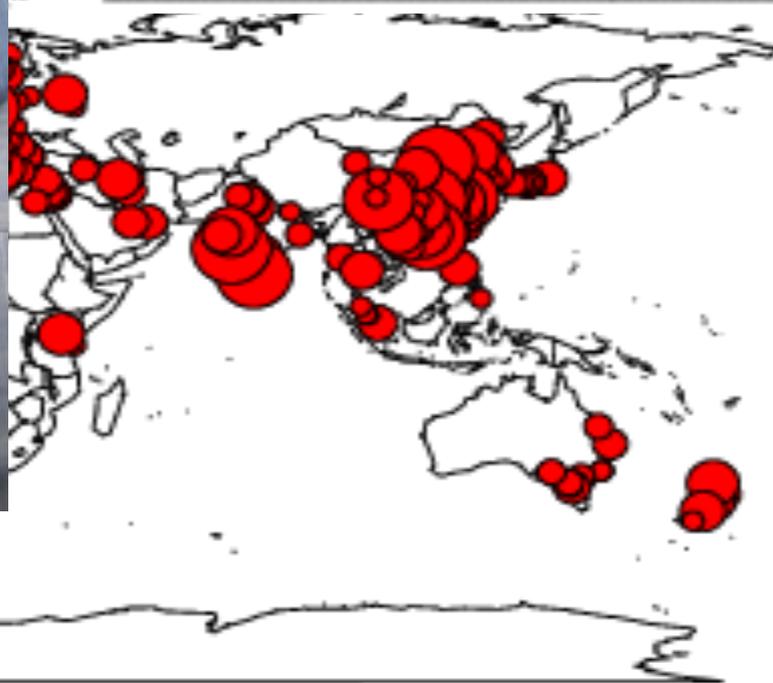
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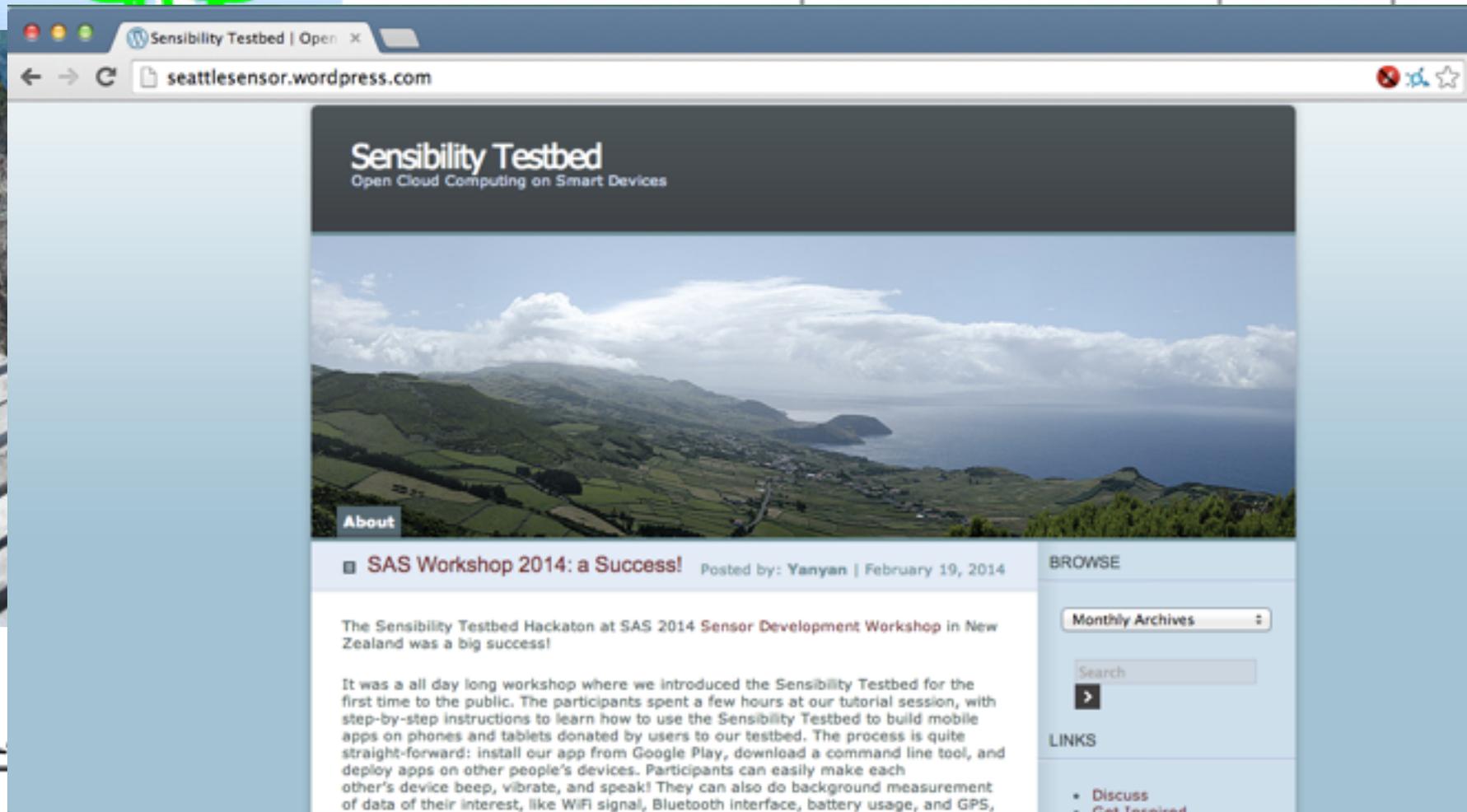
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The screenshot shows a web browser window with the URL `seattlesensor.wordpress.com`. The page header features the text "Sensibility Testbed" and "Open Cloud Computing on Smart Devices" above a large landscape photograph of a coastal town. Below the photo is a "BROWSE" sidebar with a "Monthly Archives" dropdown and a search box. The main content area displays a post titled "SAS Workshop 2014: a Success!" dated February 19, 2014, by Yanyan. The post text describes a workshop where the Sensibility Testbed was introduced to the public, detailing the process of installing the app and using it on various devices for data collection.

