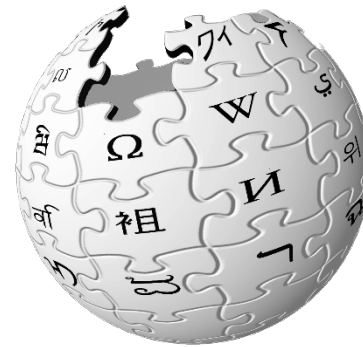


Field Trial of Tiramisu: Crowd-Sourcing Bus Arrival Times to Spur Co-Design

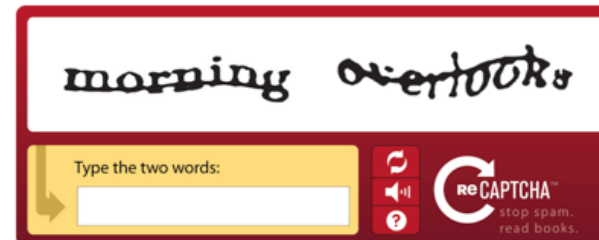
**John Zimmerman¹, Anthony Tomasic¹, Charles Garrod², Daisy Yoo¹, Chaya Hiruncharoenvate¹,
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Crowd-sourcing Social Computing



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The Fourth Generation of Computing

TABLE 1. A framework for comparing computing generations, inspired by Mark Weiser.

Generation	Time frame	Human–computer ratio	Canonical device	Application	
				Initial	Follow-on
1	Mid-1930s	Many–1	Mainframe	Scientific calculation	Data processing
2	Late 1960s	1–1	PC	Spreadsheet	Database management, document processing
3	Late 1980s	1–many	Inch/foot/yard	Calendar and contact management, human–human communication	Location-based services, social media, app ecosystem, education
4	Mid-2000s	Many–many	Cloud/crowd/shroud	Personal navigation and entertainment	Health advisors, educational assistants, supply chain logistics

Service Design (is about improving user experiences)



1. Difference between products and services: *value-in-exchange* to *value-in-use*
2. Challenges to HCI, from *usability* to *user experiences*

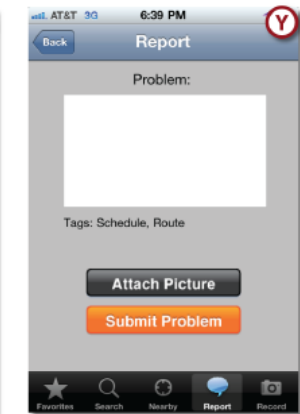
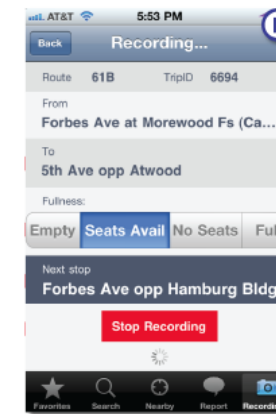
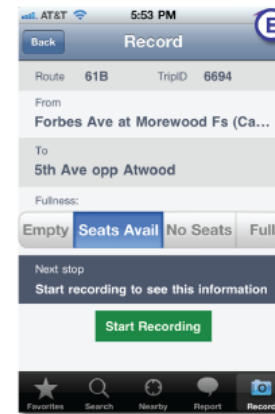
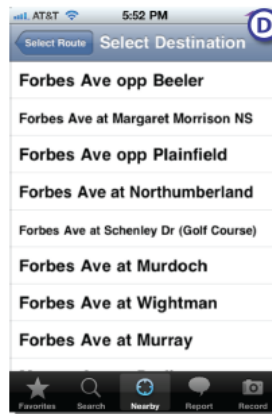
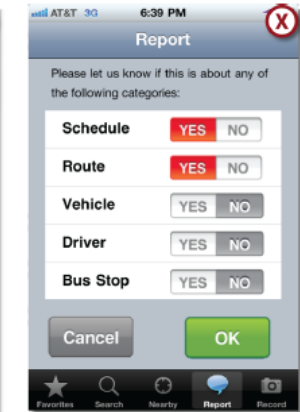
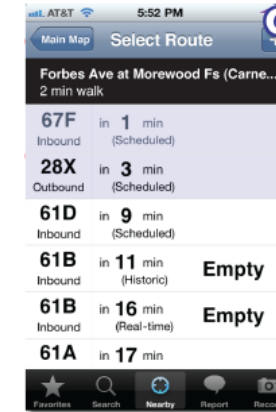
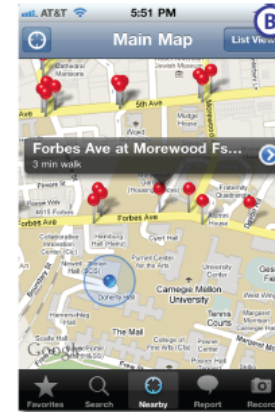
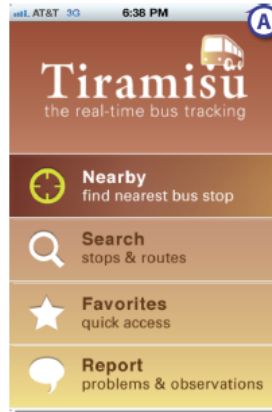
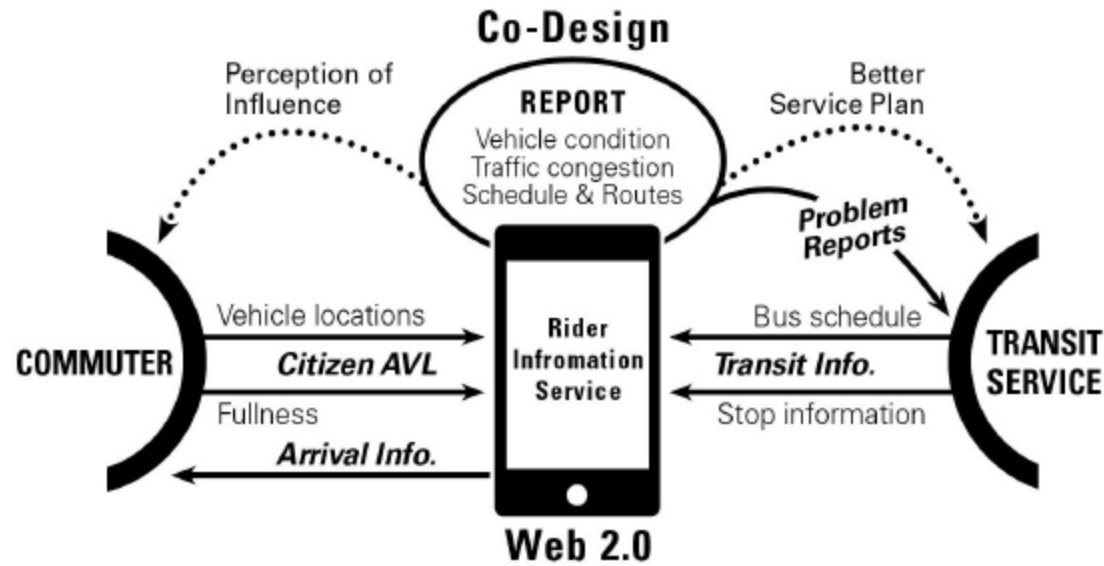
Crowd-sourcing social computing systems provide a rich space to investigate the intersection of HCI and service design.

