



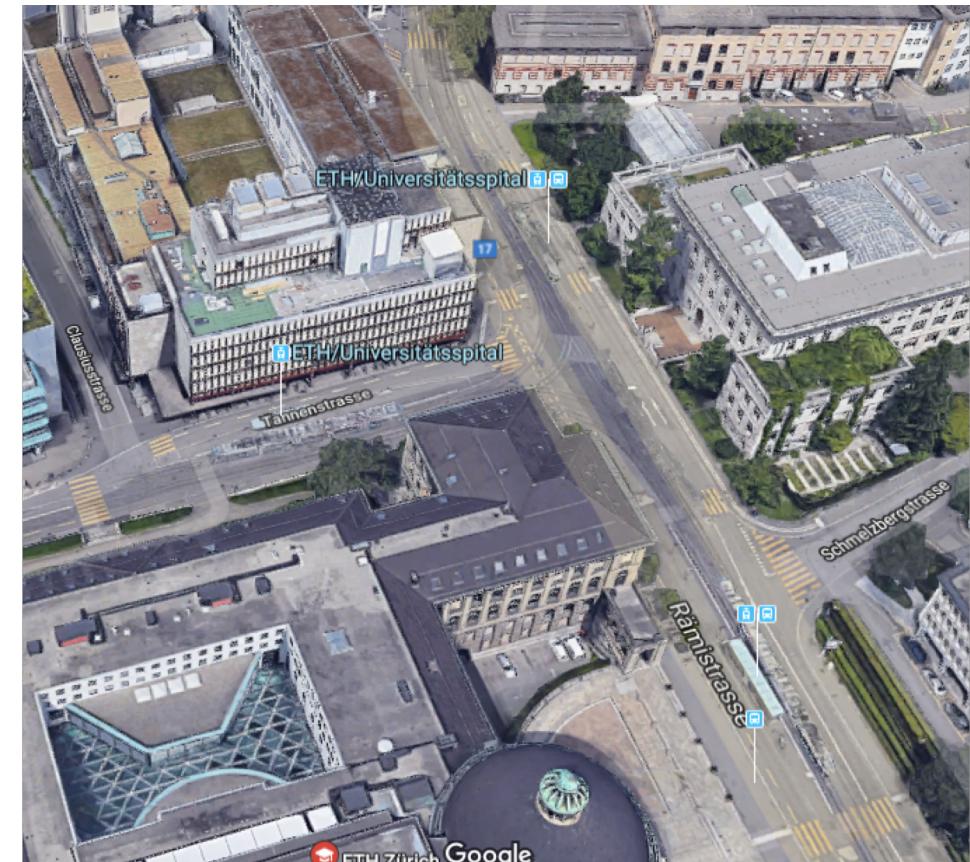
# Implementation of a Traffic Light System at the Tannenbar-Intersection

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# Introduction / Motivation

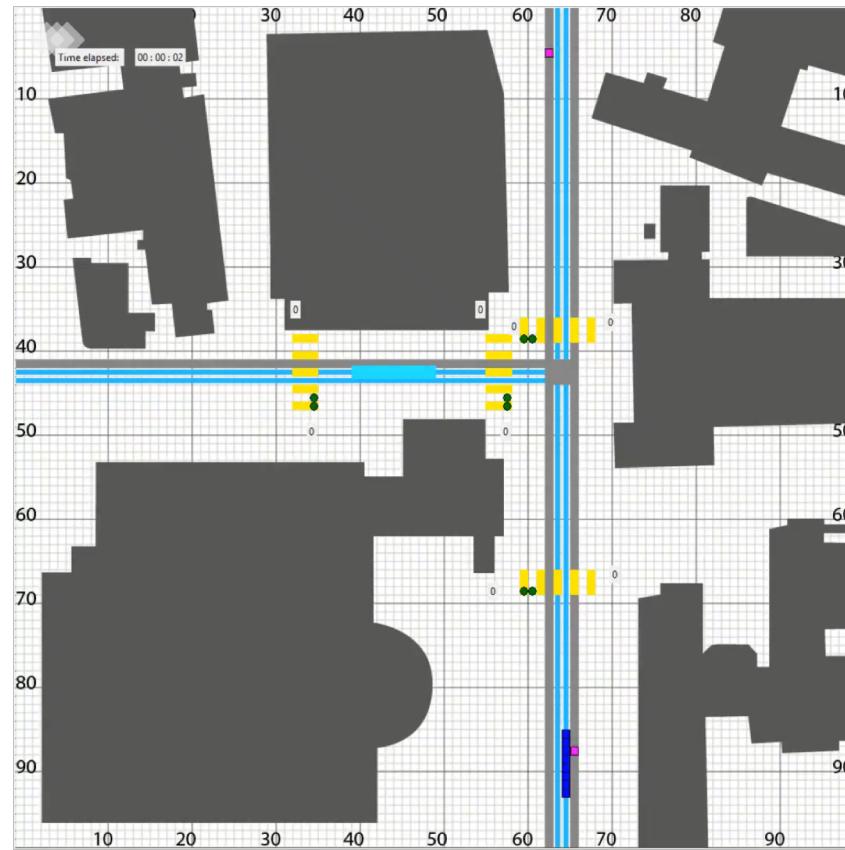
## Key Questions:

