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Midtown Atlanta Case Study

New Data Collection Techniques in Automated Pedestrian Safety Analysis

Agenda

- Challenges in traditional pedestrian safety evaluation techniques
- Introduction to Surrogate Road Safety Analysis
- Considerations when implementing a new data-driven collection technique for crosswalk interventions
- How Midtown Atlanta reduced the time to effectively validate pedestrian safety performance measurements

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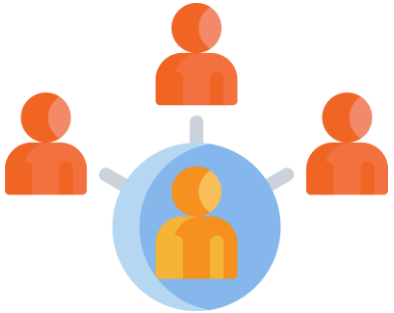
Leader in Automated Road Safety Analysis

Specialize in video-based traffic safety analysis.

- Based in Canada, with offices in Waterloo and Montreal.

Clients

Transportation authorities, municipalities, consulting firms and urban design firms



Partners

Engineering firms and System Integrators

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Automated Conflict Analysis to Measure Road Safety

Traditional Road Safety Analysis

- Countermeasures are traditionally guided by collision data
  - collected in the field by emergency services, such as police or paramedical services
  - compiled by road safety authorities.

- Road safety professionals examine this data to determine which contextual factors or new design features help explain road safety—examples:
  - effectiveness of traffic calming
  - cross walk markings redesign
  - excessive speeding

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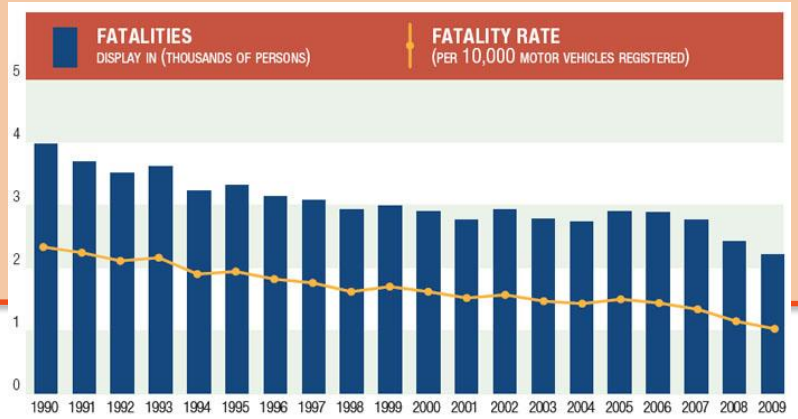
Shortcomings of Traditional Road Safety Analysis



The relative infrequency of traffic accidents makes meaningful statistical analysis **challenging** and **long**

