EAGER: SOCIUS: Socially Responsible Smart Cities

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Objectives

- Utilize CPS infrastructure for better management of city services, taking responsibility for monitoring the needs of its citizens.
- Develop a framework to estimate the location of people-in-need from sporadic measurements.
- Develop a proof-of-concept implementation of food supply-demand management for people-in-need.
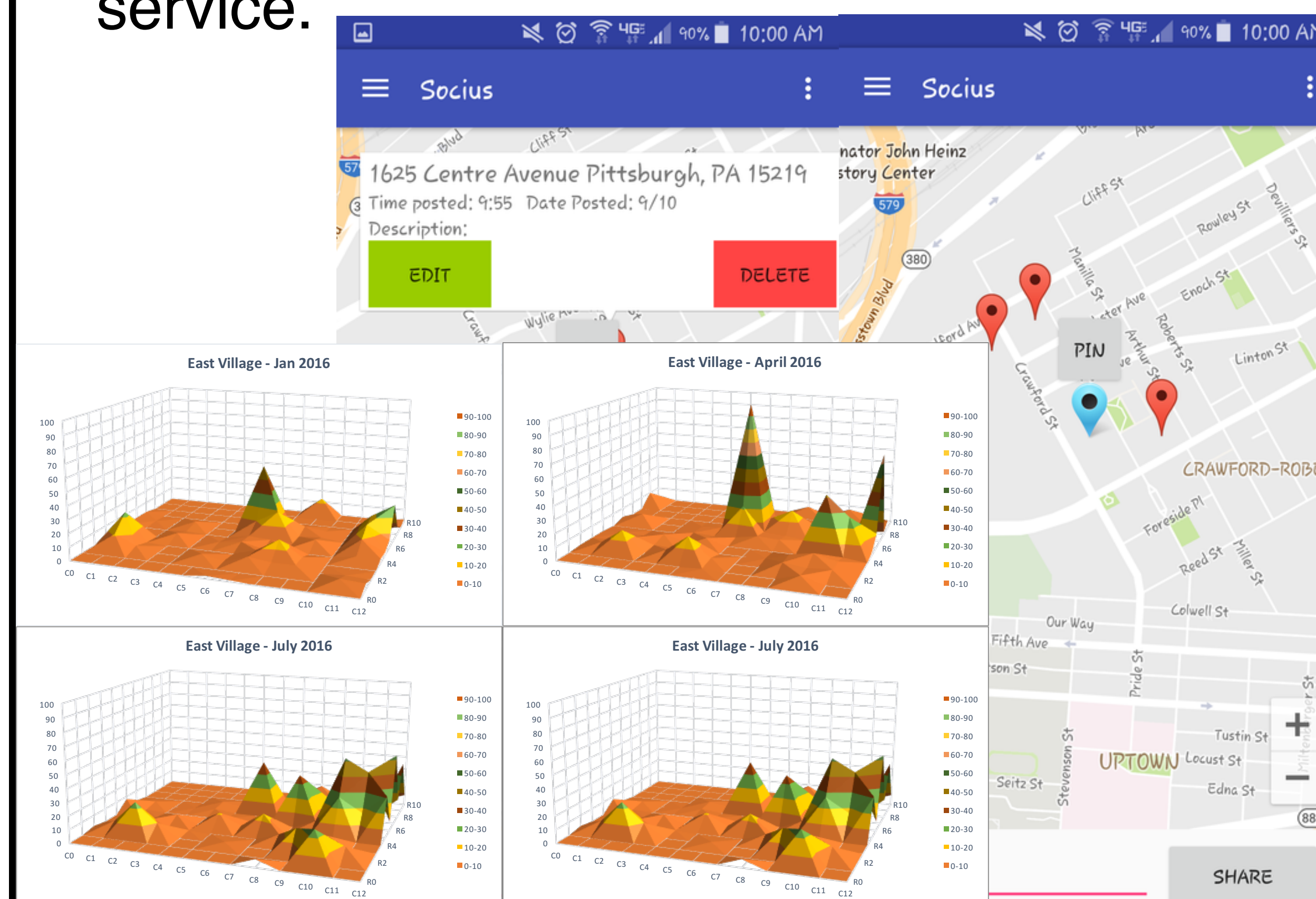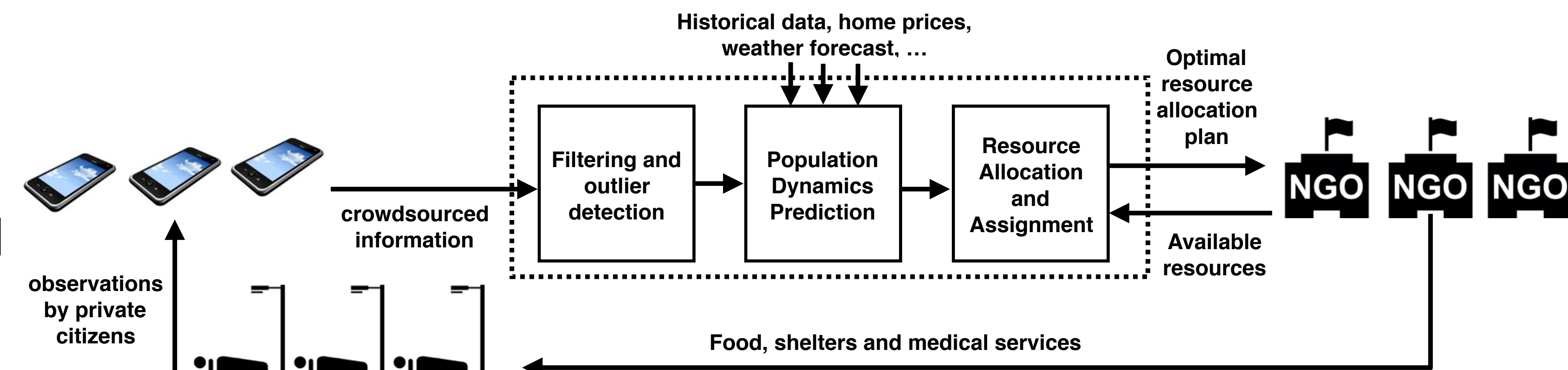
Key Challenges

