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Status Quo of Parking Location Choice in MATSim

Rashid A. Waraich

IVT
ETH
Zurich

August 2010

Institut für Verkehrsplanung und Transportsysteme
Institute for Transport Planning and Systems

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Why is parking important?

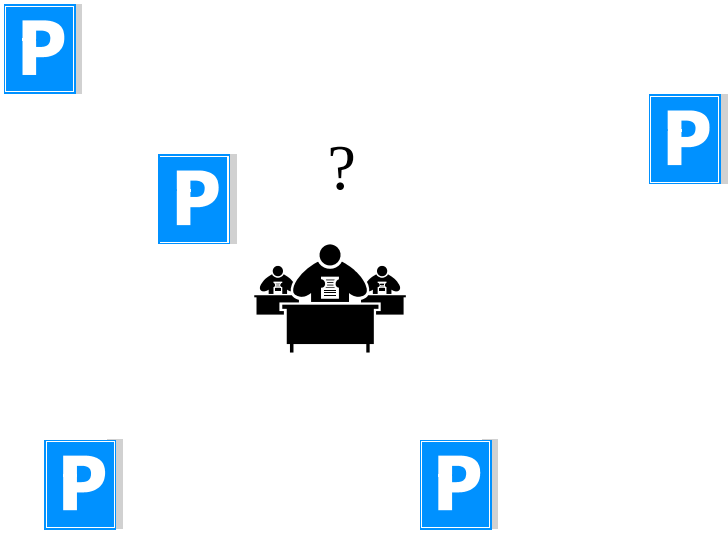
- Some studies identified 30% to 50% of traffic at central business district as parking search traffic
- Other studies report that parking policy can influence both transportation mode and traffic volumes

Problem definition

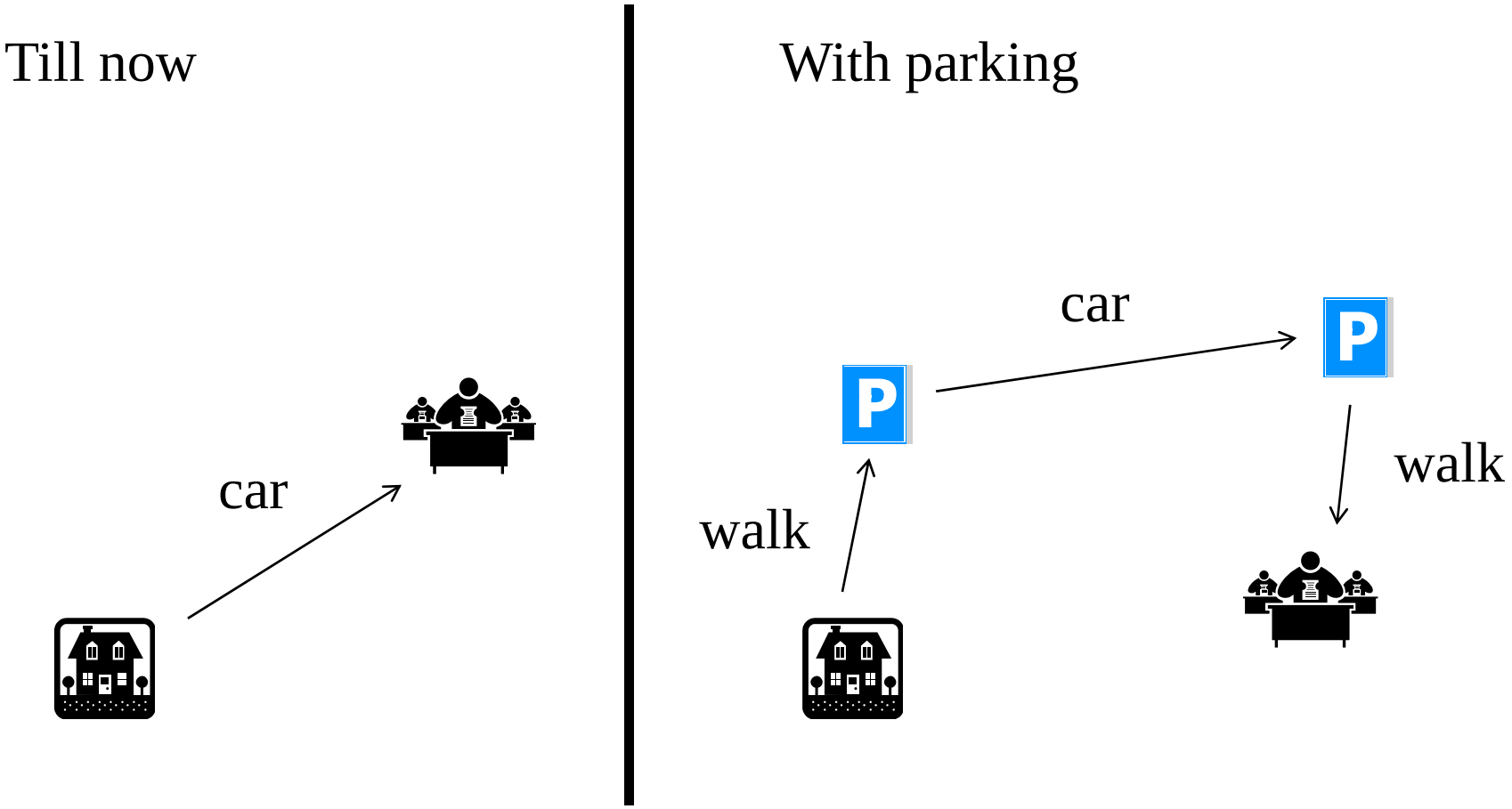
For a given activity destination, select from the set of public parkings in the neighbourhood so that the agent‘s utility is maximized?

Parking characteristics

- price
- walking distance
- capacity
- parking access
- parking type
- (Etc.)

