McKenzie Humann  
Pedestrians in Urban Mobility Panel  
4/14/23

Part I: Relevant Research


Part II: Recent News:


Part III: Q&A Summary

Q: How can we align the diverse and inconsistent ideology about walkability? How can we give people the choices when the environment is already built for the driver?

Peter Norton: We can draw on the example of success in the way that people wanted to build the environment for cars. That gives us encouragement that change is possible if not always easy.
However this is distinct between owning and operating an auto vs. rebuilding our environment that deprive of others of choices. The most attractive way to present a walkable future is a future with more choices not less choices: gives people the opportunity to make selections among competing alternatives.

Q: Can we afford it and what do we do about it? We have the infrastructure bill and inflation reduction act. How much is devoted to pedestrians? At the local level, how do you see the effort that Boston is doing? Is the current change ambitious enough?

Kris Carter: There is a fair amount of money that is coming to us, but most messaging is about electrification. The city has put in an ask for federal funds in reconnecting neighborhoods, for example to deck over I-90. There's also some projects for safe streets for pedestrians and cyclists. That said, you need a robust public transit system and a good sidewalk network and a diversity of job centers. In Boston, public transit is suffering from disinvestment over the years. We are still better off than other places but you need all of those things since walking is often coupled with other things. To Peter's point, the streetcar network in Boston was extensive in the early 20th century. The bus network doesn't even match that. Is 20% of commuters walking to work enough? Personally, the answer is no. I want to see more people walking, not just to work, and feeling safe about it like safe routes to school.

Q: The primary research area related to pedestrians is about environmental influences on pedestrian behavior. When can we move from this research to institutionalized practice? Is this something we already know and we can implement or do we need to keep researching?

Andres Sevtsuk: All large projects, if they exceed 100,000 sqft have to conduct traffic impact assessments of the project and that is 90% focused on cars. And results are usually about intersections. The idea of doing this for pedestrians rather than cars is a reaction that infrastructure is always delivered for cars. We need awareness building in cities to pause and think about the strategic plan and introspectively examine how every move you make in built environments will shift you closer or further away from the goal. The means we are ready right now! There is a lot of missing data, but we just finished digitizing pedestrian networks. Most American cities have no idea about their sidewalks even though we have road center lines that the U.S. Census updates. But there's a real need for sidewalk network information. Now we have computer vision that can be used to identify pedestrian networks and map them for all cities in the U.S. Boston has gone through an arduous survey to map that and act on it. Beyond that, look at what data we count for vehicles compared to what we count for pedestrians: the disparity is enlightening. There is an enormous historic bias that favors vehicles. We need to systemically prioritize the non-motorized street user by collecting more information on sidewalks, pedestrian counts, pedestrian accident, etc. in order to encourage projects that treat them as equals.

Kelly Clifton: We don't need more research, but doesn't mean there isn't more research to be done. Deconstructing those mechanisms is fundamental. Similar to Peter's point, there is path dependency but it is also a deliberate decision! We can and need to make different decisions to change the future. It is important to understand where the change happens at the city level and how hard it is, to think about the diversity of cities and environments, and to address whose responsibility it is between public and private property owners. Fundamentally we need to ask...
what is the street for? This conversation expands more generally to thinking about the right of way. Urban greening, community activities, unhoused people, all occupy the right of way at various times and we need to start talking beyond the transportation community to decide who this space is for.

Part IV: Reflections

Student reflections mainly focused on four main topics: The interdependent relationship of the popularity of walking with local culture, public perception, and planning history, and how these ideas can make it harder to transition toward being a more walkable environment. Shoichi, Spencer, and Yen-Chu point out various examples of how perceptions of walking vary across different countries and cities. For example, Shoichi writes, "Japanese people regard streets as good places to walk around and think they should be as enjoyable as possible, with esplanades or beautiful stores along them, while not a few American people think streets are mainly for cars and not places to enjoy." These differences in cultural perceptions of walking mean that planners cannot only try to replicate a walkable built environment because pervasive political, economic, and cultural forces will be slow to change. Spencer points out that "when people become dependent on driving in a particular city, they often advocate for increased funding towards road infrastructure at the expense of public transit. This leads to a decline in the quality of public transportation, pushing more individuals to rely on driving between cities."