<https://www.youtube.com/watch?v=BeEUemtdoJQ>

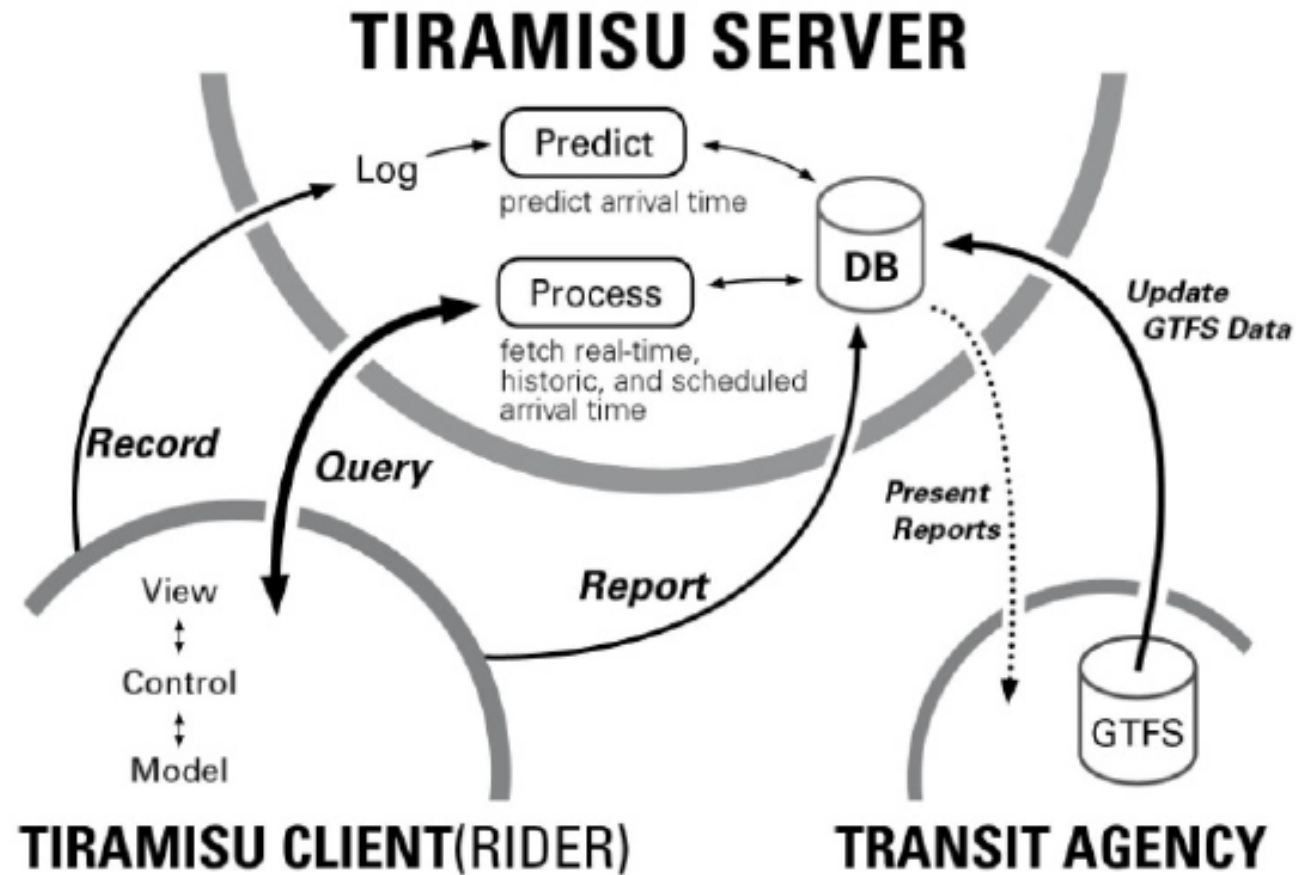
Research Question & Challenges

- How to use service design theory and crowd-sourcing technology to improve public services?
- Challenges:
 - Difficult to prototype.
 - Improve contribution
 - Customers perform some of the tasks of a service.
- Application: Transit commuters working as sensors in the transit network.

Tiramisu (Pick me up)



System Overview



Field Trial

- Not lab-based.
- Participants must be regular commuters.
- Two weeks of usage (in-software data-log)
- 28 participants: 16 fulltime students, 5 fulltime workers, and 7 part-time students who also worked fulltime

Findings - Participation

- Participants provided traces (the participation rate) for approximately 56% of their sessions.

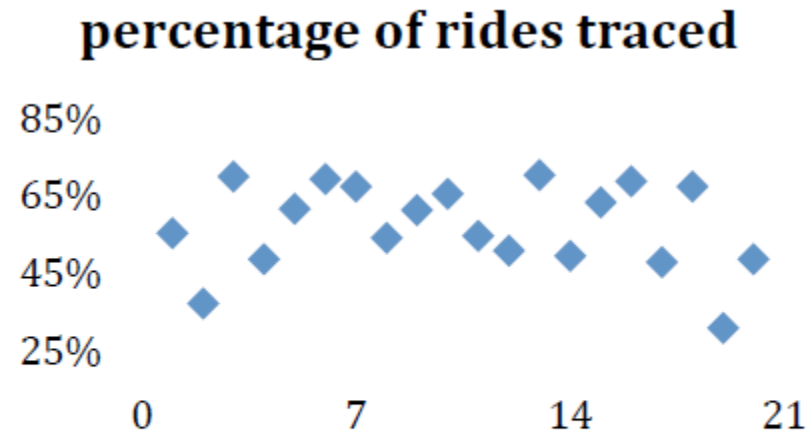


Figure 5. Change in percentage of tracing over the course of the field trial in days (14-paid followed by 7-unpaid days).

Findings - Bootstrapping

- Overall, 13% (2,132 out of 16,263) of all impressions were created by data participants supplied and 87% came from the schedule.
- In general, participants really liked the real-time data, when it was available.

Findings – Co-design

- 14 participants submitted 22 problem reports.
 - 9 related to transit infrastructure
 - 9 related to schedule information
 - 4 reported the software crash.