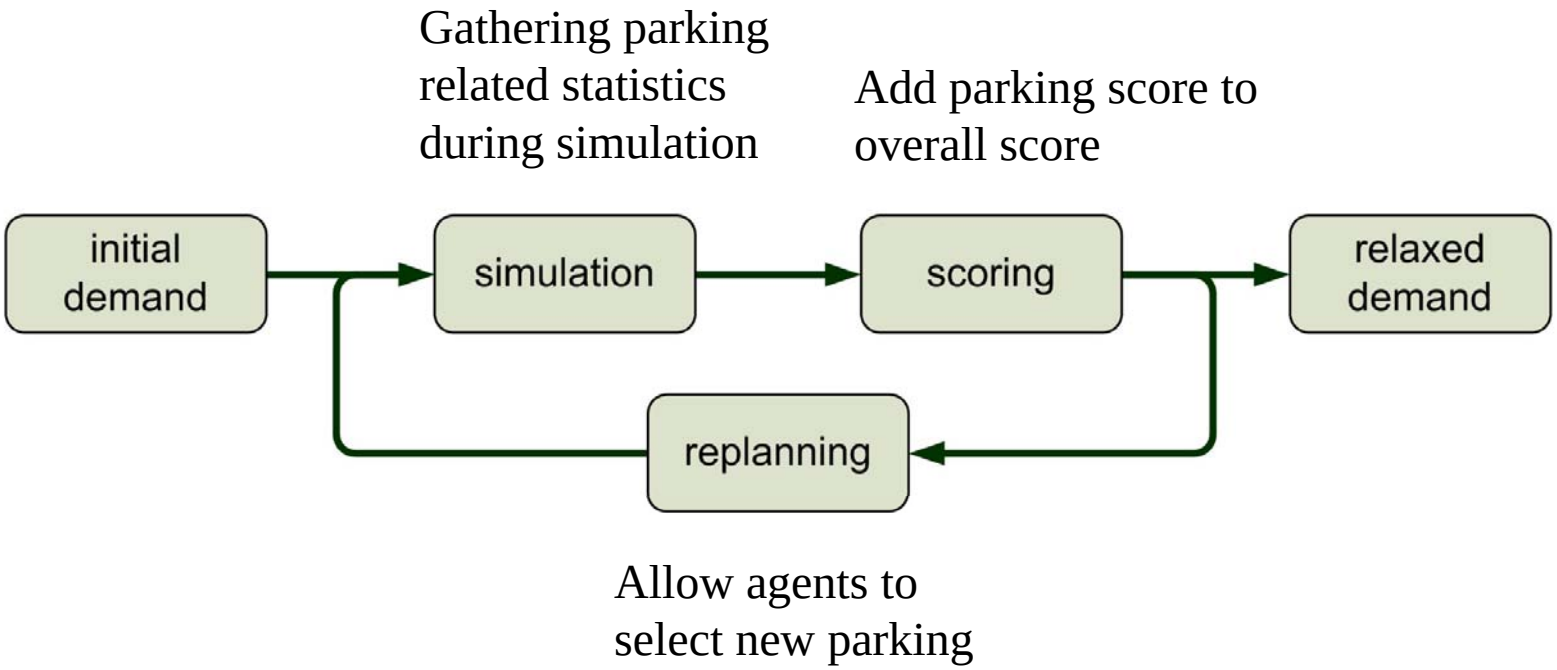


No changes to the MATSim simulation



Parkings modelled as short activities (e.g. one minute).

Parking location choice - implementation overview



Parking scoring function for experiments

- Components of the parking scoring function:
  - ParkingPriceScore = f(parkingDuration, parkingFacilityPriceRate, income)
  - ParkingAccessScore = f(access time, any other access disutility)
  - ParkingWalkingScore = f(distance, targetActivityDuration/Type)
  - ParkingCapacityViolationScore = f(how full is parking at arrival time) => this can be explicit or implicit

- Weightes chosen:
  - Parking gets a total score between 0 and 5
  - ParkingPriceScore, ParkingAccessScore and ParkingWalkingScore get same weight, whereas ParkingCapacityViolationScore gets 10 times higher weight

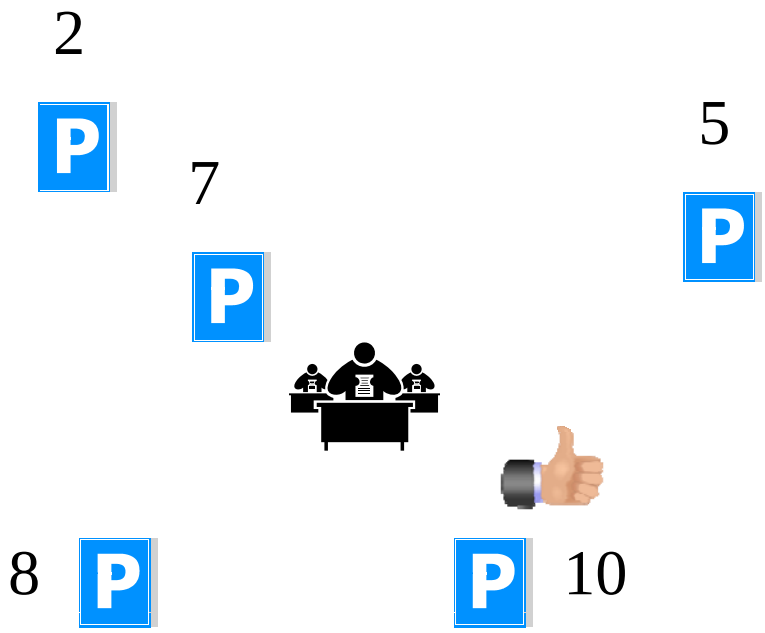
Parking location choice - replanning

Select, which parking to replan from all parkings done during the „previous“ day:

If (setOfParkingsWithCapacityViolation not empty){
    Select randomly one parking from setOfParkingsWithCapacityViolation;
} else {
    Select randomly one parking from from all parkings.
}

Parking location choice – replanning (cont.)