Other students questioned more generally how strongly people prefer walkable cities. Samuel, Michael, and Jason pointed out how walkable neighborhoods necessitate density however dense urban environments are also noisier, more expensive, allow for less personal space than in the suburbs, and can be very difficult to 'retrofit' after originally being built for car-based travel. Nineveh and Yen-Chu wrote about the "hierarchy of stakeholders", i.e. cars, mopeds, bikes, pedestrians, that Peter Norton discussed and how this relates to different safety strategies. For example, in Taipei, Taiwan, Yen-Chu shared that, "the roads there are not wide enough to build a pedestrian-only on a bicycle-only lane. Also, since it is too crowded in the city to drive and park, a lot of people choose mopeds, but it makes the pedestrian even more unsafe." Meanwhile, in the US context, Nineveh connected Norton's points to the book, There are No Accidents which offers "examples of how pedestrian fatalities due to insufficient infrastructure have been weaponized again pedestrians in marginalized communities." Transportation safety measures reflect the local transportation context and built environment as well as socio-economic conditions.

Finally, Yunhan made interesting points about walkability, the 15-minute city model, and preferences for working from home. She proposes that "it is possible that the availability of amenities within walking distance of people's homes may influence their preferences for remote work. For instance, if people have access to all essential services and amenities within a short walking distance, they may be more inclined to work from home, reducing the need for commuting to work." Thus, travel mode options and decisions could inform broader behavioral trends like working from home.

My own reflections on each guests' comments:
Peter Norton: Understanding how the transportation landscape of cities evolved in the last 100 years is a critical step for sustainable transportation advocates. Without understanding the history, there is a temptation to assume that personal vehicles dominate American cities because they are the best option rather than the current transportation system being a result of political, cultural, and economic forces. Understanding these forces can help advocates and planners strategize to effectively influence the current system, using the past successes / failures as learning opportunities. Peter's call for re-imagining who/what the street is for reminds me of the history of Amsterdam, where in the 1970s many people protested to secure safe streets for children.

Kris Carter: Kris offered a critical perspective to understand what exactly cities can do given their jurisdictional limitations and how many details are important to create a walkable environment. The city government's influence comes not just from their responsibilities in building/maintaining public infrastructure but also as a major contractor and organization operating within the city. Leveraging these different sources of influence requires a high level of diligence but can also help to set an example for other organizations and change broader cultural expectations.

Andres Sevtsuk: It is great that Andres and his team have created a pedestrian impact analysis tool that is ready to be used by cities. I recently saw an article about the 'junk science' of traffic impact analysis tools because they do not do a good job of incorporating local context and do not consider how the effect of building more infrastructure for cars (parking, road widening, etc.) perpetuates the use of cars. On the one hand, building a similar tool for understanding pedestrian flows change due to a new development is clever since traffic engineers and planners are already accustomed to traffic impact analyses. However, I wonder if it will also be subject to these same criticisms (which depends on the adaptability of the model). That said, amidst a genuine commitment to sustainable transportation systems, the 'risk' of a self-fulfilling pedestrian impact analysis only has an upside of furthering those goals while the risk of a self-fulfilling traffic impact analysis is that the analysis sabotages the goal. It would be interesting if Andres and his team could build on the pedestrian impact analysis model to create a holistic transportation impact analysis framework.
### The GoBoston 2030 Plan [released 2017]

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2014 ACS data
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2014 ACS data
Mission Accomplished...for a hot second

**Commute Mode**

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2022 BTS Data for the Entire State of Massachusetts
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2022 BTS Data for the Entire State of Massachusetts
The City of Boston spends over $11M annually on maintenance and improvement of its sidewalk network which consists of nearly 1,600 centerline miles (54 million sq. ft).

After a comprehensive condition assessment in 2014, we found that the repair backlog of the sidewalk network was nearly $500M.
**Rose - addressing sidewalk repair**

- **Past Strategy**: The City historically used constituent requests to determine repair locations with the promise that all requests will be met within 18-24 months.

- After updating the 311 system in 2015 the number of requests skyrocketed and made this “promise” impossible.

