2019

BELLEVUE VISION ZERO SUMMIT

VISION ZERO SUMMIT PROGRAM

FEBRUARY 13, 2019

OVERLAKE MEDICAL CENTER - PACCAR EDUCATION CENTER
1035 116TH AVE NE
BELLEVUE, WA 98004

ONE CITY TOWARDS SAFE STREETS

VISION ZERO SUMMIT

PROGRAM BOOKLET

SPEAKER SCHEDULE

8:00 - 8:30am	Registration & Breakfast
8:30 - 8:35am	Tom DeBord: COO, Overlake Medical Center
8:35 - 8:50am	David Braunstein: President, Together for Safer Roads » Vision Zero - Everyone's responsibility
8:50 - 9:05am	Barbara McCann: Director, Office of Policy Development, Strategic Planning and Performance, USDOT » USDOT's Safety Data Initiative: Foundation of a systemic safety approach
9:05 - 9:20am	Roger Millar: Secretary of Transportation, WSDOT » Transforming state plans into local action
9:20 - 9:30am	Lynn Robinson: Deputy Mayor, City of Bellevue » Bellevue's Vision Zero Commitment
9:30 - 9:40am	Lynn Robinson: Deputy Mayor, City of Bellevue Ivan Duran, PhD: Superintendent, Bellevue School District Lori Hairston: Executive Director, WA DECA Olivia Sun: Student, Bellevue School District » Strategic Partnership Announcement
9:40 - 9:50am	Paula Stevens: Interim Director, Bellevue Transportation Department » Where we've been and where we're going with Vision Zero
9:50 - 10:00am	10-min Break
10:00 - 10:30am	Greg Fredericksen: Regional Administrator, Region 10, NHTSA Lorraine Stewart: Cascade Bicycle Club Ride Leader Linda Nguyen: PharmD, Bellevue Resident Kate Carley: Officer, Bellevue Police Department » Putting a human face on the statistics
10:30 - 11:00am	Chris Monsere, Ph.D.: Professor and Chair of Civil & Envir. Engr., PSU » A primer on the Safe Systems approach

11:00 - 11:45am	Lunch Break
11:45am - 12:45pm	**SAFE VEHICLES** *Moderator: Keith Allen, Battalion Chief, Bellevue Fire Dept.* Yinhai Wang, Ph.D., P.E.: Director, Pactrans » Video based detection of near miss events between transit vehicles and pedestrians/bicyclists Donald Dixon: Transportation Manager, Bellevue School District » Student stop paddle camera evaluation Regina Clewlow, Ph.D.: CEO & Co-Founder, Populus » The shared mobility revolution - Safety challenges and opportunities Vijitha Chekuri: Director of Strategy & Business Development, Automotive Industry Solutions, Microsoft Corp. » Vehicle technologies in support of Vision Zero
12:45 - 1:00pm	15-min Break
1:00 - 2:00pm	**SAFE SPEEDS** *Moderator: Mark Poch, Assistant Director, Bellevue Transp. Dept.* Randy McCourt: Vice President, ITE International » Setting of speed limits and the update to the MUTCD Beth Ebel, M.D.: Director, Safe & Active Transport, HIPRC » Impact of automated photo enforcement of vehicle speed in school zones Ted Trepanier: Senior Director, INRIX » Examining systemwide speeds with big data, uncovering the extremes Mark Bandy: Director, Transportation Operations Div., SDOT » Lessons learned from SDOT’s reduction of speed limits

2:00 - 2:15pm 15-min Break

2:15 - 3:15pm **SAFE PEOPLE**

Moderator: Marcia Harnden, Captain, Bellevue Police Dept.

Darrin Grondel, Ed.D.: Director, WA Traffic Safety Commission

- Local Target Zero strategies to address the national DUI epidemic

Amy Freedheim: Senior Deputy Prosecuting Attorney, King County

- Understanding distracted driving

Offer Grembek, Ph.D.: Co-Director, UC Berkeley SafeTREC

- Safe System considerations for safer teens and other vulnerable populations

Thomas Orr: Executive Director, NORCOM 911

- Looking beyond police reports

3:15 - 3:30pm 15-min Break

3:30 - 4:30pm **SAFE STREETS**

Moderator: Toni Esparza, Asst. Director, Bellevue Parks & Comm. Services Dept.

Charles Chung: CEO, Brisk Synergies

- Video analytics towards Vision Zero partnership

Peter Koonce: Manager, Traffic Signal Maintenance, PBOT

- Innovative tools for advancing Complete Streets and Vision Zero

Peter Eun: Transportation Safety Engineer, FHWA

- Road diets, not just another fad diet

Jay Cabezuela: Captain, Criminal Investigation Division, WSP

- Leveraging UAV technologies for safe streets

4:30-5:30pm Closing Statements and Q&A Conversation

SPEAKER BIOS

AMY FREEDHEIM
SENIOR DEPUTY PROSECUTING ATTORNEY, KING COUNTY

Amy J. Freedheim began her career in the King County Prosecutor's Office in 1991. In 1999, she was appointed to the new felony traffic deputy position. Since then, she has prosecuted and overseen the prosecution of every vehicular homicide, vehicular assault, felony hit & run (death), and felony-DUI case in King County. She was the 2009 National Traffic Safety Prosecutor of the Year. She currently serves on the WA State Mothers Against Drunk Driving Advisory Board. She is also a co-author of a University of Washington/Public Safety study that analyzed intervention strategies for electronic distraction enforcement.

Over the years, she has been a member of the King County Traffic Safety Coalition, King County Medical Examiner's Advisory Committee, Distracted Driving Task Force, and advisor to the Washington Driving Council of the Washington State Traffic Safety Commission.

BARBARA MCCANN
DIRECTOR, OFFICE OF POLICY DEVEVELOPMENT, STRATEGIC PLANNING AND PERFORMANCE, USDOT

Barbara McCann serves as Director of the Office of Policy Development, Strategic Planning and Performance in the Office of Transportation Policy at the US Department of Transportation. and works to advance cross-modal transportation safety. Ms. McCann joined the Department in 2014 to lead policy development in safety, the human and natural environment, and energy issues. Ms. McCann's office developed the Department's Strategic Plan and has launched the Safety Data Initiative to modernize and expand the Department's data analysis to advance safety.

Prior to coming to DOT, Ms. McCann served as the founding Executive Director of the National Complete Streets Coalition. Her first career was in journalism; she worked for 13 years as a writer and producer for CNN.

BETH EBEL, MD

DIRECTOR, SAFE & ACTIVE TRANSPORT, HIPRC

Beth E. Ebel, MD, MSc, MPH, is Director of Safe & Active Transport, at the Harborview Injury Prevention & Research Center (HIPRC). HIPRC, aims to reduce the impact of injury and violence on people’s lives through research, education, training and public awareness. Dr. Beth Ebel is also a professor of pediatrics at the University of Washington School of Medicine, and adjunct professor in the Department of Epidemiology, UW School of Public Health. Dr. Ebel's research interests include injury prevention, community interventions and health behaviors with emphasis on high-risk populations.

CHARLES CHUNG

CHIEF EXECUTIVE OFFICER, BRISK SYNERGIES

Charles is a seasoned technology business leader, with experience in building cross-functional teams to drive highly specialized technologies to markets. He has worked on large scale software products at major high tech companies including Microsoft Corporation and DSPC (Intel). He has also founded a data security company and has guided technology start ups in values and opportunities creation. Working with municipalities, transportation leaders and traffic engineering firms from various parts of the world today, he is helping to reshape and bring new insights to the world of traffic safety.

Charles has a Master’s degree in Computer Science from University of Waterloo and an MBA in Management of Technology. He holds a patent in disaster recovery architecture and has a number of publications under his name.

CHRISTOPHER MONSERE, PH.D.

PROFESSOR AND CHAIR OF CIVIL & ENVIR. ENGINEERING, PSU

Dr. Christopher M. Monsere is Professor and Chair of Civil and Environmental Engineering in the Maseeh College of Engineering & Computer Science at Portland State University. Dr. Monsere's primary research interests are in design and operation of multimodal transportation facilities including user behavior, comprehension, preferences, and the overall safety effectiveness of transportation improvements. Dr Monsere is a member of ANF20, the Bicycle Transportation Committee, the past co-chair of the Transportation Research Board's Safety Data, Analysis, and Evaluation committee (ANB20) and a past member of the TRB Task Force to develop the Highway Safety Manual (ANB25T). Monsere received his BCE from the University of Detroit Mercy; his MSCE and Ph.D.with an emphasis in transportation from Iowa State University. Dr. Monsere is licensed professional engineer in the state of Oregon.

DARRIN GRONDEL, ED.D.
DIRECTOR, WA TRAFFIC SAFETY COMMISSION

Darrin Grondel was appointed Director of the Washington Traffic Safety Commission by Governor Christine Gregoire in 2012, and reappointed by Governor Jay Inslee in 2013. In this role, he provides statewide leadership in all aspects of traffic safety, with emphasis on human behavioral issues that affect traffic safety. He serves as Chair of the Governors Highway Safety Association (GHSA).

He represents the GHSA on the DRE Technical Advisory Panel and the Highway Safety Committee for the International Association of Chiefs of Police and serves on the National Sheriffs Association's Traffic Safety Committee.

Grondel served 25 years with the Washington State Patrol, retiring at the rank of Captain in May 2017. He has a Doctorate in Organizational Leadership from Brandman University, a Masters in Public Administration from the Evergreen State College, and a Bachelors in Political Science from Brigham Young University.

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DAVID BRAUNSTEIN
PRESIDENT, TOGETHER FOR SAFER ROADS

David Braunstein has a distinguished career spanning two decades in entrepreneurial business development and social innovation. He is known for breaking new ground using "connected" analytics solutions driven by emerging technologies, including adtech, blockchain and the Internet of Things. He also held senior roles in strategy, analytics, and innovation within eBay's marketing services organization. Lately, he has mentored through the Urban-X and Techstars Mobility accelerators and serves on the Triphammer Ventures investment committee.

Braunstein is currently serving as President of Together for Safer Roads. He is responsible for overseeing the organization's strategic direction on behalf of Together for Safer Roads' Governing Board and membership, implementing Together for Safer Roads-supported local demonstration projects, advancing TSR's thought leadership, building key partnerships, and increasing the coalition's connections to the international road safety community.

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DONALD DIXON
TRANSPORTATION MANAGER, BELLEVUE SCHOOL DISTRICT

Donald (Don) Dixon is currently the Transportation Manager for the Bellevue School District. Prior to moving to Washington State in 2002, Don lived in Kansas City, Missouri,

He started in the student transportation industry in 1997 where he worked as a Safety Trainer and eventually became a Supervisor with Laidlaw Education Services. For his schooling, Don graduated Highline College with a AAS in Administrative Management in Human Resources. He later graduated from Washington State Student Pupil Transportation Management School (At CWU).

Don has been happily married for 27 Years, has three amazing children, and 10 wonderful grandchildren. During his free time he enjoys all types of sports and spending time with his wife, children, and grandchildren.

FRANZ LOEWENHERZ
PRINCIPAL PLANNER, BELLEVUE TRANSPORTATION DEPARTMENT

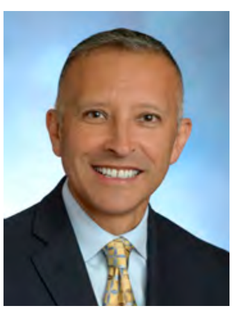
Franz Loewenherz serves as a Principal Transportation Planner for the City of Bellevue where he creates high performing teams that align agency goals with delivery systems. He received his master's degree in urban planning from the University of Washington and has more than 20 years of transportation sector experience working with diverse stakeholders to advance complex projects and high profile policy initiatives. Mr. Loewenherz is known for leading multiple technology development collaborations including the Video Analytics towards Vision Zero Partnership aimed at developing a predictive crash analysis system for flagging road safety problems. As program manager of the City of Bellevue's Pedestrian and Bicycle Implementation Initiative and the Vision Zero Initiative Mr. Loewenherz is working with agency staff and the community to pilot innovative safe systems and complete streets project concepts.

GREG FREDERICKSEN
REGIONAL ADMINISTRATOR, REGION 10, NHTSA

Administrator Fredericksen came to the United States Department of Transportation in 2007, and was appointed Regional Administrator in 2016. He has more than 30 years in transportation, serving 20 years in a State Department of Transportation in Idaho. Greg now works with the States of Alaska, Washington, Oregon, Idaho, and Montana in the delivery of highway safety behavioral programs.

Greg's transportation background includes highway design, construction, maintenance, technical training and highway safety programs. He served as a Grant's Officer delivering traffic safety programs in Idaho before joining NHTSA in 2007 as a Regional Program Manager in Seattle, Washington. He later accepted a position as Deputy Regional Administrator in Region 9 in Sacramento, California and served in that capacity until being appointed as Regional Administrator in 2016 in Seattle.

IVAN DURAN, PH.D.
SUPERINTENDENT, BELLEVUE SCHOOL DISTRICT



Dr. Ivan Duran joined the Bellevue School District as Superintendent in July 2017. Prior to his role in Bellevue, Duran was deputy superintendent of the Dallas Independent School District in Texas. Duran also served as assistant superintendent, principal supervisor, director of instructional technology, principal, assistant principal and teacher— for public school districts throughout Colorado.

Dr. Duran holds a doctorate in Education Leadership and Policy Study from the University of Denver, a master's degree in Curriculum and Instruction from the University of Colorado, and a bachelor's degree in Elementary Education. His doctoral work focused on leadership in turnaround schools and the practices that impacted student learning outcomes.

Duran and his wife share a passion for promoting equity in education and exploring the great outdoors with their dog.

JAY CABEZUELA
CAPTAIN, CRIMINAL INVESTIGATION DIVISION, WSP

Jay Cabezuela is the Commander of the Washington State Patrol's Criminal Investigation Division. The Criminal Investigation Division consists of 13 offices and 70 detectives throughout Washington State focusing on criminal investigations to include felony vehicle collisions, homicide investigations, auto theft investigations, identity theft investigations, and participate in 13 multi-agency investigative teams. Captain Cabezuela is also an Incident Commander and Coordinator of the agency's statewide Incident Management Team.

KEITH ALLEN
BATTALION CHIEF, BELLEVUE FIRE DEPARTMENT

Battalion Chief Keith Allen joined the Bellevue Fire Department in 2002. Keith has a Bachelor's degree in engineering and an MBA from the University of Washington School of Business. Prior to joining the fire service, Keith had a successful career as an engineer and project manager in the medical device industry.

Keith spent over 10 years of his career serving as both a Firefighter and Lieutenant on a truck company learning all facets of technical rescue and is the current manager of the Technical Rescue program for his department. He has also served as a Captain in the Training Division where he was responsible for hiring and training over 40 recruit firefighters. He currently serves as the Battalion Commander for A Platoon in the Operations Bureau.

LINDA NGUYEN, PHARM.D.
PHARMACIST, UNIVERSITY OF WASHINGTON MEDICAL CENTER

Linda Nguyen BCPS, PharmD., is a Pharmacist at the University of Washington Medical Center and lives in the Tam O' Shanter neighborhood of Bellevue, WA. Previously worked at several Trauma 1 level hospitals in California and Washington in the Emergency room and as a Code Blue pharmacist for pediatrics and adults.

As a passionate runner and someone who loves seeing children and adults being outside and enjoying nature, she wants to ensure that city develops in a way that provides safe pedestrian and bicycle access.

LORI HAIRSTON
EXECUTIVE DIRECTOR, WASHINGTON DECA

Lori Hairston is the Executive Director for Washington DECA. Lori is a strategic leader, with twenty-three years of experience in education. Expertise includes leadership development, curriculum design, student and staff motivation, improving academic/job performance, project management, technology integration and professional presentations. Her professional experiences include 16 years in Retail Management with Lamonts, 10 years on the board of the Washington Association of Marketing Educators, and 6 years on the Washington DECA Board of Directors, including 4 as Board Chair. Lori holds an MBA in Management and Strategy.

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LORRAINE STEWART
CASCADE BICYCLE CLUB RIDE LEADER

Lorraine Stewart is an avid cyclist and runner. She volunteers as a Ride Leader with the Cascade Bicycle Club, the nation's largest statewide bicycle nonprofit. In April 2016, she was hit from behind by a drowsy driver while she was riding her bike in Bellevue. She suffered serious injuries, including some that are permanent. After several months of healing and therapy, she was able to return to the activities she loves.

Lorraine is the Senior Vice President of Mortgage Lending at Boeing Employees Credit Union (BECU). She serves on several boards and advisory councils in the mortgage lending industry and recently joined the board of directors of Habitat for Humanity Seattle-King County. She holds a Bachelor of Science degree in Business Administration/Human Resources Management from California State University, Sacramento. Lorraine lives in Issaquah with her husband, Greg, and their two cats, Boo and Cleo.

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LYNN ROBINSON
DEPUTY MAYOR, CITY OF BELLEVUE

Deputy Mayor Lynne Robinson joined the City Council in 2014, and she has a long history of civic involvement. She served on the Parks & Community Services Board for five years, chairing it from 2011 to 2013. Lynne advocates for the environment, parks and open spaces, human services and affordable housing in Bellevue. She represents the council on the Eastside Human Services Forum Executive Board, the Safe Energy Leadership Alliance and the King County Cities Climate Collaboration. She is council liaison to the Human Services Commission and the Disability Board.

A physical therapist with her own business, Lynne holds a doctorate in physical therapy from Regis University and a bachelor's degree in physical therapy from Northwestern University Medical School. She also earned a bachelor's degree in community services from California State University Chico.

Lynne and husband Dan Watson have lived in the Woodridge neighborhood of Bellevue since 1997.

MARCIA HARNDEN
CAPTAIN, BELLEVUE POLICE DEPT.

Marcia Harnden was hired by the Bellevue Police Department in 1993 after graduating from the University of Washington where she has a Bachelor's of Arts in History and Speech Communication. She also has a Master's Degree in Applied Leadership. She served in the Patrol Section then became one of the first School Resource Officers for the Bellevue School District. She served there until becoming the Public Information Officer. She served in this position for 3 years before being promoted to Corporal in 2003. She was promoted to Lieutenant in 2010 and was assigned the Traffic Unit's Investigation Team and managed 6 Collision Reconstruction Investigators. Captain Harnden was a Drug Recognition Expert and instructor for 10 years. In 2015, she was promoted to Captain and returned to patrol where she supervised 6 patrol squads, field training, traffic and K-9. In October 2016 Captain Harnden took over command of the Special Operations Group which includes the Human Trafficking Vice Detectives. In 2018, Captain Harnden returned to Operations and took

MARK BANDY, P.E.
TRANSPORTATION OPERATIONS DIRECTOR, SDOT

Mark is the Director of Transportation Operations with the Seattle Department of Transportation. The Transportation Operations Division houses the city's Transportation Operations Center, signal operations and maintenance, traffic operations and neighborhood traffic programs, as well as truck permits and commercial vehicle enforcement.

Mark has past experience at the Washington State Department of Transportation in freeway operations, traffic design, and traffic analysis. He has bachelors and masters degrees in Civil Engineering from the University of Utah and University of Washington, respectively.

Mark lives in Seattle with his wife and two daughters and enjoys soccer, bike riding, hiking, and travel.

MARK POCH
ASST. DIRECTOR, BELLEVUE TRANSPORTATION DEPT.

Mark Poch is a registered Professional Engineer in the state of Washington and one of the area's first Professional Traffic Operations Engineers. Mark has both a Bachelor's and Master's degree in Civil Engineering from the University of Washington, and has 30 years of transportation and traffic engineering experience. Mark has worked for the City of Bellevue Transportation Department for the past 28 years, where he currently serves as Assistant Director overseeing the Traffic Management function. Among his contributions, Mark began Bellevue's award-winning Collision Reduction program 28 years ago.

OFFER GREMBEK, PH.D.
CO-DIRECTOR, UC BERKELEY SAFETREC

Dr. Offer Grembek is a researcher and lecturer at the University of California Berkeley. He serves as the Co-Director at the university's Safe Transportation Research and Education Center (SafeTREC), a research center affiliated with the UC Berkeley School of Public Health and the UC Berkeley Institute of Transportation Studies. Dr. Grembek is a member of the Transportation Research Board Committee on Transportation Safety Management (ANB10), and the Co-Chair of the TRB Global Road Safety Subcommittee (ANB10(8)). His research expertise includes: injury risk in multimodal environments, pedestrian safety, systemic approach to road safety management, and in-vehicle injury protection systems. Dr. Grembek received his B.Sc. in Industrial Engineering from the Ben Gurion University of the Negev in 2002, his MS in Civil and Environmental Engineering from the University of California, Berkeley in 2005 and received his PhD in Civil and Environmental Engineering from the University of California, Berkeley in 2010.

OLIVIA SUN
STUDENT, BELLEVUE SCHOOL DISTRICT

Olivia is a junior at Interlake High School who is currently enrolled in the Accelerated Learning Program and on track to receive her International Baccalaureate Diploma this spring. She is club officer for her school's DECA chapter and class officer for the student body. In 2018, she placed as a finalist in the International DECA Conference and led an ed-tech project that cultivated her interest in entrepreneurship. Additionally, she is passionate about urban sustainability.

Olivia conducted research at the International Climate Development Institute in Taipei, where she co-edited the Global Smart Solutions Report to be presented at a COP24 side event. Her work included analysis of environmentally sustainable initiatives in cities around the globe. She is currently exploring ways she can foster entrepreneurial, environmental and civic engagement among youth.

PAULA STEVENS
INTERIM DIRECTOR, BELLEVUE TRANSPORTATION DEPARTMENT

Paula Stevens is currently serving as Interim Director of the City of Bellevue's Transportation Department. When her work in this capacity concludes she will return to her position as Assistant Transportation Director, overseeing the multi-faceted Planning Division, which includes long range planning, modeling, finance, facilities planning, and grants. Paula has worked for the city for just over five years, following time spent in both the public and private sectors working in both land use planning and transportation planning and engineering. She has a Master of Science in Civil Engineering and a Master of City and Regional Planning from the Georgia Institute of Technology. A personal highlight of her 20+ years in the transportation field is the time she spent working with the Salt Lake Organizing Committee on transportation matters related to the 2002 Winter Olympics in Salt Lake City, Utah.

PETER EUN
TRANSPORTATION SAFETY ENGINEER, FHWA

Peter Eun is a Transportation Safety Engineer with the FHWA Resource Center's Safety & Design Technical Service Team and is located in Olympia Washington. He is currently a Co-Lead for the EDC STEP (Everyday Counts Safe Transportation for Every Pedestrian) initiative, which will be promoting 7 pedestrian safety treatments in 2019-2020. Road Diets are one of those treatments. He also Co-Leads the Pedestrian and Bicyclist Safety Focused Approach to Safety. In both initiatives, he develops and delivers training, provides technical assistance in various forms, such as Road Safety Audits/ Assessments. Peter has been with FHWA for 20+ years and spent the majority of his career in the area of saving lives.

PETER KOONCE, P.E.
MANAGER, TRAFFIC SIGNAL MAINTENANCE DIVISION, PBOT

Peter Koonce, P.E., has earned a reputation as one of the nation's innovative engineers and has dedicated his life to delivering engineering solutions that improve the safety of multimodal travel. He manages the City of Portland Bureau of Transportation's Signals, Street Lighting, & ITS Division and is responsible for the oversight of an annual budget in excess of $18 Million and 50 professionals.

Peter has served as an adjunct professor at Portland State University teaching graduate level courses in transportation engineering. He is a member of the Bicycle Technical Committee of the National Committee on Uniform Traffic Control Devices and recently completed serving as Chair of the Transportation Research Board's Committee on Traffic Signal Systems. He is also active with multiple professional societies including Institute of Transportation Engineers, the National Association of City Transportation Officials, and the Association of Pedestrian and Bicycle Professionals.

Over the years, Peter has served on several University Advisory Boards related to transportation engineering. Currently, he is in his fifth year as a Board Member of the Street Trust.

RANDY MCCOURT
VICE PRESIDENT, ITE INTERNATIONAL

Randy McCourt is a Principal of DKS Associates with 39 years of transportation engineering experience and is a graduate of Oregon State and the University of California, Berkeley. He is the Vice President of the Institute of Transportation Engineers and has been an active leader within ITE having authored several ITE publications.

McCourt has been involved with the National Committee on Uniform Traffic Control Devices since 2007 and has chaired and participated in several task force activities in several areas including dynamic message signs, LED, BRT, parking signs, site roadways open to public travel and the speed limit task force for which he will be speaking to us today.

REGINA CLEWLOW, PH.D.
CEO & CO-FOUNDER, POPULUS

Regina is the CEO and Co-founder of Populus, a data platform for cities to plan for the future of mobility. Trusted by cities from coast to coast, the Populus platform securely ingests real-time data from shared electric scooters, bikes, and cars to deliver data-driven insights for transportation policy and planning. Regina has over a decade of experience in transportation, building software to simulate the future of cities. She formed Populus after serving in executive roles at a Ford Smart Mobility investment and moovel, the mobility services arm of Daimler.

Prior to her roles in industry, Regina received her Ph.D. in transportation and energy systems from MIT. As a research scientist at Stanford and UC Berkeley, she developed and led research on the travel behavior impacts of shared mobility services (e.g. Uber, microtransit) and autonomous vehicles. She has been recognized as an EPA STARS Fellow, MIT Energy Fellow, Department of Transportation Eisenhower Fellow, and Mass Transit 40 Under 40.

ROGER MILLAR
SECRETARY OF TRANSPORTATION, WSDOT

A graduate of the University of Virginia, Millar is a registered engineer in Washington and five other states. He was elected a Fellow of the American Society of Civil Engineers (ASCE) in 1999 and received the ASCE President's Medal in 2016 and the ASCE Outstanding Public Official Award in 2017. Millar was elected to the College of Fellows of the American Institute of Certified Planners in 2018. He is currently president of the Western Association of State Highway and Transportation Officials and a member of the ASCE Board of Direction, the Intelligent Transportation Society of America Board of Directors, The National Operations Center of Excellence Board of Directors, and the National Complete Streets Association Steering Committee. Millar has served as president of the Oregon Section of the American Society of Civil Engineers and of the Montana Association of Planners. He is married to Candis Millar, the former planning director of Billings, Montana (retired 2016), and has two teenage children and a black lab named Ouzel.

TED TREPANIER
DIRECTOR OF PUBLIC SECTOR SERVICES, INRIX

Ted Trepanier serves as Director of Public Sector services at INRIX. A nationally recognized leader in traffic operations, ITS, Planning, and applications of big data for enhanced mobility, Mr. Trepanier joined INRIX in May of 2010. He is focused on scoping and deploying INRIX traffic services to reduce agency cost for congestion management, lifting system efficiency and expanding strategic assessment. Prior to joining INRIX, Ted was the Director of Traffic Operations for the Washington State Department of Transportation.

In addition to his extensive background in traffic operations, he has experience in design, planning, project management and toll operations. Ted earned his bachelor's degree in Civil Engineering from Washington State University and Masters in Civil Engineering from the University of Washington.

THOMAS ORR
EXECUTIVE DIRECTOR, NORCOM 911

Thomas Orr currently serves as the Executive Director for NORCOM - a multi-discipline, multi-jurisdiction 911 Public Safety Answering Point (PSAP) and Emergency Communications Center. Prior to NORCOM, Tom served as the Executive Director for the Law Enforcement Support Agency (LESA). Tom has been an attorney for over thirty years with eleven years of service as a Legal Advisor and City Attorney in Colorado and Washington State; and over ten years in the private sector. He graduated, cum laude, from the University of Washington with a B.S. degree in society and justice, and graduated, magna cum laude, from Seattle University Law School. In addition to his local public service, Tom served for 29 years as a commissioned officer in the U.S. Navy Reserve, retiring in 2015 at the rank of Navy Captain. He resides locally with his wife, Pamela, and youngest son Nicholas.

TOM DEBORD
CHIEF OPERATING OFFICER, OVERLAKE MEDICAL CENTER

Since joining Overlake Medical Center as COO in 2015, Tom DeBord has overseen the day-to-day operations of the hospital, including patient care services, cardiac, medical imaging, surgical services, supply chain, facility and support services and regulatory compliance. DeBord also has had primary responsibility for the planning and implementation of Project FutureCare.

Previously, DeBord served as the president of Summa Barberton & Wadsworth-Rittman Hospitals in Akron, Ohio. He also served as an executive leader of the Summa Health System.

DeBord is a Fellow in the American College of Healthcare Executives and board member of the Kirkland Chamber of Commerce.

TONI ESPARZA
ASST. DIRECTOR, BELLEVUE PARKS & COMMUNITY SERVICES DEPT.

Toni Esparza serves as the Assistant Director for the City of Bellevue’s Parks and Community Services Department. She lives and works in Bellevue along with her children. Toni has spent over 20 years of her career working with underserved youth and families, who frequently find themselves at a higher level of vulnerability in many systems, including transportation. She is excited about the City’s Vision Zero plan for eliminating traffic fatalities and serious injuries in Bellevue by 2030, as it will make the community even safer for her family and for all those she serves.

VIJITHA CHEKURI

DIRECTOR OF STRATEGY & BUSINESS DEVELOPMENT,
AUTOMOTIVE INDUSTRY SOLUTIONS, MICROSOFT CORP.

Vijitha Chekuri currently manages Microsoft's strategy in the automotive industry, helping to support automakers withinnovative solutions and partner strategies that enable digital transformation. Chekuri is responsible for new business development with a core focus on connected vehicles, autonomous vehicle development, and smart mobility solutions, including Microsoft technology strategies and joint solutions with key industry partners. She also focuses on cultivating strategic partnerships and engagements with various industry organizations and research institutes to advance the testing and development of future automotive technologies. Chekuri has more than 24 years of engineering, IT consulting, management, and business development experience in the automotive industry and participates in many speaking engagements at automotive industry events on connected and autonomous cars as well as contributes to associated publications.

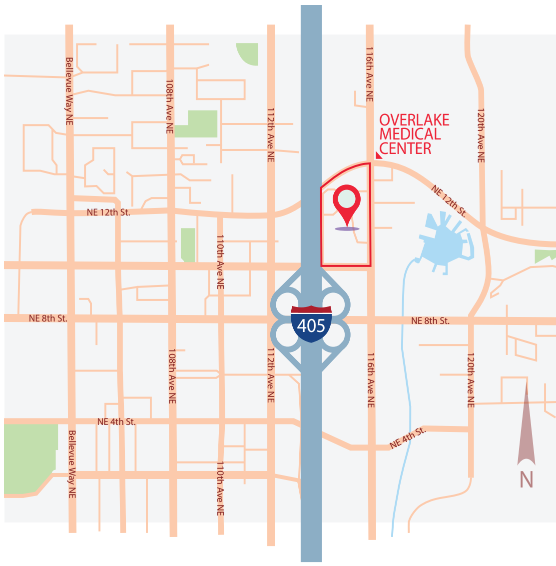
YINHAI WANG, PH.D., P.E.

DIRECTOR, PACTRANS

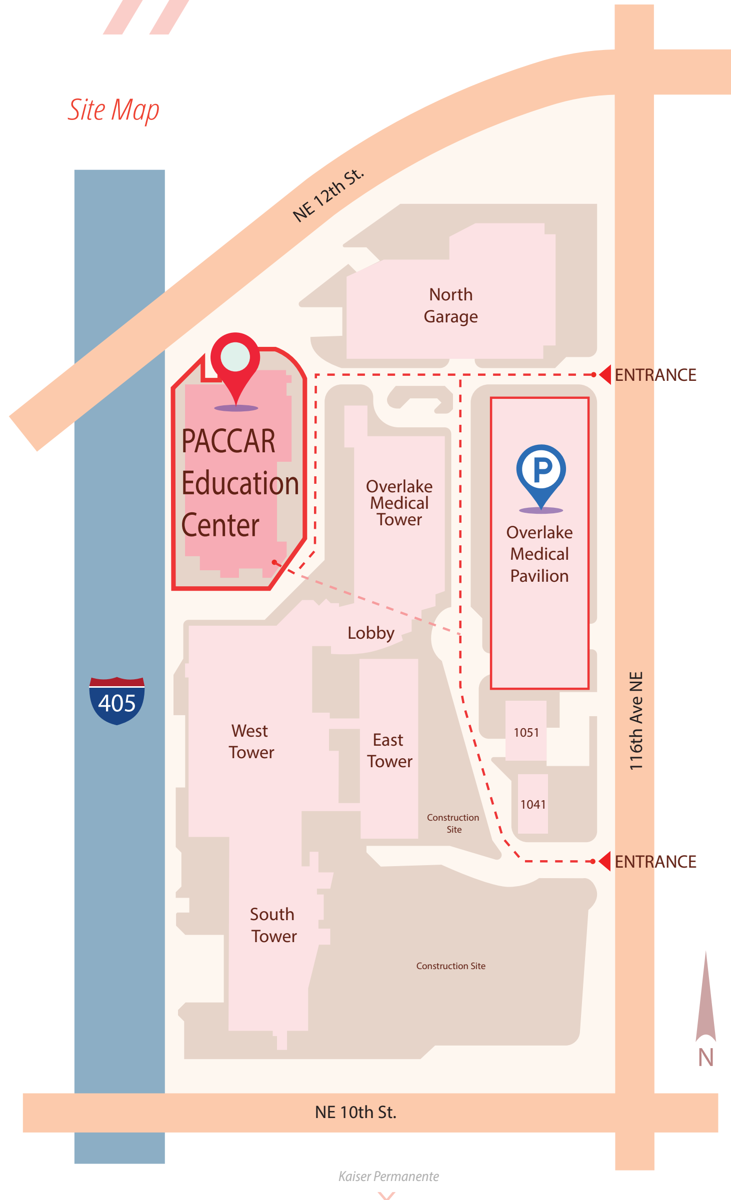
Dr. Yinhai Wang is a professor in transportation engineering and the founding director of the Smart Transportation Applications and Research Laboratory (STAR Lab) at the University of Washington (UW). He also serves as director for Pacific Northwest Transportation Consortium (PacTrans), USDOT University Transportation Center for Federal Region 10. Dr. Wang is currently president of Transportation & Development Institute (T&DI) at American Society of Civil Engineers (ASCE) and a member of the IEEE Smart Cities Technical Activities Committee. Dr. Wang's active research fields include transportation safety, traffic sensing, e-science of transportation, big-data analytics, traffic operations and simulation, smart urban mobility, etc. He has published over 160 peer-reviewed journal articles and delivered more than 150 invited talks and nearly 270 other academic presentations. Also, he serves as a member of the Highway Capacity and Quality of Service Committee, Transportation Information Systems and Technology Committee, and Artificial Intelligence and Advanced Computing Committee of the Transportation Research Board (TRB).

OVERLAKE MEDICAL CENTER MAP

General Map



Site Map



Driving directions to the hospital

Southbound

Exit I-405 at NE 8th St. eastbound. Merge to the left lane and turn left (north) at the first stoplight onto 116th Ave. NE. Turn left into the hospital campus.

Northbound

Exit I-405 at NE 4th St. Turn right on NE 4th St. and turn left on 116th Ave NE. Turn left into the hospital campus.

From the airport

Take I-5 northbound to I-405 northbound; then follow the directions for northbound.

Public Transit Directions to Overlake Medical Center

For a comprehensive list of public transit options and a list of bus routes that service Overlake please go to the following webpage: http://bit.ly/OverlakeHospitalBusRoutes

Additional Parking Information

Please park your vehicles in the parking garage located in the Overlake Medical Pavilion. The Overlake Medical Pavilion (where Starbucks is located) has a parking rate of $7.00 for an all-day pass.

PLEASE NOTE: The Overlake Medical Pavilion is not a part of the Overlake Medical Center.

Address

Overlake Medical Center
PACCAR Education Center
1035 116th Ave. NE
Bellevue, WA 98004

TOGETHER FOR® SAFER ROADS

COMPANIES DRIVEN TO SAVE LIVES™

Vision Zero - Everyone's Responsibility

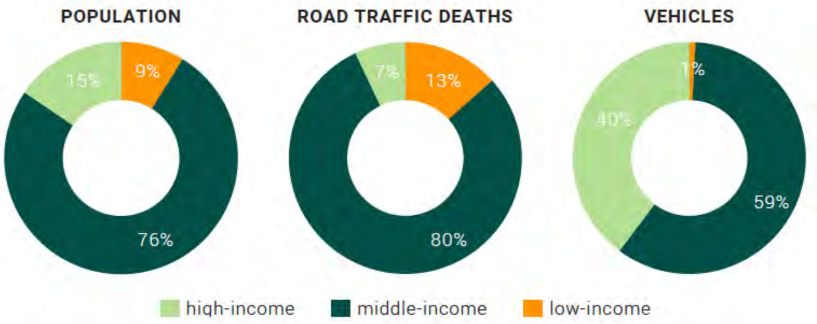
Bellevue Vision Zero Summit

February 13, 2019

Vision Zero in Global Context

On the world's roads every year, more than **1.35 million** people die and roughly **50 million** people are injured, making traffic fatalities the **8th leading** cause of death among all people.

There has been **no reduction in traffic deaths in any low income country** since 2013, despite the very low proportion of global motor vehicle ownership.



*income levels are based on 2017 World Bank classifications.

WHO IS HARMED

NO. 1 KILLER of young people age 5-29

90% of deaths are in low- and middle-income countries

More than 50% of deaths are among vulnerable road users:

- 28% MOTORCYCLISTS
- 26% PEDESTRIANS
- \+ CYCLISTS

Source: World Health Organization. Global Status Report on Road Safety 2018.

TOGETHER FOR SAFER ROADS

Who We Are

Multinationals on a Mission

Launched in 2014 at the United Nations, TSR is a social business coalition on a mission to ***make the world's roads safe for all road users.***

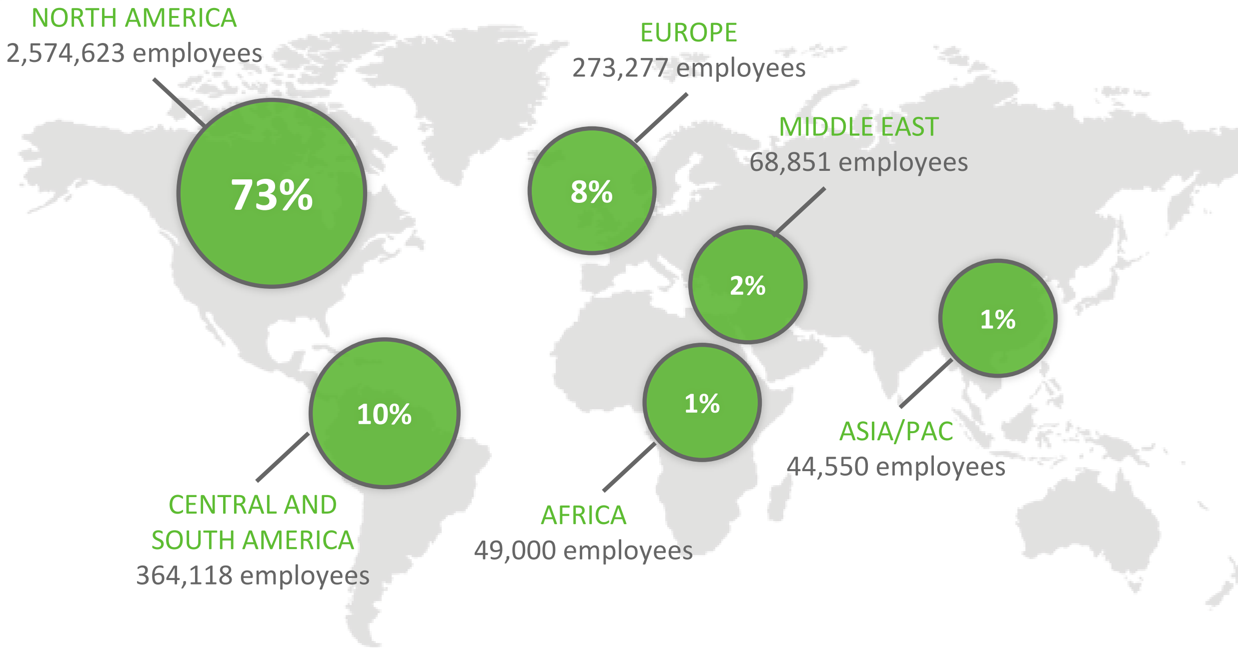
ABInBev AIG AT&T REPUBLIC SERVICES

CalAmp ERICSSON GEOTAB GM iHeart MEDIA

lyft OCTO PEPSICO ups Walmart

ALPHA DRIVE HAAS ALERT OUSTER Zendrive

Center of Gravity in N.A. with Global Footprint



Top Countries Our Members Operate In
United States
United Kingdom
Canada
Brazil
Mexico
China
Germany
Italy and France

286,318 professional drivers globally

606,202 company vehicles globally

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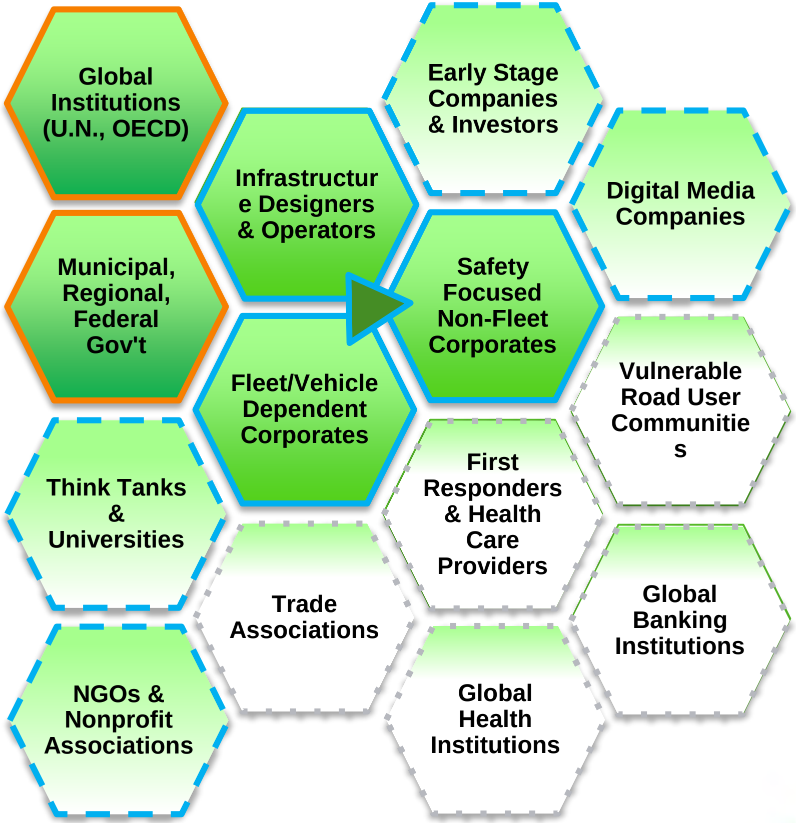
How We Work

Partnering To Catalyze Change

TSR works closely with global and local institutions to affect change.

But we also have our eye on a much larger ecosystem of collaborators.

Our programs in Safer Cities, Safer Companies & Fleets and Data & Digital Innovation are all about convening across sectors to bring new resources to the table (read: not just financial ones).



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Lessons Learned

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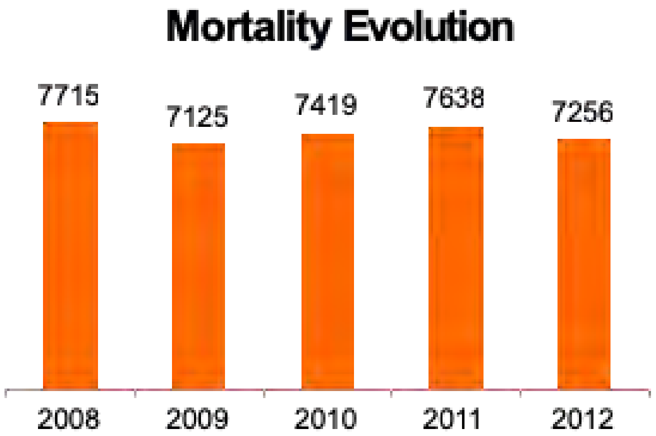
“Vision Zero” Motivations are Global

We have experienced the need for “Safe Systems” approach across the globe, motivating agencies, advocates and the private sector into action.

TOGETHER FOR SAFER ROADS

Vision Zero is a Team Sport

When Sao Paulo state began their road safety initiative, agencies were working in silos and there was little in the way of public-private partnership.



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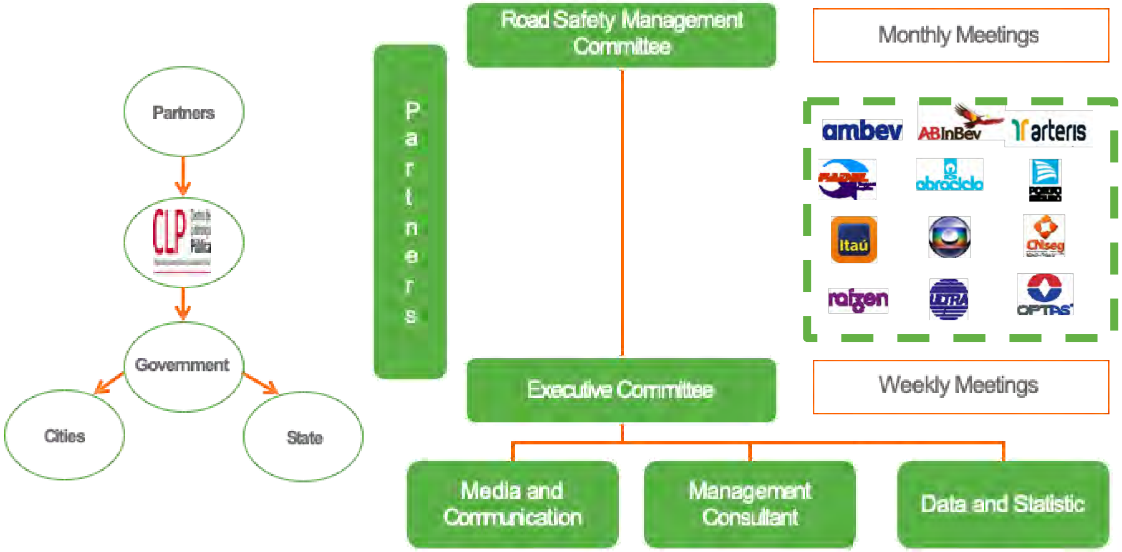
Diverse Teams are Stronger Teams

Private sector involvement was carefully included in the governance process.



Cross-Sector Committees Leverage Respective Strengths

Public-Private

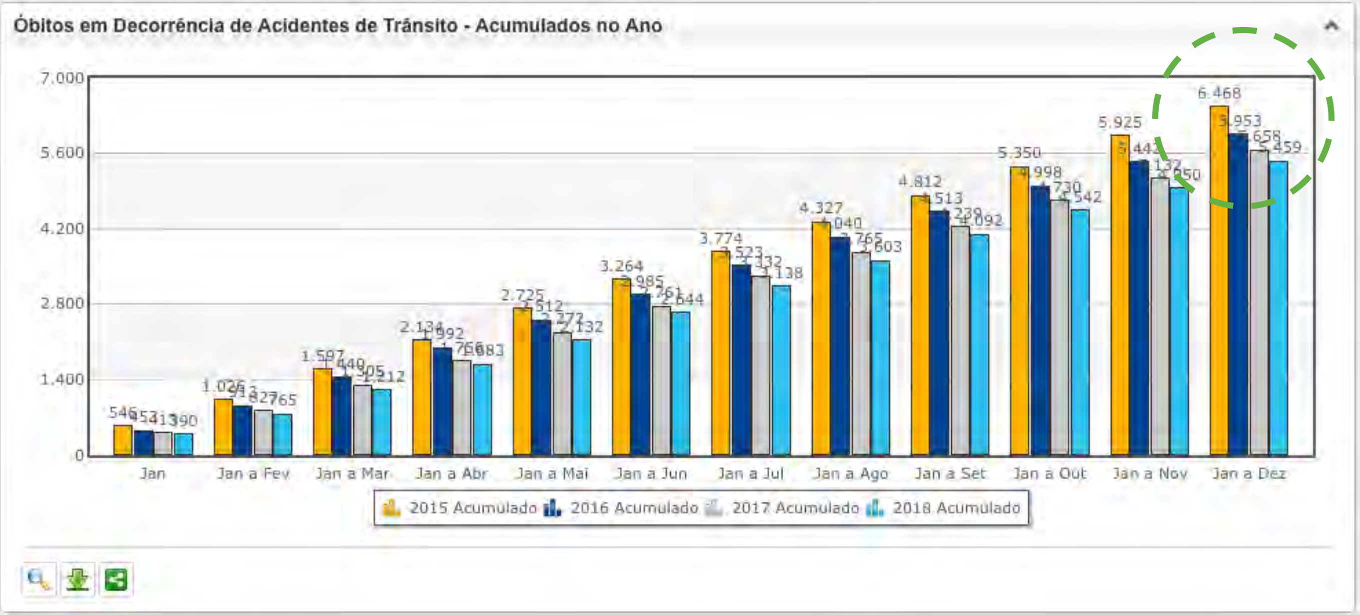
Partnerships Thrived

Here!!

1. Traffic Safety Committee
2. Safer Roads & Mobility Committee
3. Safer Vehicles Committee
4. Driver and Road Users Awareness Committee
5. More Efficient Response to Accidents Committee
6. Legislation and Oversight Committee
7. Communication Committee

Bending the Curve is Definitely Possible

Fatalities in Sao Paulo are down 15% since 2015, reversing a trend that could have seen more than 7,000 citizens lost without intervention.



Thank You!

David Braunstein
President
dbraunstein@togetherforsaferroads.org

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SAFER ROADS

Foundation of a Systemic Safety Approach

Office of the Under Secretary for Policy
Bellevue Road to Zero Meeting

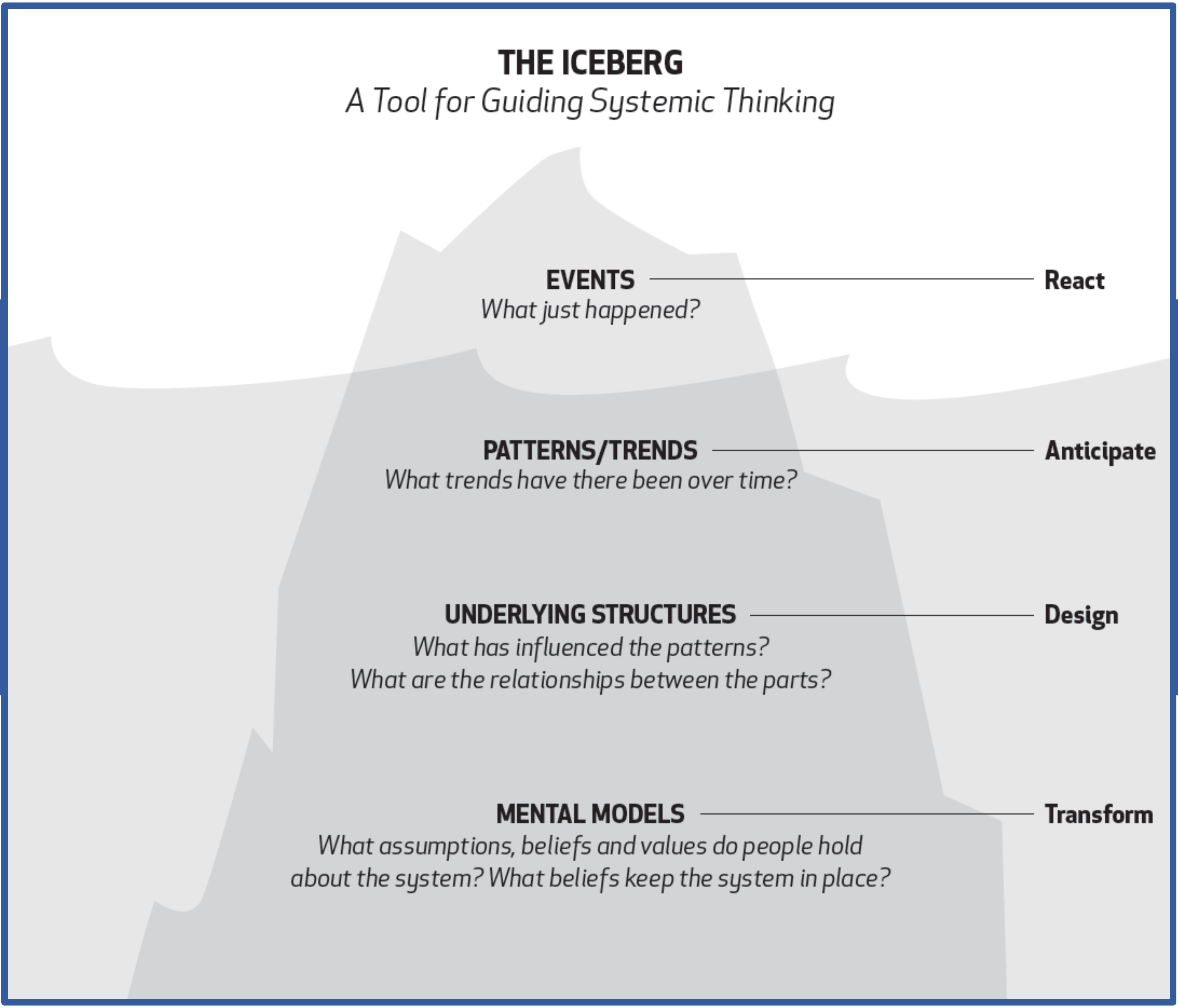
Erika Sudderth (Volpe National Transportation Systems Center)
on behalf of
Barbara McCann, Director
Office of Strategic Planning, Policy Development and Performance

USDOT is Committed to Systemic Safety

- Systemic Safety Approach
- Strategies:
  - Improve the collection, management, and integration of **data**
  - **Identify risks** that contribute to fatalities and serious injuries
  - **Collaborate** with stakeholders to foster behavior and infrastructure changes

Systems Thinking: The Iceberg

Source: Northwest Earth Institute via the UNC Highway Safety Research Center



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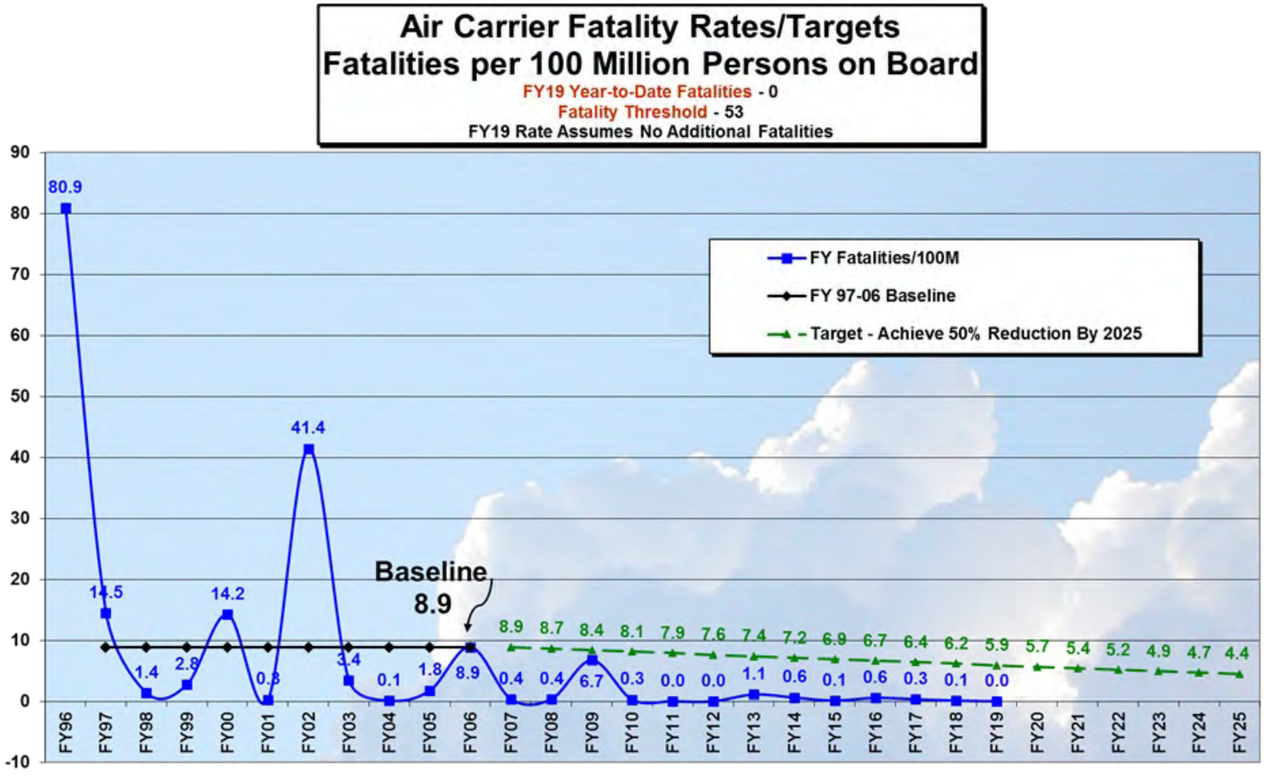
Aviation Safety

- Commercial aviation fatality rates decreased 95% in the past 20 years
- Key is data sharing through an open, collaborative safety culture
- Detect risks and address problems before accidents occur



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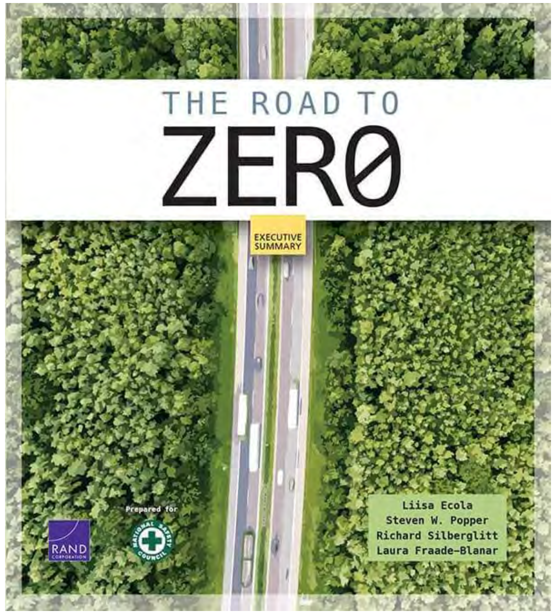
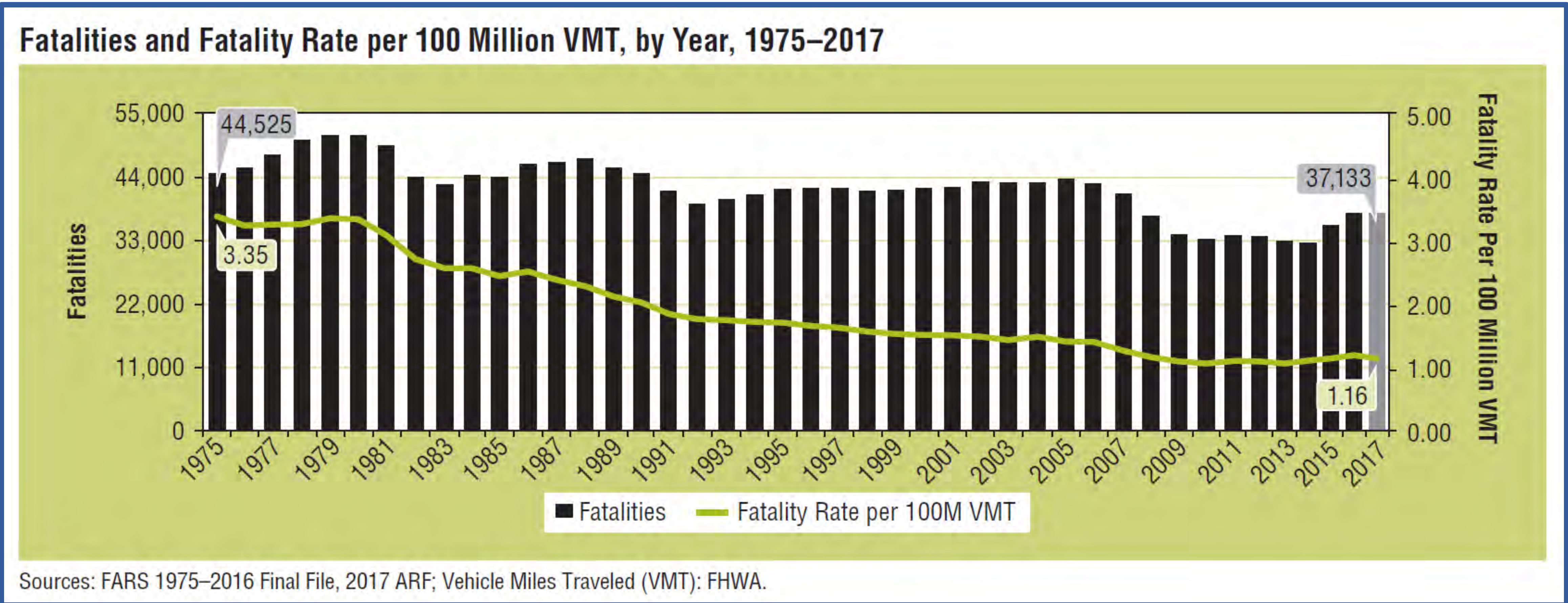
The Road to Zero Coalition

- Established to encourage implementation of proven counter-measures in the near term
  - National Highway Traffic Safety Administration (NHTSA)
  - Federal Highway Administration (FHWA)
  - Federal Motor Carrier Safety Administration (FMCSA)
  - National Safety Council (NSC)
  - Additional partners
- Sponsored *The Road to Zero*, a vision of a thirty-year zero-fatality scenario and associated policy steps and safety needs

ROAD TO ZERO





We need better data analysis tools to understand why traffic fatalities have been increasing in recent years.

Source: NHTSA, 2017 Traffic Safety Facts

Vision of the Safety Data Initiative

Evolve from retrospective to predictive analysis

Identify transportation safety challenges

Find solutions that can save lives

Integrate existing USDOT data with new big-data sources

Use advanced analytics to provide new insights into transportation safety risks

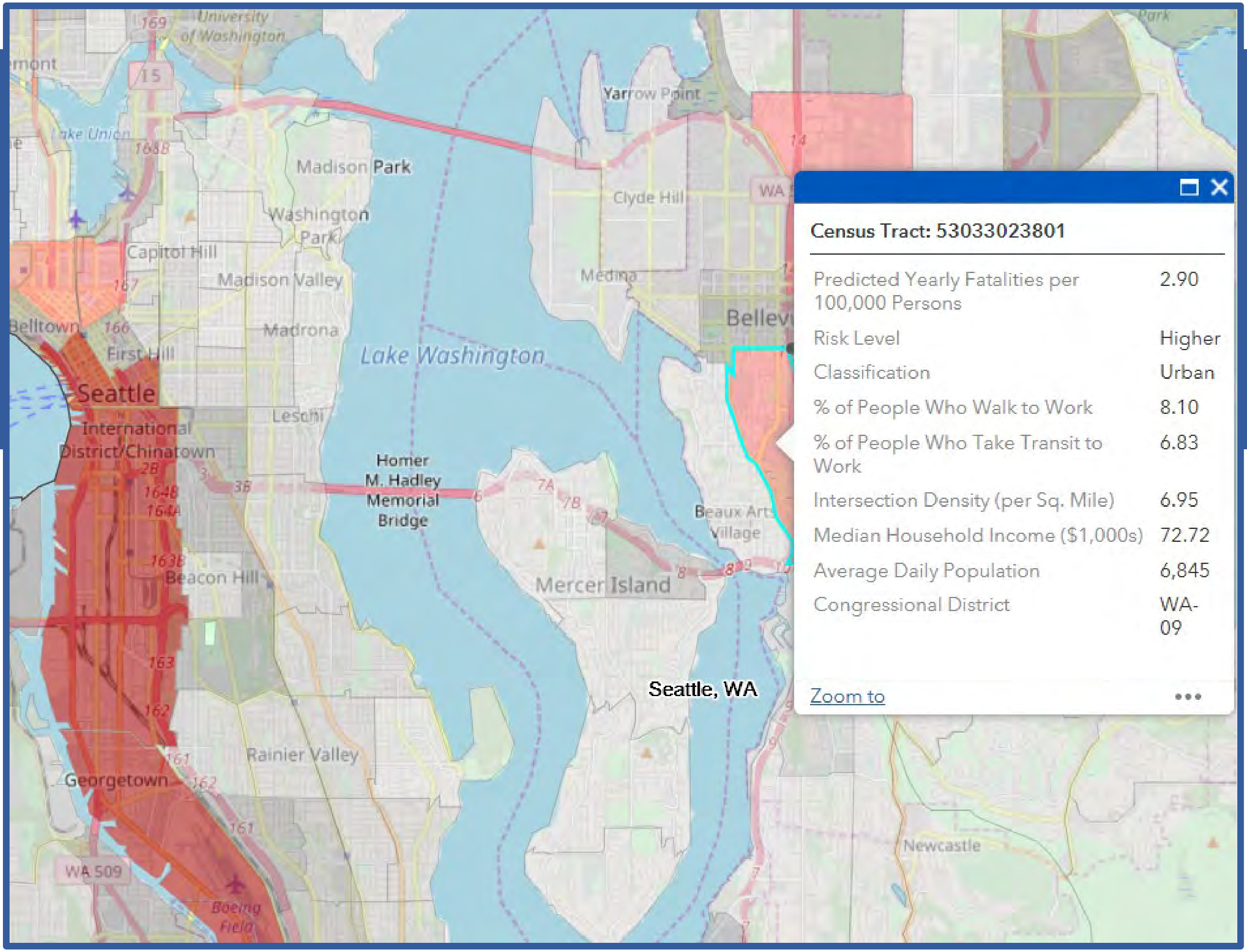
Create data visualizations to help policymaker arrive at safety solutions

Safety Data Initiative Pilot Projects

1. Integration – National Pedestrian Risk Map
2. Advanced Analysis – Waze Data
3. Visualizations – Fatality Analysis Reporting System (FARS) Data
4. Visualizations – Solving for Safety Visualization Challenge

Pilot 1: Integrating Data to Assess Risk

National Pedestrian Risk at the neighborhood level on a national scale



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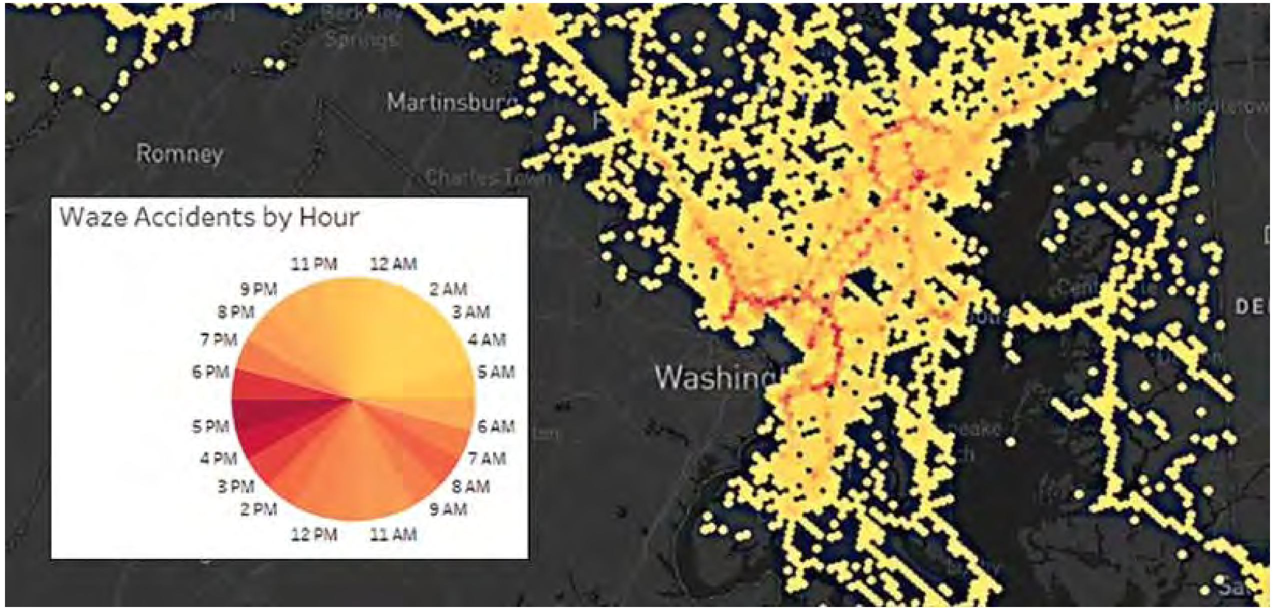
Pilot 2: Crowdsourced Data Insights to Improve Transportation Safety

- **Question:** Can we integrate Waze with other DOT data resources at large scales to develop rapid crash indictors?

  - **Yes!**
  - Successfully integrated data sources not intended for traffic safety to support



Applied machine learning methods to reliably estimate hourly police reportable traffic crashes in 1 mile areas grids, based on Waze and other traffic data.

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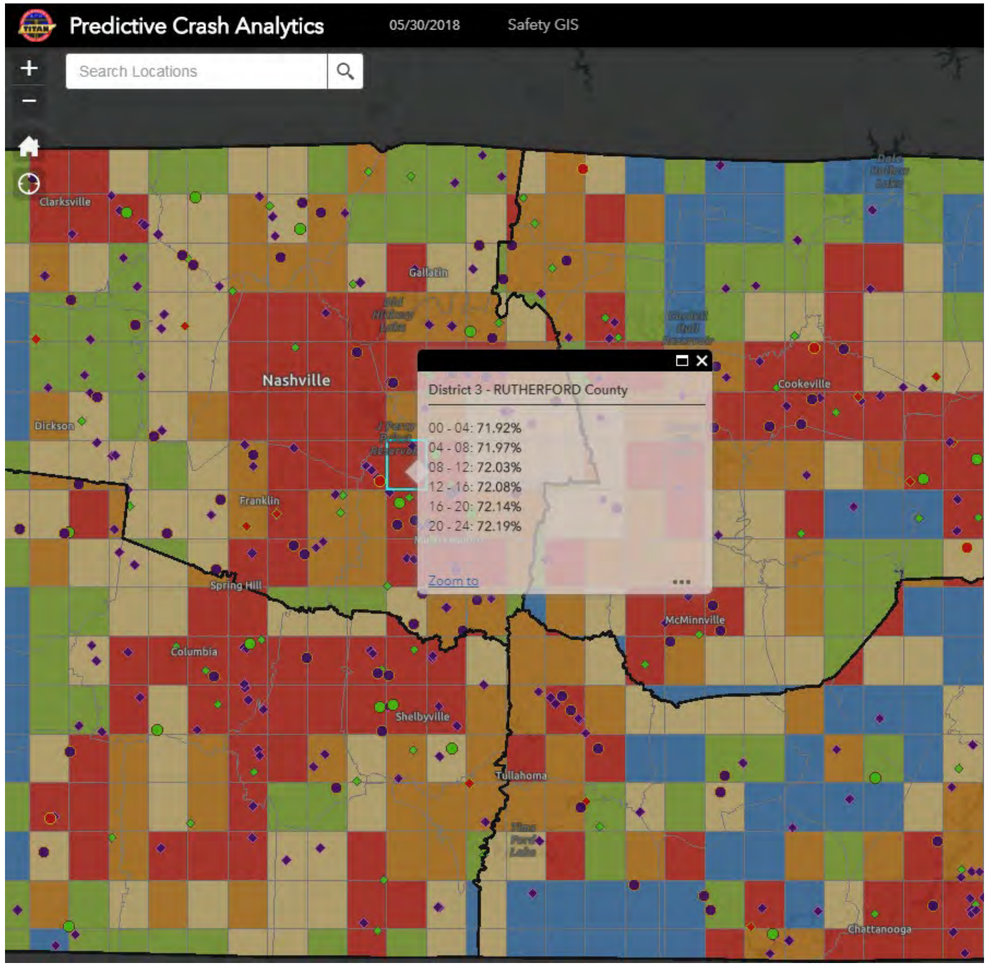
Best Practice: Predictive Analytics for Safety in Tennessee

- Law Enforcement Resource Allocation Tool
- Targeted enforcement at the right places and times
- Integrates crash and roadway data



Source: Tennessee Department of Safety and Homeland Security

U.S. Department of Transportation

Waze Project: Bellevue Case Study

Question: Can crowdsourced traffic incident data support better traffic safety management in Bellevue?