Try to find parking with potentially higher score for the selected target activity (based parking statistics/estimates gathered during traffic simulation) in neighbourhood of target activity:

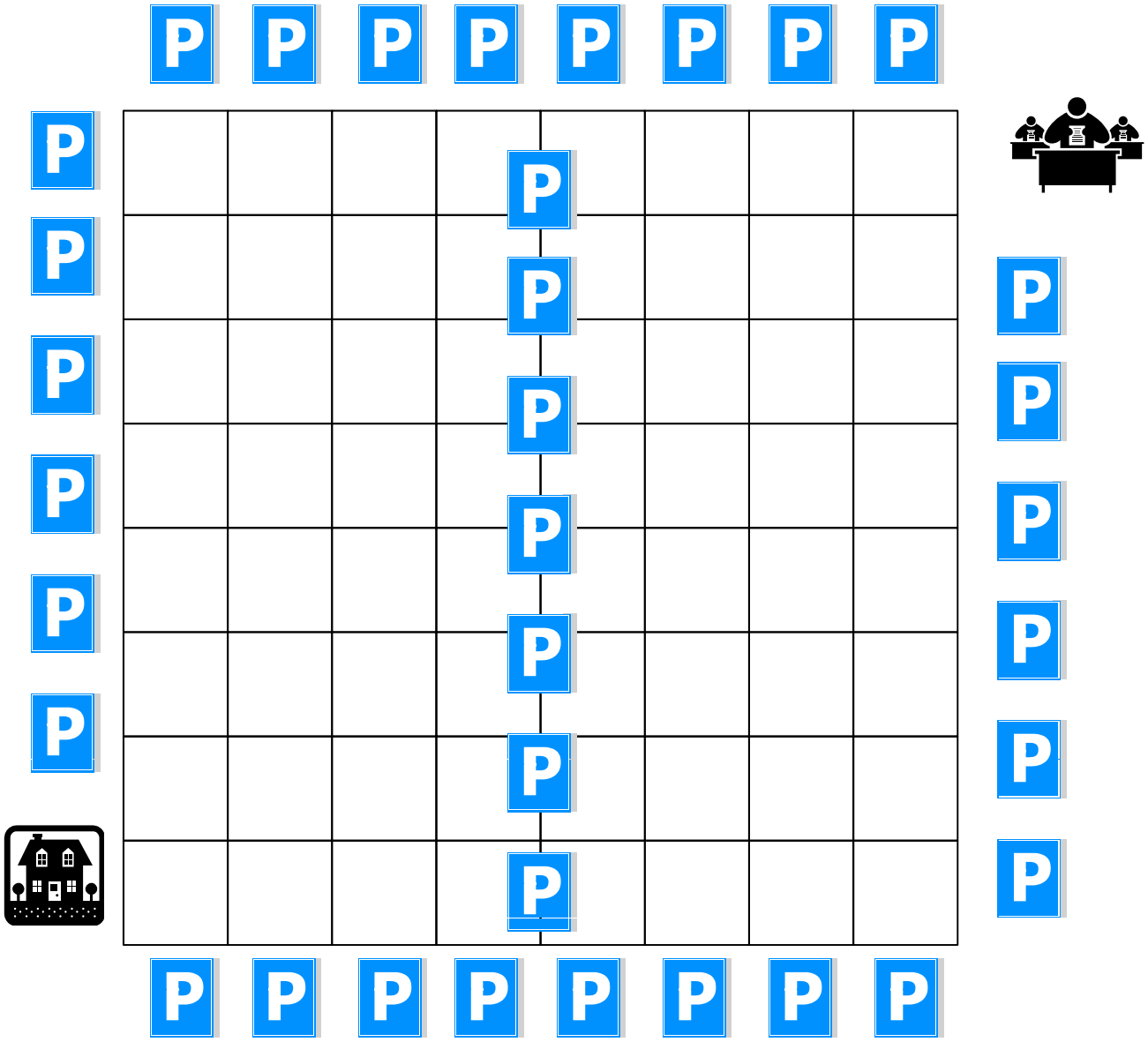


(the parking type choice also happens in this step)