1

Accidents on the order of 1 per million-km driven

2

Year-to-year variation, especially at the site-level

3

Data collection may take years to complete

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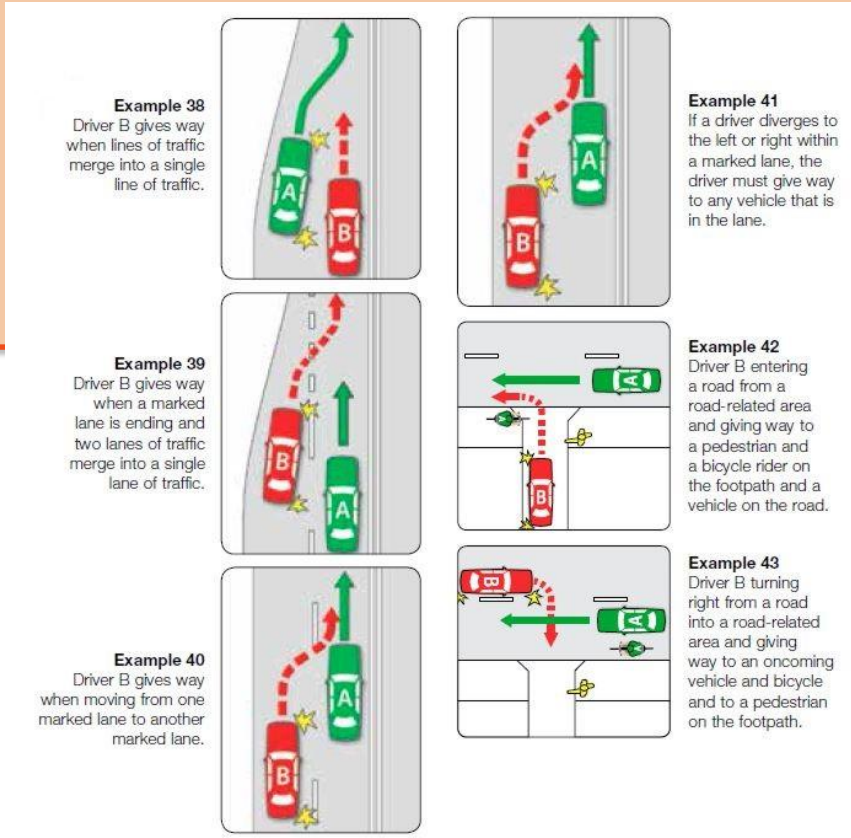
Shortcomings of Traditional Road Safety Analysis

- Possible **disconnect** between the information reported by **emergency service personnel** and the information sought by **road safety practitioners**.
  - Difficulty anticipating relevant information.

- Lack of technical detail prior to the collision:
  - non-expert witnesses
  - costly reconstruction



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Surrogate Safety Analysis as a New Technique

- The early technical and methodological challenges that are being solved today:

- **ubiquity of traffic cameras,** enable cost-effective observation
- advances in computer vision, driving automated and objective **extraction of road user trajectories**
- advances in robotics, provide improved **collision modeling** technologies and consistent definitions of the collision-course

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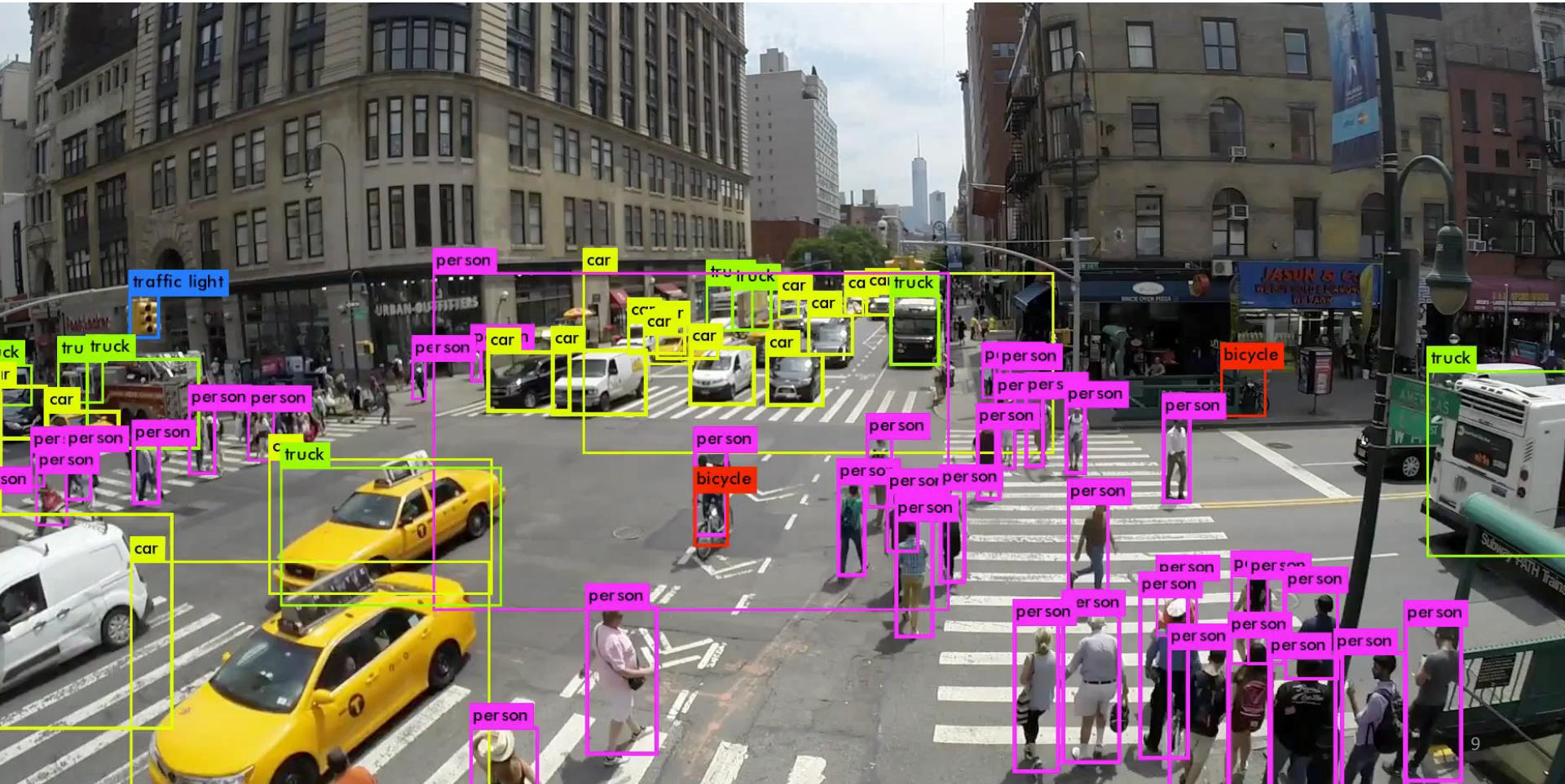
Computer Vision and AI to Analyze Traffic Movements