Approach:

- Integrate data sources and create dashboards
- Develop crash estimation models: identify conditions, times and locations with high crash propensity
- Transfer methods to Bellevue

Map example: Bellevue crash and Waze accident data

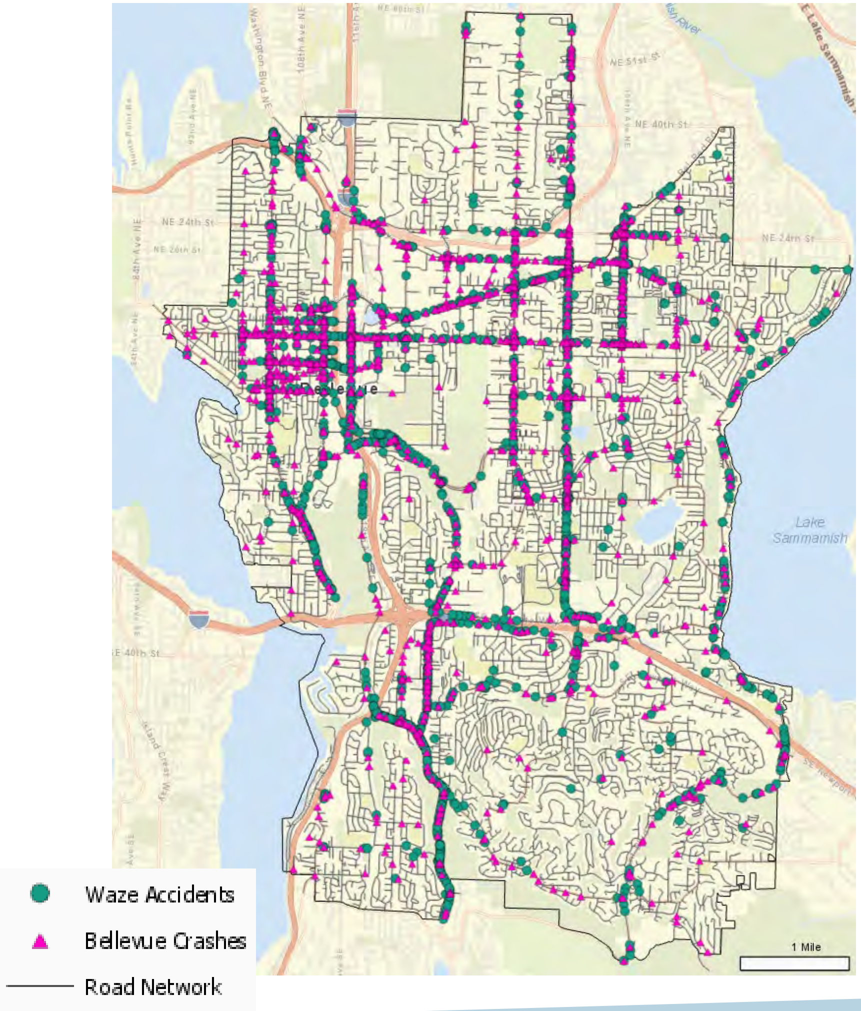
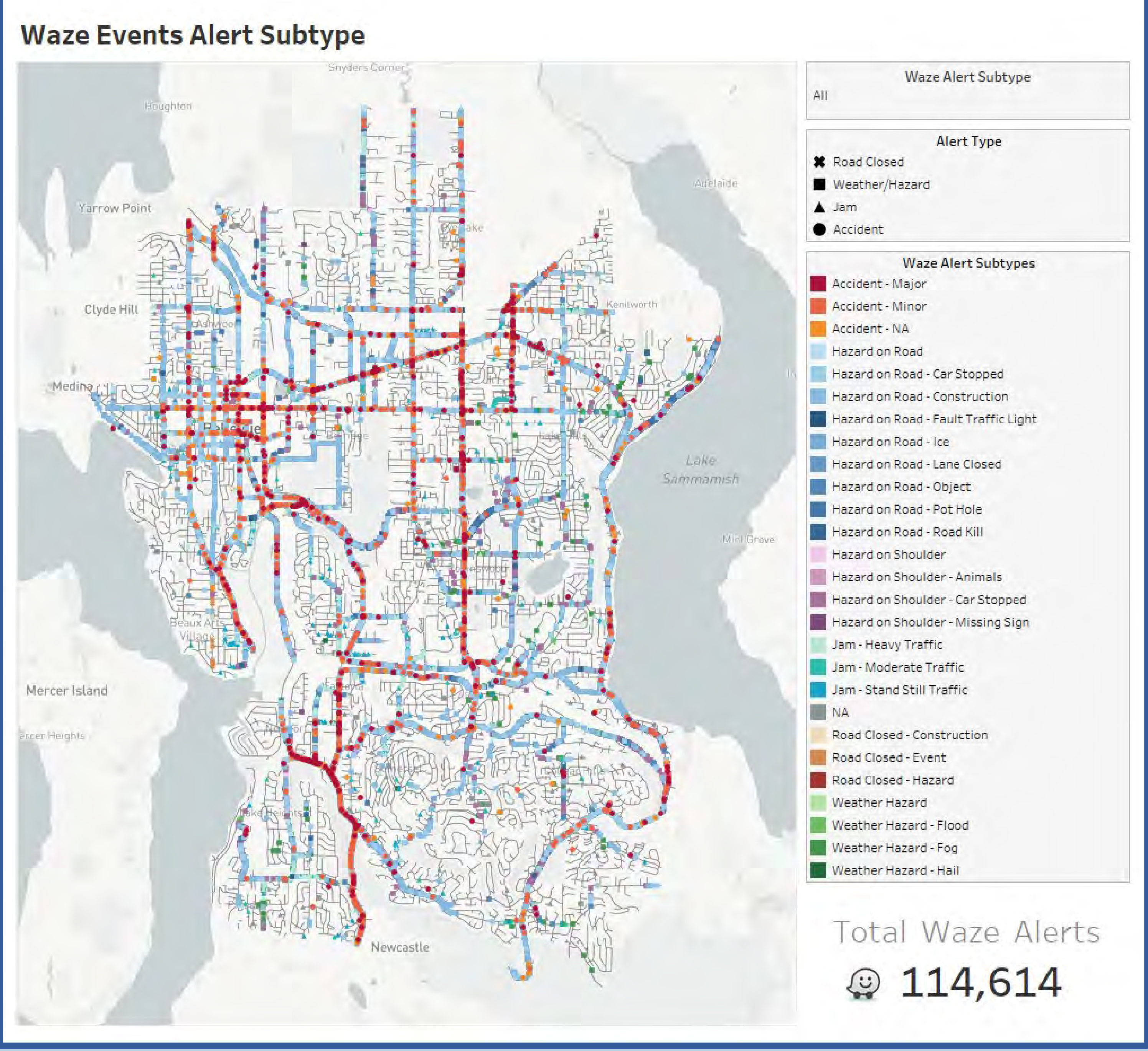


Tableau Dashboard: Waze Weather/Hazard

- Waze: mobile sensor network
- If alerts are significant crash indicators, could preemptively address safety risks.
- Weather and hazard subtypes (stopped car, lane closed, pot hole, road kill, flood, fog, hail)

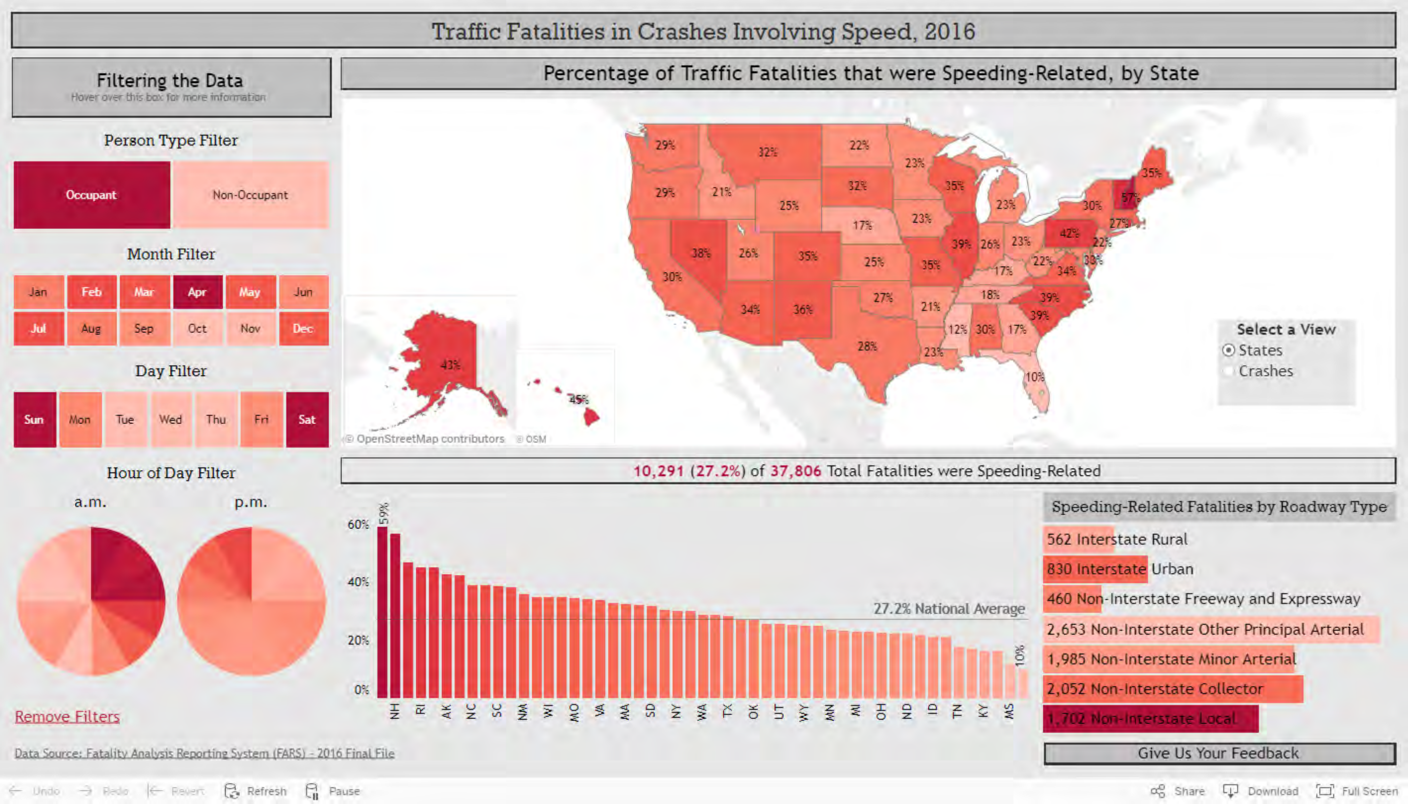


Pilot 3: Visualization of Traffic Fatalities

Table 6
Speeding-Related Traffic Fatalities, by State and Roadway Function Class, 2016

State	Total Traffic Fatalities	Speeding-Related Fatalities		Speeding-Related Fatalities by Roadway Function Class						
		Total	Percentage of Total Traffic Fatalities	Interstate Rural	Interstate Urban	Non-Interstate Freeway and Expressway	Non-Interstate Other Principal Arterial	Non-Interstate Minor Arterial	Non-Interstate Collector	Non-Interstate Local
Alabama	1,038	317	31%	13	15	0	67	68	83	58
Alaska	84	36	43%	4	2	0	6	7	10	7
Arizona	962	311	32%	41	16	30	72	54	47	51
Arkansas	545	117	21%	1	7	0	30	25	26	28
California	3,623	1,056	29%	49	118	205	254	188	152	54
Colorado	608	211	35%	14	18	5	64	47	42	21
Connecticut	293	79	27%	1	9	4	15	23	13	13
Delaware	119	39	33%	0	1	0	11	4	18	5
District of Columbia	27	16	59%	0	2	0	0	0	0	14
Florida	3,174	310	10%	3	11	11	132	34	78	38
Georgia	1,554	266	17%	9	24	8	51	71	50	55
Hawaii	120	54	45%	0	3	0	38	12	1	0
Idaho	253	54	21%	13	3	1	11	5	11	6
Illinois	1,082	418	39%	26	51	4	101	86	76	74
Indiana	821	213	26%	12	18	4	39	41	63	36
Iowa	404	95	24%	12	6	0	23	27	15	12
Kansas	429	106	25%	9	5	2	36	14	8	32
Kentucky	834	138	17%	4	7	3	25	15	57	27
Louisiana	757	173	23%	13	13	0	29	27	57	33
Maine	161	56	35%	0	0	0	9	12	17	18
Maryland	505	127	25%	5	21	7	35	18	19	22
Massachusetts	389	105	27%	1	20	7	25	33	4	15
Michigan	1,064	245	23%	8	29	12	43	50	53	48
Minnesota	392	92	23%	1	6	5	23	22	19	16
Mississippi	690	81	12%	7	0	0	13	13	36	12
Missouri	945	328	35%	7	16	12	64	64	82	83
Montana	190	61	32%	7	0	8	18	4	18	14
Nebraska	218	36	17%	2	2	0	8	8	1	15
Nevada	328	125	38%	12	5	8	31	27	25	14
New Hampshire	136	77	57%	5	7	0	21	12	16	16
New Jersey	601	130	22%	0	3	19	36	32	18	23
New Mexico	402	145	36%	11	9	3	53	20	25	23
New York	1,025	314	31%	21	12	17	87	36	30	111
North Carolina	1,450	566	39%	23	40	4	316	28	35	120
North Dakota	113	25	22%	1	0	0	11	2	1	10
Ohio	1,132	257	23%	7	27	8	29	53	81	50
Oklahoma	683	183	27%	8	14	10	40	21	53	37
Oregon	495	142	29%	5	7	0	46	25	45	14
Pennsylvania	1,188	505	43%	30	27	11	115	105	102	107
Rhode Island	51	23	45%	0	4	3	9	0	2	5
South Carolina	1,015	381	38%	40	16	10	80	157	28	50
South Dakota	116	37	32%	3	1	0	5	5	18	5
Tennessee	1,041	183	18%	12	17	1	37	42	43	31
Texas	3,776	1,069	28%	47	124	69	199	133	167	0
Utah	281	72	26%	8	10	0	17	11	12	13
Vermont	62	29	47%	2	0	0	4	6	9	8

Turn from dense tables to compelling images to spark insights



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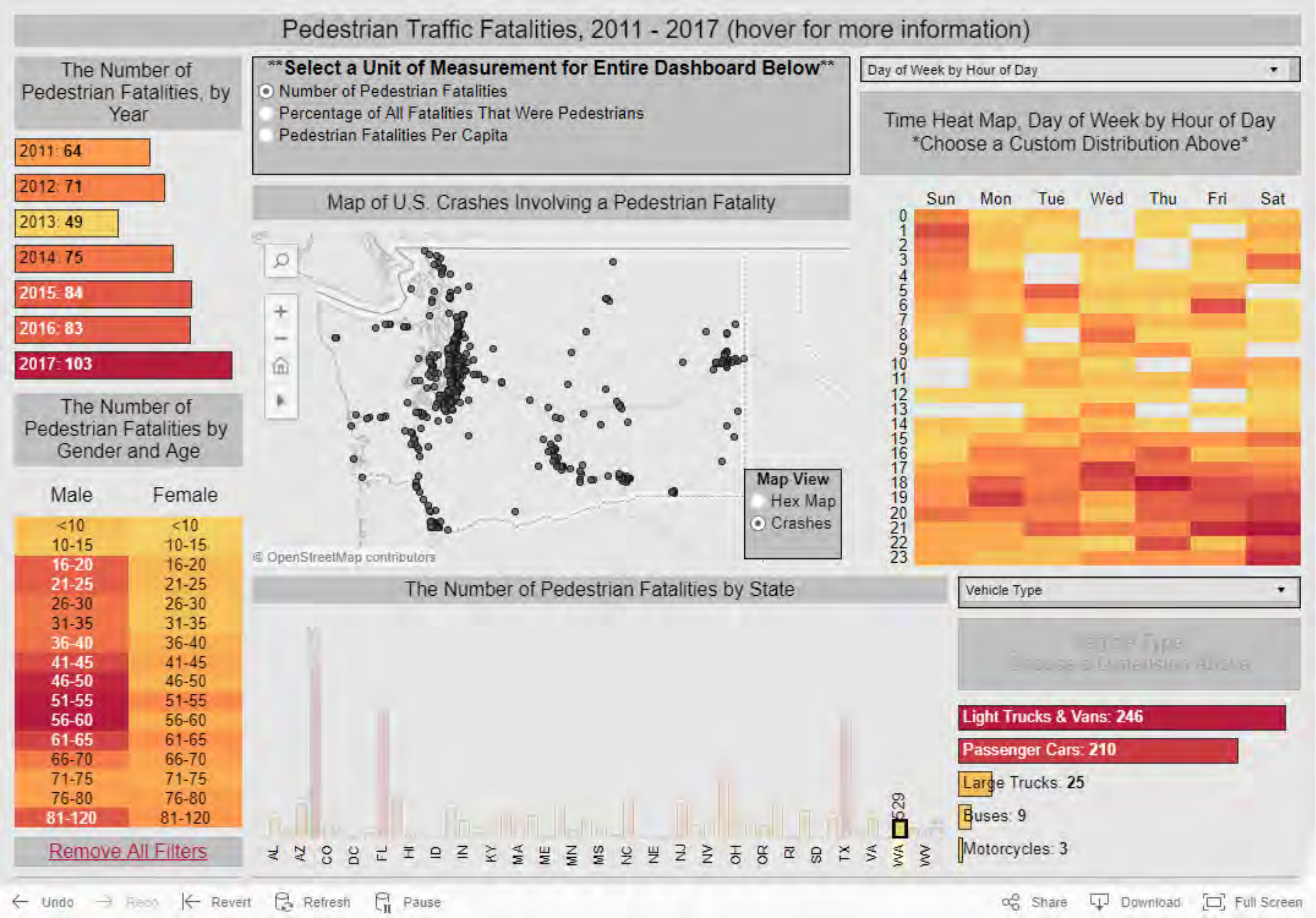
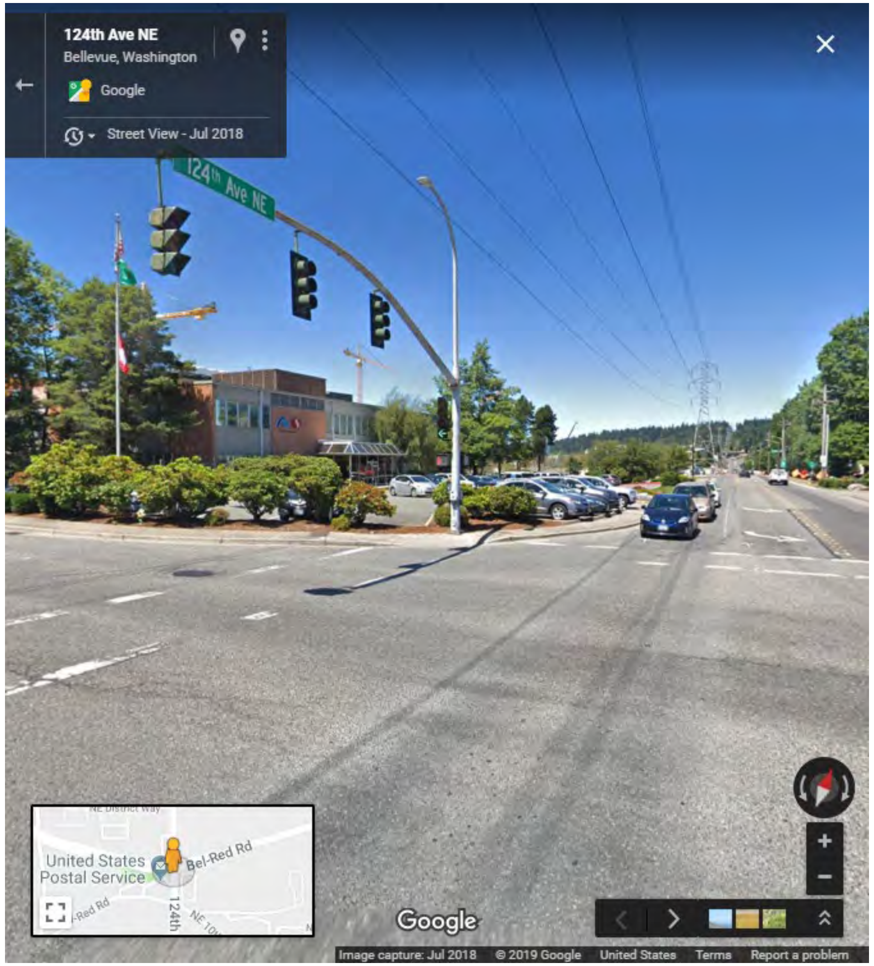
Visualizing Pedestrian Fatality Data





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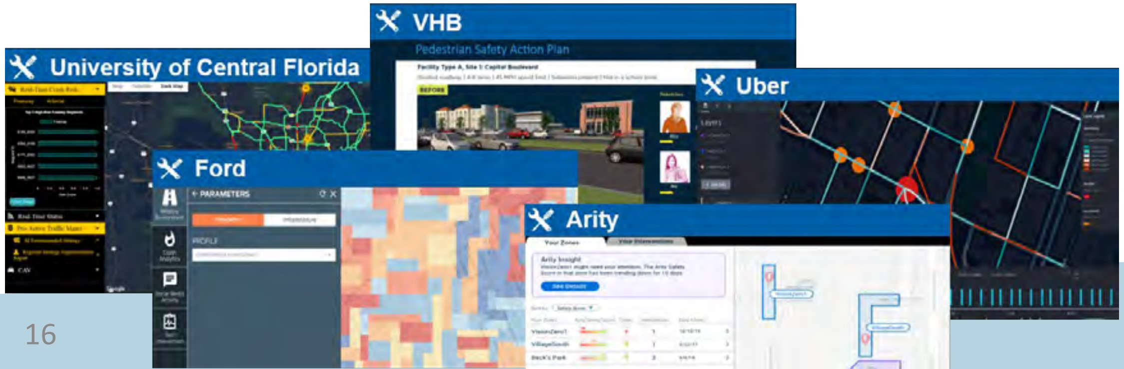
Pilot 4: Solving for Safety Visualization Challenge

Develop analytical visualization tool
- Discover Insights Tool
- Simulation Tool

Priority safety focus areas
- Conflict Points Impacts
- High Risk Factors
- Vulnerable System Users

Design for one or more users
- Policy makers/influencers
- Providers/Operators
- Public



STAGE I
IDEATION
5 Semi-finalists

STAGE II
CONCEPT
2 Finalists
Interim Prize Purse

STAGE III
TOOL
2 Finalists
Final Prize Purse

54 Solvers competed for a prize purse of $350,000 by developing innovative analytical visualization tools that reveal insights into reducing serious crashes

5 Stage I semi-finalists are developing ideations into proofs of concept

https://www.transportation.gov/solve4safety/solve4safetysubmissions

U.S. Department of Transportation

Questions?

https://www.transportation.gov/SafetyDataInitiative

Barbara McCann, Director
Office of Strategic Planning, Policy Development and Performance
barbara.mccann@dot.gov
202-366-8016

Bellevue's Vision Zero Commitment

Bellevue Vision Zero Summit

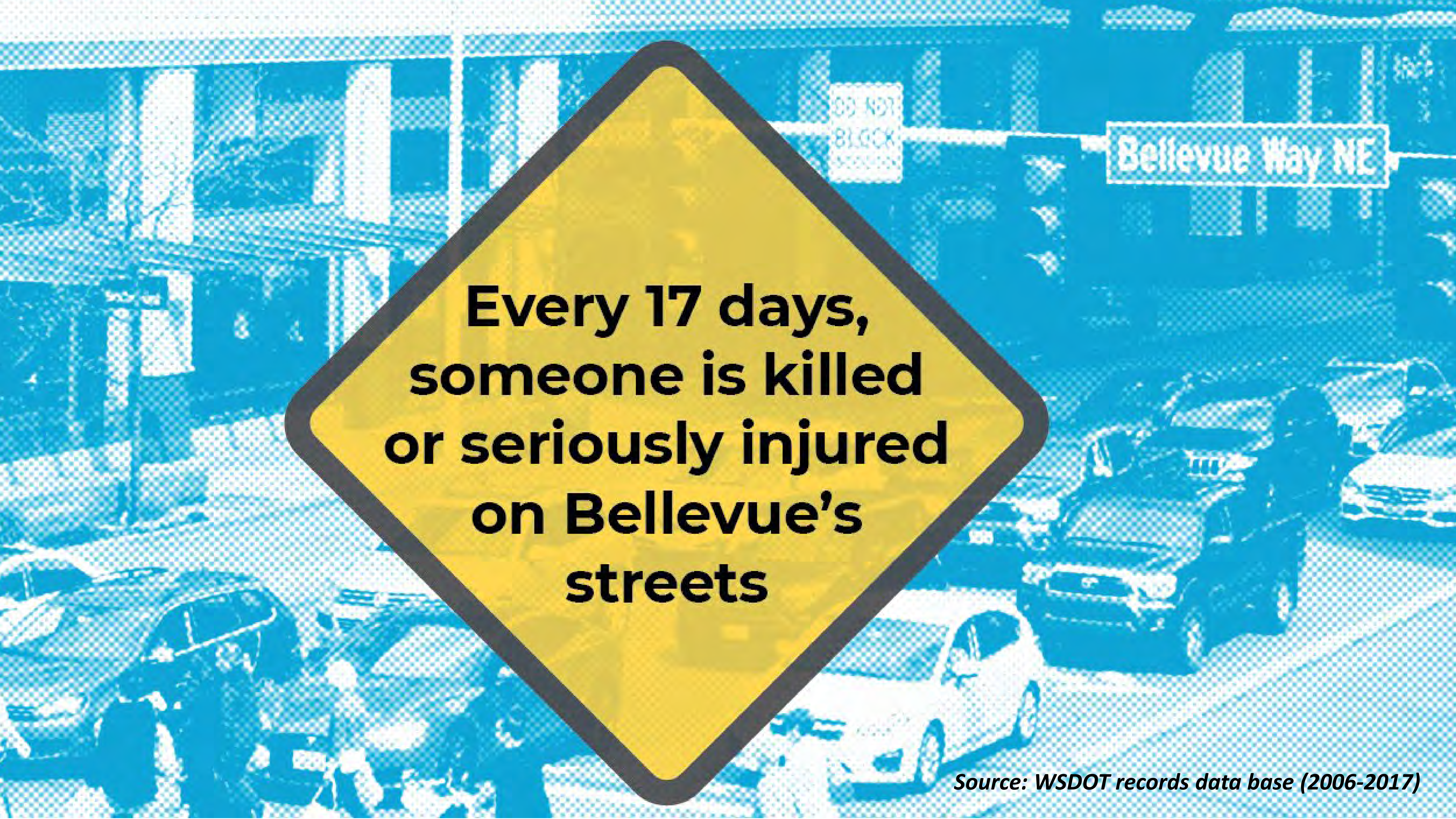
Feb. 13, 2019

Lynne Robinson

Deputy Mayor

City of Bellevue


2018-Nov-20 02:29:24.022 PM
MAIN ST
102 AVE NE
102 @ MAIN *



Every 17 days, someone is killed or seriously injured on Bellevue's streets

Source: WSDOT records data base (2006-2017)

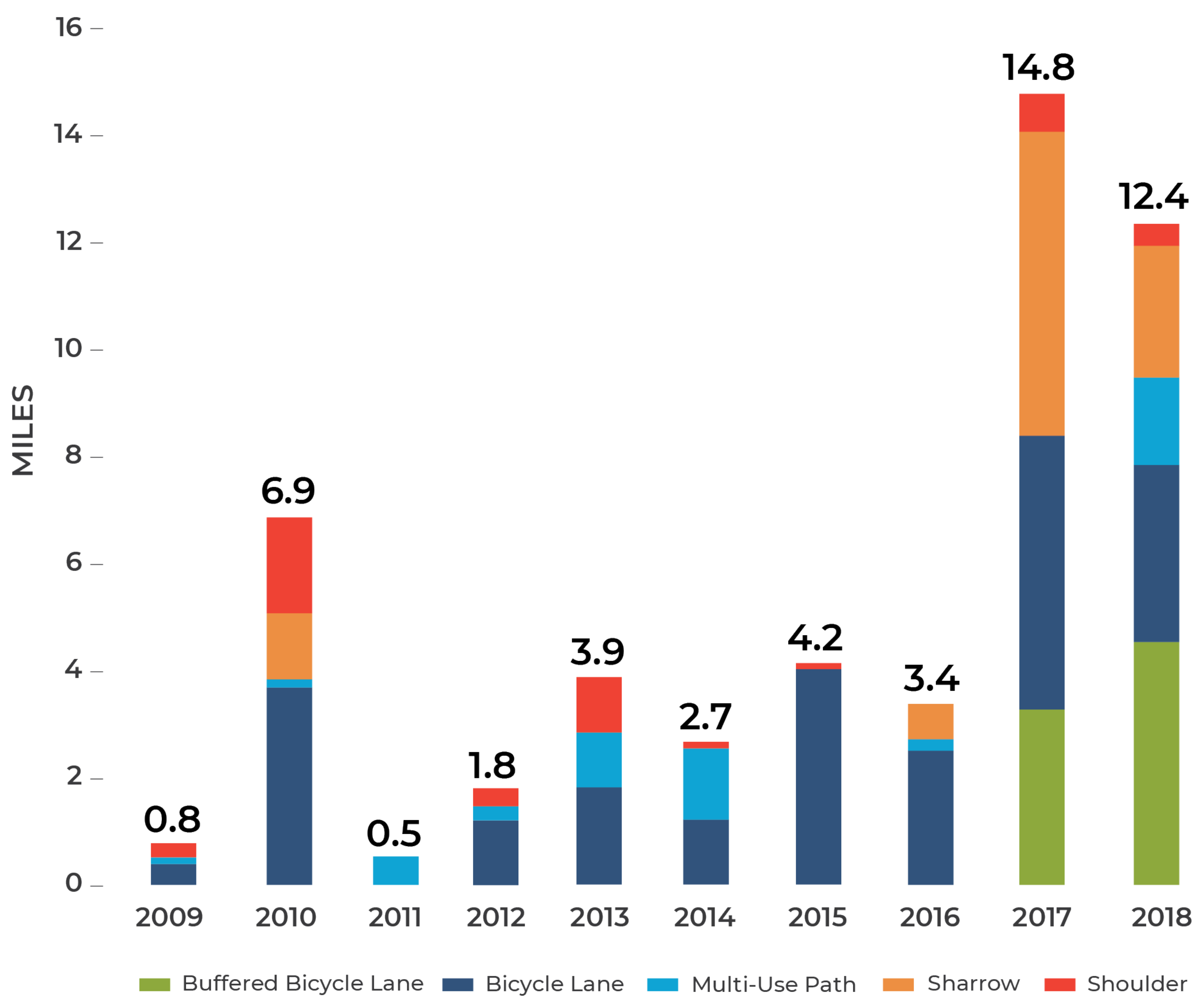
"The life, safety and health of residents, employees and visitors to Bellevue is the City Council's highest priority."

- Vision Zero Resolution

NEIGHBORHOOD

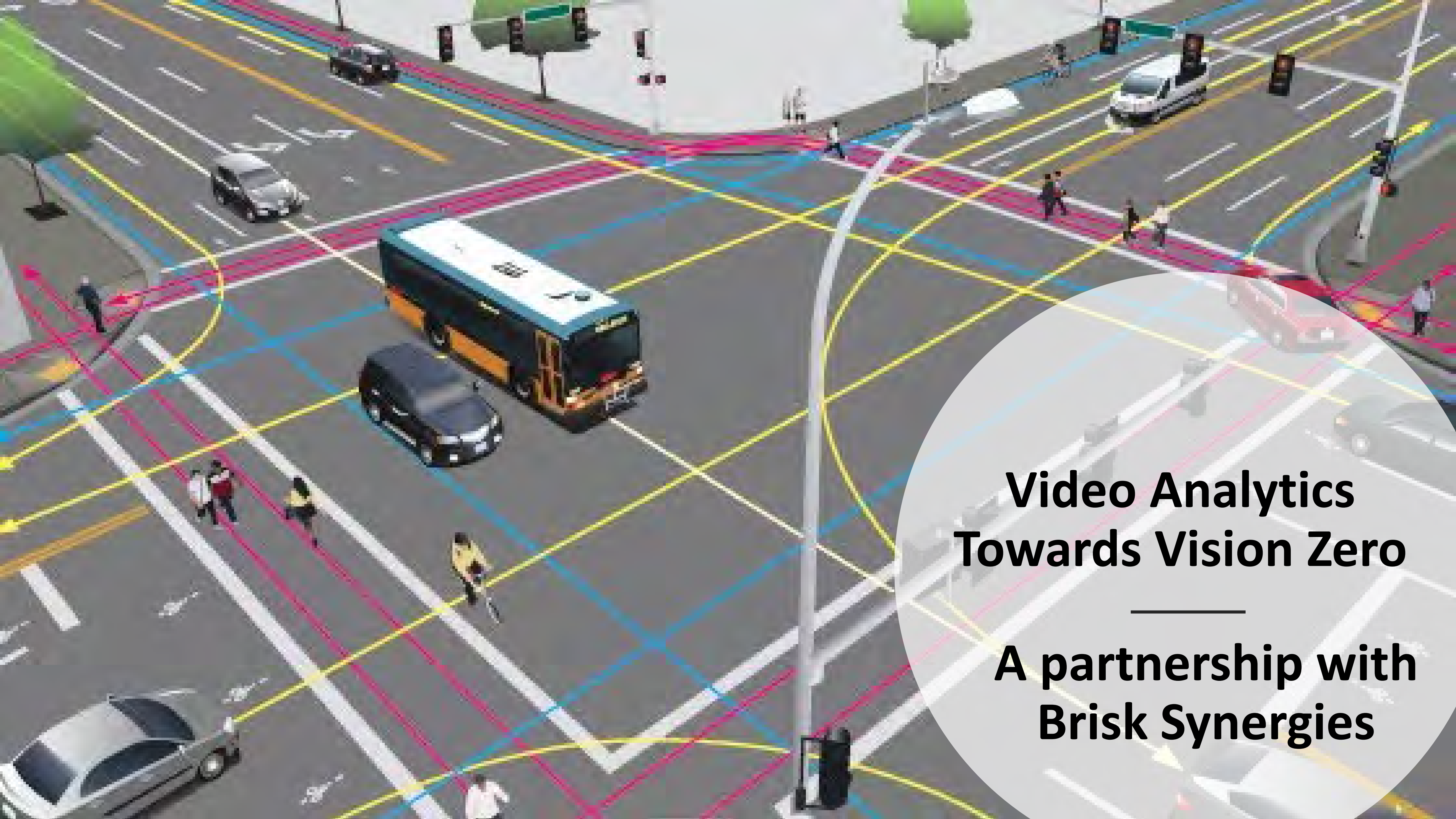
SAFETY, CONNECTIVITY AND CONGESTION LEVY

BICYCLE FACILITY CONSTRUCTION 2009-2018




DRIVE SAFE
RIDE SAFE
NEIGHBORHOOD LEVY PROJECT
405

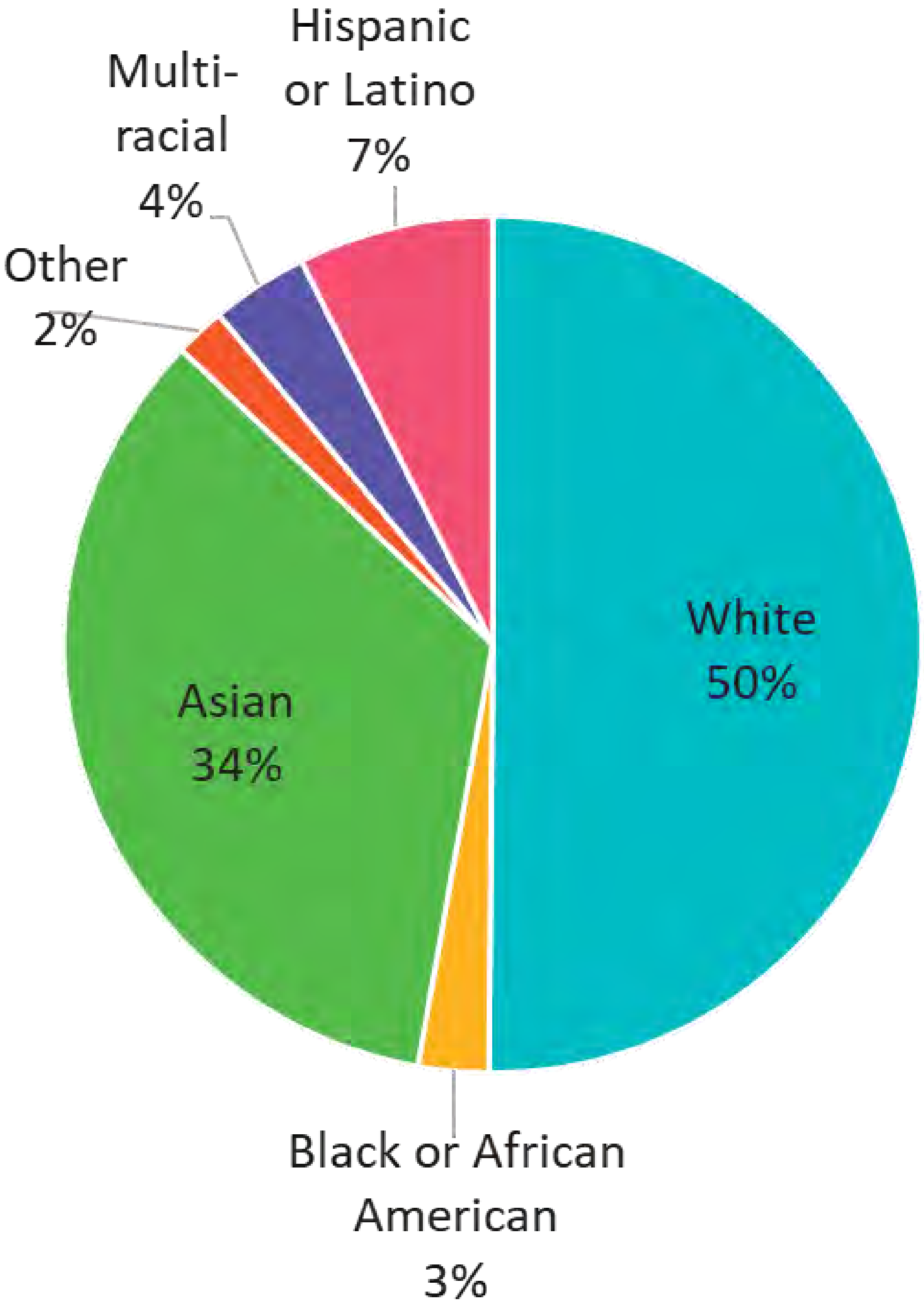

NE 4th St
ONLY
NEIGHBORHOOD
LEVY PROJECT
Thank you for your vote of confidence
BellevueWA.gov/TransportationLevy
425-452-6856

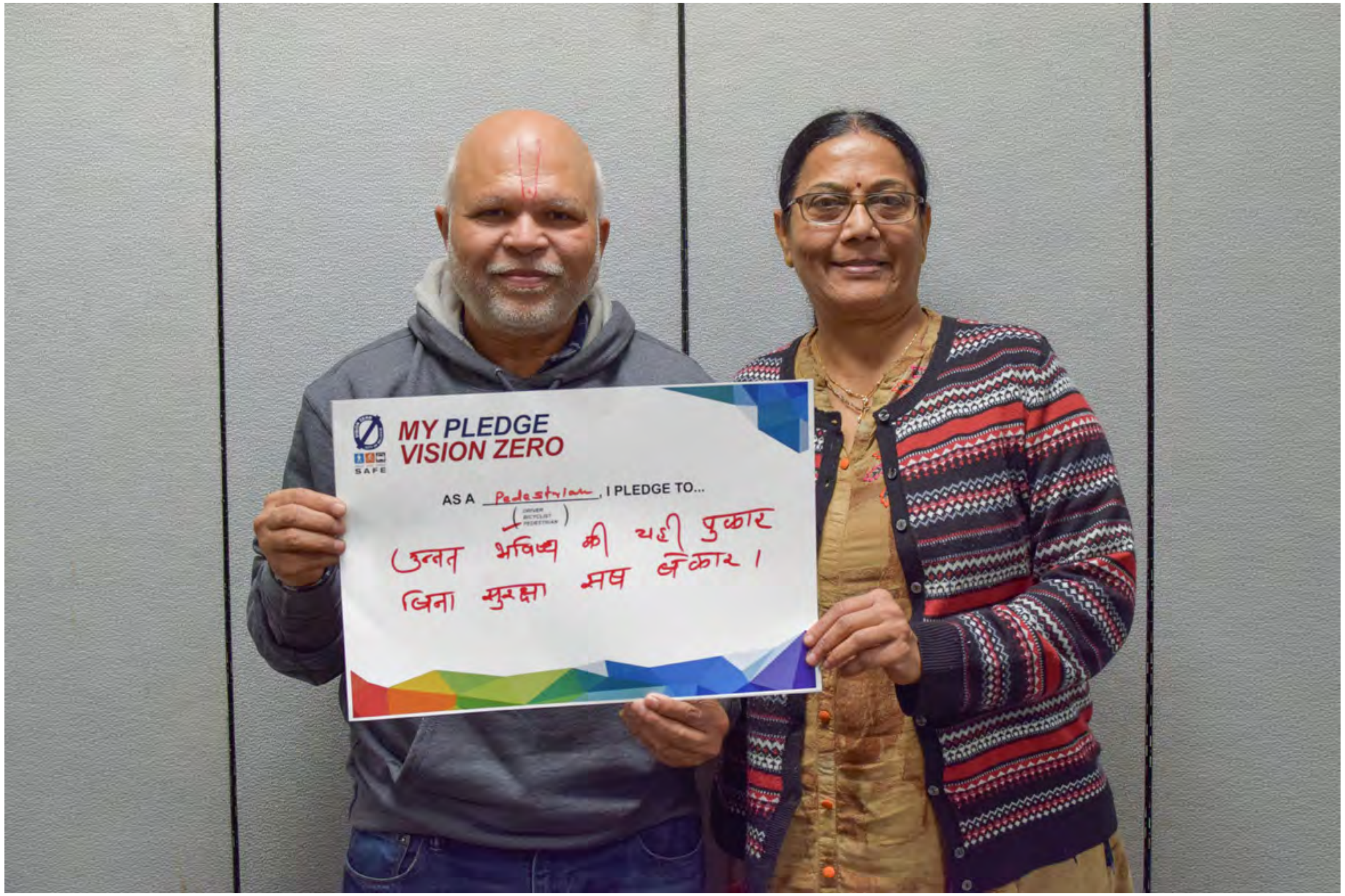


Video Analytics Towards Vision Zero

A partnership with Brisk Synergies

One City Towards Safe Streets






Young drivers account for 25% of drivers involved in fatal and serious injury collisions in Bellevue.
Source: WSDOT records data base (2006-2017)

Campaign to address teenage distracted driving:

TINO – Tune In / Not Out

WASHINGTON DECA

City of Bellevue

Bellevue School District

Bellevue's Vision Zero Action Plan

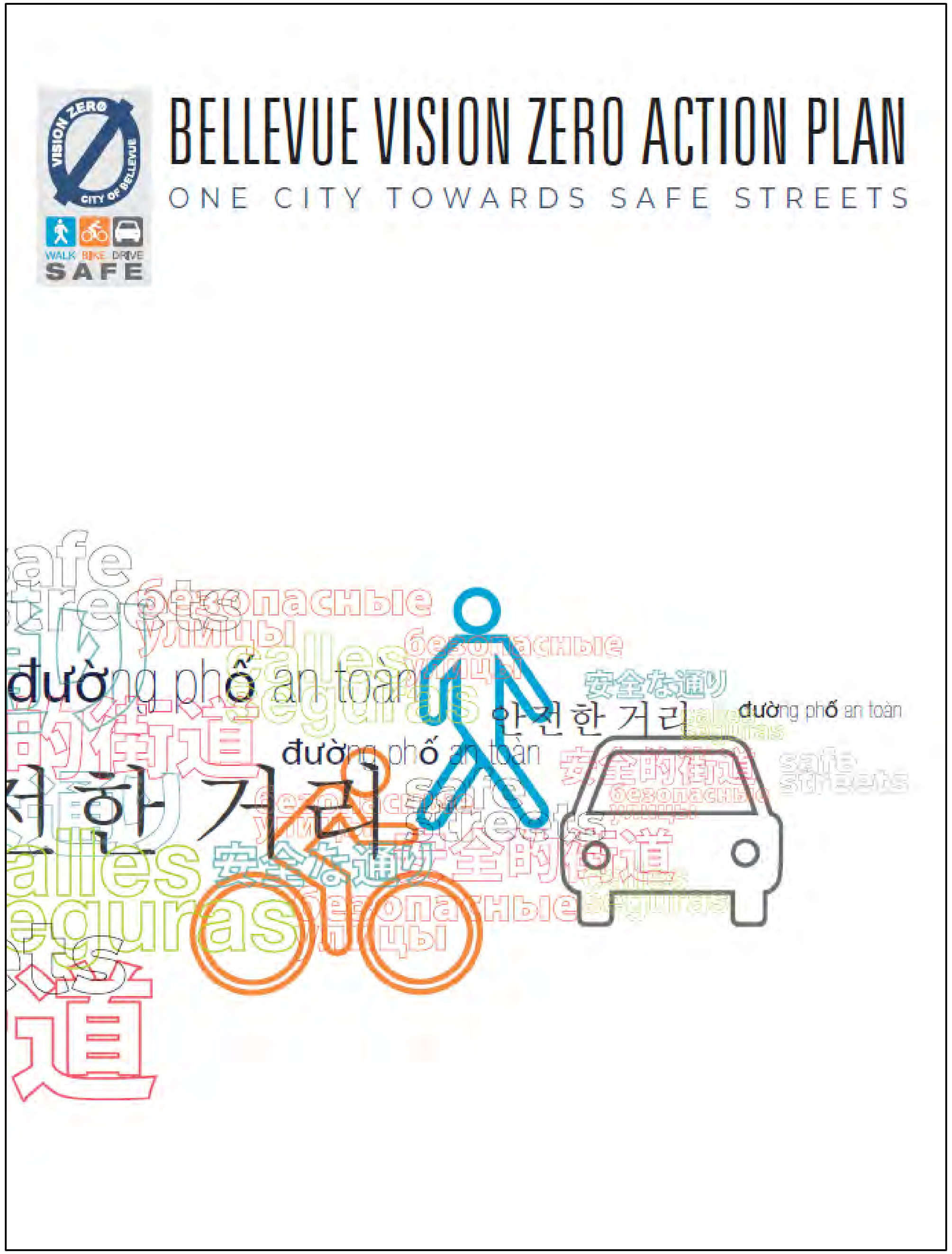
Bellevue Vision Zero Summit

Feb. 13, 2019

Paula Stevens

Interim Transportation Director

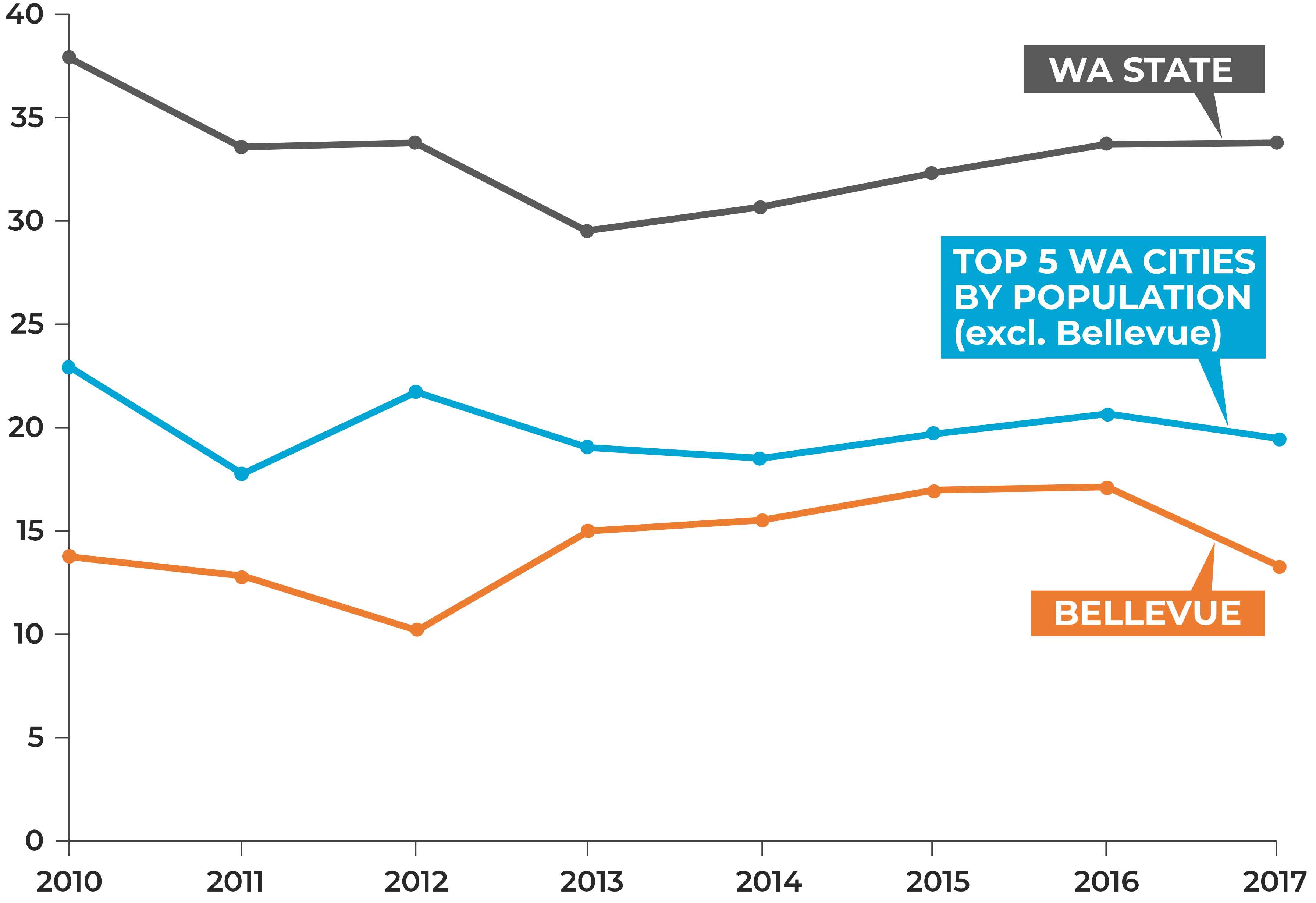
City of Bellevue



Scope of Work:

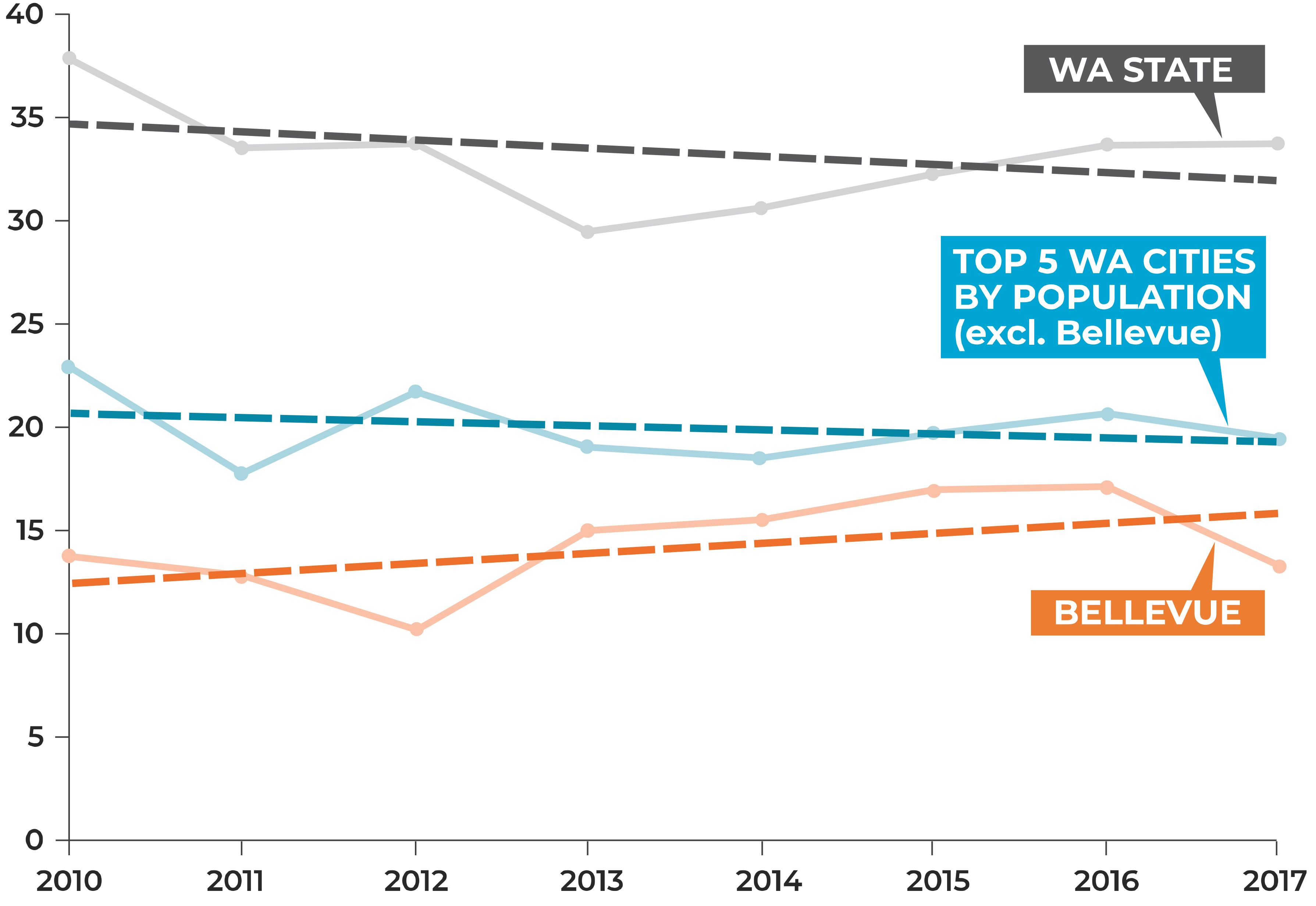
- Best practices
- Assessment of data
- Build on existing efforts
- Engage stakeholders
- Create a timeline
- Identify partnerships
- Refine metrics

Fatal and serious-injury collisions per 100,000 population



Source: *WSDOT collision data base (2010-2017) for City of Bellevue street system only (freeways and their associated fatalities and serious injuries are not represented).*

Fatal and serious-injury collisions per 100,000 population



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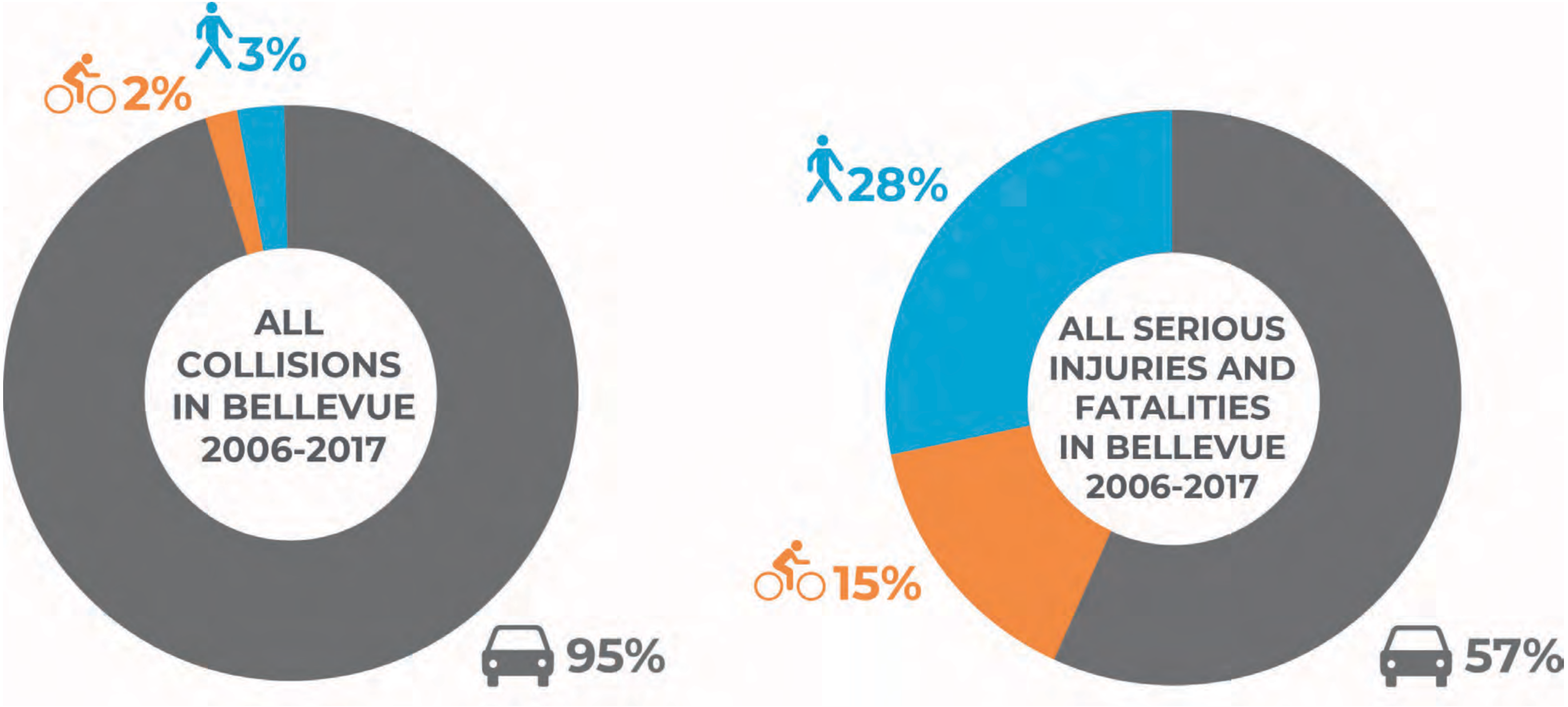

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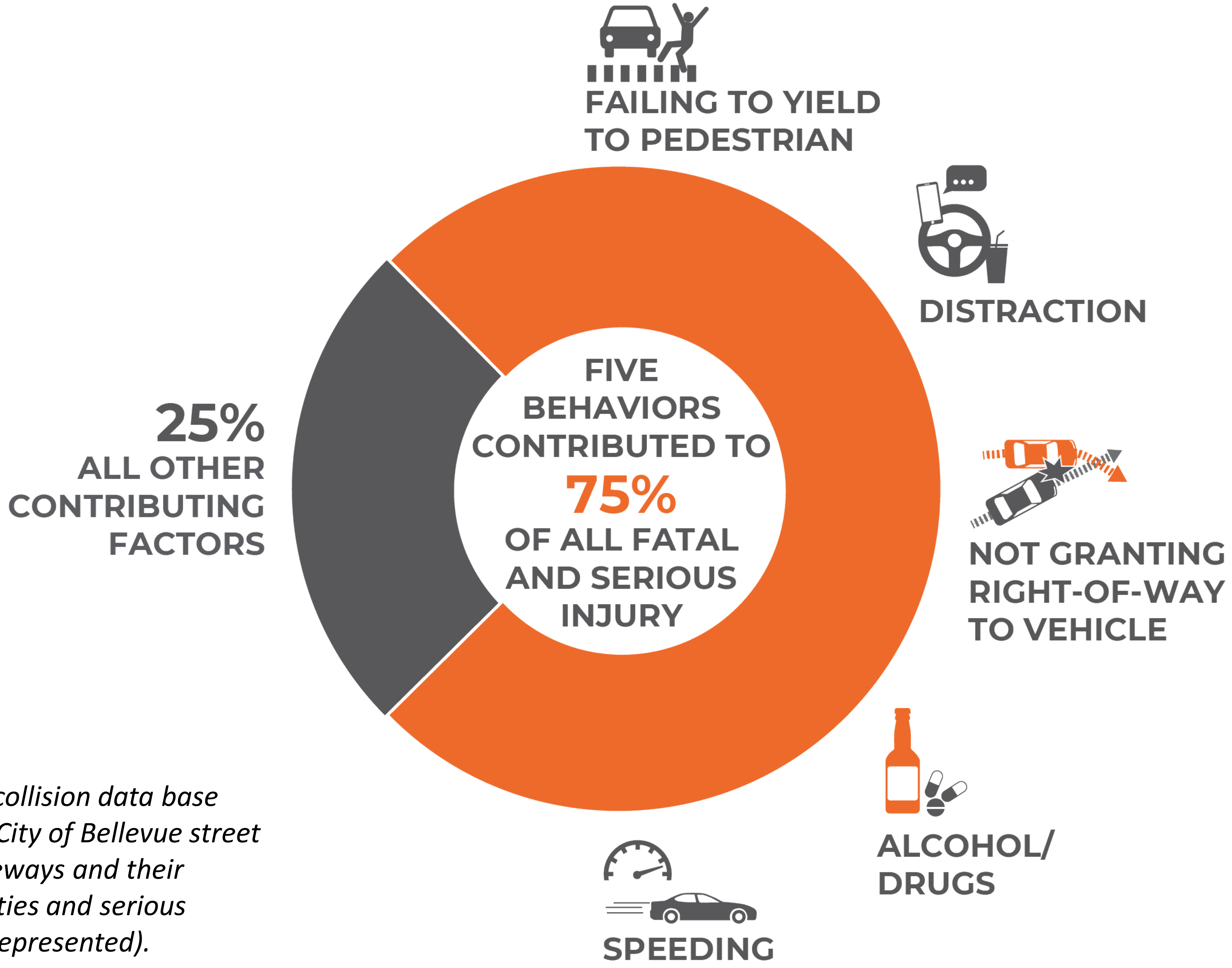

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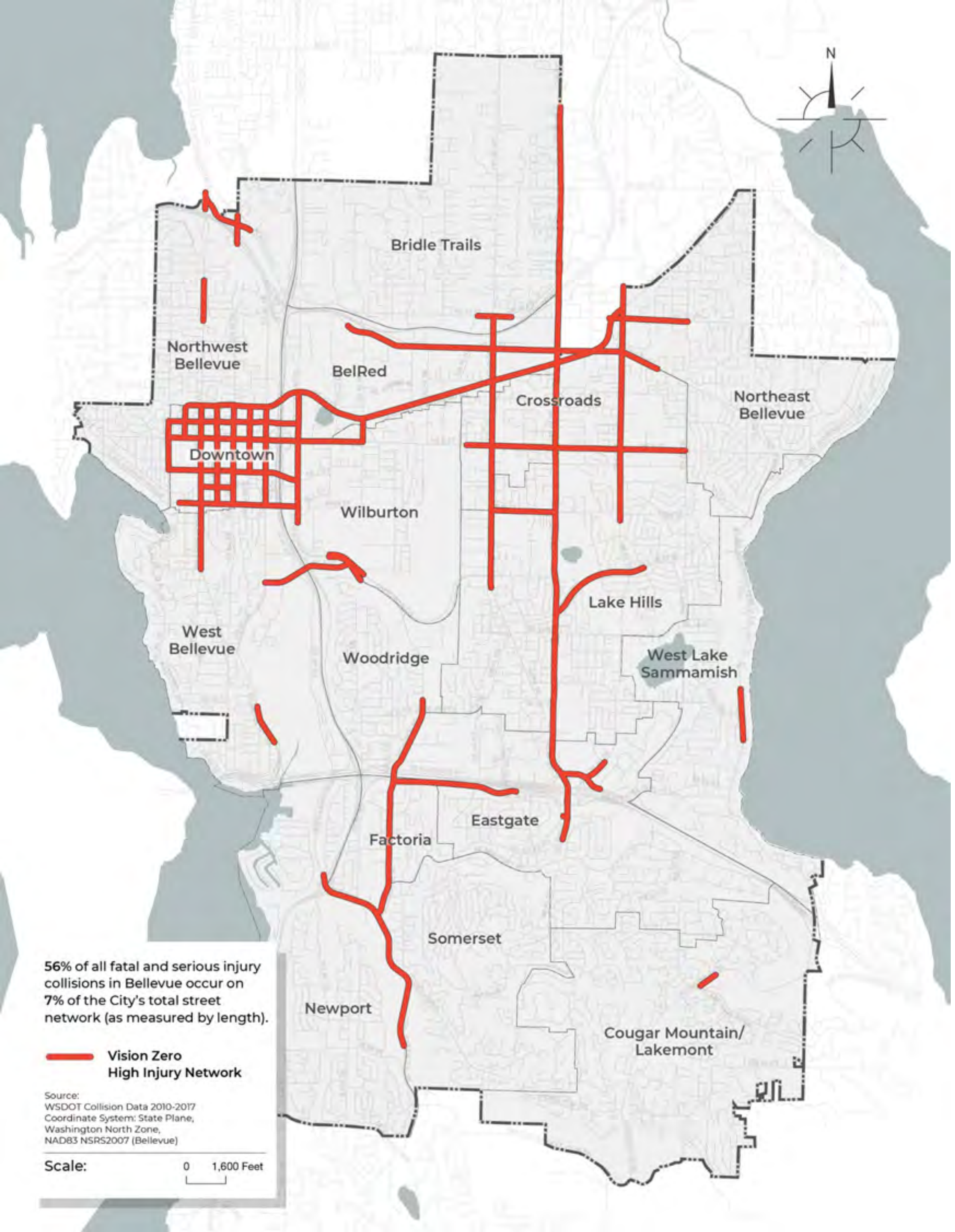
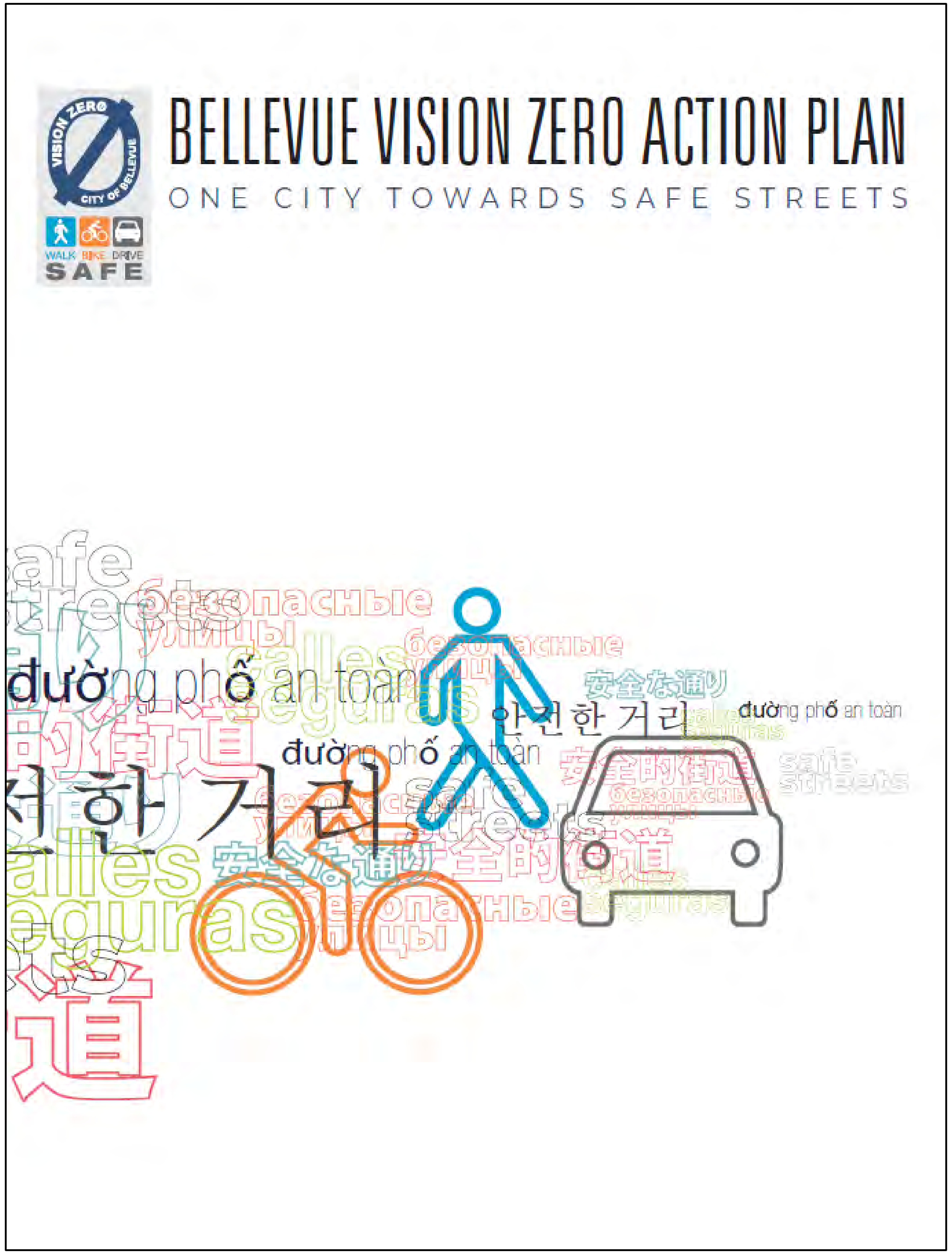


High Injury Network (HIN) Map:

- **56% of all fatal & serious-injury collisions in Bellevue occur on just 7% of streets.**
- **The HIN carries 28% of all traffic in Bellevue**
- **NE 8th St, 156th Ave NE, and 140th Ave NE are top collision corridors.**



Scope of Work:

- Best practices
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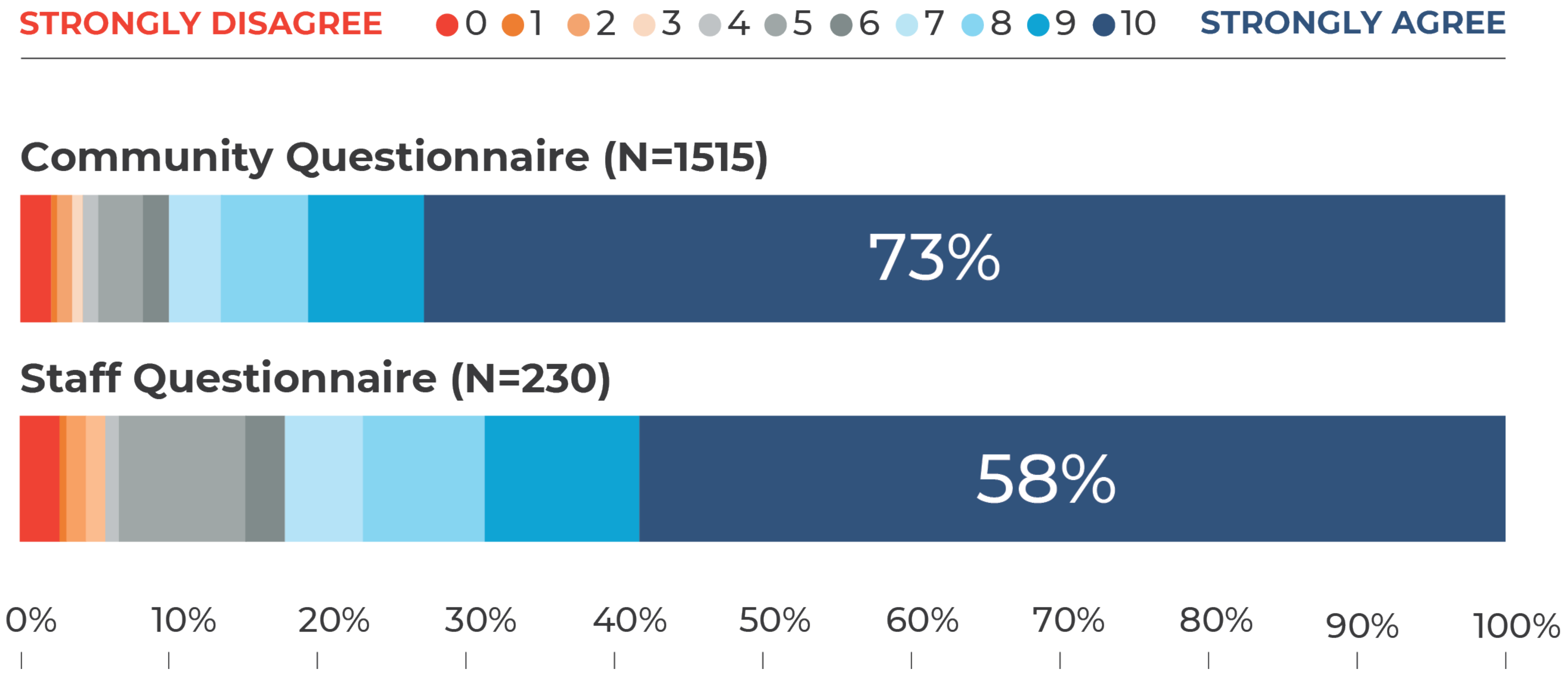
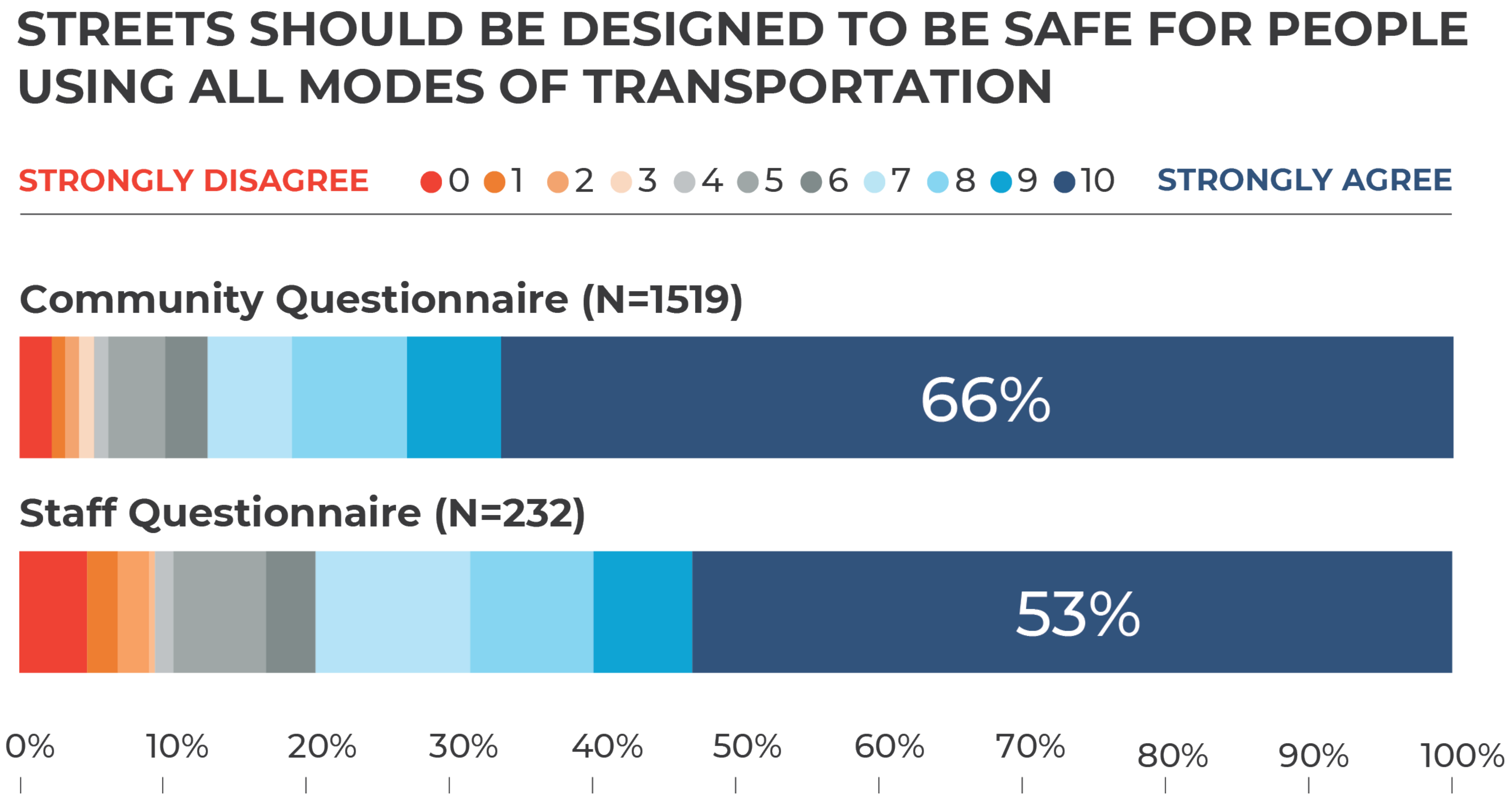
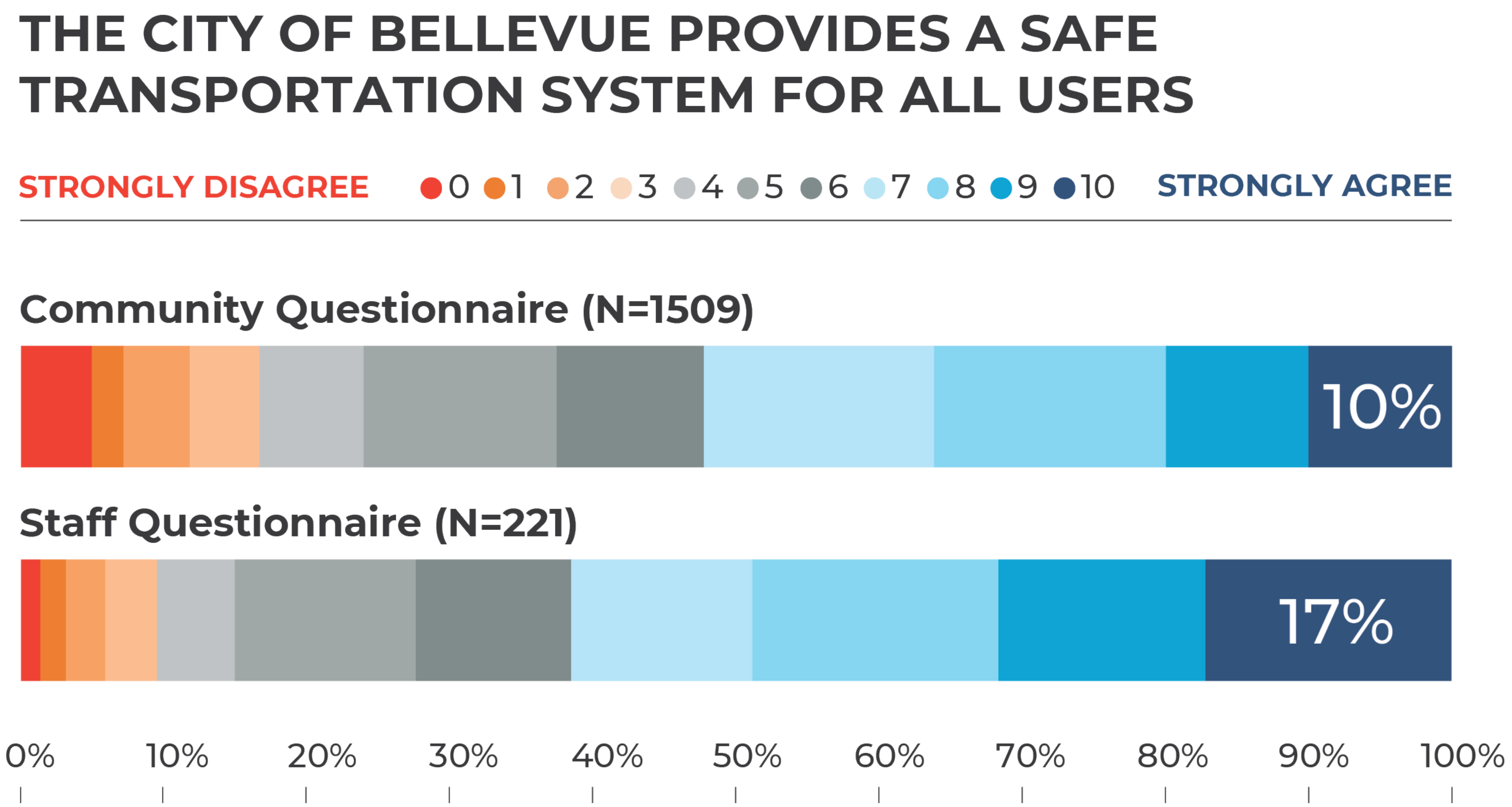
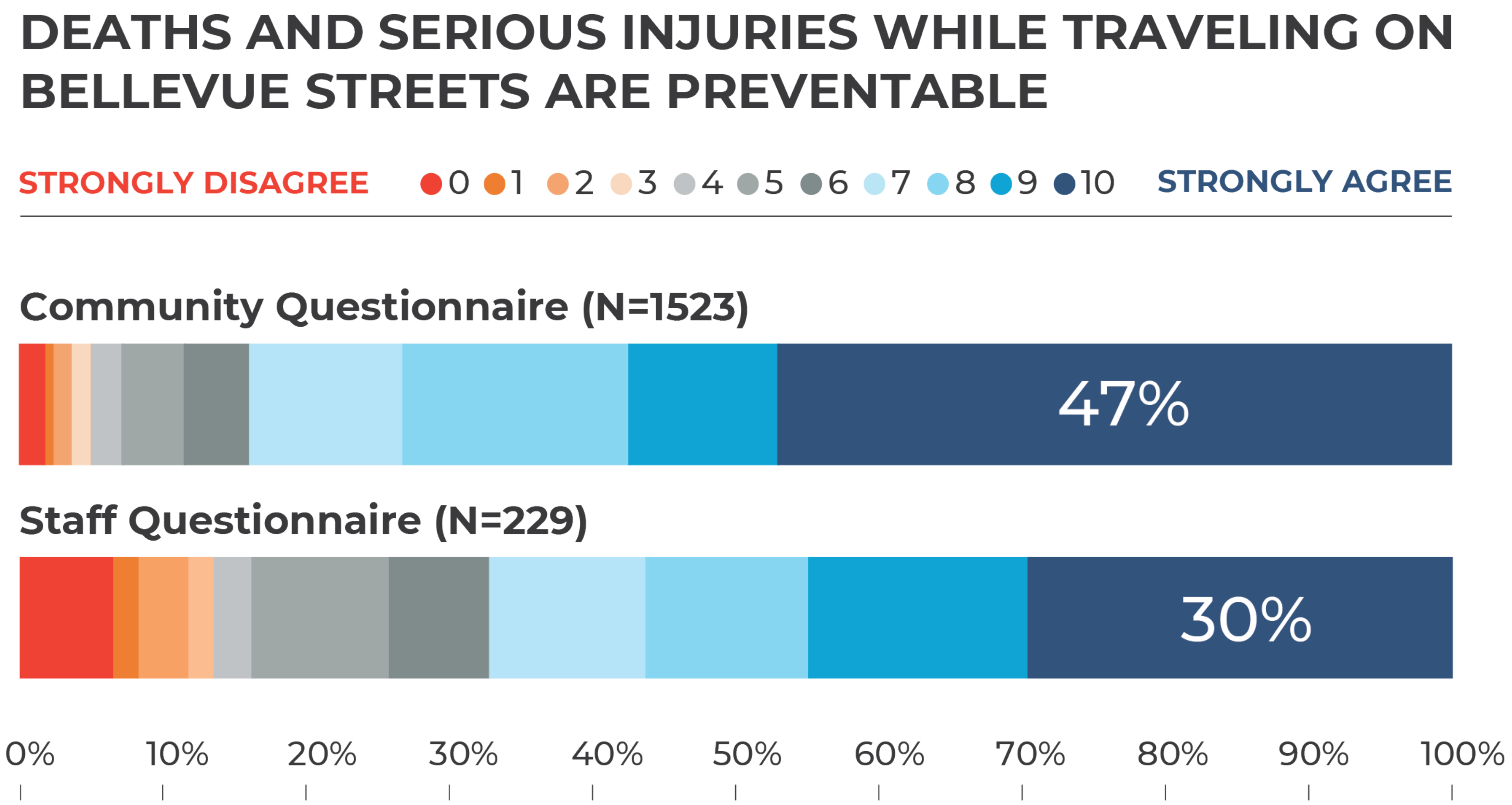
LEADERSHIP
CULTURE
PARTNERSHIPS
DATA
SAFE VEHICLES
SAFE PEOPLE
SAFE STREETS
SAFE SPEEDS
TOWARDS
ZERO
TOGETHER
MY PLEDGE
VISION ZERO
AS A Driver , I PLEDGE TO...
Not text & drive

IT IS UNACCEPTABLE FOR ANYONE TO BE KILLED OR SERIOUSLY INJURED WHILE TRAVELING ON BELLEVUE STREETS




STREETS SHOULD BE DESIGNED TO BE SAFE FOR PEOPLE USING ALL MODES OF TRANSPORTATION
STRONGLY DISAGREE
0
1
2
3
4
5
6
7
8
9
10
STRONGLY AGREE
Community Questionnaire (N=1519)
66%
Staff Questionnaire (N=232)
53%
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%


THE CITY OF BELLEVUE PROVIDES A SAFE TRANSPORTATION SYSTEM FOR ALL USERS
STRONGLY DISAGREE
0
1
2
3
4
5
6
7
8
9
10
STRONGLY AGREE
Community Questionnaire (N=1509)
10%
Staff Questionnaire (N=221)
17%
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%



DEATHS AND SERIOUS INJURIES WHILE TRAVELING ON BELLEVUE STREETS ARE PREVENTABLE
STRONGLY DISAGREE
0 1 2 3 4 5 6 7 8 9 10
STRONGLY AGREE
Community Questionnaire (N=1523)
47%
Staff Questionnaire (N=229)
30%
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%

Today, please remember to:

- **Have your picture taken at the photo booth in the foyer**
- **Leave comments/questions on post-it notes, also in the foyer**

After the 10 minute break; please return for the next session:

"Putting a human face on the statistics"


SPEED
LIMIT
25


SE 60 ST
12514


Head Impact
Shoulder Impact
Hip Impact


cannondale
RD2.0



cascade
BICYCLE CLUB
cascade
BICYCLE CLUB

cascade BICYCLE CLUB

Ride SMART

We encourage all riders to **Ride SMART**.