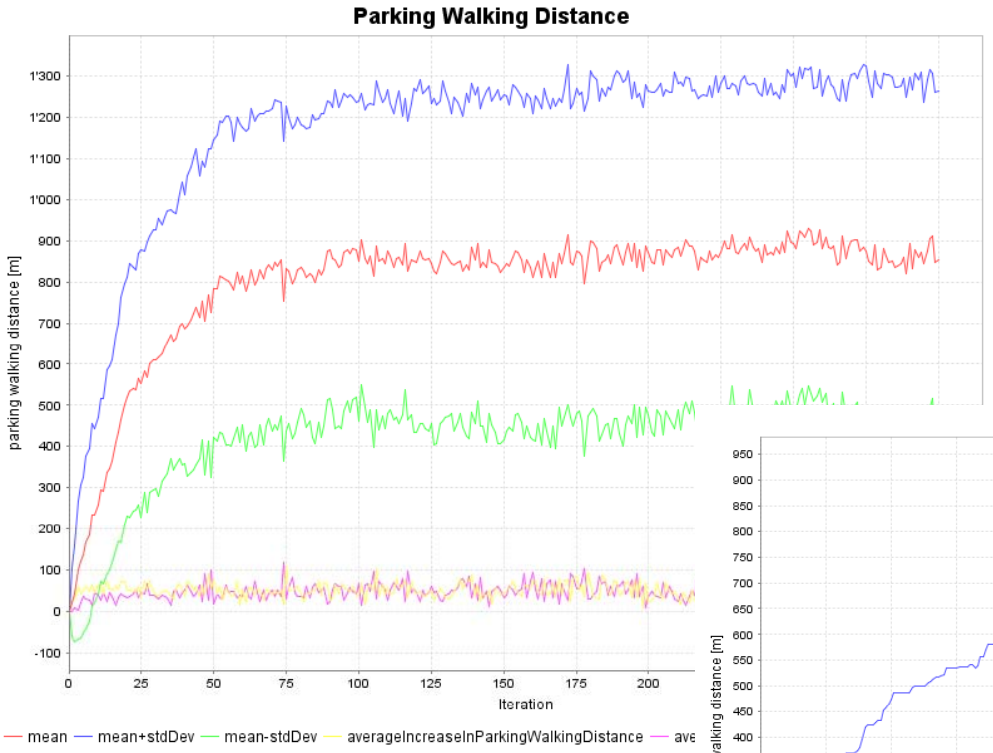
Experiments and sensitivity analysis

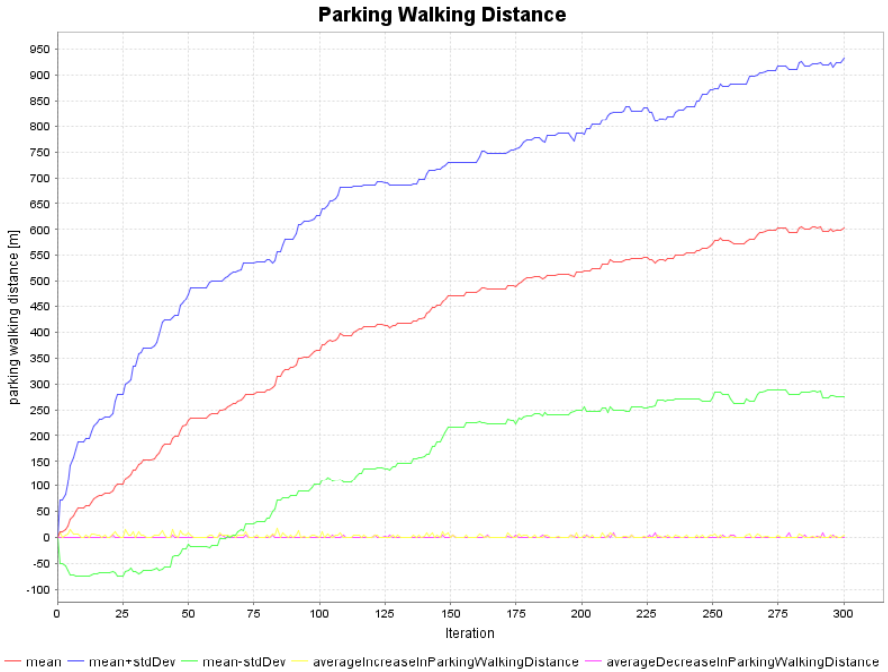
- Using small test scenario
- Run with one million agents on the test network tried out

Scenario layout (chess board)

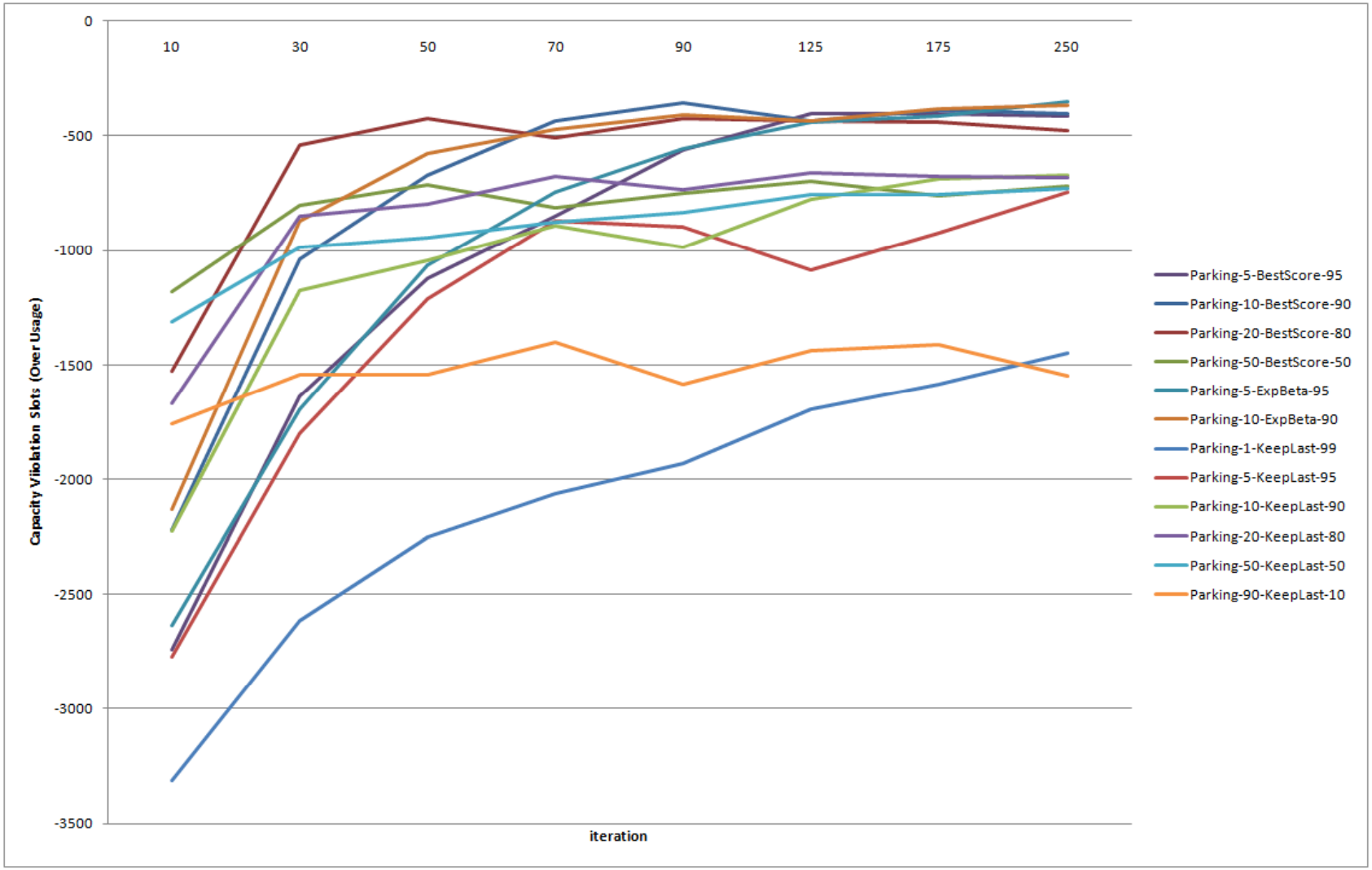


Does system relax? How many iterations?