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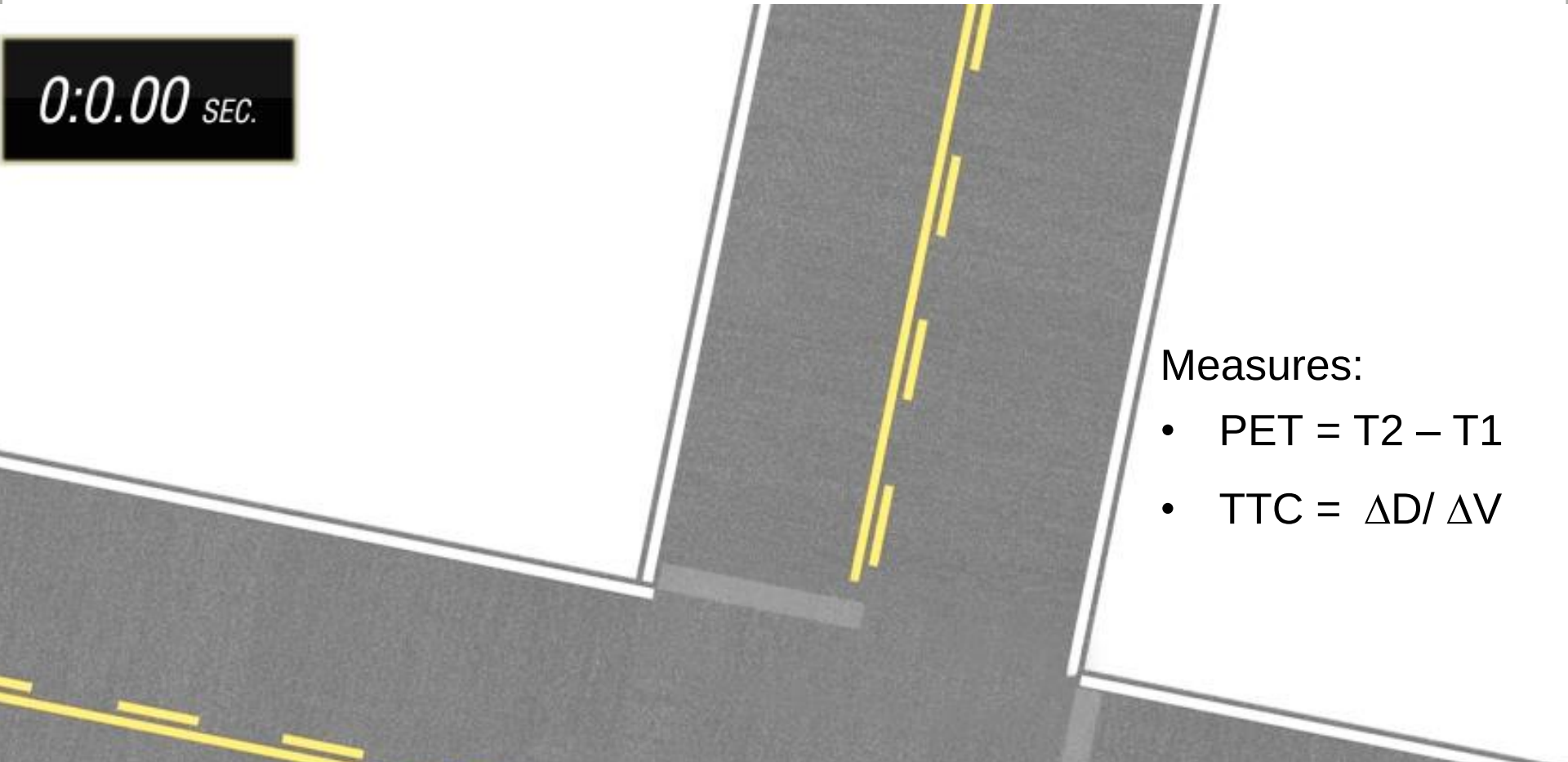
PET: 0.88 s
2017-10-13 16:53:16 TH
Waterloo
0.88 sec
to collision