- System-scale information fusion and planning algorithms.
- Principles, interaction techniques and measures for smart city CPS with human-in the loop.
- Develop communication channels for smart city community services.
- Study the social effect

Students

- Debbie Tsai (UCLA)
- Vincent Kang (CMU)
- Lisa Otto (CMU)

Crowdsourced Sensing:

- Developing location-based smart services for the homeless population.
- Performing social studies to understand the benefits and risks for such location-based service.

Fair algorithms: what is fair and how to decide?

- Conducted surveys to determine what fair allocation means to different stakeholders - donors, NGOs, recipients.
- Combination of efficiency, equity, and equality.
- Need for a method to define "levels of needs" for an equity model; otherwise an equality model that treats all recipient same
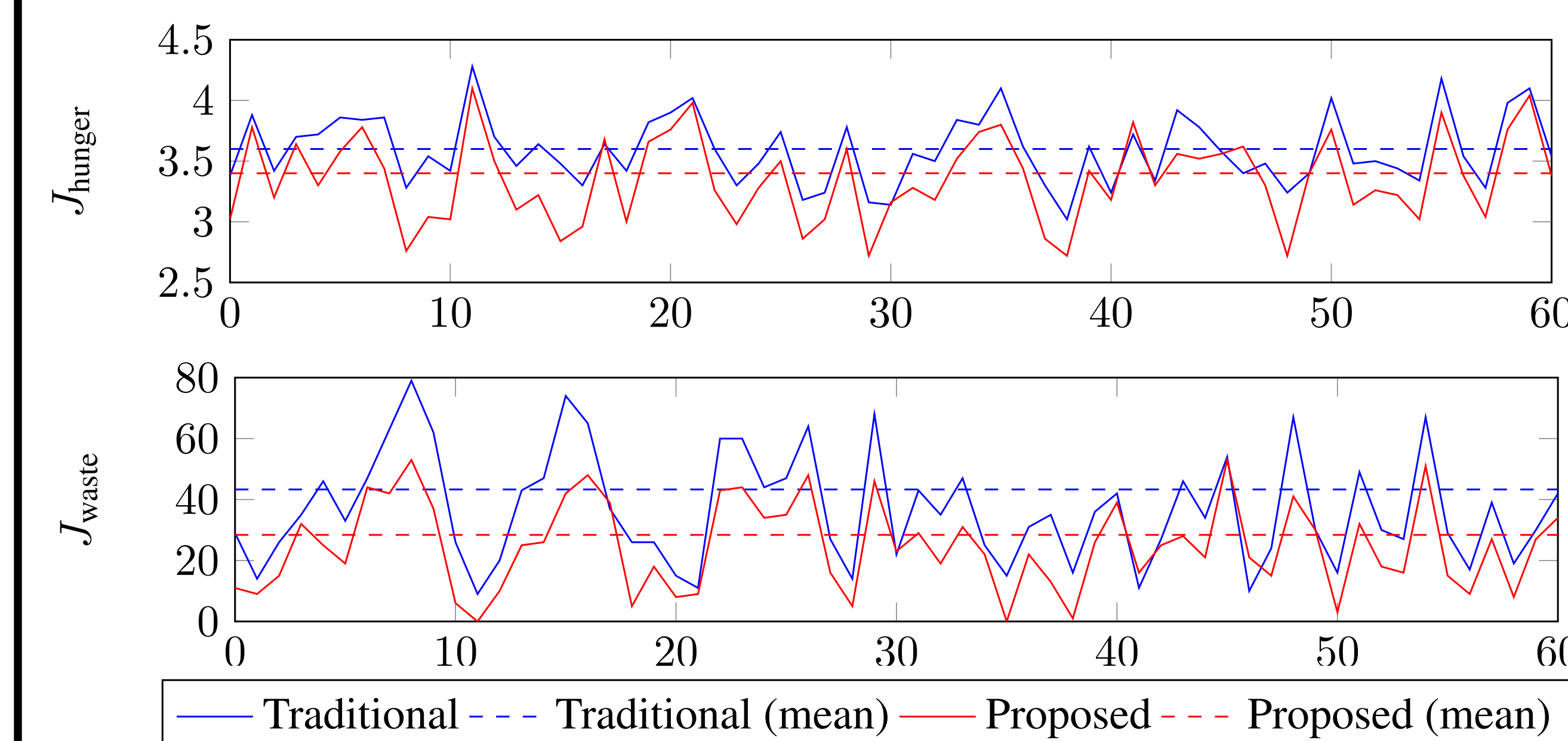

Optimal Social Welfare:

- **Resource allocation:** assign service locations to mobile NGOs
- **Resource Matching:** pair people-in-needs with available resources
- **Social Welfare criteria:**
- Percentage of individuals serviced
- Average hunger
- Percentage of food waste

$$\underset{c_i, I(\mathrm{NGO}_i, \mathrm{PiN}_j)}{\text{maximize}} \quad J_{\%\text{serviced}} + J_{\text{hunger}} + J_{\text{waste}}$$

$$\text{subject to} : \; I(\mathrm{NGO}_i, \mathrm{PiN}_j) = 1 \Leftrightarrow \|c_j - l_j\| \le r_j$$

$$\sum_{i=1}^{N_{\mathrm{NGO}}} I(\mathrm{NGO}_i, \mathrm{PiN}_j) \le 1$$

$$\sum_{j \in \{k \;|\; I(\mathrm{NGO}_i, \mathrm{PiN}_k) = 1\}} h_j \le s_i$$