



**Crowd Soft Control:** (CSC) exert limited control over the temporal and spatial movements of mobile users by leveraging the built-in incentives of location-based gaming and social applications.

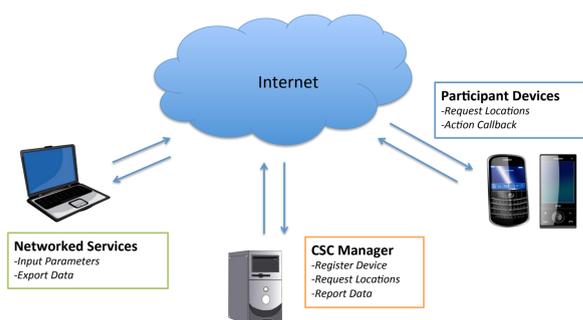
*Augment community supported mobile network services*

- Community Sensing
- Data Muling
- Pocket-Switched Networks
- Mobile Network Alleviation

*Coverage Without Scale*

- Control comes from existing application incentives (such as game objectives).
- Repurpose application incentives for measurement requirements.

### CSC Implementation:



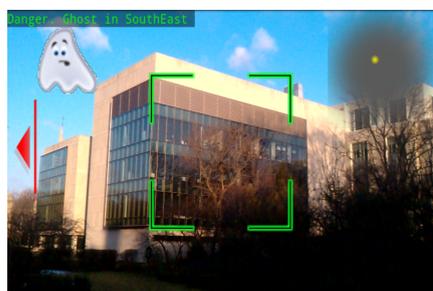
**Networked Service:** A third-party networked service that submits requests for assignment to participating devices.

**CSC Participant Devices:** Participant mobile devices, such as those of players in a third-party location-based game, registered with the CSC manager and accepting requests from it.

**CSC Manager:** The manager, acting as a match maker, that assigns networked service requests to devices according to a device's capabilities and physical and temporal location.



**GhostHunter:** Augmented Reality Game for Android



CSC was implemented as a library for Android. The library is integrated into existing mobile applications, where it gathers measurement request information from the CSC Manager, and incorporates the desired locations into the mobile application with the appropriate incentive.

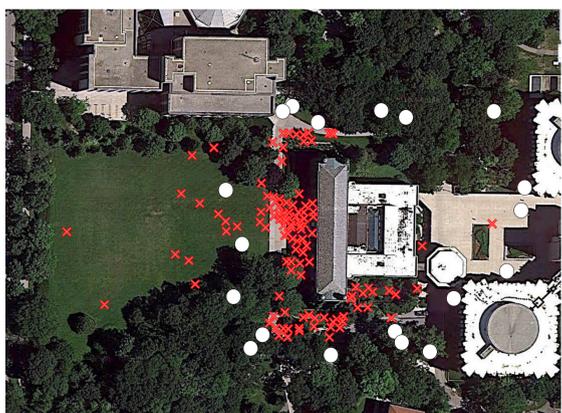
**Networked Service Requirements:**

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      <point>42.23;-87.345</point>
      <point>42.3;-87.554</point>
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    <elasticity>100</elasticity>
  </area>
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  <end>2011-9-03 11:59:59</end>
  <action>
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  </action>
</requirements>

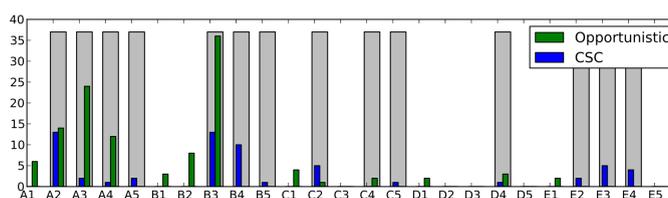
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### Case Studies and Evaluation:



#### Case Study 1: Photo Hunting

Photo hunting for 3-D reconstruction of landmarks and building requires complete coverage of all sides of the building. We crawled Flickr for photos of Deering Library at Northwestern's Campus (Red X). These cluster around the iconic front of the building with very little from the back of the building. CSC's measurements (White Circle) provide complete coverage of the building's faces.



#### Case Study 2: Noise Pollution

Noise pollution requires even spatial coverage. We compared opportunistic measurements from participants (Blue Dots) against our CSC implementation (Red Dots). The opportunistic measurements follow along heavy traffic corridors. Through CSC we can achieve broad and even spatial coverage.