Indicators of Potential Collision

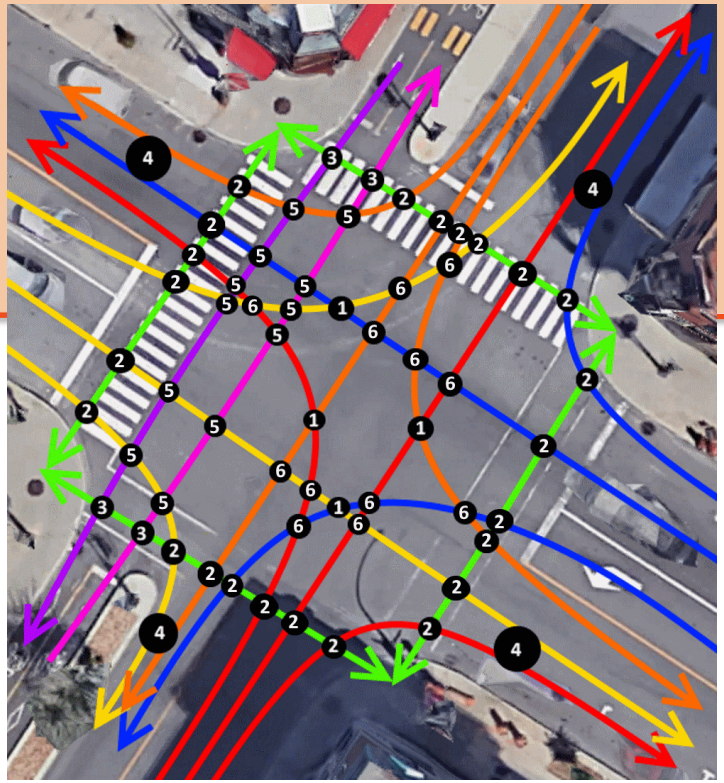


Measures:

- PET = T2 – T1
- TTC = $\Delta D / \Delta V$

Data Collection Considerations

- Using traffic cameras, **all** road users can be observed simultaneously.
- Each road user is classified by mode of transportation or vehicle classification, and is grouped into a movement.
- Safety analysis is performed between different movements.



