Senseable Mobilities

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9 November 2016 | Rimini | Green Economy

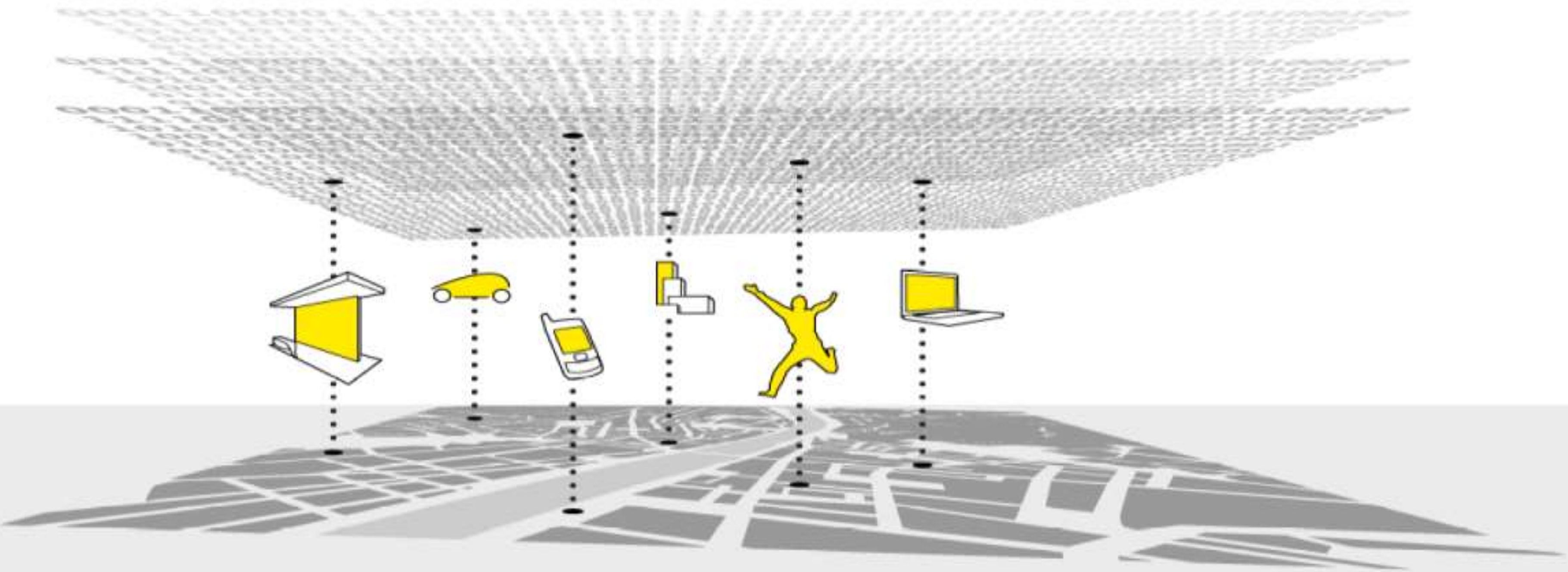

1990…

"we are headed for the death of cities"
{due to the continued growth of personal computing and distributed organizations advances}
"cities are leftover baggage from the industrial era.“

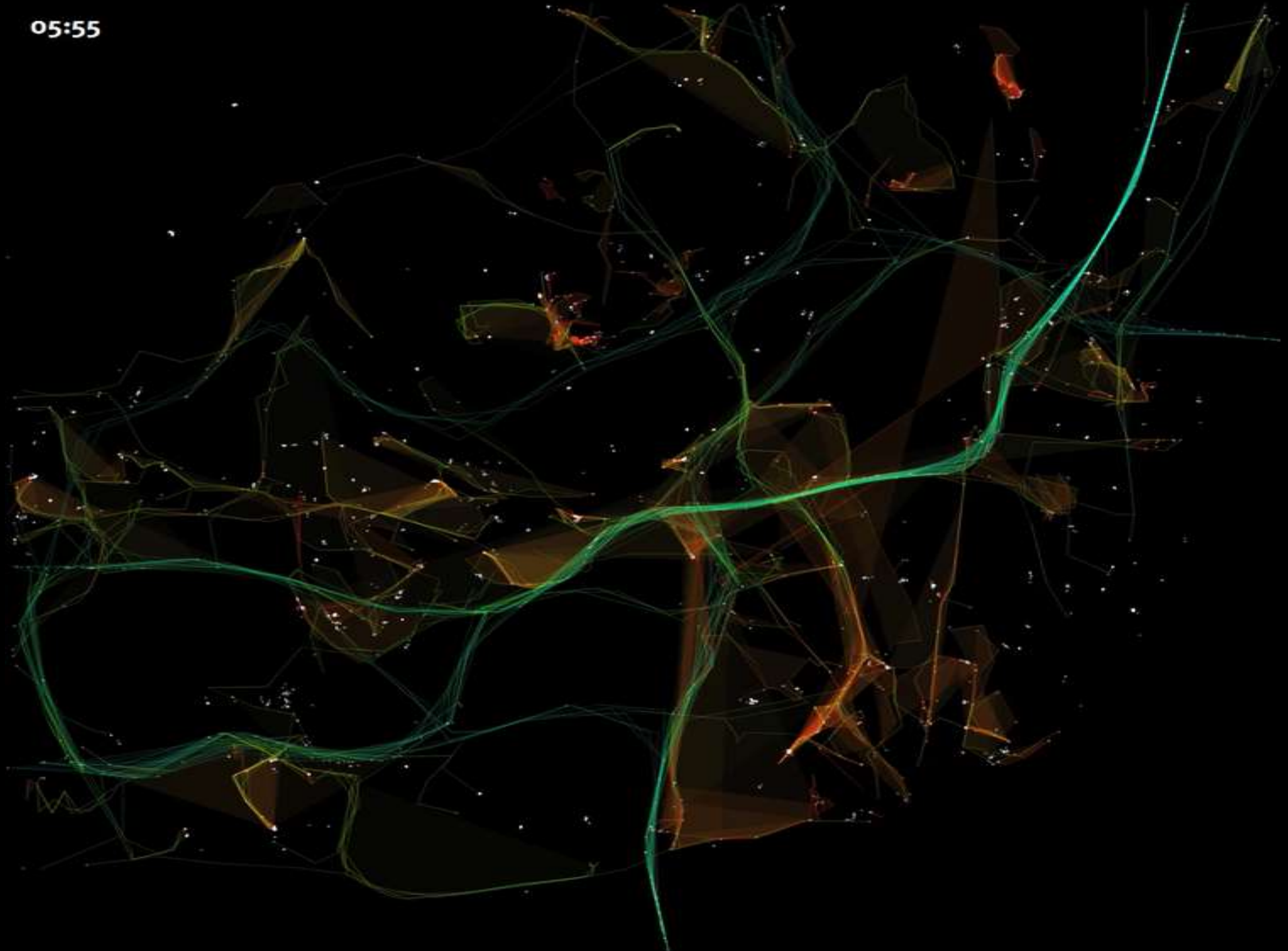
George Gilder (1995)

“in 2008, the world reaches an invisible but momentous milestone: for the first time in history more than half its human population, 3.3 billion people, will be living in urban areas. by 2030, this is expected to swell to almost 5 billion”.