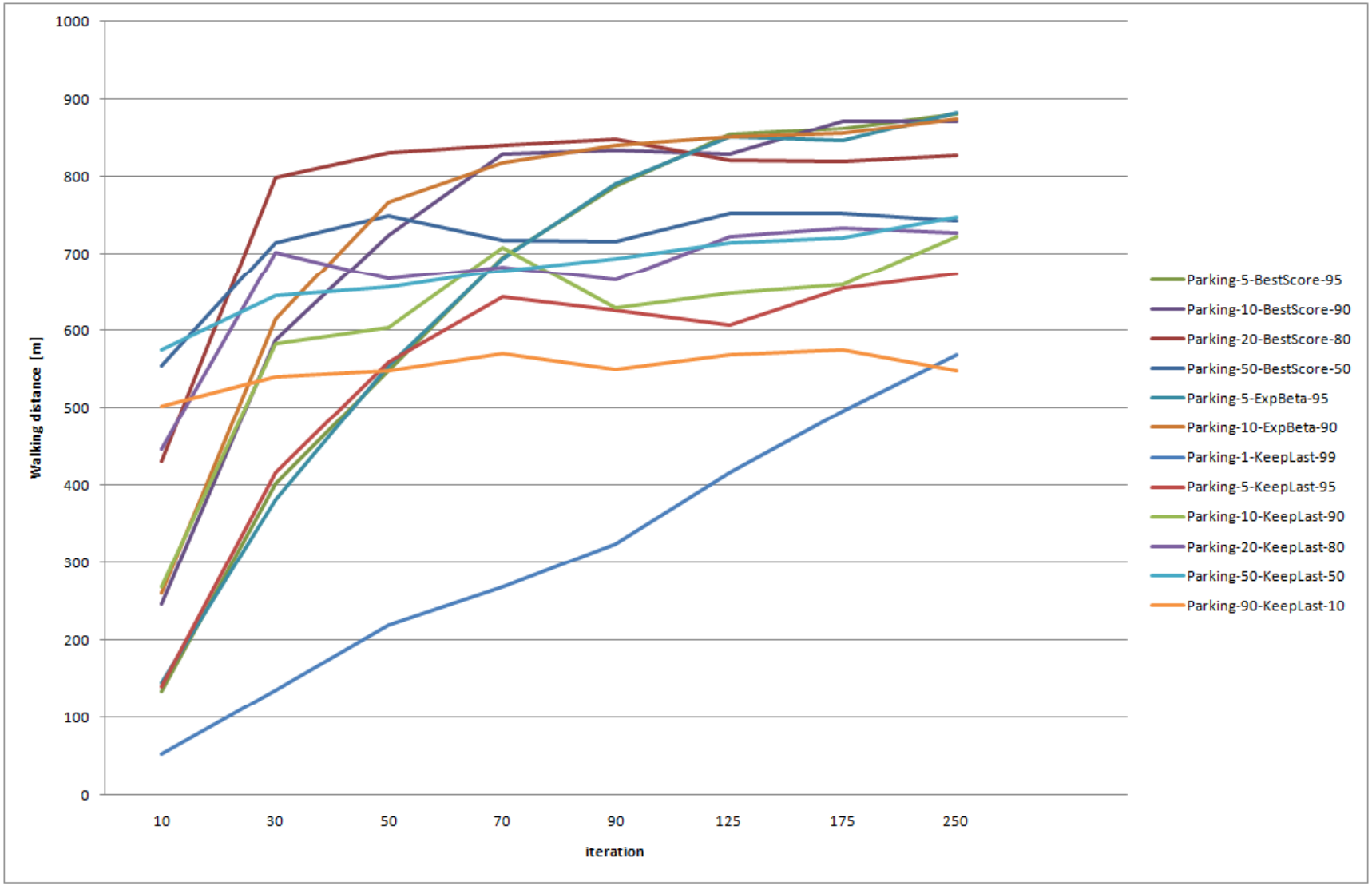




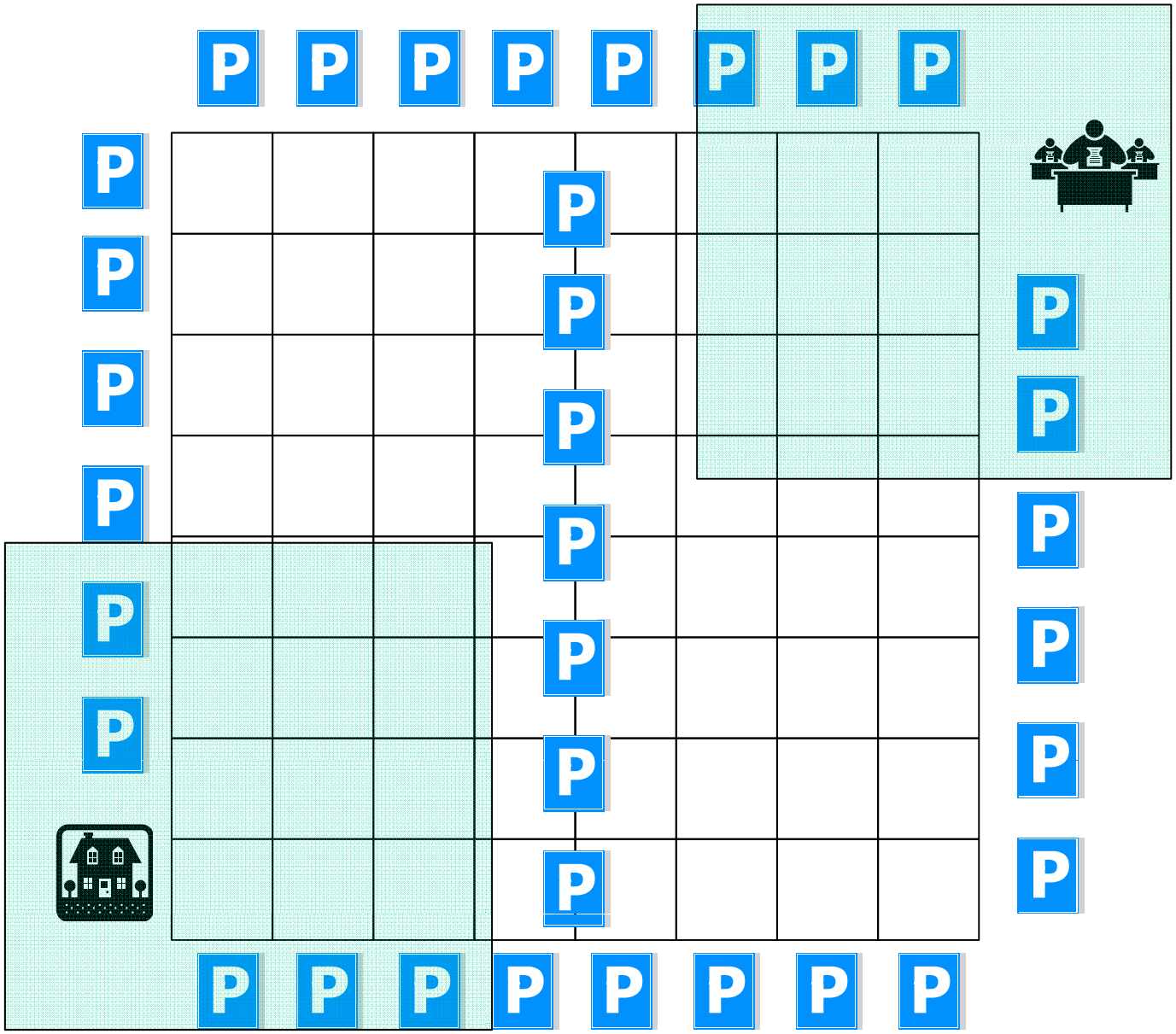
Relaxation measure 1: capacity violation reduction