Sensibility Testbed
Open Cloud Computing on Smart Devices

About

SAS Workshop 2014: a Success! Posted by: Yanyan | February 19, 2014

The Sensibility Testbed Hackaton at SAS 2014 Sensor Development Workshop in New Zealand was a big success!

It was a all day long workshop where we introduced the Sensibility Testbed for the first time to the public. The participants spent a few hours at our tutorial session, with step-by-step instructions to learn how to use the Sensibility Testbed to build mobile apps on phones and tablets donated by users to our testbed. The process is quite straight-forward: install our app from Google Play, download a command line tool, and deploy apps on other people's devices. Participants can easily make each other's device beep, vibrate, and speak! They can also do background measurement of data of their interest, like WiFi signal, Bluetooth interface, battery usage, and GPS,

BROWSE

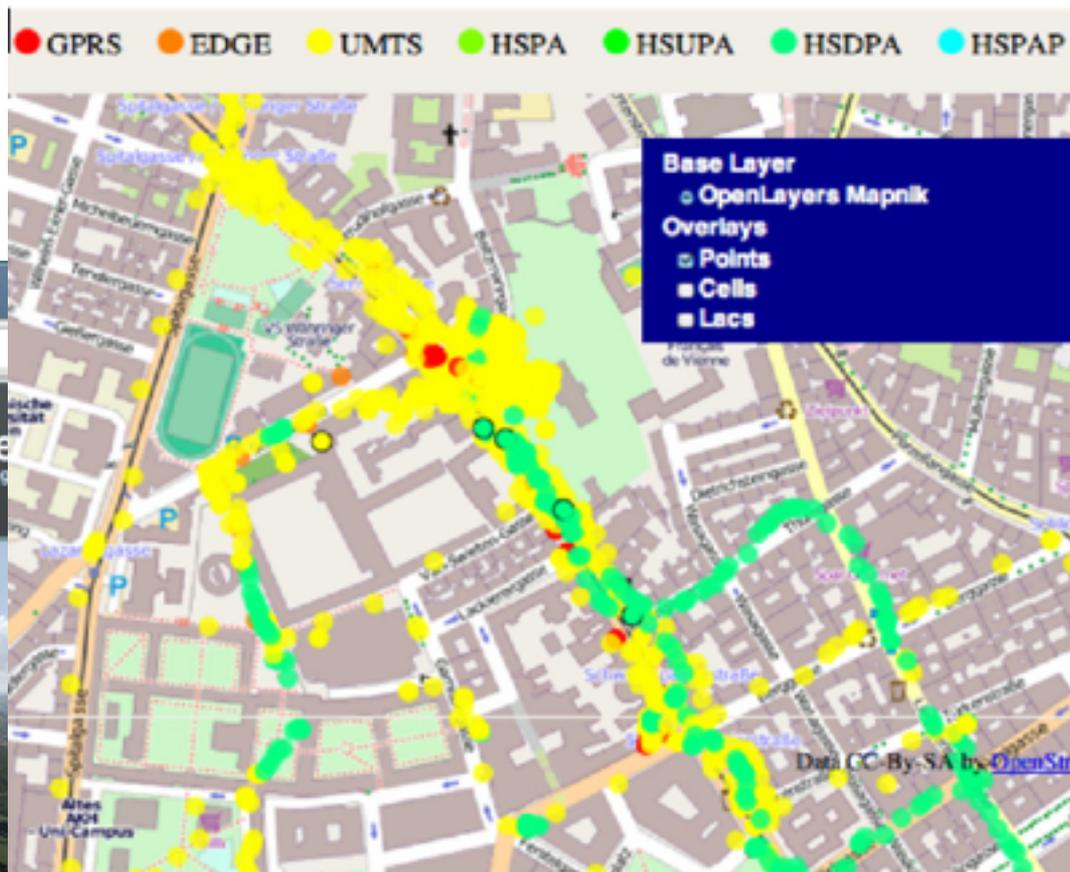
Monthly Archives

Search

LINKS

- Discuss
- Get Inspired

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Sensibility Testbed | Open x