United Nations Population Fund
http://www.unfpa.org/swp/2007/english/introduction.html




actuating
sensing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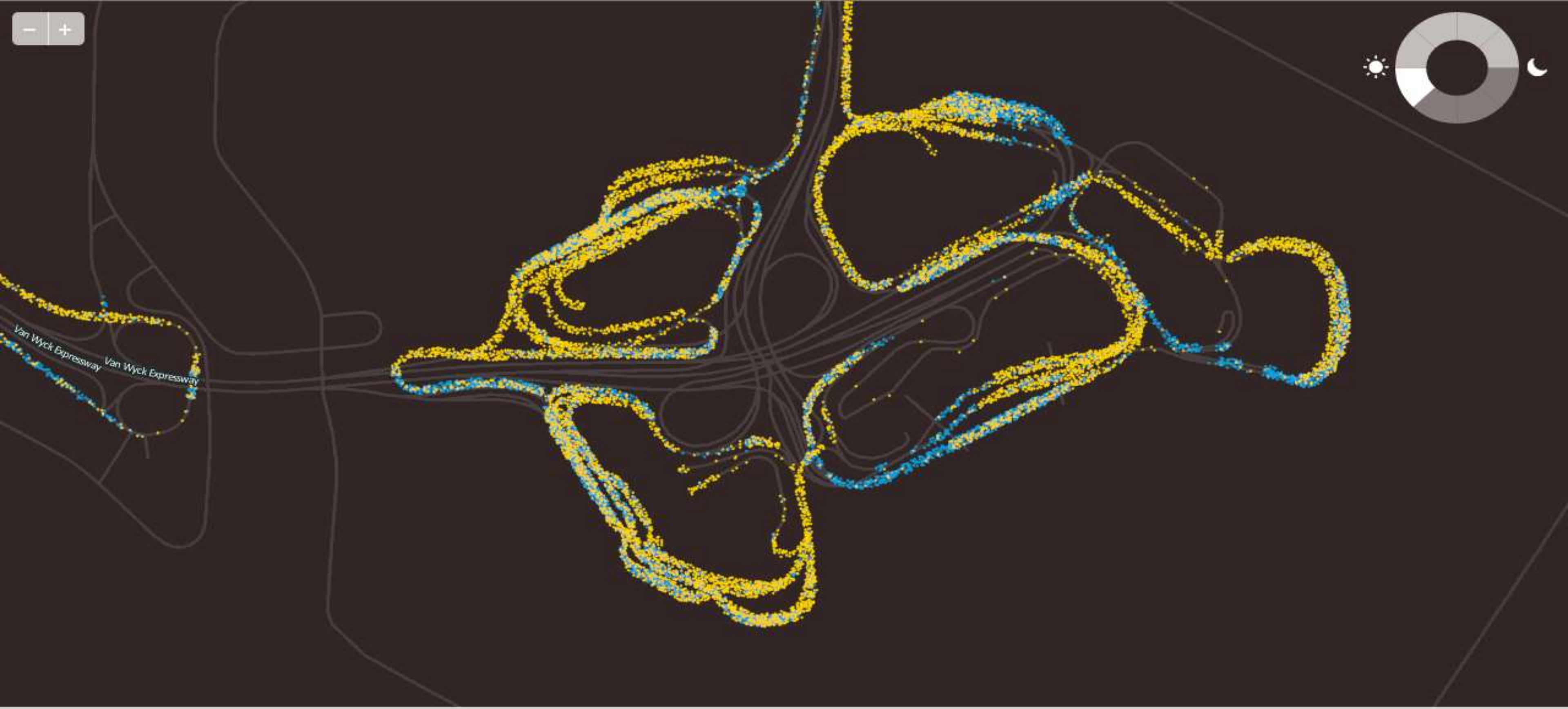

hubcab

MIT senseable city lab

HubCab is an interactive visualization that invites you to explore the ways in which over 150 million taxi trips connect the City of New York in a given year. Show me how it works.

Taxi Pickup

Taxi Dropoff

Learn more about the project ↓

hubcab

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Taxi Pickup

Taxi Dropoff

Learn more about the project ↓


Sharing benefits
3,160,172 $
1,052,627 mi
445,261 kg
225k
214k
West 57th Street
East 57th Street
West 42nd Street
West 34th Street
West 14th Street
East 14th Street
Lincoln Tunnel
Queensboro Bridge lower level
Queens-Midtown Tunnel
Long Island Expressway
FDR Drive
hubcab
HubCab is an interactive visualization that invites you to explore the ways in which over 150 million taxi trips connect the City of New York in a given year.
Show me how it works.
MIT senseable city lab
Audi
Taxi Pickup
Reset
West 15th Street
Total Pickups: 1069
Average duration: 12.4 min
Average distance: 3 mi
Taxi Dropoff
Reset
East 54th Street
Total Dropoffs: 1053
Average duration: 10.2 min
Average distance: 2.38 mi
Learn more about the project

PNAS

CrossMark click for updates

Quantifying the benefits of vehicle pooling with shareability networks

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Edited* by Michael F. Goodchild, University of California, Santa Barbara, CA, and approved July 25, 2014 (received for review March 3, 2014)

Taxi services are a vital part of urban transportation, and a considerable contributor to traffic congestion and air pollution causing substantial adverse effects on human health. Sharing taxi trips is a possible way of reducing the negative impact of taxi services on cities, but this comes at the expense of passenger discomfort quantifiable in terms of a longer travel time. Due to computational challenges, taxi sharing has traditionally been approached on small scales, such as within airport perimeters, or with dynamical ad hoc heuristics. However, a mathematical framework for the systematic understanding of the tradeoff between collective benefits of sharing and individual passenger discomfort is lacking. Here we introduce the notion of shareability network, which allows us to model the collective benefits of sharing as a function of passenger inconvenience, and to efficiently compute optimal sharing strategies on massive datasets. We apply this framework

At the basis of a shared taxi service is the concept of ride sharing or carpooling, a long-standing proposition for decreasing road traffic, which originated during the oil crisis in the 1970s (6). During that time, economic incentives outbalanced the psychological barriers on which successful carpooling programs depend: giving up personalized transportation and accepting strangers in the same vehicle. Surveys indicate that the two most important deterrents to potential carpoolers are the extra time requirements and the loss of privacy (7, 8). However, the lack of correlations between socio-demographic variables and carpooling propensity (8), the design of appropriate economic incentives (9), and recent practical implementations of taxi-sharing systems in New York City (http://bandwagon.io) give ample hope that many social obstacles might be overcome in newly emerging "sharing economies" (10, 11).