![Graph showing the increase in requests from 2008 to 2016](image-url)

*Source: City of Boston 311 Data*
Rose - A further look at 311 requests for sidewalk repairs

Requests (red=high frequency)  Sidewalk Conditions (red=poor)  Per Capita Income (red=highest)

Source: City of Boston 311 Data  Source: City of Boston Sidewalk Condition Index data  Source: US Census
Look for **highest impact per dollar, increase effectiveness, focus on people**

1. Full replacement instead of partial repairs
2. Prioritize repairs where people walk the most
3. Prioritize where our repairs will help residents the most
4. Put all these together and locate regions where **full reconstruction** would be most beneficial
5. Still use 311 requests for “make-safe” work
Lateral Protective Devices or Side Guards

Bud: Vehicle Safety for Vulnerable Road Users

Alex Epstein, Volpe
Cyclist Killed by Trucks in ‘Boston’ over the Last 15 years

Boston runs nation’s largest sideguard pilot

Boston enacts nation’s first truck safety ordinance

Gordon
Tanya
Christopher
Kanako
Eoin
Anita
Bernard*
Antawani
Meng
Joe*
Paula
Amanda*
George

*Cambridge

Boston files state bill to bring ordinance to state law

Third version of bill passes into MA law. No meaningful action at federal level.
1. Defines a “vulnerable road users”
2. Safe Passing (4ft buffer)
3. Truck Safety Devices
4. Speed Limits
5. Crash Reporting
6. Rear Red Lights for Bicyclists
Bud: Creating a Direct Vision Rating System

Research Team: Boston Public Health Commission, Volpe Center, City of Boston Public Works, Mayor’s office of New Urban Mechanics, Transportation Department
Bud: Creating a Direct Vision Rating System

Generated from the Volpe-developed VIEW app
Bud: Creating a Direct Vision Rating System

City of Boston Fleet (Draft)
Generated by Volpe Center, in collaboration with the Boston Public Health Commission
https://blindzonecalculator.herokuapp.com/
Thorn: areaways

- Areaways are private property.
- The sidewalks above areaways are not private property. They are public sidewalks.
- The City has a regulatory responsibility to maintain the public right of way.
- City ordinances place the responsibility on the areaway owner to maintain the sidewalks (the structural roof of the areaway) in part because it is difficult to reconstruct these sidewalks without ending up in someone’s private basement.
Thorn: areaways

The City has to build roughly 1,600 pedestrian curb ramps a year per the CREEC settlement.

Areaways are going to hamper this progress unless we dedicate more resources & time to it.

Missing ramp / suspected areaway based upon contextual clues on sidewalk
Matthew Petersen @meptrsn
I just learned via @BOS311 that these sidewalks in Chinatown are not part of the public way - is there anything the @CityOfBoston can do to either make the owners maintain them, or make a deal to have the City maintain them instead?

Twitter  Today at 12:34 PM 310 kB
Thorn: areaways

State Street Reconstruction
Thorn: *areaways*

*Literally, All Areaways*
Areaways impact Chinatown’s environment: poor quality sidewalks, uneven roads, hotter public spaces

Drawing from Chinatown 2010 master plan asking for more street trees
Mapping the Walk: scalable computer vision approach for generating sidewalk network datasets from aerial imagery

Andres Sevtsuk
Associate professor of Urban Science and Planning
Director, City Form Lab
Head, City Design and Development group
Department of Urban Studies and Planning
FRAMEWORK

DECARBONIZING URBAN MOBILITY?
FRAMEWORK

DECARBONIZING URBAN MOBILITY? CO₂ — EVs, AVs, TNCs

INCOME
FRAMEWORK

DECARBONIZING URBAN MOBILITY?

EVs, AVs, TNCs

EQUITY?

PUBLIC HEALTH?

BROAD-BASED ECONOMIC DEVELOPMENT?

SOCIAL INTERACTION AND ACCESS TO OPPORTUNITIES?
FRAMEWORK

- Decarbonizing urban mobility?
- Equity?
- Public health?
- Broad-based economic development?
- Social interaction and access to opportunities?

EVs, AVs, TNCs

Planning walkable and transit-oriented cities

Income distribution
March 2023
Planning walkable, bikeable and transit-oriented cities
MIT City Form Lab

London, UK
% sustainable mode-share: 62%

Cincinnati, OH
% sustainable mode-share: 6.1%

Source: https://www.mylondon.news
Source: Google Maps
Macroscopic view

% sustainable mobility = f(density, public transit quality, street quality)

Data source: CDP19
Microscopic view

Sources and sinks
of pedestrian movement
Amount of flow from each opening (# pedestrian trips) for a particular trip purpose (e.g. to parks) depends on the amount of water in the tank (trip generation) and the diameter of the opening (pedestrian accessibility).

Accessibility = \sum_{i=1}^{n} \frac{\text{Destination attractiveness}}{f(\text{Travel cost})}
Sources and sinks of pedestrian movement

Amount of flow from each opening (pedestrian trips) additionally depends on the relative size of other openings (relative accessibilities on other modes).
Pedestrian trips on city streets
Trip distribution and route choice
Total volume of foot-traffic on city streets
Multiple trip origins and destinations
Variation by time of day
How do street attributes affect pedestrian route choice and willingness to walk?