STAY ALERT

Momentary inattention is the number one cause of incidents. Watch for vehicles, bicyclists, pedestrians and hazards. Do not wear earbuds or use phones while riding.

MAINTAIN SPACE

Leave enough room in front of you to avoid other riders, vehicles and hazards. Ride outside the door zone, and move off the road or trail when stopping.

ACT SAFELY AND PREDICTABLY

Wear a properly fitted helmet. Make sure you can see and be seen. Ride a straight line and only pass on the left. Be courteous.

RESPECT THE RULES OF THE ROAD

Obey all traffic laws; stop for all red lights and stop signs. Signal turns whenever safe, ride no more than two abreast (single file is safer) and yield right-of-way when appropriate.

THINK AHEAD AND TALK

Scan ahead and anticipate what others will do. Communicate actions and hazards, tell others when passing and cross railroad tracks at a right angle when possible.

A Primer on the Safe Systems Approach

Christopher M. Monsere @CMonsere
Portland State University
BELLEVUE VISION ZERO SUMMIT
February 13, 2019

Portland State University

Vision Zero

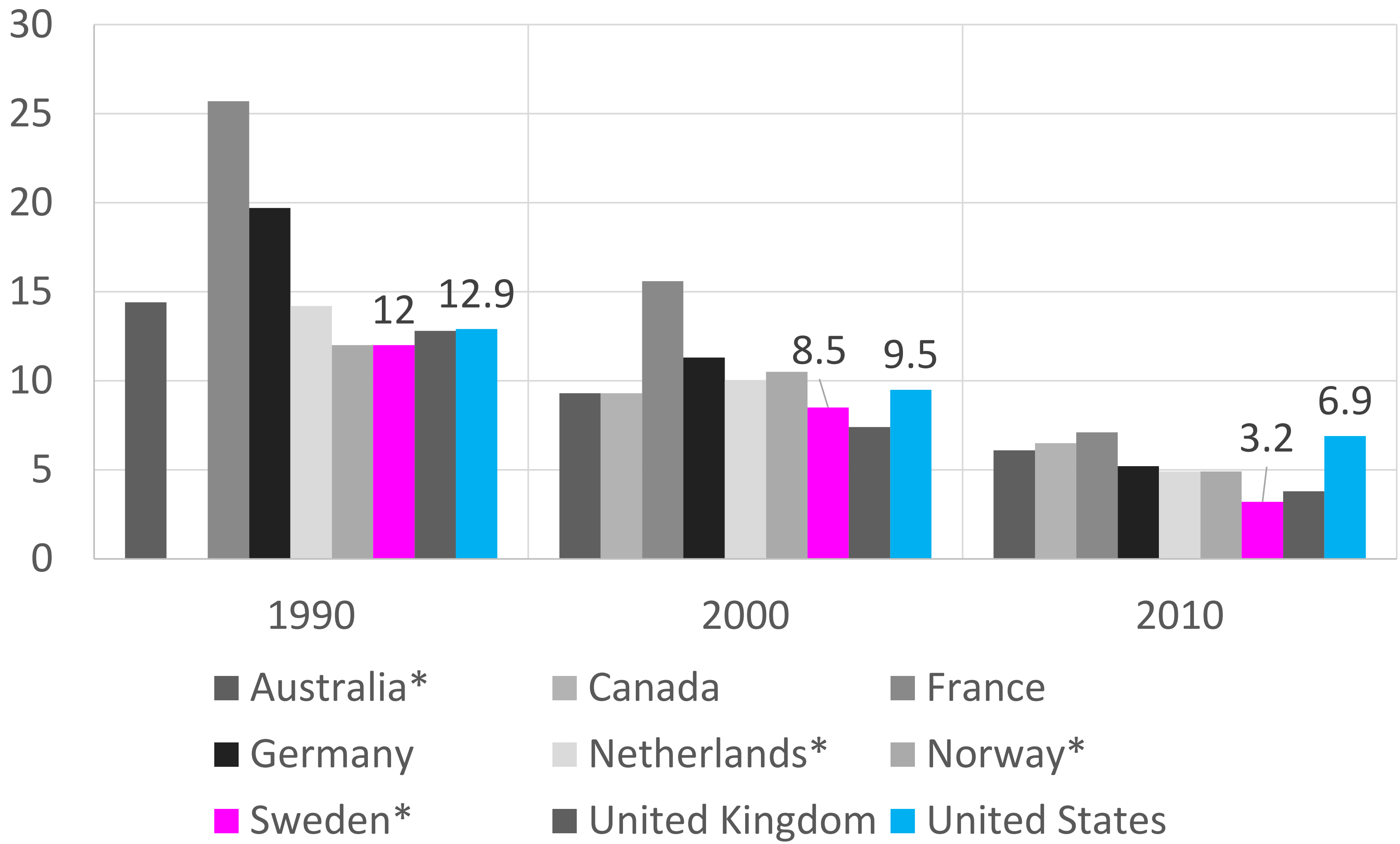
- Credited to Sweden, 1997
  - “Vision Zero means that eventually no one will be killed or seriously injured within the road traffic system.”
  - “….a zero fatality target was the only justifiable target for road traffic.” (Johansson, 2009, p.826).
- Not necessarily a reduction in crashes, but reduction in severity of outcomes.

Countries with Vision Zero / Safe System / Sustainable Safety National Policy

- Australia
- Austria
- Czech Republic
- Denmark
- Finland
- Netherlands
- New Zealand
- Norway
- Poland
- Slovenia
- Sweden

Source: IRTAD 2014 Annual Report

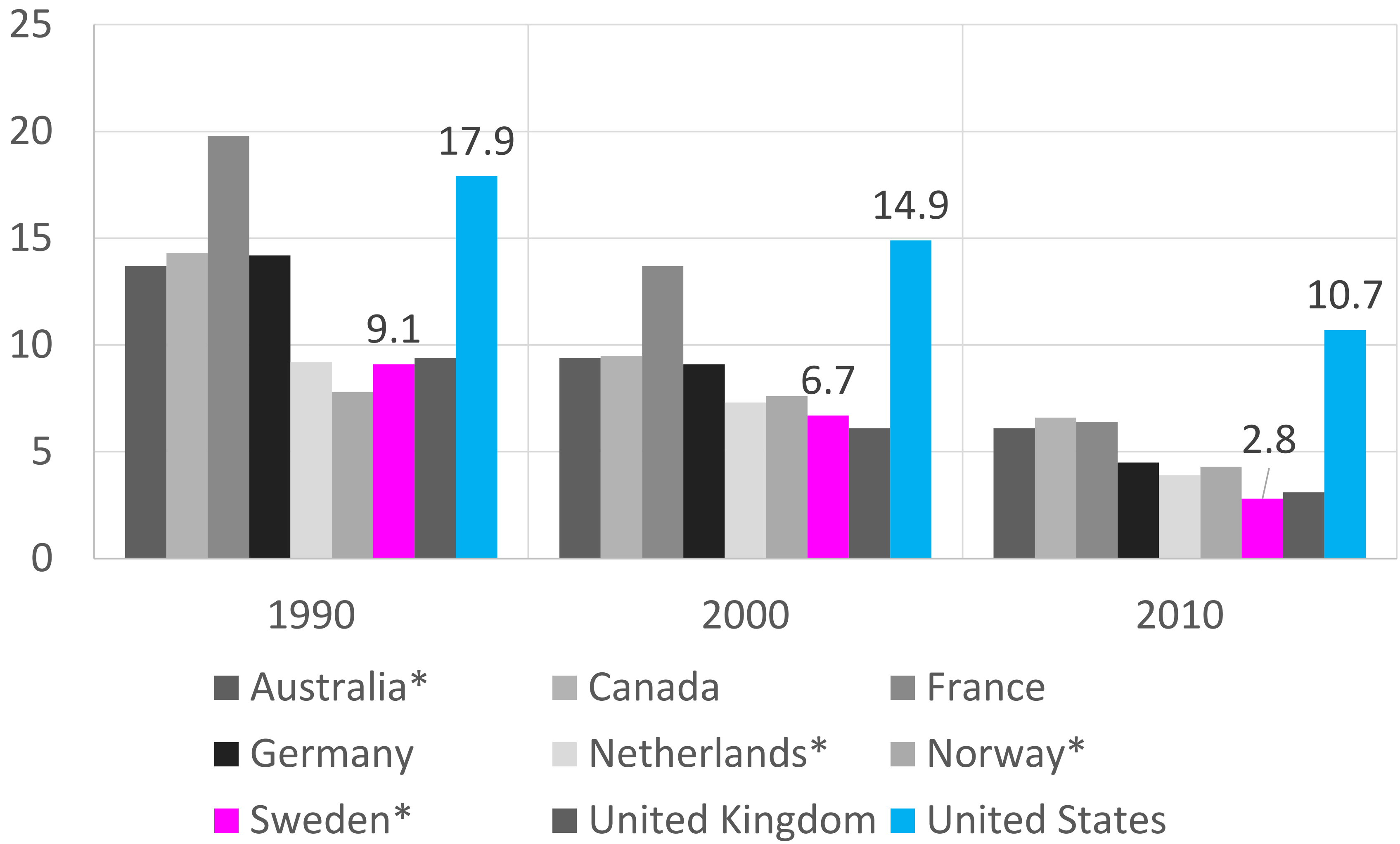
Road fatalities per billion vehicle-km



Source: IRTAD 2014 Annual Report

* Vision Zero / Safe System / Sustainable Safety National Policy

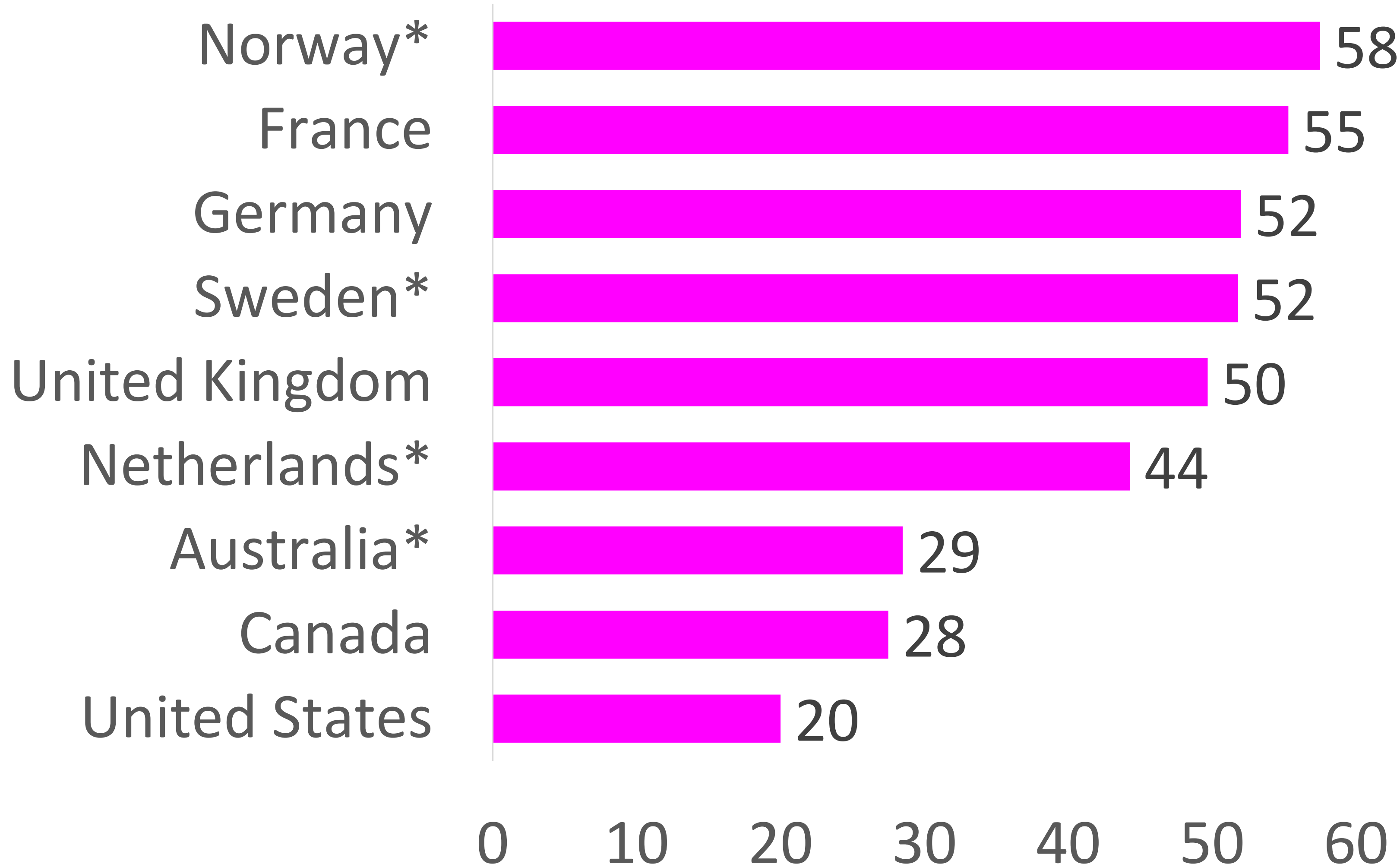
Road fatalities per 100,000 population



Source: IRTAD 2014 Annual Report

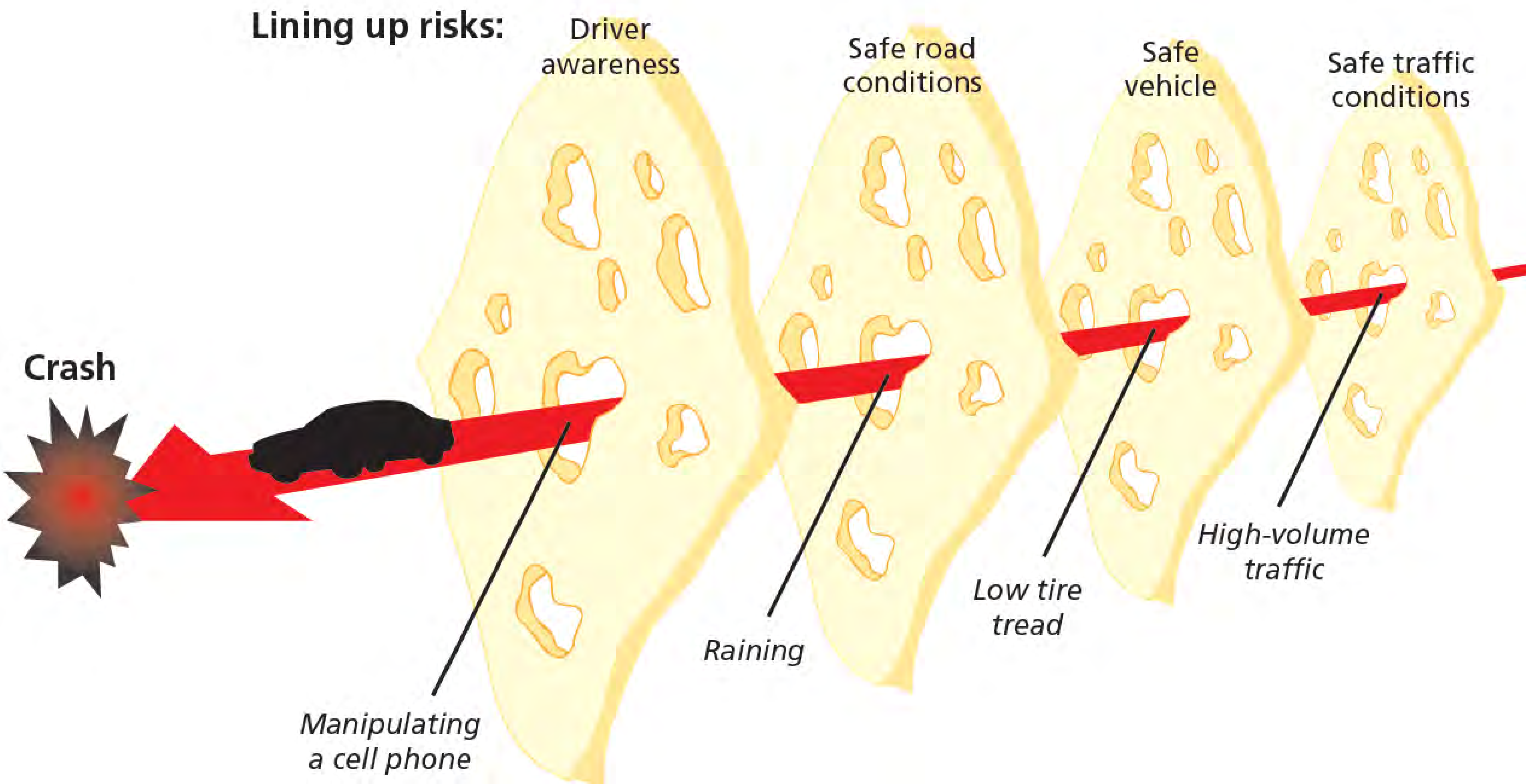
* Vision Zero / Safe System / Sustainable Safety National Policy

Percent Decrease in Road Fatalities, 2000-2012



* Vision Zero / Safe System / Sustainable Safety National Policy

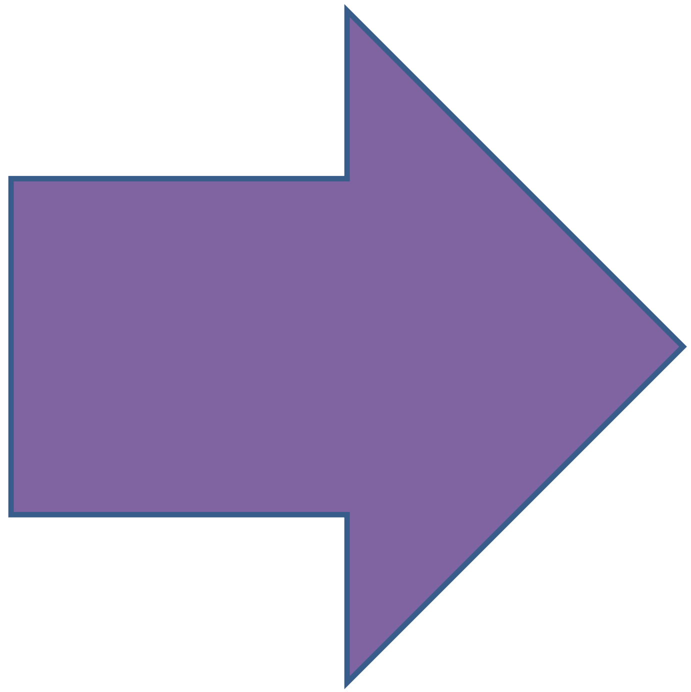
Figure 1.3
Swiss Cheese Model of Crash Causation



SOURCES: Adapted from Seppa (2013) and Reason (2000).
RAND *RR2333-1.3*

Responsibility for Safe Outcomes

Road User



Transport System Designers

Safe Systems Principles

- Humans make errors
- Humans are vulnerable to injury
- Responsibility is shared
- No death or serious injury is acceptable
- Proactive vs. reactive

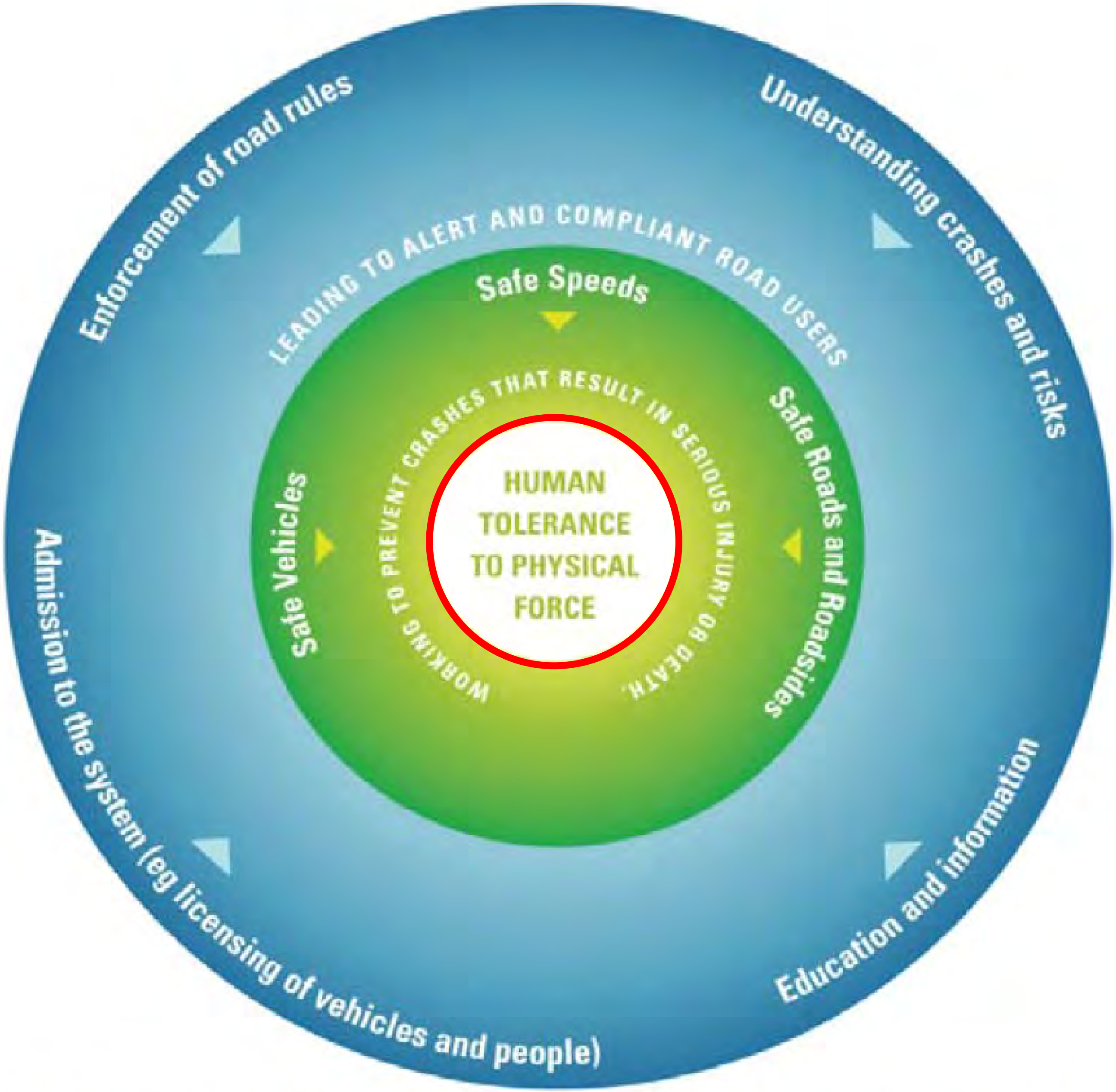


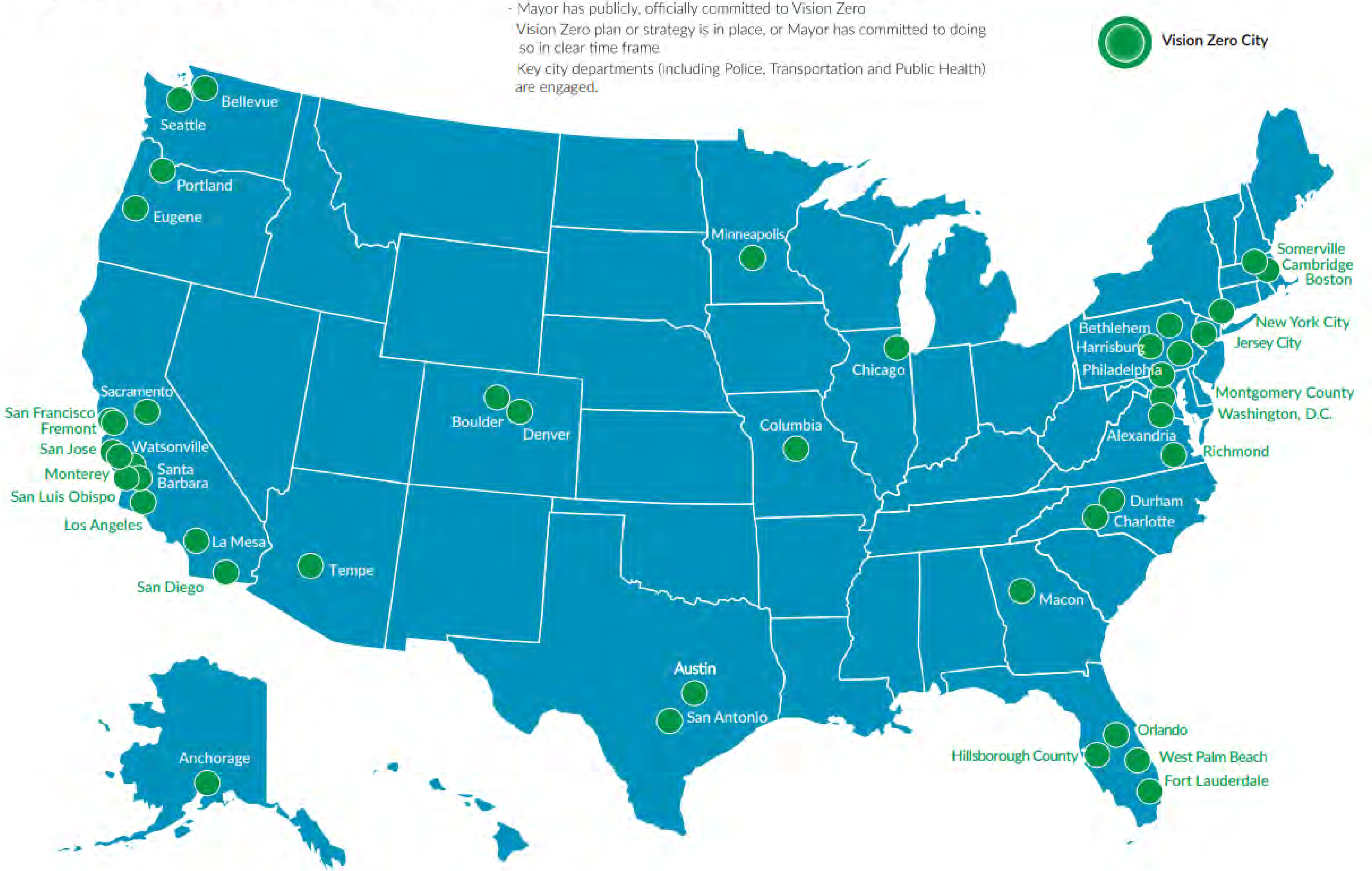
Figure 2: Western Australia's *Towards Zero* approach to road safety.


LEADERSHIP
SAFE VEHICLES
SAFE PEOPLE
MY PLEDGE VISION ZERO
Not text & drive
DATA
TOWARDS
ZERO
TOGETHER
CULTURE
SAFE SPEEDS
SAFE STREETS
PARTNERSHIPS

Vision Zero Cities

A Vision Zero City meets the following minimum standards:

- Sets clear goal of eliminating traffic fatalities and severe injuries
- Mayor has publicly, officially committed to Vision Zero
- Vision Zero plan or strategy is in place, or Mayor has committed to doing so in clear time frame
- Key city departments (including Police, Transportation and Public Health) are engaged.



Source: Vision Zero Network, 2019

Transport System

Passenger Vehicles
Transportation Network Companies / Taxi
Freight Vehicles
Transit
Walking
Bicycling
Shared Micromobility

Implementation

- "To saves lives one has to pay in money, time and freedom" *Hauer, 2010*
- Safe system approach
  – challenges (eliminates) the option to tradeoff mobility and safety
  – Requires reconsideration of safety benefit-cost framework
  – Requires solutions that are not optimal for an individual (i.e. "loss of freedom")

Action Areas for Safe Systems

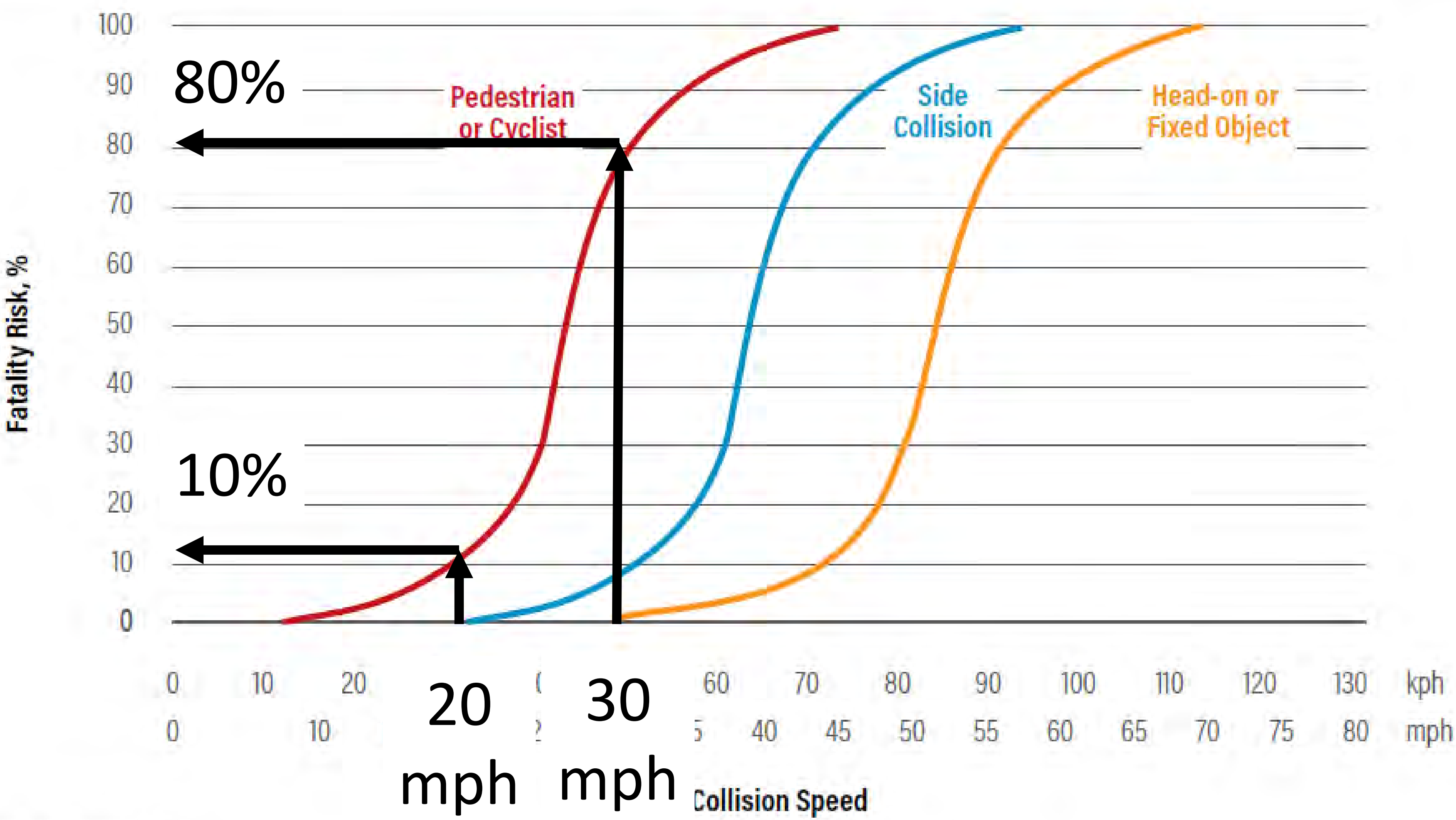
- Land Use Planning
- Improved Mobility
- Enforcement of Laws and Regulation
- Vehicle Design and Technology
- Street Design and Engineering
- Speed Management
- Education and Capacity Building
- Post Crash Emergency Response

Source: “Safe and Sustainable: A Vision and Guidance for Zero Road Deaths,” January 11, 2018, World Resources Institute

Speed Management

- The level of violence that the **human body can tolerate** without being killed or seriously injured **forms the basic parameter in the design** of the transport system
- **Vehicle speed is the most important regulating factor** for safe road traffic

Tingvall and Haworth, 1999



Source: Wramborg, P. 2005." A New Approach to a Safe and Sustainable Road Structure and Street Design for Urban Areas." Paper presented at 13th International Conference on Road Safety on Four Continents, Warsaw, Poland, October 5–7.

Homogeneity of mass, speed, direction

Type of Infrastructure and Traffic	Possible Travel Speed (mph)
Locations with possible conflicts between pedestrians and cars	20
Intersections with possible side impacts with cars	30
Roads with possible frontal impacts between cars	40
Roads with no possibility of a side impact of frontal impact (only impact with infrastructure)	60

Tingvall and Haworth, 1999

Interstate Freeways

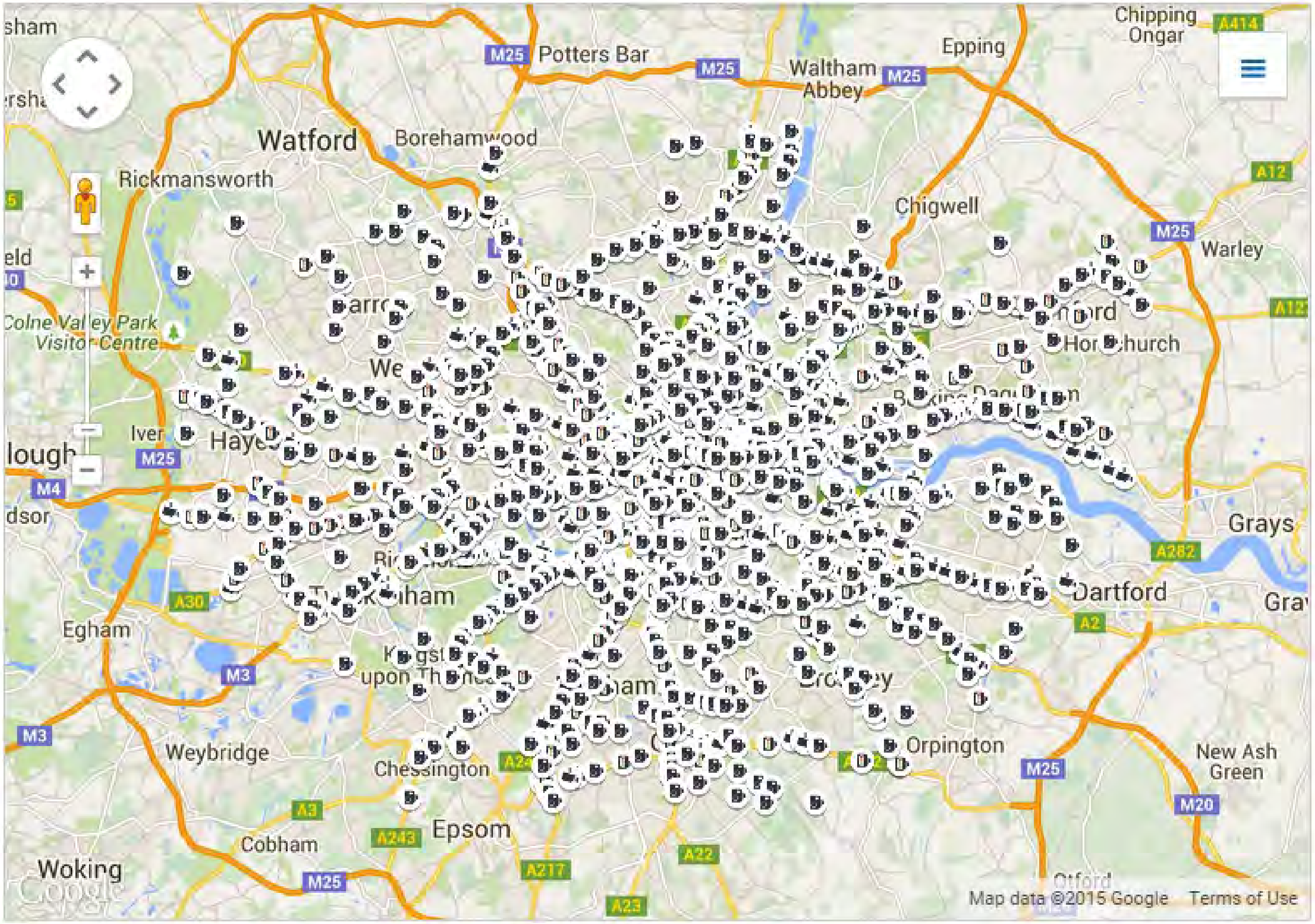
Source: https://www.aaroads.com/guides/i-005-south-skagit-wa/

2+1 Cable Barrier Rural Roads

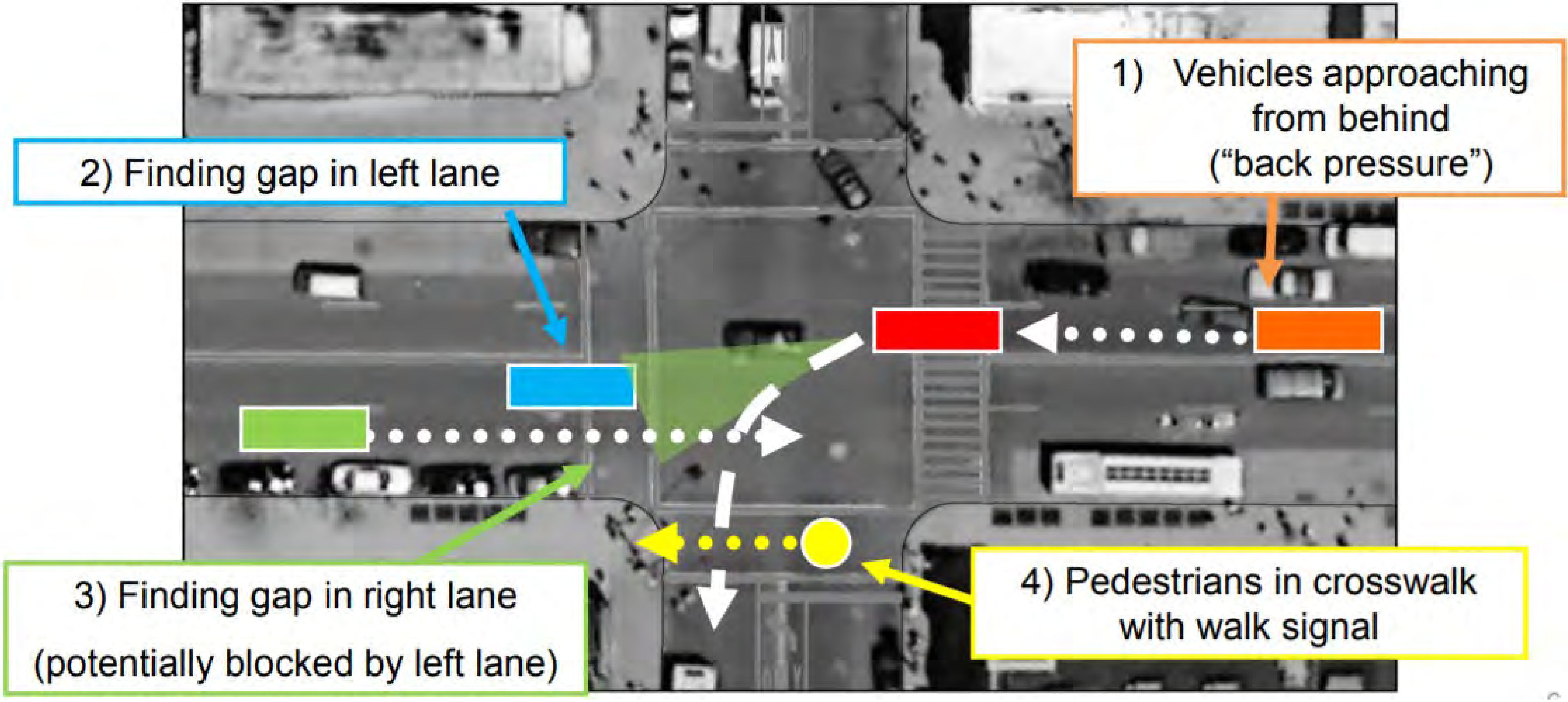
Source: "MMLNorr1" by Skvattram - Own work. Licensed under Public Domain via Commons - https://commons.wikimedia.org/wiki/File:MMLNorr1.JPG#/media/File:MMLNorr1.JPG

Separated Bike Lanes

London: safety enforcement cameras

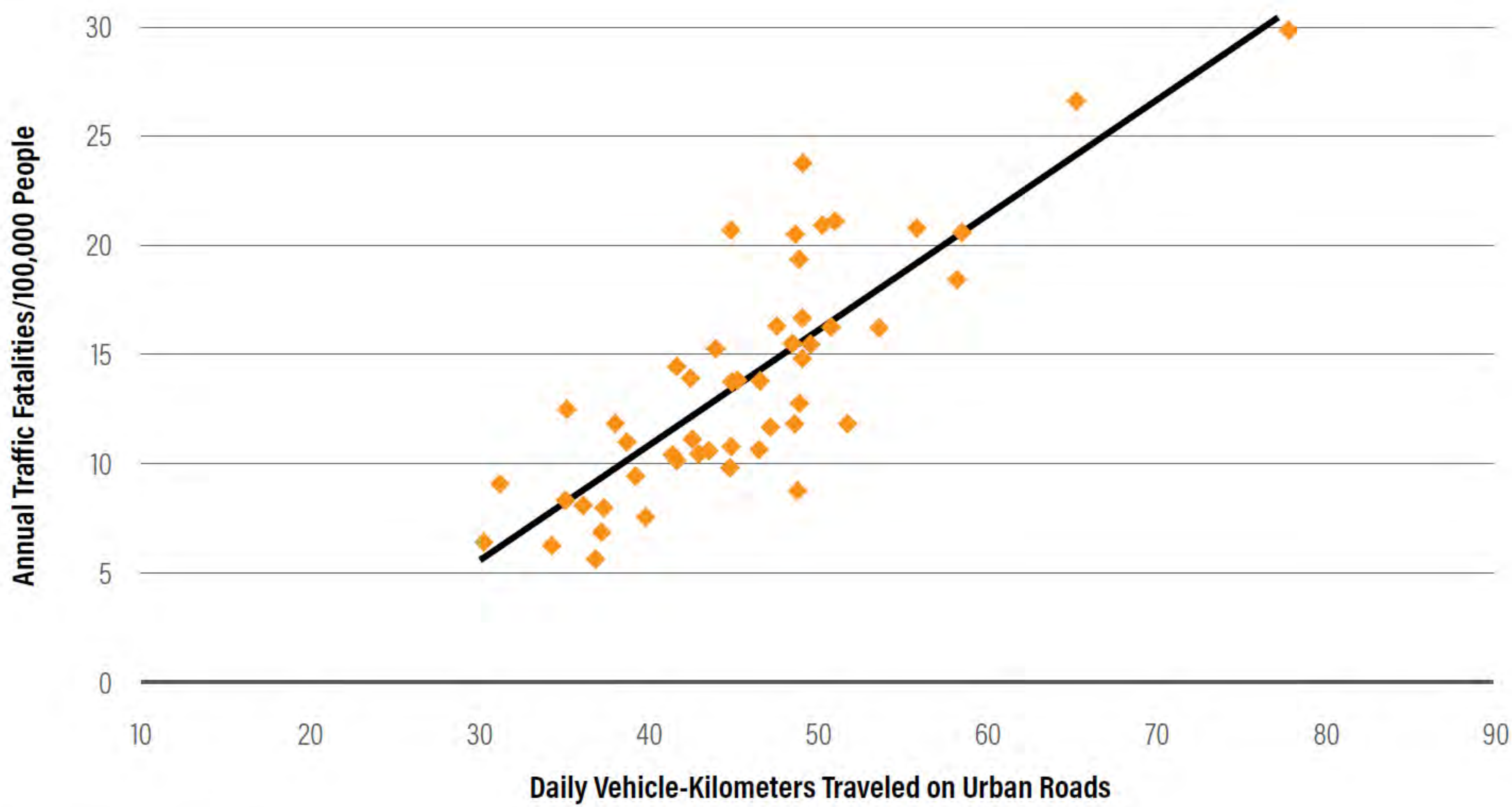


Left-turns



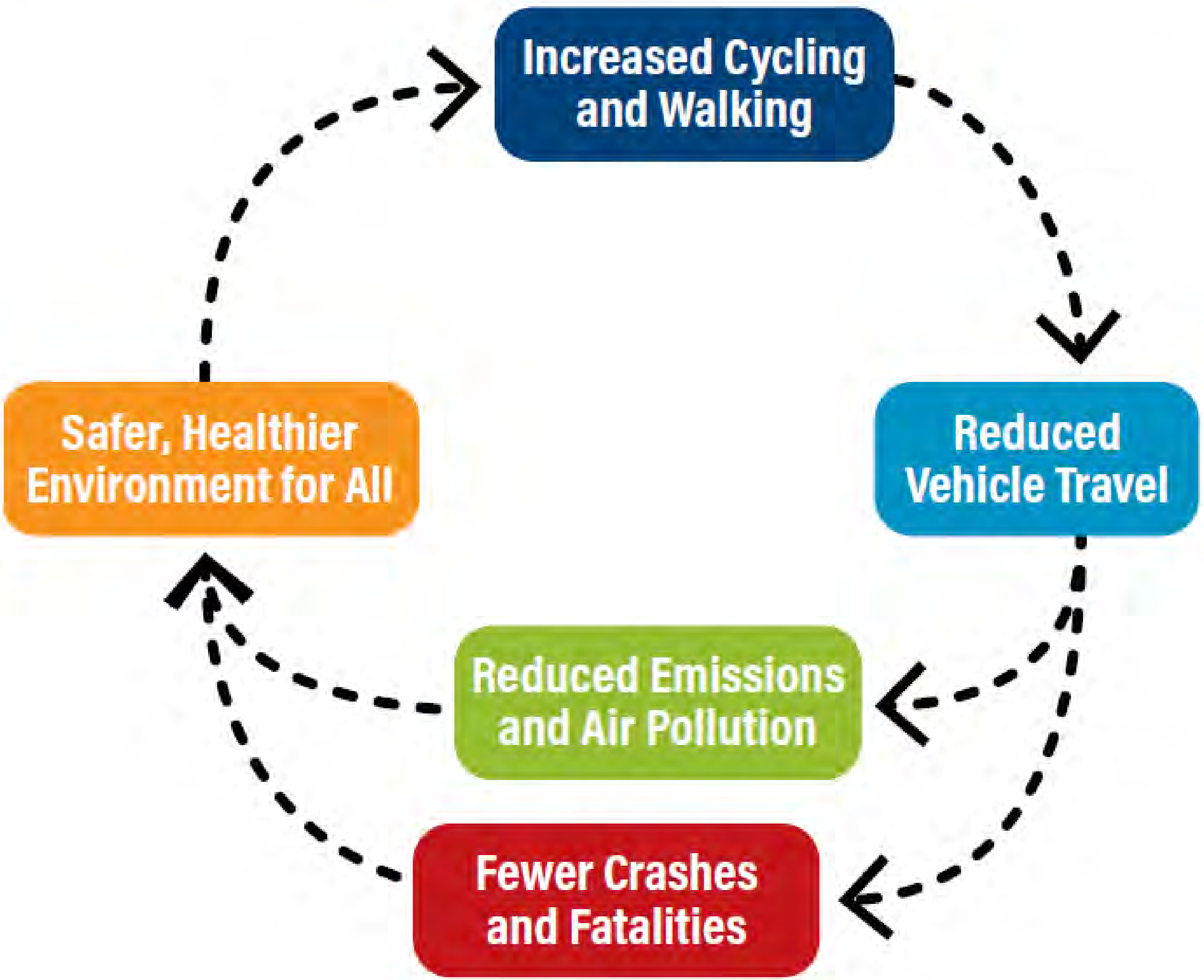
Source: Ryan Russo, Assistant Commissioner, Traffic Management New York City Department of Transportation, Transportation Research Board Annual Meeting, January 23, 2012

Vehicle Travel



Source: Clark and Cushing 2004.

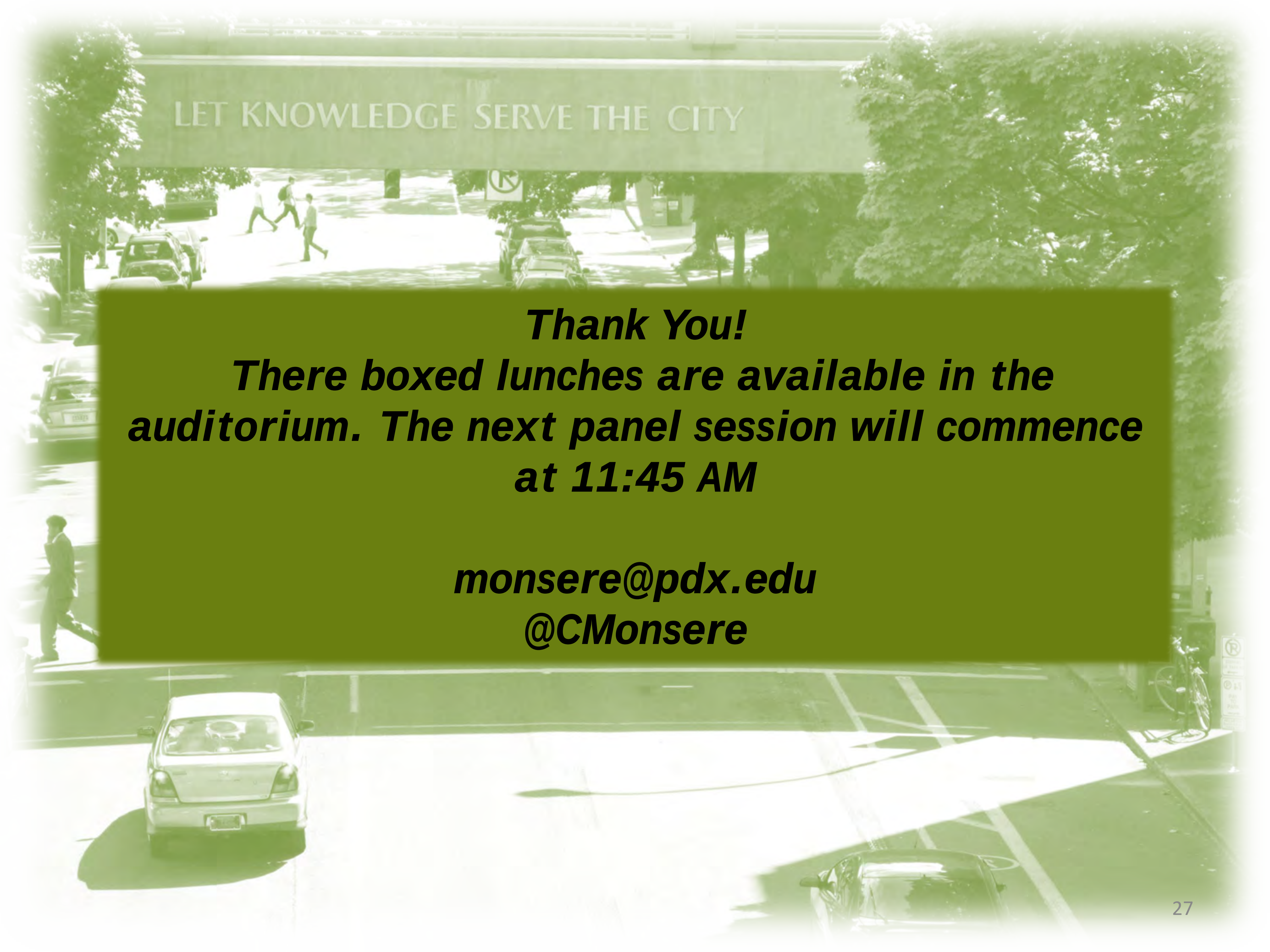
Figure 2.4 | Environmental and Health Benefits of a Safe Systems Approach



Source: “Safe and Sustainable: A Vision and Guidance for Zero Road Deaths,” January 11, 2018, World Resources Institute

Closing Thoughts

- A systems thinking approach is required to make significant change
- Vast majority want safety but large gap in public’s understanding of the how speed, mobility, and safety are related
- Early adopters: many examples of Vision Zero now in other U.S. cities
- Leadership required to make the “hard” choices



Thank You!

There boxed lunches are available in the auditorium. The next panel session will commence at 11:45 AM

monsere@pdx.edu

@CMonsere

Video-based Detection of Near-miss Events between Transit Vehicles and Pedestrians/Bicyclists

Ruimin Ke and Yinhai Wang, PhD, PE

Email: yinhai@uw.edu Tel: (206) 616-2696

PacTrans STAR Lab, University of Washington

Feb 13, 2019

UNIVERSITY OF WASHINGTON COLLEGE of ENGINEERING Civil & Environmental Engineering

STARLab Smart Transportation Applications & Research

Background

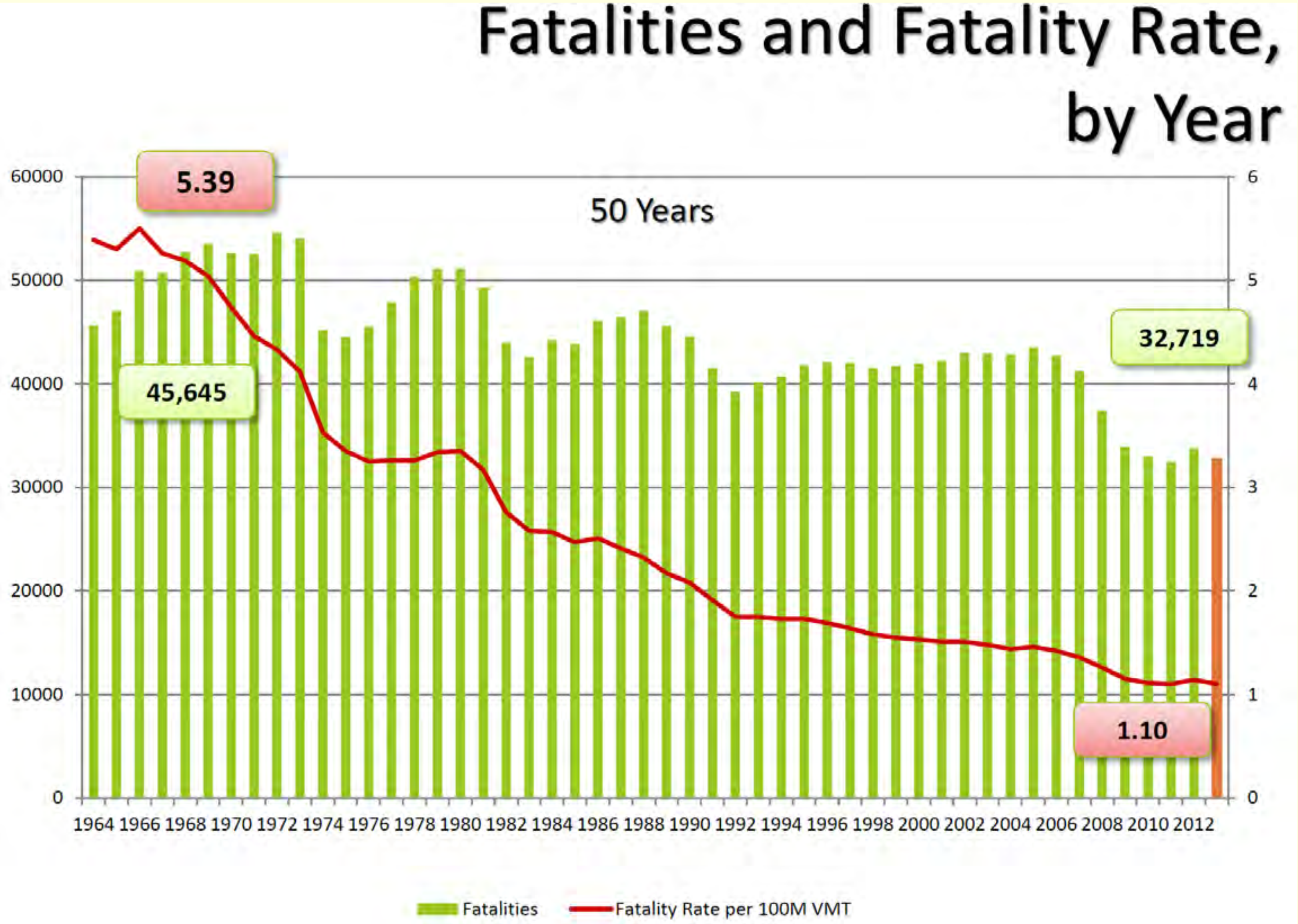


Image source: NHTSA, 2013 Crash Overview, accessed online at http://www-nrd.nhtsa.gov/Pubs/13WPPP.pdf

Need to Reduce Traffic Fatalities

Traffic deaths jumped 8.4% nationally in 2015, ending a five-decade trend! The number further increased by 5.6% in 2016. 37,133 people killed in 2017, a 1.8% decrease, but the number is still too high! How to further decrease traffic deaths?

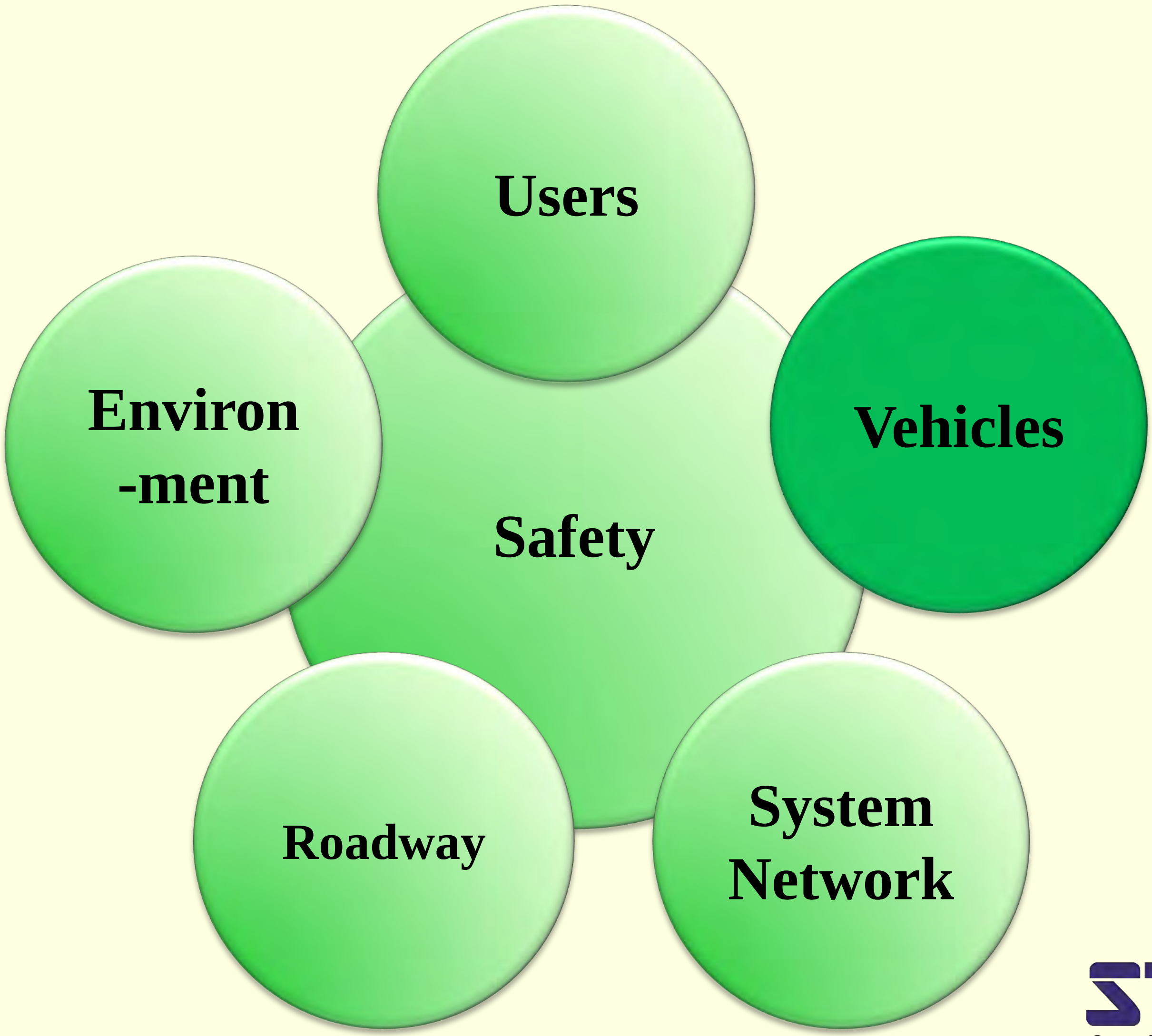
Image source: http://www.chicagotribune.com/news/nationworld/ct-traffic-deaths-up-20150817-story.html

Impact Factors on Traffic Safety

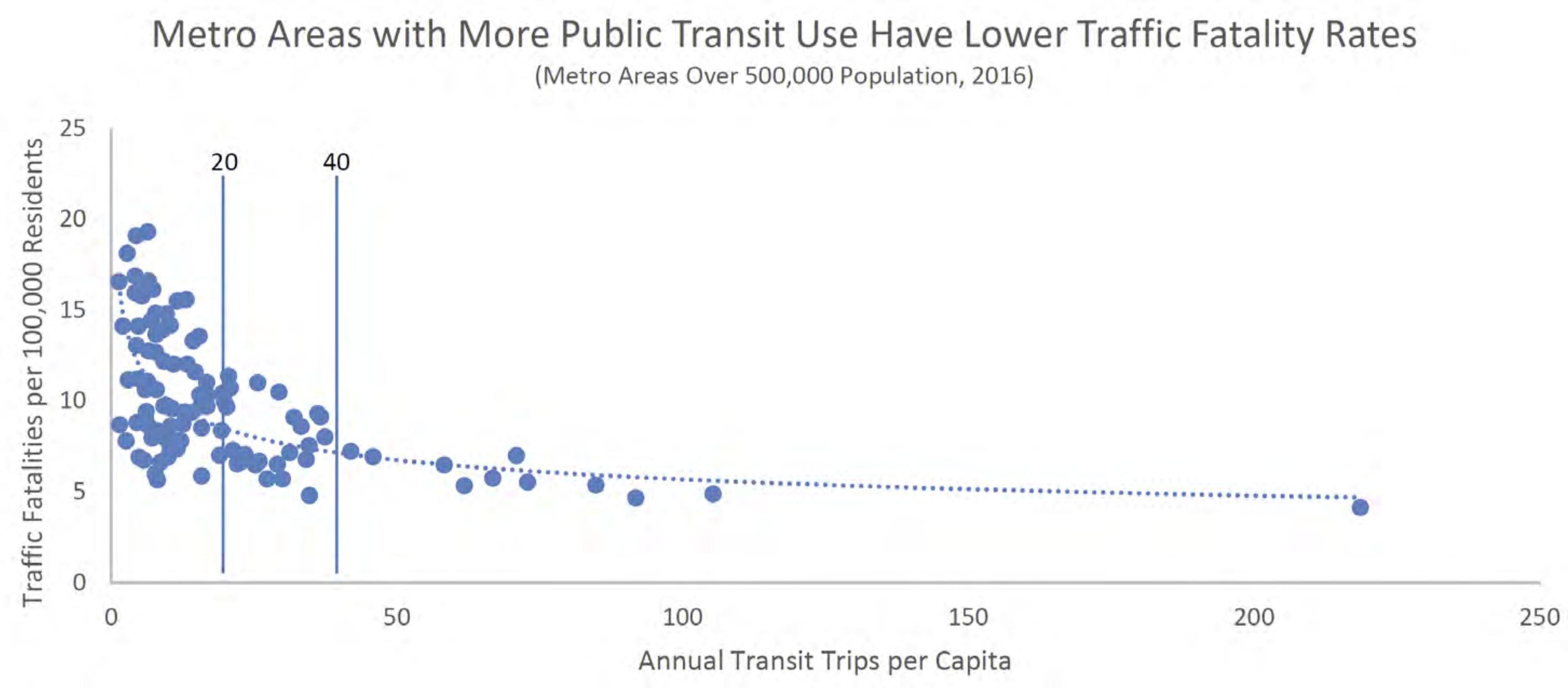
PacTrans is here to address the safety and mobility challenges in Federal Region 10!

http://www.pactrans.org/

Impact Factors on Traffic Safety

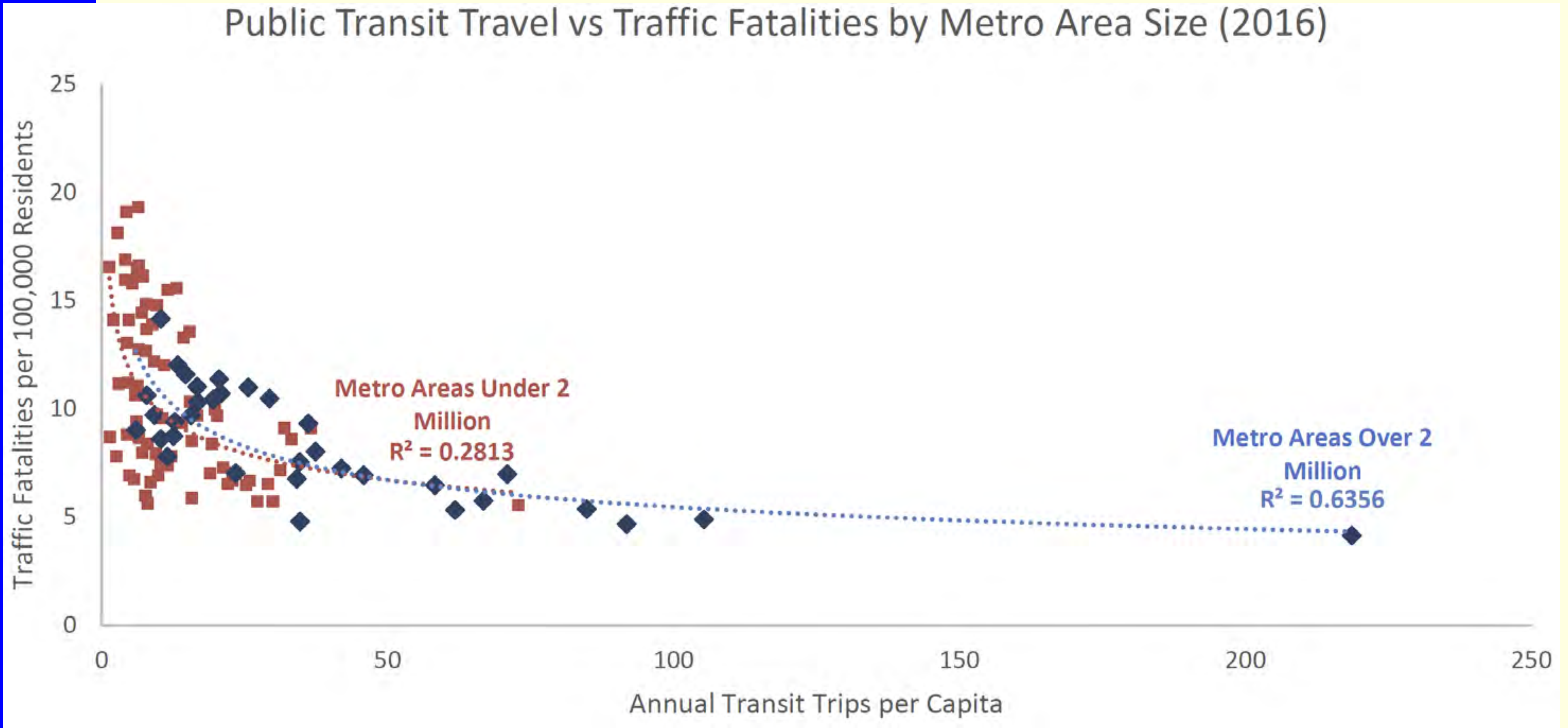


Public Transit & Safety



Source: https://www.apta.com/resources/hottopics/Documents/APTA%20VZN%20Transit%20Safety%20Brief%208.2018.pdf

Public Transit & Safety

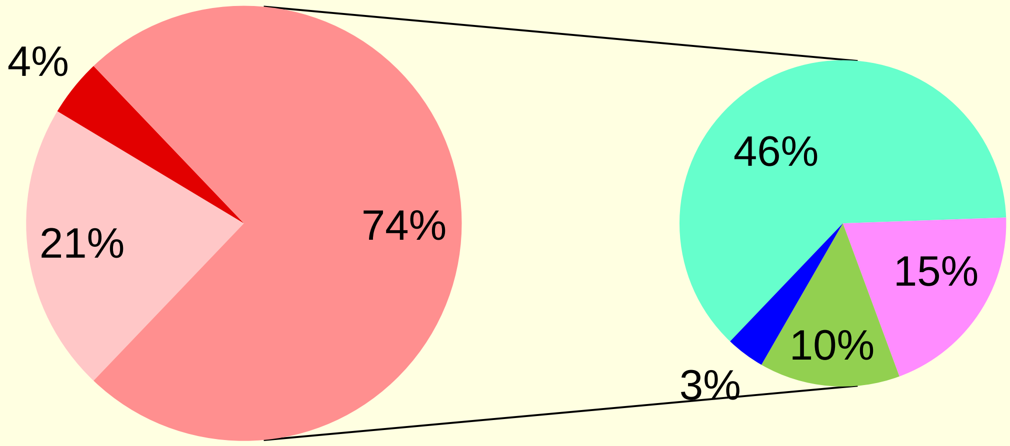


Source: https://www.apta.com/resources/hottopics/Documents/APTA%20VZN%20Transit%20Safety%20Brief%208.2018.pdf

PacTrans

Smart Transportation Applications & Research

WSTIP Loss Distribution for Claims >= $100k



- Passanger Related
- Others
- Pedestrain, Bike and Motorcyclist
- Forward Collision Related
- Non-preventable: black ice, was rear-ended, side collision, run-over traffic light, driver blackout, etc
- Others

Source: Spears, Jerry. 2016. “Active Safety/Collision Avoidance Washington State Transit Pilot.” Presented at the 2016 Annual Meeting of Transportatin Research Board. Washington, D.C.

Use of Near Miss for Safety Analysis

- Collisions between transit vehicles and peds/bikes account for 34% of the total loss and need research to find effective countermeasures
- Observed collisions of this type are often too sparse for solid statistical analysis
- Researchers and engineers are aware of the lack of such collision data and seek for surrogate safety measures
- Near-miss is highly desirable to serve as such a surrogate for transit vehicle and ped/bike crashes

Smart Transportation Applications & Research

Near-Miss and Crash Relationship

- Near-miss: A near-miss is the conflict between road users that requires sudden evasive action and has the potential to develop into a collision

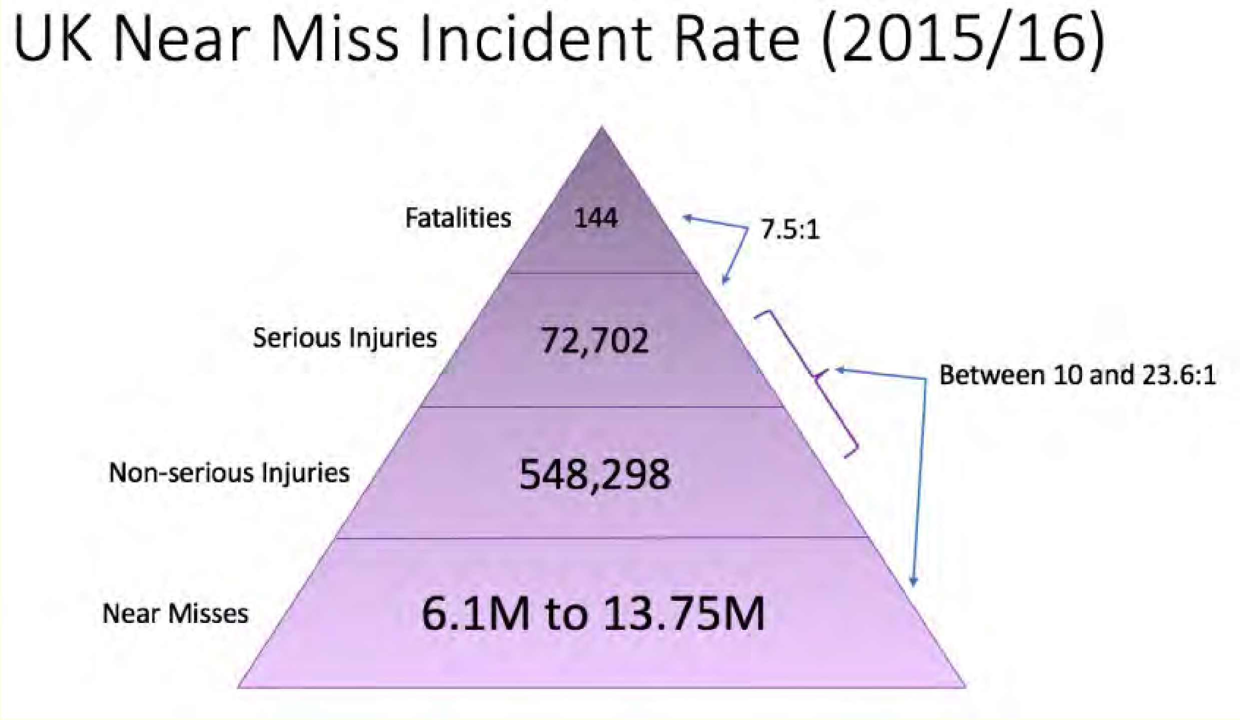


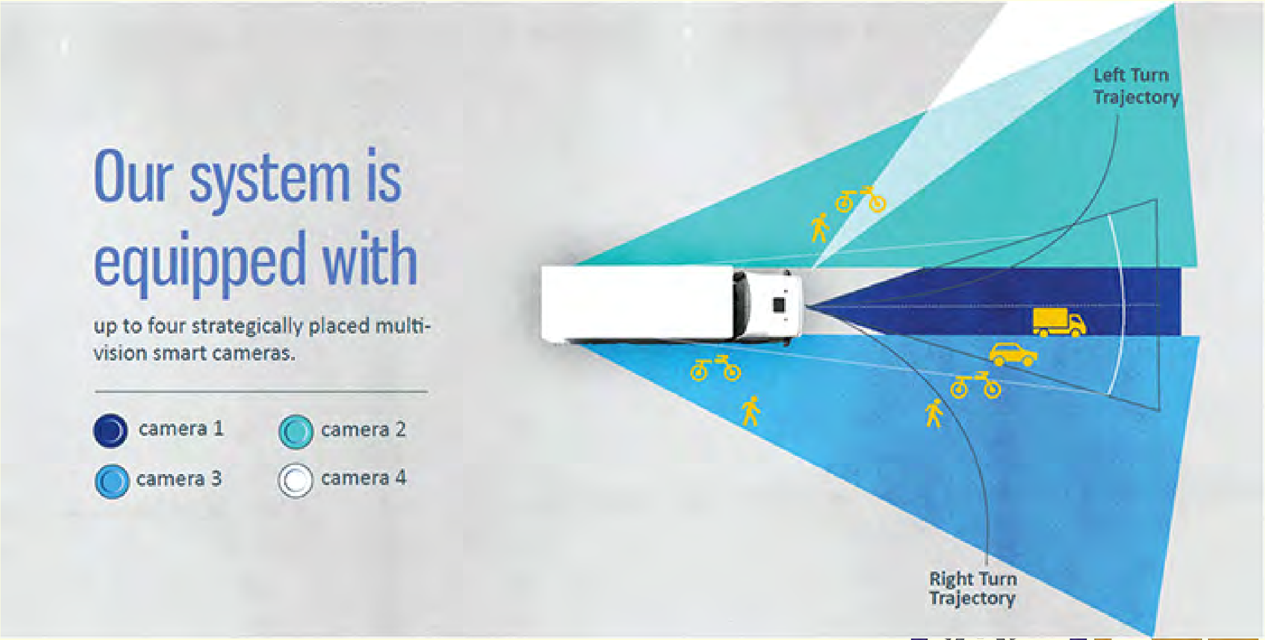
Image source: https://www.banyardsolutions.co.uk/insights/wp-content/uploads/2017/05/Screen-Shot-2017-05-23-at-3.10.13-PM-846x492.png

Images from Transit Video Cameras

Interior Camera

Driver Perspective

Exterior Camera



Camera Detection Range

PacTrans STAR Lab Research on Near-Miss

Smart Transportation Applications & Research

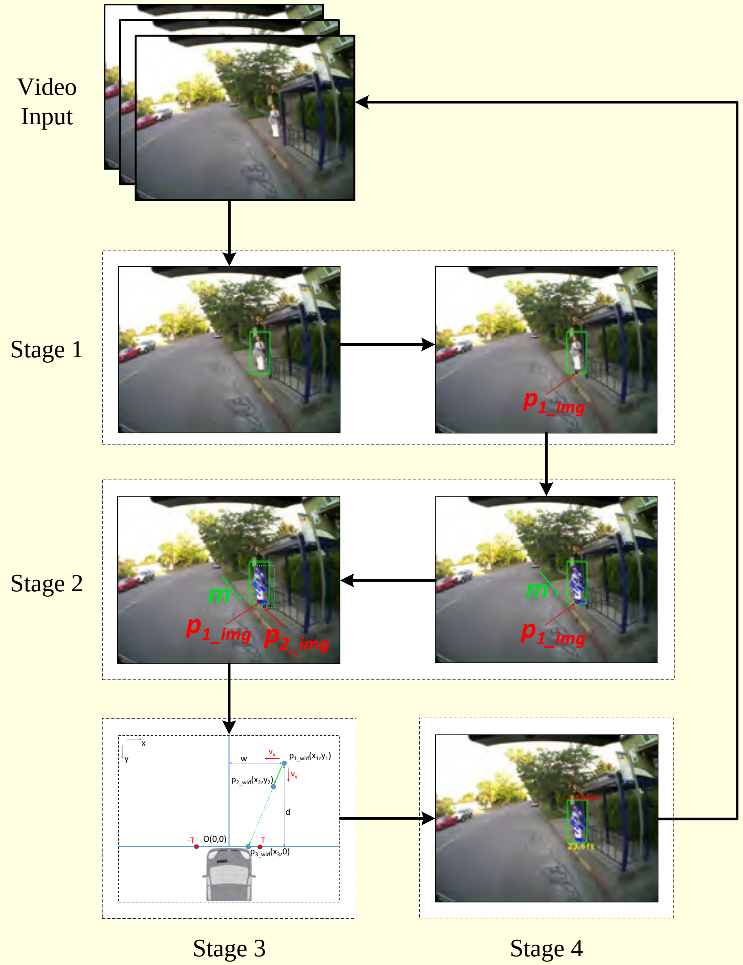
Methodology for Near Miss Detection

Stage 1: Pedestrian detection using deep learning (previously HOG)

Stage 2: Pedestrian tracking and motion estimation using KLT in image coordinate

Stage 3: Relative position and relative speed estimation in the real-world coordinate

Stage 4: Near-miss detection using time-to-collision and distance-to-safety as the indicators



Ke, Ruimin, et al. "A cost-effective framework for automated vehicle-pedestrian near-miss detection through onboard monocular vision." *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition Workshops*. 2017.