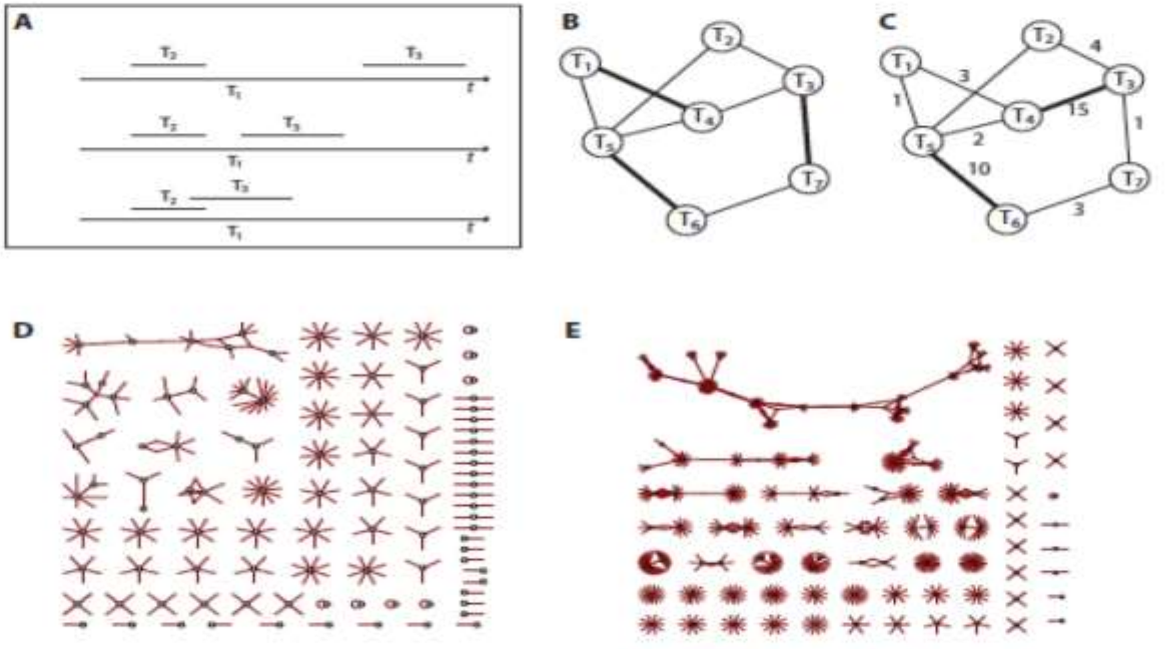
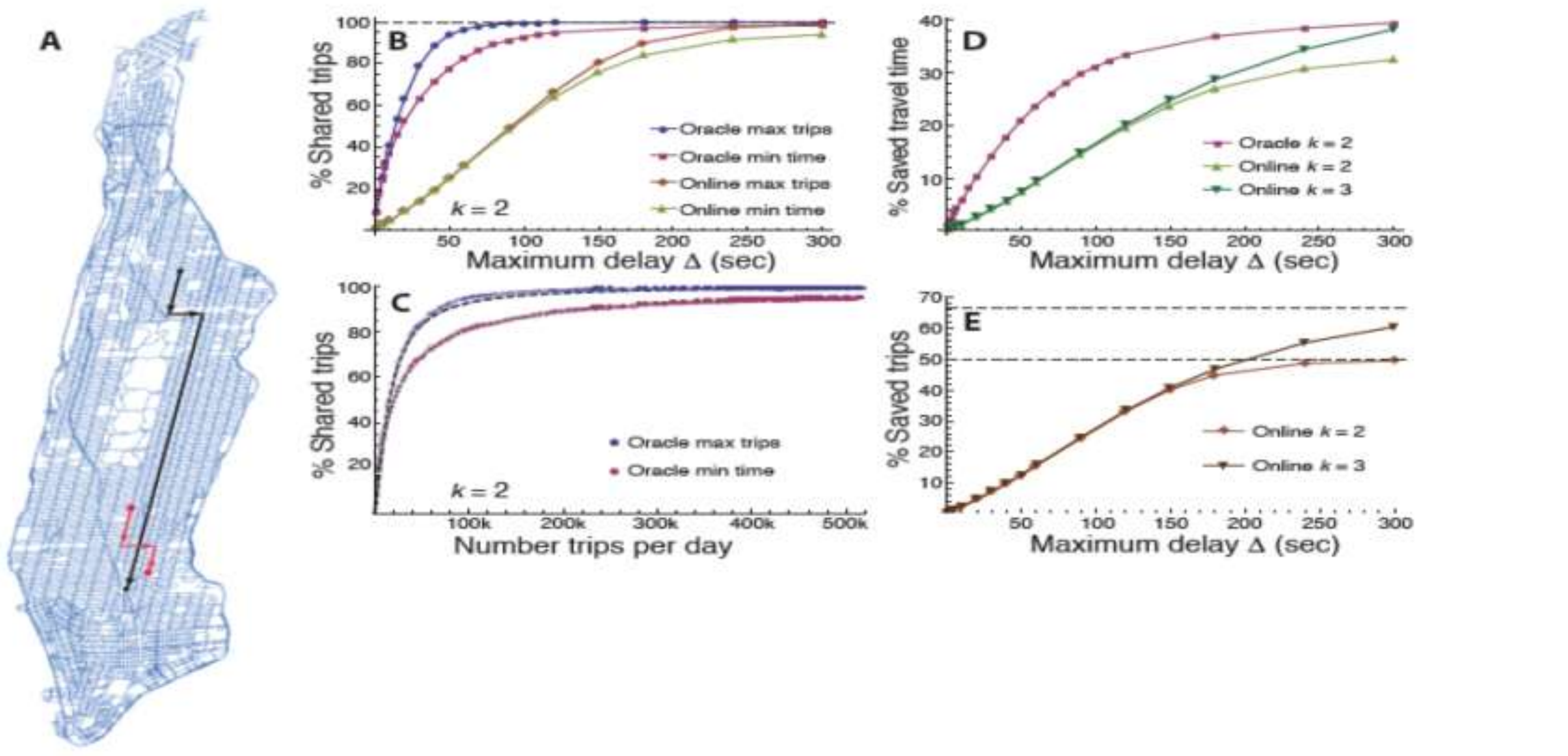