seattlesensor.wordpress.com

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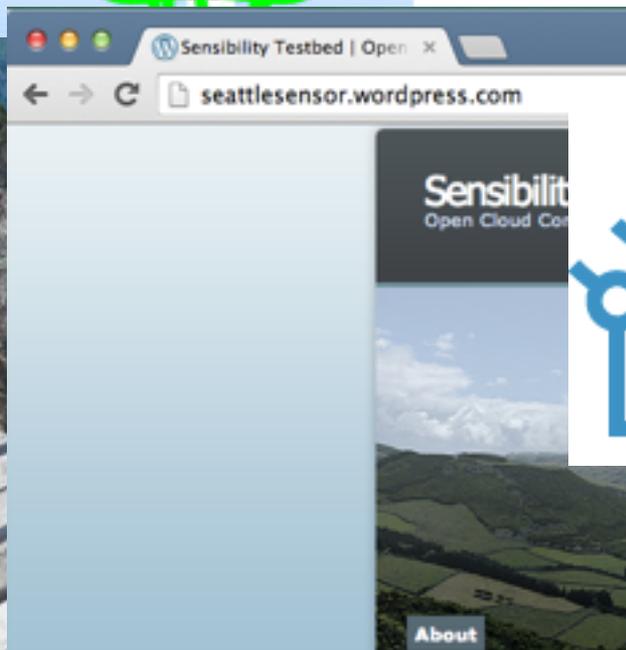
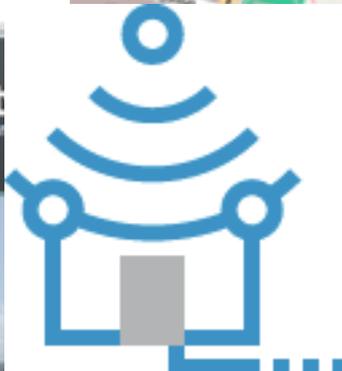
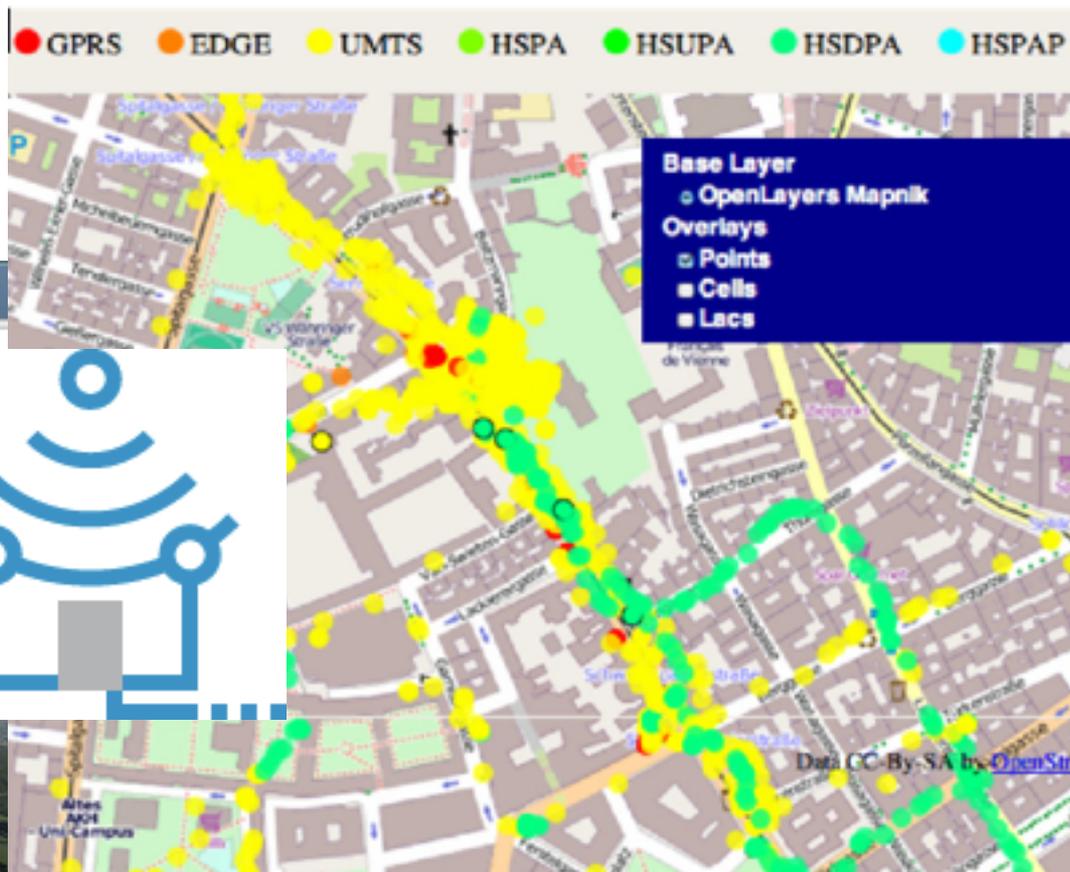
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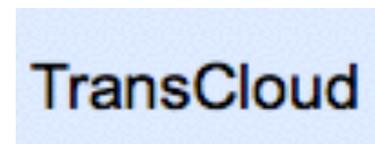
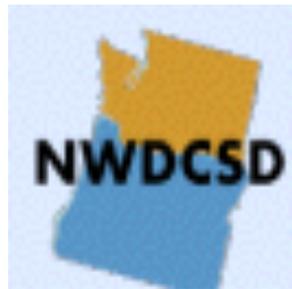
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Demonstration

Typical Seattle Workflow

- **Registration**
- **Download installer**
- **Acquire resources**
 - **Use Seattle public clearinghouse**
- **Deploy application**
- **Use shell to locate and control resources**
- **(All Pairs UDP Ping?)**

Thanks to:



Seattle / Sensibility conclusion

- Seattle widely deployed around the world
 - Geographic diversity, network diversity, device diversity...
 - **Tens of thousands** of installs, **thousands** of VMs online at a time, **thousands** of developers
- Battle tested educational / research / app platform!
- Discussion: Where might we fit in?
 - Testbeds (Seattle / Sensibility) for experimentation
 - Common library for experiments
 - Collab(?) with mobiperf (expose their measurement libs)
 - Toolkit for easily building customized testbeds
 - Seattle, BISMark, ToMaTo, Sensibility Testbed, ICLab, SocialCloud, SciWiNet(?), PhantomNet(?), Mitate(?), etc.

<https://seattle.poly.edu/> SeattleOnAndroid (Google Play)

Thanks!