Example Results

- Sample frames showing the detected near-misses in transit onboard videos

Pedestrian crossing the street

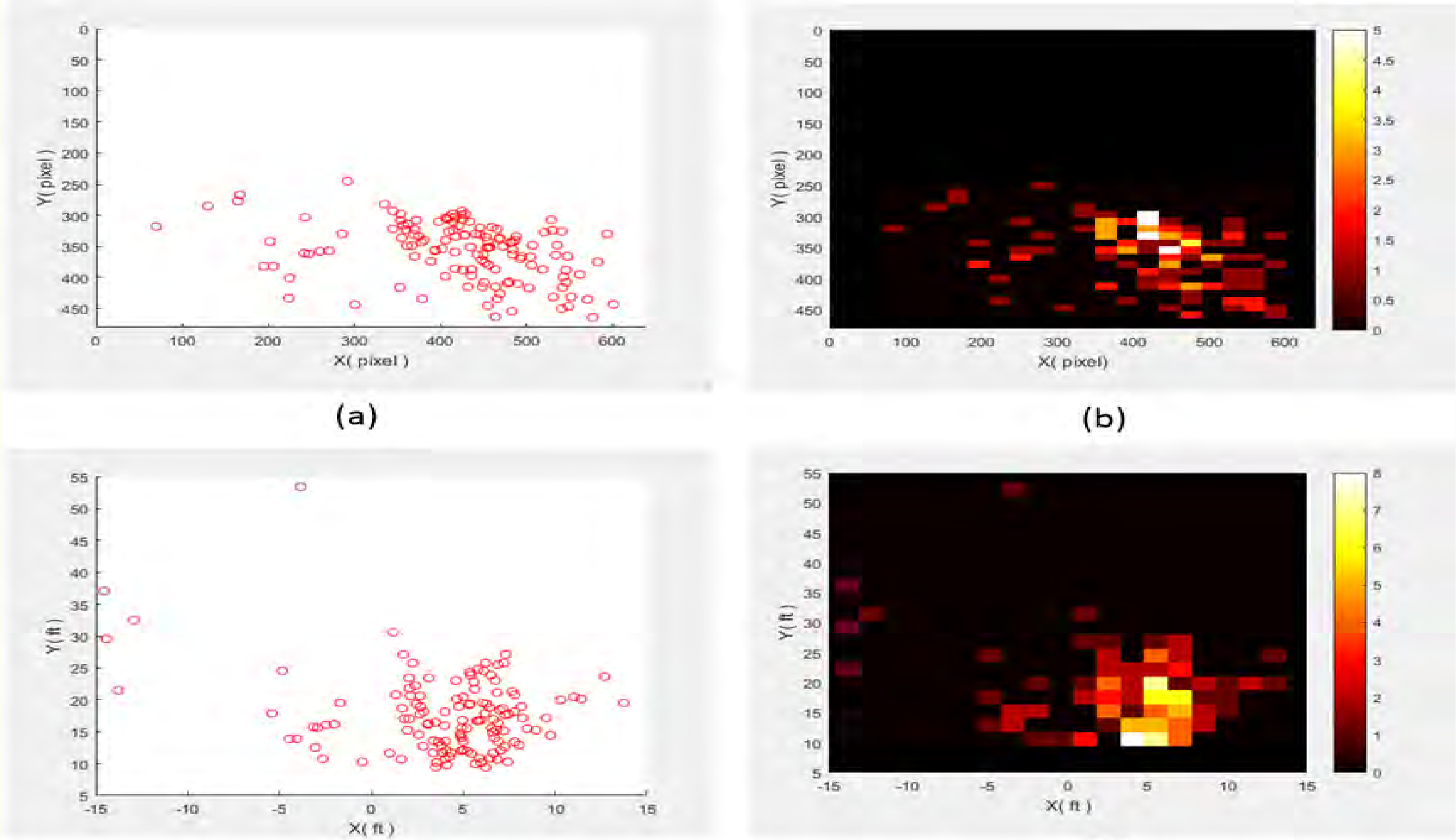
Pedestrian waiting at a bus stop

Ke, Ruimin, et al. "A cost-effective framework for automated vehicle-pedestrian near-miss detection through onboard monocular vision." *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition Workshops*. 2017.

STARLab 11111010011
Smart Transportation Applications & Research

Safety Applications

- To identify hotspots



(a) (b) (c) (d)

Ke, Ruimin, et al. "A cost-effective framework for automated vehicle-pedestrian near-miss detection through onboard monocular vision." *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition Workshops*. 2017.

Safety Applications

- Assist in the evaluation of a commercial collision avoidance system (MobilEye Shield+): typical patterns of false-positives

Spears, Jerry, et al. *Active Safety-Collision Warning Pilot in Washington State*. No. Transit IDEA Project 82. 2017.

Safety Applications

- Assist in the evaluation of a commercial collision avoidance system (MobilEye Shield+): examples of late detections identified as false-negatives

Spears, Jerry, et al. *Active Safety-Collision Warning Pilot in Washington State*. No. Transit IDEA Project 82. 2017.

Safety Applications

- Cost-benefits estimation for collision avoidance systems

Years of Service Life (YSL)	Lower Bound of Annual Net Benefit Per Vehicle ($) (LBV)	Lower Bound of Annual Total Net Benefit ($) LBV X NV	Upper Bound of Annual Net Benefit Per Vehicle ($) (UBV)	Upper Bound of Annual Total Net Benefit ($) UBV X NV
5	-4	-4,232	1,039	1,099,262
6	242	255,860	1,285	1,359,354
7	417	441,639	1,460	1,545,133
8	549	580,974	1,592	1,684,468
9	652	689,346	1,695	1,792,840
10	734	776,043	1,777	1,879,537
11	801	846,977	1,844	1,950,471
12	856	906,089	1,899	2,009,583
13	904	956,106	1,947	2,059,600
14	944	998,979	1,987	2,102,473

Spears, Jerry, et al. *Active Safety-Collision Warning Pilot in Washington State*. No. Transit IDEA Project 82. 2017.

Ongoing Work

- Pierce Transit collision avoidance pilot project (sponsored by Federal Transit Administration)
- Implementation of the vehicle-pedestrian/bicyclist near-miss detection algorithm on the Nvidia Jetson TX2 AI computer
- Development of vehicle-vehicle near-miss detection algorithm based on 3D object detection in onboard video
- Long-term multiple-object tracking for better robustness
- Development of a smart data hub for real-time transit onboard video data reduction and transmission

Thanks for your attention!

Please Contact:

Yinhai Wang (yinhai@uw.edu) or Ruimin Ke (ker27@uw.edu)

for questions you may have!

Smart Transportation Applications & Research

February 2019

Stop Paddle Camera Program

Bellevue School District Transportation

Stop Paddle Camera's

School buses are the most safest forms of student transportation to and from school.

-NHTSA

Stop Paddle Cameras

RCW 46.63.180

- Gives us the authority to put them on the buses.
- Tells us what to spend the money on after operating/administration /court cost.

	Violations	Average
December 4-21	156	5.77
January 7- 31	152	5.62
February 1-11		
Total Violations		

Stop Paddle Cameras'

How it started?

- About three years ago with a pilot program with 2 buses
- increasing number of fatalities with people running stop paddles in the United States.
- 31 day trial with 179 violations recorded. Average 3 per day per bus.
- Concerns with district parents has risen.
- Concern with bus drivers.

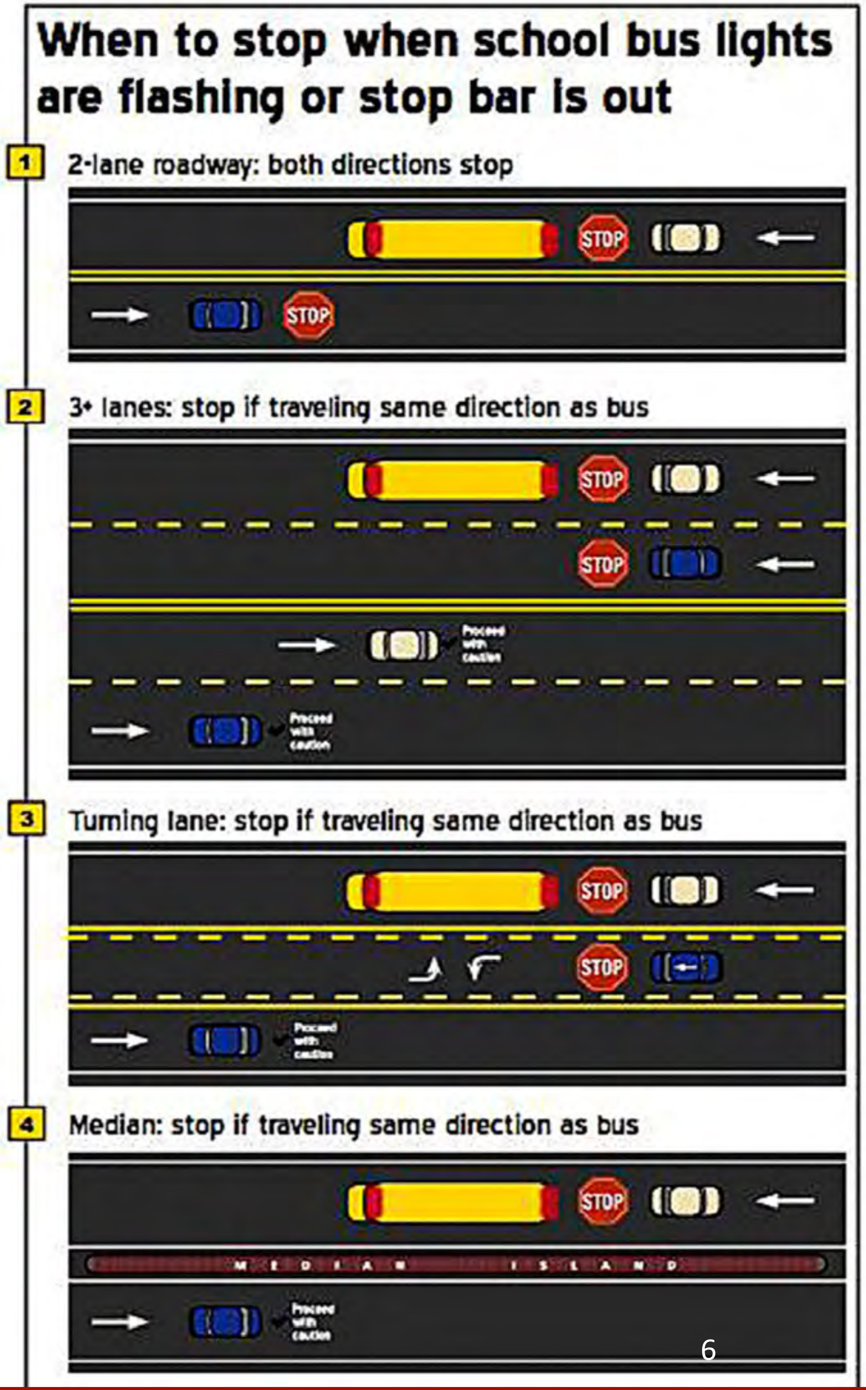
Stop Paddle Cameras'

Current Program

- On 20% of bus fleet. (27 buses)
- Warning Period from December 1st thru 21st.
- In hot spots of the district.
- Violations started January 7th.
- All monies collected after administrative cost go to school bus safety programs.
- Count as a non-moving violation (parking ticket).
- Current violations cost is $419.

When do I stop?

- When travelling in the same direction of the bus.
- When you are behind a school bus unloading/loading students.
- When the flashing red lights are activated.



Stop Paddle Cameras

- 116th Ave NE & NE 30th Place
- SE 41st Place & Factoria Blvd SE

148th Ave NE & NE 1st Place

Video footage of violators

Stop Paddle Cameras

Purpose of the program:

- Improve student safety.
- Reduce the number of violations.
- Educate the public on student safety.

Thank You!

Don Dixon, Transportation Manager

BELLEVUE SCHOOL DISTRICT

Advanced Vehicle Technologies

Aiding Vision Zero ….

Vijitha Chekuri

Director – Strategy & Business Development, Automotive Industry

Microsoft

I believe the auto industry will change more in the next five to 10 years than it has in the last 50

Mary Barra
CEO and Chairman of General Motors

The Automotive Industry is at an Inflection Point

The industry is being transformed by a combination of **key technology and business model trends:**

By 2030…

Trend	By 2030…
1. **Connectivity**	**~100%** of new cars projected to be connected, up from ~25% today
3. **Autonomous Driving**	**~10-15%** of new cars projected to be fully autonomous. **15%** of auto OEM R&D budgets are now spent on AD research
3. **Shared Services**	**~32%** of miles driven on new cars will be in shared rides
4. **Electric**	**~25%** WW by 2025 and **100%** of passenger vehicles in China and India will be electric by 2030

As a result, **automakers need to:**

Transform into mobility service providers with a suite of integrated and intelligent connected car services

Own AV technology to provide mobility services and preserve their market position

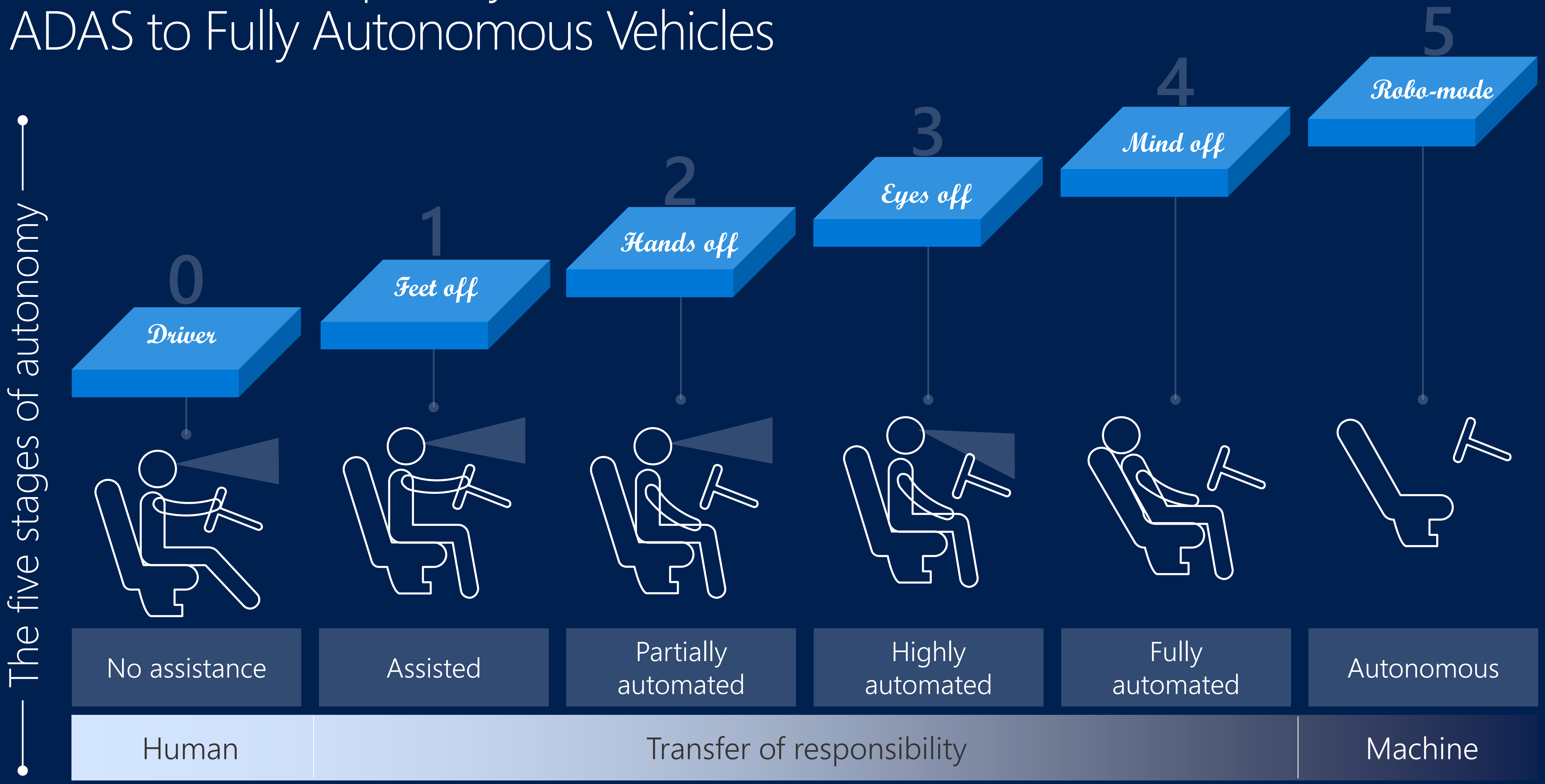
Invest in vehicle sharing and fleet management services to prepare for a world with fully autonomous vehicles

Own EV technology and avail charging services to enable customer demand

C A S E **Connected/Autonomous/Shared Mobility/Electric**

Sources: McKinsey; Accenture; Microsoft analysis

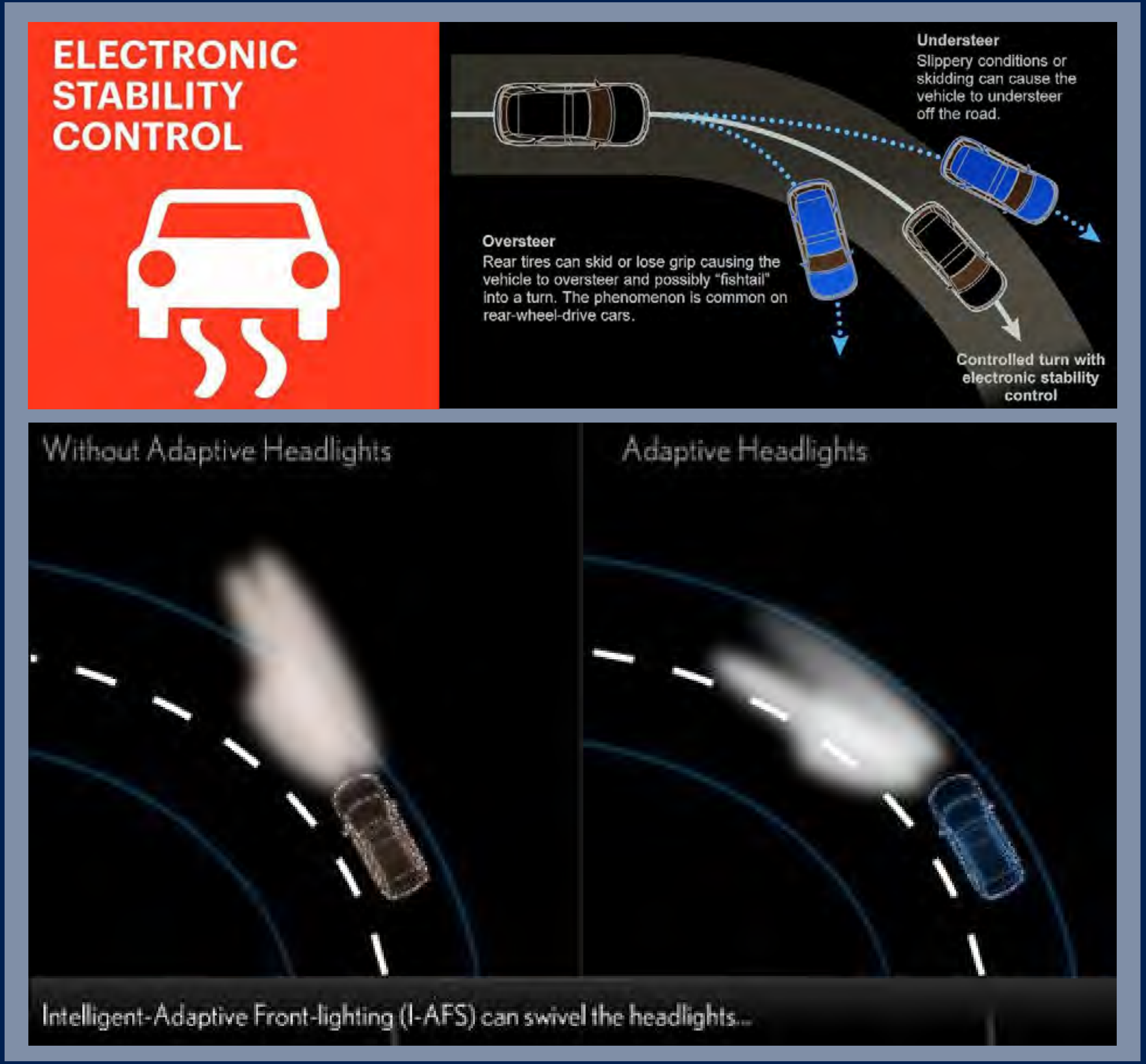
Autonomous Capability Continuum – ADAS to Fully Autonomous Vehicles



Sources: Evercore ISI, SAE International

Automotive Technology - Enabling Vision Zero Today
Advanced Driver Assist Systems (ADAS)

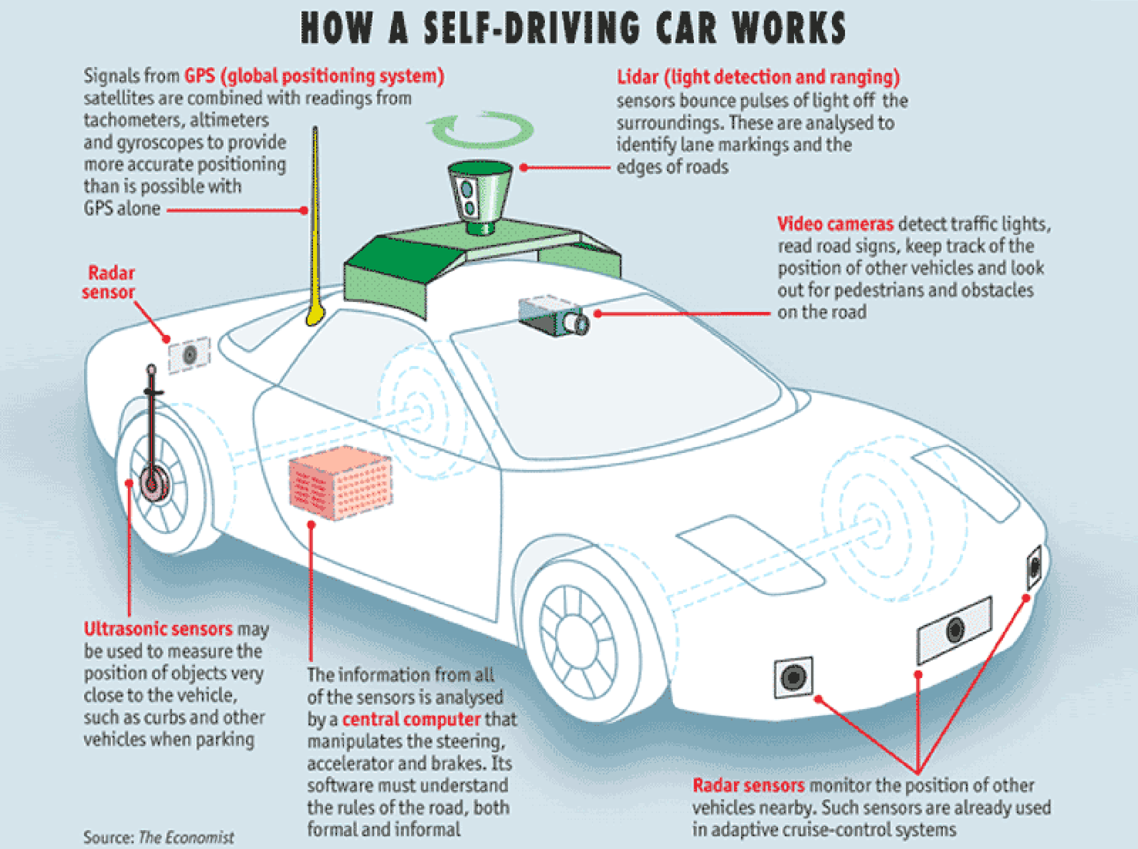
- Electronic Stability Control (ESC)
- Adaptive Headlights
- Reverse/Back-up Camera
- Blind Spot Detection
- Adaptive/Auto Cruise Control (ACC)
- Lane Departure Warning (LDW)
- Lane Departure Prevention (LDP)
- Forward Collision Mitigation (FCM)
- Forward Collision Warning (FCW)
- Automatic Emergency Braking (AEB)
- Automatic Crash Notification (ACN)
- Parking Aid

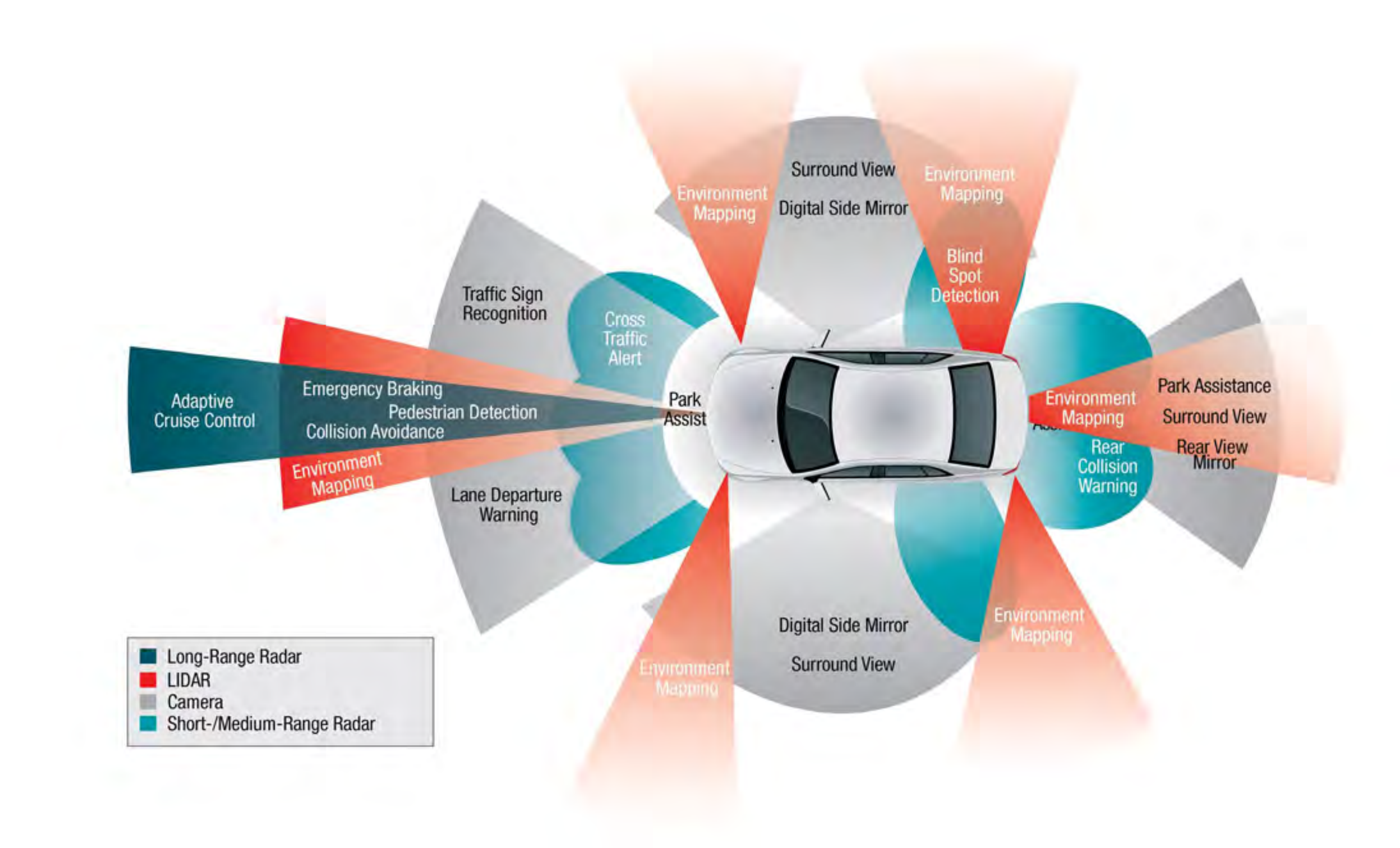


Autonomous Vehicle Technology Landscape

Various sensors instrumented into the vehicle serve as the sensory inputs to the "robo" driver.

Lidar, Radar, Camera, Ultrasound, Infrared, GPS & Internet data like weather, maps etc., help map the surroundings and feed the sensory inputs of the robo driver.





The sensors generate large amounts of data that needs to be processed, analysed and trained for optimal algorithms that work for the real world.

A **PETABYTE** is **ALOT** of data

20 Petabyte

The amount of data processed by Google **per DAY**

1 Petabyte

20MILLION four-drawer filing cabinets filled wit text

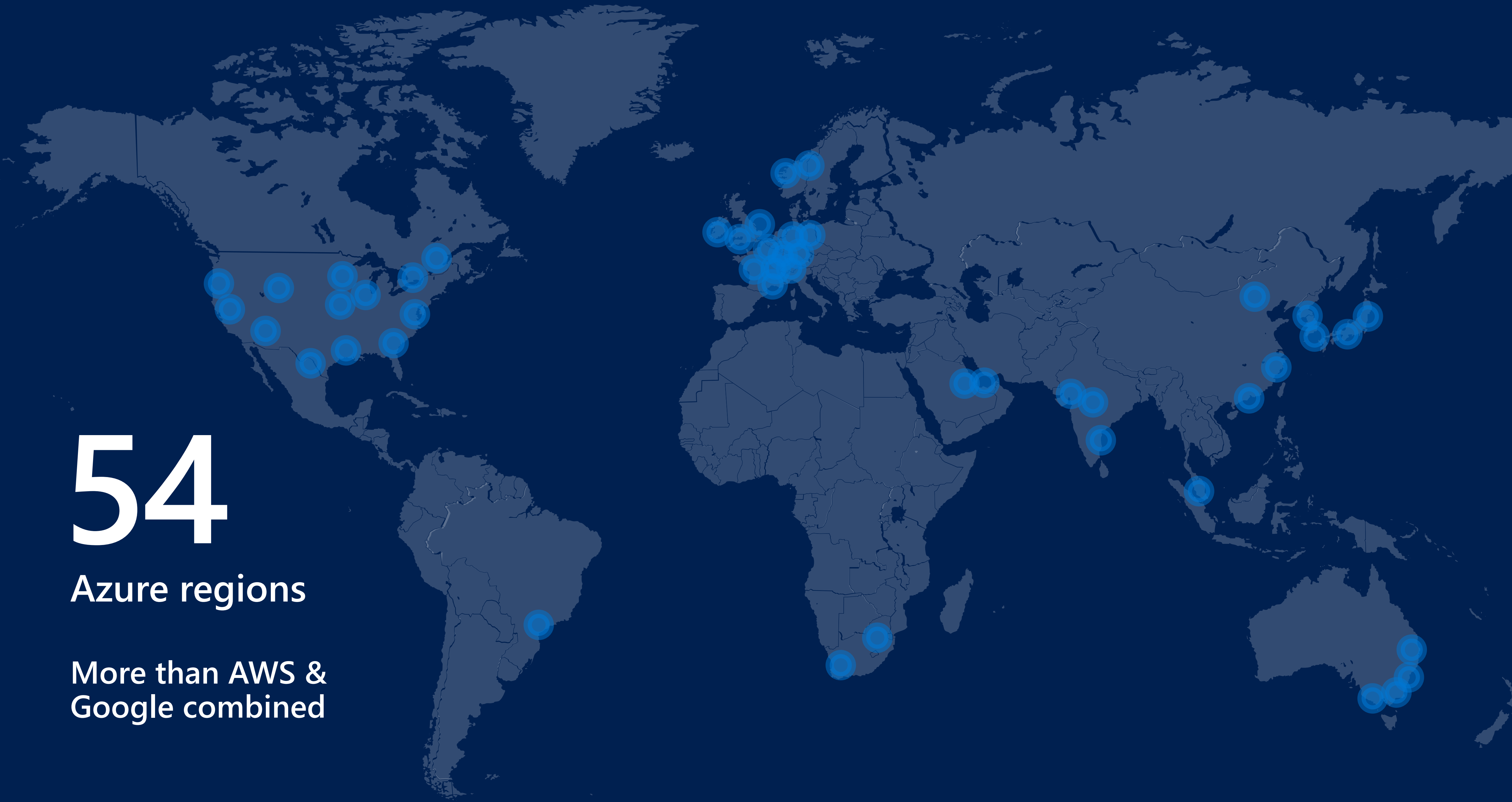
1.5 Petabyte

Size of the 10 billion Photos on ⇨

15+ Petabyte

Internet user's data backed up on mozy

Source – mozy.com

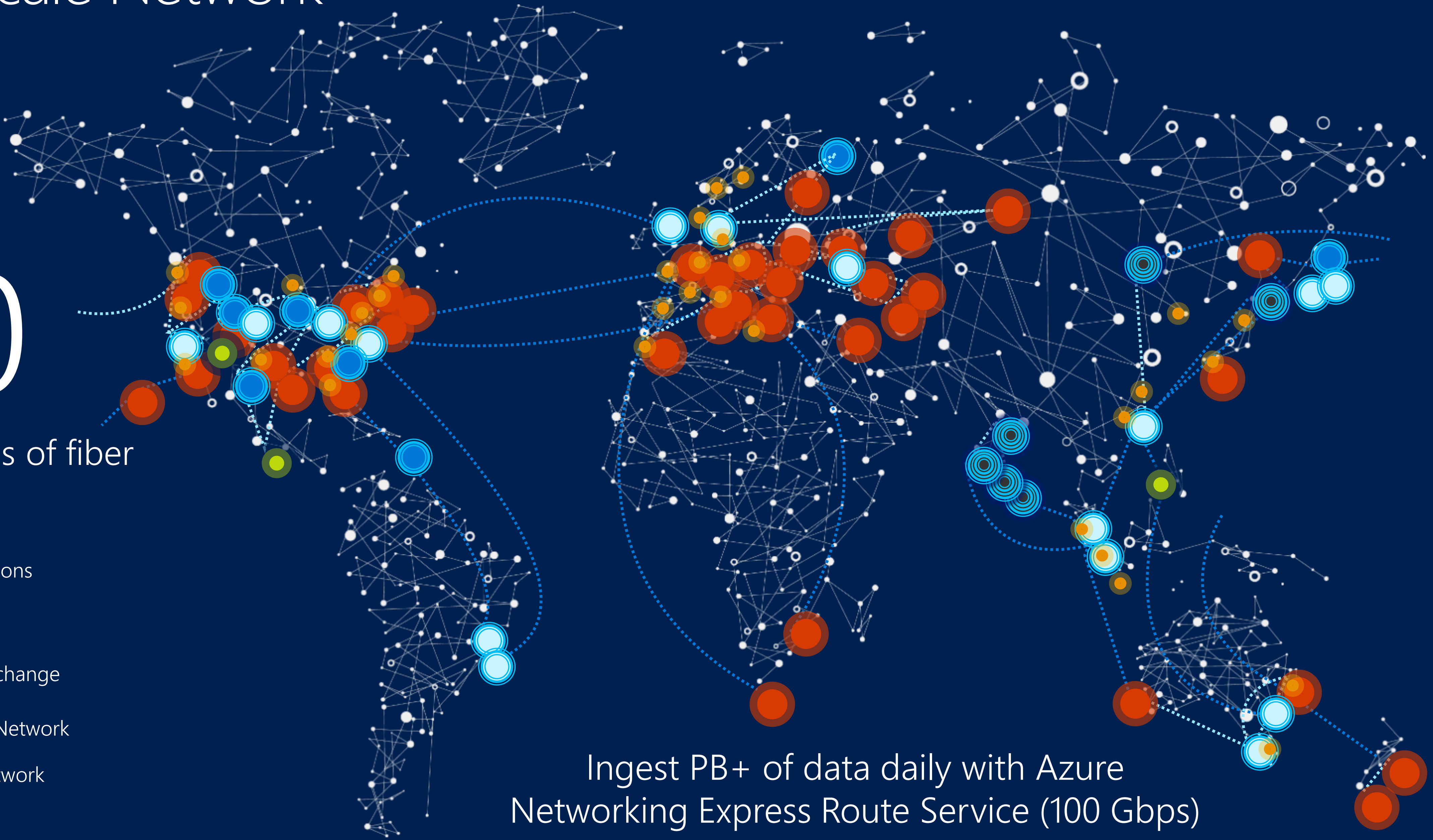


54

Azure regions

More than AWS &
Google combined

Hyperscale Network



2.0

million miles of fiber

- Datacenter
- CDN Locations
- Edge Node
- Internet Exchange
- Terrestrial Network
- Subsea Network

Ingest PB+ of data daily with Azure Networking Express Route Service (100 Gbps)

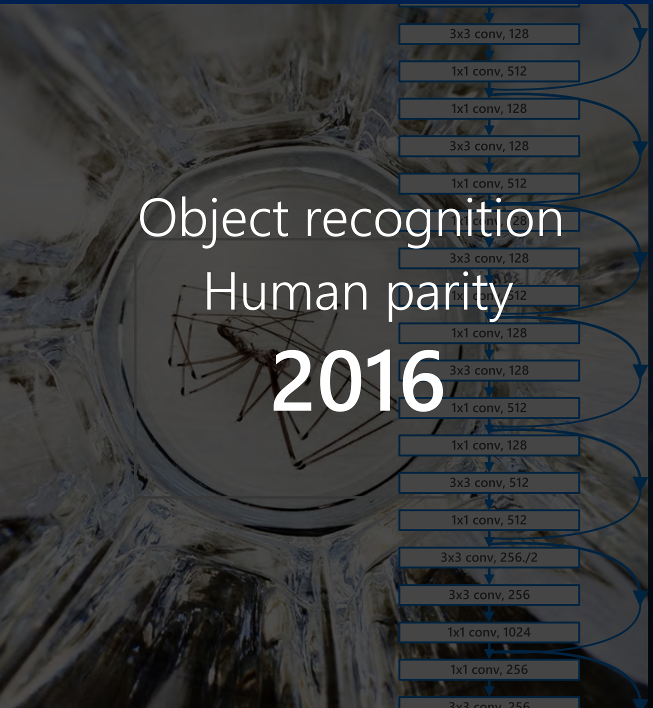
Microsoft AI advancements

96%
RESNET vision test
152 layers

5.1%
Switchboard speech
recognition test

88.493%
SQuAD reading
comprehension test

69.9%
MT research
system



Object recognition
Human parity
2016

Speech recognition
Human parity
2017

Machine reading
comprehension
Human parity
Jan 2018

Machine translation
Human parity
March 2018

Guiding principles

Microsoft is not building a car for production

We are partnering with automakers and suppliers to enable them to build the best connected and autonomous cars possible.

Microsoft does not own the user experience

The user experience belongs to each automaker and should reflect their brand identity; we will build platform capabilities that enable automakers to create experiences their users love.

Microsoft does not own the data

The data belongs to the automaker and/or their customers, not to Microsoft. We will build services that can create exceptional value when data from multiple data sources (automakers, suppliers, etc.) are federated together and the data owners will always be able to control what data is shared into a federated service.

Privacy is a human right

We fully support GDPR and we call up for “digital Geneva Convention.”

Connected services

Autonomous

Smart mobility

TOYOTA RENAULT NISSAN DAIMLER VOLVO ZF CNH INDUSTRIAL

TOMTOM bright box Mobi Mobility Insight cognata cubic moovit CUBIC Intelligent travel made real ABB

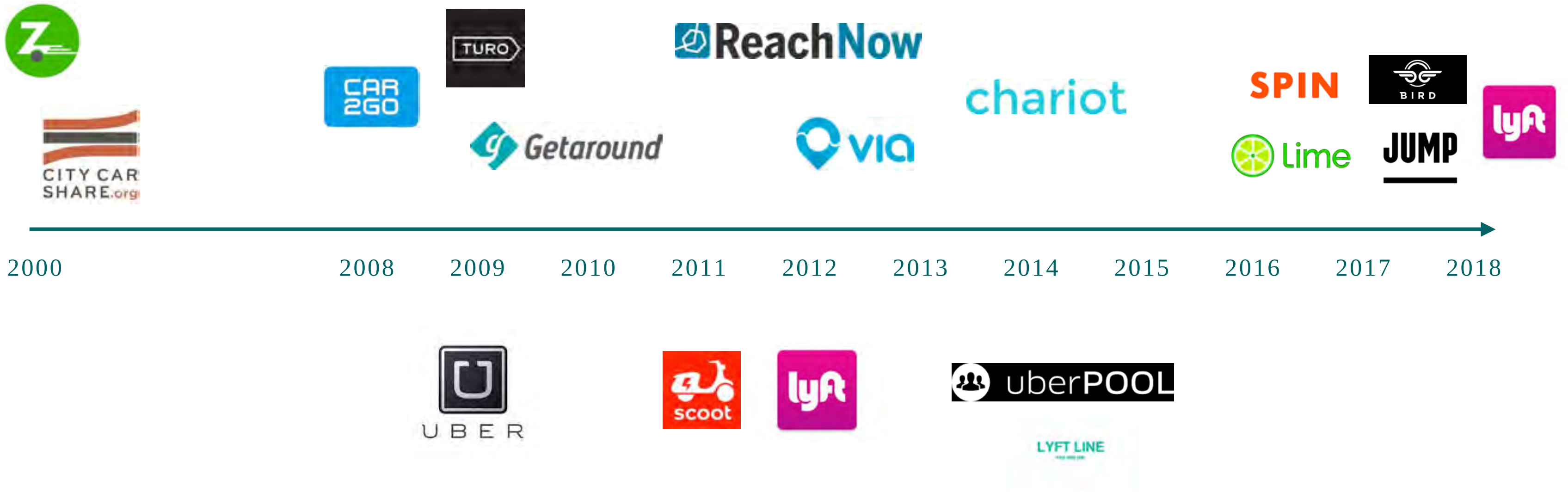
The Shared Mobility Revolution: Safety Challenges and Opportunities

Bellevue Vision Zero Summit
Wednesday, February 13, 2019

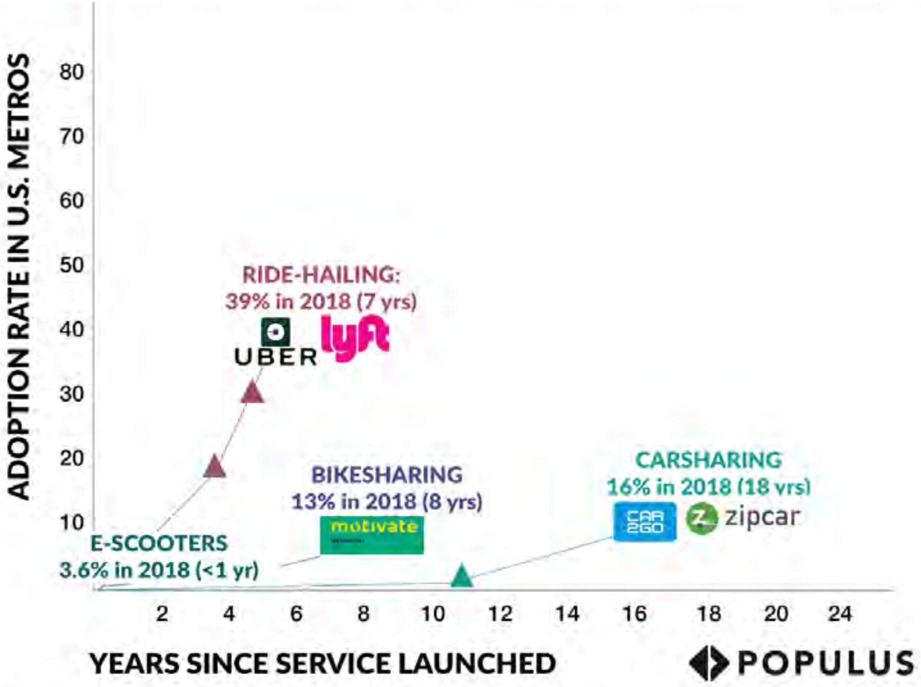
Regina Clewlow, Ph.D.
CEO & Co-Founder
Populus
@ReginaClewlow
@populus_ai

www.populus.ai

SHARED MOBILITY SERVICES HAVE RAPIDLY EVOLVED IN CITIES



ADOPTION OF NEW MOBILITY SERVICES IS ACCELERATING



Source: The Micro-Mobility Revolution, A Populus Research Report, July 2018

KEY FACTORS HAVE LED TO RAPID GROWTH

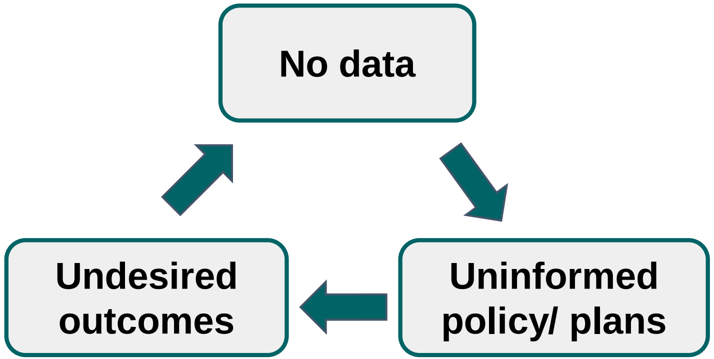
1. **GPS:** smartphone adoption has risen from 35% in 2011 to 77% in 2018
2. **Traffic:** in many major cities, it is actually faster to bike or scooter trips that are 3 miles or less
3. **Venture capital:** these companies have raised more money faster than prior mobility service providers

THE ROLE OF DATA FOR MANAGING MOBILITY SERVICES

Cities are now requiring data from private mobility operators to manage progress towards public goals, including:

1. **Safety:** reducing transportation-related injuries and fatalities.
2. **Equitable access:** improving availability and accessibility of transportation services to people of all backgrounds.
3. **Efficiency:** prioritizing efficient use of public space, and reducing transportation energy use/ climate impacts.

CITIES ARE LOOKING OUT FOR THE COMMON GOOD



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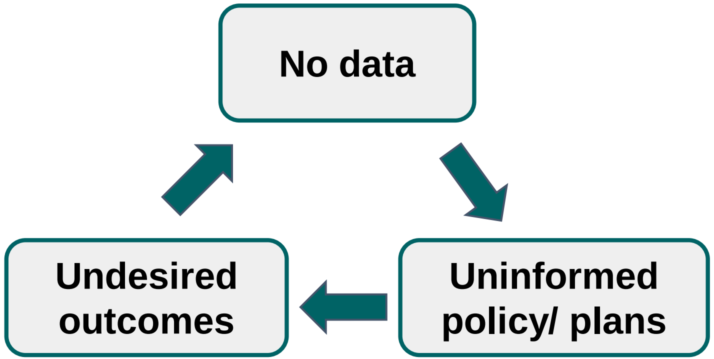


CURRENT/ PLANNED SAFETY STUDIES ON SHARED "MICROMOBILITY"

A few study highlights:

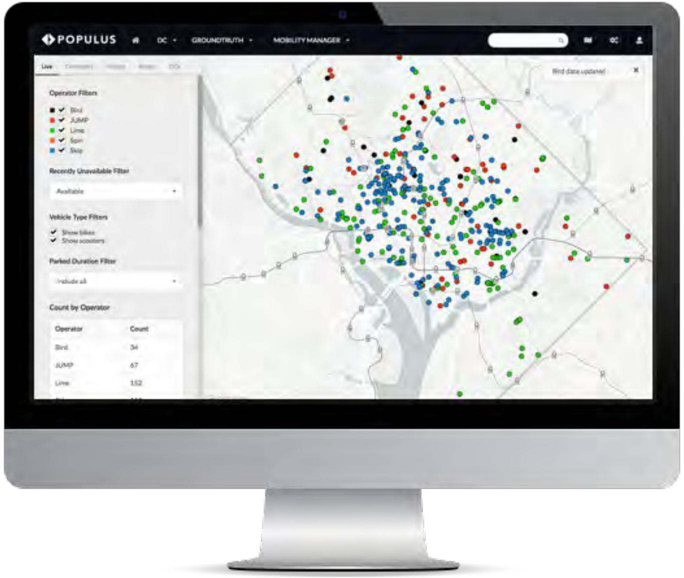
<u>Ride-hailing (i.e. Uber/Lyft)</u>

- The arrival of ride-hailing was found to be associated with a 2-3% *increase* in the number of motor vehicle fatalities and fatal accidents. (Barrios et al, 2018)

<u>Bike- and scooter-sharing</u>

- On a per kilometer basis, bike share is associated with a decreased risk of fatal and non-fatal bicycle injuries when compared to general bicycling riding. (Fishman & Schepers, 2018)
- In Austin, the CDC will conduct an epidemiological study of scooters based on scooter injury reports and emergency responder calls between Sep '18 and Nov '18.
- A Seattle study found that 91% of riders of private bikes wore helmets, and 20% of bikeshare riders did. (Mooney & O'Connor, 2018)
- Among 249 scooter injuries presented to an emergency department in Southern California, 4.4% of riders were wearing a helmet. Most common injuries were fractures (31.7%), head injuries (40.2%), and soft-tissue injuries (27.7%). (Trivedi et al, 2019)

CITIES ARE TRANSITIONING TOWARDS ACTIVE MOBILITY MANAGEMENT



Populus Mobility Manager ingests data from major mobility operators on behalf of cities

With access to real-time data for new mobility services (primarily dockless shared bikes and scooters <u>today</u>), cities are entering a new era of active mobility management.

KEY EXAMPLES

- Vehicle and fleet monitoring
- Incident management
- Data-driven policy (e.g. flexible vehicle caps)
- Data-driven planning
- Pricing to efficiently allocate public space

METHODS OF GATHERING NEW DATA FOR SHARED MOBILITY SAFETY

COMMONLY REQUESTED DATA POINTS FROM OPERATORS

- Trips
- Vehicles
- Maintenance logs
- Complaints
- Injuries

REQUEST DATA THROUGH INDUSTRY STANDARD APIs

- GBFS (General Bike Feed Specification) is commonly required for public -facing APIs of vehicle locations (for example to third -party apps).
- MDS (Mobility Data Specification), initially introduced by LADOT, is now being used widely to require trip, vehicle status, and route data.

INCIDENT MANAGEMENT TRACKING THROUGH A THIRD-PARTY

- Tracking injuries, collisions, and other safety related incidents is a challenge.
- Cities are beginning to require that operators collect data in a consistent format through a third party with public -facing tools.

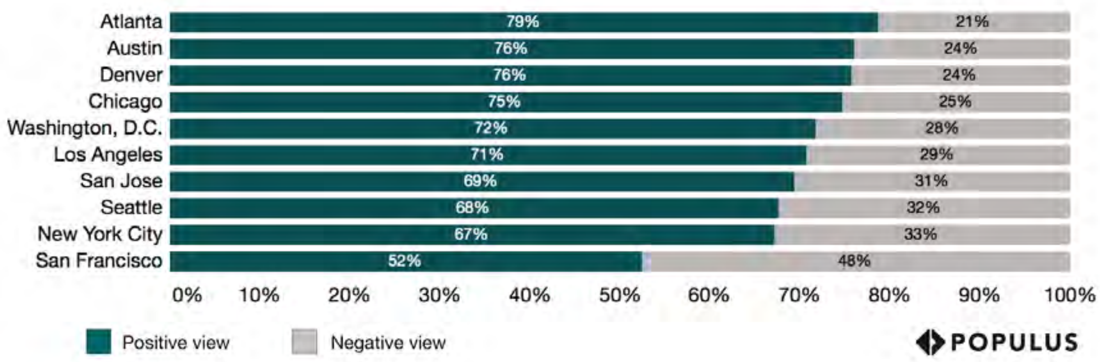
THE KEY OPPORTUNITY: THERE IS A BROADER COALITION OF PEOPLE CALLING FOR SAFER STREETS FOR ALL MODES OF TRAVEL

Both opinion data and trip data suggest that a broader demographic of people are supportive of, and utilizing dockless bikes and scooters.

While historically, less than 3% of people might have commuted to work on a bike in the majority of cities, we are now seeing greater adoption of "micromobility"

This broader coalition is calling for more and safer bike/scooter/ped infrastructure.

OPINIONS OF DOCKLESS SCOOTERS IN U.S. CITIES



THE KEY OPPORTUNITY: BETTER DATA HELPS CITIES EXPAND BIKE/SCOOTER INFRASTRUCTURE

Cities that receive detailed trip data can now harness GPS trace data to plan safer routes for bicycling and scooter infrastructure such as protected lanes and parking areas.

In addition to requiring that operators provide stationary vehicle location data (i.e. parked vehicles), cities need to require trip and route data through a standard such as the Mobility Data Specification (MDS).

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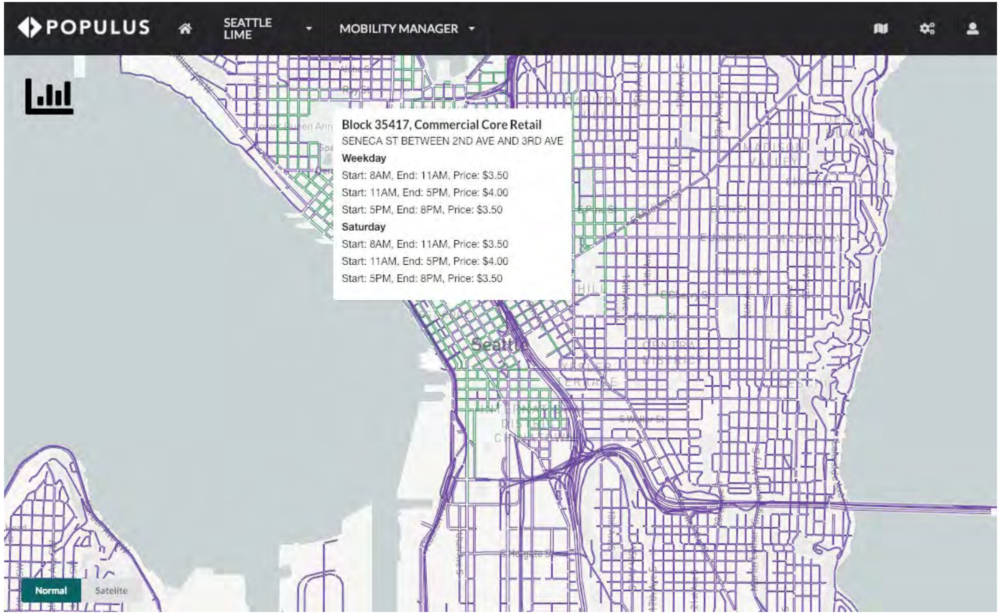
1 PARKING SPOT FOR A CAR >> 15 BIKES AND SCOOTERS

LOOKING TO THE FUTURE: HARNESSING FLEET DATA FOR SAFER STREETS

As we look to the future, many cities are exploring strategies for more effective management of streets and fleets:

- Better data from ride-hailing services, whose traffic patterns differ from personally-owned vehicles, is critical for design.
- Carefully designed pick-up and drop-off zones for fleet vehicles are currently a missed opportunity in most cities.



Lime and Populus announced a new partnership to validate use of on-street parking for their free-floating car-sharing vehicles, the LimePod, for a city.

THANK YOU

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Setting of Speed Limits MUTCD Proposal

Ransford S. McCourt, PE, PTOE

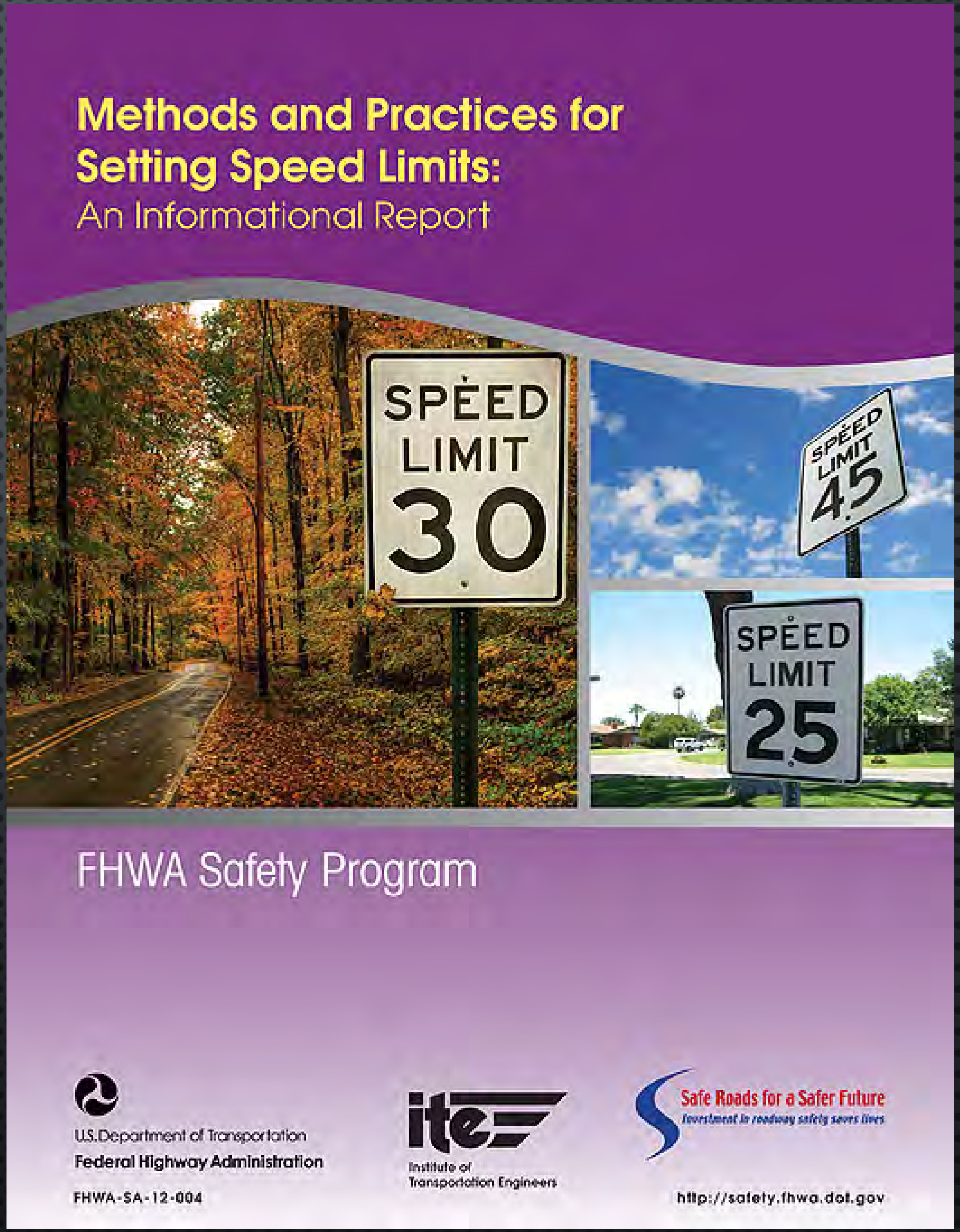
ITE Vice President

NCUTCD Task Force Chair on Speed Limits

Principal, DKS Associates

Setting of Speed Limits

- NCUTCD Task Force
  - Findings
  - Proposal to FHWA
- ITE Speed Management Resource Hub
  - Traffic Calming
  - Vision Zero
  - Education and Culture
- What Lies Ahead
  - Research



NCUTCD ESTABLISHES TASK IN RESPONSE TO NTSB REPORT

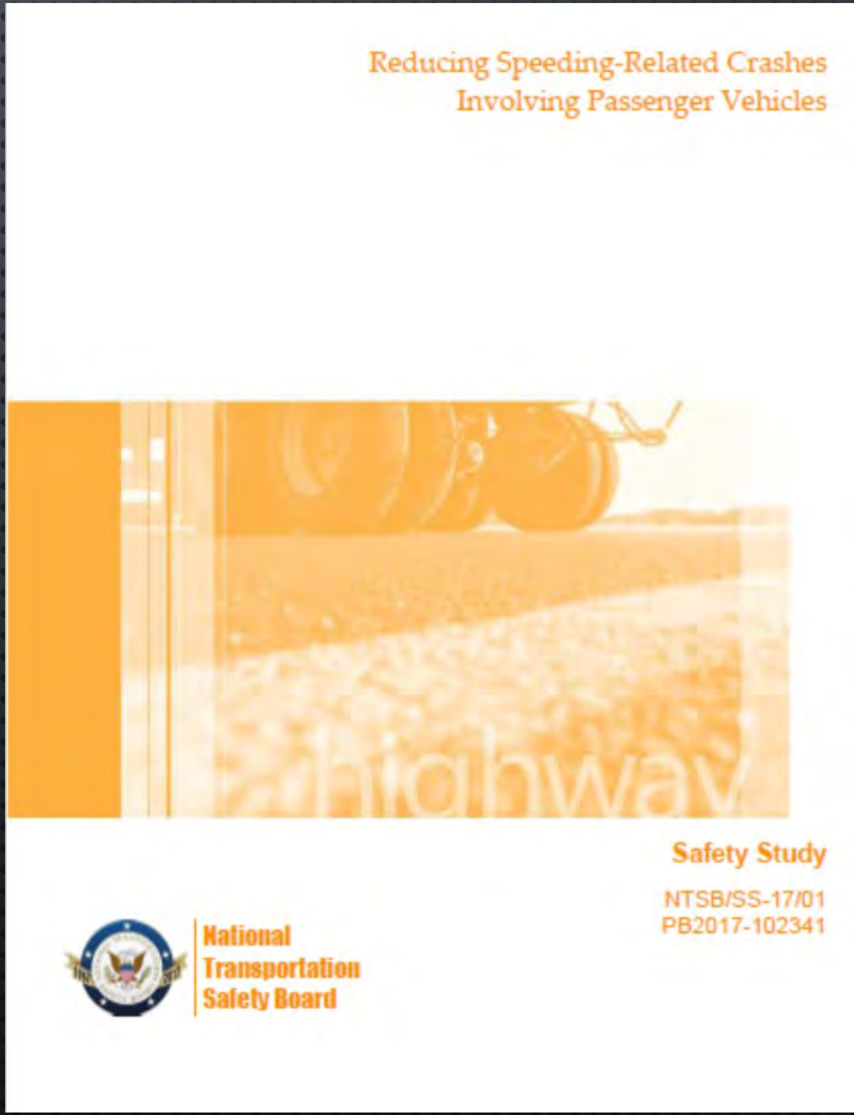
(H-17-27) Revise Section 2B.13 of the MUTCD so that:

a. The factors currently listed as optional for all engineering studies are required

b. Require that an expert system such as USLIMITS2 be used as a validation tool, and

c. Remove the guidance that speed limits in speed zones be within 5 mph of the 85th percentile speed.

(H-17-28) Revise Section 2B.13 of the MUTCD to (at a minimum) incorporate the safe system approach for urban roads to strengthen protection for vulnerable road users.



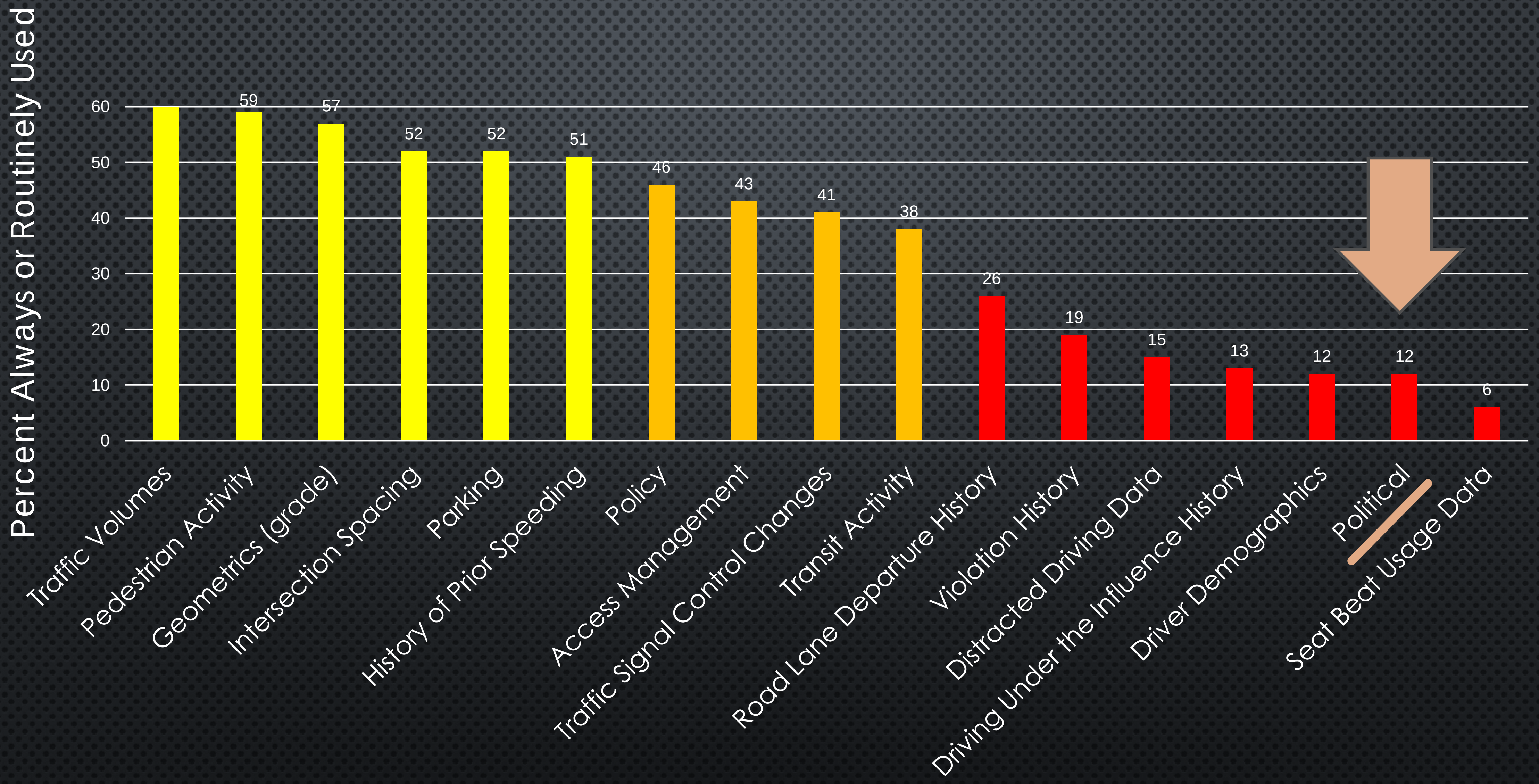
Survey Information

- Open = Spring 2018
- Distributed to numerous transportation professionals
- Number of respondents = 740
- Over 80% regular MUTCD users
- Average Experience = 20 years
- Number of questions = 13

FACTORS MOST UTILIZED IN SETTING SPEED LIMITS Q7

Utilization criteria (top 10 with always utilized)	Overall Rank	10 years or less (rank)	11-20 years (rank)	Over 20 years (rank)
Speed of vehicles	***1***	4	**1**	**2**
Crash history	2	**2**	**3**	**3**
Context - location	3	**1**	**2**	5
Statutory requirements	4	9	4	**1**
Geometrics (curve)	5	6	5	4
Facility classification type	6	7	10	7
Context - land use	7	**3**	6	10
Geometrics (sight distance)	8	--	8	6
Geometrics (lane width, CS)	9	10	9	9
% vehicles above PSL / speed distribution curve / % veh in pace	10	--	7	8

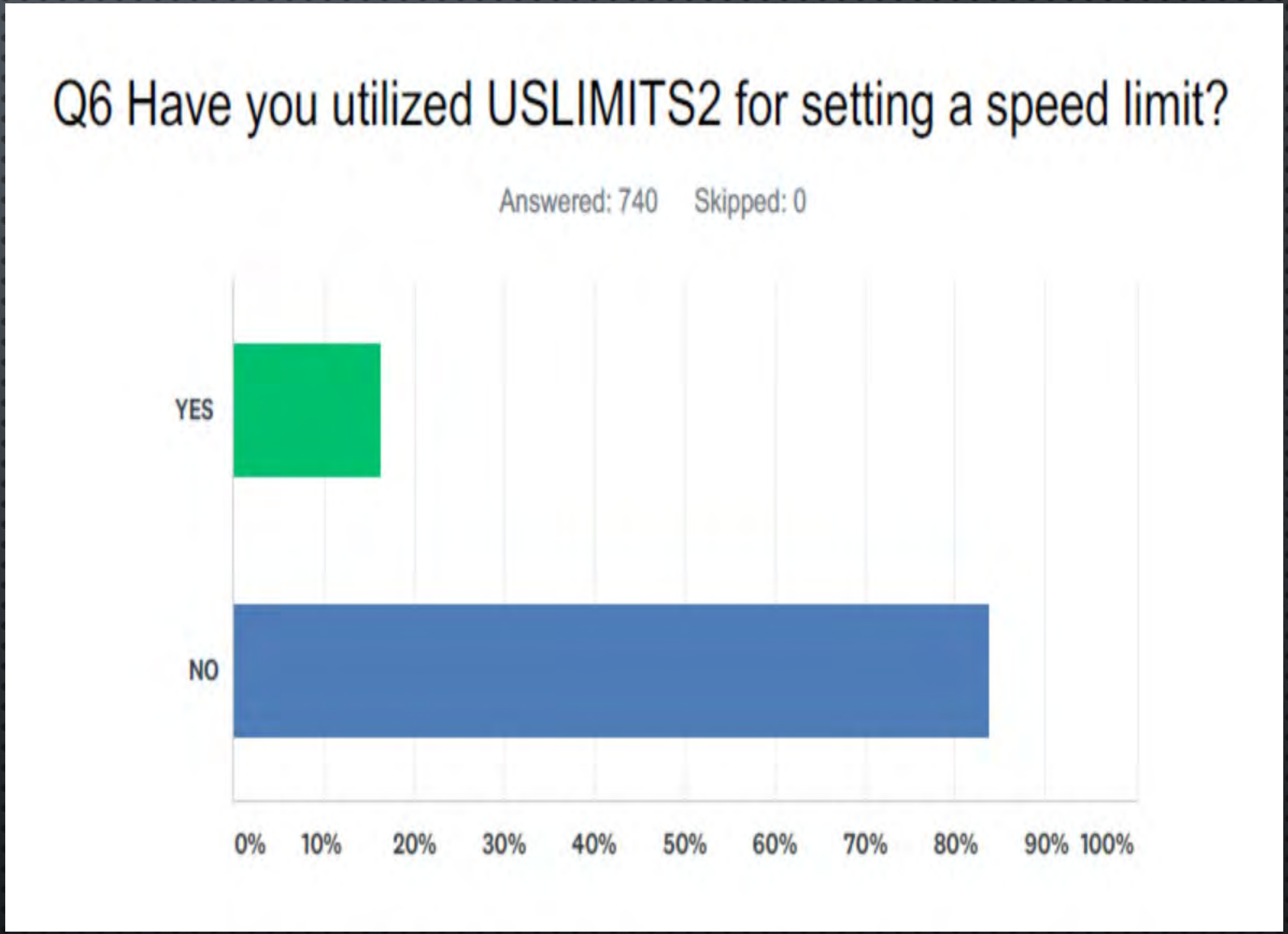
LESS USED FACTORS IN SETTING SPEED LIMITS



EXPERT SYSTEMS ARE NOT BEING USED BY PROFESSIONALS

AVAILABLE SINCE 2006

- "BLACK BOX"
- PROFESSIONALS USE MANY FACTORS AND APPEAR TO WANT TO UNDERSTAND/CONTROL THEM IN MAKING FINDINGS
- DON'T FEEL IT IS DIFFERENT THAN THEIR STATE/LOCAL POLICY
- SOMEWHAT HIGHER USE BY EXPERIENCED STATE AGENCY STAFF
- MORE STUDY NEEDED TO UNDERSTAND THE "WHY"



The Five Most Important Criteria (Q8) by Experience (Q2) and Performed 1+ Speed Study?

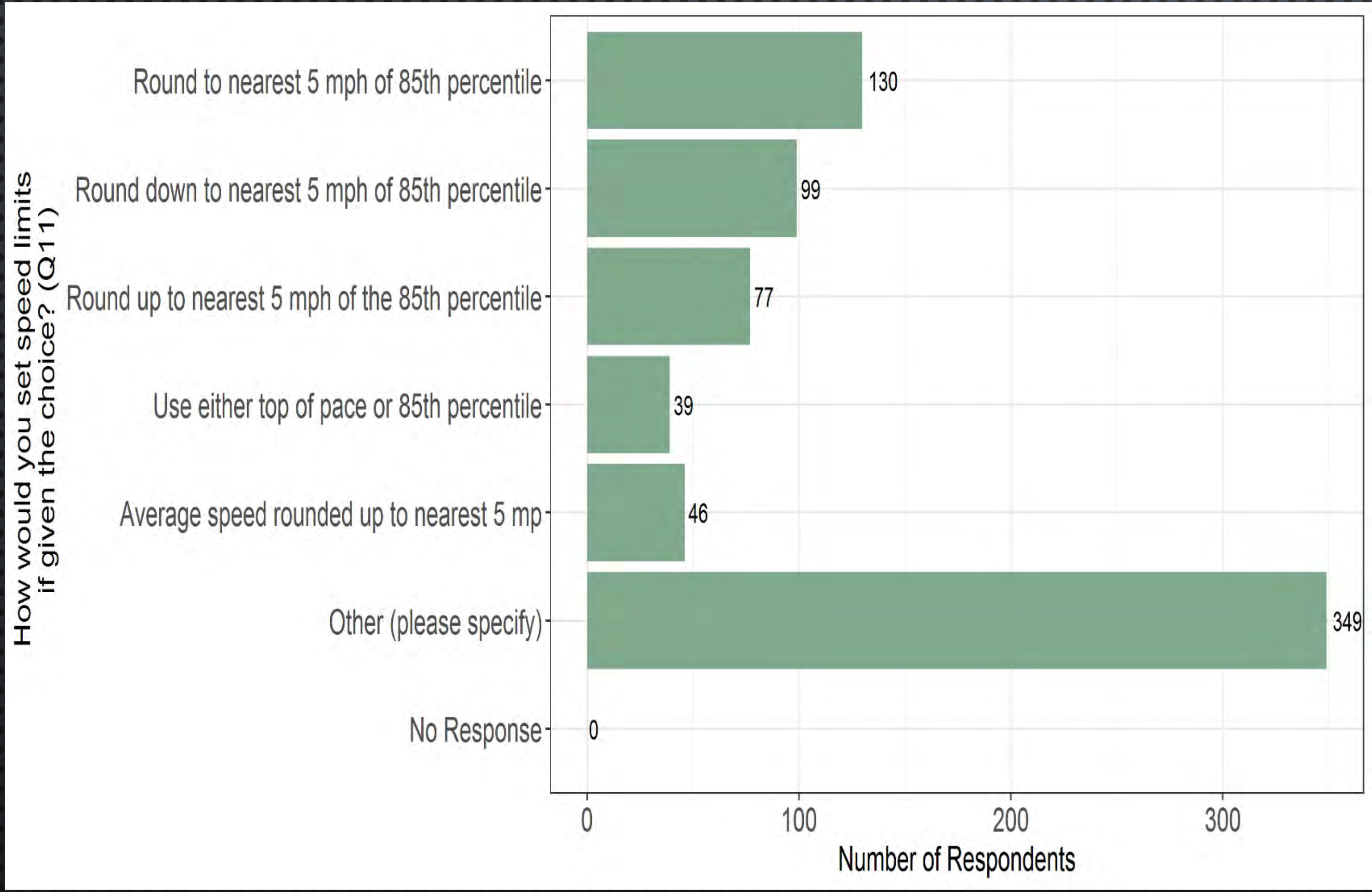
Top Responses for those w/ 10 yr or less experience compared to >20

- Bicycle activity
- Pedestrian activity
- Policy
- Context – location
- Contest – land use

More important for those w/ >20 yr experience compared to 10 yr or less

- Speed of vehicle
- Statutory requirements
- Geometrics (sight distance)
- % vehicles over PSL/ % Pace
- Access management

Q11: HOW WOULD YOU SET SPEED LIMITS IF GIVEN THE CHOICE?