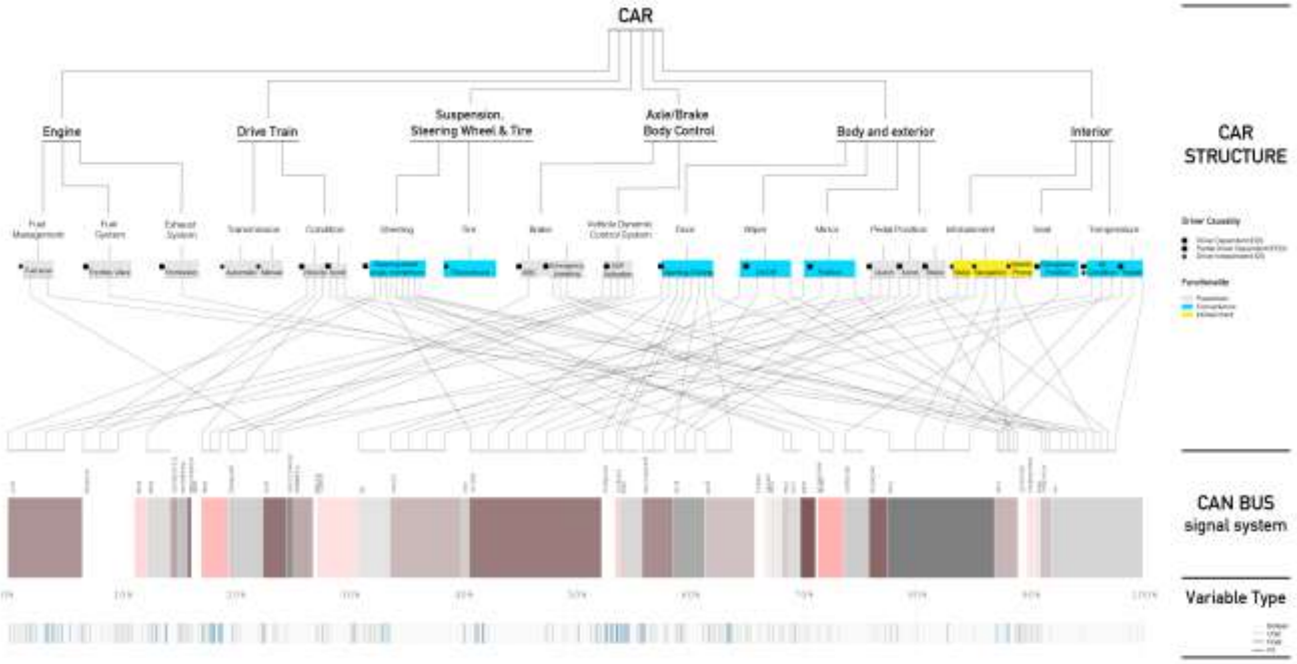
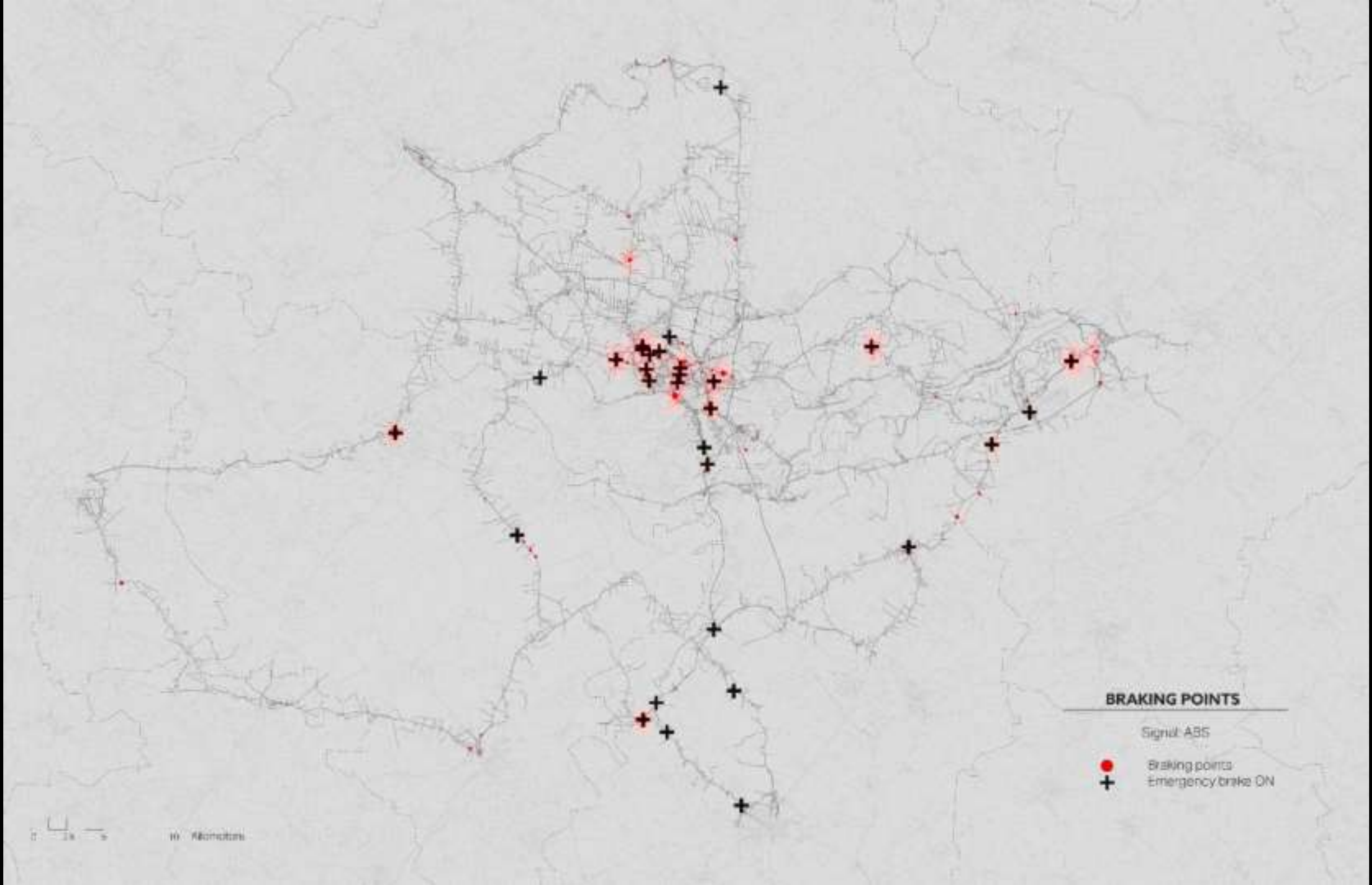