Relaxation measure 2: walking distance

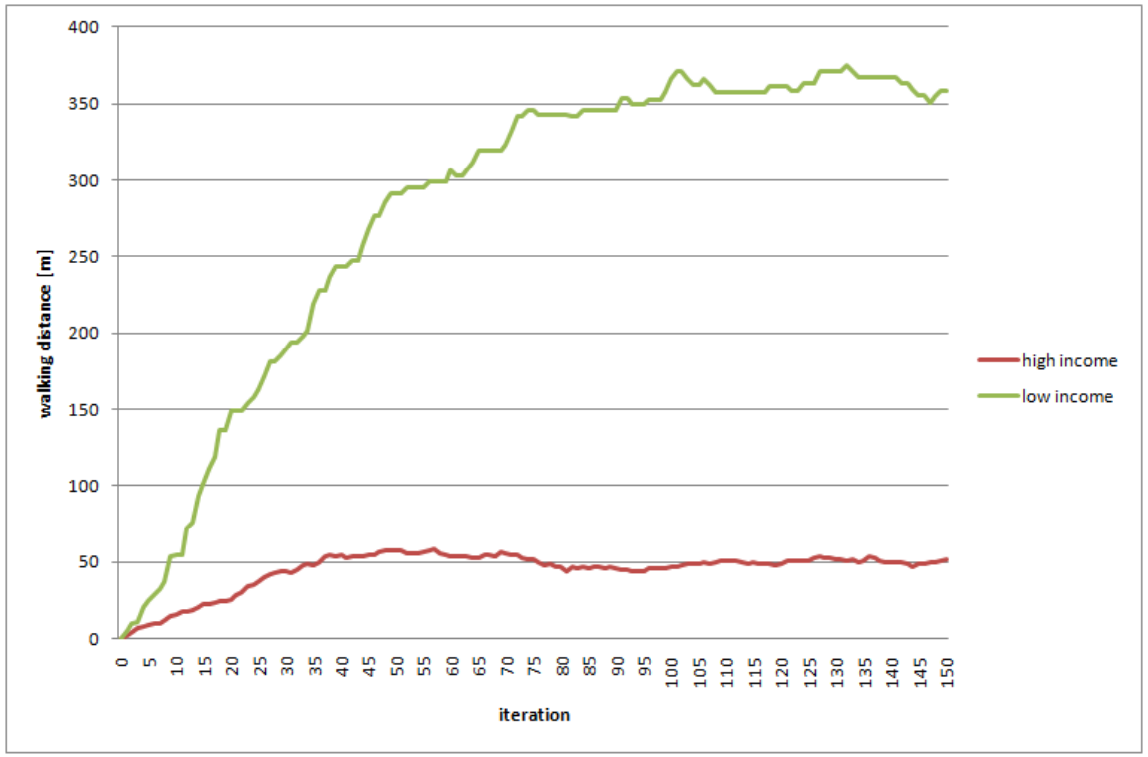


Scenario layout – grouping of parkings

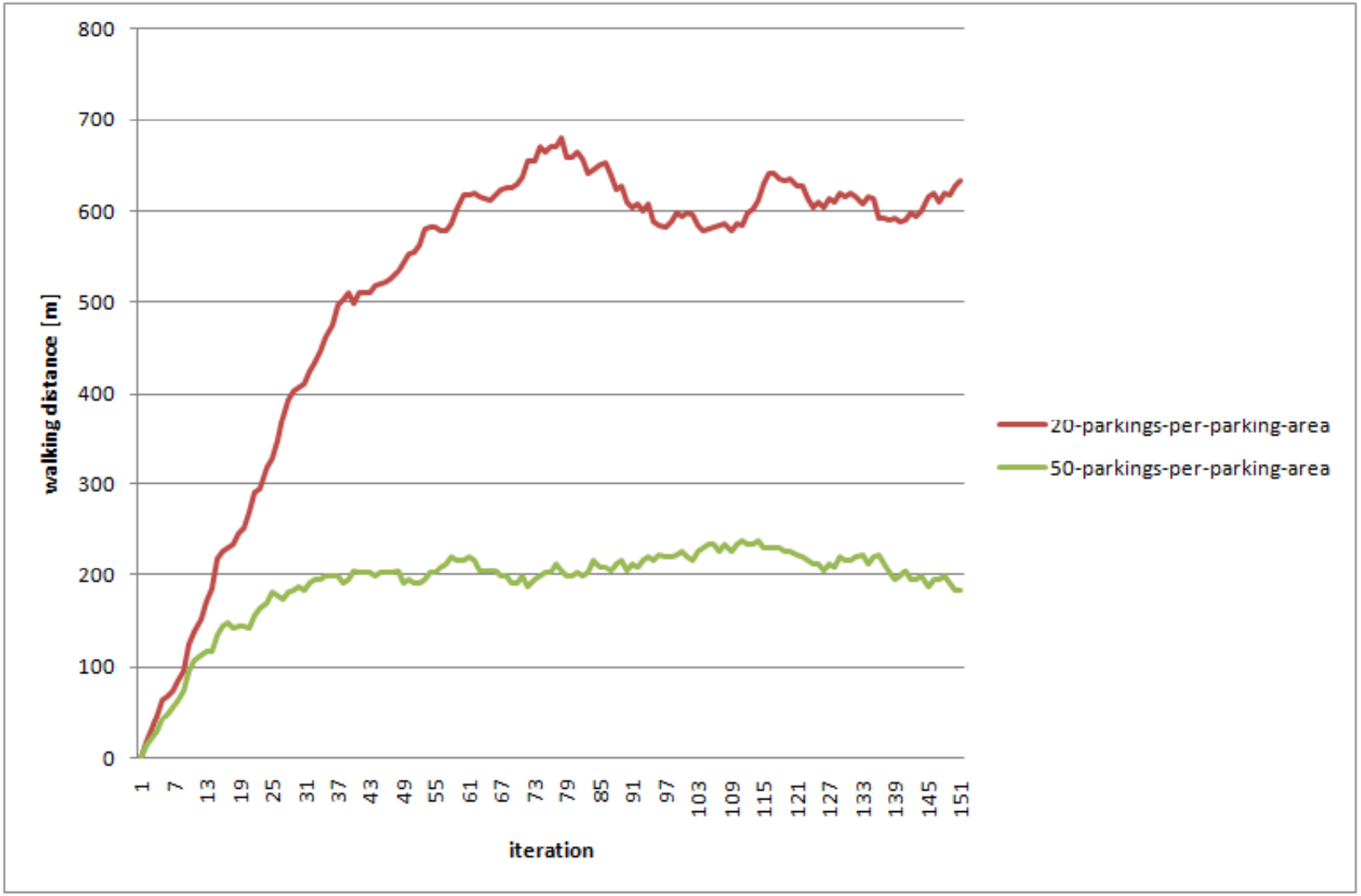


Parking price and income

