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Benefit-Cost Evaluation Method for Transit Stop Removal

Zef Wagner
Portland State University

A Benefit-Cost Evaluation Method for Transit Stop Removal

Zef Wagner
Robert L. Bertini
Portland State University

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Overview

- Introduction
- Research
- Methodology
- Application
- Next Steps

Introduction

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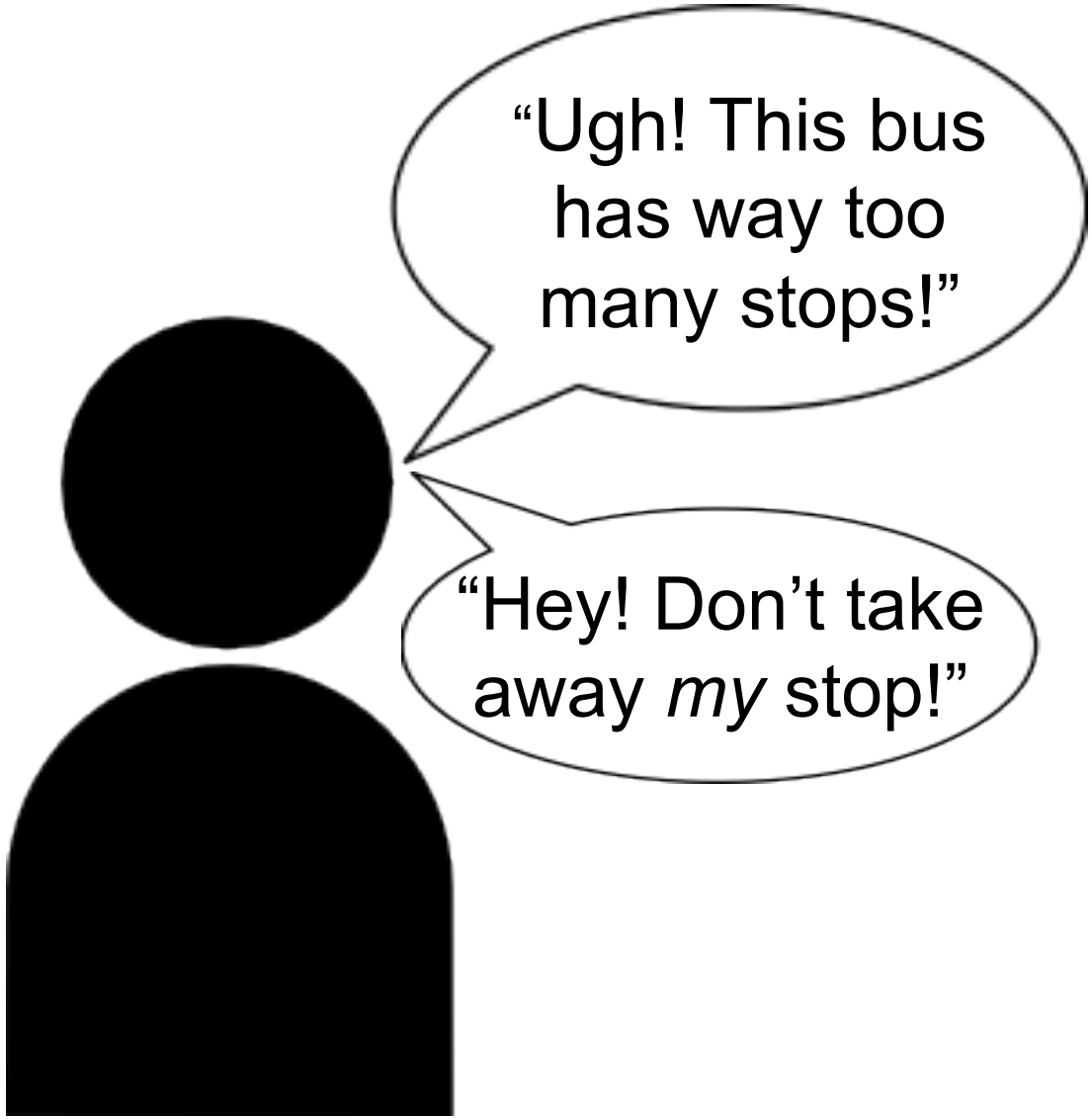