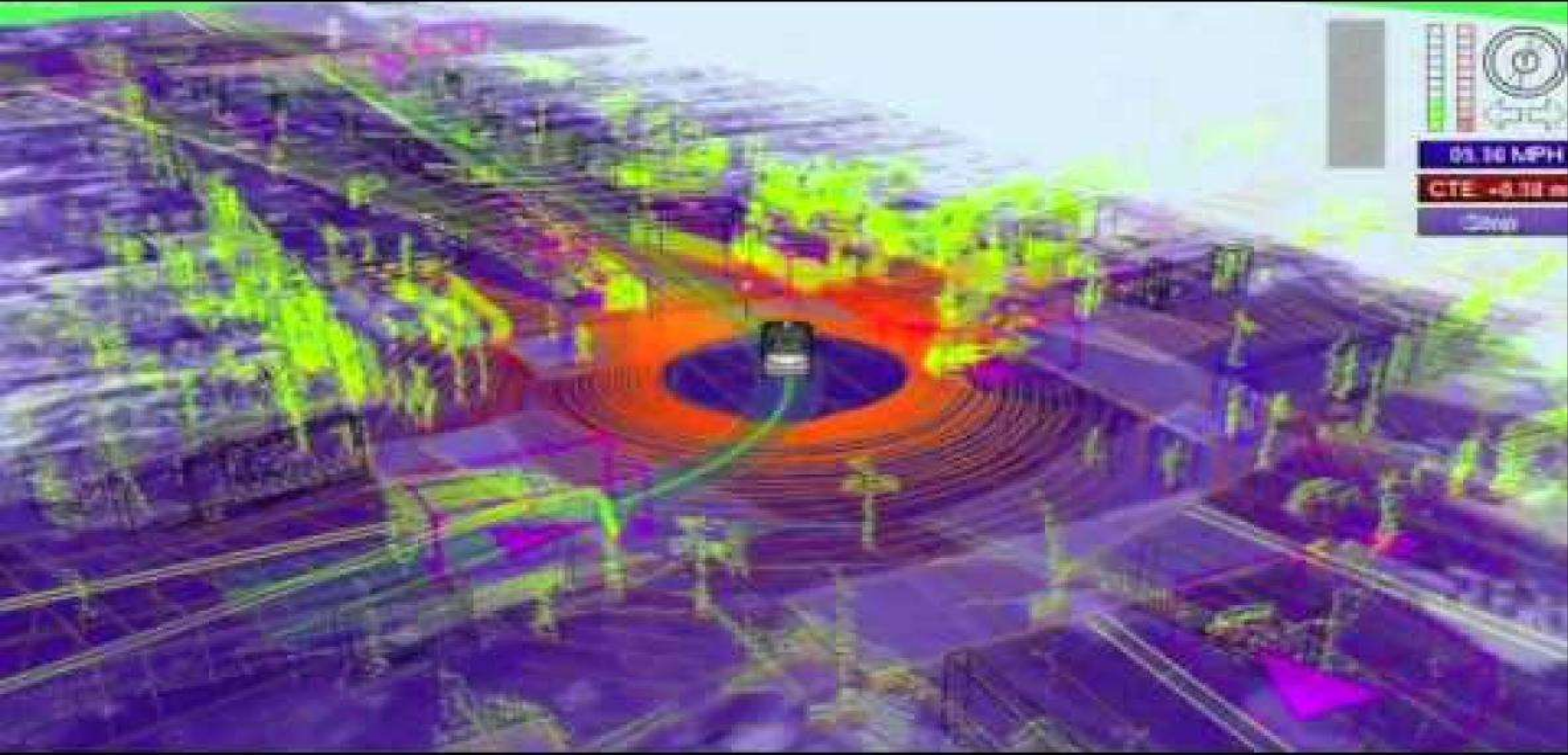
Figure 1: **Shareability networks.** **(A)** Trip sharing model and taxi capacity. Each of the three cases involves three trips T_1, T_2, and T_3 to be shared, but ordered differently in time t. The top case corresponds to a feasible sharing according to our model with $k = 2$, and the trips can be accommodated in a taxi with capacity ≥ 2. The middle case corresponds to a model with $k = 3$ since three trips are combined; notice that the three trips can be combined in a taxi with capacity two since two of the combined trips are non-overlapping. The bottom case corresponds to $k = 3$, but here a taxi capacity ≥ 3 is needed to accommodate the combined trips. **(B)** Example of maximum matching (*4*) in a simple shareability network. The links belonging to the maximum matching are displayed in bold. **(C)** Example of maximum weighted matching (*4*). **(D)** Exemplary subset of the shareability network corresponding to 100 consecutive trips for values of $\Delta = 30\,\mathrm{sec}$ and **(E)** $\Delta = 60\,\mathrm{sec}$, showing network densification effects and thus an increase of sharing opportunities with longer time-aggregation. Open links point to trips outside the considered set of trips. Isolated nodes are represented as self-loops. Node positions are not preserved across the networks.