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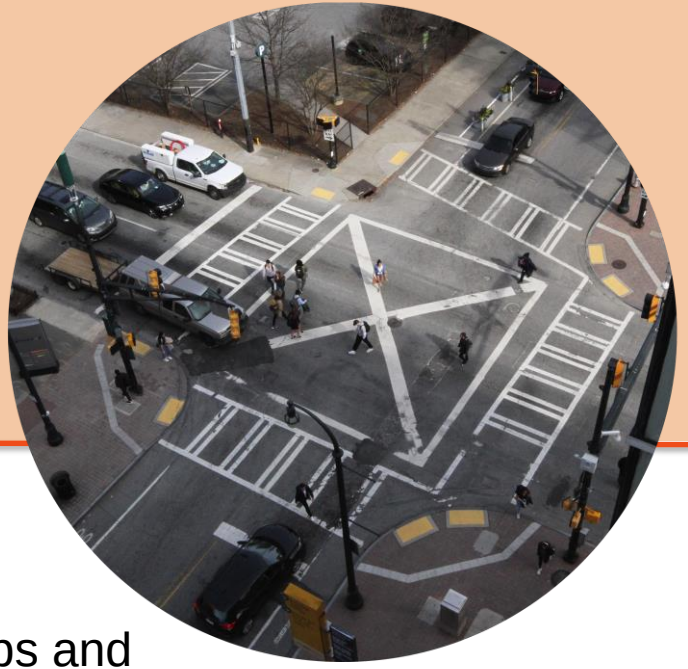
Midtown Atlanta Challenge

- Atlanta's innovation and entrepreneurial hotspot Tech Square
- Busy intersection at Spring Street and 5th Street
- Large volume of pedestrian and cyclists
- Need for a safer crossing system

Solution



- Installed a multi-directional pedestrian scramble
- Project deployment team - Midtown Alliance, Jacobs and AECOM
- Increased demand to validate safety performance measurements

AECOM JACOBS

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AECOM Project Applications

- Pedestrian scramble phase deployment
- Freeway on ramp intersection
- Unsignalized intersection

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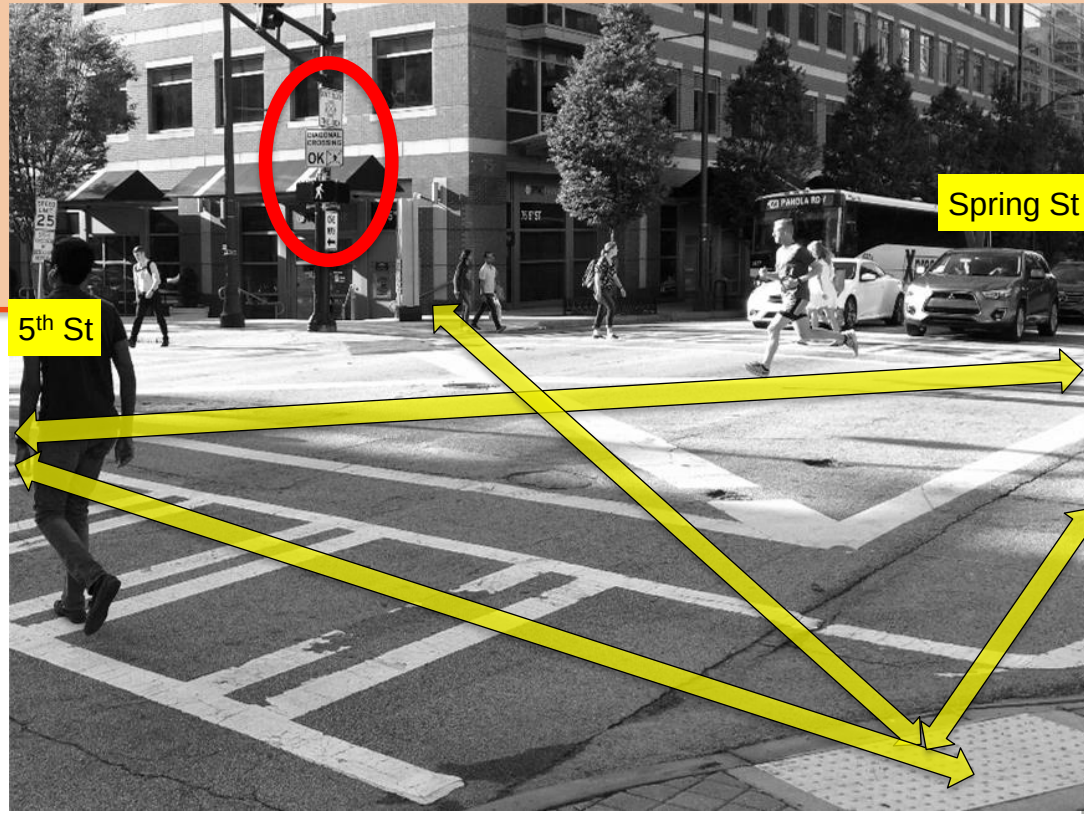
Pedestrian Scramble Phase Deployment