Findings – User Experiences

- Several participants even expressed concern when we cabled their phone to our computer, fearing we would delete the software

Table 1. Average TAM 3 ratings across all participants.

Measure	Ave	STD
Utility	5.51	1.25
Ease of use	5.56	1.55
Enjoyment	5.68	1.08
Output quality	4.82	1.60
Results of use	5.59	1.03
Behavioral Intent	5.90	1.44

Discussion

- Participation: novelty effect, payment, information value
- Bootstrapping: no need for initial set of crowd-sourced data
- Co-design: lack of trust among commuters
- User Experience: increased likelihood of acceptance

Conclusion & Future Work

- Tiramisu's design integrates theories from service design on co-production and co-design, with the intention of getting commuters to engage more deeply with the transit service and begin to feel they can influence its service offerings.
 - Anthony Tomasic, John Zimmerman, Charles Garrod, Yun Huang, Terence Nip, and Aaron Steinfeld. 2015. [The performance of a crowdsourced transportation information system](#). Transportation Research Board 94th Annual Meeting. Transportation Research Board.
- Anthony Tomasic, Aaron Steinfeld, John Zimmerman, Yun Huang. 2014. [Motivating contribution in a participatory sensing system via quid-pro-quo](#). In Proceedings of the 17th ACM Conference on Computer Supported Cooperative Work and Social Computing (CSCW '14).