1. How good is the current solution?
2. Could the situation be improved by adding traffic lights?
3. What would be the best solution for all agents?



# Simulation

**Without Traffic Lights**  
12:00 lunch-time



**Including Traffic Lights**  
12:00 lunch-time



- Pedestrian
- Car
- Tram

# Simulation

## Cellular Automata (Rules)

- Waygiving Hierarchy
  1. Pedestrians
  2. Trams
  3. Cars
- Occupied Squares → no move allowed

## Spawning

- Given Path
- Spawns at Startingposition
- Deleted at Endposition

	0	1	2	3	4	5	6
0	0	0	0	0	0	0	0
1	0	0	2	0	0	0	0
2	0	1	0	0	1	2	0
3	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0
5	0	0	0	0	2	0	0
6	3	3	3	3	0	0	0



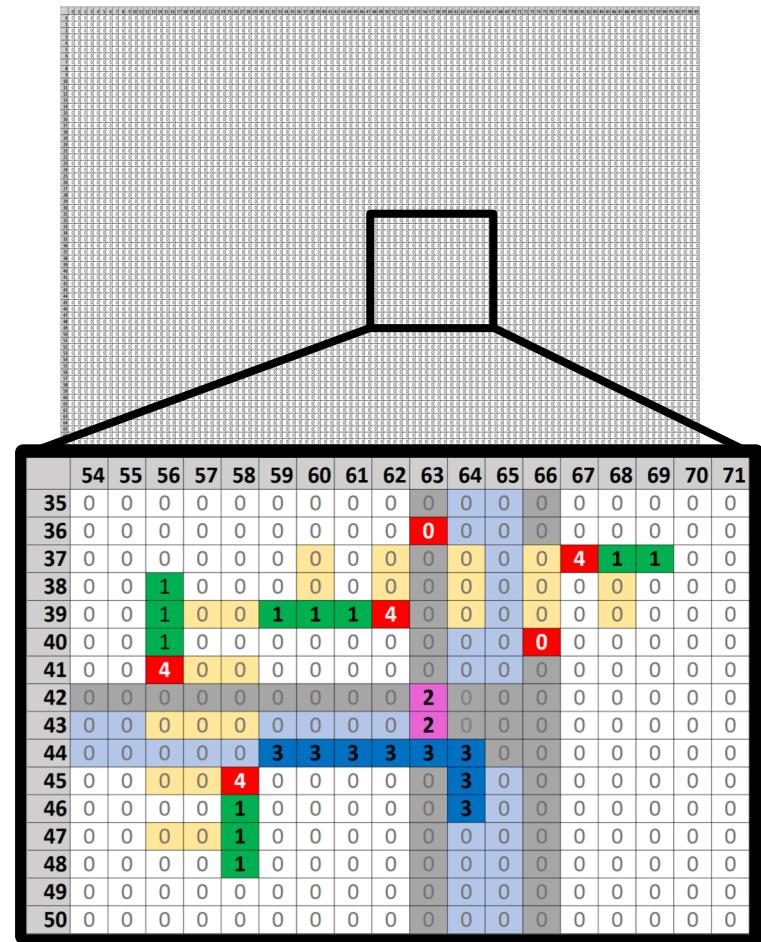
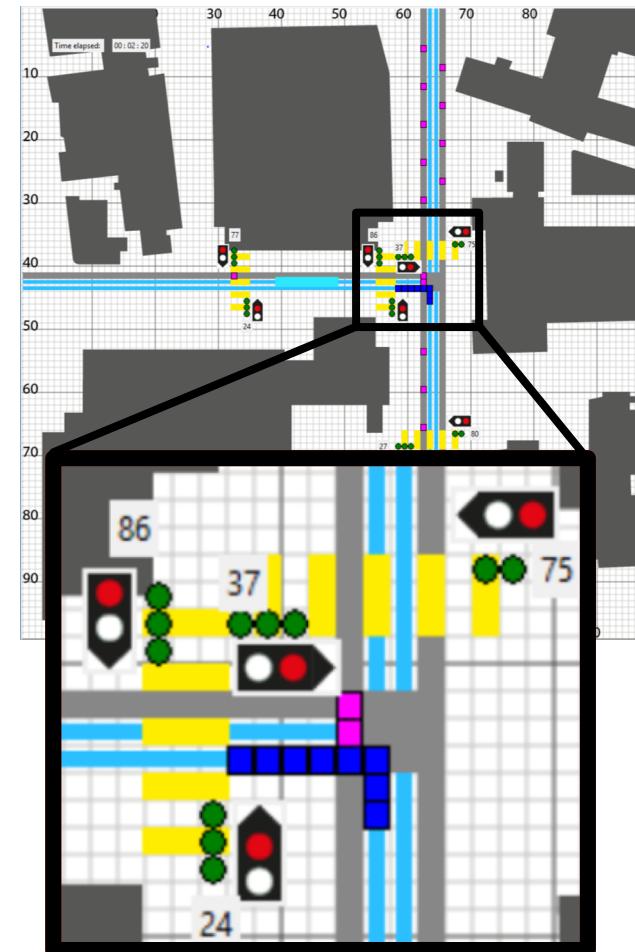
	0	1	2	3	4	5	6
0	0	0	0	0	0	0	0
1	0	0	2	0	0	0	0
2	0	0	1	0	1	0	0
3	0	0	0	0	0	2	0
4	0	0	0	0	0	0	0
5	0	0	0	0	2	0	0
6	0	3	3	3	3	0	0