- Implemented in January 2018
- Before and after video processing
- Selected intersection conflict points
- Pedestrian and driver compliance
- Education and enforcement

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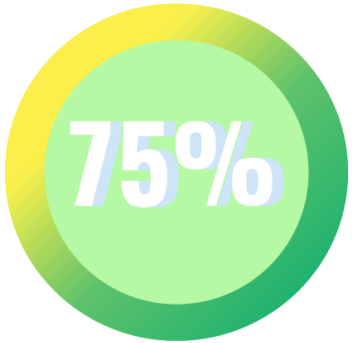
Deployment Safety Benefit

5th Street and Spring Street	Risk Level	Before	After
Near Collision Events	High (< 1 sec)	2	0
	Medium (1 – 2 sec)	38	6
	Low (2 – 3 sec)	150	26
	Total Events	190	32
% of Pedestrians involved in a potential conflict		4%	1%
Total pedestrian count		4,409	2,520

Pedestrians near collision risk (PET < 3 secs) reduced from 4% to 1%



75% performance improvement in near collisions between vehicles and pedestrians

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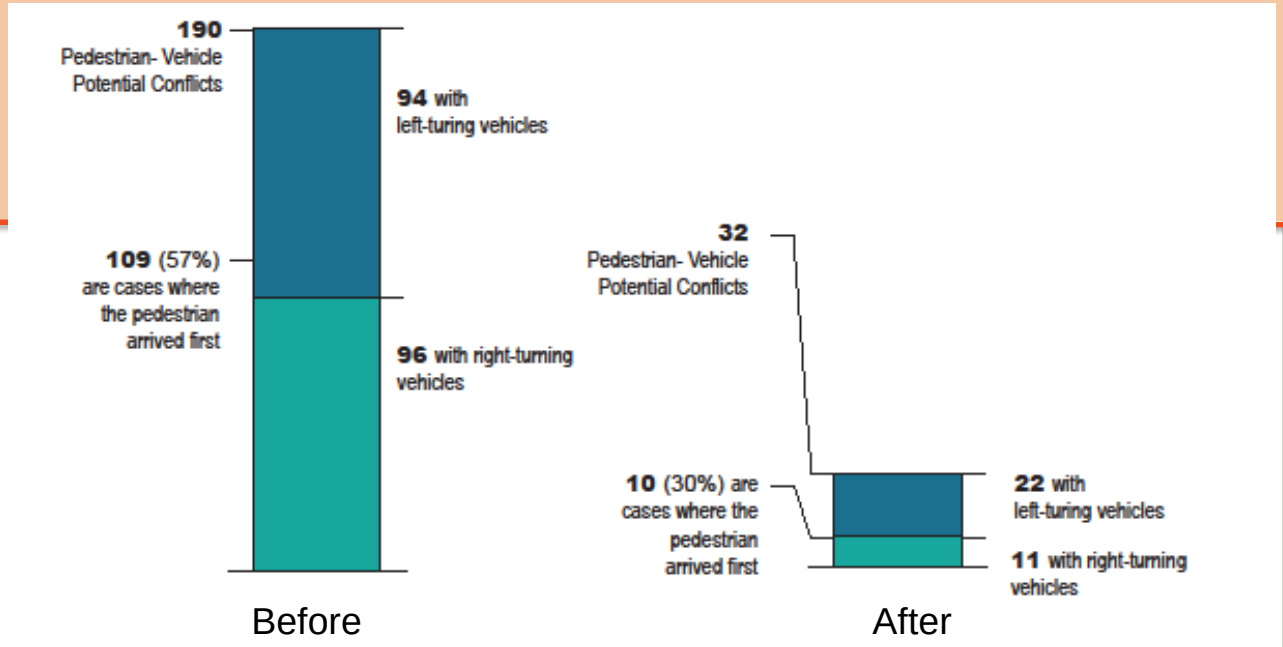
Detailed Insights