Introduction

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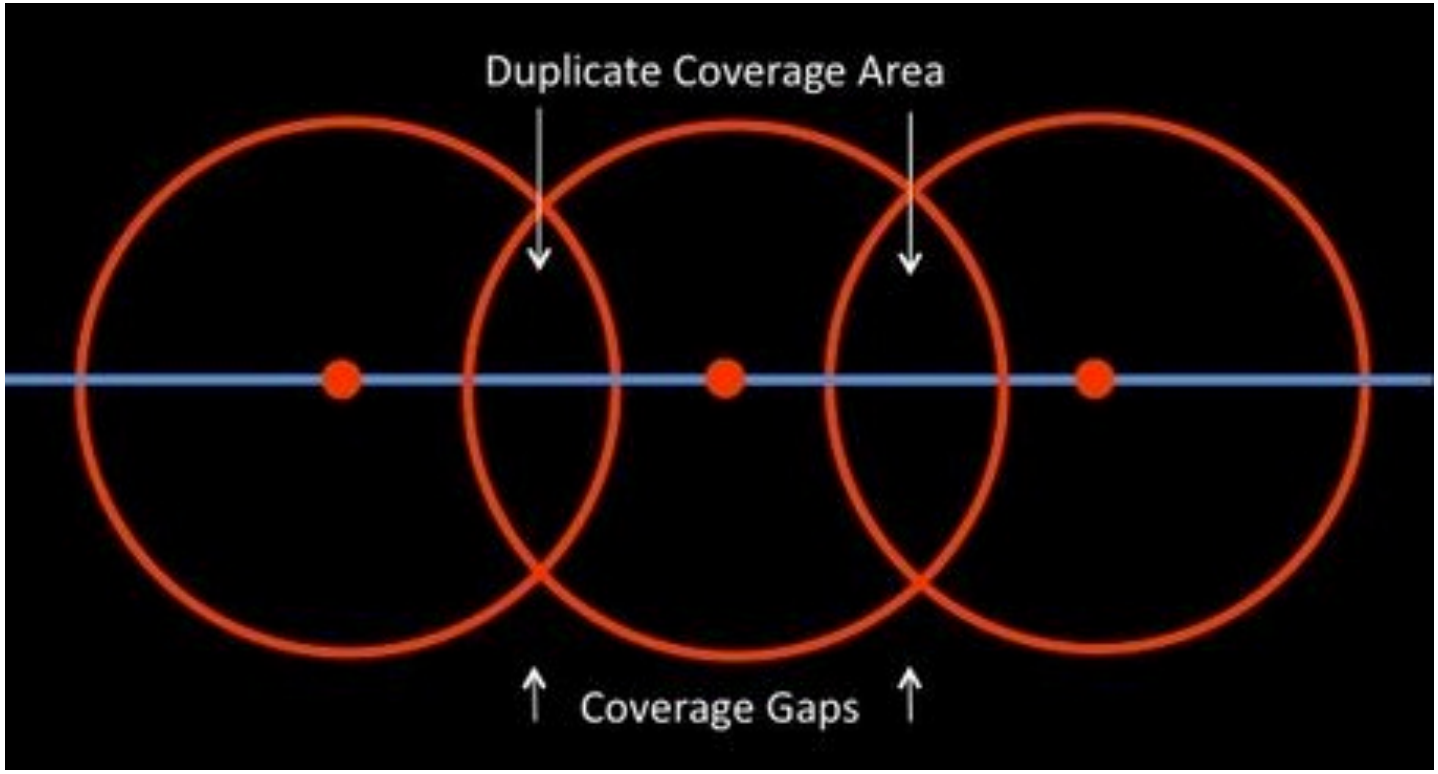
Wider Spacing ⟷ Closer Spacing

Ridership ⟷ Coverage

Speed ⟷ Access

Reliability ⟷ Proximity

Close Spacing = Duplicate Coverage



Wide Spacing = Coverage Gaps

Introduction

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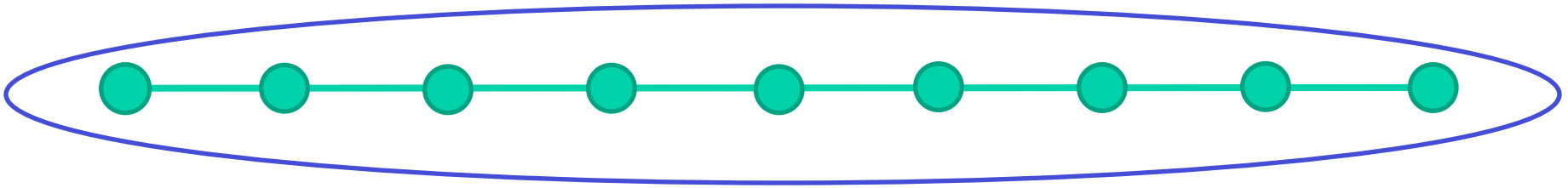
Stop Spacing Standards = ~1/4-mile

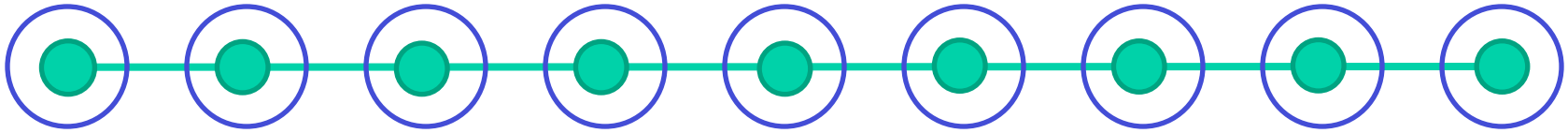
Stop Spacing in Practice = ~1/8-mile (or less!)