# Simulation

## Matrix

- 100x100
- Keeps track of Agents

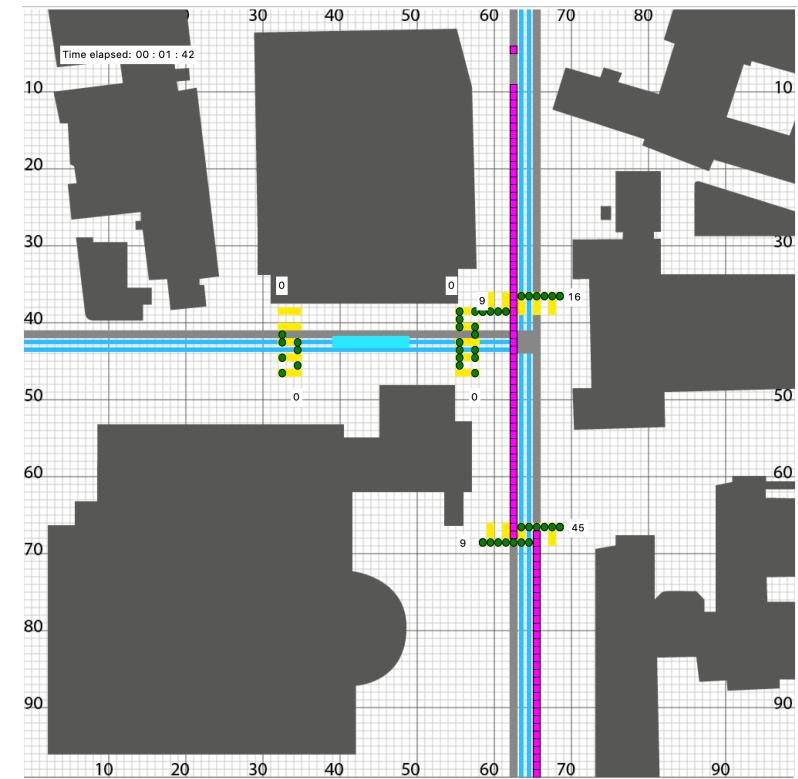
Entry	Meaning
0	Empty
1	Pedestrian
2	Car
3	Tram
4	Pedestrians Wait
5	Cars Wait