Q12 USE YOUR BEST JUDGEMENT TO SET TARGET SPEED FOR THE FOLLOWING FACILITY TYPES

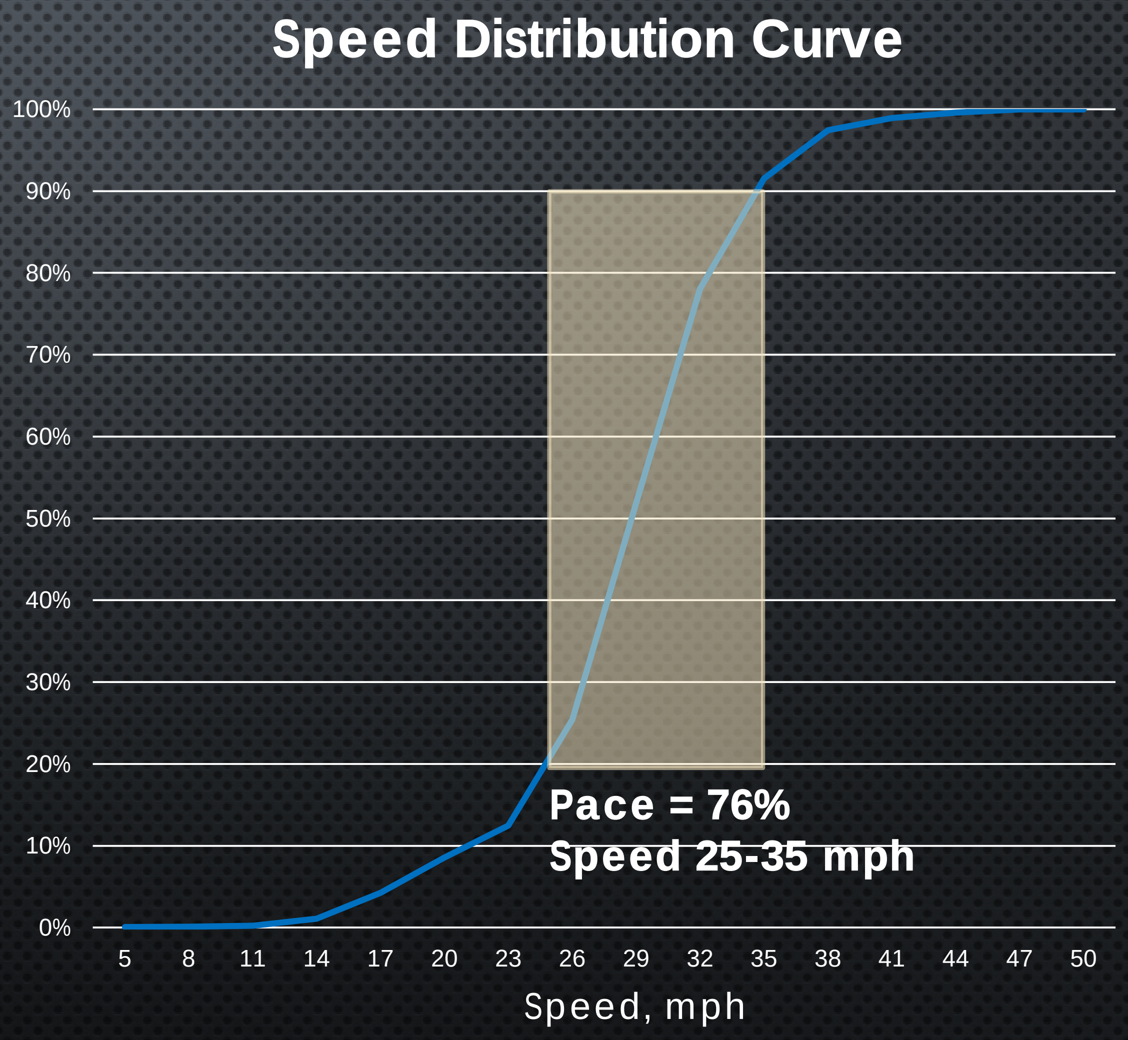
Functional Class/Type	Speed, mph
Interstate Freeway (rural)	70
Interstate Freeway (urban)	60
State Highway (rural)	60
County Road (rural)	50
County Road (rural unpaved)	35
Suburban Arterial (5+ lanes)	45
Urban Arterial (multi-lane)	35
Collector Street	30
Business/Commercial District Street	25
Neighborhood Street (used to leave a residential area)	25
Local Residential Street	25
School Zone Street	20

ACTION #1: FACTORS MOVED UP AND EXPANDED

- ***Speed distribution of free-flowing vehicles*** *(such as current 85th percentile, the pace, review of past speed studies)*
- ***Reported crash experience for at least a 12-month period relative to similar roadways.***
- ***Road character****istics (such as lane widths, curb/shoulder condition, grade, alignment, median type, sight distance).*
- ***Road context*** *(such as roadside development and environment including number of driveways and land use, functional classification, parking practices, presence of sidewalks/bicycle facilities).*
- ***Road Users*** *(such as pedestrian activity, bicycle activity)*

ACTION#2: 85TH PERCENTILE KEPT AND TWEAKED EMPHASIS ON PACE

WHEN A SPEED LIMIT WITHIN A SPEED ZONE IS POSTED ON **FREEWAYS, EXPRESSWAYS, OR RURAL HIGHWAYS**, IT SHOULD **MAXIMIZE THE PERCENTAGE OF VEHICLES IN THE PACE** AND SHOULD BE WITHIN 5 MPH OF THE 85TH-PERCENTILE SPEED OF FREE-FLOWING VEHICLES.



SPEED MANAGEMENT FOR SAFETY RESOURCE HUB

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Technical Resources

Home > Technical Resources > Topics > Speed Management for Safety

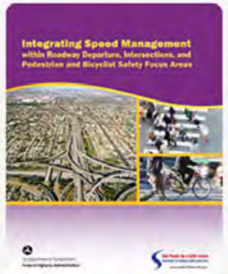
Speed Management for Safety

The Speed Management for Safety resource hub is an interactive website on speed management for all transportation professionals seeking to safely manage speeds. The Institute of Transportation Engineers developed this resource hub, with funding from the Road to Zero Coalition, to provide transportation professionals with tools when considering the intricate factors in advancing effective speed management and road design. Creating a comprehensive speed management program can be an element of a successful Vision Zero plan toward eliminating roadway-related fatalities in the United States by 2050.

"In 2050, those crashes are less severe, in part because of changes to how we build roads. Roadways are designed to reduce speed in safety-critical areas and lessen the

Transportation professionals understand the critical connection of vehicular speed to fatalities and serious injuries, but the factors in designing a road for safe speeds, mobility, and context is complex. With the use of roads

Featured Resources



Integrating Speed Management

Speeding, defined as traveling too

TRAFFIC CALMING RESOURCES

Traffic Calming Fact Sheets
May 2018 Update

A Community of Transportation Professionals

Speed Hump

Description:
- Rounded (vertically along travel path) raised areas of pavement typically 12 to 14 feet in length
- Often placed in a series (typically spaced 260 to 500 feet apart)
- Sometimes called road humps or undulations

Applications:
- Appropriate for residential local streets and residential/neighborhood collectors
- Not typically used on major roads, bus routes, or primary emergency response routes
- Not appropriate for roads with 85th-percentile speeds of 45 mph or more
- Appropriate for mid-block placement, not at intersections
- Not recommended on grades greater than 8 percent
- Work well in combination with curb extensions
- Can be used on a one-lane one-way or two-lane two-way street

(Source: City of Boulder, Colorado)

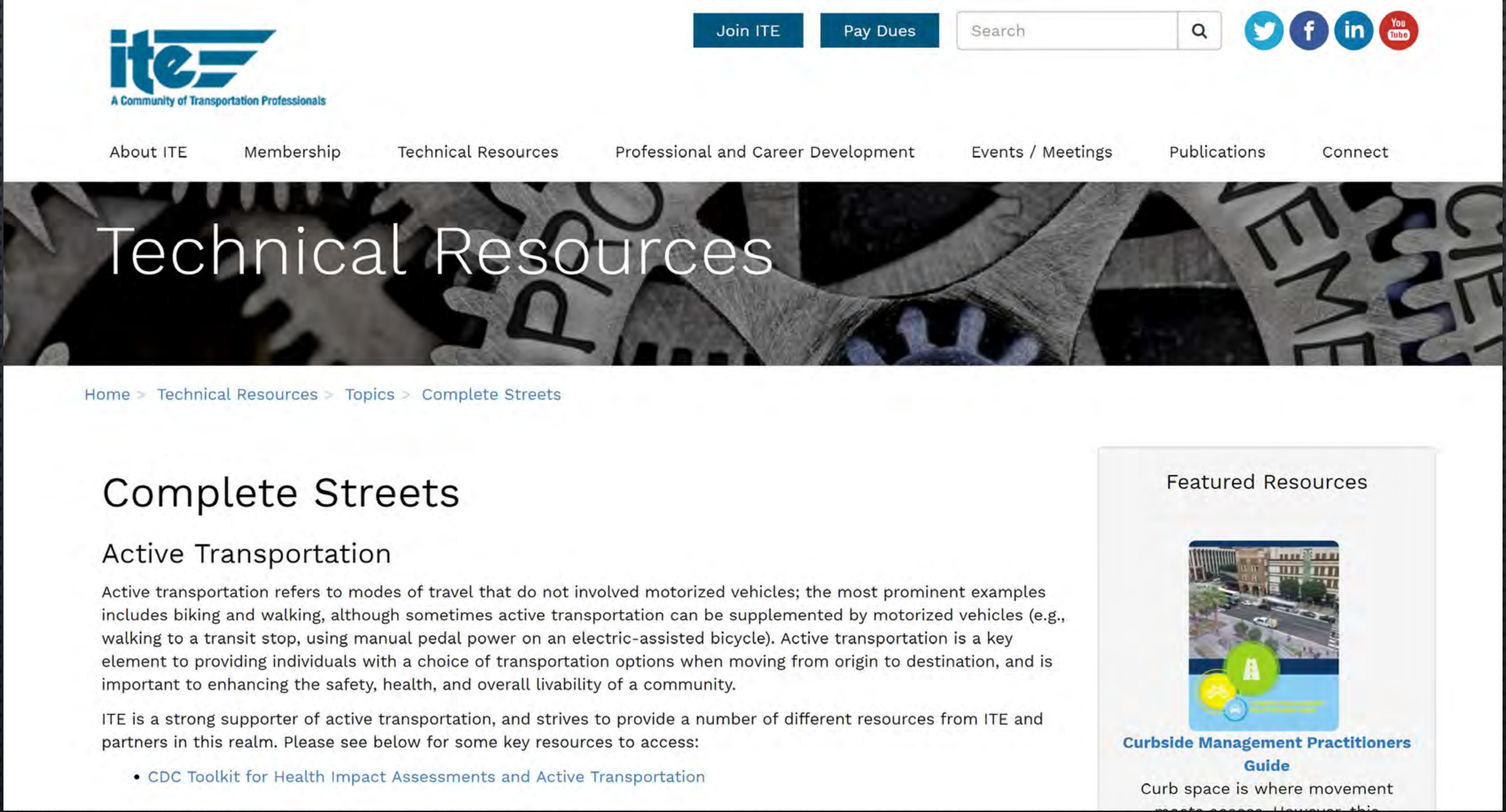
(Source: PennDOT Local Technical Assistance Program)

ITE/FHWA Traffic Calming EPrimer: https://safety.fhwa.dot.gov/speedmgt/traffic_calm.cfm

Design/Installation Issues:
- ITE recommended practice - "Guidelines for the Design and Application of Speed Humps"

CHICANE
CHOKER
CLOSURE
CORNER EXTENSION/BULB-OUT
DIAGONAL DIVERTER
LATERAL SHIFT
MEDIAN BARRIER/FORCED TURN ISLAND
MEDIAN ISLAND
MINI ROUNDABOUT
ON-STREET PARKING
RAISED INTERSECTION
REALIGNED INTERSECTION
ROAD DIET
ROUNDABOUT
SPEED CUSHION
SPEED HUMP
SPEED TABLE
TRAFFIC CIRCLE

COMPLETE STREETS RESOURCES
CURBSIDE MANAGEMENT GUIDE



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Technical Resources

Home > Technical Resources > Topics > Complete Streets

Complete Streets

Active Transportation

Active transportation refers to modes of travel that do not involved motorized vehicles; the most prominent examples includes biking and walking, although sometimes active transportation can be supplemented by motorized vehicles (e.g., walking to a transit stop, using manual pedal power on an electric-assisted bicycle). Active transportation is a key element to providing individuals with a choice of transportation options when moving from origin to destination, and is important to enhancing the safety, health, and overall livability of a community.

ITE is a strong supporter of active transportation, and strives to provide a number of different resources from ITE and partners in this realm. Please see below for some key resources to access:

- CDC Toolkit for Health Impact Assessments and Active Transportation

Featured Resources

Curbside Management Practitioners Guide

Curb space is where movement

EMERGING RESEARCH

STAYING FOCUSED ON THE CORRECT PROBLEM – EXCESSIVE SPEEDS NOT SPEED LIMITS

Study	Outcome
Iowa State FHWA,November 2018	Naturalistic Driving Data Study analysis of speed – as variance increase so do crashes
NCHRP 17-76 TTI, Fall 2019	Guidance for setting of speed limits
GHSA Report, January 2019	Focus on EXCESSIVE SPEED and fatals/serious injuries
AAA Spring 2019	White paper on setting of speed limits
New Paradigm: Engineering – Enforcement – Judicial Collaboration	**Building partnerships** **New partners – MADD, Truckers, Emergency response** **More uniform coordinated approaches** **Avoiding "entrapment" or "undue enrichment" perceptions** **Culture change**

AUTOMATED PHOTOENFORCEMENT IN SCHOOL ZONES

Beth Ebel, MD, MSc, MPH
Harborview Injury Prevention & Research Center
University of Washington/Seattle Children's Hospital

February 13, 2019

UW Medicine
HARBORVIEW MEDICAL CENTER

HARBORVIEW
INJURY PREVENTION
& RESEARCH CENTER

Dr. Ebel has no conflicts of interest to disclose

BACKGROUND

Walking/biking/busing to school is important for health and safety

- Kids with built-in physical activities – such as biking or walking to school – experience significant and long-lasting health benefits
- Safety concerns are a major reason families don't choose active transportation options
- Slowing down car traffic encourages kids to walk, bike or bus to school, which improve child health and concentration

BENEFITS IN IMPROVING TRANSPORT SAFETY AROUND SCHOOLS

- Encourage walking/biking/busing
- Reduce risk of child injury
- Resources for continuing to improve school safety
- Equitable and consistent enforcement for drivers
- Wide application in urban/rural areas

LOWER VEHICLE SPEED CRITICAL TO REDUCE PEDESTRIAN INJURIES

- Most crashes involving child pedestrians happen near schools
- School zone speed is 20mph
- Vehicle speed significantly alters the risk of severe injury
  - A pedestrian has a less than 10 percent chance of being fatally injured by a vehicle traveling 20 mph
  - Risk jumps to 50 percent when the vehicle is traveling 40 mph

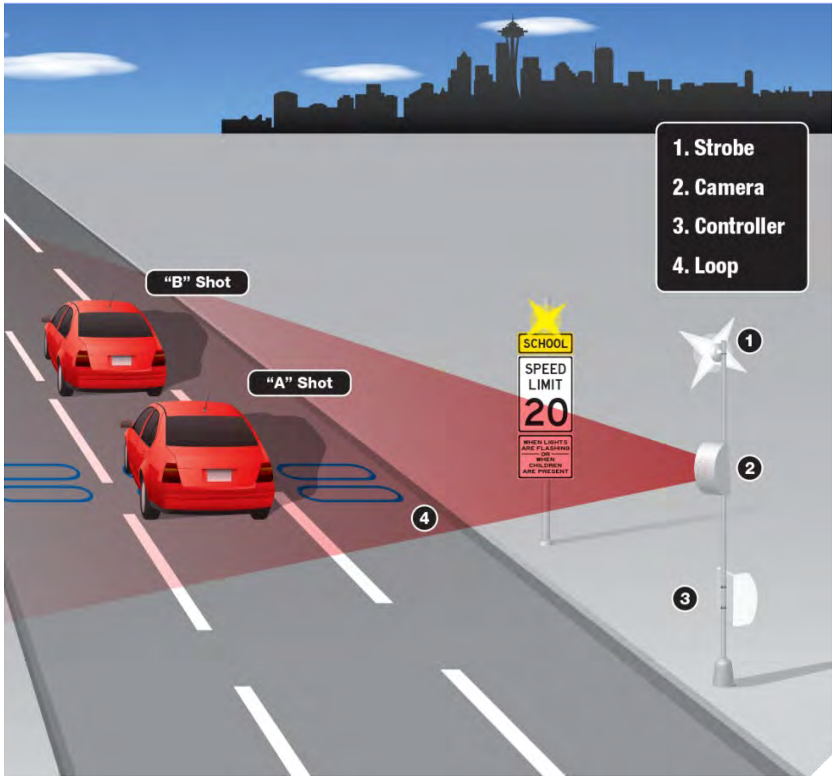
KIDS SHOULD BE ABLE TO TRAVEL TO SCHOOL SAFELY

0

RENTON, WA - A pedestrian was hit by a car near the intersection of Edmonds Avenue and Northeast 12th Avenue just before 9 a.m. Tuesday. That location is at the southwest corner of the McKnight

PHOTOENFORCEMENT

- Camera linked to embedded speed measurement
- Photo of license plate linked to DOL records
- Generates ticket by mail



OUR STUDY

Original article

Impact of automated photo enforcement of vehicle speed in school zones: interrupted time series analysis

D Alex Quistberg,[1,2] Leah L Thompson,[3] James Curtin,[4] Frederick P Rivara,[1,3,5,6] Beth E Ebel[1,3,5,6]

► Additional material is published online only. To view please visit the journal online (http://dx.doi.org/10.1136/injuryprev-2018-042912).

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[2]Department of Anesthesiology & Pain Medicine, University of Washington, Seattle, Washington, USA
[3]Department of Pediatrics, University of Washington, Seattle, Washington, USA

ABSTRACT

Objective Measure the impact of automated photo speed enforcement in school zones on motorist speed and speeding violation rates during school travel.

Methods Automated enforcement cameras, active during school commuting hours, were installed around four elementary schools in Seattle, Washington, USA in 2012. We examined the effect of automated enforcement on motorist speeds and speed violation rates during the citation period (10 December 2012 to 15 January 2015) compared with the 'warning' period (1 November to 9 December 2012). We evaluated outcomes with an interrupted time series approach using multilevel mixed linear regression

sharply to over 50% risk of death in a 40 MPH collision.[13 14]

Excessive vehicle speeds have other negative effects on child health. If parents perceive that motorists travel at high speeds in their neighbourhoods or destinations, children are less likely to walk or bike.[15 16] Active transport represents the easiest way for children to incorporate exercise into daily routines.[17] The relationship between regular physical activity and the health and development of children has been well documented.[18 19] Studies suggest that periodic exercise may improve children's bone composition, social and mental health

OUR STUDY

- Examined the effect of automated enforcement on motorist speeds and speed violation rates during citation period (10 December 2012 to 15 January 2015) compared with the ’warning’ period (1 November to 9 December 2012)

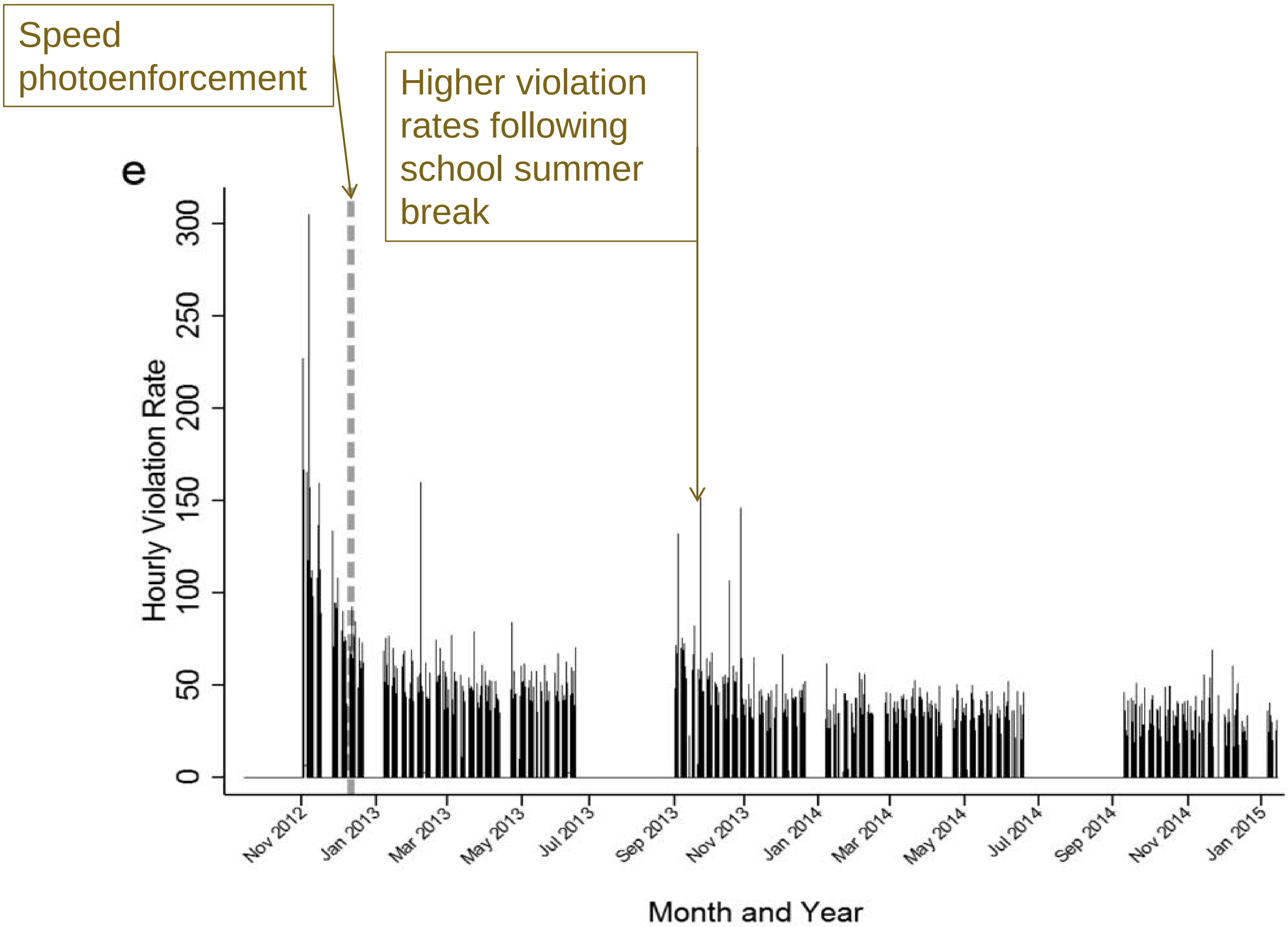
- We evaluated outcomes with an interrupted time series approach using multilevel mixed linear regression

RESULTS

- **Rate of speeding violations decreased ~50%** after police began issuing tickets based on automated photo enforcement, when compared to the period when drivers received written warnings

- **Proportion of vehicles exceeding 20 mph limit decreased by ~50%** in the citation period compared to the warning period

- **Impact** of automated enforcement was **sustained over two years**



Speed photoenforcement
Higher violation rates following school summer break
e
Hourly Violation Rate
0
50
100
150
200
250
300
Nov 2012
Jan 2013
Mar 2013
May 2013
Jul 2013
Sep 2013
Nov 2013
Jan 2014
Mar 2014
May 2014
Jul 2014
Sep 2014
Nov 2014
Jan 2015
Month and Year

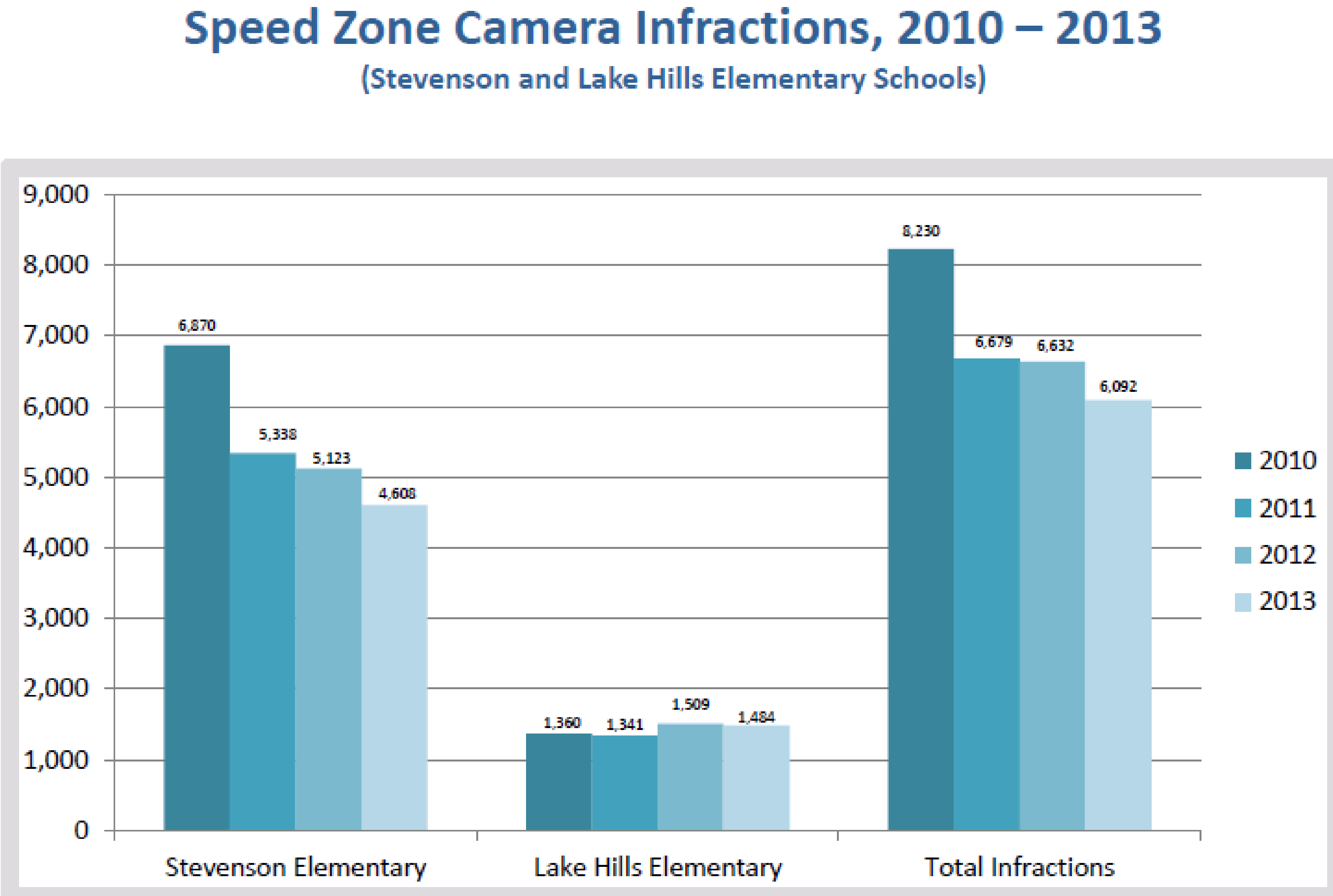
BELLEVUE SCHOOL PHOTOENFORCEMENT

Stevenson Elementary School Speed Zone

No Active School Speed Zone	With Active School Speed Zone	With Photo Enforcement
1999 to 2007	2007 to 2009	2009 to present
Speed = 37 mph	**Speed = 33 mph**	**Speed = 24 mph**

Speeds represent 85th percentile speeds

BELLEVUE PHOTOENFORCEMENT



CONSIDERATIONS FOR LOCALITIES CONSIDERING PHOTOENFORCEMENT

1. Thoughtful selection of locations

2. Talk with community partners
    - School principal and PTA
    - Local businesses
    - How can community benefit?

3. Negotiate with photo-enforcement partner re: enforcement revenue, data collection in useful form

4. Set up evaluation matrix
    - Before/after vs control sites
    - Vehicle speeds (individual cars) and volume
    - Measure active commuting?
    - Identify on/off periods and vacations
    - Consider phased implementation

5. Report back to community partners

QUESTIONS?

UW Medicine
HARBORVIEW
MEDICAL CENTER

HARBORVIEW
Injury Prevention
& Research Center

Examining Systemwide Speeds with Big Data
Uncovering the Extremes

Movement Today and Tomorrow

Technology is fundamentally reinventing transportation, creating a unique opportunity

Transformation of Automotive Industry

Autonomous | Connected | Electric | Shared

Smarter Transportation

INRIX

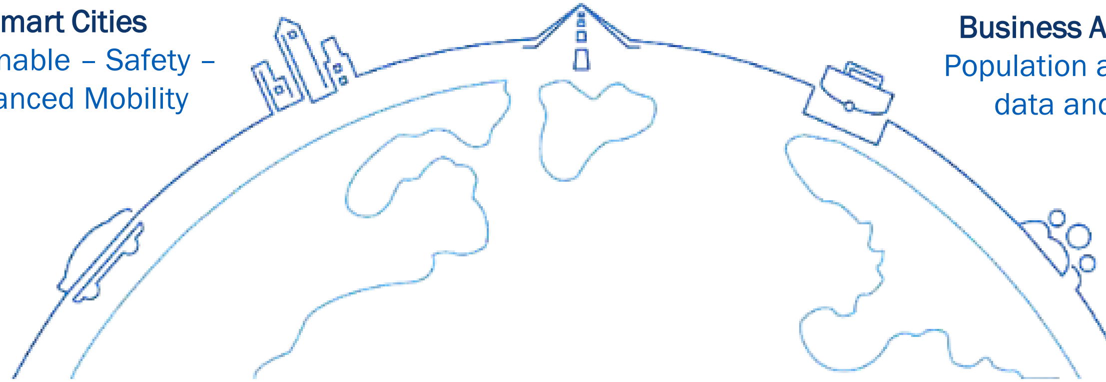
Use of Big Data for Decision Making

Urbanization | Sustainability | IoT | Analytics

INRIX is at the center of smarter transportation by positioning ourselves at the convergence of the connected car and smart cities

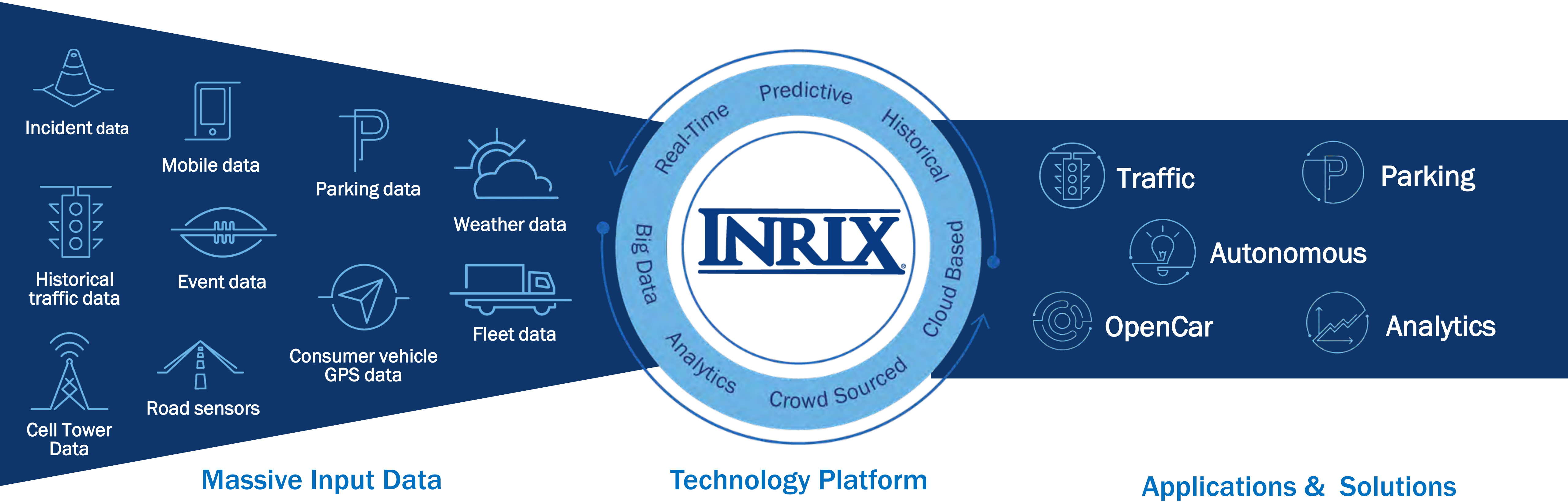
Our Mission is to Transform Mobility Worldwide

Working across the ecosystem to connect every car and city



INRIX Technology Platform

Unique big data and analytics platform ingests multiple data feeds



- Global geo-spatial platform for location based services
- Massive real-time data aggregation and processing
- Analytics capabilities on 10 years of historical data

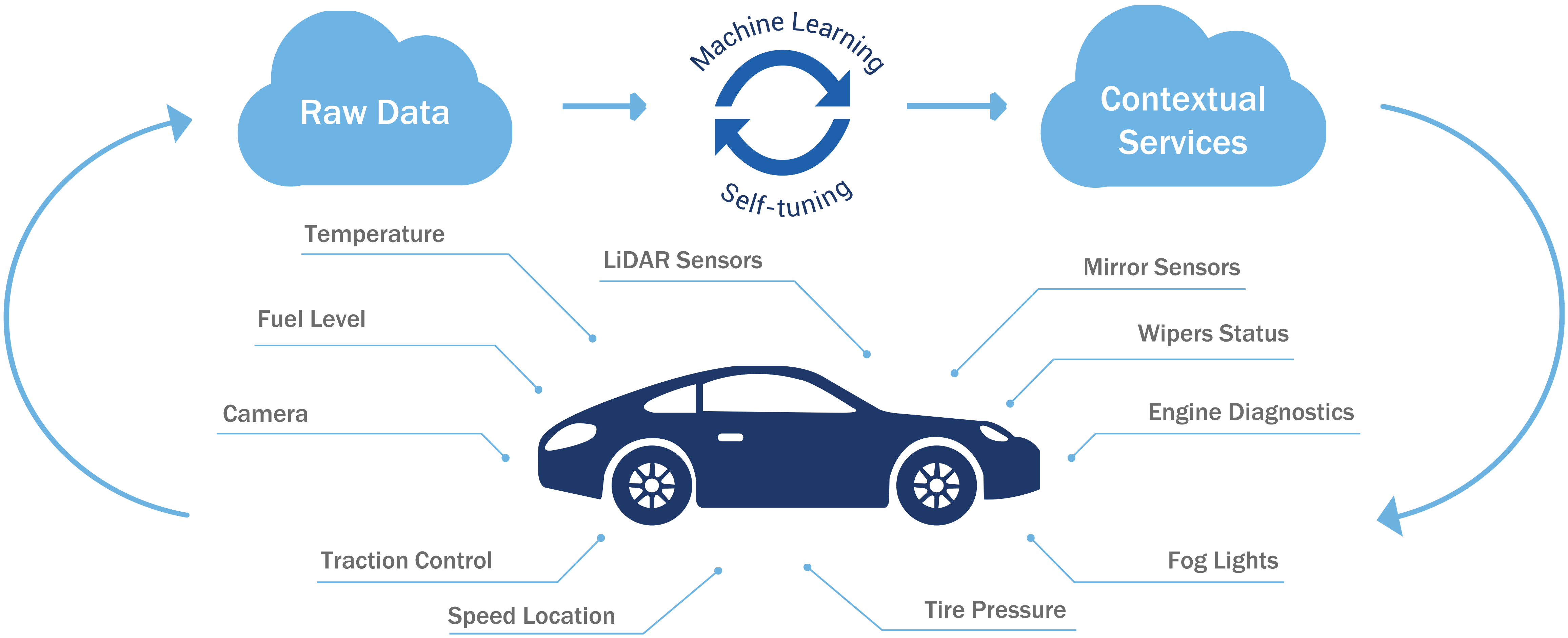
Milk– Milk Products

One Source – Vastly Different Products

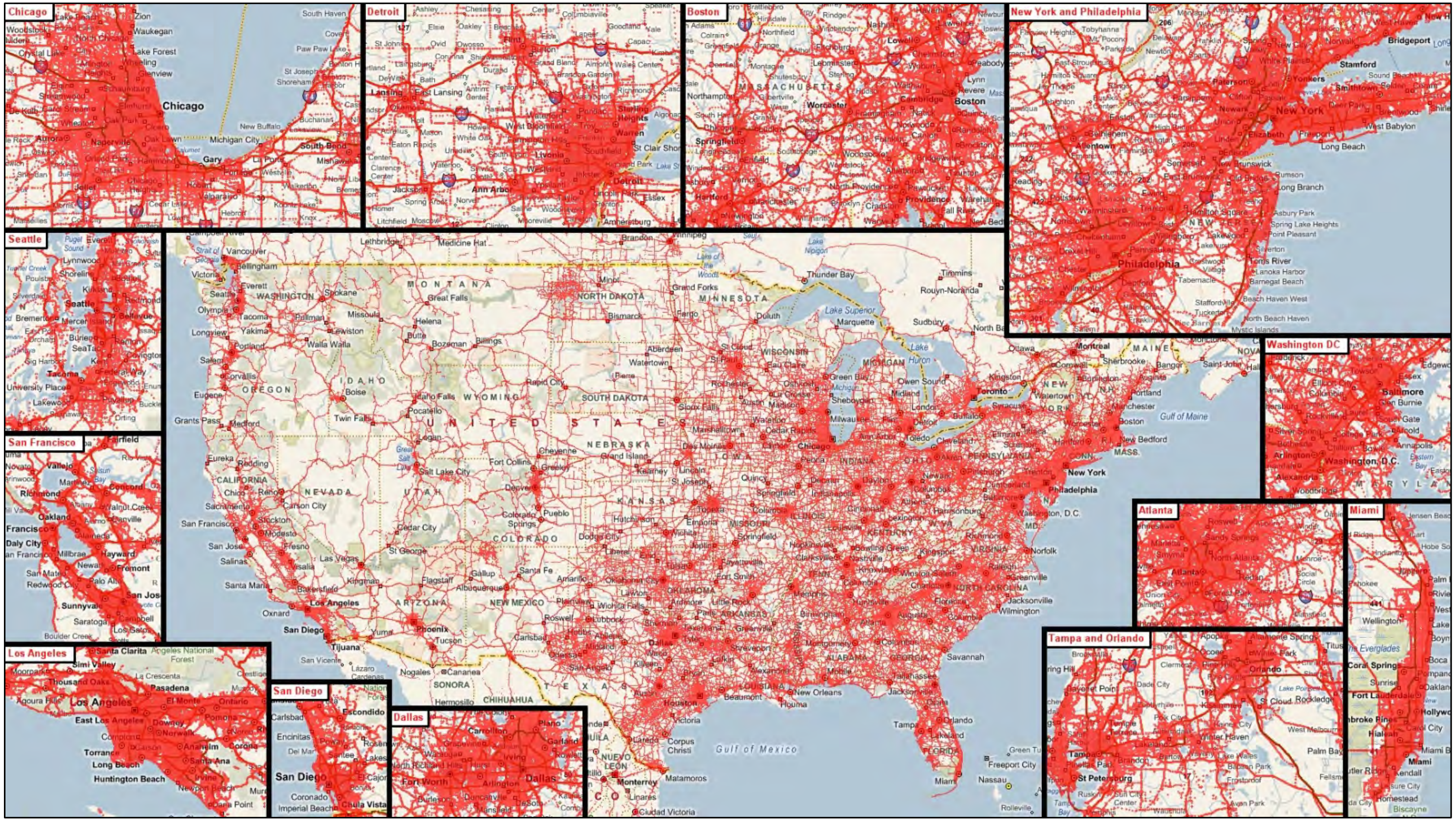
The INRIX Crowd-Sourced Traffic Community

Data Mining the Connected Car

We leverage data from the car, the cloud, drivers and personalized apps



Source Data – GPS equipped vehicles (Floating Car Data)



8

Comprehensive Services for Urban Mobility

Data – Analytics – Services

Operate Efficiently

- Real-Time Traffic APIs & Monitoring Services
- Incident Reporter
- Key Route Travel Times
- Incident Alerts
- Real-Time Population Density

Manage Demand

- Traffic Tiles
- Incident Alerts
- Key Route Travel Times
- Multimodal Routing
- Parking Availability/Pricing

Strategically Add Capacity

- Speed Archives
- Performance Analytics
- Bottleneck History
- Origin-Destination Matrices

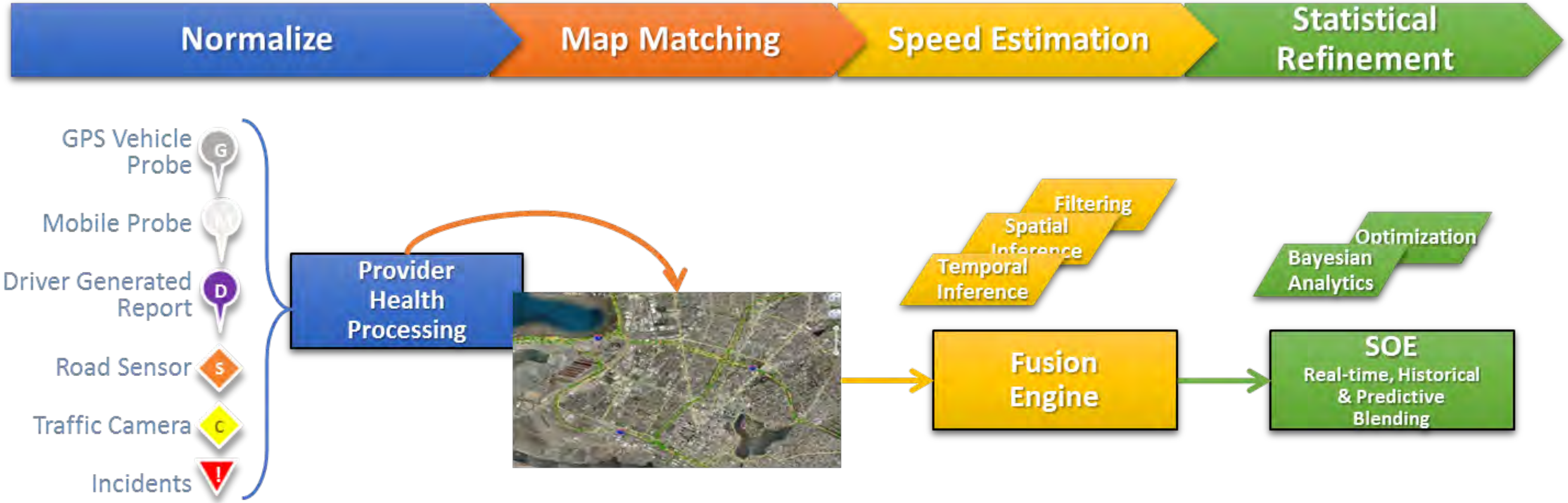
Enhance Safety & Security

- Incident Management
- Incident Alerts
- Dangerous Slowdowns
- Systemwide Speed Evaluation

Real-Time Traffic

RTTI Archives

Speeds Calculation - Overview



Aggregate **speed data from probes and sensor**

- Collect data from over 400 sources
- Monitor to ensure proper data point – timely and valid
- Place valid data points on a specific road
- Sensor and Provider Health Processing

Snap **probe data to road network**

- Filter points based on location, heading, speed
- Locate points within a Road segment

Compute **speed value based on data collected over 15 minutes**

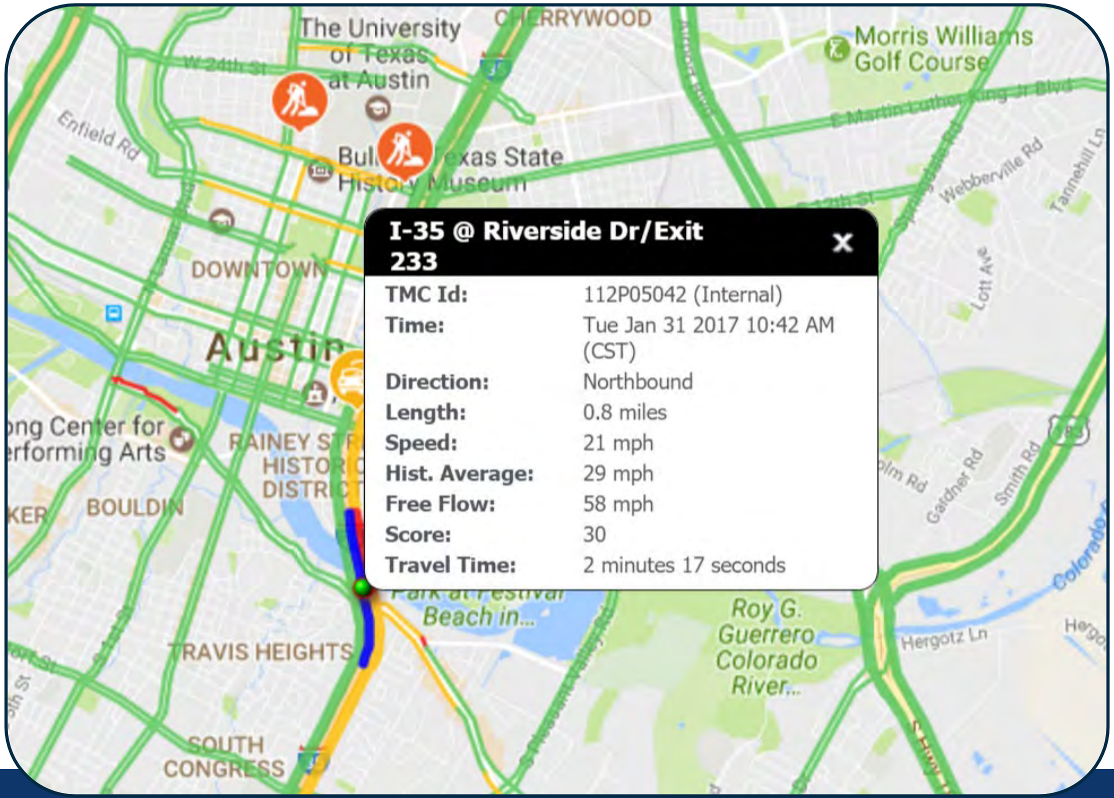
- Outlier detection to remove statistical anomalies
- Weight data based on source and latency
- Apply "Adaptive Spatial Resolution" to optimize accuracy and relevance

Enhance precision **of result and calculate confidence factor**

- Leverage real-time where possible
- Enhance data to leverage road closures
- Process less than ideal real-time estimates with typical and predictive forecasts

Live Traffic & Safety

Speed data calculated in real time, updated approximately every minute, from current conditions based on input from the INRIX Traffic Intelligence Network. Reported at the **TMC** and **XD** Traffic Segment level.



Field	Definition
Segment Code	Definition of the roadway link
Speed	Current real time speed in MPH on the road segment
Average	Historical average speed in MPH on the road segment. This is the typical speed for the current day of week and hour of day (in 15 minute increments)
Reference	Reference speed in MPH on the road segment. This is the proxy of the free flow or uncongested speed on the roadway, defined as the 68th percentile of calculated speeds throughout the entire day
Traveltime minutes	Time required to travel across the road segment
Score	This is a score between 10 and 30 that defines how the speed on the road segment was calculated: • "30" = Speed is calculated from real time data only • "20" = Speed is calculated from a blend of real time and typical/average speed on the road segment • "10" = Speed is calculated only from typical/average speed on the road segment
Confidence	This is a rating from 0 to 100% that defines INRIX's confidence on the real time speed on the road segment

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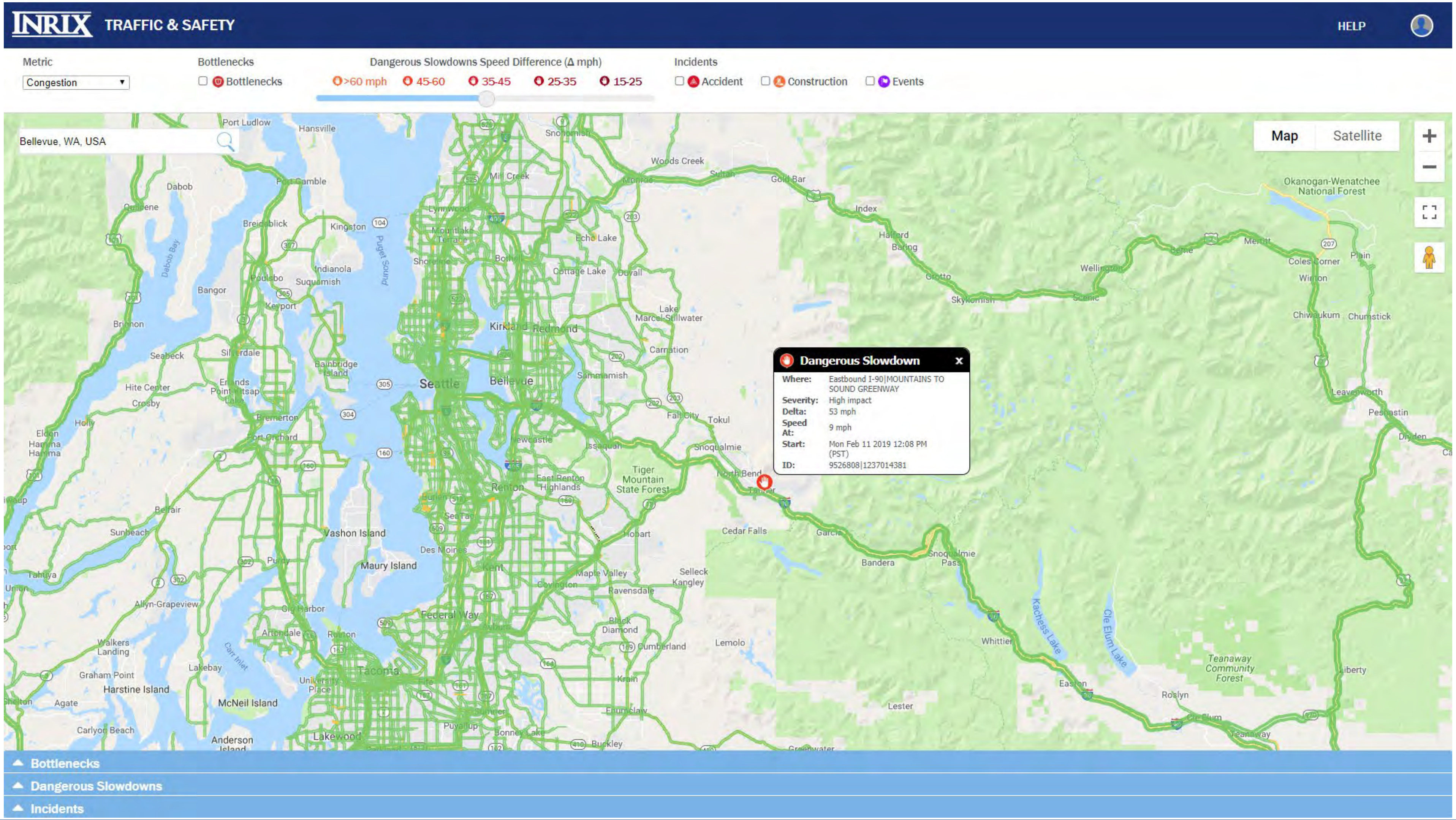
Live Traffic & Safety



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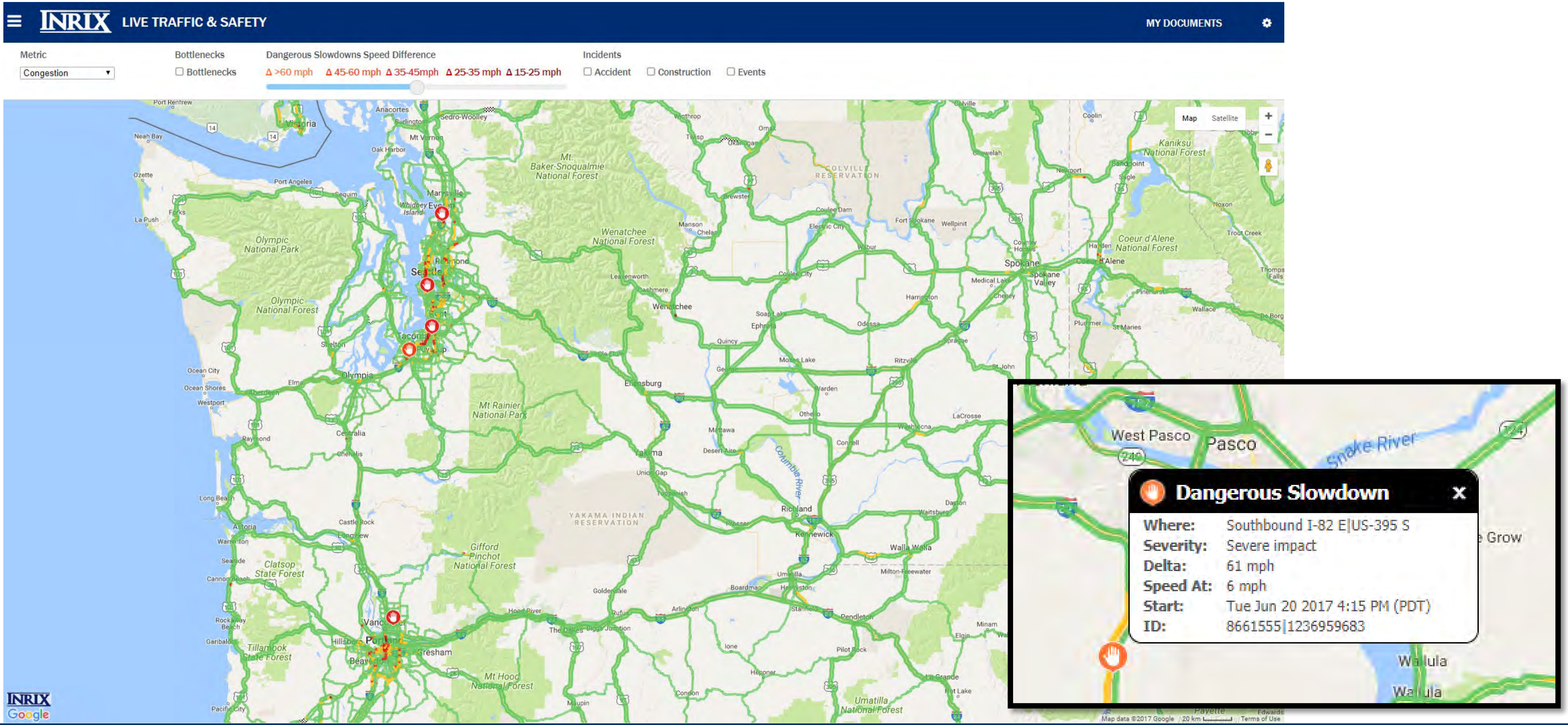
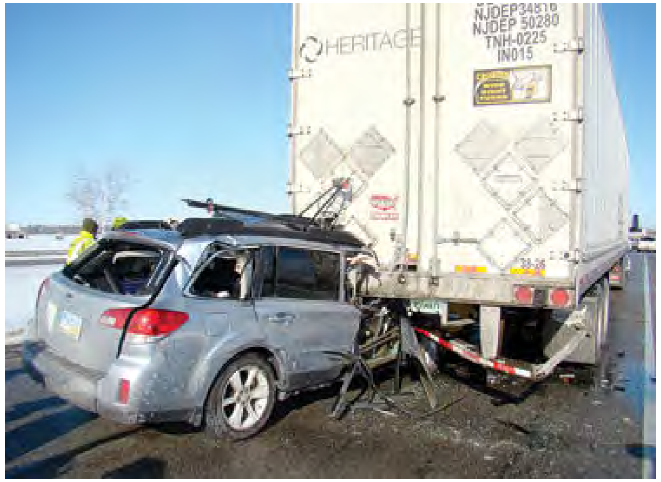
Dangerous Slowdown Alert



Back of Queue/Secondary Crash Research

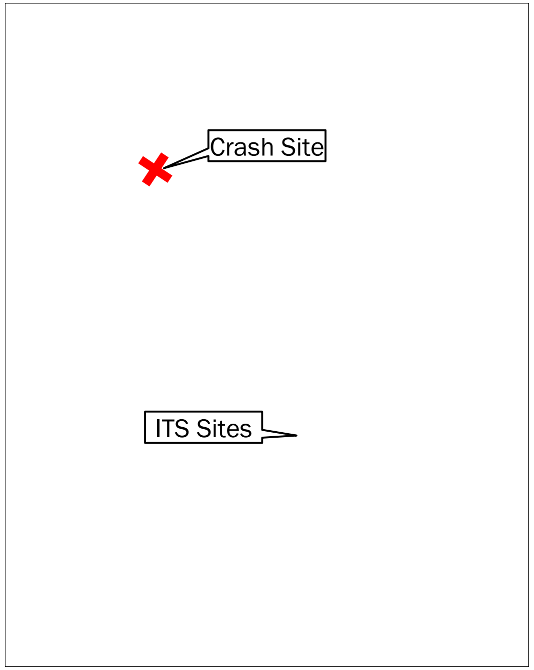
(from Published TRB Paper 16-1194)

- Purdue analyzed INDOT/ISP crash data and INRIX speed data – 3 years, statewide interstate system
- 15,000+ crashes…
- Conclusions:
  - ***Congestion is a safety problem, not just a mobility problem***
    - 23% of crashes over a year on the interstates occurred in congestion
    - Crash rate 24 times greater in congestion vs. free flow
  - ***Trucks and queues don't mix***
    - In congestion: 87% of fatal crashes involved trucks (vs. 40% in free flow)
  - ***Current queue detection/notification adequate in most cases***
    - 90% of time queues were detected for at least 5 minutes before crash
    - 75% of time queues were detected for at least 14 minutes before crash



PURDUE UNIVERSITY

Feb. 2nd, 2015 @ 10:15 AM

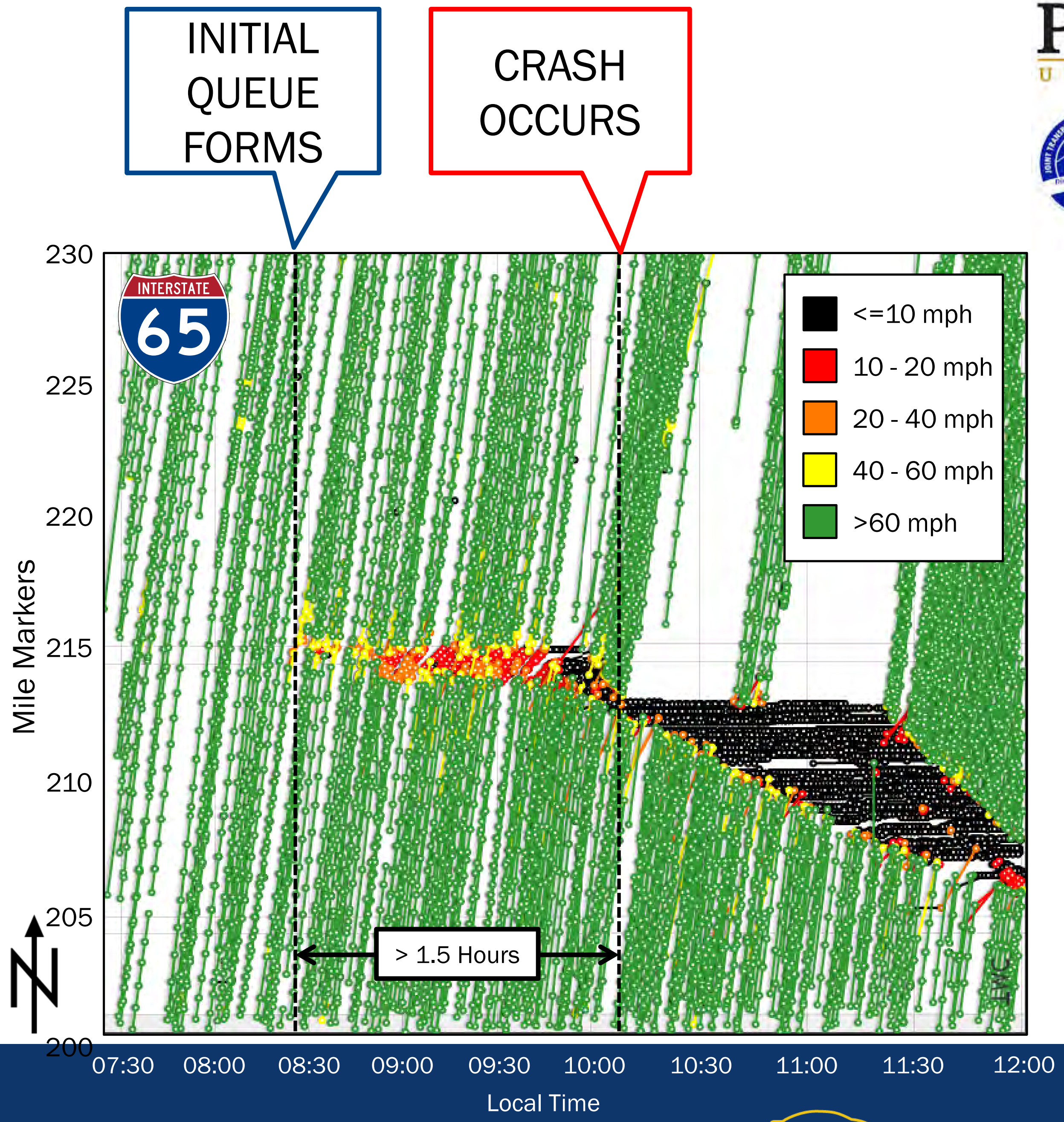


Narrative from Crash Report:

"D1 Stated that he was watching the roadway for snow and icy patches. D1 stated that he then looked up to see traffic stopped on the roadway in front of him"

I-65 Crash Example (2)

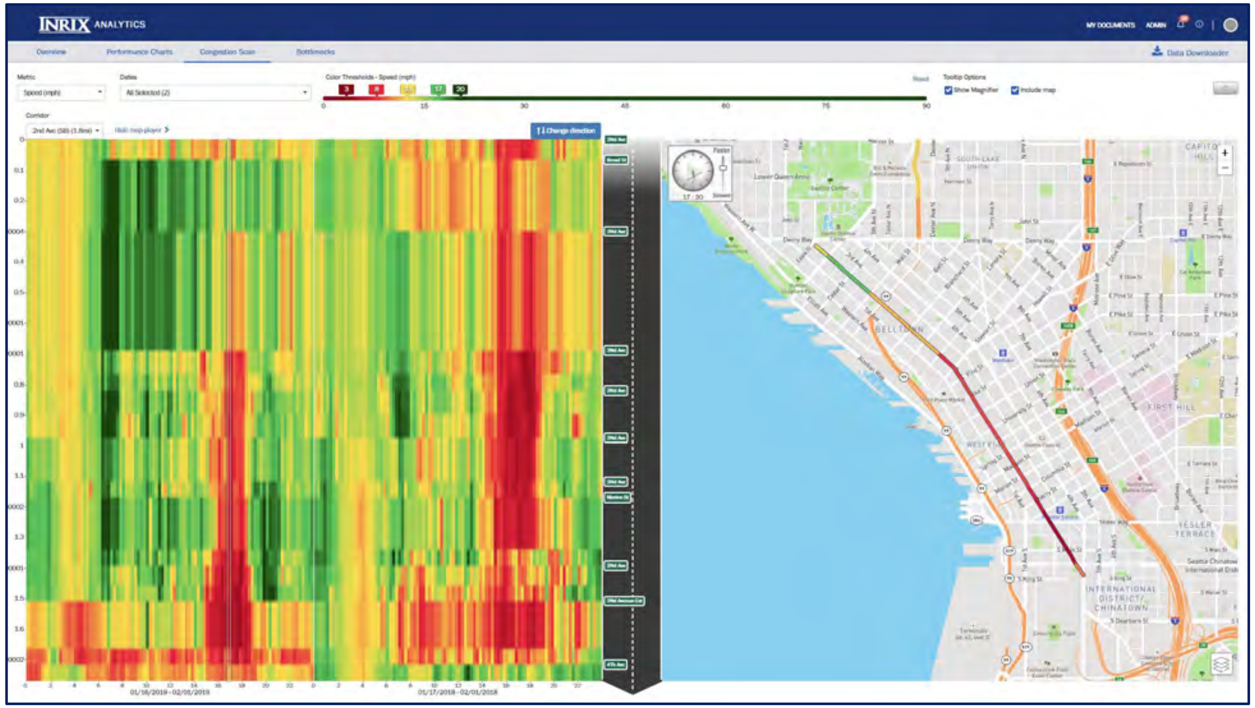
Feb. 2nd, 2015



RTTI Archives - Roadway Analytics – Probe Data Analytics

Systemwide Performance Measure

- Performance Charts
- Congestion Scan
- Massive Data Downloader
- Bottleneck Ranking Tool



Observed History

Trips Reports

NPMRDS

Speed Profiles

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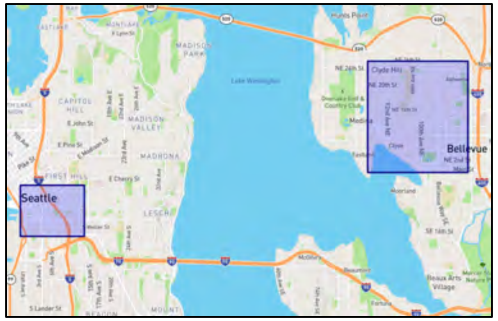
INRIX Trips Report

- Report created by querying for a particular geography (polygons) and time range
- Raw trips are delivered in large csv file, either through a download link/OneDrive or AWS S3 file transfer



Example Query: Jan 2018 (1 month)
Two polygons (in Seattle & Bellevue)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	TripId	DeviceId	ProviderId	StartDate	EndDate	StartLocLat	StartLocLon	EndLocLat	EndLocLon	patialType	erType	ofile	tClass	Type	OriginZoneName	DestinationZoneNa	Endpoint	TripMeanSp	TripMaxSp	TripDistan	MovementType	
2	022451	64c2bae927	82cec96096d	2018-02-0	2018-02-0	47.612	-122.316	47.606	-122.327	EI	1	1	1	1		SeattleDowntown	0	13.8382265	39.63442	1345.383	1	
3	05c68c2	d92ffb5a8a	c3e878e27f5	2018-02-0	2018-02-0	47.597	-122.334	47.664	-122.344	IE	1	1	1	1	SeattleDowntown		0	25.847499	43.40402	10502.25	1	
4	1323d6	72b049841d	c3e878e27f5	2018-02-0	2018-02-0	47.643	-122.136	47.617	-122.201	EI	1	1	1	1		Bellevue	0	29.2453911	60.59694	9098.729	1	
5	151734	2749dd9c63	c3e878e27f5	2018-02-0	2018-02-0	47.621	-122.161	47.617	-122.201	EI	1	1	1	1		Bellevue	0	20.562039	24.34587	3104.828	1	
6	161212	b8ba6cce70	8d3bba7425	2018-02-0	2018-02-0	47.589	-122.321	47.599	-122.323	EI	1	1	1	2		SeattleDowntown	0	9.68112499	9.681125	1072.991	1	
7	1e37be	55f1b18f10	c3e878e27f5	2018-02-0	2018-02-0	47.599	-122.33	47.429	-121.995	IE	1	1	1	1	SeattleDowntown		1	52.3605269	103.9779	37324.42	1	
8	1f11b0	29c4726685	f033ab37c30	2018-02-0	2018-02-0	47.611	-122.193	47.293	-122.247	IE	2	3	2	1	Bellevue		3	68.1852964	91.8033	38429.99	1	
9	214f96f	8c0dff477c6	c3e878e27f5	2018-02-0	2018-02-0	47.616	-122.202	47.654	-122.196	IE	1	1	1	1	Bellevue		0	27.8756652	45.72657	4321.502	1	
10	24a79a	0217e1342b	54229abfcfa	2018-02-0	2018-02-0	47.612	-122.345	47.598	-122.325	EI	2	3	2	1		SeattleDowntown	1	18.1021891	43.60989	2262.774	1	
11	26bc69	27d514d754	8dd48d6a2e	2018-02-0	2018-02-0	47.617	-122.196	47.619	-122.193	II	1	1	1	1	Bellevue	Bellevue	0	7.85271852	25.18932	392.6359	1	
													1	1		Bellevue	0	25.1271453	67.20122	24778.02	1	
													2	1	SeattleDowntown		2	16.9657626	75.90637	3822.009	1	
													1	1		Bellevue	0	31.4933924	79.66411	8178.335	1	
													1	2	SeattleDowntown	SeattleDowntown	0	3.13707237	43.42189	431.3475	1	
													1	1	Bellevue		0	25.1791261	44.01074	9061.429	1	
													1	1		SeattleDowntown	3	10.8218019	24.01668	6746.413	1	
													1	1		Bellevue	0	31.0346494	106.3864	9224.187	1	
													1	1	Bellevue		0	17.9941891	58.89609	5585.166	1	
													1	1		SeattleDowntown	0	20.1930619	22.96109	3151.464	1	
													1	1	Bellevue	Bellevue	0	13.6778582	29.58393	1044.836	1	
													1	1	Bellevue		0	34.0605459	57.65456	9991.727	1	
													2	1		SeattleDowntown	2	58.6790009	97.85173	40993.8	1	
													1	1	Bellevue		0	24.5203124	46.01614	11419.81	1	
													1	1		Bellevue	0	45.6554124	87.47136	23041.06	1	
													1	1		Bellevue	0	31.278549	70.77735	22655.92	1	
													1	1	SeattleDowntown		0	17.3070777	29.57976	3483.434	1	
													2	1	SeattleDowntown		2	21.8699206	41.96197	4975.407	1	
													1	1		Bellevue	0	17.6696596	26.08897	3558.719	1	
30	7f274bf	4ece73900c	82cec96096d	2018-02-0	2018-02-0	47.611	-122.2	47.483	-121.777	IE	1	1	1	1	Bellevue		0	63.8440574	128.2128	45116.47	1	
31	837ad8	8efb15b0b1	82cec96096d	2018-02-0	2018-02-0	47.618	-122.229	47.615	-122.212	EI	1	1	1	1		Bellevue	0	9.37993757	49.9893	1823.877	1	

SampleTripsReport

200,000 Trip Records (metadata)
- Trip Start/End Time
- Trip Start/End Latitude & Longitude
- Trips Start/End Zone
- Anonymous Device ID
- Provider ID and Type
- Trip Mean Speed, Max Speed, Distance
- Endpoint Quality

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Using the INRIX Trips Report

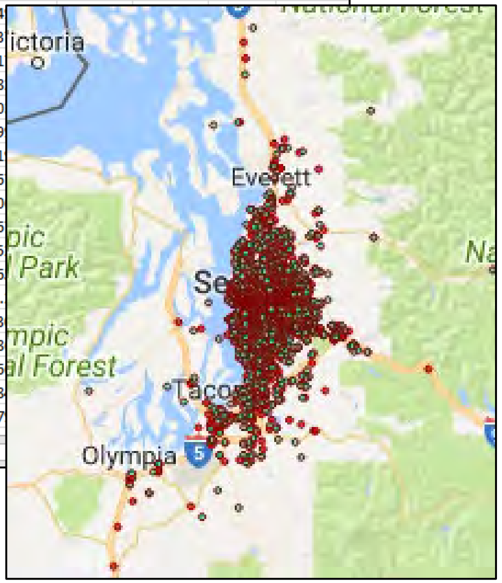
Customizable based on the fields that are relevant to each customer's application

	TripId	DeviceId	ProviderId	StartDate	EndDate	StartLocLat	StartLocLon	EndLocLat	EndLocLon	patialType	erType	ofile	tClass	Type	OriginZoneName	DestinationZoneNa	Endpoint	TripMeanSp	TripMaxSp	TripDistan	MovementType
2	022451	64c2bae927	82cec96096d	2018-02-0	2018-02-0	47.612	-122.316	47.606	-122.327	EI	1	1	1	1		SeattleDowntown	0	13.8382265	39.63442	1345.383	1
		5a8a	c3e878e27f5	2018-02-0	2018-02-0	47.597	-122.334	47.664	-122.344	IE	1	1	1	1	SeattleDowntown		0	25.847499	43.40402	10502.25	1
		9841d	c3e878e27f5	2018-02-0	2018-02-0	47.643	-122.136	47.617	-122.201	EI	1	1	1	1		Bellevue	0	29.2453			
		d9c63	c3e878e27f5	2018-02-0	2018-02-0	47.621	-122.161	47.617	-122.201	EI	1	1	1	1		Bellevue					
		cce70	8d3bba7425	2018-02-0	2018-02-0	47.589	-122.321	47.599	-122.323	EI	1	1	1	2		SeattleDowntown					
		18f10	c3e878e27f5	2018-02-0	2018-02-0	47.599	-122.33	47.429	-121.995	IE	1	1	1	1	SeattleDowntown		1	52.36			
		26685	f033ab37c30	2018-02-0	2018-02-0	47.611	-122.193	47.293	-122.247	IE	2	3	2	1	Bellevue		3	68.18529			
		f477c6			2018-02-0	47.616	-122.202	47.654	-122.196	IE	1	1	1	1	Bellevue		0	27.87566			
				2018-02-0	2018-02-0	47.612	-122.345	47.598	-122.325	EI	2	3	2	1		SeattleDowntown	1	18.10218			
			d48d6a2e	2018-02-0	2018-02-0	47.617	-122.196	47.619	-122.193	II	1	1	1	1	Bellevue	Bellevue	0	7.852718			
		eac	c3e878e27f5	2018-02-0	2018-02-0	47.461	-122.235	47.616	-122.206	EI	1	1	1	1		Bellevue	0	25.12714			
		9b8bc	54229abfcfa	2018-02-0	2018-02-0	47.598	-122.333	47.625	-122.334	IE	2	3	2	1	SeattleDowntown		2	16.9657626	75.90637	3822.009	1
		e04f5	c3e878e27f5	2018-02-0	2018-02-0	47.546	-122.185	47.616	-122.193	EI	1	1	1	1		Bellevue	0	31.4			
15	40a402	ab00ca66cb	84d9ee44e4	2018-02-0	2018-02-0	47.6	-122.328	47.601	-122.323	II	1	1	1	2	SeattleDowntown	SeattleDowntown	0	3.13			
		4c66b	c3e878e27f5	2018-02-0	2018-02-0	47.622	-122.218	47.577	-122.244	IE	1	1	1	1	Bellevue		0	25.1			
		9b38	c3e878e27f5	2018-02-0	2018-02-0	47.634	-122.376	47.596	-122.323	EI	1	1	1	1		SeattleDowntown	3	10.8			
		74233	82cec96096d	2018-02-0	2018-02-0	47.651	-122.133	47.617	-122.2	EI	1	1	1	1		Bellevue	0	31.0			
		be3d	c3e878e27f5	2018-02-0	2018-02-0	47.611	-122.198	47.66	-122.201	IE	1	1	1	1	Bellevue		0	17.9			
		108c7	c3e878e27f5	2018-02-0	2018-02-0	47.588	-122.296	47.606	-122.32	EI	1	1	1	1		SeattleDowntown	0	20.1			
		ec8f1	f4f6dce2f3a	2018-02-0	2018-02-0	47.62	-122.193	47.625	-122.201	II							0	13.6			
		75348	c3e878e27f5	2018-02-0	2018-02-0	47.618	-122.202	47.7	-122.186	IE							0	34.0			
		b1f41	54229abfcfa	2018-02-0	2018-02-0	47.841	-122.108	47.603	-122.329	EI							2	58.6			
		2b940	c3e878e27f5	2018-02-0	2018-02-0	47.618	-122.197	47.709	-122.19	IE							0	24.5			
		1a23c	c3e878e27f5	2018-02-0	2018-02-0	47.561	-121.984	47.616	-122.192	EI							0	45.6			
26	71c357	ca24575024	c3e878e27f5	2018-02-0	2018-02-0	47.513	-122.257	47.615	-122.205								0	31.			
27	783a5a	3d9211ed20	c3e878e27f5	2018-02-0	2018-02-0	47.602	-122.333	47.611	-122.289	IE							0	17.3			
28	7ab3b5	0d6e8a8561	54229abfcfa	2018-02-0	2018-02-0	47.603	-122.324	47.562	-122.311	IE							2	21.8			
29	7d73a7	0b4a3d855d	c3e878e27f5	2018-02-0	2018-02-0	47.587	-122.204	47.618	-122.201	EI							0	17.6			
30	7f274b	4ece73900c	82cec96096d	2018-02-0	2018-02-0	47.611	-122.2	47.483	-121.777	IE	1	1	1	1	Bellevue		0	63.8			
31	837ad8	8efb15b0b1	82cec96096d	2018-02-0	2018-02-0	47.618	-122.229	47.615	-122.212	EI	1	1	1	1		Bellevue	0	9.37			

Trip Start & End times reveal time-of-day, day-of-week, or week-over-week patterns

Origin/Destination Zones summarize travel demand

Lat/Long points show actual Trip Origins & Destinations



Provider Type separates traffic by Fleet (trucks/vans) vs. Consumer (cars)