Research

- Existing research focused on *line-level* analysis to determine optimal *average* stop spacing

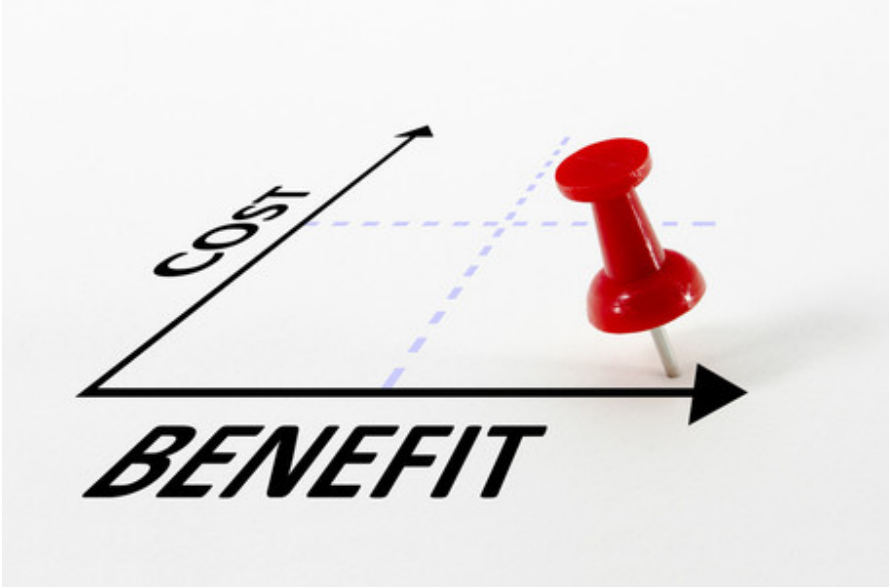


- Needed: a *stop-level* analysis method to determine which *specific* stops to remove



Methodology

- Calculate Benefit-Cost Ratio (B/C) for removing each stop
- B/C > 1 = candidate for stop removal



Methodology

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- B = (# of through riders on vehicle) x (time saved by not serving stop)
- C = (# of riders using stop) x (additional time to access nearest remaining stop)
- Passenger-minutes saved vs. passenger-minutes lost

Methodology

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- Average load and stop-level ridership
- Distances between stops
- Value of time ratio
- Average walking speed
- Average time lost per stop (not including dwells)