# Simulation

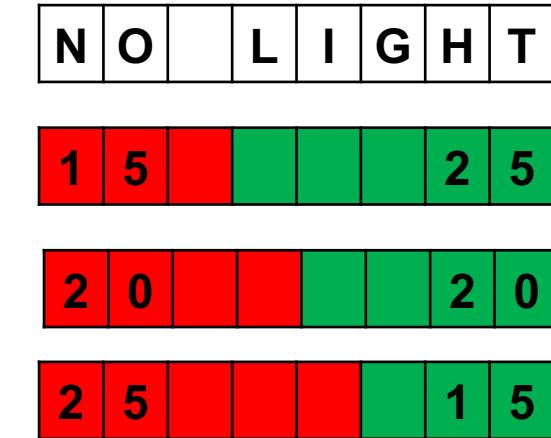
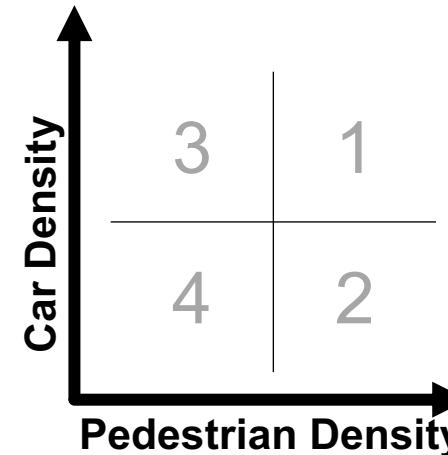
## Limitations of the simulation

- Simplifications:
  - Agents behave “perfectly”
  - Agents strictly adhere to given paths
  - Short-sighted agents
- Adaptability to a different Crossroad is limited
- Critical Parameters
  - Too many pedestrians result in a deadlock



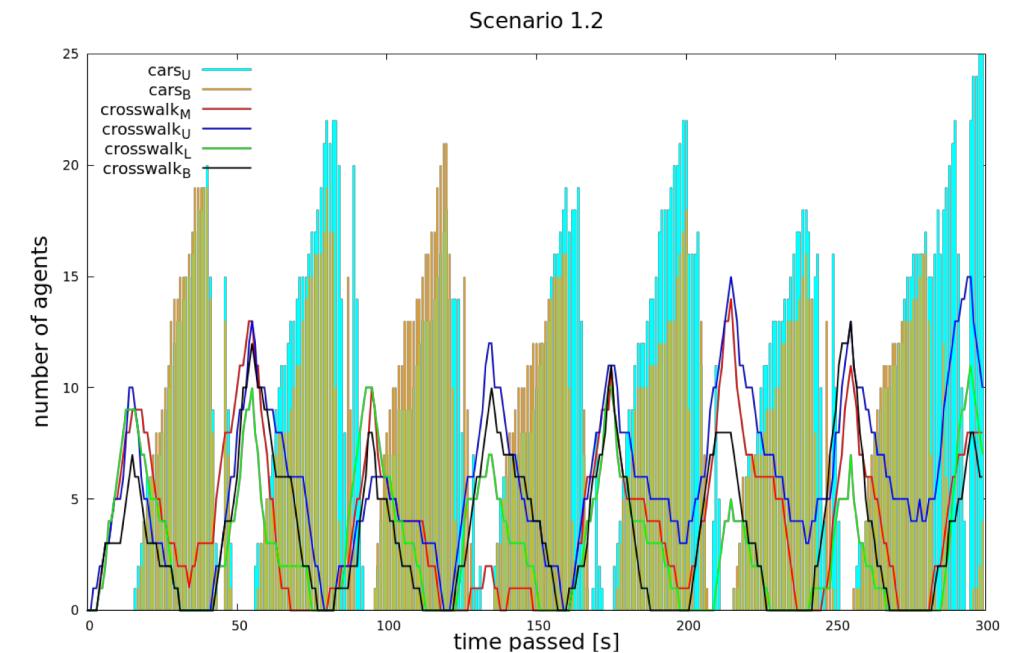
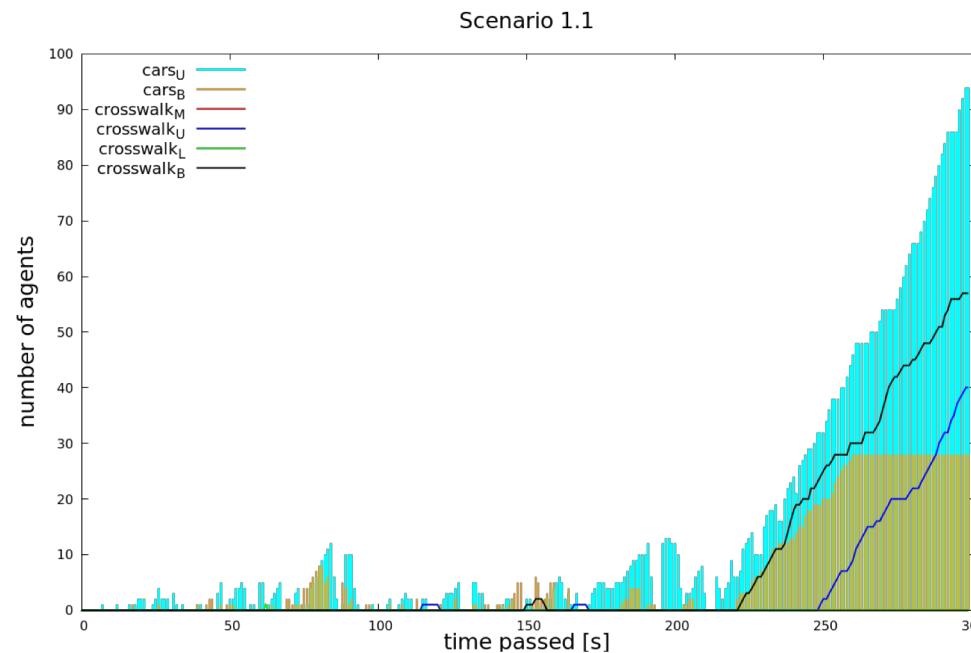
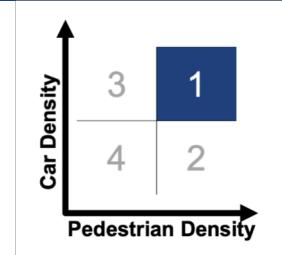
# Performed Simulations