A
B
% Shared trips
Maximum delay Δ (sec)
Oracle max trips
Oracle min time
Online max trips
Online min time
k = 2
C
% Shared trips
Number trips per day
Oracle max trips
Oracle min time
k = 2
D
% Saved travel time
Maximum delay Δ (sec)
Oracle k = 2
Online k = 2
Online k = 3
E
% Saved trips
Maximum delay Δ (sec)
Online k = 2
Online k = 3

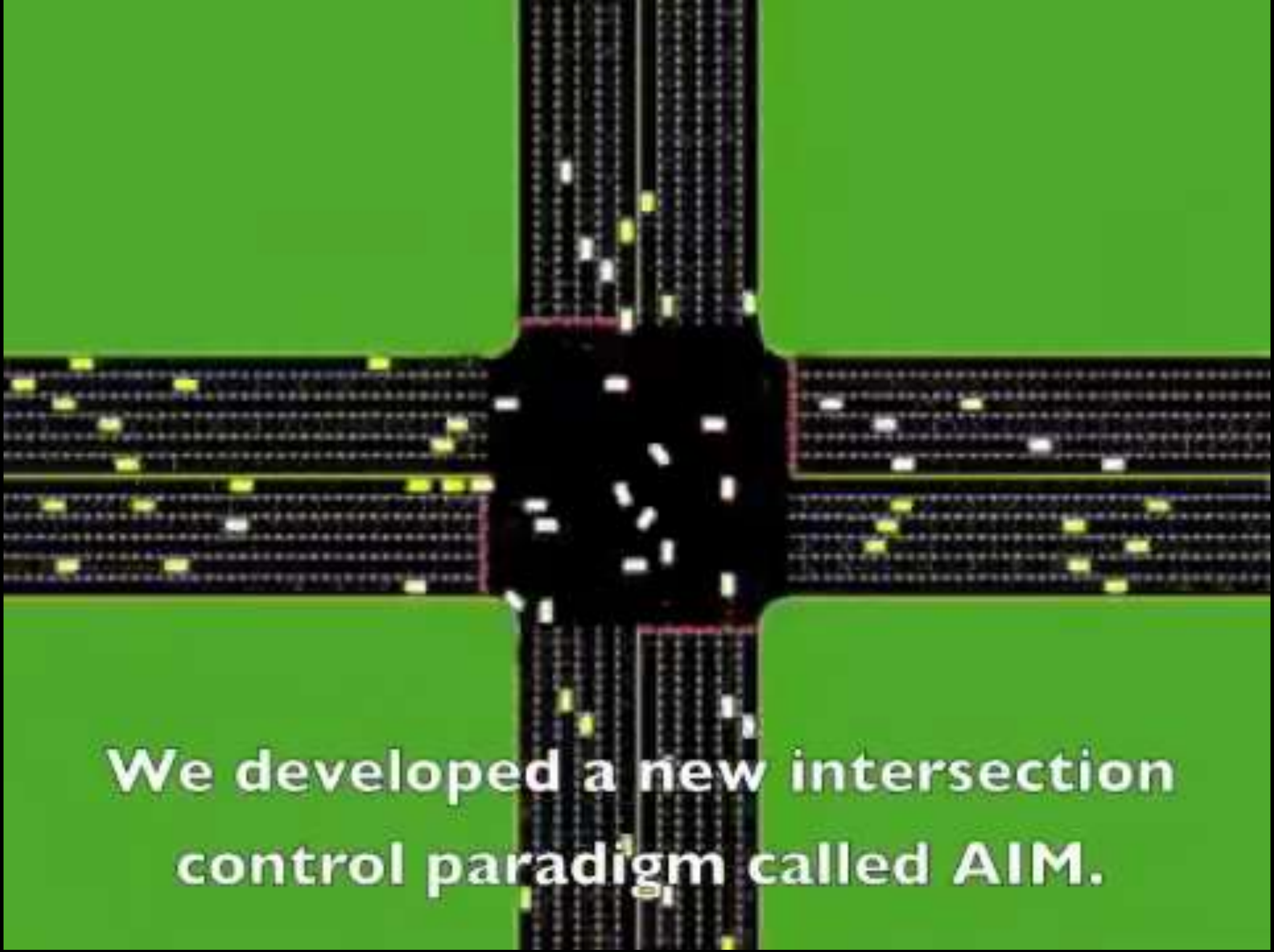


CAR
Engine
Drive Train
Suspension,
Steering Wheel & Tire
Axle/Brake
Body Control
Body and exterior
Interior
CAR STRUCTURE
CAN BUS
signal system
Variable Type


BRAKING POINTS
Signal: ABS
Braking points
Emergency brake ON


MPH
CTE

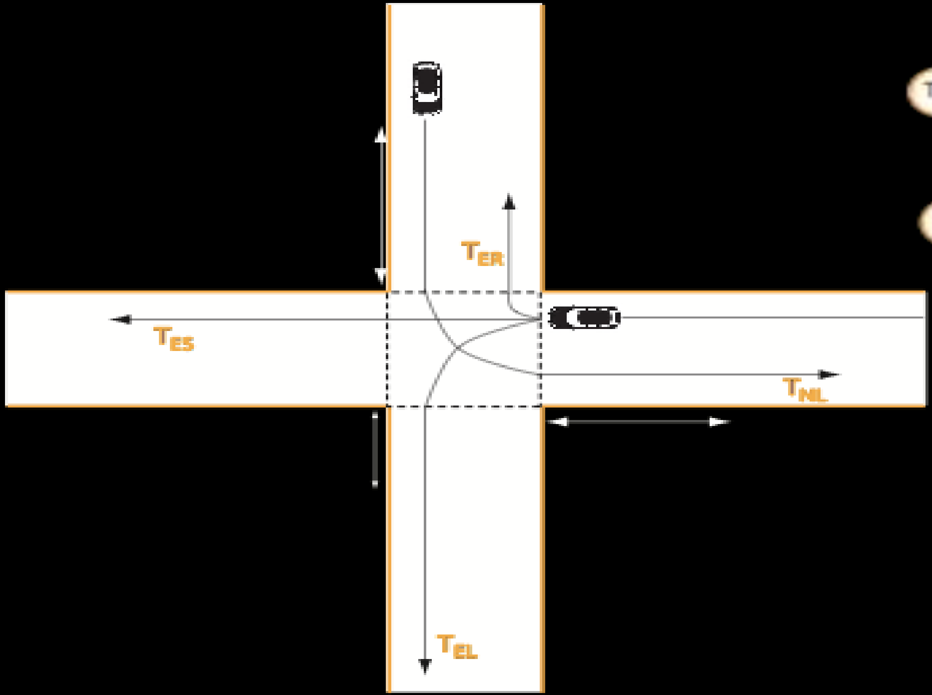

DRIVE
TO
RIGHT


We developed a new intersection
control paradigm called AIM.

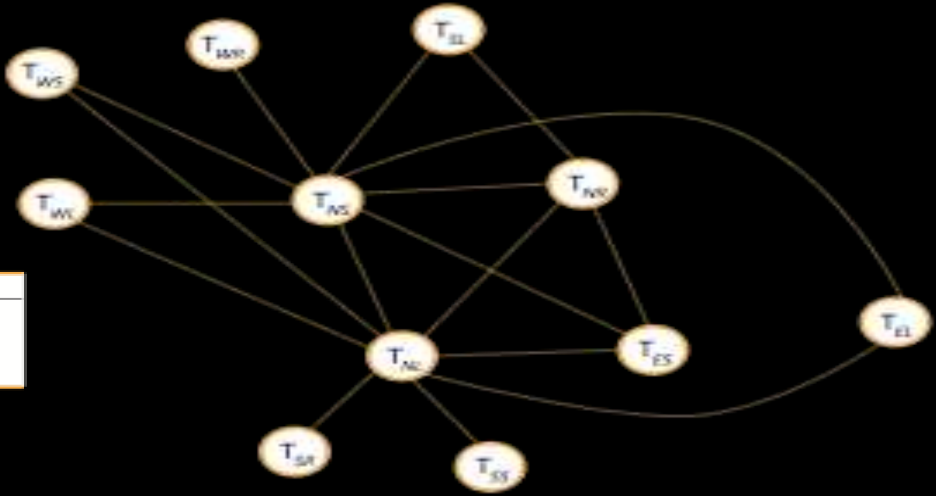
"In Milan, traffic lights are instructions.
In Rome, they are suggestions.
In Naples, they are Christmas decorations.”

Antonio Martino, Italian Minister

Access to intersection based on Incompatibility Network and ….