Assumptions

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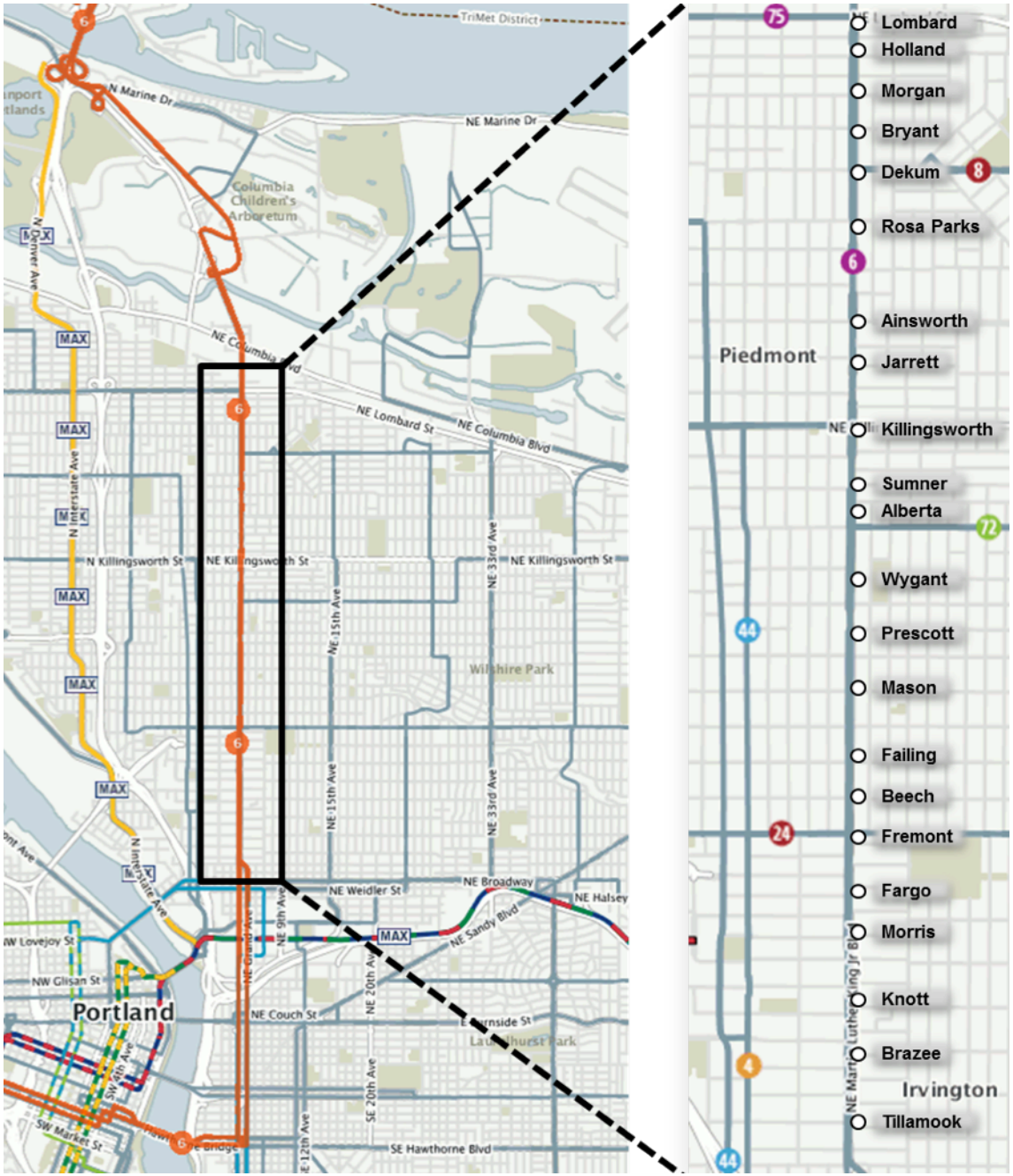
- Bus serves all stops on every trip
- All passengers migrate to nearest stop
- Perfect street grid with small blocks

IMAGES AND MAPPING COURTESY OF URBAN DESIGN 4 HEALTH

Application

- TriMet Line 6
  - 20 stops
  - Outbound
  - PM Peak
  - Fall 2011
- Why chosen?
  - High ridership
  - Close spacing
  - Grid streets
  - Many stops



Results

- 5 stops have B/C>1
- 3 adjacent stops
  - Remove outer stops first
- Remove stops, then re-evaluate after one year

Cross Street	B/C
Holland	1.6
Morgan	3.7
Bryant	1.6
Dekum	0.7
Rosa Parks	0.6
Ainsworth	0.2
Jarrett	0.7
Killingsworth	0.2
Sumner	1.0
Alberta	0.3
Wygant	1.0
Prescott	1.0
Mason	0.9
Failing	0.7
Beech	2.2
Fremont	1.0
Fargo	2.7
Morris	0.7
Knott	0.5
Brazee	0.9

Sensitivity Analysis

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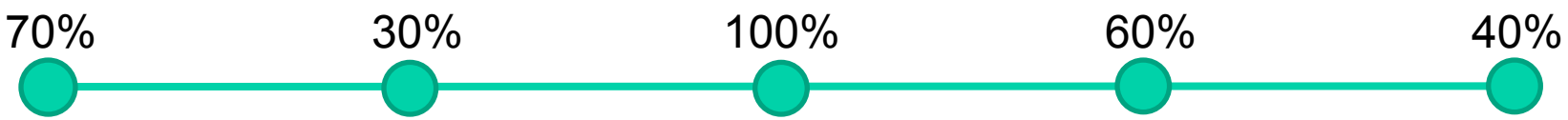
- V_a = Value of Time
- T_r = Time Lost/ Stop
- B/C = Benefit/Cost

- A range of values still support the same conclusion

V_a	T_r	B/C	
		Rosa Parks	Beech
2.5	10	0.3	1.2
	15	0.5	1.7
	20	0.6	2.3
2	10	0.4	1.5
	15	0.6	2.2
	20	0.8	2.9
1.5	10	0.5	1.9
	15	0.7	2.9
	20	1.0	3.9

Next Steps

- Stop Probability



- Network Analysis

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- Operational Benefits

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Thank You

Zef Wagner
zef.wagner@gmail.com

Robert L. Bertini
bertini@pdx.edu

Special Thanks:

TRIMET

Human Transit

stepatpsu
students in transportation engineering and planning

OTREC
OREGON TRANSPORTATION RESEARCH AND EDUCATION CONSORTIUM

NITC NATIONAL INSTITUTE for TRANSPORTATION and COMMUNITIES