- 4 Different scenarios / times of day:
- 4 Different Traffic light waiting periods



Red and green times for pedestrians [s]

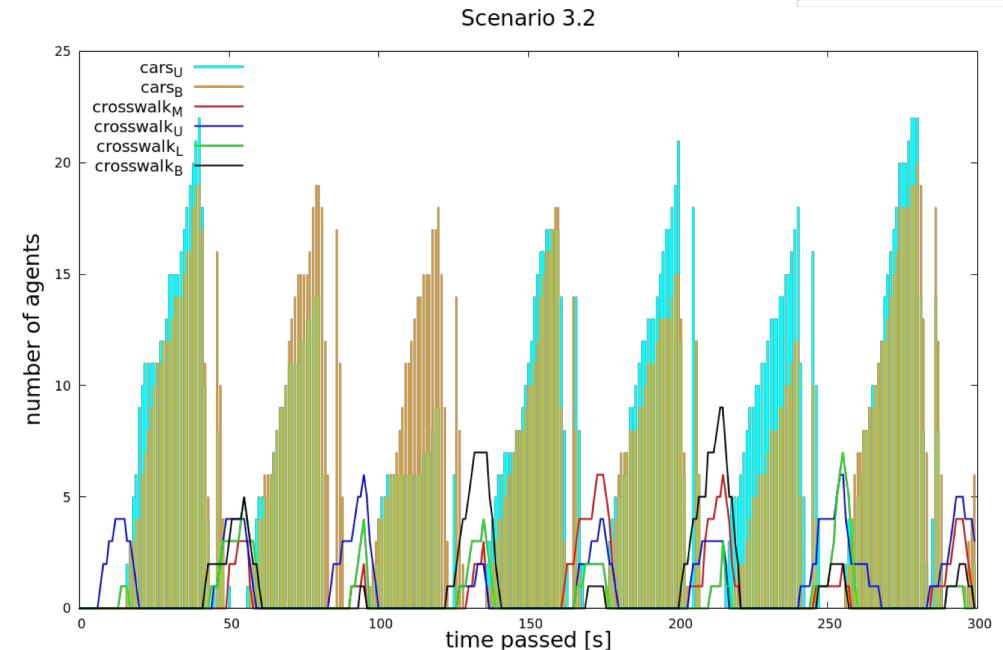
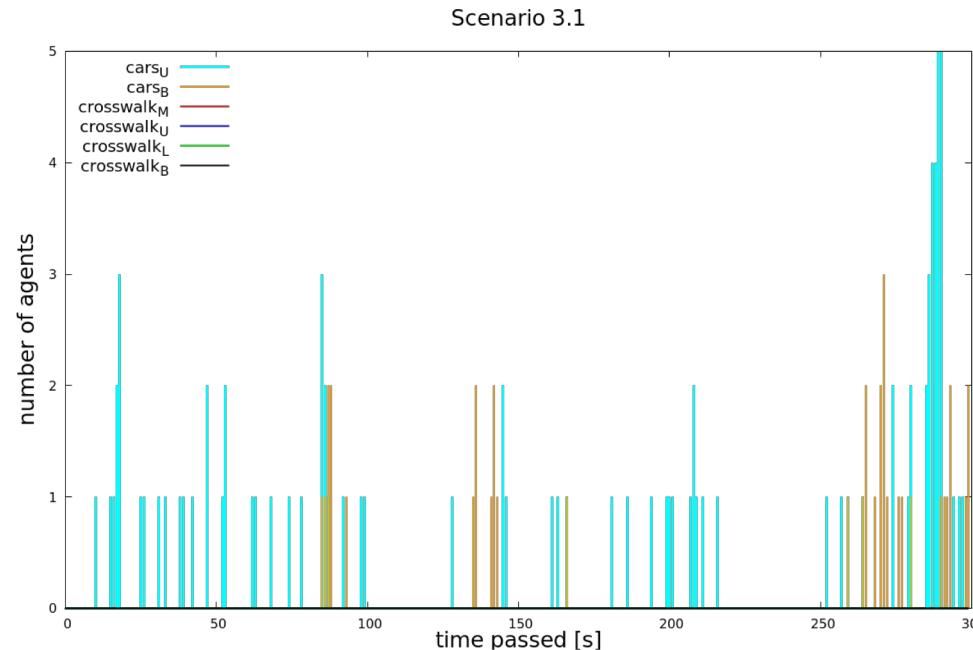
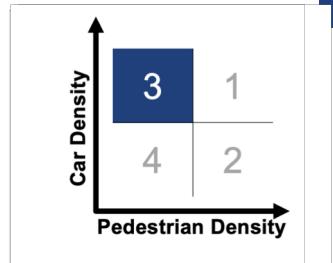
# Results – Improvement