- 47% reduction of total potential conflicts when pedestrian arrive first
- 32% reduction of total potential conflicts with pedestrians and right-turning vehicles



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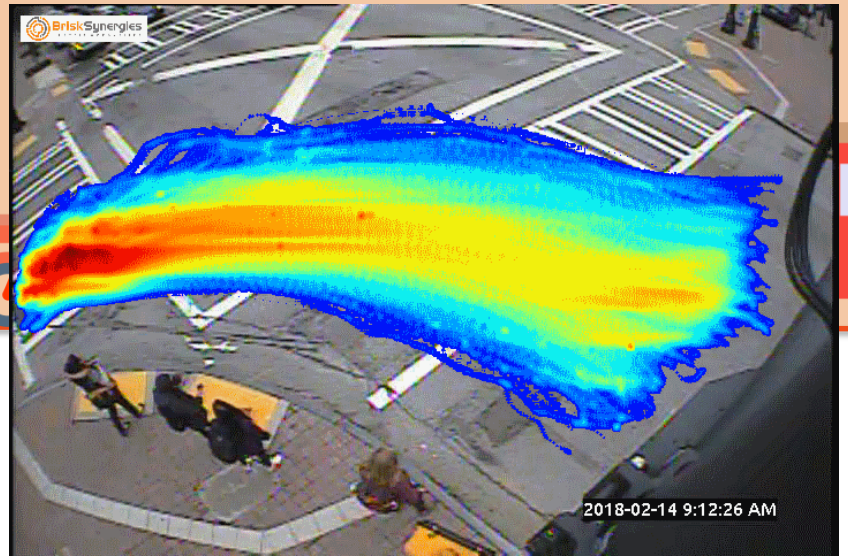
Other Insights



- Turning vehicle speed increases
  Right turning: 5 to 8 mph
  Left turning: 12 to 16 mph
- Pedestrian potential conflicts were largely consistent throughout the day
- Difference between pedestrian potential conflicts and bicycle potential conflicts
- More pedestrians involved in potential conflicts during the weekend than during the weekday

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Insights Summary

- Quick and effective way of evaluating and validating “before and after” pedestrian safety numbers
- Quantifiable safety-related behaviors of pedestrians, bicyclists, and drivers
  - Potential conflict (near-miss) risk profile
  - Temporal characteristics (day of week, daylight, dark, peak hours, etc.)
  - Aggressive driver (vehicle turning speed)
  - First to arrive (pedestrian or vehicle)
- Reinforced intuition/field experience, and supported constructive discussions
- Pedestrian vs bicycle evaluation (significant differences)
- “Data clarity”; professionals and the public understand the data results

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Don’t Learn
Road Safety By
Accident