Trips Reports Data Fields

- TripID - A trip's unique identifier
- DeviceID - A device's unique identifier
- ProviderID - A provider's unique identifier
- StartDate - The trip's start date and time in UTC
- EndDate - The trip's end date and time in UTC
- StartLocLat - The latitude coordinates of the trip's start point
- StartLocLon - The longitude coordinates of the trip's start point
- EndLocLat - The latitude coordinates of the trip's end point
- EndLocLon - The longitude coordinates oh the trip's end
- GeospatialType - describes the trip's geospatial intersection with the requested zones (II - Internal-to-Internal; IE - Internal-to-External; EI, EE)
- ProviderType - Numeral representing the provider type (Consumer, Fleet, Mobile)
- ProviderDrivingProfile - Numeral representing the provider driving profile
- VehicleWeightClass - Numeral representing the vehicle weight class
- OriginZoneName - The origin zone of the trip, if the trip started in a zone
- DestinationZoneName - The destination zone of the trip, if the trip started in a zone
- EndpointType - Indicates if the trip starts and ends in a detected stop (blank=unknown (prior to 2017), -1 = Unknown, 0 = Trip does not start or end at stop, 1 = Trip starts at stop, 2 = Trip ends at stop, 3 = Trip starts and ends at stop)
- MovementType - 1 = Moving Trip, 0 = Non-moving Trip
- OriginCensusBlockGroup - Census Block Group of origin (US only)
- DestinationCensusBlockGroup - Census Block Group of desetination (US only)

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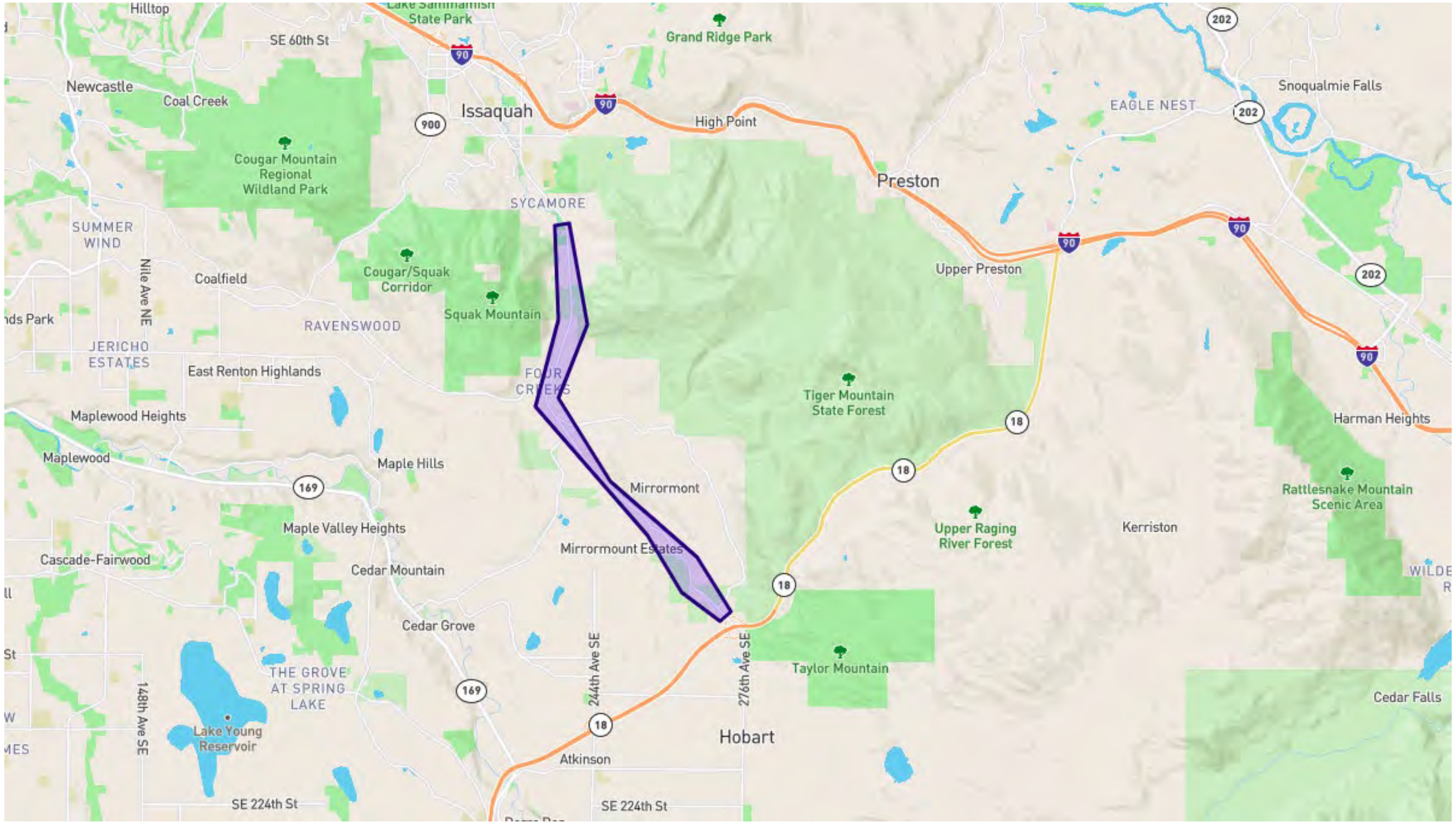
Corridor Sample – Issaquah Hobart Rd SE

Sample includes all trips that started-ended-traversed the zone: November 4-10, 2018



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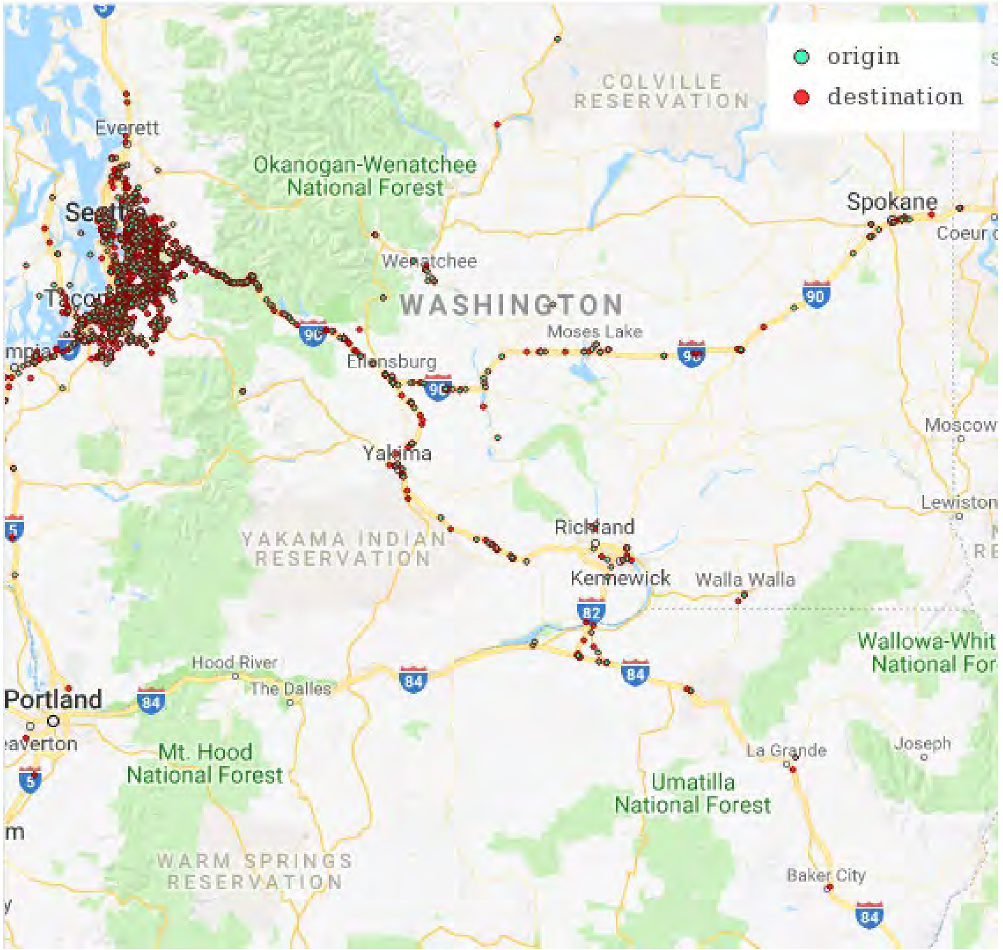
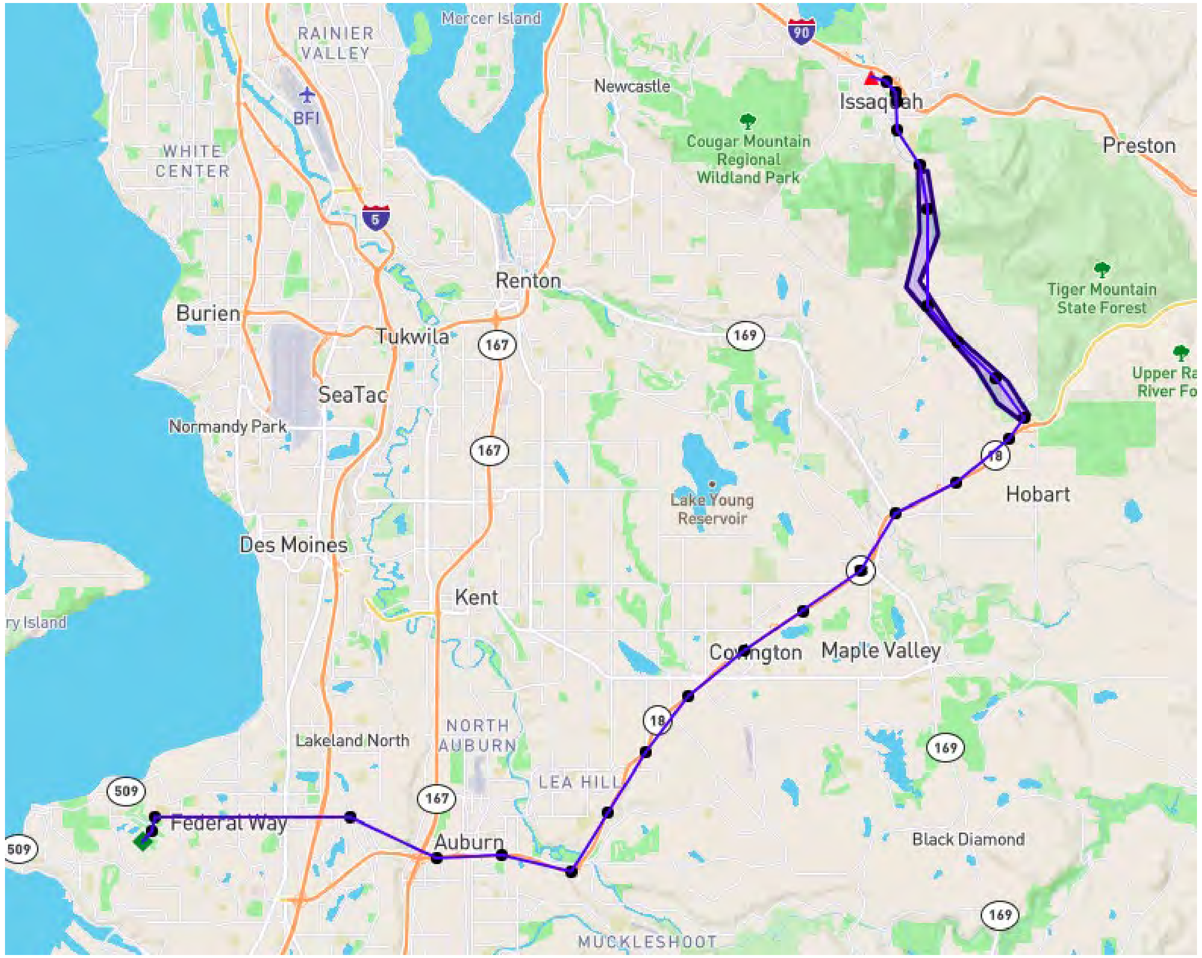


2300 Trips – O/D Plot



77,985 Waypoints – Single Trip Visualization

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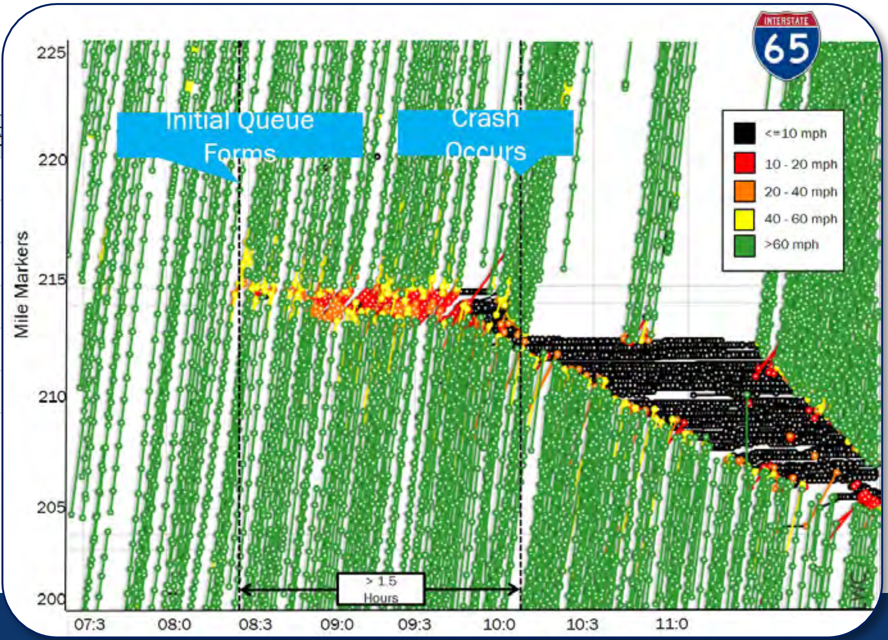
Trip Reports

Individual Trip Records with vehicle metadata

TripId	DeviceId	ProviderId	Mod	StartDate	Start	EndDate	End	StartL	StartLoc	EndLocL	EndLocL	IsStartH	IsEndHome	ProviderTyp	ProviderDr
5eaf7dcb	2da99c8b67	a8c88a0055	1	2015-10-12T16	1	2015-10-12T16	1	24.5457	46.6719	24.5467	46.6702	0	0	3	3
1c34352e	bd52b5a7e	a8c88a0055	1	2015-10-12T04	1	2015-10-12T04	1	24.5546	46.5097	24.5447	46.5132	0	0	3	3
2d5a4d24	e1846b8ea	3fe94a00231	1	2015-10-13T13	2	2015-10-13T13	2	24.5914	46.5704	24.5986	46.6914	0	0	1	3
97ecbafc	a77133fbf0	58238e9ae2	1	2015-10-12T15	1	2015-10-12T15	1	24.7537	46.6546	24.7802	46.6344	0	0	1	3
0b72ab74	8267ba2bc	3fe94a00231	1	2015-10-12T19	1	2015-10-12T19	1	24.5966	46.6544	24.5991	46.65	0	0	1	3
31cc5b4b	8c194cae7	a8c88a0055	1	2015-10-13T13	2	2015-10-13T13	2	24.7951	46.7268	24.8036	46.7523	0	0	3	3

Trip Waypoints

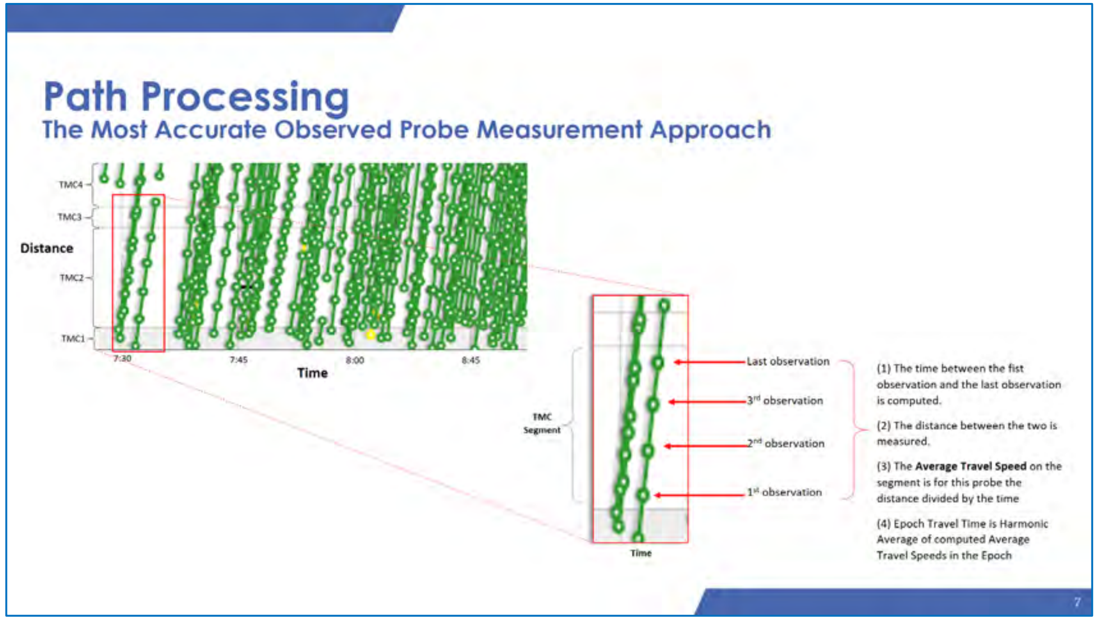
TripId	WaypointSec	CaptureDate	Latitude	Longitude
037e2949223f6bec276c5d3b3bf	1	2015-10-12T00:54:23.000Z	24.6046	46.6573
037e2949223f6bec276c5d3b3bf	2	2015-10-12T00:55:30.000Z	24.605	46.6579
037e2949223f6bec276c5d3b3bf	3	2015-10-12T00:56:31.000Z	24.605	46.658
037e2949223f6bec276c5d3b3bf	4	2015-10-12T00:58:48.000Z	24.6049	46.658
037e2949223f6bec276c5d3b3bf	5	2015-10-12T01:01:58.000Z	24.6058	46.6592
037e2949223f6bec276c5d3b3bf	6	2015-10-12T01:06:15.000Z	24.6037	46.6602

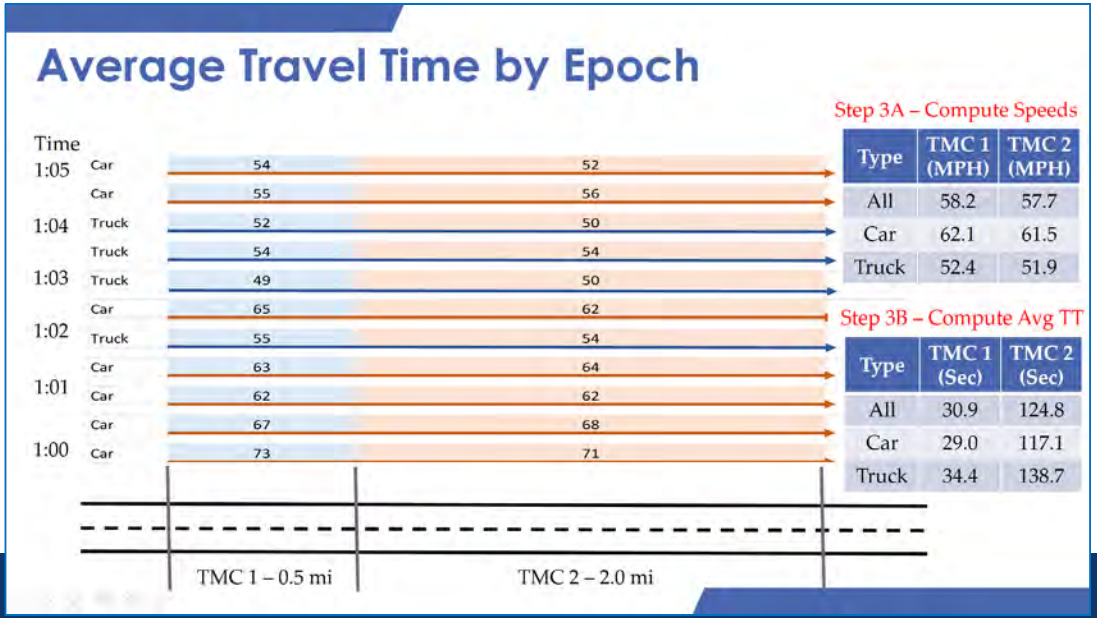


INRIX

NPMRDS – Point Paired Speeds

- Actual Observed crossing speeds
- 5-minute bins
- Averages for Cars, Trucks, All
- Sample size indicator
- Epochs filled with Nulls (in data gaps)
- Inner/outer TMC segments provided
- Easy access via UMD data portal





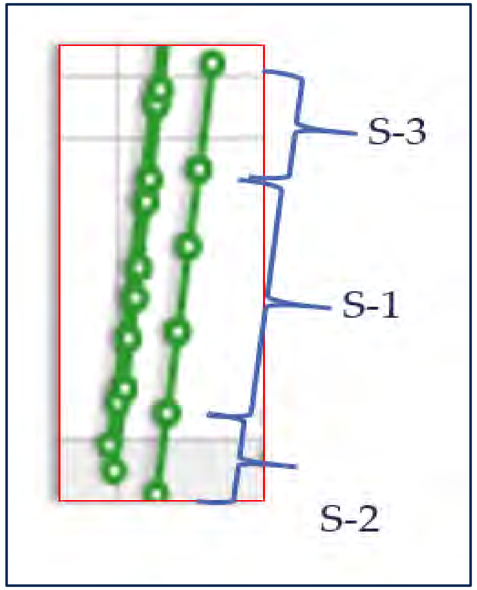
INRIX

26

Historical Speed Profile (Path Processed Observations)

Data provided in time bins of 15 minute or one hour for the typical 7 day week with detailed statistics (672 bins):

- TMC - 9 character TMC code (Section Identifier)
- DayOfWeek - 1 through 7, where 1=SUN, 2=MON, … 7=SAT
- MinutesFromMidnight - start time of bin in minutes after midnight.
- Stddev – standard deviation of distribution in MPH.
- AveSpeed – Average Speed for the segment in MPH
- TravelTime – Travel Time in Seconds
- Percentile5 – speed of 5th percentile of sample
- Percentile10 – speed of 10th percentile of sample
- Percentile15 – speed of 15th percentile of sample
- Percentile20 – speed of 20th percentile of sample
- Percentile25 – speed of 25th percentile of sample
- Percentile30 – speed of 30th percentile of sample
- Percentile40 – speed of 40th percentile of sample
- Percentile50 – speed of 50th percentile of sample
- Percentile60 – speed of 60th percentile of sample
- Percentile70 – speed of 70th percentile of sample
- Percentile75 – speed of 75th percentile of sample
- Percentile80 – speed of 80th percentile of sample
- Percentile85 – speed of 85th percentile of sample
- Percentile90 – speed of 90th percentile of sample
- Percentile95 – speed of 95th percentile of sample

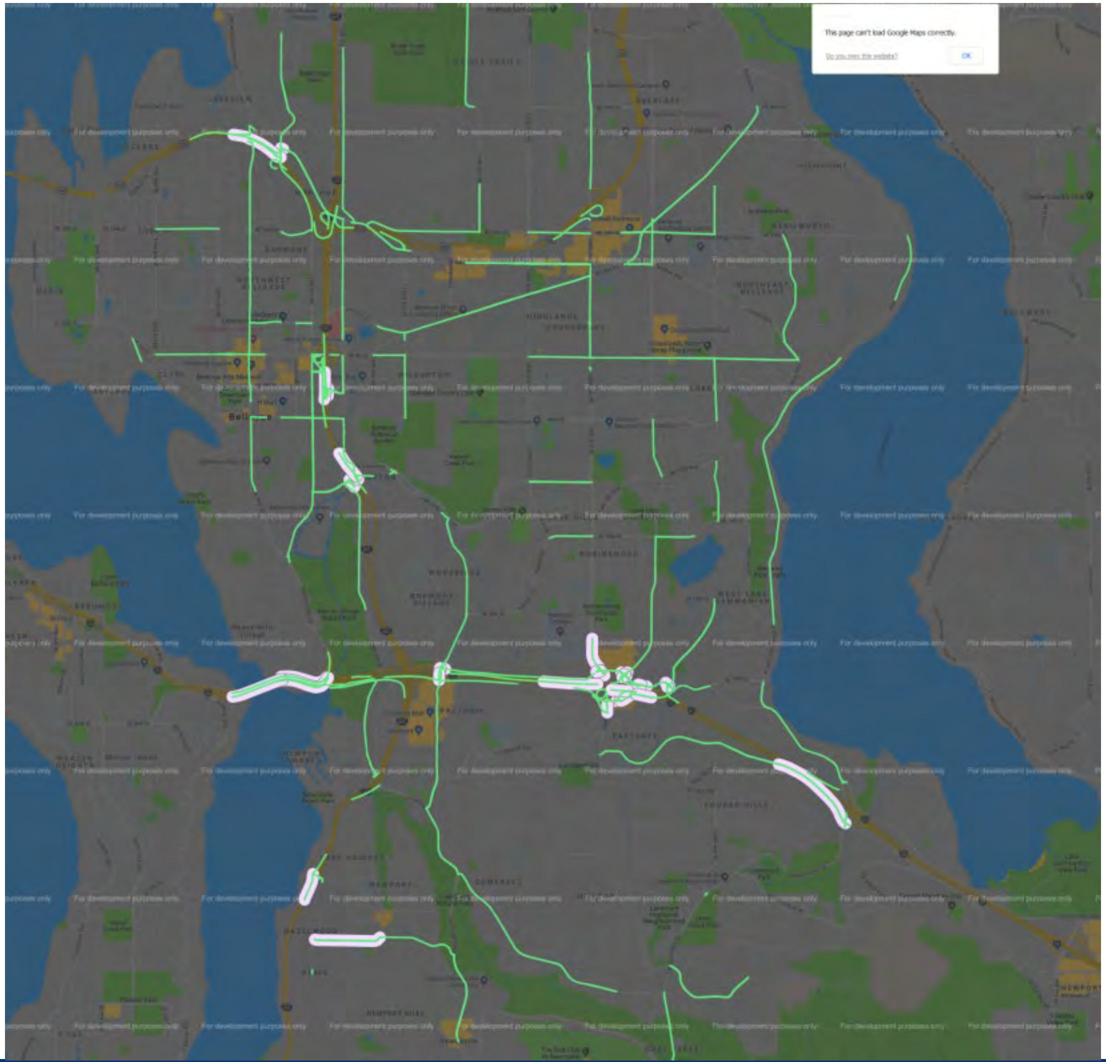


- FailureRate10 – percent slower than 10 mph
- FailureRate20 – percent slower than 20 mph
- FailureRate30 – percent slower than 30 mph
- FailureRate40 – percent slower than 40 mph
- FailureRate50 – percent slower than 50 mph
- FailureRate60 – percent slower than 60 mph
- FailureRate70 – percent slower than 70 mph
- FailureRate80 – percent slower than 80 mph
- FailureRate90 – percent slower than 90 mph

Bellevue Profile

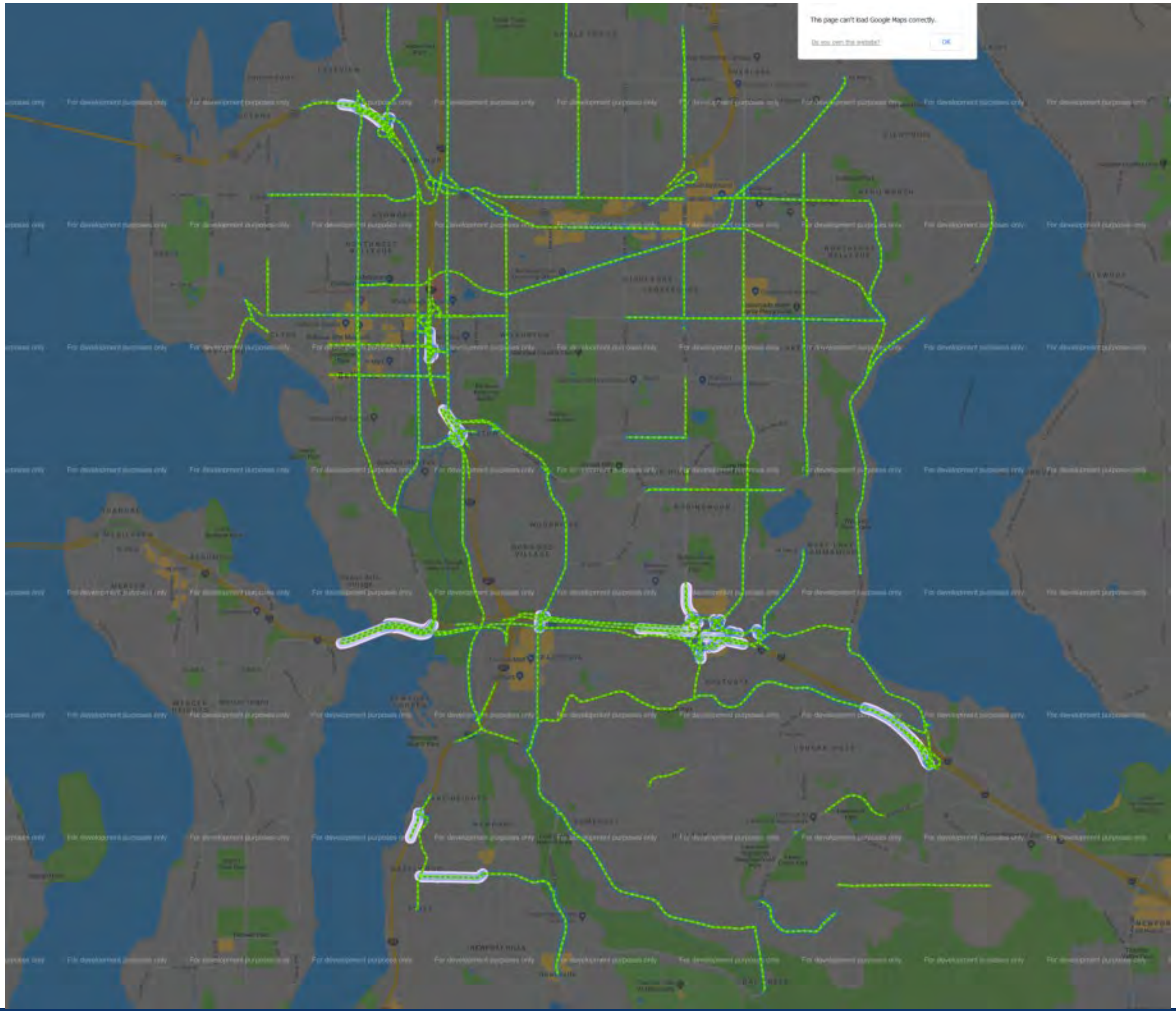
Links where the 99th percentile speed is 15x higher than the 50th percentile

Bellevue Profile



Links where the 95th percentile speed is 7x higher than the 50th percentile

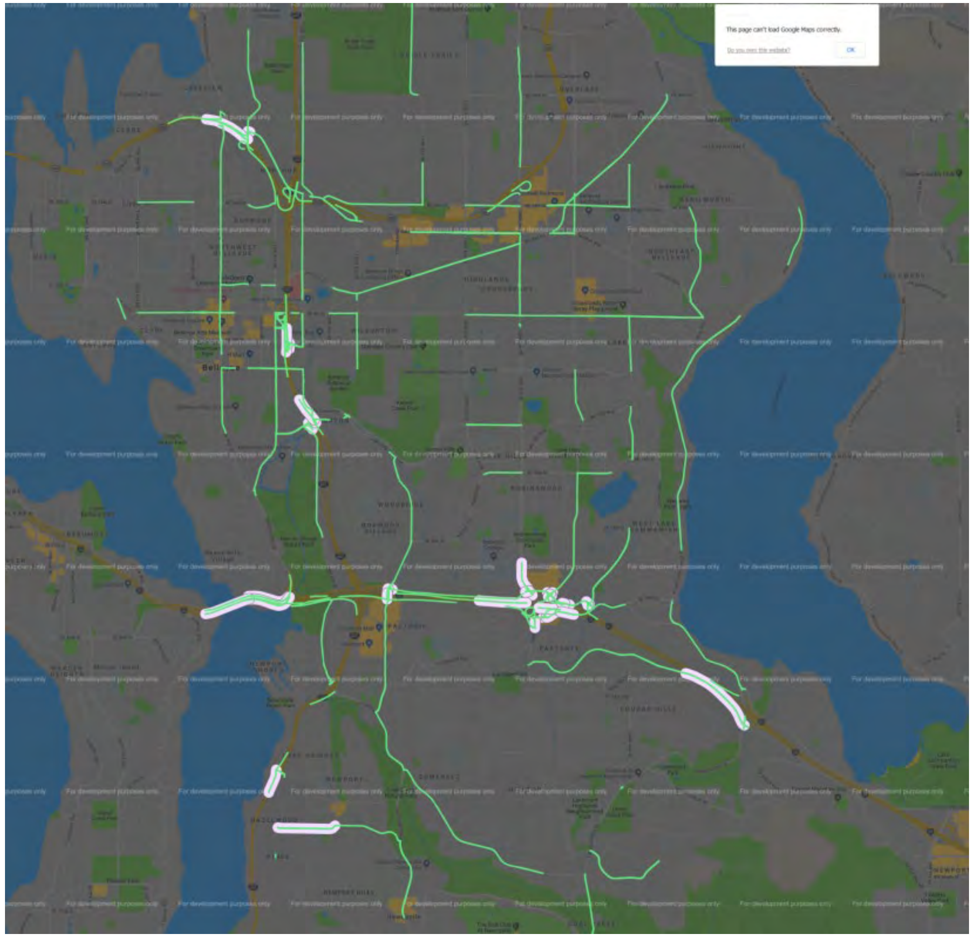
Bellevue Profile

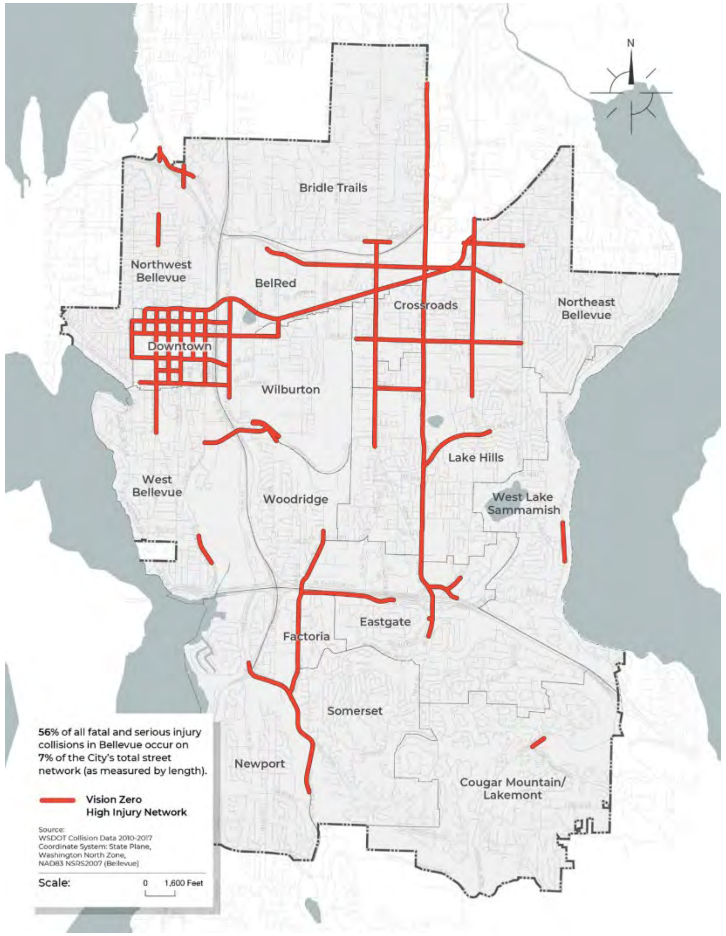


Links where 85th percentile is 4x higher than the 50th percentile

Next Steps

Compare speed stats for specific magnitudes and time periods with high injury locations





Thank You

Ted Trepanier
ted@inrix.com

Lessons Learned from Speed Reduction

Bellevue Vision Zero Summit

Mark Bandy, PE
Director of Transportation Operations

February 2019 **Seattle Department of Transportation**

City of Seattle

Presentation overview

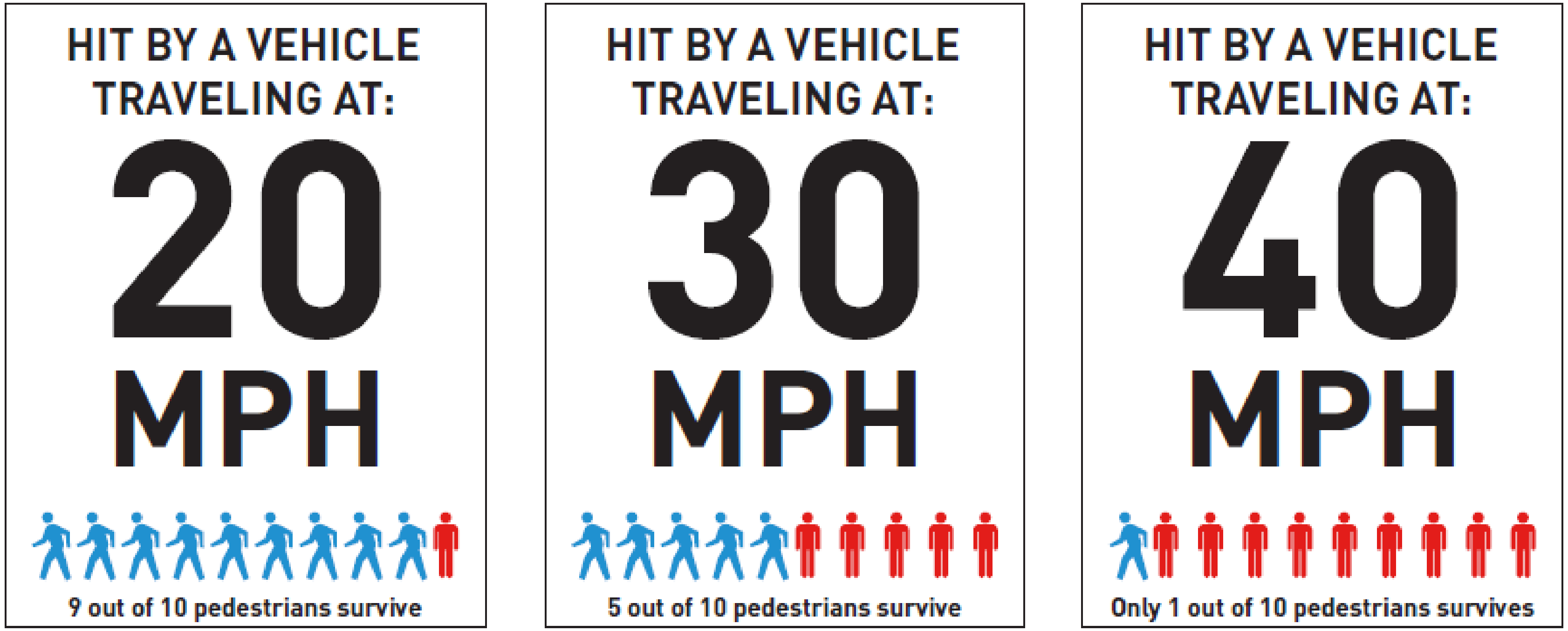
- Seattle's Vision Zero Program
- Default Speed Limit Change
- Speed Limit Review Workplan
- Lessons Learned

Vision Zero

- End traffic deaths and serious injuries by 2030
- Funded through a 9-year transportation levy
    - Engineering
    - Education
    - Enforcement
    - Evaluation

The Role of Speed

- Speed is a key factor in the frequency and severity of crashes
- Key part of Seattle's Vision Zero efforts

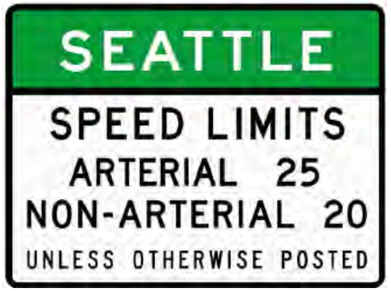


Timeline

2015

Rainier Ave S rechannelization (30-> 25 MPH)
35th Ave SW rechannelization (35-> 30 MPH)

2016



2017

Began urban village evaluations

2018

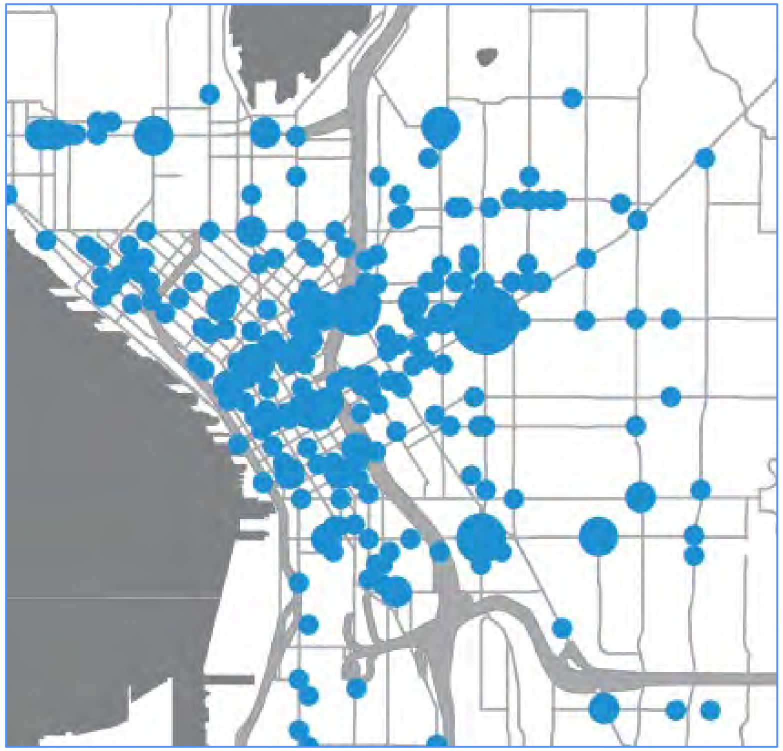
Five urban villages speed limits reduced to 25 MPH

Default Speed Limit Change

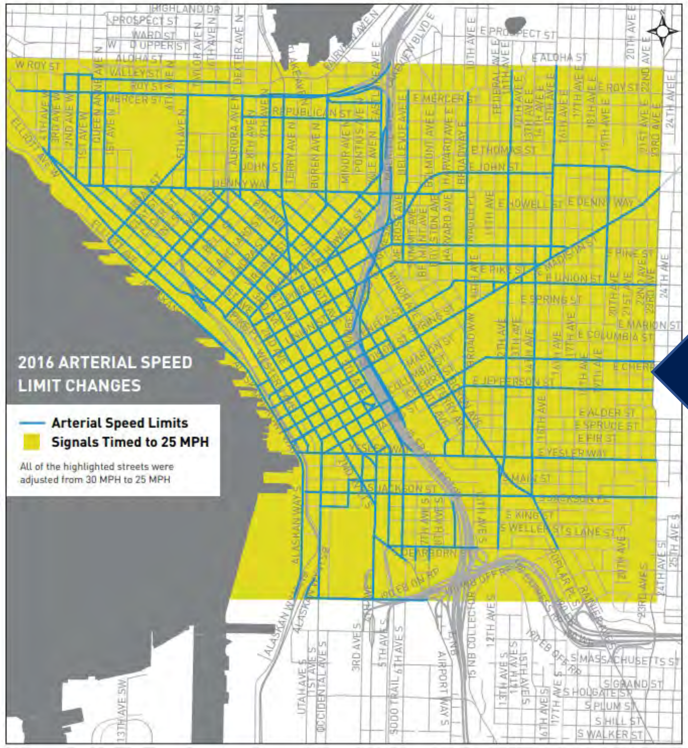
- City ordinance establishes default speed limits for arterial and non-arterial streets
- Changed to 25 mph for arterials and 20 mph for non-arterials
- Revised 'gateway' signing
- Associated education & public awareness campaign

Prioritization

Focused on where pedestrian crashes are happening



2015 Pedestrian Crash locations

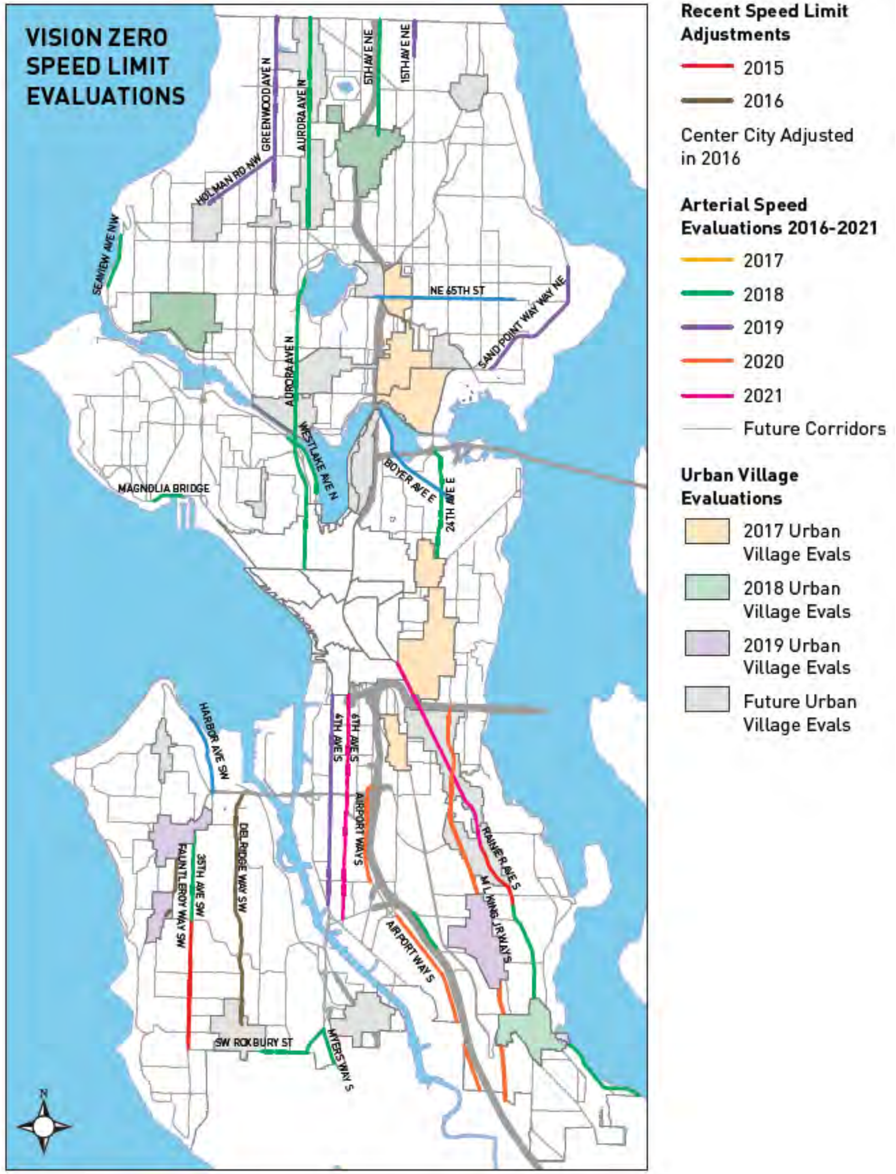


2016 CBD speed limit changes

Traffic signals were re-timed to match posted speed limit of **25 MPH**

Speed limit evaluation schedu

- Prioritizing urban villages (think: neighborhood business districts)
- Evaluating speed limits on corridors that have been redesigned

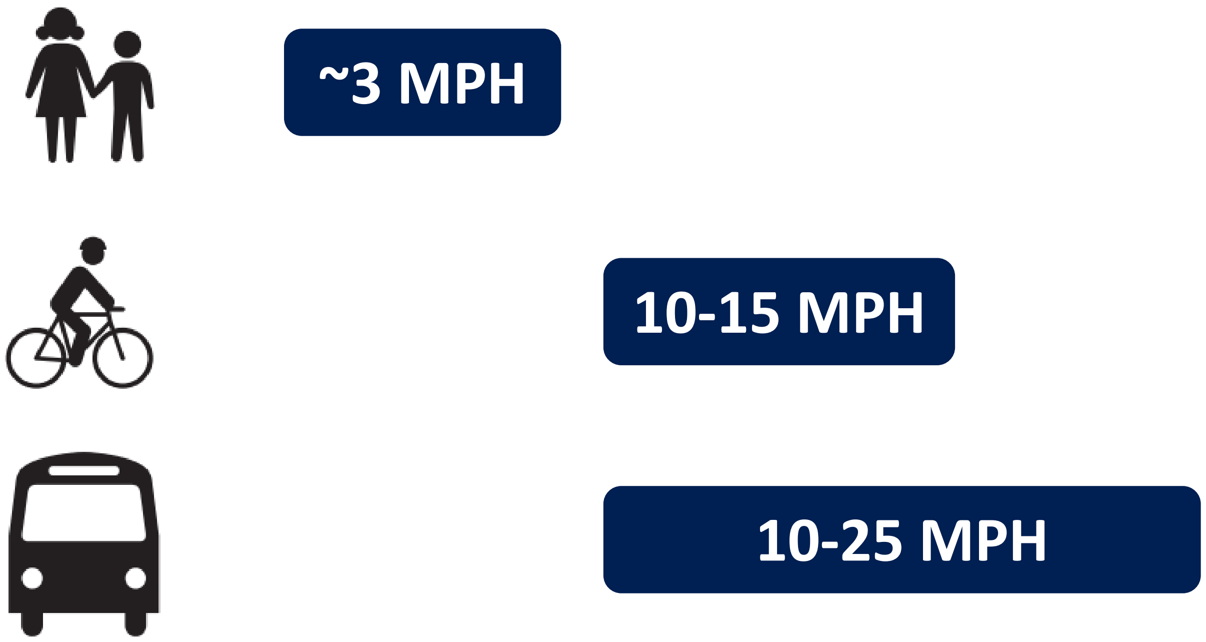


2017 Vision Zero Progress Report

Urban villages

Why 25 MPH?

Land use within urban villages supports more people walking, biking, and taking transit

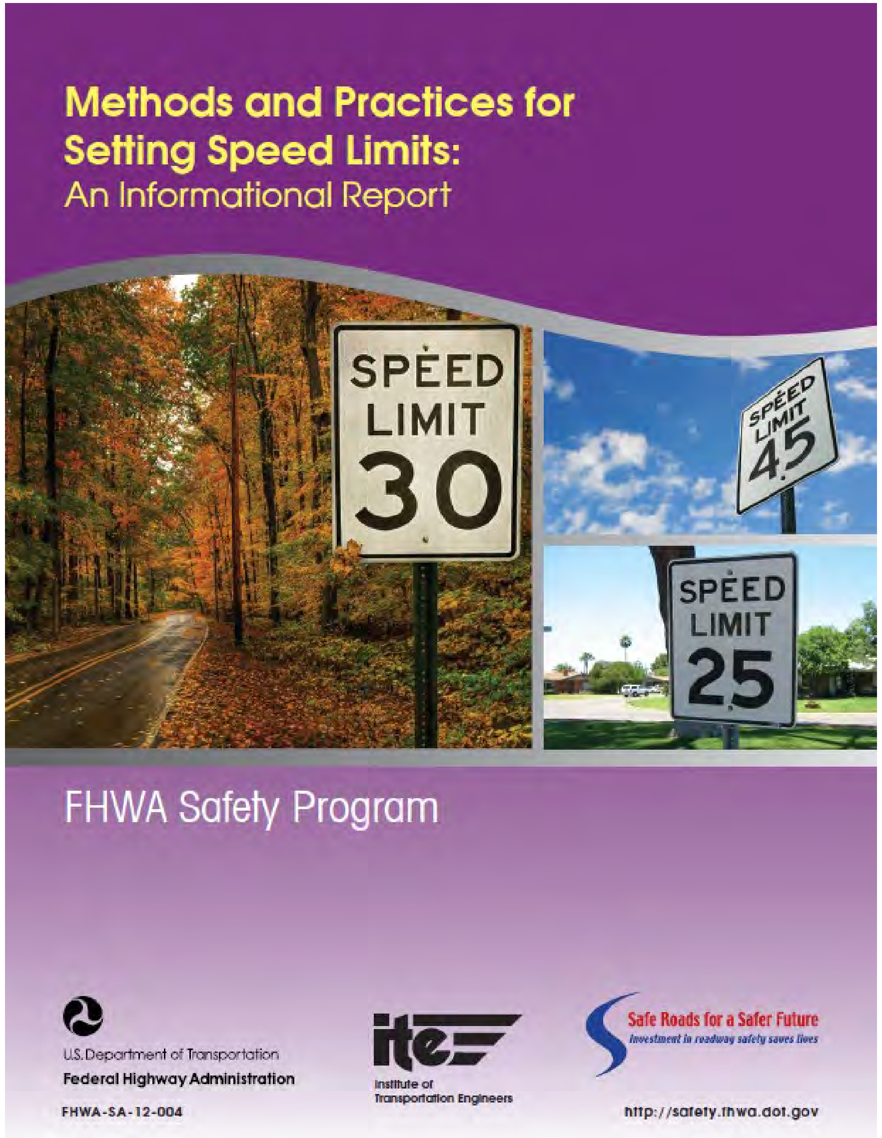


Operating speeds within Urban Villages

Methodology

What we're looking at

- 50th percentile speeds (USLimits2)
- Factors being considered:
  - Traffic signal density
  - Pedestrian and bicycle activity
  - Parking activity
  - Driveway activity



FHWA-SA-12-004 (2012)

Example Treatment: Lane narrowing
Delridge Way SW

Before

After

Lessons Learned

- Non-arterial/residential 20 mph widely supported
  - 2,400 miles streets (~60% of street network)
  - Speeds are typically less than 20 mph due to geometry
  - Reduces signing needs, such as warning signs for speed humps
  - Increases requests for traffic calming
- Speed limit revisions in Urban Centers/Villages provide more focused awareness
- Difference in expectation with some public audiences and elected officials (i.e. not every arterial street in the city is 25mph)

Questions?

mark.bandy@seattle.gov

https://www.seattle.gov/visionzero

Seattle Department of Transportation

City of Seattle

TARGET ZERO

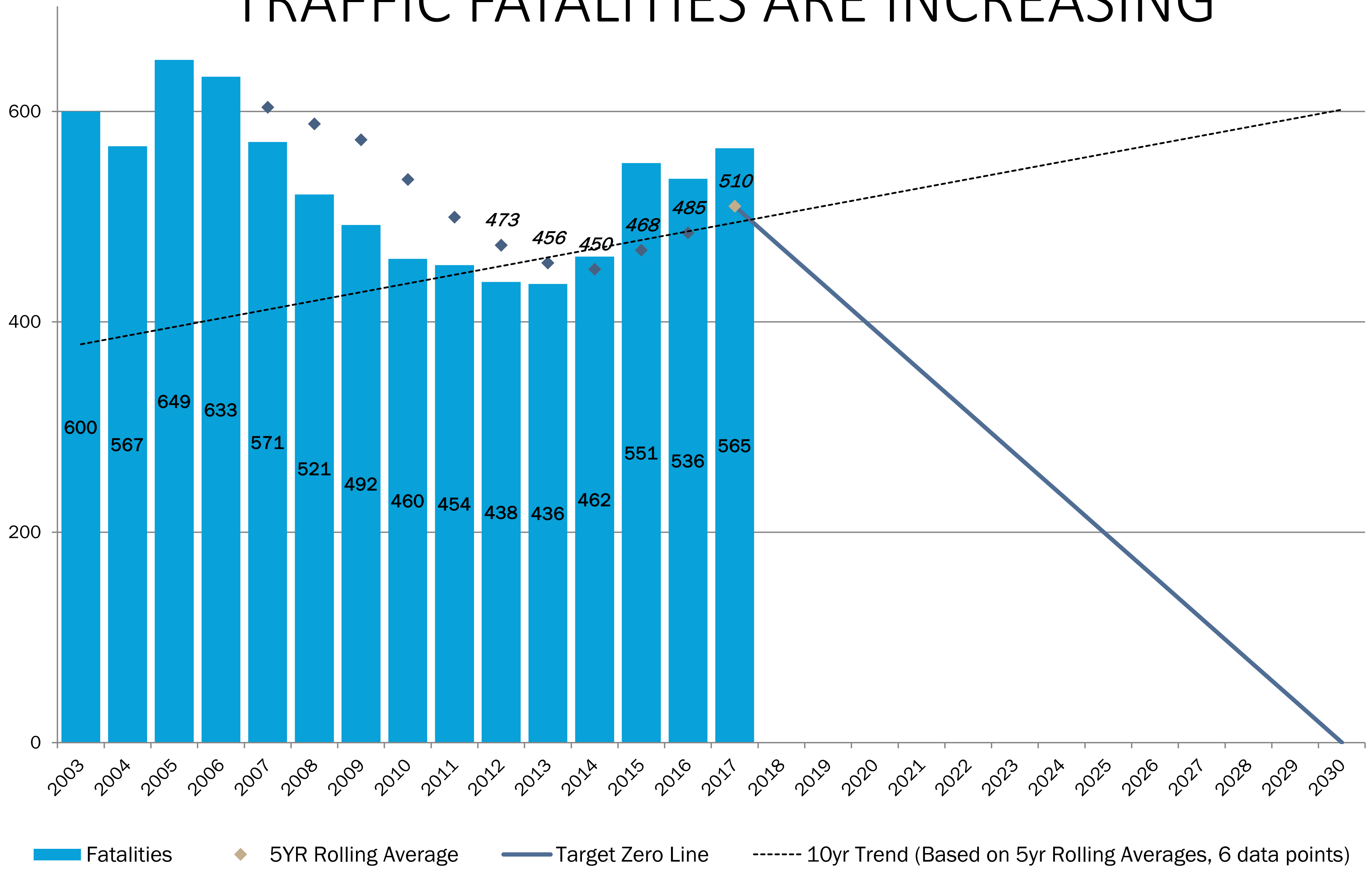
Bellevue Vision Zero Summit

Safe People

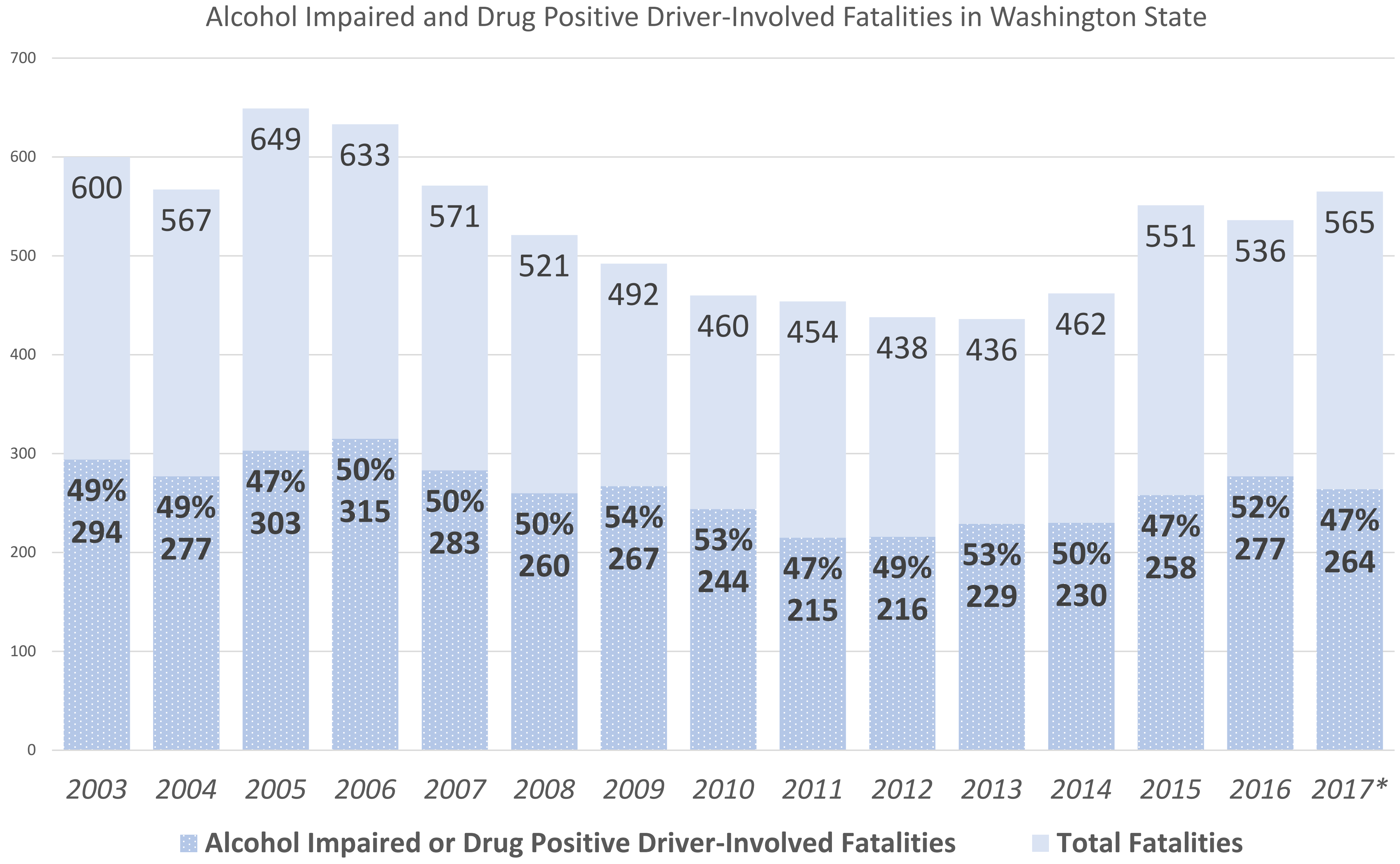
Local Strategies to Address the National DUI Epidemic

Darrin Grondel, Ed.D.: Director, WA Traffic Safety Commission

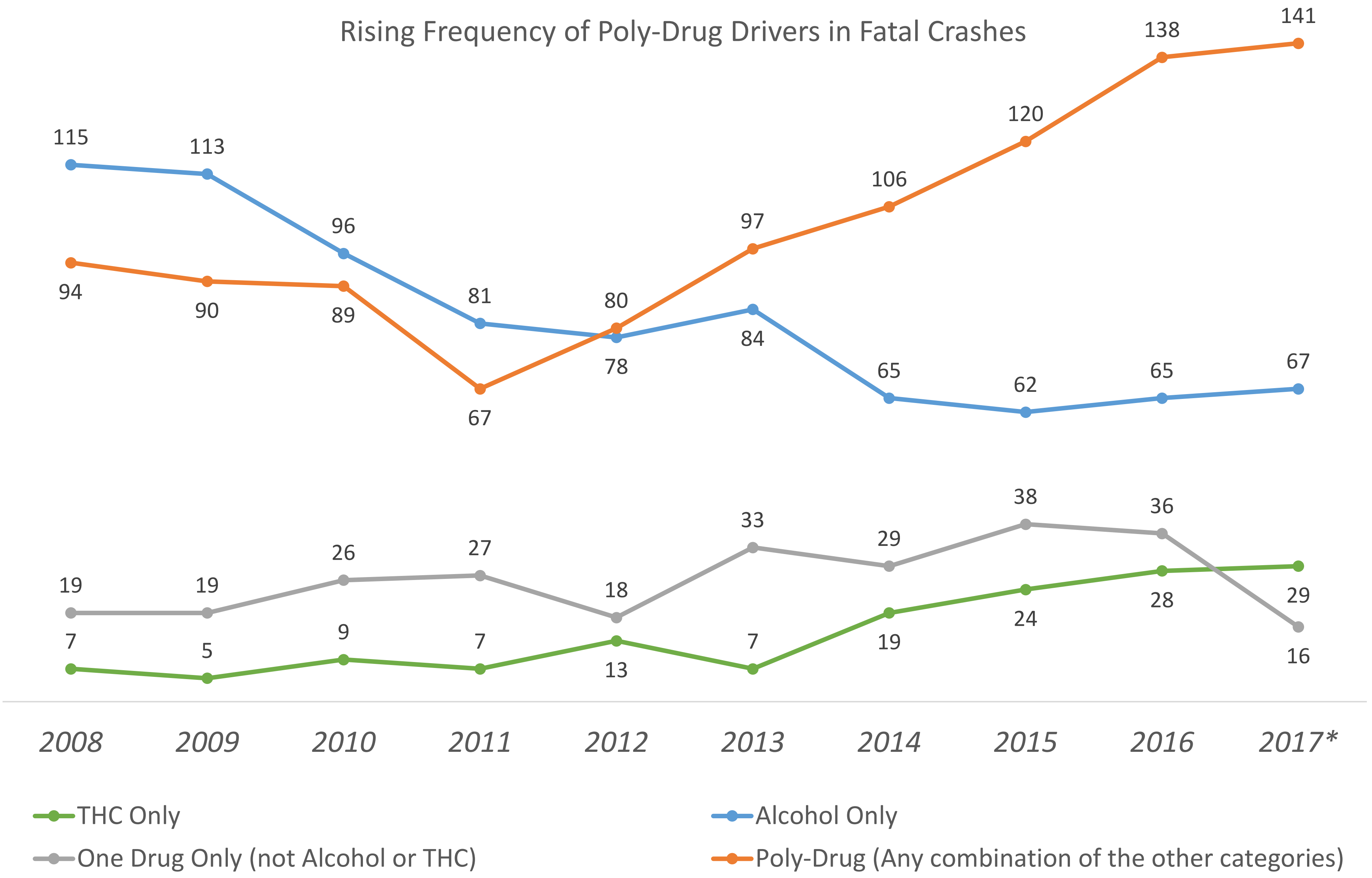
TRAFFIC FATALITIES ARE INCREASING



IMPAIRMENT IS STILL INVOLVED IN ~50% OF TRAFFIC FATALITIES



POLY-DRUG DRIVING



TARGET ZERO - IMPAIRED DRIVING BEST PRACTICES -LOCAL LAW ENFORCEMENT IMPLEMENTATION

- Law Enforcement DUI Training/Mentoring

LAW ENFORCEMENT DUI TRAINING/MENTORING

TARGET ZERO - IMPAIRED DRIVING BEST PRACTICES -LOCAL LAW ENFORCEMENT IMPLEMENTATION

- Law Enforcement DUI Training/Mentoring
- E-Warrants for DUI

E-WARRANTS FOR DUI

WASHINGTON STATE
DUI ARREST REPORT
REPORT OF BREATH / BLOOD TEST FOR ALCOHOL AND/OR THC OR REFUSAL TO SUBMIT TO BREATH TEST FOR ALCOHOL

SUBJECT'S NAME (LAST, FIRST, MI)	SEX ☐ M ☐ F	DATE OF BIRTH	DATE / TIME OF ARREST
STREET ADDRESS	CITY / STATE / ZIP CODE		

DRIVER'S LICENSE NUMBER	CDL ENDORSED? (CHECK IF YES) ☐	STATE	COUNTY OF ARREST	CASE / CITATION NUMBER

BAC Readings - DataMaster 1st Sample _____ 2nd Sample _____ **Refused Test** _____
BAC Readings - Draeger 1st Sample (IR) _____ 2nd Sample (IR) _____ **Blood Alcohol** _____
1st Sample (EC) _____ 2nd Sample (EC) _____ **Blood THC** _____

The subject was lawfully arrested. At that time, there were reasonable grounds to believe that the arrested person had been driving or was in actual physical control of a motor vehicle within this state while under the influence of intoxicating liquor or drugs, or both, or was under the age of twenty-one years and had been driving or was in actual physical control of a motor vehicle while having an alcohol or THC concentration in violation of RCW 46.61.503.

After receipt of any applicable warnings required, the person refused to submit to a test of his or her breath, or a test was administered and the results indicated that the alcohol concentration of the person's breath or blood was 0.08 or more, or the THC concentration of the person's blood was 5.00 or more, if the person is age twenty-one or over, or that the alcohol concentration of the person's breath or blood was 0.02 or more, or the THC concentration of the person's blood was above 0.00, if the person is under the age of twenty-one.

☐ **Driver's Hearing Request Information was given to the arrested person.**

Notice of Right to Hearing: I have been given written notice of my right to a hearing, including the steps required to obtain a hearing, and understand that the notice of suspension, revocation, or denial of license will be mailed to the address of record on file with the Department of Licensing.

SIGNATURE OF DRIVER DATE

Complete this box ONLY if the arrested person was driving a commercial motor vehicle as defined in Chapter 46.25 RCW at the time of the incident.

☐ Operating a Vehicle Requiring a Commercial Driver's License

There were reasonable grounds to believe that the driver was driving a commercial motor vehicle while having alcohol, marijuana, or any drug in his or her system or while under the influence of alcohol, marijuana, or any drug. The driver was informed that refusing the breath test would result in disqualification from operating a commercial motor vehicle under RCW 46.25.090. A breath test was administered and the result indicated an alcohol concentration of 0.04 or more OR the person refused the breath test OR a blood test was administered pursuant to a search warrant, a valid waiver of the warrant requirement, when exigent circumstances exist, or under any other authority of law AND the blood test indicated an alcohol concentration of 0.04 or more or any measurable amount of THC concentration.

VEH YEAR	MAKE	MODEL	LICENSE PLATE NUMBER	STATE	HAZARDOUS MATERIAL? ☐ YES ☐ NO

NOTE: If applicable, sign and date this page after toxicology report is received.

I certify (or declare) under penalty of perjury under the laws of the state of Washington that the foregoing and the accompanying reports/copies of documents and the information contained therein are true, correct, and accurate. (RCW 9A.72.085.)

LAW ENFORCEMENT AGENCY	ORI NO. (9 digits)	OFFICER'S SIGNATURE	DATE SIGNED
MAILING ADDRESS		PRINTED NAME OF OFFICER	BADGE NUMBER
CITY	STATE ZIP	PLACE SIGNED (city / county / state)	CONTACT PHONE NUMBER FOR HEARING (include area code) ( )
OFFICER'S E-MAIL ADDRESS			

OFFICERS: Fax or e-mail complete report, test result document, and supplemental reports to:

Department of Licensing
Driver Records
SwornReports@DOL.WA.GOV
Fax: (360) 570-7026

Number of pages_________

USE THIS PAGE AS COVER SHEET

TARGET ZERO - IMPAIRED DRIVING BEST PRACTICES -LOCAL LAW ENFORCEMENT IMPLEMENTATION

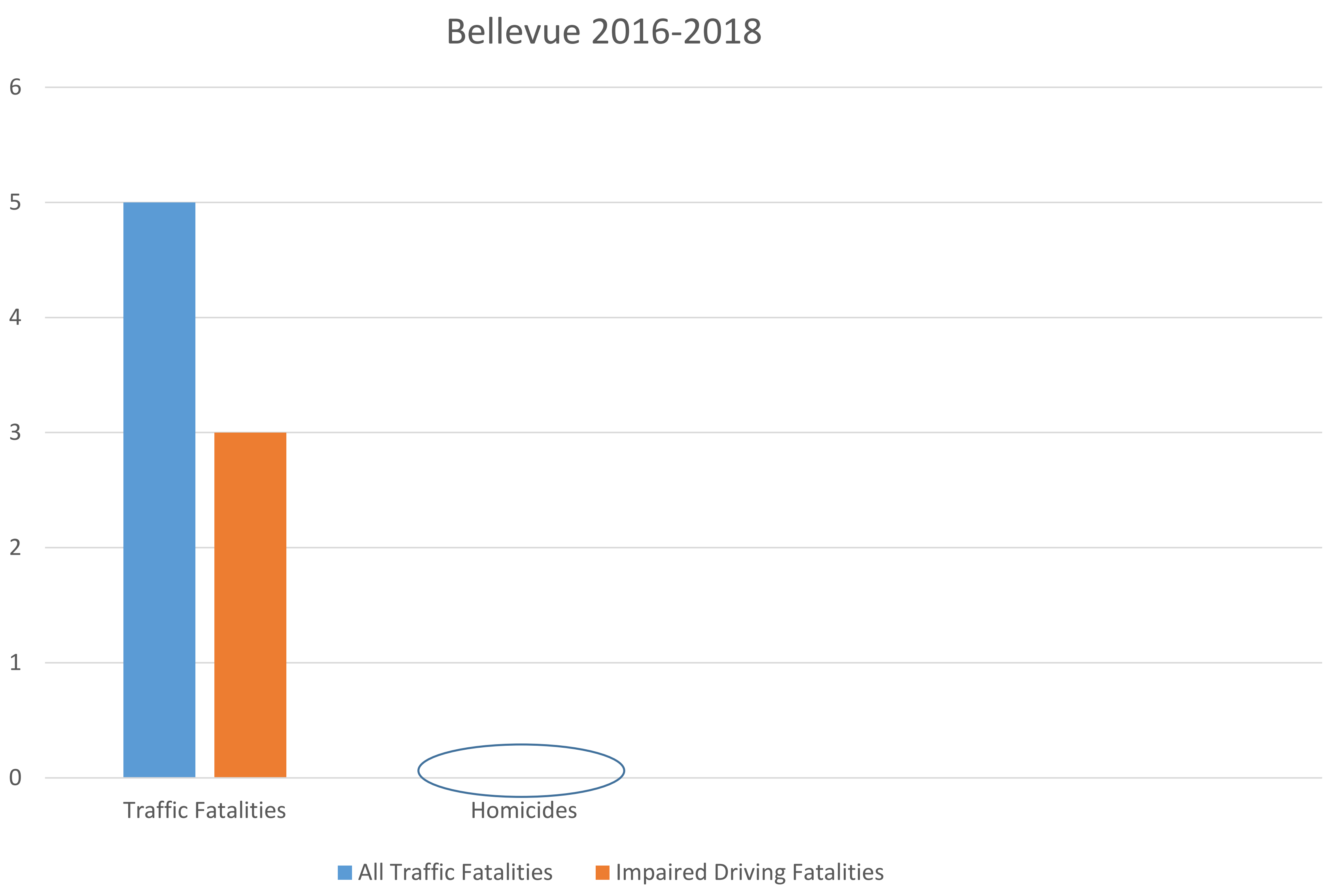
- Law Enforcement DUI Training/Mentoring
- E-Warrants for DUI
- Law Enforcement Phlebotomy Program

LAW ENFORCEMENT PHLEBOTOMY PROGRAM

https://www.thenewstribune.com/news/local/crime/article136373773.html

https://q13fox.com/2017/03/02/lakewood-police-officers-to-collect-blood-specimen-from-dui-suspects/

HOMICIDES VS. TRAFFIC FATALITIES



AUTOMATED ENFORCEMENT

OTHER DUI STRATEGIES FOR LOCAL JURISDICTIONS

- DUI Therapeutic Court
- DUI Resource Prosecutor Program
- Dedicated DUI Officers
- Monitoring of DUI arrests
- Work with LCB on compliance checks
- Alternative transportation programs
- Active participation in the King County Traffic Safety Task Force

DARRIN T. GRONDEL, DIRECTOR
Washington Traffic Safety Commission
(360) 725-9898
dgrondel@wtsc.wa.gov

When is a Crash a Crime?

Amy J. Freedheim

Senior Deputy Prosecuting Attorney
King County PAO - Felony Traffic
516 Third Ave, Seattle, WA 98104
206-477-1921
Amy.Freedheim@kingcounty.gov

Accident

- Unforeen event without apparent cause
- Misfortune
- Mishap

- Unexpected, sudden event without intent, through carelessness, unawareness, ignorance, that produces unfortunate result

Collision

- violent forcible contact between two or more objects

Motor vehicle crashes

- 6^{th} leading cause of preventable death
  - 4x greater than gun deaths
- Leading cause of death 1-37yO
- Leading cause of death in children 10-19yO
- Societal costs exceed $150 billion annually

Intentional v. unintentional

results

Intentional crash

Assault 2°

- Deadly weapon prong
  - RCW 9A.36.021(1)(c)
  - The vehicle is a device/instrument, which under the circumstances in which it is used, attempted to be used, or threatened to be used, is readily capable of causing death or substantial bodily harm.