N	O	L	I	G	H	T
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1	5			2	5
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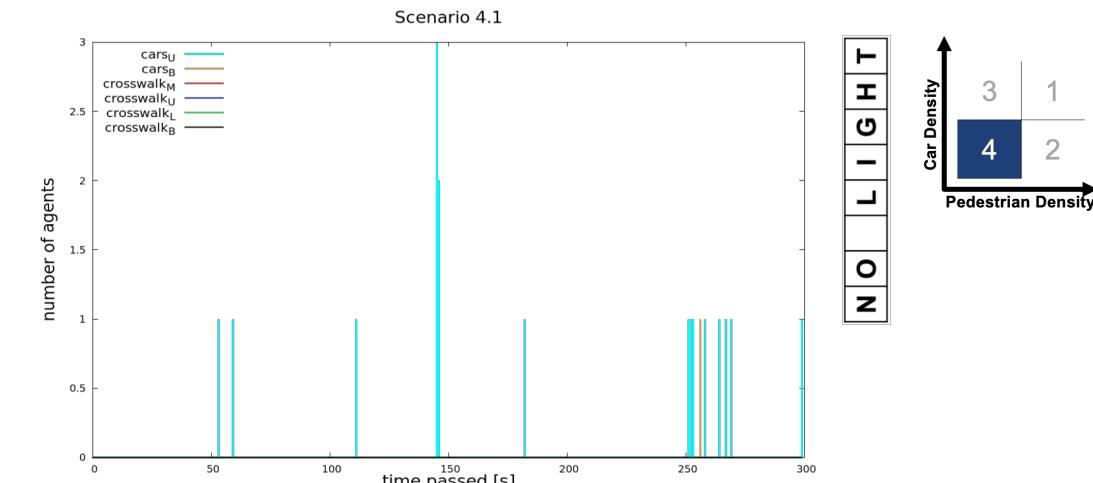