Vehicle trajectories
(partial view)

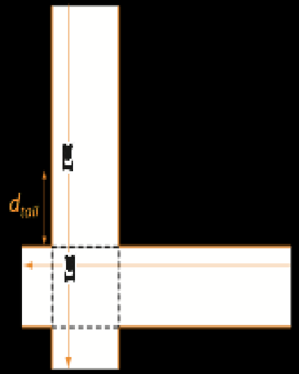


Incompatibility Network
(partial view)

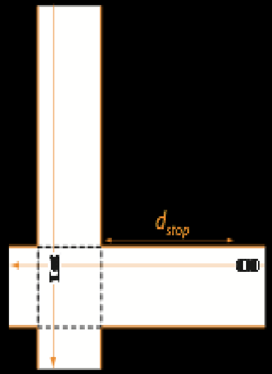
Access to intersection based on Incompatibility Network and safety constraints

Safety constraint

- based on tailgate distance (a.k.a. two seconds rule) for vehicles with compatible trajectories
- based on vehicle stopping distance for vehicles with incompatible trajectories



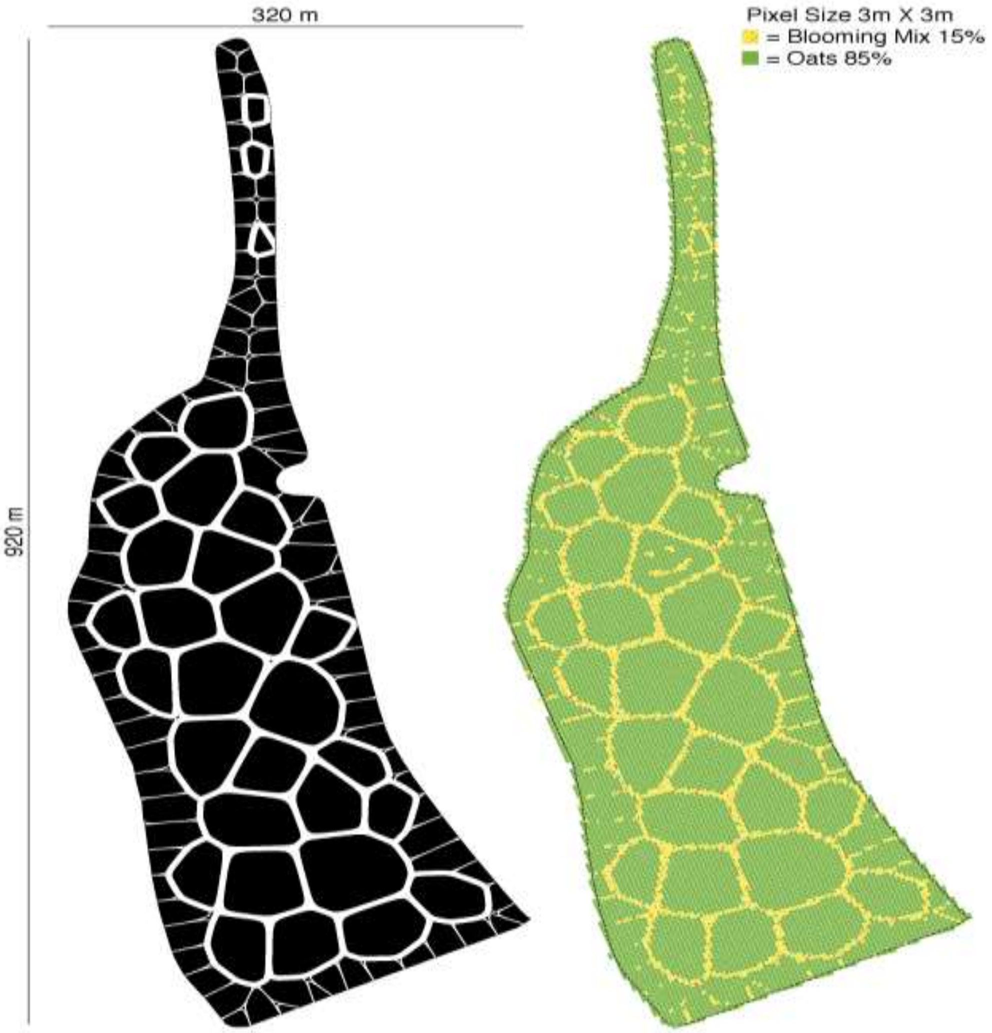
Typically, $d_{tail} < d_{stop}$

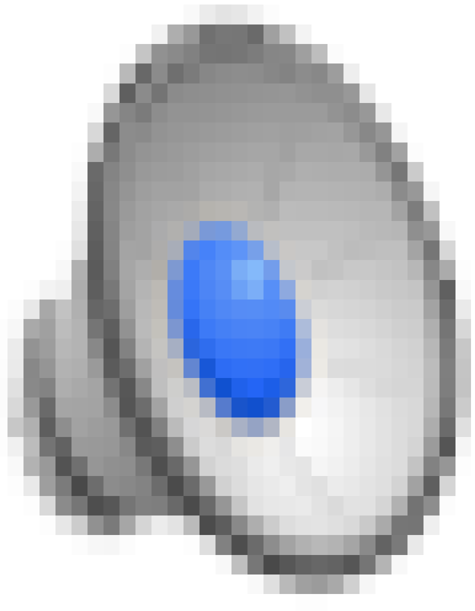


City Drive


New Holland
T7070


EXPO


320 m
920 m
Pixel Size 3m X 3m
= Blooming Mix 15%
= Oats 85%




AMS
MIT


GEORG JENSEN


Træk

TIME

20 November 2014

311 notes

tech

boston

cycling

urbanism

design

red

time

SUPERPEDESTRIAN

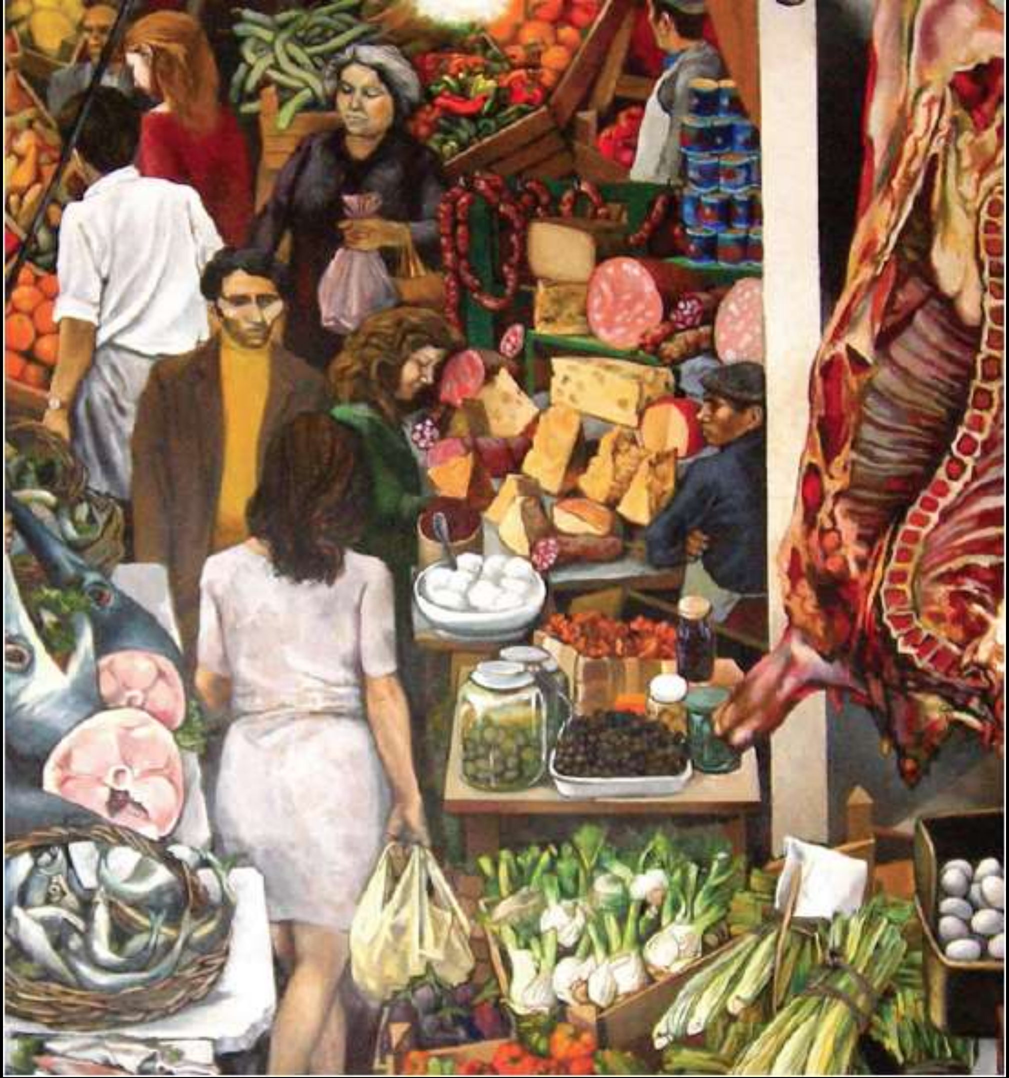
SUPERPEDESTRIAN

Future Food District
Expo 2015, Milan

“Behind every cheese there is a pasture of a different green under a different sky. This shop is a museum: Mr. Palomar, visiting it, feels as he does in the Louvre, behind every displayed object the presence of the civilization that has given it form and takes form from it”

Italo Calvino, Mr. Palomar


6



Exposition table layout


Golden
1.97 € / Kg
coop


coop


casse
cash counters
VINO
wine
Franciacor
CARNE e PESCE
meat and fish
L'ESSENZA
DELLE OLIVE
321


0.99 €


Expo Filiera Latte E Derivati
Expo Filiera Latte E Derivati Weekly Sales
Sales


Il pomodoro,
della terra,
ricorrente e


VIVI VERDE SPREMUTA 100% DI ARANCE ROSSE BIOLOGICA 750ML
VIVI VERDE 100% ORGANIC RED ORANGES JUICE 750ML
2.25 €
al L/per L
VALORI NUTRIZIONALI PER PORZIONE A.R. / NUTRITIONAL VALUES - R.I.
ENERGIA ENERGY
52.00 kcal 217.57 kj
2%
ZUCCHERI SUGAR
12.30 g
12%
GRASSI FATS
0.00 g
0%
AC. GRASSI SATURI SATURED FATS
0.00 g
0%
SALE SALT
0.00 g
0%
IMPATTO AMBIENTALE / CARBON FOOTPRINT
0.6 g/Kg
Co2

The Supermarket of the Future Knows Exactly What You're Eating

May 28, 2015 / 6:15 pm

BY ALBERTO MUCCI