Unintentional crash

Vehicular assault/homicide

- Under the influence of alcohol/drugs/weed
- Reckless manner
- Disregard for the safety of others (DSO)

Substantial Bodily Harm

- involves a *temporary but substantial* **disfigurement**,

- causes a *temporary but substantial* **loss or impairment of the function of any part or organ of the body,**

- a **fracture** of any bodily part

DUI

- Alcohol impairment
  - Per se = .08 within 2 hrs of crash
  - Affected by

*Marijuana impairment

*Per se = 5ng THC within two hours

* Affected by

* Drug impairment
  - No per se in WA
  - Affected by

Reckless manner

- Rash and heedless, indifferent to the consequences
  - Driving wrong-way on road
  - Extreme speed
  - Racing another vehicle
  - Intentionally through red lights or stop signs
  - Aggressively weaving in traffic

DSO

- Aggravated negligence, more than ordinary negligence
- Conscious disregard

More than ordinary negligence

- Electronic distraction
- Drowsy driving
- Distraction – what was happening in car

Types of Distraction

- Manual
  - Taking one or both hands off wheel
- Visual
  - Not looking at road ahead
- Cognitive
  - Mind not focused on driving

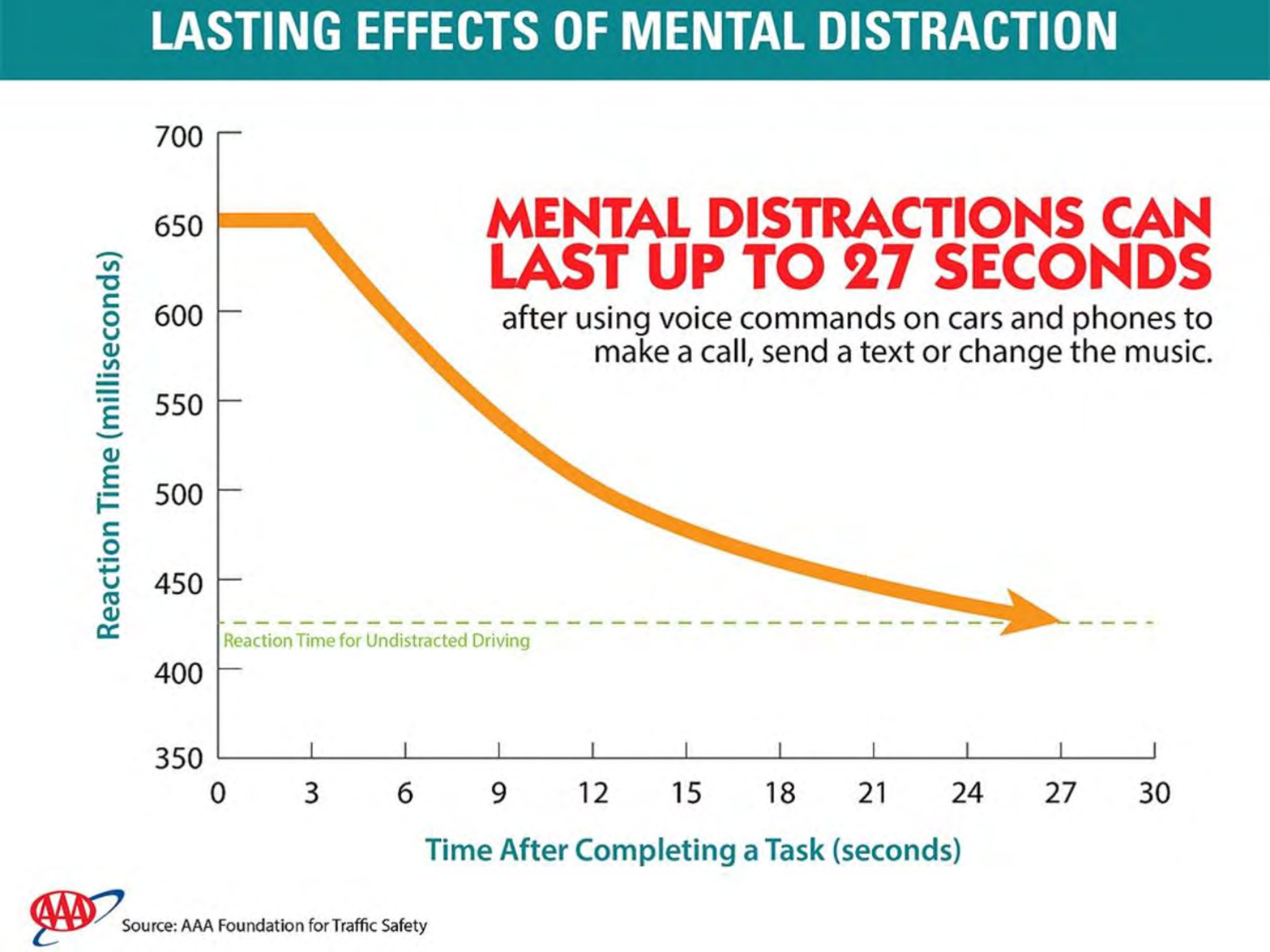
Common Distractions

- Eating
- Adjusting radio
- Irritable child
- Applying make-up/shaving/brushing teeth
- Listening to audiobook
- Thinking about problems/issues
- Regulating heater/air conditioner

Electronic Distraction

- Crash risk increases 3.6 times with hand-held device
- Inattentional blindness
  - 27sec recovery from texting
  - Failure to “see” visual cues
- 4.6 seconds to read/send text
  - At 55mph, length of football field


MENTAL DISTRACTION RATING SYSTEM
Even with your eyes on the road and your hands on the wheel, mental distractions dangerously affect drivers behind the wheel.
Mild Danger
Example: Listening to the radio or an audio book
Moderate Danger
Example: Talking on a hand-held phone or a hands-free phone
High Danger
Example: Using voice-activated texting or email feature
John Doe
End Call
TO: SUSIE
I'm on my way home. See you soon.
AAA
AAA.com/distraction



LASTING EFFECTS OF MENTAL DISTRACTION
MENTAL DISTRACTIONS CAN LAST UP TO 27 SECONDS
after using voice commands on cars and phones to make a call, send a text or change the music.
Reaction Time (milliseconds)
700
650
600
550
500
450
400
350
Reaction Time for Undistracted Driving
0
3
6
9
12
15
18
21
24
27
30
Time After Completing a Task (seconds)
AAA
Source: AAA Foundation for Traffic Safety

Challenges for LE

- What activities was driver doing?
- Collecting/preserving evidence of distraction with witnesses/forensics
- Demonstrating choice to engage in activity put lives in danger
- Consequences of behavior

Is it more than ordinary negligence?

"A crime persevered in a thousand centuries ceases to be a crime, and becomes a virtue. This is the law of custom, and custom supersedes all other forms of law.“

~Mark Twain

Safe System for Safe/r People:

Considerations for vulnerable populations

(Image: FOX)

Presented by:

Dr. Offer Grembek

Berkeley SafeTREC

Collaborative Sciences Center for ROAD SAFETY

Presented at:

Bellevue Vision Zero Summit

February 13, 2019

What is a safe transportation system?

a system in which people cannot die despite human error.

Job, and Sakashita. 2016a

safe system

Berkeley SafeTREC

What is a dangerous transportation system?

dangerous system

a system in which people can die with <u>no human error</u> (e.g., mine field, avalanche area).

Job, and Sakashita. 2016a

Our system is not safe and also not dangerous

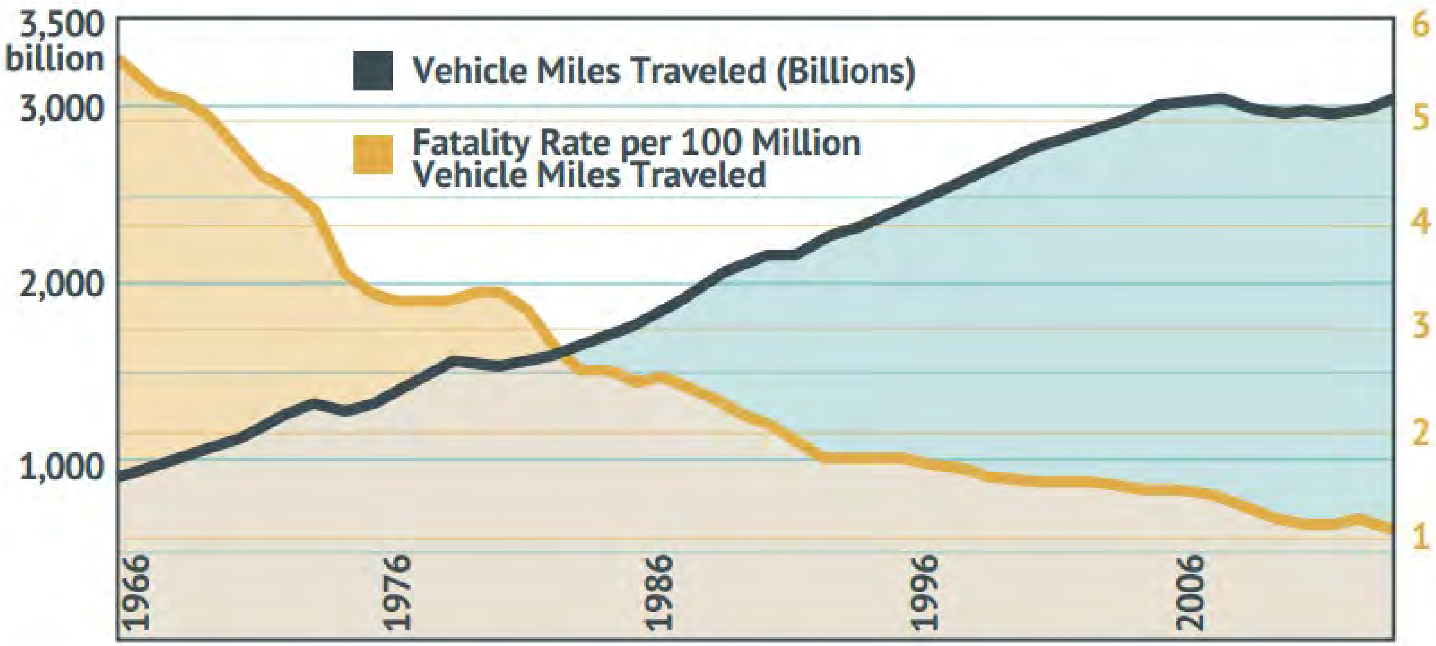


FIGURE 1-3: Fatality Rate and Vehicle Miles Traveled, 1966-2013 (Source: NHTSA FARS)

unsafe system

a system in which people can die <u>through</u> human error

Job, and Sakashita. 2016a

Berkeley SafeTREC

Policy innovation to move the needle

Vision Zero &
Safe System

challenge our ability to reach zero without a major change

dangerous system

unsafe system

safe system

Safe System: Multi-layered system approach

Mooren et al., 2011

Figure 3 – The Safe System model reproduced from Howard, 2004 [25]

dangerous system

unsafe system

safe system

Safe System: Multi-layered system approach

Mooren et al., 2011

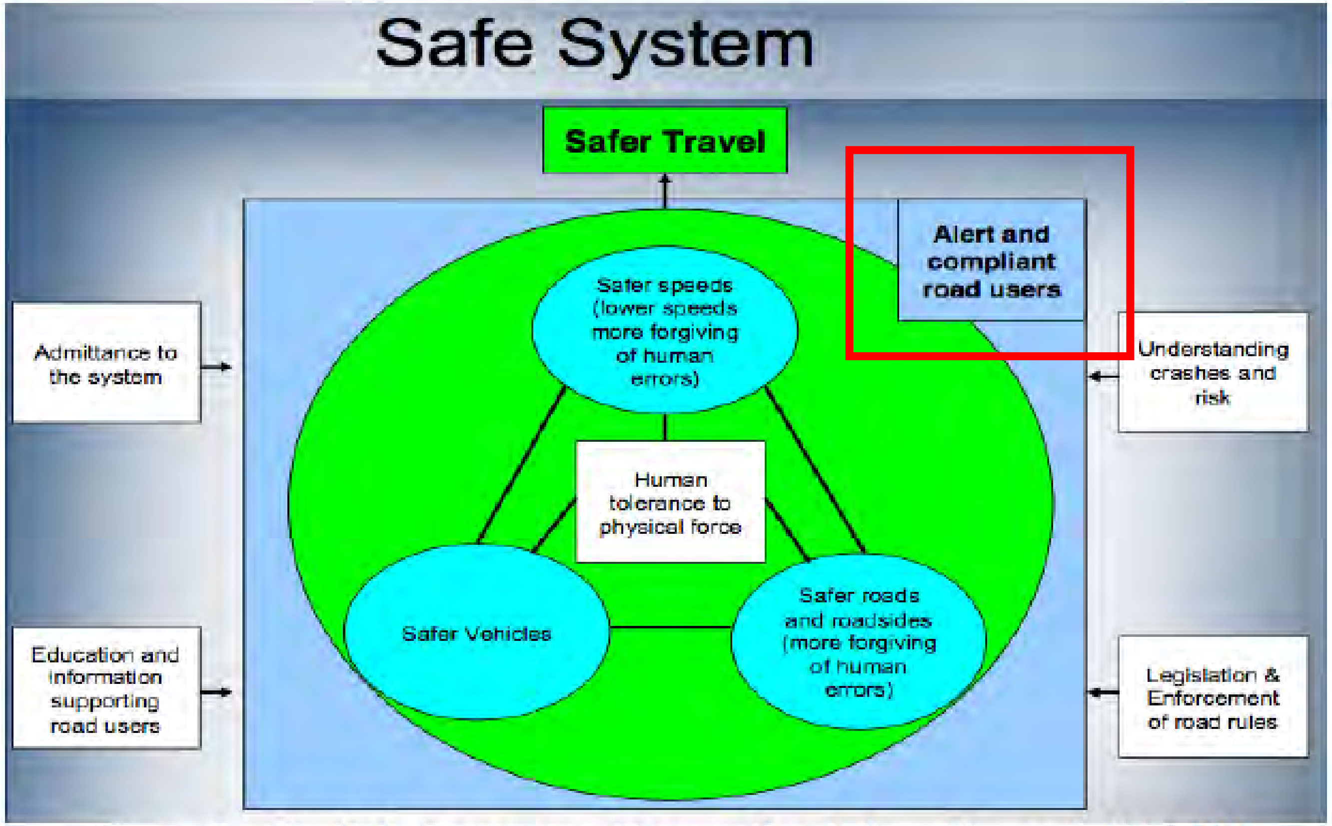


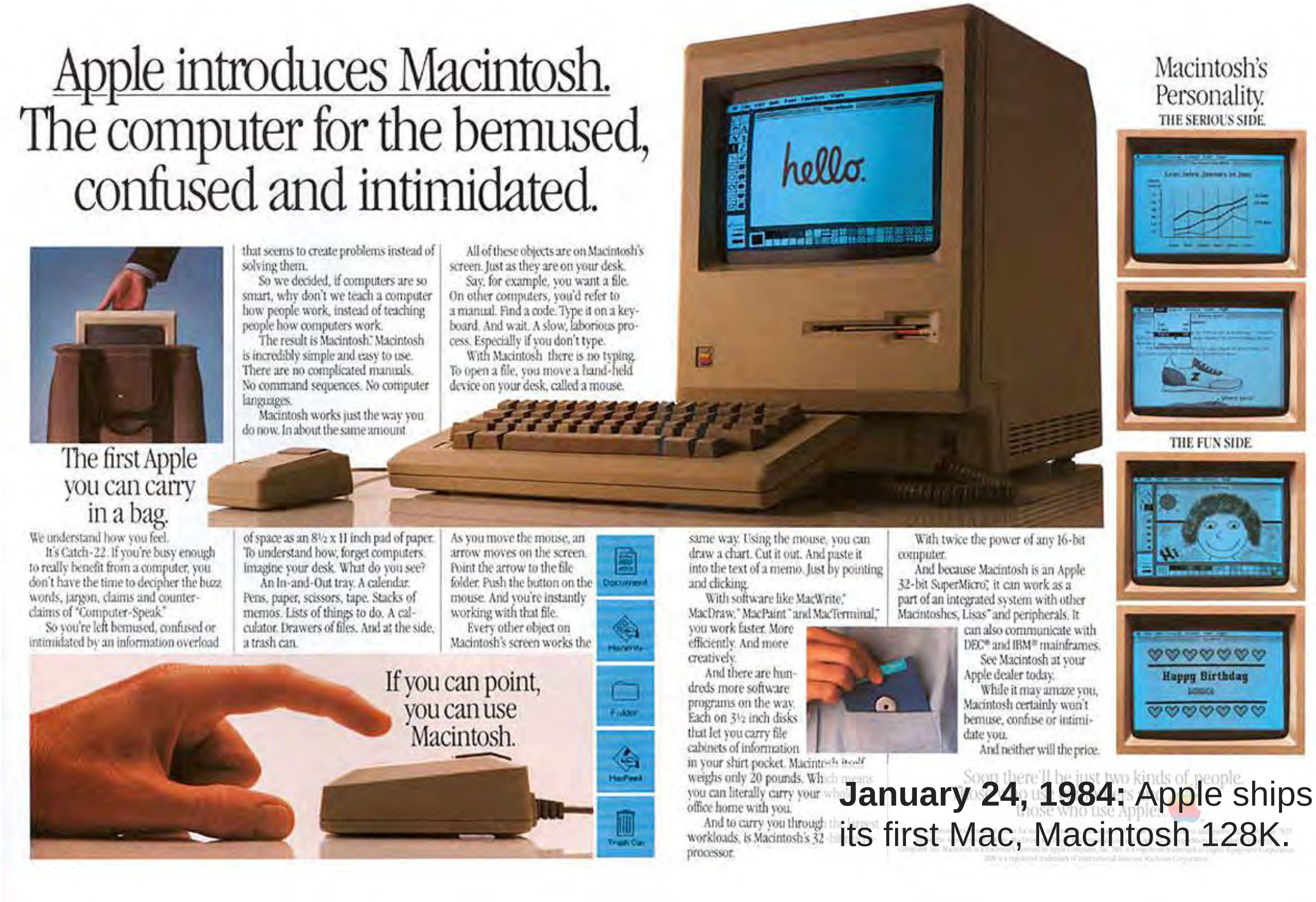
Figure 3 – The Safe System model reproduced from Howard, 2004 [25]

dangerous system

unsafe system

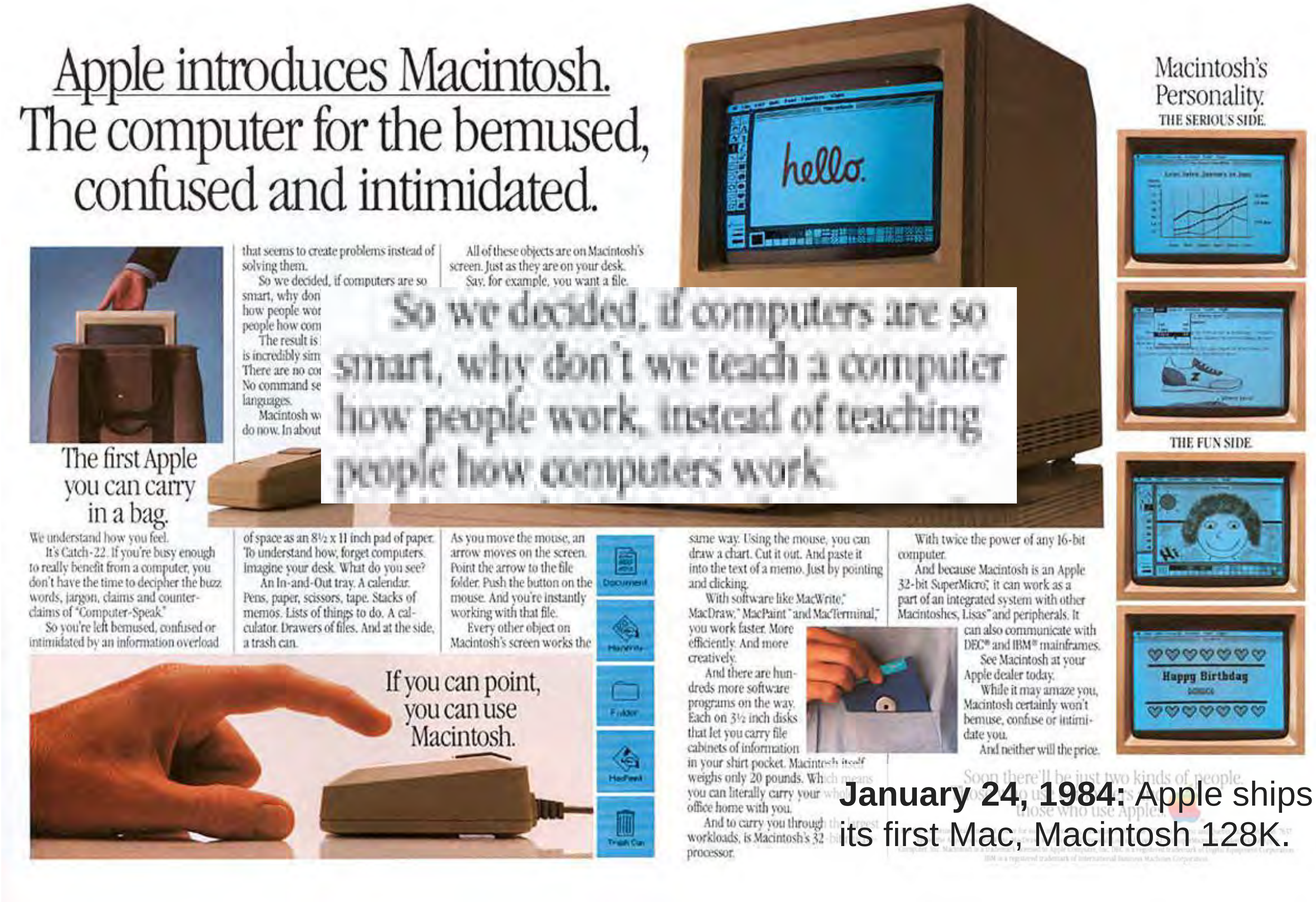
safe system

Other innovative human-centered efforts?



January 24, 1984: Apple ships its first Mac, Macintosh 128K.

Other innovative human-centered efforts?



January 24, 1984: Apple ships its first Mac, Macintosh 128K.

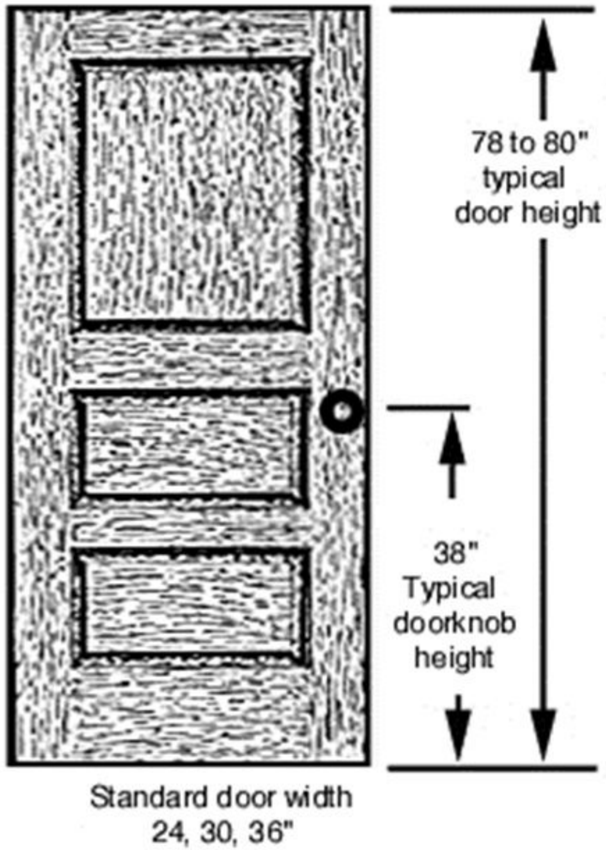
Designing a system around the user, considering the natural limitations of the human user.

We can ask the user to stop making mistakes, but it might not be very effective.

Berkeley SafeTREC

One size does not fit all

One size does not fit all, unless it does…



Who is this safe/r road user we design for?

Goody two shoes minion

Phil

Error-prone minion

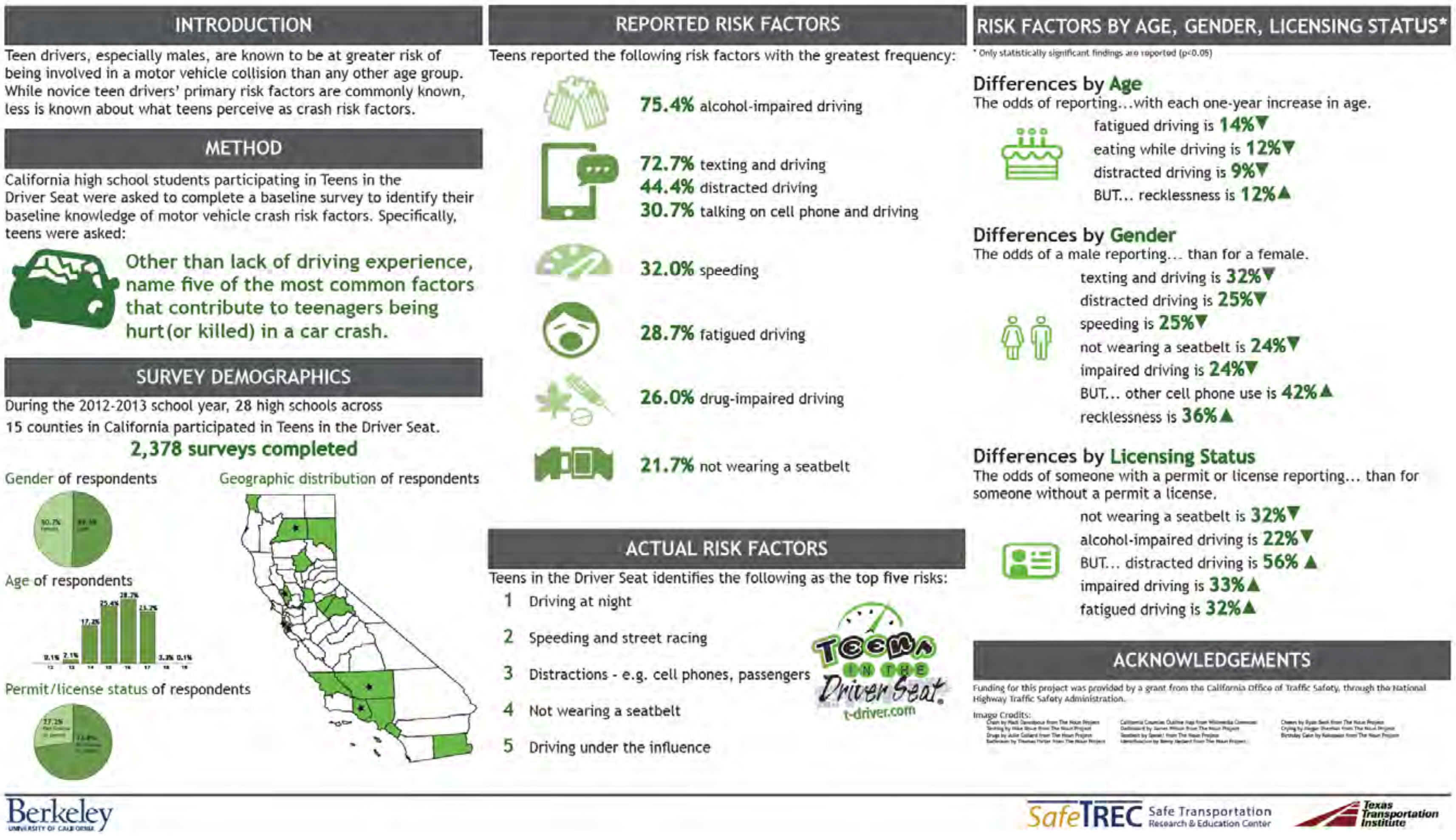
Carl

Unsafe system

Safe system

Variations in teen perception of risk factors

Chen K., Cooper J., Grembek O., 2015.



INTRODUCTION

Teen drivers, especially males, are known to be at greater risk of being involved in a motor vehicle collision than any other age group. While novice teen drivers' primary risk factors are commonly known, less is known about what teens perceive as crash risk factors.

METHOD

California high school students participating in Teens in the Driver Seat were asked to complete a baseline survey to identify their baseline knowledge of motor vehicle crash risk factors. Specifically, teens were asked:

Other than lack of driving experience, name five of the most common factors that contribute to teenagers being hurt (or killed) in a car crash.

SURVEY DEMOGRAPHICS

During the 2012-2013 school year, 28 high schools across 15 counties in California participated in Teens in the Driver Seat.

2,378 surveys completed

Gender of respondents

Geographic distribution of respondents

Age of respondents

Permit/license status of respondents

REPORTED RISK FACTORS

Teens reported the following risk factors with the greatest frequency:

- **75.4%** alcohol-impaired driving
- **72.7%** texting and driving
- **44.4%** distracted driving
- **30.7%** talking on cell phone and driving
- **32.0%** speeding
- **28.7%** fatigued driving
- **26.0%** drug-impaired driving
- **21.7%** not wearing a seatbelt

ACTUAL RISK FACTORS

Teens in the Driver Seat identifies the following as the top five risks:

1. Driving at night
2. Speeding and street racing
3. Distractions - e.g. cell phones, passengers
4. Not wearing a seatbelt
5. Driving under the influence

TEENS IN THE Driver Seat® t-driver.com

RISK FACTORS BY AGE, GENDER, LICENSING STATUS*

* Only statistically significant findings are reported (p<0.05)

Differences by Age

The odds of reporting...with each one-year increase in age.

- fatigued driving is **14%▼**
- eating while driving is **12%▼**
- distracted driving is **9%▼**
- BUT... recklessness is **12%▲**

Differences by Gender

The odds of a male reporting... than for a female.

- texting and driving is **32%▼**
- distracted driving is **25%▼**
- speeding is **25%▼**
- not wearing a seatbelt is **24%▼**
- impaired driving is **24%▼**
- BUT... other cell phone use is **42%▲**
- recklessness is **36%▲**

Differences by Licensing Status

The odds of someone with a permit or license reporting... than for someone without a permit a license.

- not wearing a seatbelt is **32%▼**
- alcohol-impaired driving is **22%▼**
- BUT... distracted driving is **56%▲**
- impaired driving is **33%▲**
- fatigued driving is **32%▲**

ACKNOWLEDGEMENTS

Funding for this project was provided by a grant from the California Office of Traffic Safety, through the National Highway Traffic Safety Administration.

Image Credits:

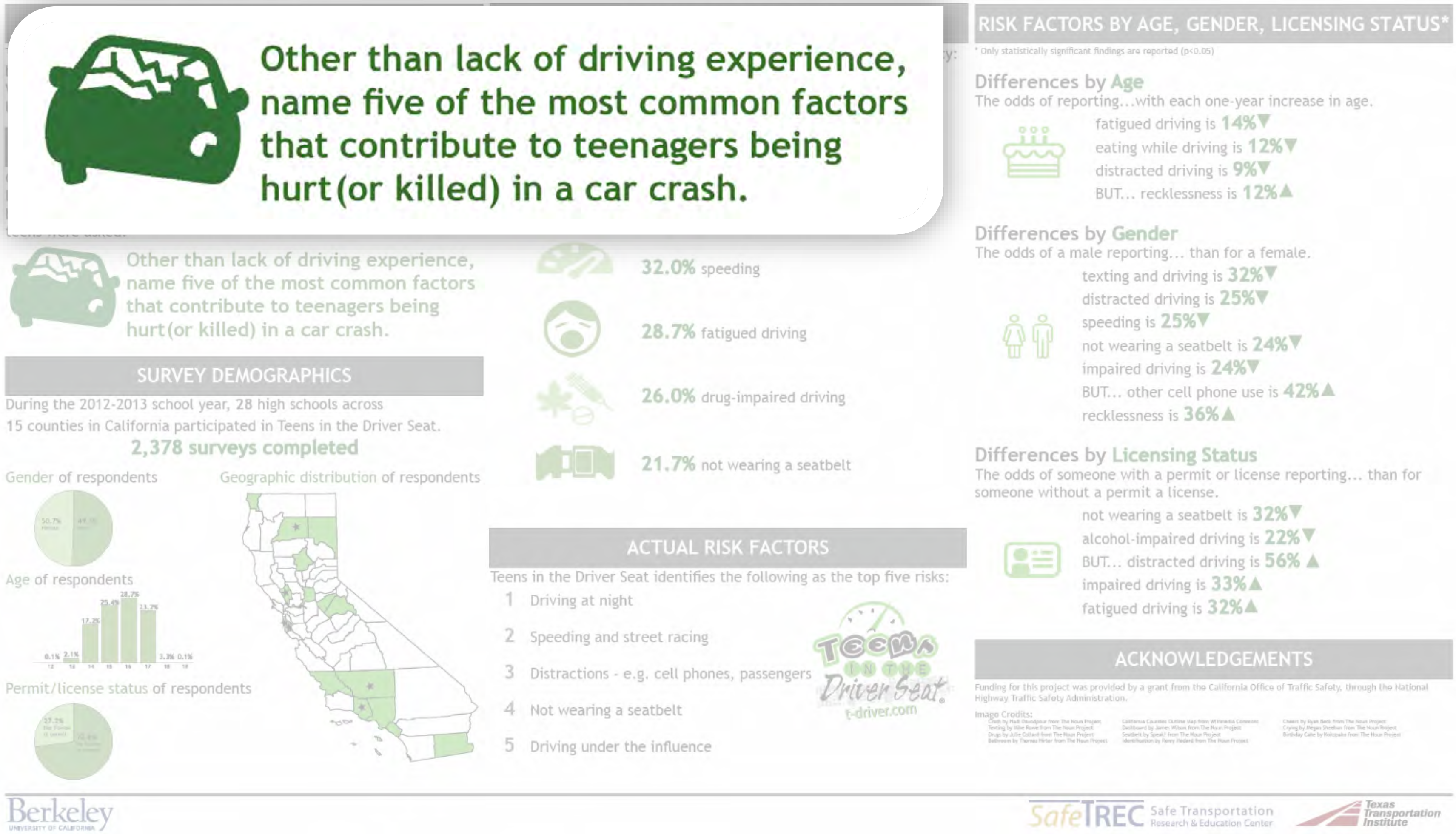
Berkeley UNIVERSITY OF CALIFORNIA

SafeTREC Safe Transportation Research & Education Center

Texas Transportation Institute

Variations in teen perception of risk factors

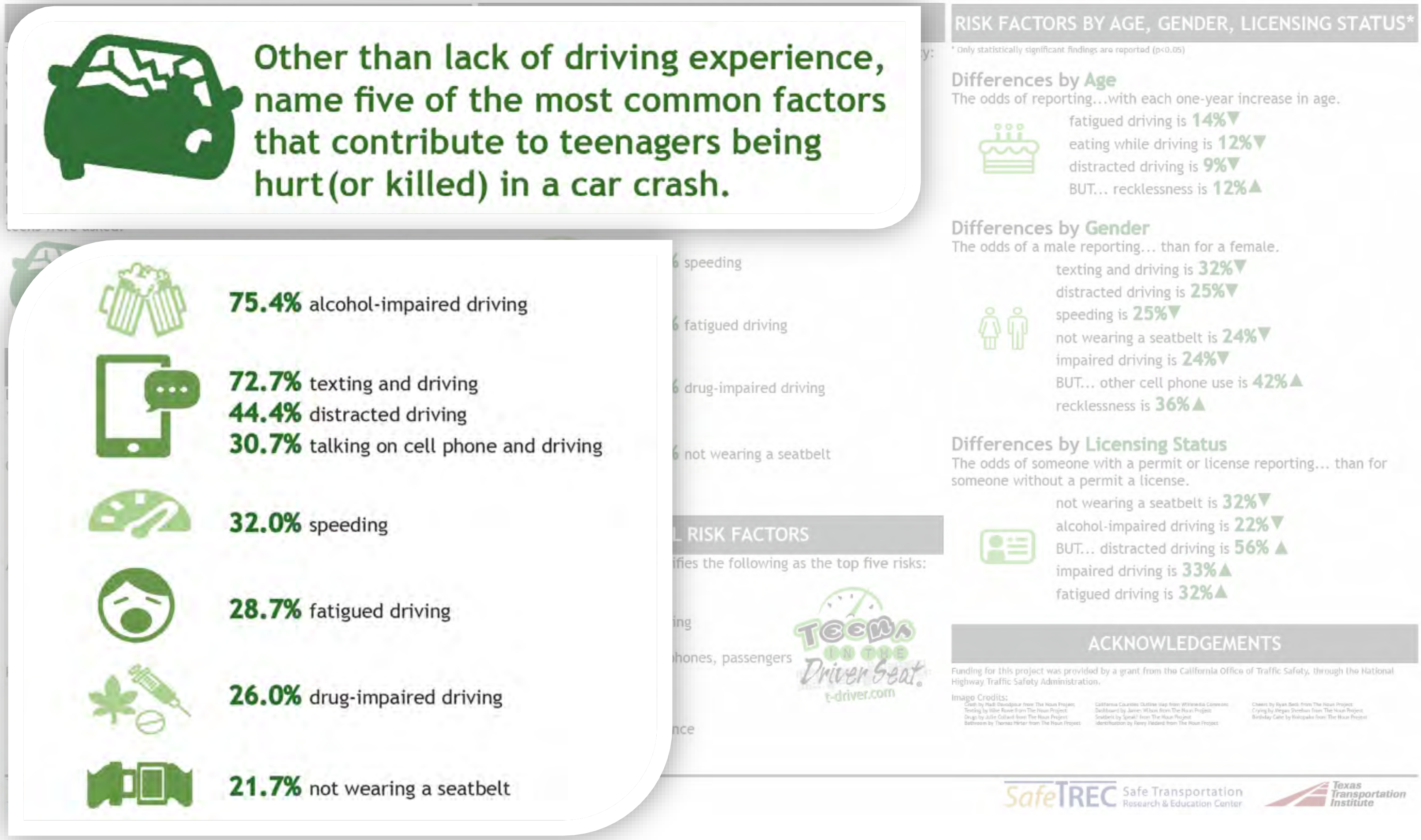
Chen K., Cooper J., Grembek O., 2015.



Berkeley SafeTREC

Variations in teen perception of risk factors

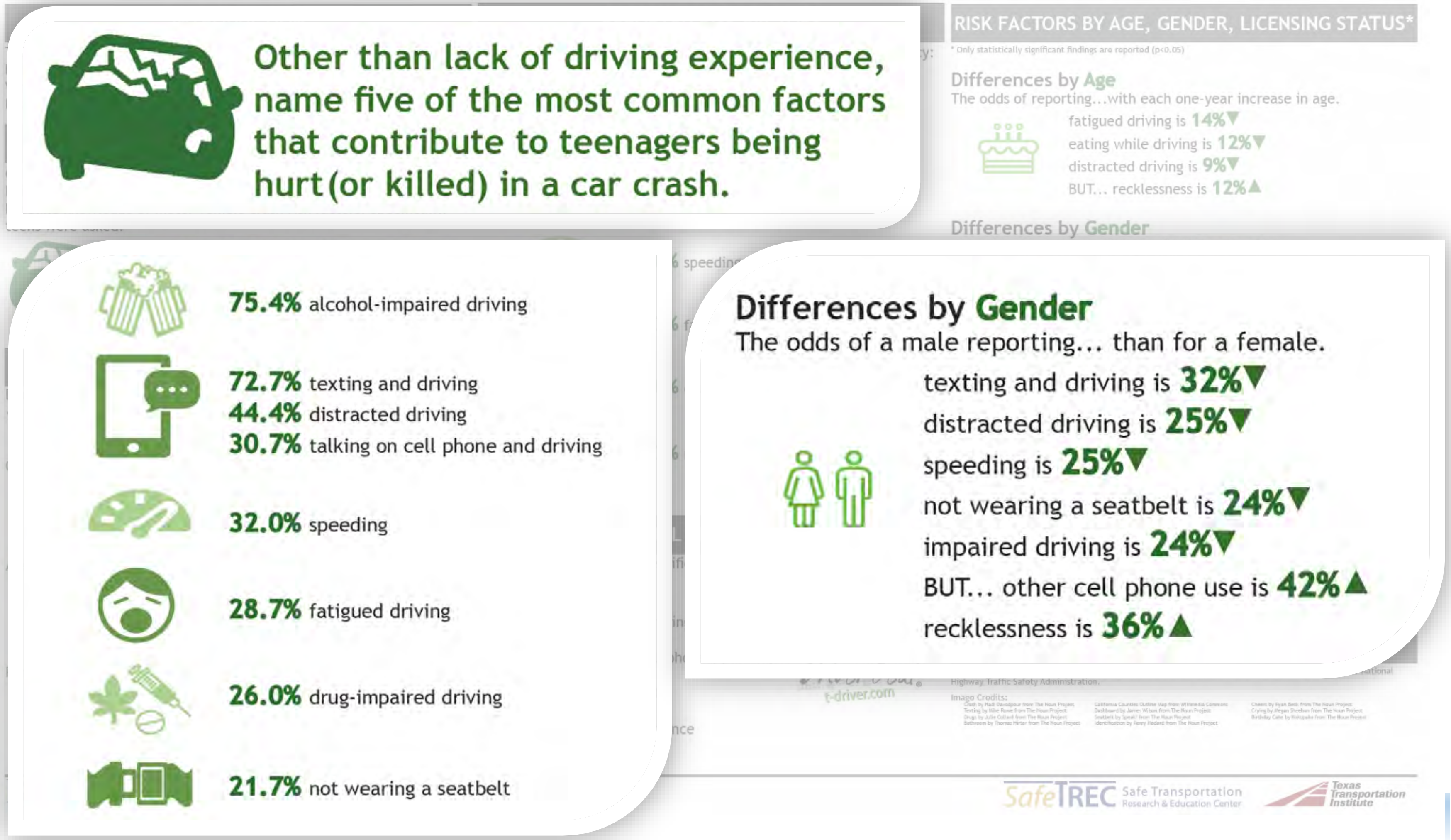
Chen K., Cooper J., Grembek O., 2015.



Berkeley SafeTREC

Variations in teen perception of risk factors

Chen K., Cooper J., Grembek O., 2015.



Berkeley SafeTREC

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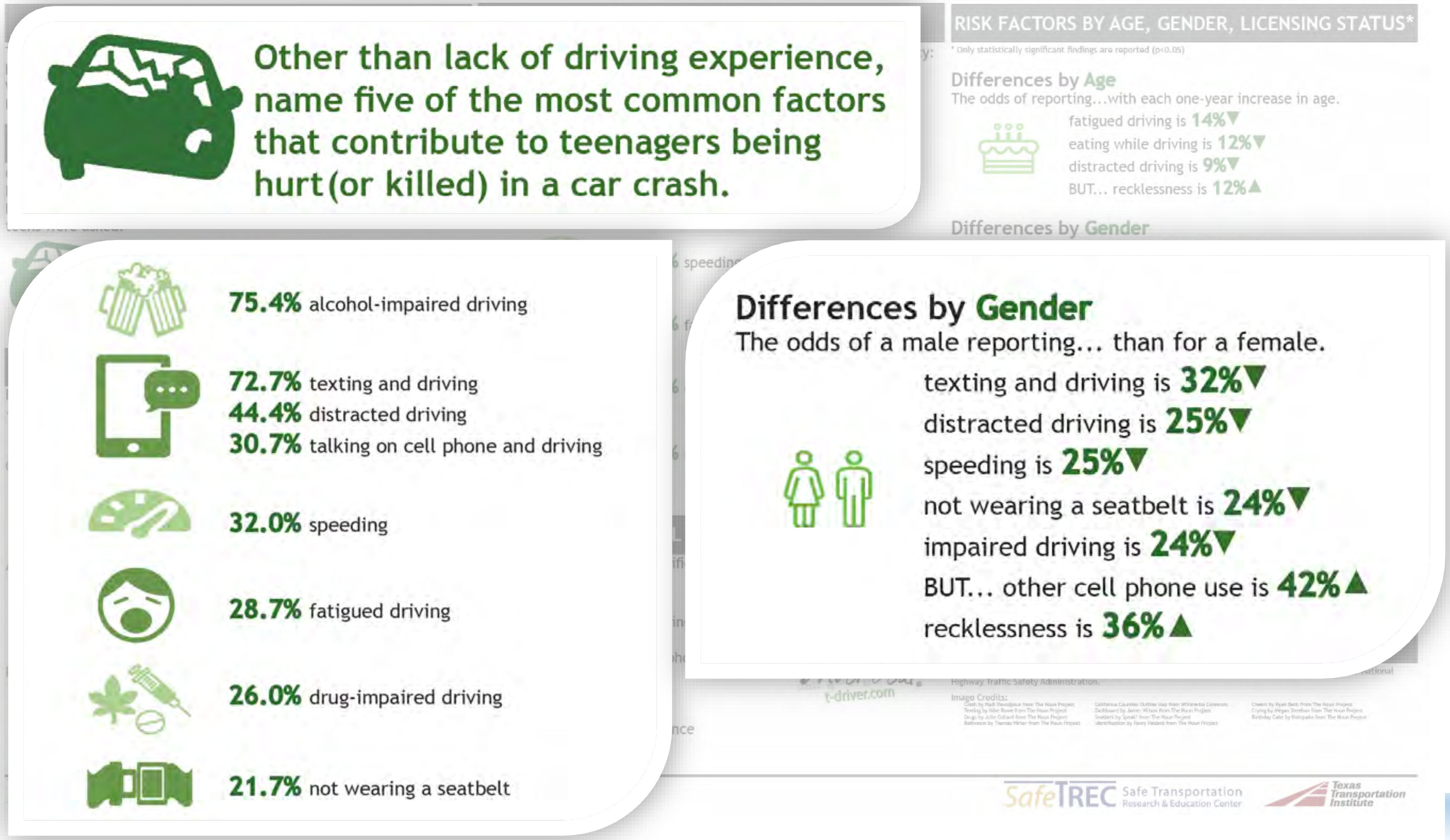
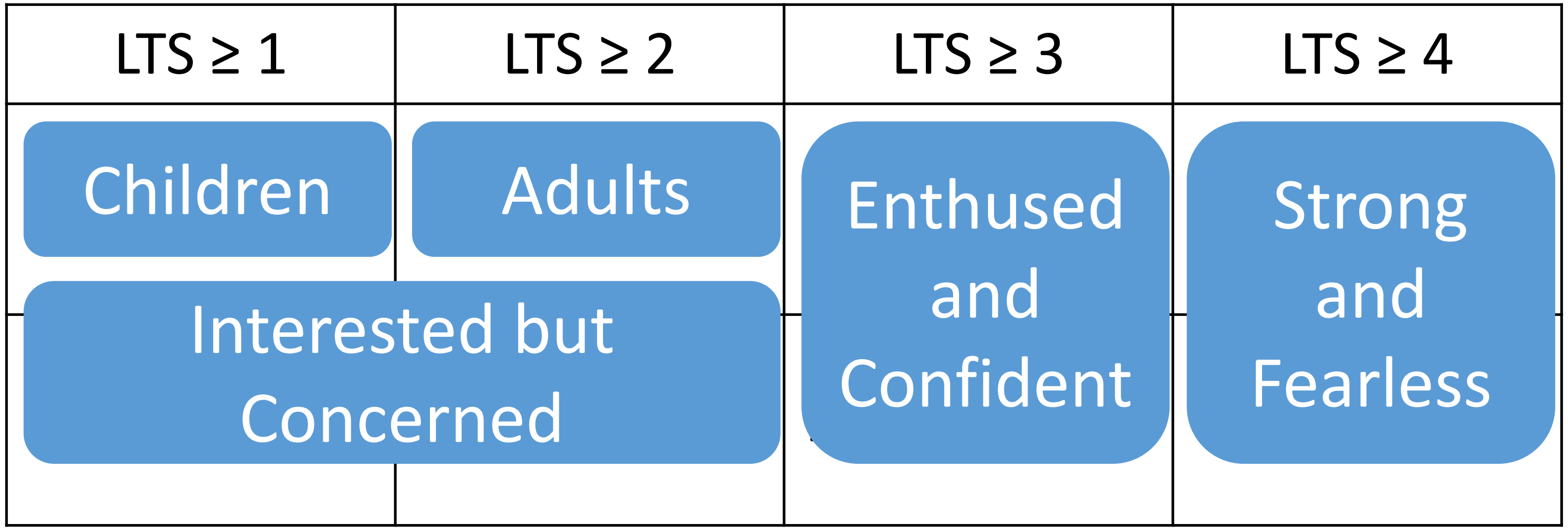


Non-symmetric Perception

and

Misjudgment

Portland cyclist typology and LTS



Design

Heterogeneity of cyclists

Bicycle User Experience Survey





Safety

Comfort

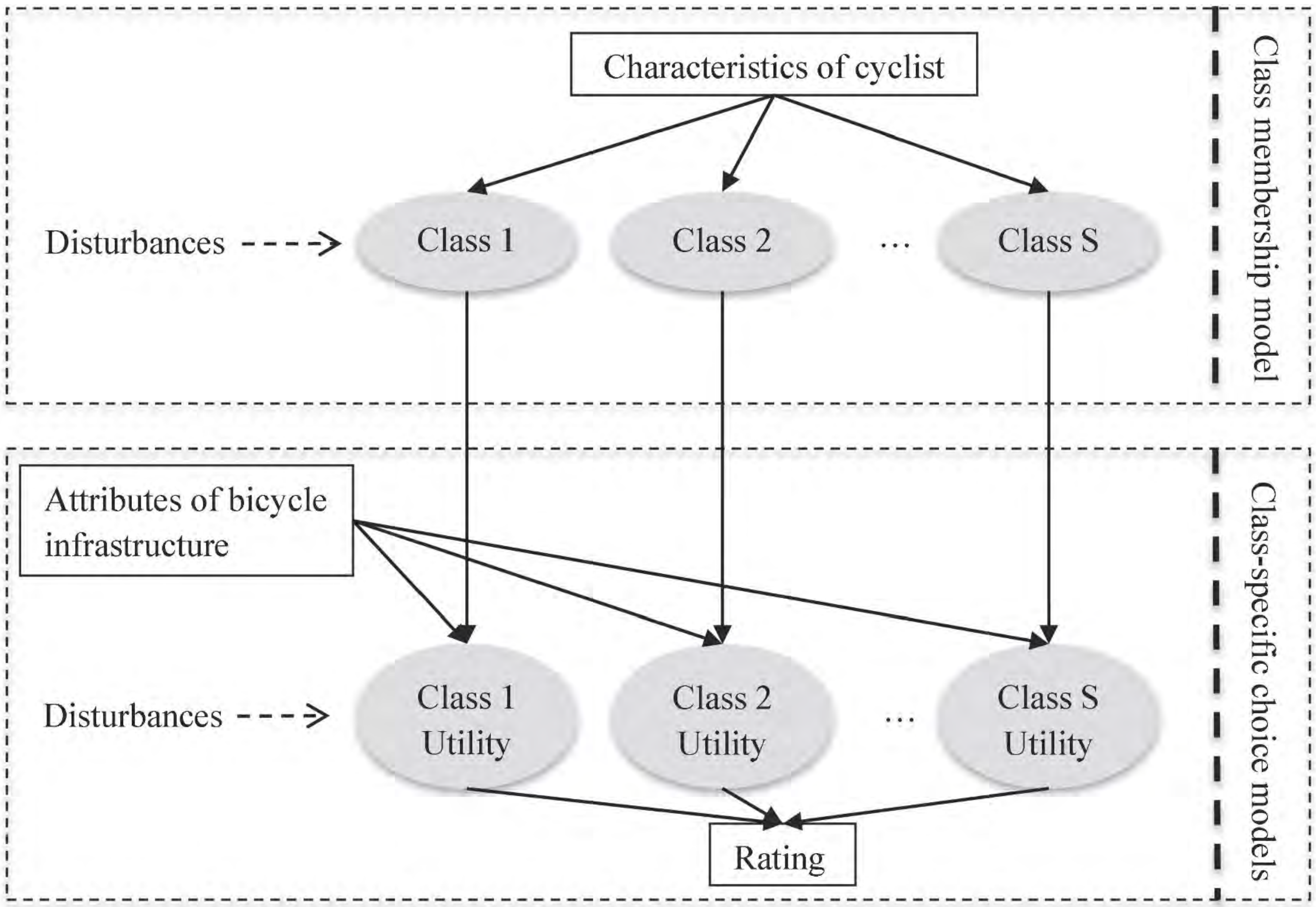
Satisfaction

Performance

Would you ride it?

Griswold, J.B., Yu, M., Filingeri, V., Grembek, O. and Walker, J.L., 2018

Latent Class Choice Model



Griswold, J.B., Yu, M., Filingeri, V., Grembek, O. and Walker, J.L., 2018

Heterogeneity of cyclists

Empirical approach with multiple attribute combinations

We identified 3 classes of cyclists

Prefers:

	Buffered bike lanes Slow traffic	47%	Neighborhood
	Bicycle boulevards Low traffic volume	45%	Urban
	No bike facilities Low traffic volume	9%	Fitness

Griswold, J.B., Yu, M., Filingeri, V., Grembek, O. and Walker, J.L., 2018

Here’s a favorite of “fitness” riders

$P_{neighborhood}(ride) = 0.04$

$P_{urban}(ride) = 0.19$

$P_{fitness}(ride) = 0.85$

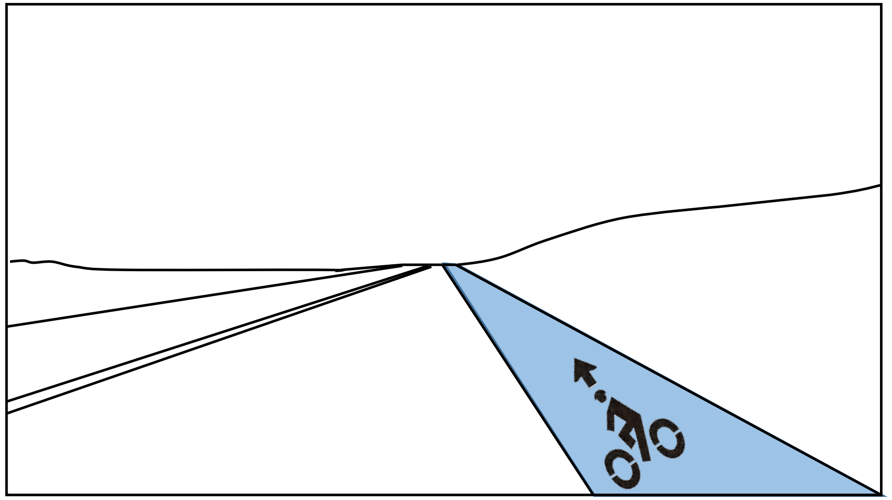
Griswold, J.B., Yu, M., Filingeri, V., Grembek, O. and Walker, J.L., 2018

What if we add a standard bike lane?

$P_{neighborhood}(ride) = 0.04$

$P_{urban}(ride) = 0.19$

$P_{fitness}(ride) = 0.85$



$P_{neighborhood}(ride) = 0.96$

$P_{urban}(ride) = 1.0$

$P_{fitness}(ride) = 0.09$

Griswold, J.B., Yu, M., Filingeri, V., Grembek, O. and Walker, J.L., 2018

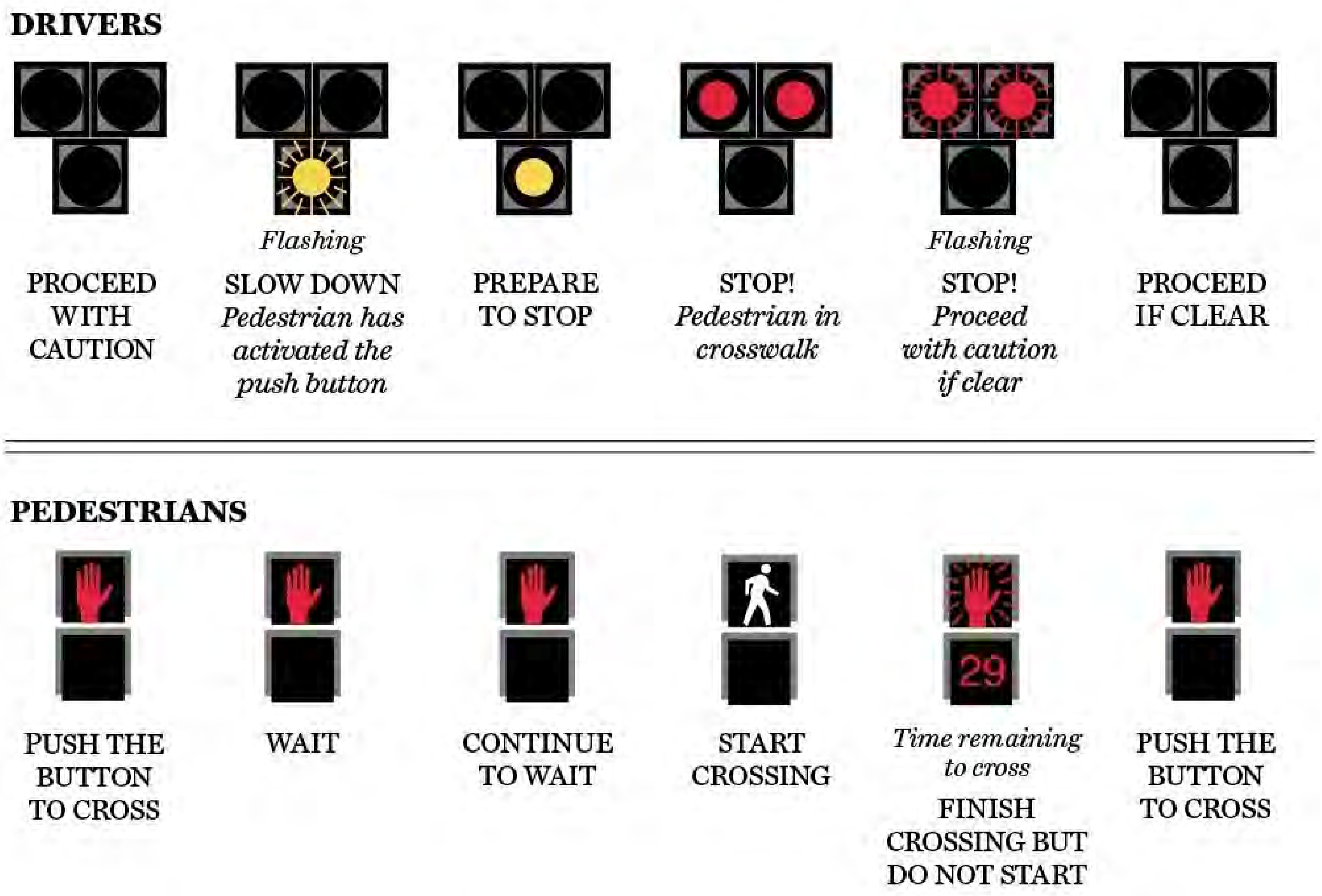
Implementation Complexities

Heterogenous level of comfort with different combinations of attributes

and

Misjudgment

Pedestrian Hybrid Beacon (HAWK)



Effectiveness

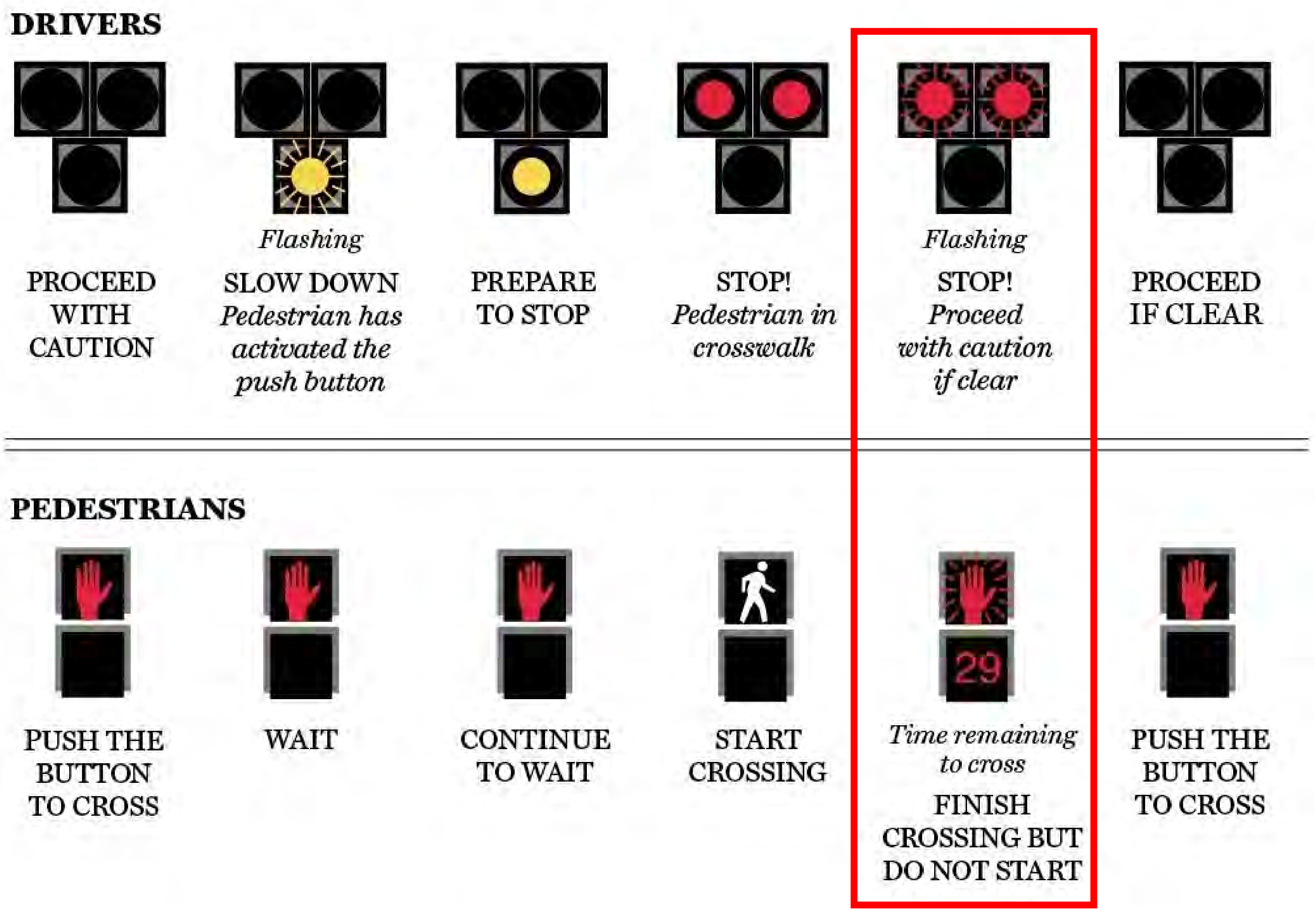
vs.

Confusion?

and

Misjudgment

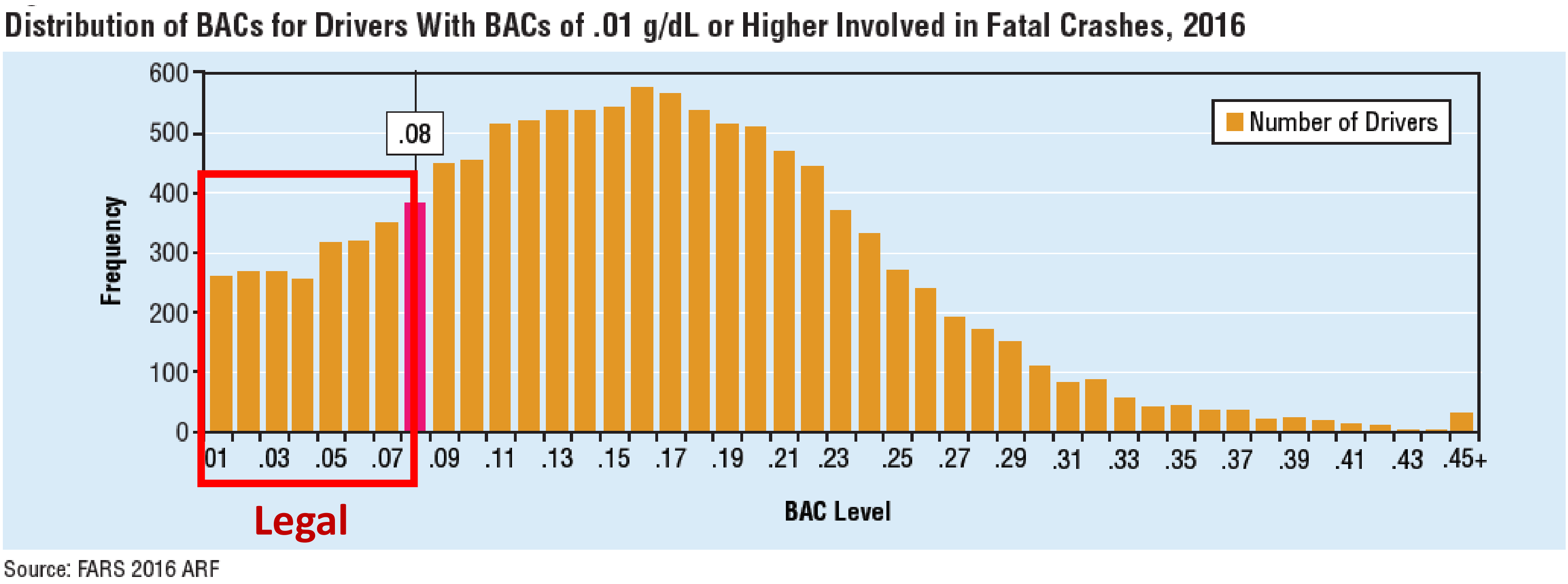
Pedestrian Hybrid Beacon (HAWK)



Effectiveness
vs.
Confusion?

and
Misjudgment

Safe/r road users and alcohol



Alcohol

and

Misjudgment

Diminished performance below 0.08 BAC may not be accounted for in perception reaction time assumptions for current design standards

Itani, I., Grembek, O., In preparation

Berkeley SafeTREC

Safe/r road users and speed

Speed limits

and

Misjudgment

Does our unsafe system require us to be safer than what we are?

Mooren et al., 2011

Figure 3 – The Safe System model reproduced from Howard, 2004 [25]

dangerous system

unsafe system

safe system

Hope for the best,

Goody two shoes minion

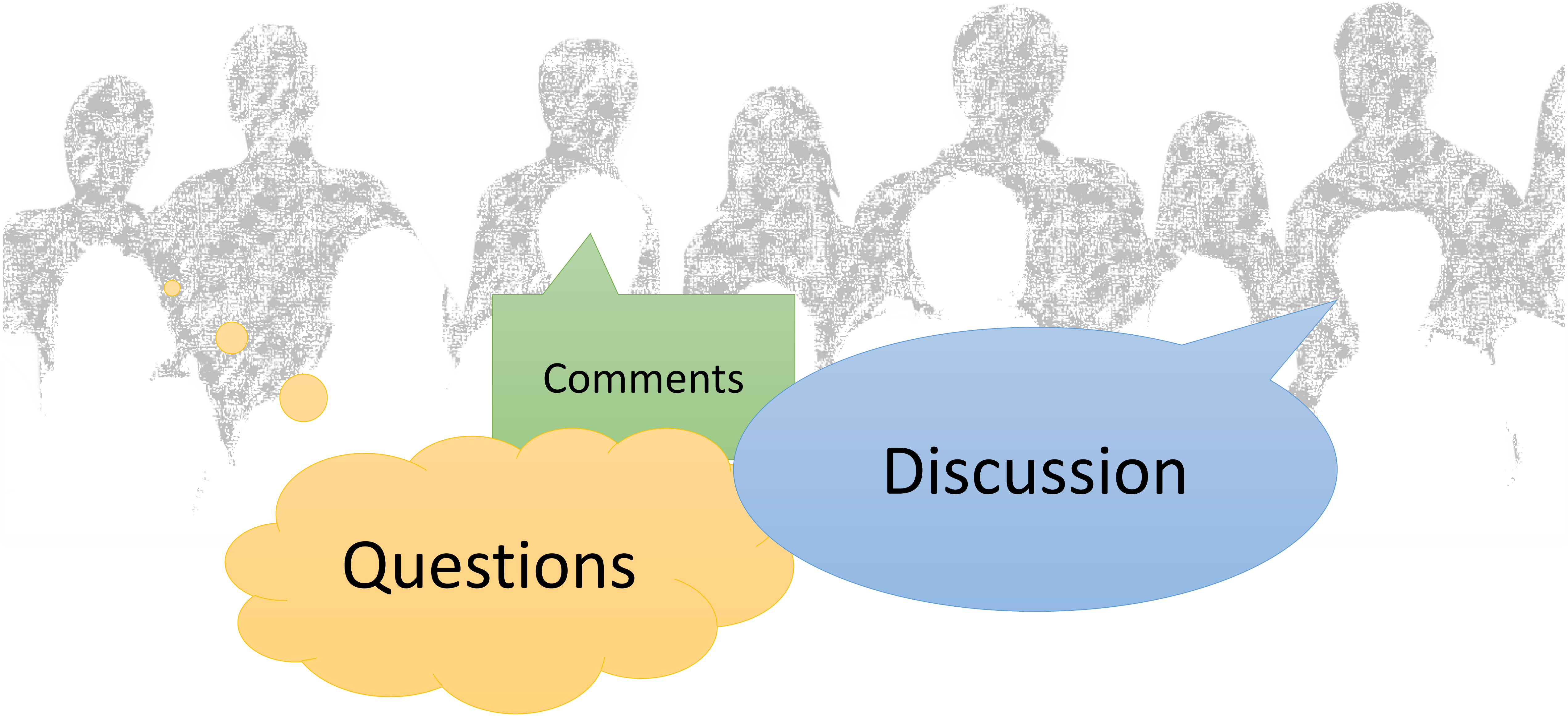
Error-prone minion

Berkeley SafeTREC

Hope for the best, and design for the vulnerable

Goody two shoes minion

Error-prone minion


Comments
Questions
Discussion

Looking Beyond Police Reports

Accident Data and More In Real Time

Official Police Accident Reports

Washington State Patrol - Sector

Other Accident Data Sources:

- Computer Aided Dispatch Records
  - Police Exchange of Information
  - No Police Dispatch
- Records Management Systems
- Fire/EMS Field Reports
- Fire/EMS Aid Calls
- Analytics / Artificial Intelligence

911 NORCOM
www.norcom.org

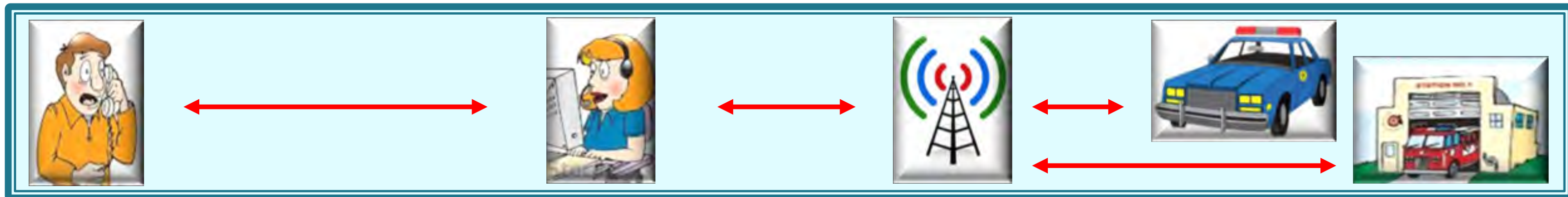
Thomas R. Orr
Executive Director

PO Box 50911
Bellevue, WA 98015
Phone: 425-577-5671
Fax: 425-577-5701
torr@norcom.org

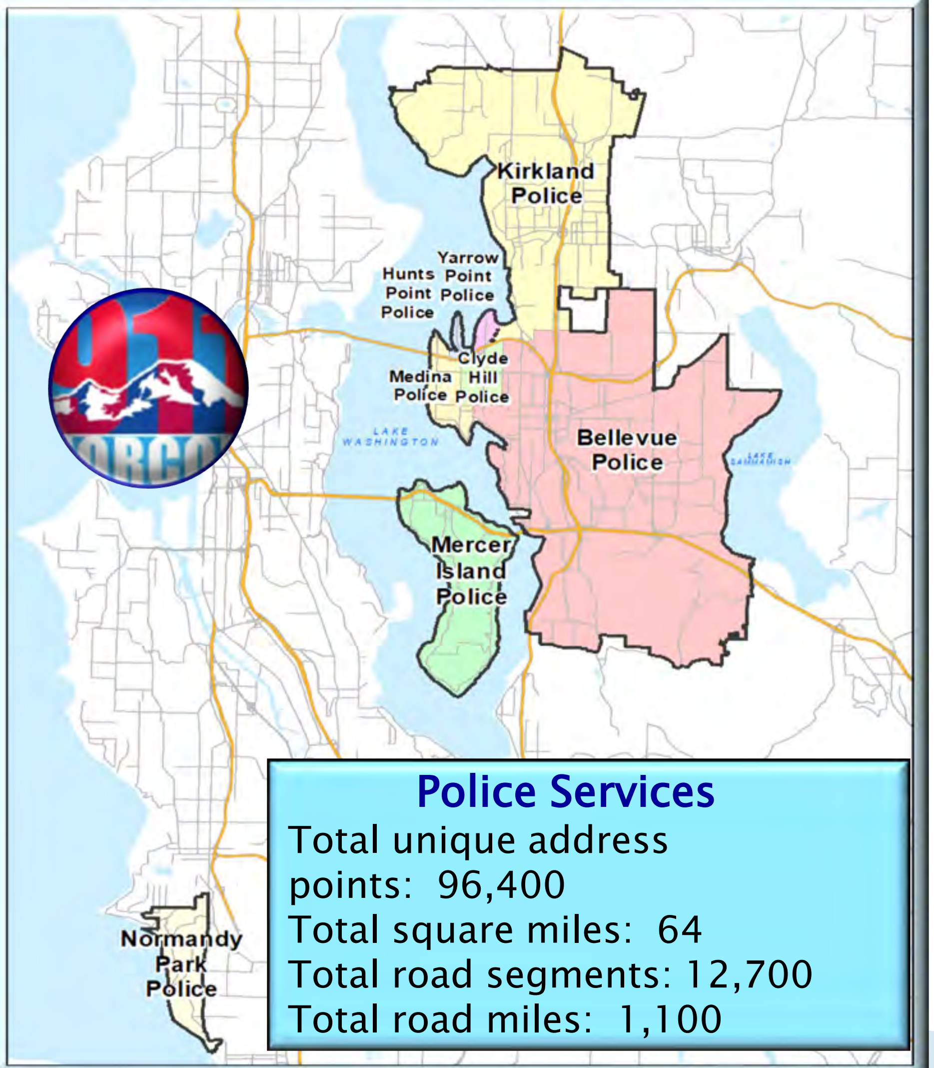
Providing High Quality Emergency Service Communications

Who is NORCOM?