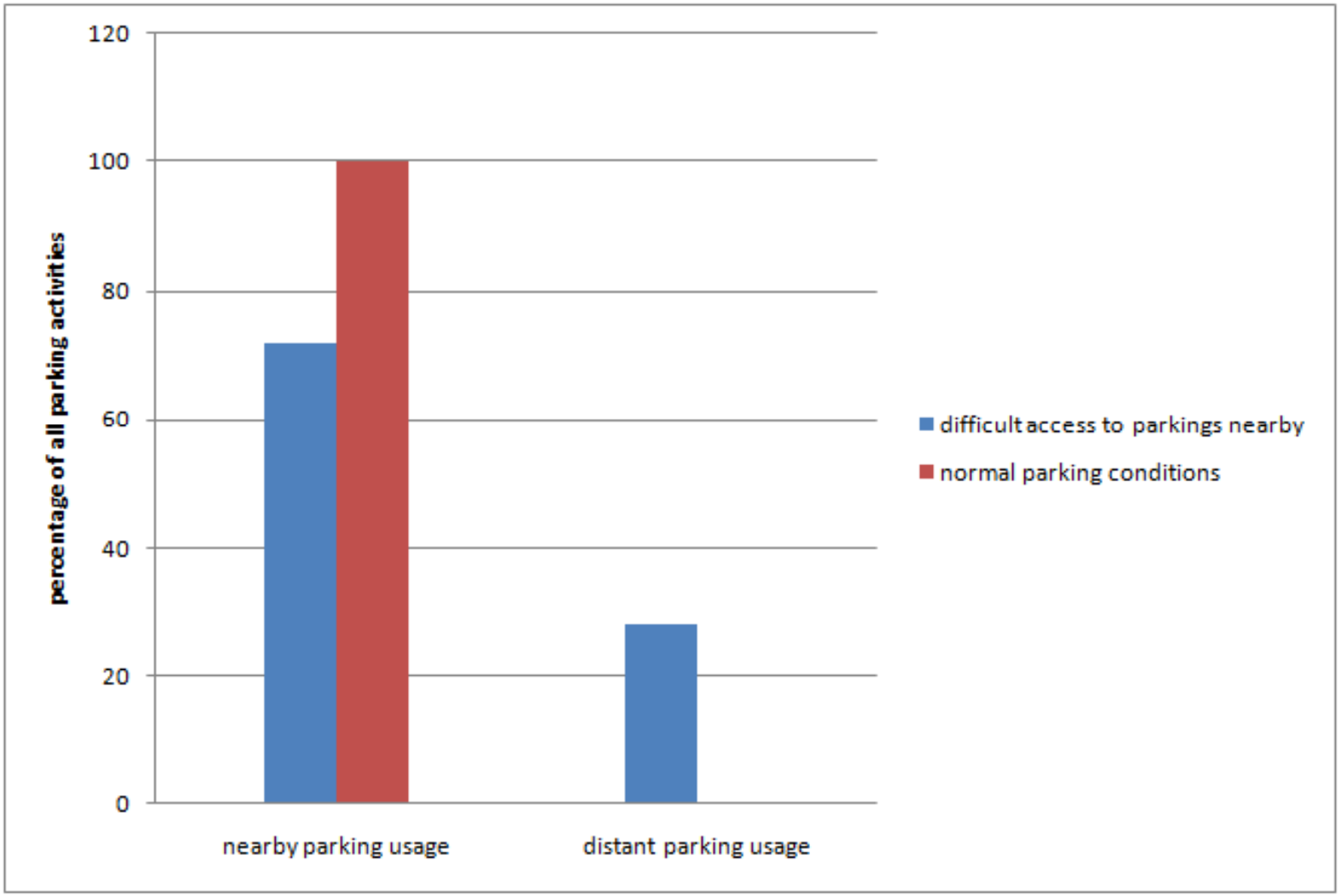
- Two groups: one with very high and one with very low income (50% of people belong to each group)
- Parkings close to home and work are MUCH more expensive than the parkings further away.