SHARE TWEET

http://munchies.vice.com


Sourcemap
Greenland
Iceland
Россия
Russia
Canada
United States
México
Kazakhstan
Mongolia
Iran
Afghanistan
Pakistan
India
Indonesia
Papua New Guinea
Australia
Indian Ocean
North Pacific Ocean
South Pacific Ocean
New Zealand
North Atlantic Ocean
South Atlantic Ocean
Venezuela
Colombia
Brasil
Brazil
Perú
Bolivia
Chile
Argentina
Suomi
Finland
Sverige
Sweden
Norge
Norway
United Kingdom
Polska
Poland
Ukraine
España
Spain
Italia
Italy
Türkiye
Turkey
Iraq
Saudi Arabia
Algeria
Libya
مصر
Egypt
Mauritania
Mali
Niger
Chad
Sudan
Nigeria
Ethiopia
DR Congo
Kenya
Tanzania
Angola
Namibia
Botswana
South Africa
Madagascar
7
13
14
20
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32
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Sourcemap
Россия
Russia
Kazakhstan
Mongolia
Iran
Afghanistan
Pakistan
India
Indonesia
Papua New Guinea
Indian Ocean
Australia
New Zealand
North Pacific Ocean
South Pacific Ocean
Canada
United States
México
Greenland
Iceland
North Atlantic Ocean
Venezuela
Colombia
Brasil
Brazil
Perú
Bolivia
Chile
Argentina
South Atlantic Ocean
Suomi
Finland
Sverige
Sweden
Norge
Norway
United Kingdom
Polska
Poland
Ukraine
España
Spain
Italia
Italy
Türkiye
Turkey
Iraq
Saudi Arabia
Algeria
Libya
مصر
Egypt
Mauritania
Mali
Niger
Chad
Sudan
Nigeria
Ethiopia
Kenya
DR Congo
Tanzania
Angola
Namibia
Botswana
Madagascar
South Africa

CE0168

QUALCOMM
On / Off


MIT / Trash Track
Volunteers


MONiTOUR E-TRASH TRANSPARENCY
FILTER
ABOUT
by Device Type
CRT
LCD
Printer
by Starting Region
16
51
84
39
by Ending Region
Inside of US
Outside of US
Highlights
11/11
LCD from Waukegan, IL
LCD from Cadillac, MI
LCD from Wapakoneta, OH
LCD from Oxford, MI
LCD from Willard, OH
LCD from Orlando, FL
CRT from Youngstown, OH
CRT from Norcross, GA
CRT from Doraville, GA
CRT from Doraville, GA
200
Trackers
4 km
Average Travel Distance
0 days
Average Active Time
Starting cities
Ending cities
Traveling paths
Selected paths

twitter

@senseablecity

@crassociati