How do street attributes affect pedestrian route choice and willingness to walk?


<table>
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<tr>
<th>Variable</th>
<th>Willingness-to-walk (WTW) in meters</th>
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<td><strong>Study Area</strong></td>
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<td><strong>Number of observations</strong></td>
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<td>Turns</td>
<td>One extra turn along the route changes WTW by:</td>
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<tr>
<td>Elevation gain</td>
<td>One meter of elevation gain changes WTW by:</td>
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<td>Amenities</td>
<td>Passing 10 extra amenities changes WTW by:</td>
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<td>Sidewalk width</td>
<td>A 10 ft. increase changes WTW by:</td>
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<tr>
<td>Sky View Factor</td>
<td>An average increase by 10% changes WTW by:</td>
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<td>Green View Index</td>
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<td>Avg. traffic volume</td>
<td>An increase by 1000 veh/hr changes WTW by:</td>
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<td>Traffic speed</td>
<td>An increase by 10 mph changes WTW by:</td>
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Trip origins and destinations
Urban Network Analysis toolbox
All routes to the destination up to 15% longer than the shortest route are equally likely? Idiosyncratic route preferences between diverse peds…

Urban Network Analysis toolbox
What if some routes are notably nicer, better for peds? Accounting for different pedestrian qualities of streets in route assignment.

Urban Network Analysis toolbox
What if some routes are notably nicer, better for peds? Accounting for different pedestrian qualities of streets in route assignment.

Urban Network Analysis toolbox
Predicting the effect of upcoming developments on pedestrian flow.

Predicting the effect of upcoming developments on pedestrian flow.
Pedestrian Impacts of new developments → mitigation measures

**Signal adjustments**

**Sidewalk widening**

**Public space investments**

**Investments into safe crossings**
A fundamental question we face:

How do we build cities that will produce a higher mode share of pedestrian and transit trips?
The Radical Revision

Peter Norton
norton@virginia.edu
Department of Engineering and Society
University of Virginia

MIT Mobility Initiative
April 14, 2023

Note: Images in this file are the property of their respective rightsholders and should be used only by permission.
America’s love affair with the automobile
However, one thing is clear from the results presented in the two preceding sections and that is—pedestrians impede traffic flow.
THE DANCE OF DEATH THAT GOES ON BETWEEN THE SIDEWALKS OF NEW YORK

St. Louis, 1923

Sacrifices to the Modern Moloch

By James

New York, 1928

E. J. Mehren,
in small volume. There is little chance of this motor use decreasing or even of remaining stable. Driver and traffic regulations can only remove a part of the difficulty. The obvious solution, then, lies only in a radical revision of our conception of what a city street is for, and this reduces to a problem for the engineer. Motor boulevards, second-story streets, under or over crossings for pedestrians, all are probabilities of the near future in our congested centers and engineers.
WINNING the WAR on
TRAFFIC ACCIDENTS

By Paul G. Hoffman
President The Automotive Safety Foundation

WHILE vast strides have been made toward reducing the rate of highway accidents, this lowered rate must be even further reduced, while more people ride more miles each year. Here is a paradox challenging the automotive industry today.

Cure for Congestion

DAVISON UNITED HIGHWAY, DETROIT. Built by the Board of Wayne County (Michigan) Road Commissioners, this United Highway provides nonstop highway travel for 50 miles through a solidly built neighborhood in the Detroit area. Concrete bridges carry cross traffic over the expressway. Entrance to the expressway is permitted only at each end. One-way concrete service drives for local traffic are provided on both sides of the concrete highway. At the center of the project, provision is made for bus stops and passenger interchanges with the upper level.

RELIEVE CONGESTION
SPEED TRAFFIC
INCREASE SAFETY

No community today can afford narrow, congested roads and streets.


Whether you build new roads or widen old, be sure to demand concrete—the safest and most economical pavement for modern traffic.

PORTLAND CEMENT ASSOCIATION
10 W. Broad St., Columbus, Ohio

E. J. MEHREN,

Portland Cement Association, 1948

Chillicothe Scioto Gazette, June 17, 1937, p. 8
The first radical revision
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Walk First Priority
Sustainable Transportation
Biking / High Capacity Transit
Goods movement
Personal Transit
Taxi/on-demand services
Private Autos

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