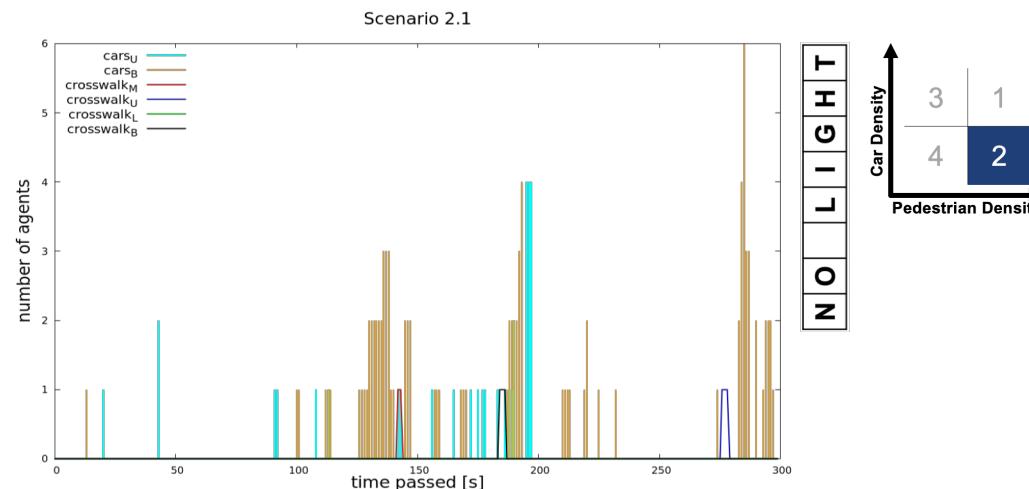
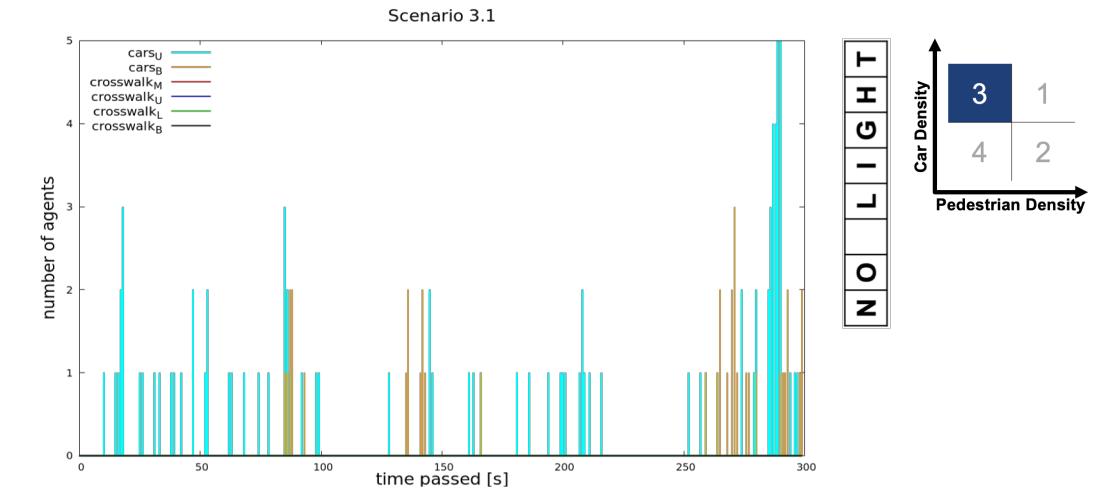
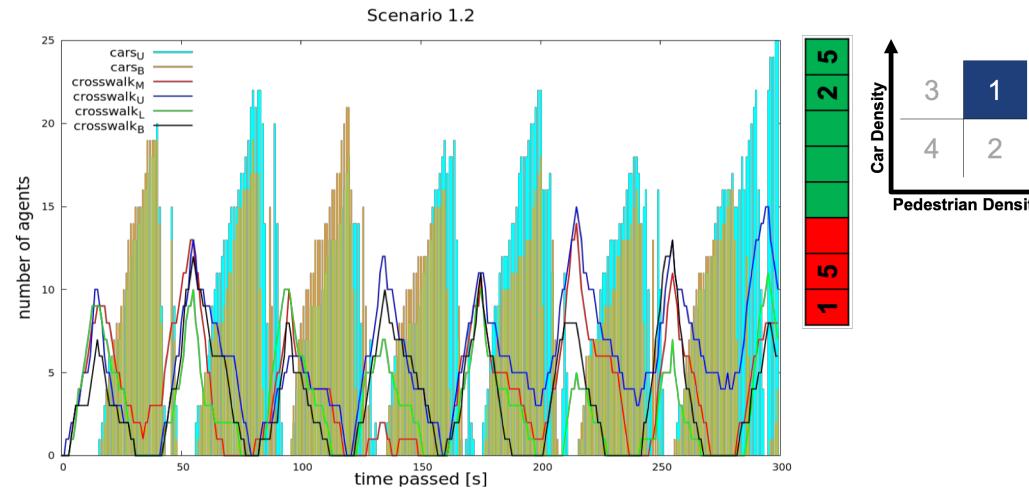
# Results – Counterproductive