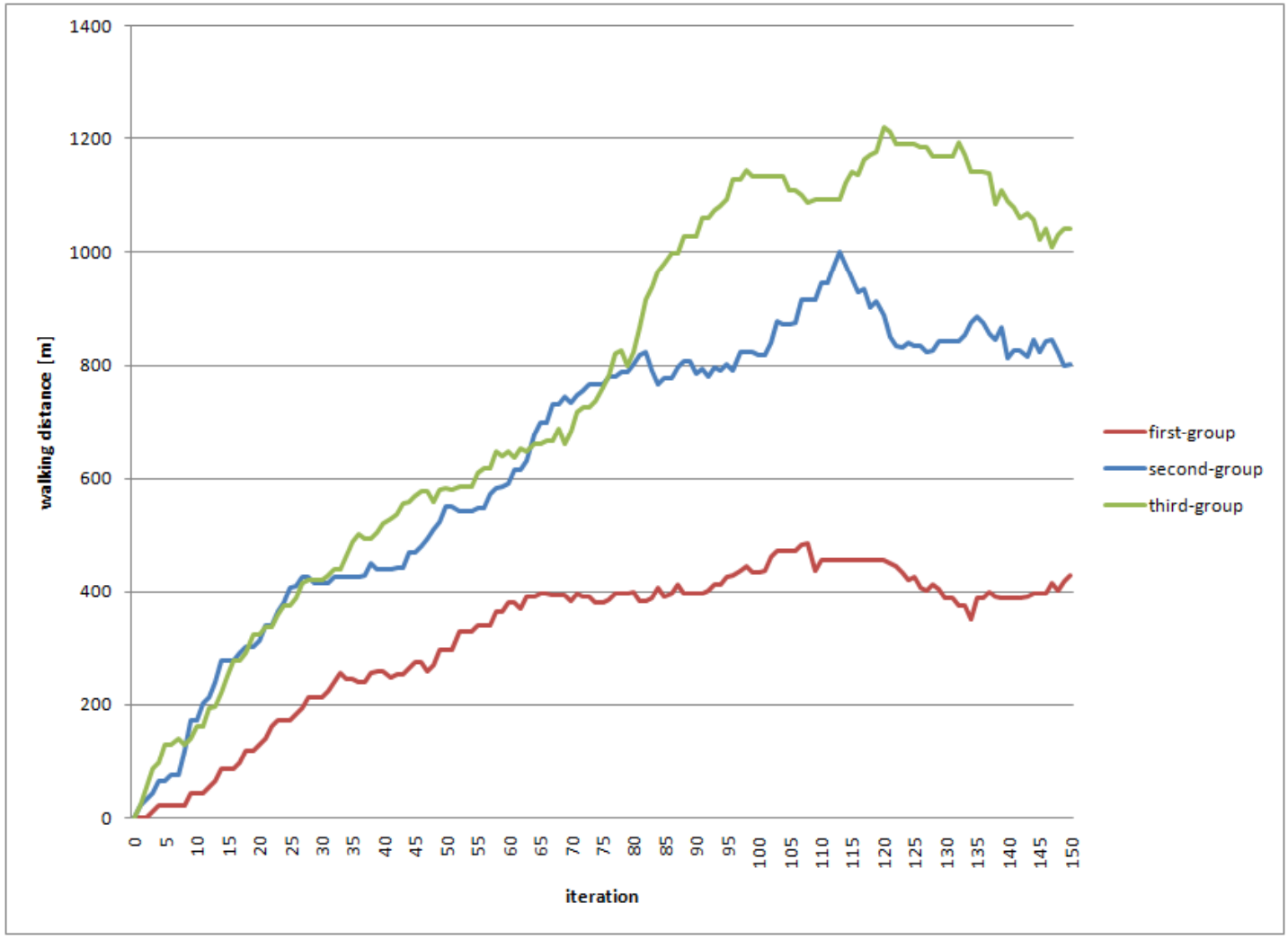
Parking supply



Introducing parking access constraints



Temporal advantage (walking distance)



Parking type (in progress)

- Two groups of agents: driving electric vehicles (10% or convential vehicles (90%)
- 2 types of parkings: only electric vehicle parkings (50%) and parkings for all vehicles (50%).

Future Work

- Cleaning code and incorporate into MATSim (core?)
- Agree on file structure of new data structures
- Improve replanning algorithm for better optimization

Long term:

- Add parking search into QueueSim (within day replanning)

Questions?