N O L I G H T

1 5 2 5

# Results – Best Solutions



# Conclusion

## Key Questions

1. How good is the current solution?
  - Current situation works well in most cases
2. Could the situation be improved by adding traffic lights?
  - Only for situations with high densities of pedestrians and cars
  - Otherwise, counterproductive
3. What would be the best solution for all agents?
  - Traffic lights turned «ON» only for high densities of pedestrians and cars
  - Traffic lights turned «OFF» for all other scenarios

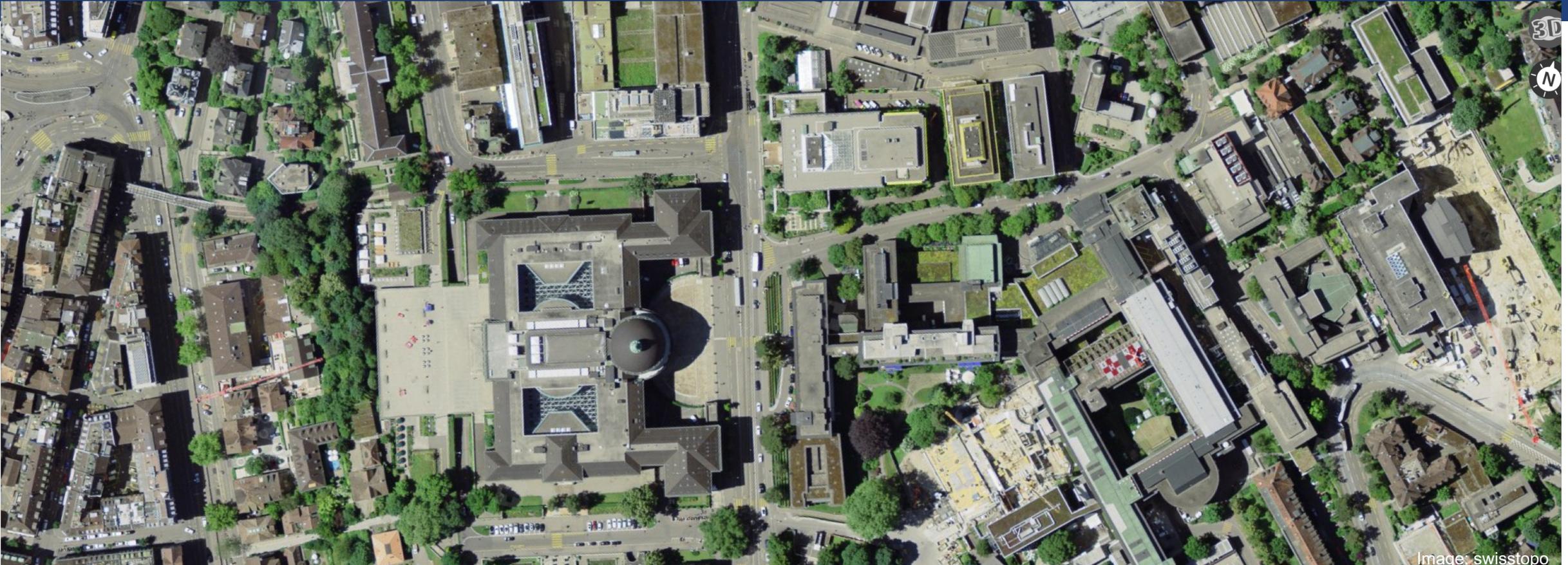


Image: swisstopo

# Thank you for your attention