911 Center or Public Safety Answering Point (PSAP)

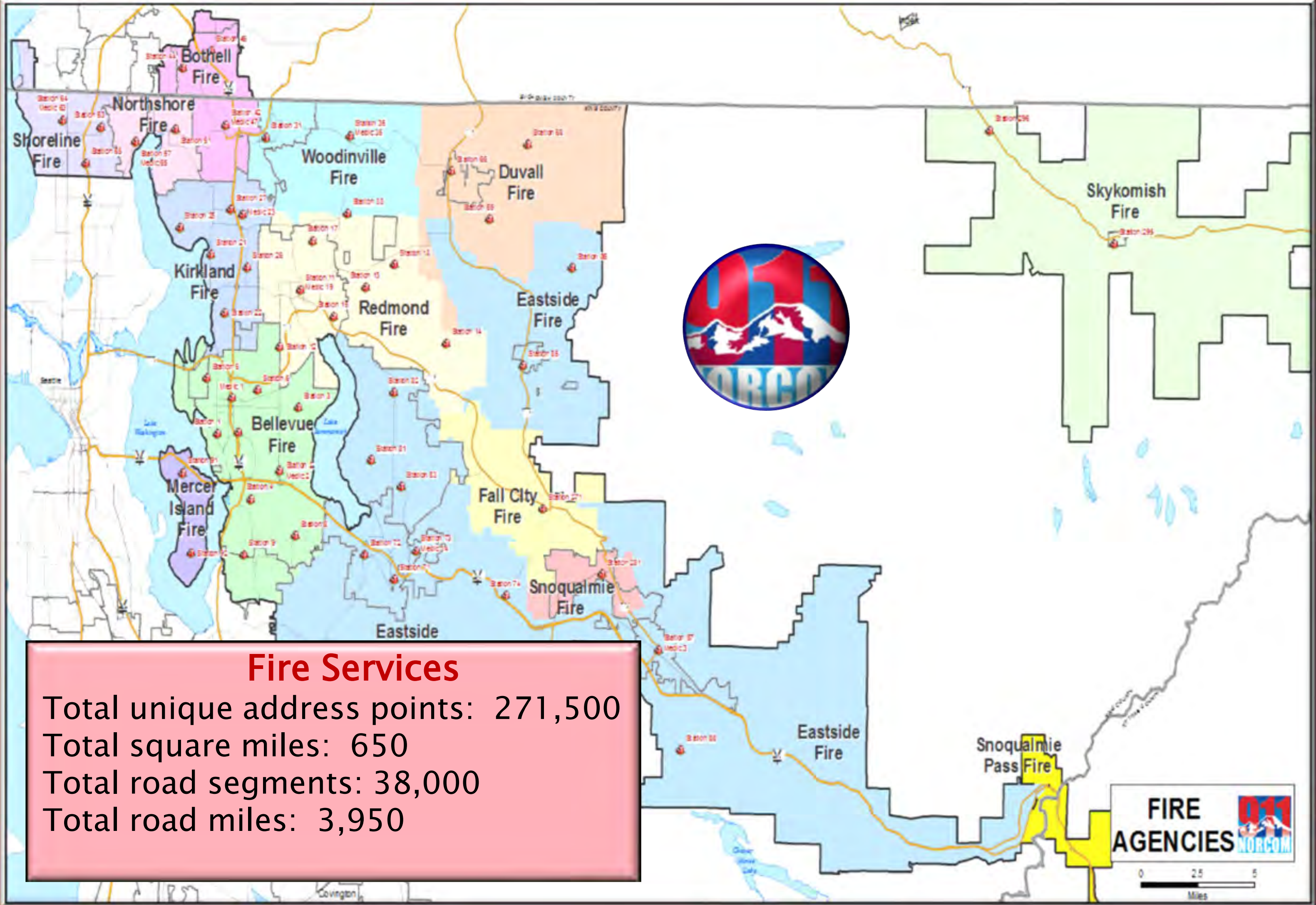


911 Call Answering | **911 Dispatch – Computer Aided**



Police Services

Total unique address points: 96,400
Total square miles: 64
Total road segments: 12,700
Total road miles: 1,100



Fire Services

Total unique address points: 271,500
Total square miles: 650
Total road segments: 38,000
Total road miles: 3,950

PSAP Name	Pop. Served	Total 911 Calls	Total Calls Incoming Calls	Jurisdictions Served	Police/Fire /Both	Sq. Miles	PROBLEM 1: CRIMINALS & INCIDENTS DO NOT RESPECT BORDERS
Valley Communications	735,694	440,211	678,724	22	Both Fire and Police	380	**9 Police Agencies**: Renton, Tukwila, Kent, Auburn, Pacific, Federal Way, Black Diamond, Algona, Des Moines **13 Fire Departments/Districts**: Kent, Valley Regional Fire Authority (Auburn, Algona, Pacific), Renton, Tukwila, South King Fire (Federal Way/Des Moines) Burien/Normandy Park, Skyway, Maple Valley,
NORCOM	**640,000**	**175,131**	**332,513**	**20**	**Both Fire and Police**	**649**	**6 Police Agencies: Bellevue, Kirkland , Mercer Island, Clyde Hill, Medina, Normandy Park** **14 total Fire/EMS Agencies/Districts: Bellevue, Kirkland, Mercer Island, Bothell, Redmond, Snoqualmie, Eastside Fire & Rescue, Duvall Fire, Fall City Fire, Shoreline Fire, Northshore Fire, Woodinville Fire, Snoqualmie Pass Fire & Rescue, and Skykomish Fire & Rescue.**
Redmond	**66,924**	**21,419**	**58,523**	**2**	**Police**	**19.43**	**Redmond, Duvall**
Bothell	**54,721**	**17,412**	**57,705**	**2**	**Police**	**17.35**	**Bothell, Lake Forest Park, UW Bothell Campus Police Officers when requested**
Issaquah	**46,835**	**14,952**	**48,141**	**3**	**Police**	**22.2**	**Issaquah, Snoqualmie, North Bend**
Univ. Wash	70,000	3,374	35,179	1	Police	2	University of Washington
Wash. State Patrol (Bellevue Communications Center)	2,044,000	268,925	252,715	19	Police	2,307	**11 State Agencies serving Seattle & all of King Count**y: Washington State Patrol, WA Dept. of Fish & Wildlife, DOT, State Parks, DSHS, DNR, WA Forest Service, Gambling Commission, Liquor Control Board, DOC, Utilities & Transportation **6 Federal Agencies serving Seattle & all of King County**: US Fish & Wildlife, Nat'l Marine Fisheries, ATF, US Forest Service, Dept. of Agriculture, Immigration & Customs Enforcement **2 Transport Entities serving Seattle & all of King County**: BNSF Railroad, Union Pacific Railroad
Enumclaw	31,479	4,960	25,471	3	Both Fire and Police	85.1	City of Enumclaw, Fire District 28, National Park Service - Mt. Rainier (after hours)
Port of Seattle	65,000	9,877	54,777	3	Both Fire and Police	15	Normandy Park, SEATAC International Airport, Port of Seattle International Marina/Port
Seattle Police/Fire	662,400	687,628	922,825	2	Both Fire and Police	89	City of Seattle
King County Sheriff	473,425	339,384	566,787	18	Police	1,821	Unincorporated King County, Carnation, Sammamish, Skykomish, Woodinville, Beaux Arts Village, Covington, Maple Valley, Muckleshoot Tribe, Newcastle, Burien, SeaTac, Kenmore, Shoreline, King County Int'l Airport, King County Metro, Sound Transit

How Most Accident & Other Data Warehoused Today

Current Legacy Mindset

(Current State)

- Reactive
- Separate Silos
- Jurisdictional Barriers
- Delay to Execution
- Technology Lag
- Resistance to Change

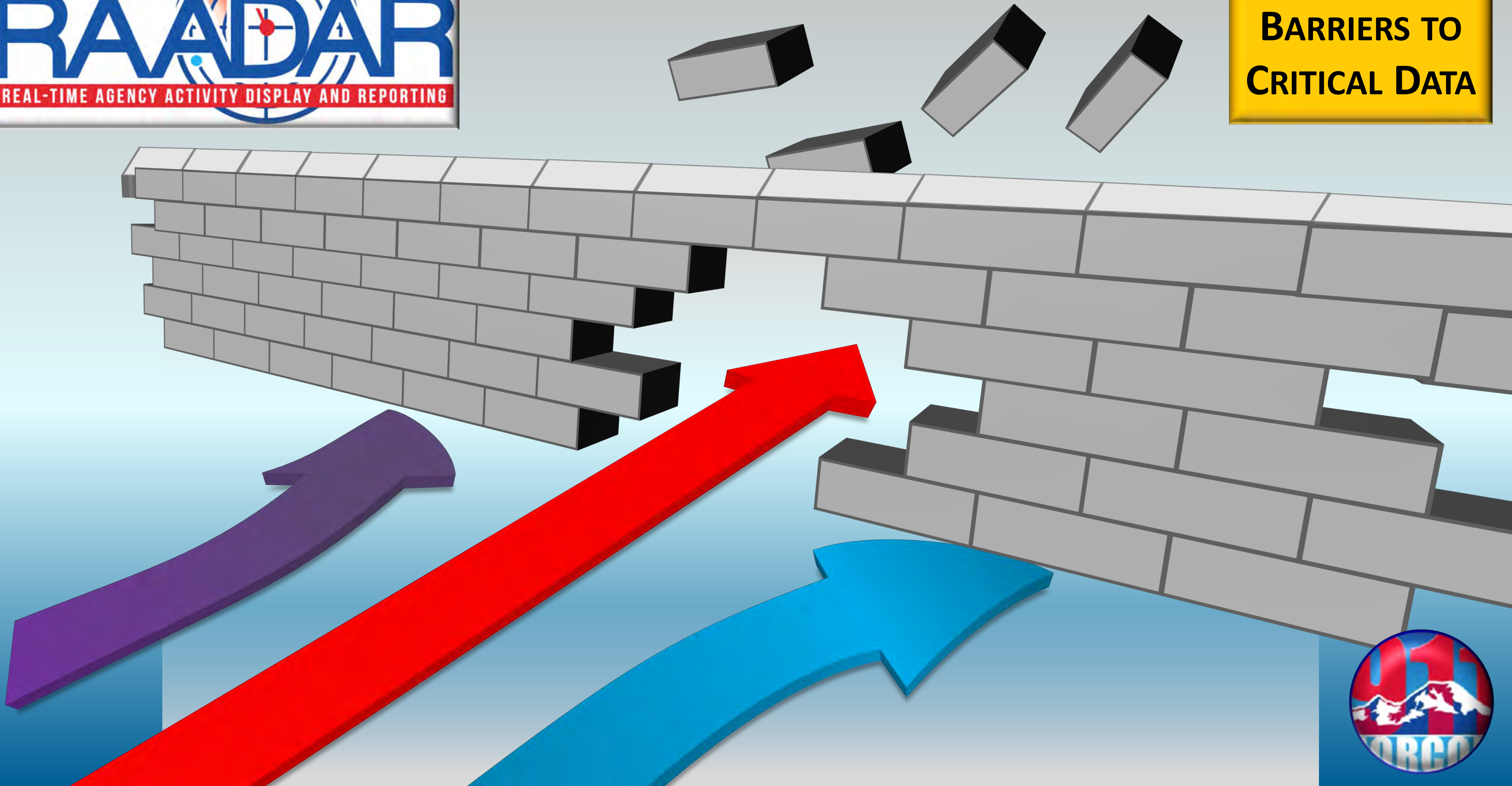
Police Reports Only One Source for Accident Data

Problem 2: Getting Critical Actionable Information in Real Time

RAADAR

REAL-TIME AGENCY ACTIVITY DISPLAY AND REPORTING

BREAKING BARRIERS TO CRITICAL DATA



Real-time Agency Activity Display And Reporting (RAADAR®)

RAADAR® collects data from disparate CAD software systems and displays them in a unified web interface.

Any device with web access: Computer, Smart Phone, Tablet, MDC

Accident Data Using RAADAR

Combining Police & Fire Accident Data

And Discovering Near Misses

RAADAR Data Searches

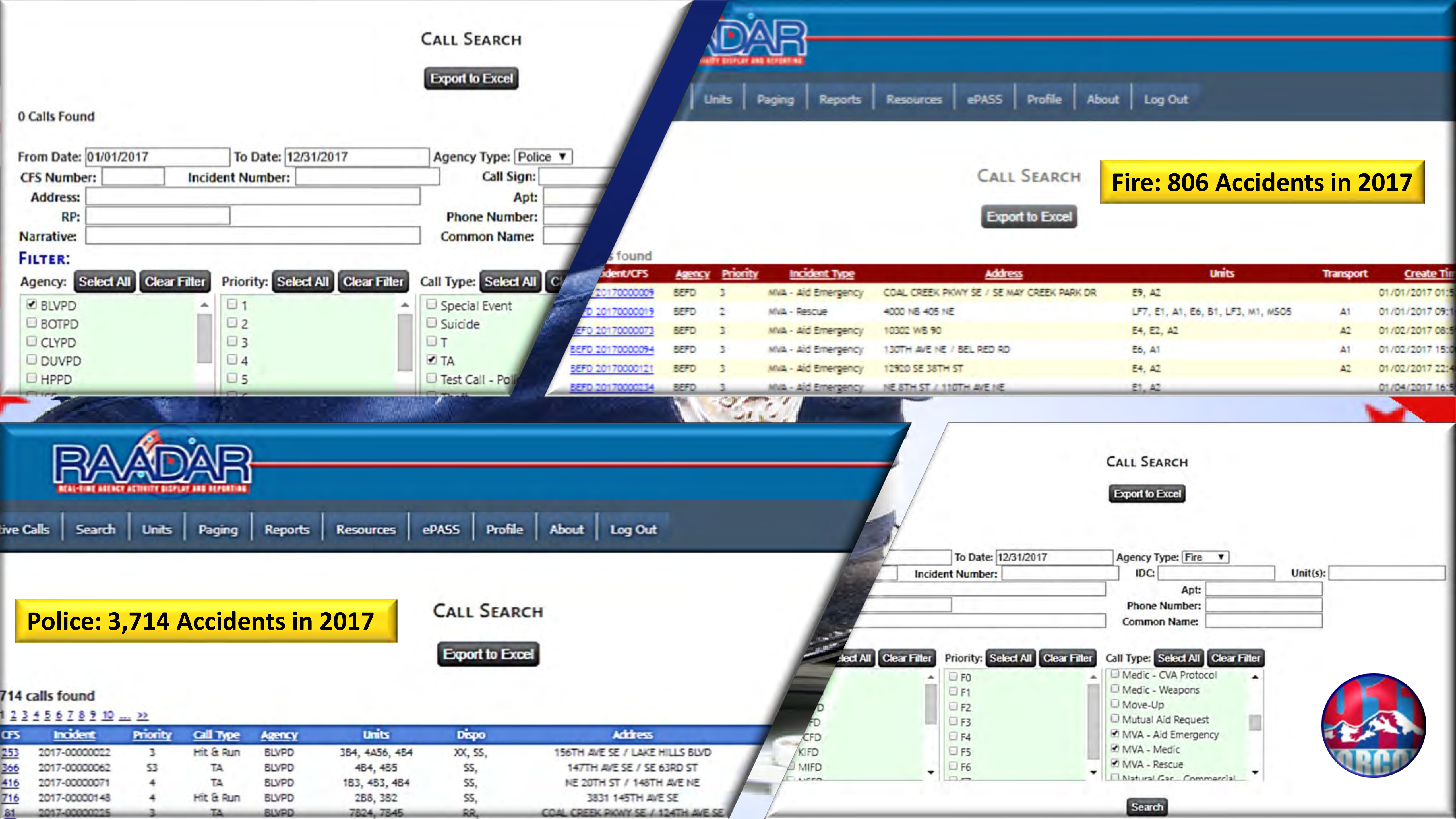
<u>Bellevue Police and Fire - 2017</u>

- Police Total: 3714
- Fire Total: 806
- Unique Fire: 495
- Unreported Accidents: 27

Police Accident Reports

<u>Bellevue - 2017</u>

- Police Total 1495


Fire: 806 Accidents in 2017
Police: 3,714 Accidents in 2017
RAADAR
REAL-TIME AGENCY ACTIVITY DISPLAY AND REPORTING
Call Search
Export to Excel
0 Calls Found
From Date: 01/01/2017 To Date: 12/31/2017 Agency Type: Police
CFS Number: Incident Number: Call Sign:
Address: Apt:
RP: Phone Number:
Narrative: Common Name:
Filter:
Agency: Select All Clear Filter Priority: Select All Clear Filter Call Type: Select All
BLVPD BOTPD CLYPD DUVPD HPPD
1 2 3 4 5
Special Event Suicide T TA Test Call - Pol
Units Paging Reports Resources ePASS Profile About Log Out
Agency Priority Incident Type Address Units Transport Create Time
BEFD 20170000094 BEFD 3 MVA - Aid Emergency 130TH AVE NE / BEL RED RD E6, A1 A1 01/02/2017
BEFD 20170000121 BEFD 3 MVA - Aid Emergency 12920 SE 38TH ST E4, A2 A2 01/02/2017
Live Calls Search Units Paging Reports Resources ePASS Profile About Log Out
714 calls found
CFS Incident Priority Call Type Agency Units Dispo Address
253 2017-00000022 3 Hit & Run BLVPD 3B4, 4A56, 4B4 XX, SS, 156TH AVE SE / LAKE HILLS BLVD
366 2017-00000062 S3 TA BLVPD 4B4, 4B5 SS, 147TH AVE SE / SE 63RD ST
416 2017-00000071 4 TA BLVPD 1B3, 4B3, 4B4 SS, NE 20TH ST / 148TH AVE NE
716 2017-00000148 4 Hit & Run BLVPD 2B8, 3B2 SS, 3831 145TH AVE SE
To Date: 12/31/2017 Agency Type: Fire
Incident Number: IDC: Unit(s):
Apt: Phone Number: Common Name:
Priority: Select All Clear Filter Call Type: Select All Clear Filter
F0 F1 F2 F3 F4 F5 F6
Medic - CVA Protocol Medic - Weapons Move-Up Mutual Aid Request MVA - Aid Emergency MVA - Medic MVA - Rescue
Search

Fire / EMS: 495 unique responses out of 806

Response Date	Problem	Location	Address
5/24/2017 17:38:22	MVA - Aid Emergency	Tony Maronis Factoria	12672 SE 38TH ST
5/24/2017 22:22:40	MVA - Aid Emergency		Se 38th St / 150th Ave Se
5/27/2017 10:58:03	MVA - Medic		Lakemont Blvd Se / 171st Ave Se
5/29/2017 16:13:58	MVA - Aid Emergency		3533 120TH AVE SE
5/29/2017 16:14:28	MVA - Aid Emergency		3533 120TH AVE SE
5/29/2017 16:49:06	MVA - Aid Emergency		Se 17th St / 125th Ave Se
5/30/2017 07:43:06	MVA - Aid Emergency		1106 W Lake Sammamish Pkwy Ne
5/30/2017 16:36:05	MVA - Aid Emergency		120th Ave Ne / Ne 5th St
5/30/2017 22:42:22	MVA - Aid Emergency	Edgewood Park Apts 1541 "H" bldg	1541 145th Pl Se
6/1/2017 11:29:02	MVA - Aid Emergency		Se 60th St / Coal Creek Pkwy Se
6/1/2017 16:13:27	MVA - Medic	Chase Crossroads	1320 156th Ave Ne
6/2/2017 13:29:02	MVA - Aid Emergency		116th Ave Ne / Ne 8th St
6/3/2017 13:15:48	MVA - Aid Emergency	Fred Meyer Overlake	2041 148th Ave Ne
6/7/2017 07:36:03	MVA - Aid Emergency		Bellevue Way Se / 108th Ave Se
6/7/2017 12:59:14	MVA - Aid Emergency		1600 156th Ave Ne
6/7/2017 14:13:22	MVA - Aid Emergency		Ne 24th St / Bel Red Rd
6/7/2017 15:57:35	MVA - Medic		148th Ave Ne / Ne 12th St
6/8/2017 09:36:42	MVA - Aid Emergency		120th Ave Ne / Ne 8th St
6/9/2017 08:44:13	MVA - Aid Emergency		Bel Red Rd / Ne 24th St
6/9/2017 15:41:37	MVA - Aid Emergency		156th Ave Ne / Northup Way
6/10/2017 15:38:56	MVA - Aid Emergency		148th Ave Ne / Ne 8th St
6/12/2017 15:28:14	MVA - Aid Emergency	AKA: NORTHUP WAY	14700 NE 20TH ST
6/12/2017 17:55:05	MVA - Aid Em		
6/14/2017 17:57:05	MVA - Aid Em		
6/15/2017 20:43:06	MVA - Aid Em		
6/15/2017 21:11:27	MVA - Aid Em		
6/16/2017 08:47:32	MVA - Aid Em		
6/16/2017 10:56:09	MVA - Aid Em		
6/16/2017 23:35:52	MVA - Aid Em		
6/18/2017 18:19:20	MVA - Me		
6/19/2017 16:11:29	MVA - Aid Em		
6/21/2017 19:19:26	MVA - Aid Em		
6/25/2017 18:04:52	MVA - Aid Em		
6/26/2017 15:32:25	MVA - Aid Em		
6/26/2017 19:23:16	MVA - Aid Em		

Fire/EMS

27 Other Events involving Accidents

Response Date	Problem	Location	Address	Comment
1/28/2017 14:32:37	Aid - Emergency	BelMar MJ Store	614 116th Ave Ne	REQ AID FOR HIT AND RUN VS PED
2/9/2017 17:52:08	Aid - Emergency		Ne 10th St / 110th Ave Ne	POSS VEH VS PED UNABLE TO CONFIRM
4/17/2017 20:40:20	Aid - Emergency		1335 162nd Ln Ne	FELL OFF A BIKE
5/3/2017 10:26:57	Medic		162nd Pl Se / Se 35th Pl	IT WAS A BLOCKING ACCIDENT BIKE STILL ON SCENE DONT KNO
5/6/2017 16:48:40	Aid - Emergency		4586 144th Ave Se	FELL OFF BIKE
5/8/2017 18:53:22	Aid - Emergency		Ne 38th St / Ne 37th Ct	FELL OFF BIKE
5/13/2017 09:35:02	Aid - Emergency		1848 W Lake Sammamish Pkwy Se	BIKE ACCIDENT
5/31/2017 19:12:41	Aid - Emergency		Ne 1st St / Bellevue Way Ne	JUST SOUTH OF GREG'S BICYCLES
6/16/2017 10:54:37	Medic	AKA: ROSEMONT PL	W Lake Sammamish Pkwy Ne / Ne 15th Pl	FELL OFF BIKE
6/16/2017 19:13:30	Aid - Emergency	Crossroads Park NE 8th St	16120 Ne 8th St	HIT BY BICYCLE
7/7/2017 15:26:03	Aid - Emergency	AKA: NE 20TH ST	15600 NORTHUP WAY	BIKE FELL OVER
7/8/2017 09:04:27	Aid - Emergency		Se Newport Way / 150th Ave Se	BICYCLE ACCIDENT
7/9/2017 07:11:17	Aid - Emergency		2236 W Lake Sammamish Pkwy Se	BICYCLE ACCIDENT
7/14/2017 20:35:00	Aid - Emergency	Downtown Park	10201 Ne 4th St	5YO M BLEEDING FROM THE MOUTH AFTER MINOR BIKE VS CAR TA

RAADAR
REAL-TIME AGENCY ACTIVITY DISPLAY AND REPORTING

Active Calls | Search | Units | Paging | Reports | Resources | ePASS | Profile | About | Log Out

Listen to Real-Time Radio Traffic

0:00

Alternate Link

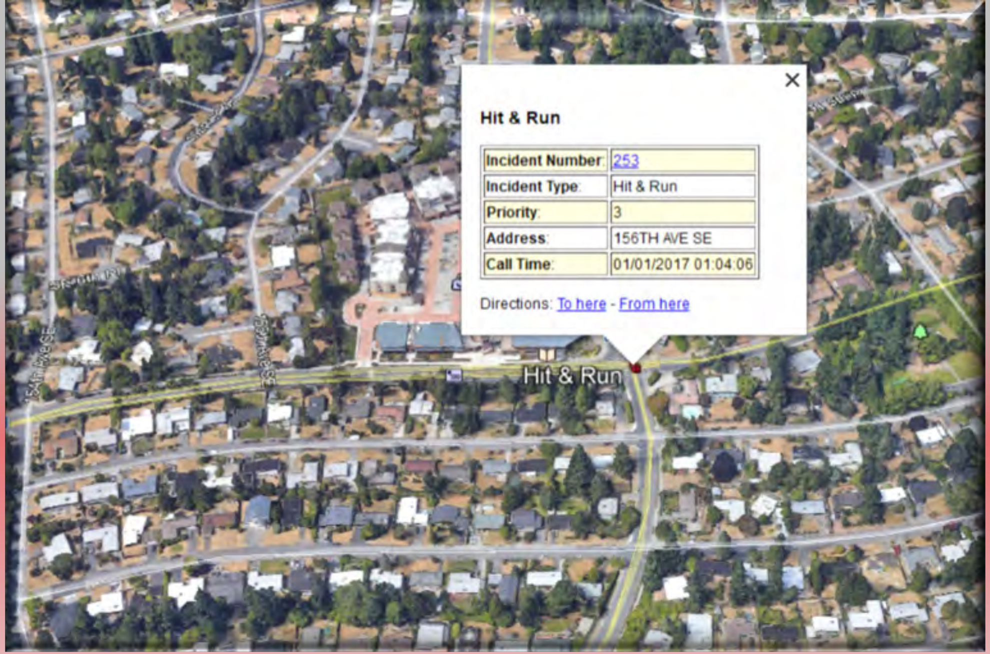
911 Audio | Radio Audio | Current Traffic | Detailed Report | Redacted Report | Map AVL Data

CFS Number	253
Call Time	01/01/2017 01:04:06
Call Type	Hit & Run
Call Priority	3
Incident Number	2017-00000022
Case Number	
Department	BLVPD

Common Name	
Address	156TH AVE SE / LAKE HILLS BLVD
Nearest Cross Street	No Cross Streets Found
Call Source	911 call
Caller Phone	(866) 866-5006
Units	

Last Update At: 02/12/2019 08:37:06 Auto Refresh: 10 Sec

Timestamp	Login	Description
01/01/2017 01:26:57	kkunce	Added: XX Count 1,SS Count 1
01/01/2017 01:26:57	kkunce	Close Call
01/01/2017 01:26:56	kkunce	Unit 4B4 Available for calls
01/01/2017 01:26:07	kkunce	No damage to victim's vehicle. Provided RP with incident number. Performed by Mobile Unit 4B4



Priority: 3
Agency: Police
Taken By: Schaible, Jennifer
Disposition: Assisted other unit
Closed Time: 01/01/2017 01:26:57
Latitude: 47.6032945950000000
Longitude: -122.1307237560000000

Call Type: Hit & Run
Problem: Emergency In-Progress
Jurisdiction: BLVPD
Venue: Bellevue Police Department
Beat: BD-4-3
Police ORI: WA0170200
Call Number: 253

CFS Location

Common Name:
Address: 156TH AVE SE
Apartment:
City, State, Zip: BELLEVUE, WA 98007

Location Name:
Location Type: Intersection
Cross Street: No Cross Streets Found

Caller Information

Caller Name: ONSTAR
Caller Role: Reporting party

Phone: (866) 866-5006
Call Source: 911 call

Person Information

Name	Phone	Role	Primary Caller
ONSTAR	(866) 866-5006	Reporting party	✓

Call Timestamps

Call Created: 01/01/2017 01:04:06
1st Unit Dispatched: 01/01/2017 01:05:03
1st Unit Enroute: 01/01/2017 01:05:03
1st Unit Arrived: 01/01/2017 01:09:36
Call Closed: 01/01/2017 01:26:57

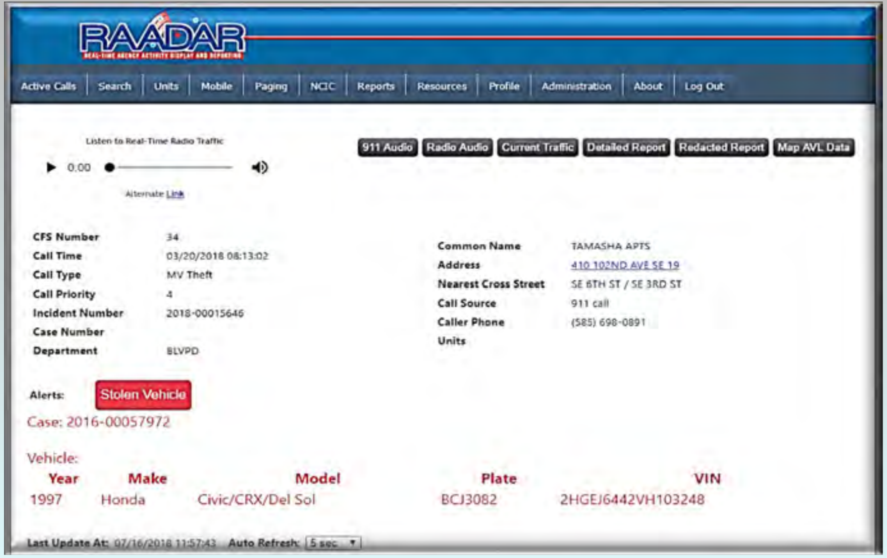
Elapsed Times

Call Create to Dispatch: 00:00:57
1st Dispatch to Enroute: 00:00:00
1st Enroute to Arrived: 00:04:33
Call Duration: 00:22:51

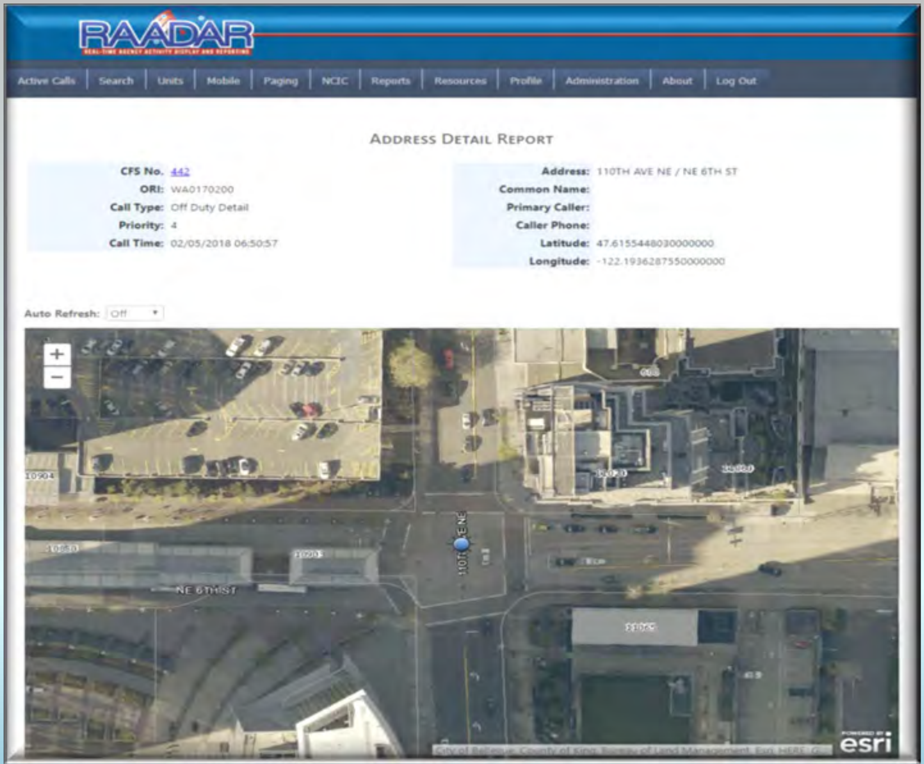
Resources Assigned

Unit	Dispatch	Enroute	Staged	Arrived	Cleared	At Patient	Transport	At Hospital	Depart Hospital
4B4	01:05:03	01:05:03			01:26:56				
3B4	01:05:03	01:05:03		01:10:08	01:21:07				
4A56	01:06:32	01:06:45		01:09:36	01:11:20				

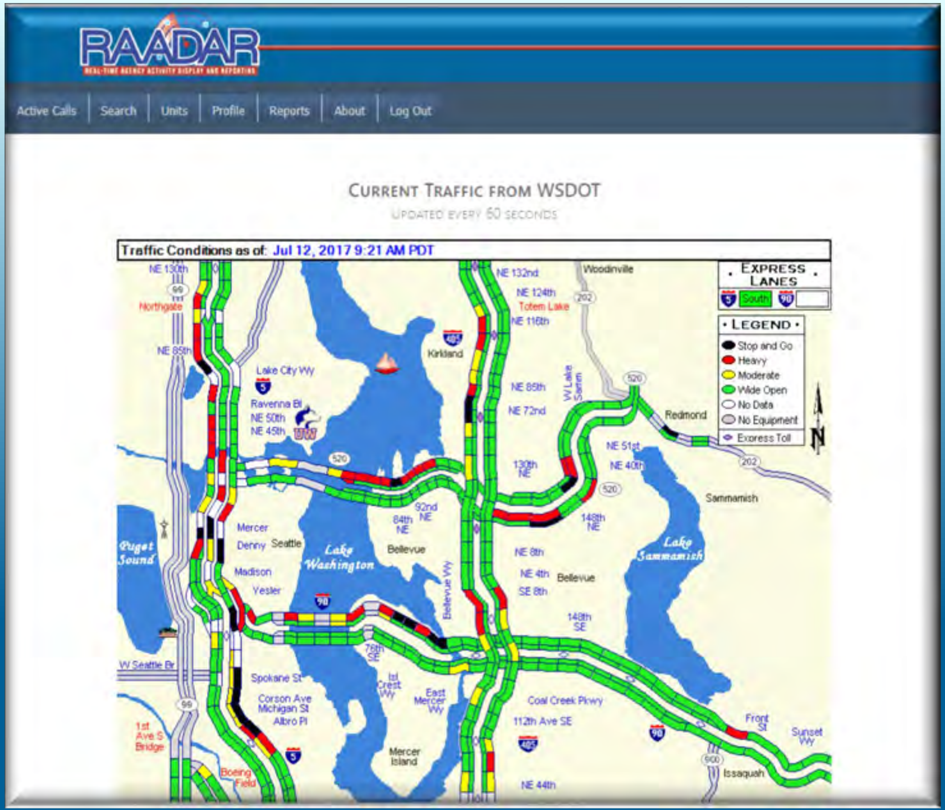
- **Call Detail in Real Time**
- **Mapping in Real Time**
- **911 Audio in Real Time**
- **Radio Audio in Real Time**
- **Detailed Reports**

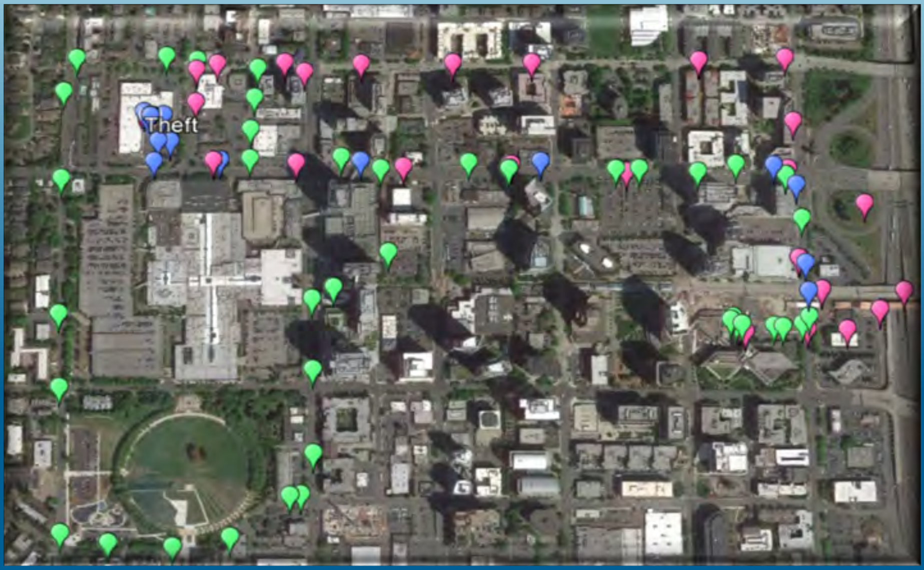


RAADAR
REAL-TIME AGENCY ACTIVITY DISPLAY AND REPORTING



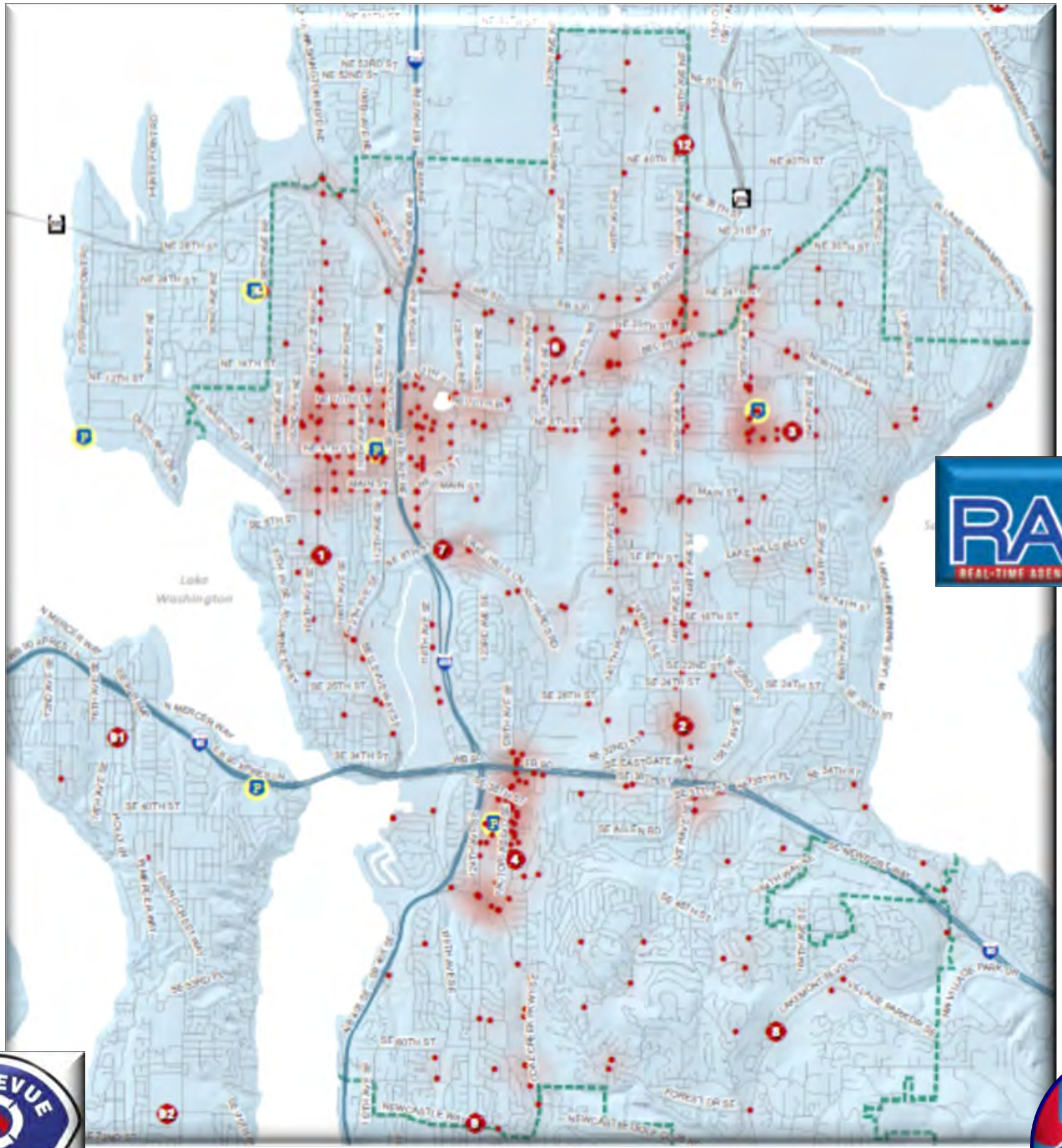
- **Alerts**
- **Road Conditions**
- **Automatic Vehicle Location (AVL)**
- **Address Detail Reports**
- **Personnel Accountability**
- **Customizable Reports**
- **Dashboard**
- **Heat Maps**





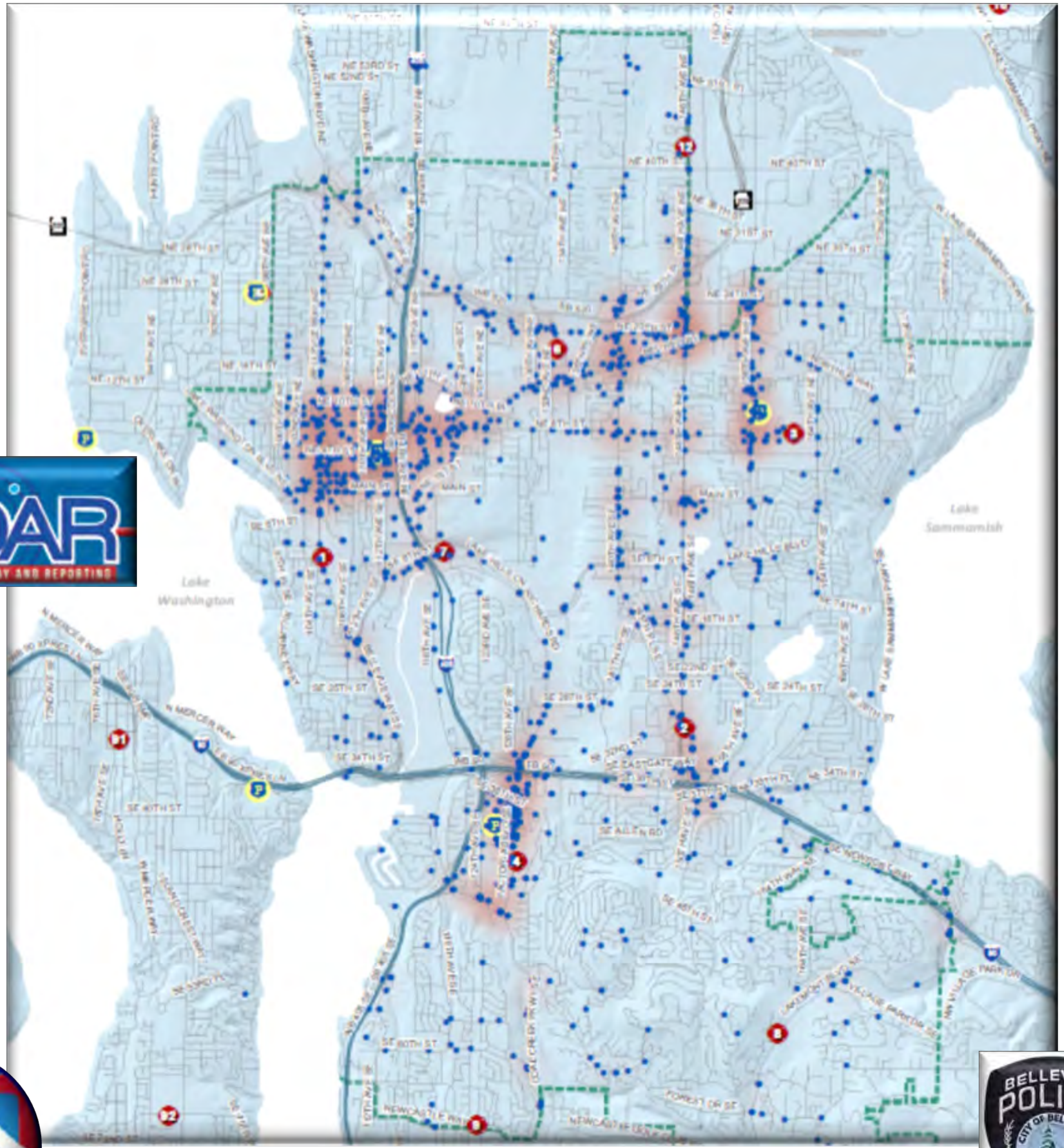
Motor Vehicle Accident Calls 10/01/17 - 10/01/18

CITY OF BELLEVUE



Traffic Accident Calls 10/01/17 - 10/01/18

CITY OF BELLEVUE



RAADAR
REAL-TIME AGENCY ACTIVITY DISPLAY AND REPORTING

Sharing Information

In Real Time – Agreements to Exchange Information

MEMORANDUM OF UNDERSTANDING
AMONG THE
NORTH EAST KING COUNTY REGIONAL PUBLIC SAFETY COMMUNICATIONS AGENCY (NORCOM)
AND
PARTICIPATING AGENCIES
FOR
A SOFTWARE LICENSE AND VIEW-SHARING INITIATIVE KNOWN AS REAL-TIME AGENCY ACTIVITY DISPLAY AND REPORTING ("RAADAR"®)

This Memorandum of Understanding (MOU or Agreement) is a Software License and Data Viewing Agreement entered into by the North East King County Regional Public Safety Communications Agency (NORCOM) and ____________________ ("AGENCY") participating in an information sharing initiative for Police, Fire, and Emergency Medical Services ("AGENCIES"). This initiative is facilitated by software developed and owned by NORCOM, and licensed under this MOU to Agencies, known as the Real-Time Agency Activity Display and Reporting ("RAADAR" or the "Software").

A. CONCEPT OF OPERATIONS AND DATA VIEWING.

1. RAADAR permits Agencies who have signed an MOU to view data of NORCOM and other participating Agencies. Each Agency will designate shared data fields and which Agencies may view that data by completing **Exhibit A** to this Agreement. If after signing this Agreement, an Agency desires to change these designations, it must provide NORCOM thirty (30) days' notice.

2. Each Agency participates under its own individual legal status, jurisdiction, and authorities. RAADAR is not intended to, and shall not be deemed to have, independent legal status.

3. RAADAR will access Agency data via a separate, sensitive but unclassified server located in NORCOM facilities. Agencies will access RAADAR via secure Internet connections. Each Agency is responsible for obtaining Internet access and providing devices capable of using RAADAR.

4. Each Agency shall designate in writing an individual point of contact (POC) for MOU purposes. The Agency's POC will be responsible for: (1) providing and maintaining a list of users authorized to access RAADAR; (2) completing Exhibit A to designate data fields to be shared and authorized recipient; and (3) facilitating the information technology configuration needed for RAADAR to view information.

Elements

- Viewing vs. Warehousing
- Public Disclosure
- CJIS, HIPPA, etc.
- Liability
- Third Party Use
- Security
- Level of Access

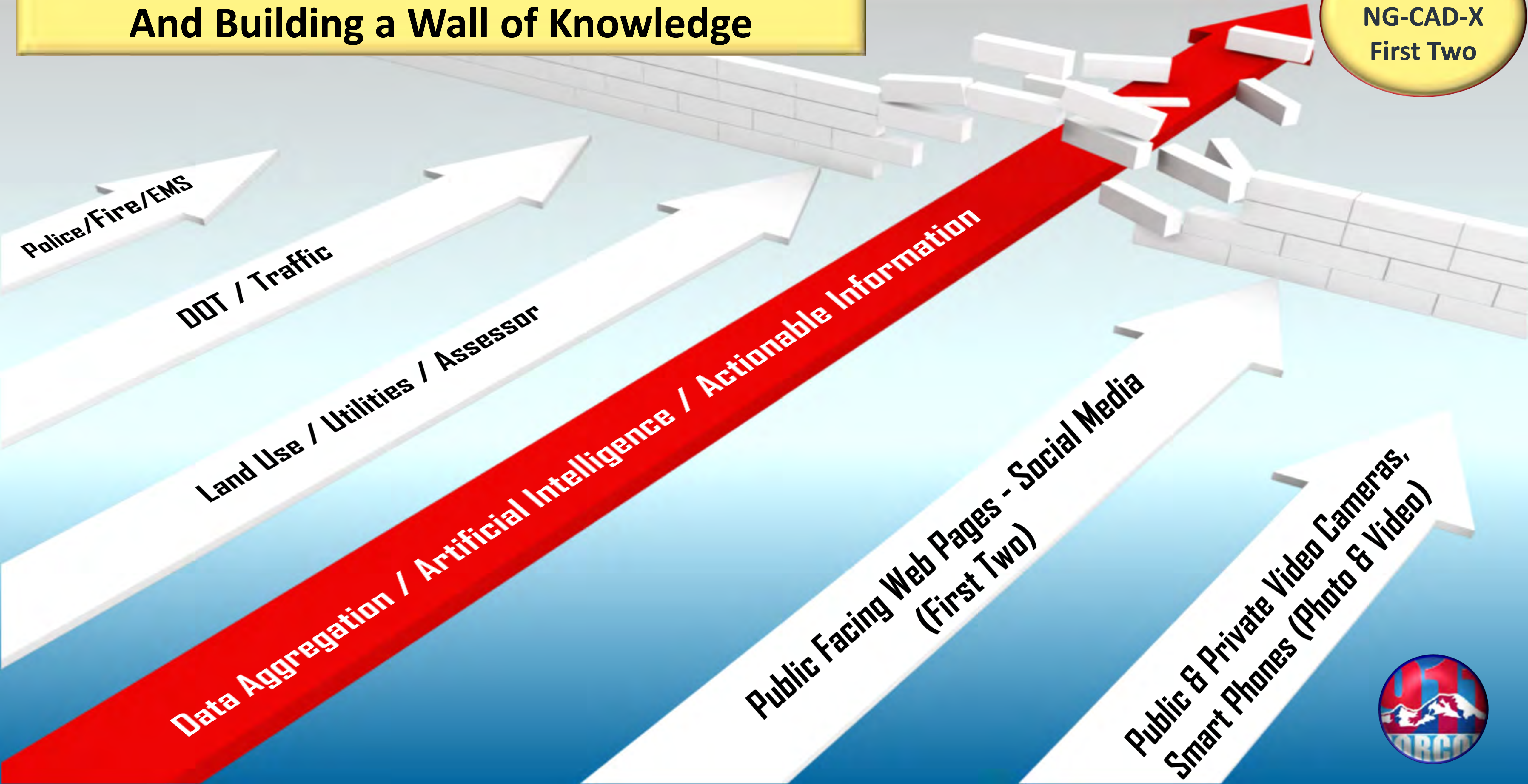
Future: Collaborative Wall of Knowledge

Knowledge Multiplier & Facilitator

Mutil-Source & Multi-Discipline

Breaking Barriers –
And Building a Wall of Knowledge

RAADAR
NG-CAD-X
First Two



Wall of Knowledge Already Emerging

- Houston
- Detroit
- St. Louis
- New Haven
- Albuquerque

- Sacramento
- Seattle
- New Orleans
- Philadelphia
- New York

- Louisville
- Detroit
- Wilmington
- Hartford
- Miami Gardens

- West Palm Beach
- Delaware Valley
- Fort Meyers
- Austin
- Laredo

Correlation in Real Time for
<u>Actionable Information</u>

- Multi-Source
- Multi-Format
- Multi-Discipline

Thank You

Thomas R. Orr
Executive Director

911 NORCOM
www.norcom.org

PO Box 50911
Bellevue, WA 98015
Phone: 425-577-5671
Fax: 425-577-5701
torr@norcom.org

Providing High Quality Emergency Service Communications

BriskSynergies

Video analytics towards Vision Zero Partnership

Presented by Charles Chung, CEO Brisk Synergies

Leader in Automated Road Safety Analysis

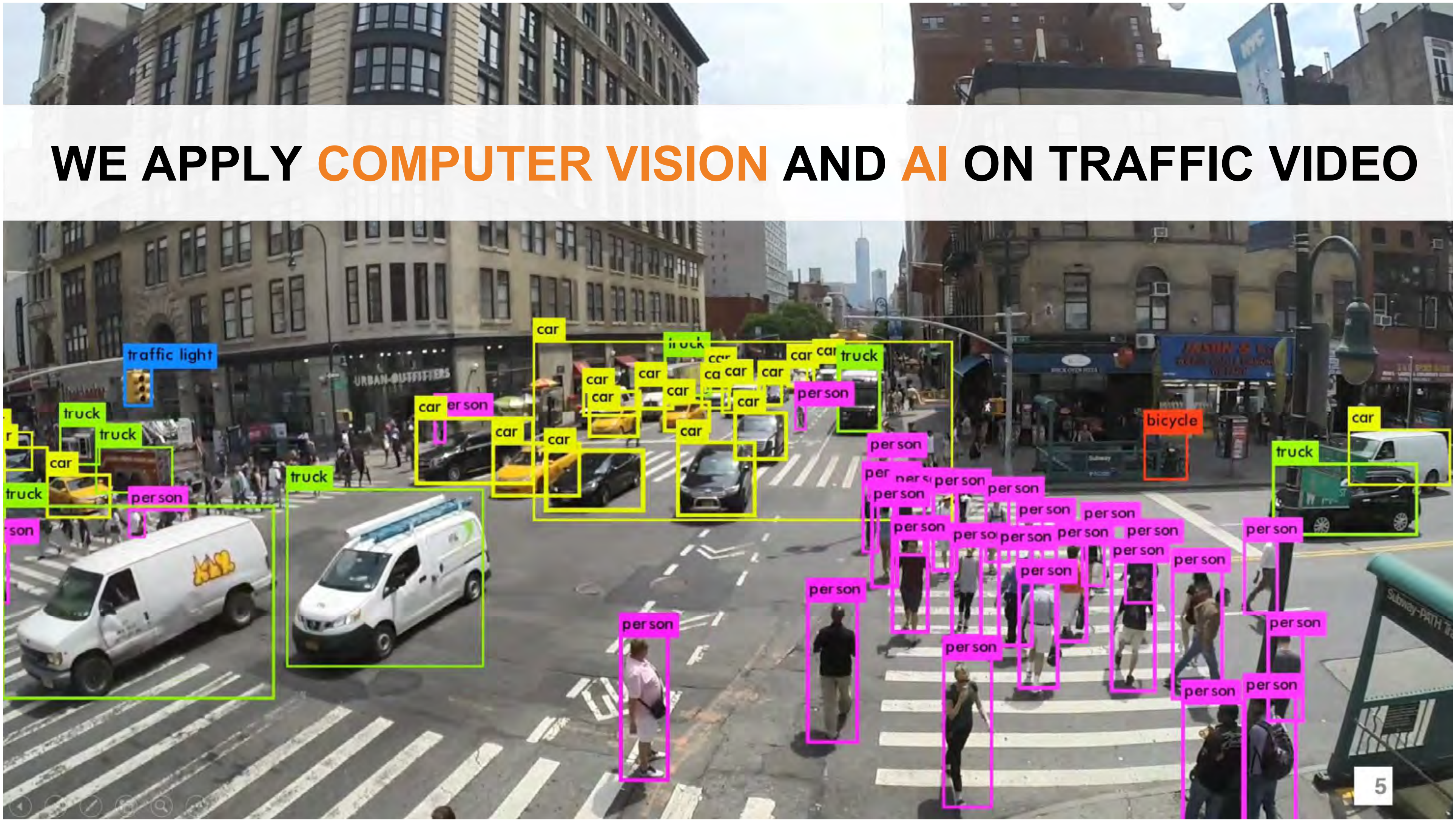
- We detect near-crashes to predict future traffic collisions
- Based in Canada, with offices in Waterloo and Montreal
- **Clients:** Transportation authorities, municipalities, consulting firms and urban design firms
- **Partners:** Engineering firms and System Integrators


EVERY YEAR
1M
ROAD FATALITIES


EVERY YEAR
50M
ROAD INJURIES

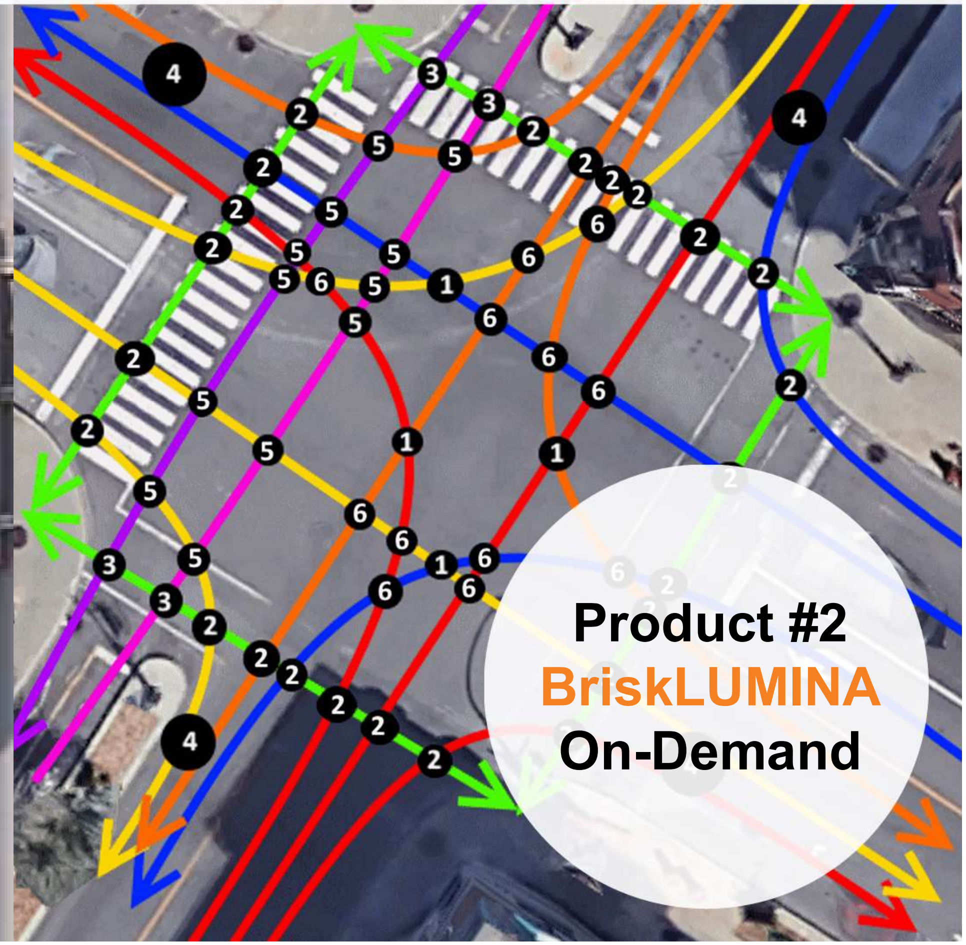

COLLECT
5 yrs
COLLISION DATA
FIRE
CITIES WAIT 5 YEARS OF COLLISION DATA
TO KNOW WHAT CAUSES THE ACCIDENTS

WE APPLY COMPUTER VISION AND AI ON TRAFFIC VIDEO

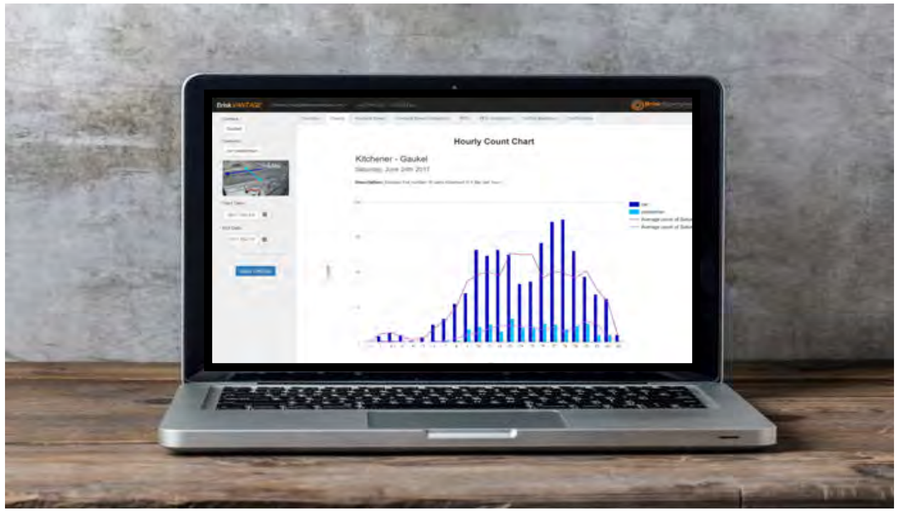


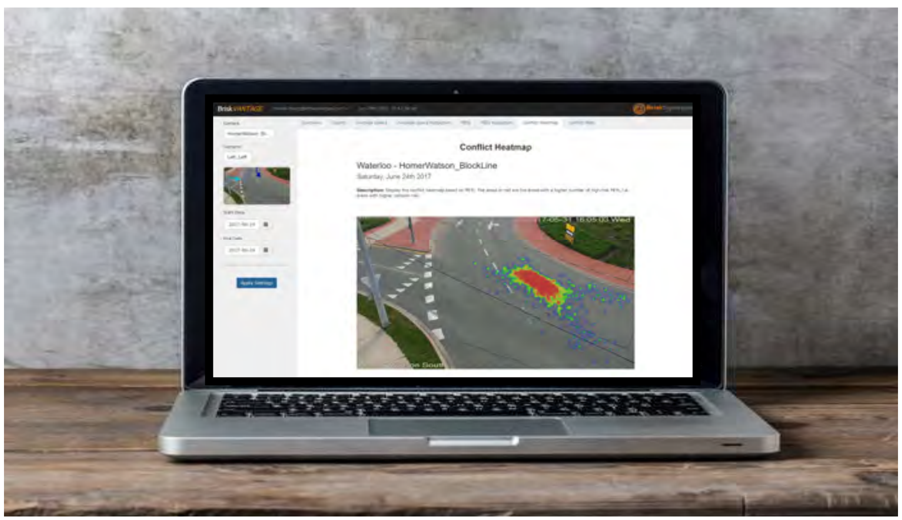

0.96 sec
to collision
0.88 sec
to collision
0.26 sec
to collision
MEASURE NEAR-MISSES THAT HAPPEN EVERYDAY

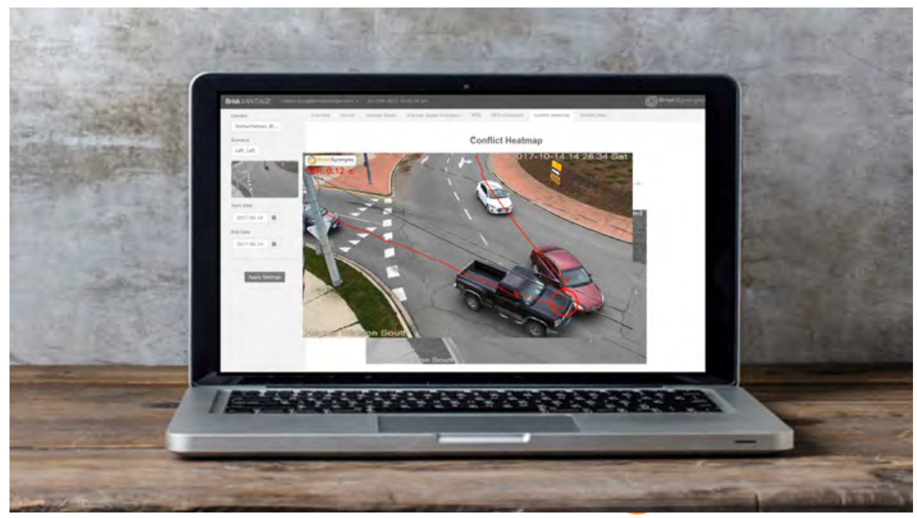
SOLUTIONS TO MONITOR HIGH-RISK INTERSECTIONS



Identify Most Likely Cause of Next Collisions At Each Intersection


Hourly Count Chart
Kitchener - Gaukel


Conflict Heatmap
Waterloo - HomerWatson_BlockLine


Conflict Heatmap

Vision Zero Video Analytics Partnership

Vision Zero Video Analytics Partnership

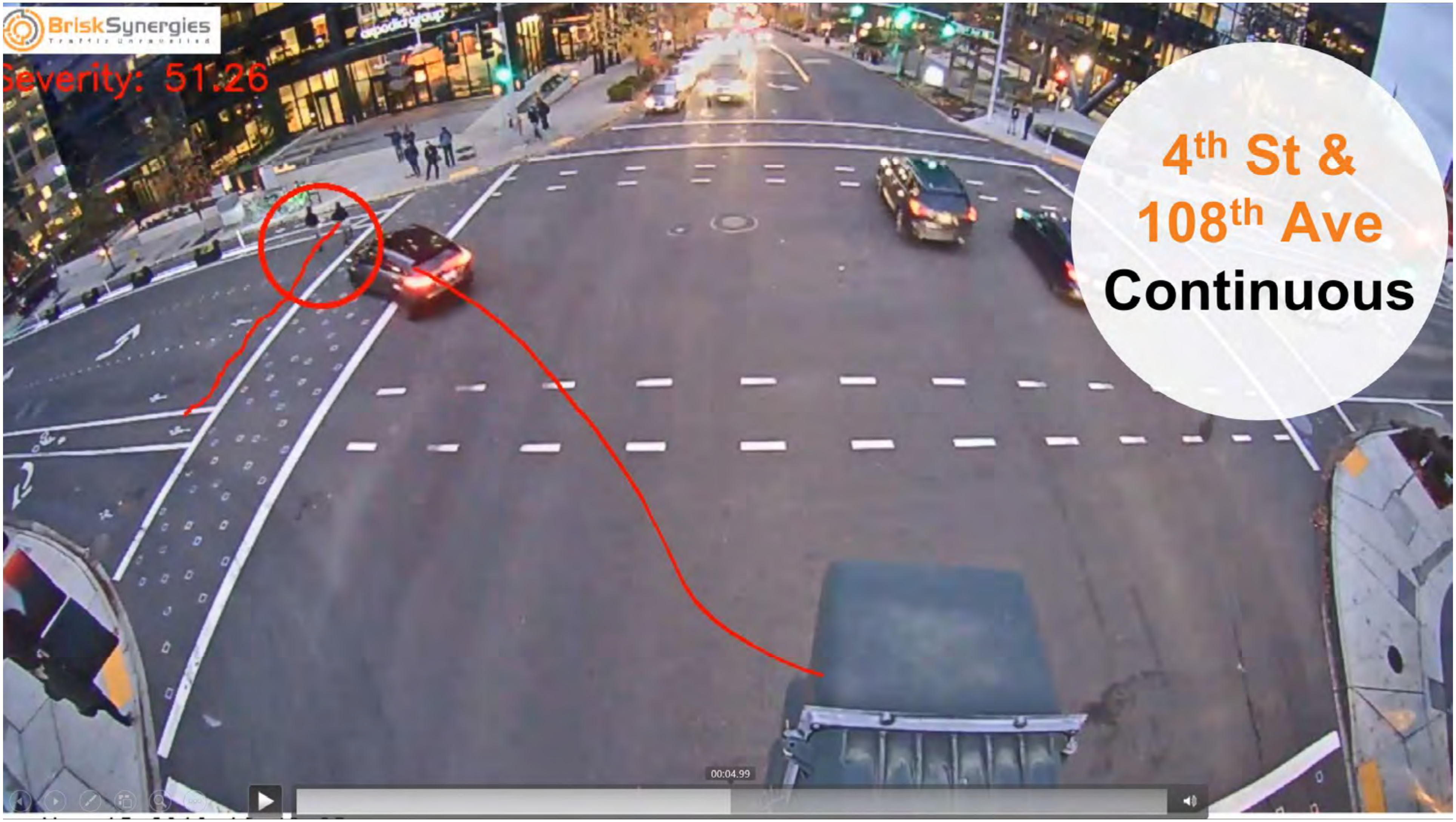
Vision Zero Video Analytics Partnership

BriskVANTAGE – Continuous

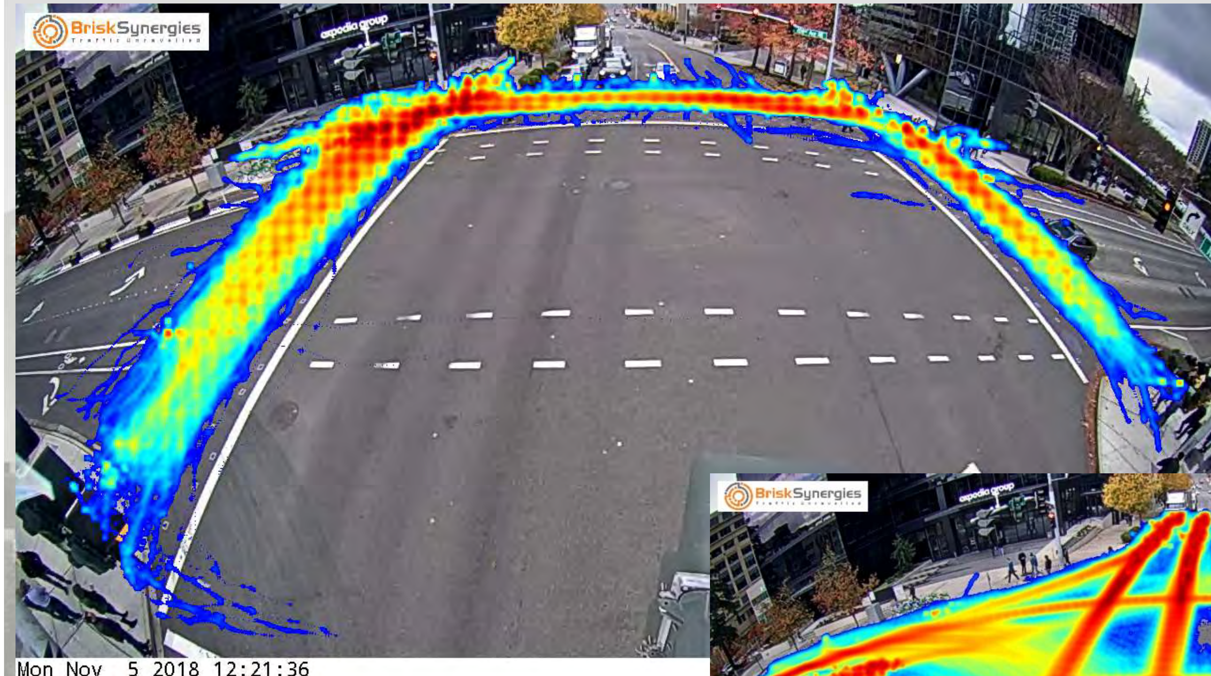
- **High-risk locations**

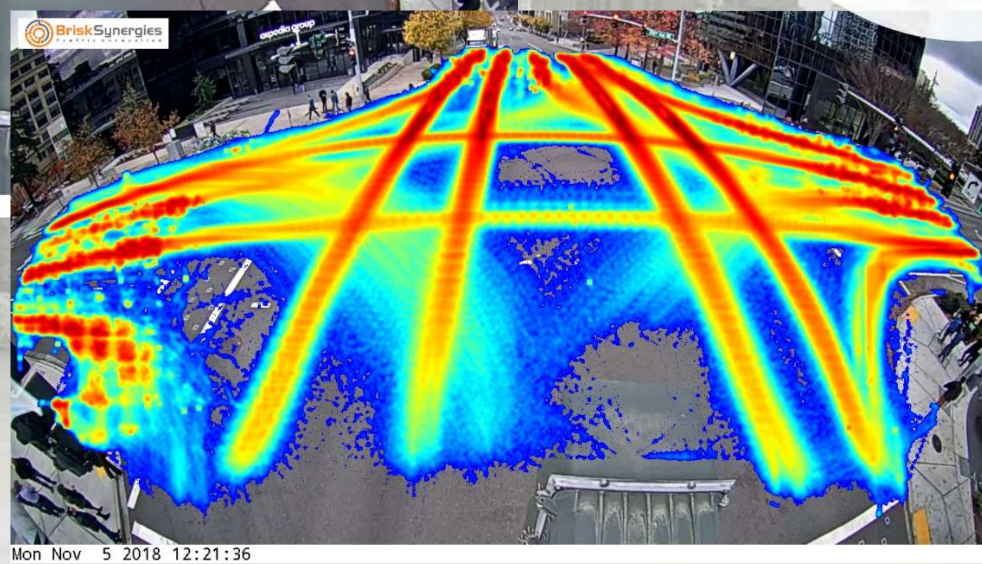
BriskLUMINA – Snapshots analyses

- **Mon-Fri Peak-hour**
- **Carry out weekly**


BriskSynergies
Severity: 51.26
4th St &
108th Ave
Continuous
00:04.99

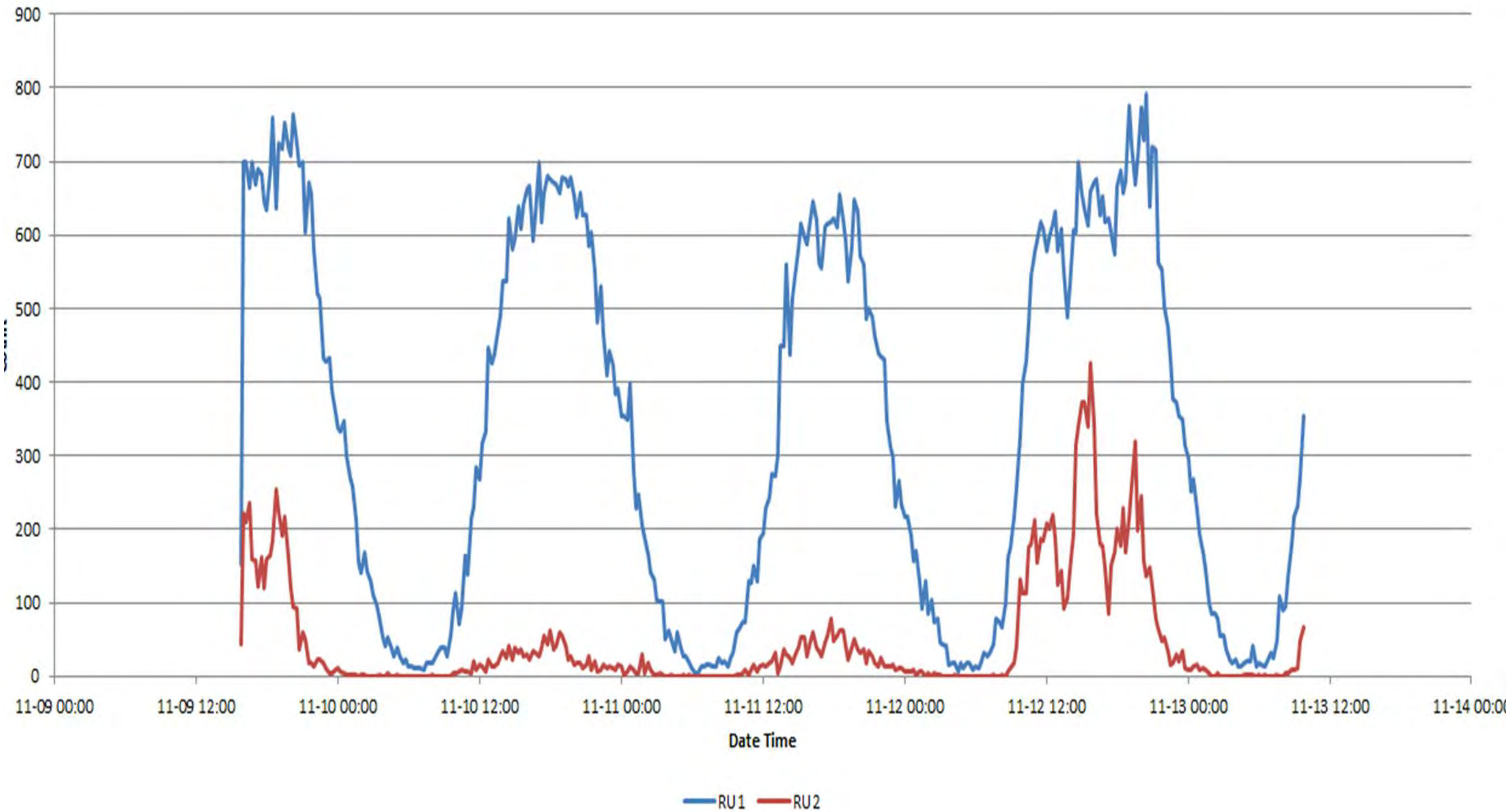
4^{th} St & 108^{th} Ave Continuous





CITY OF BELLEVUE WASHINGTON

Brisk Synergies



900
800
700
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11-10 00:00
11-10 12:00
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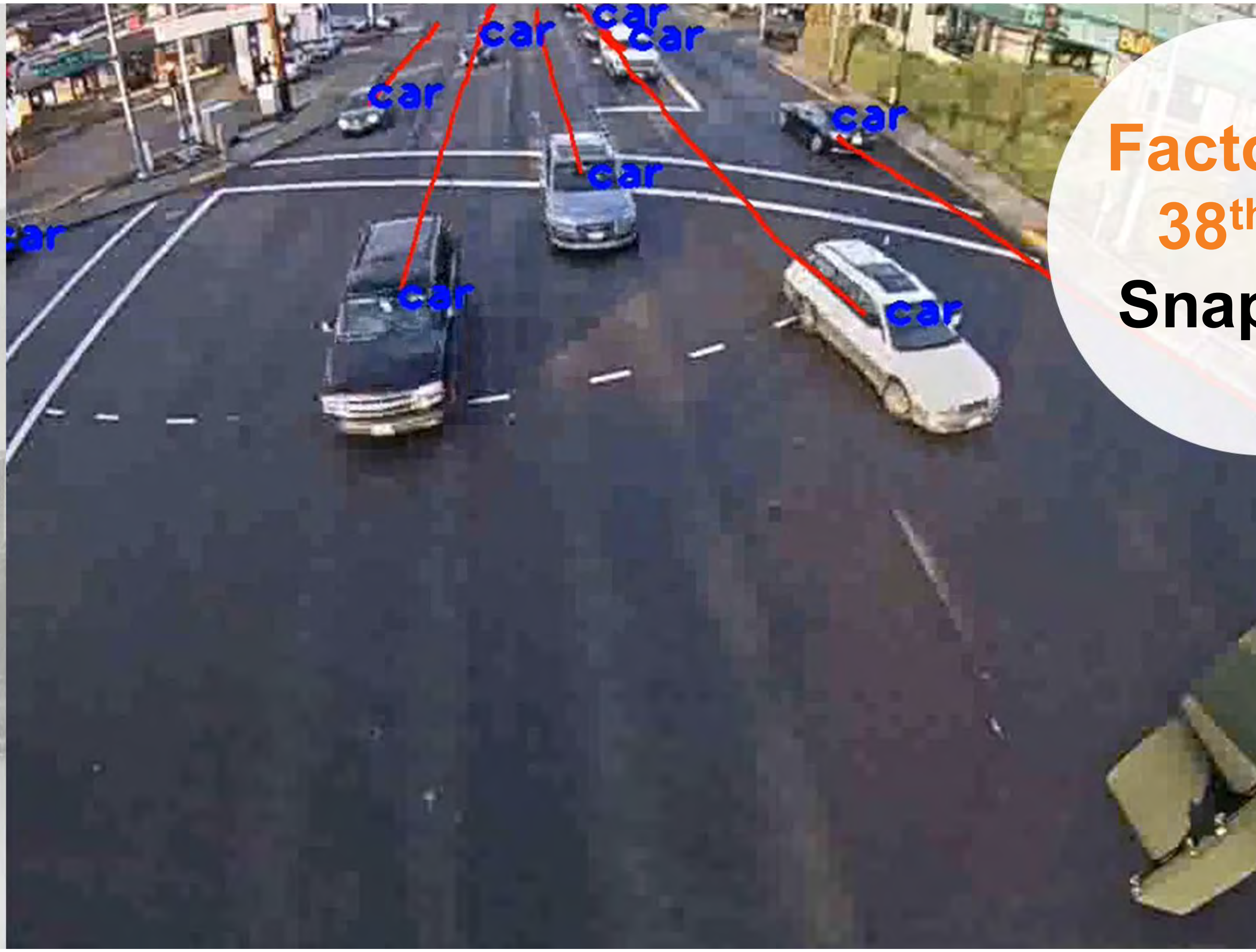
Date Time
RU1
RU2

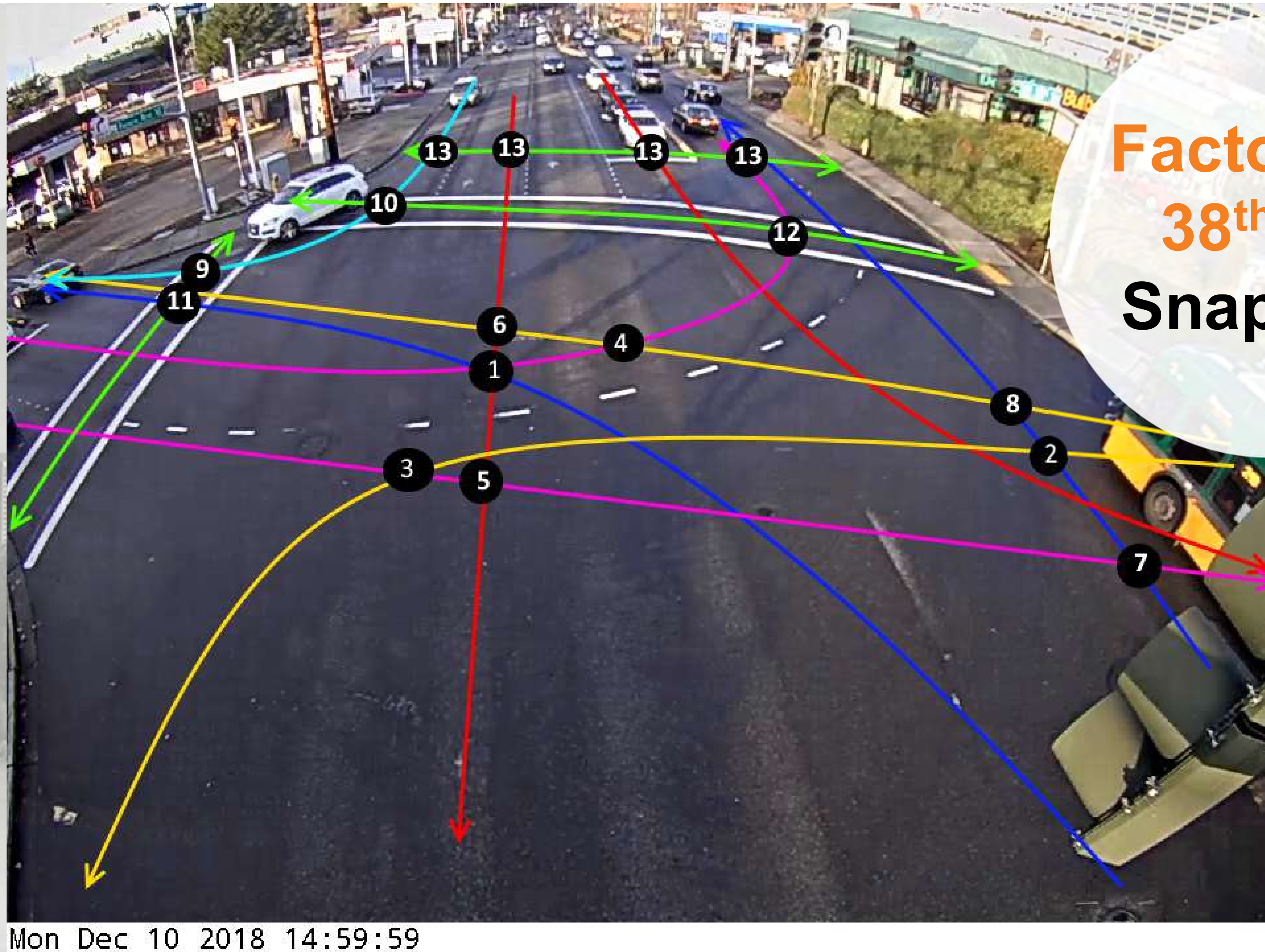


Factoria & 38th SE Snapshot

CITY OF BELLEVUE WASHINGTON

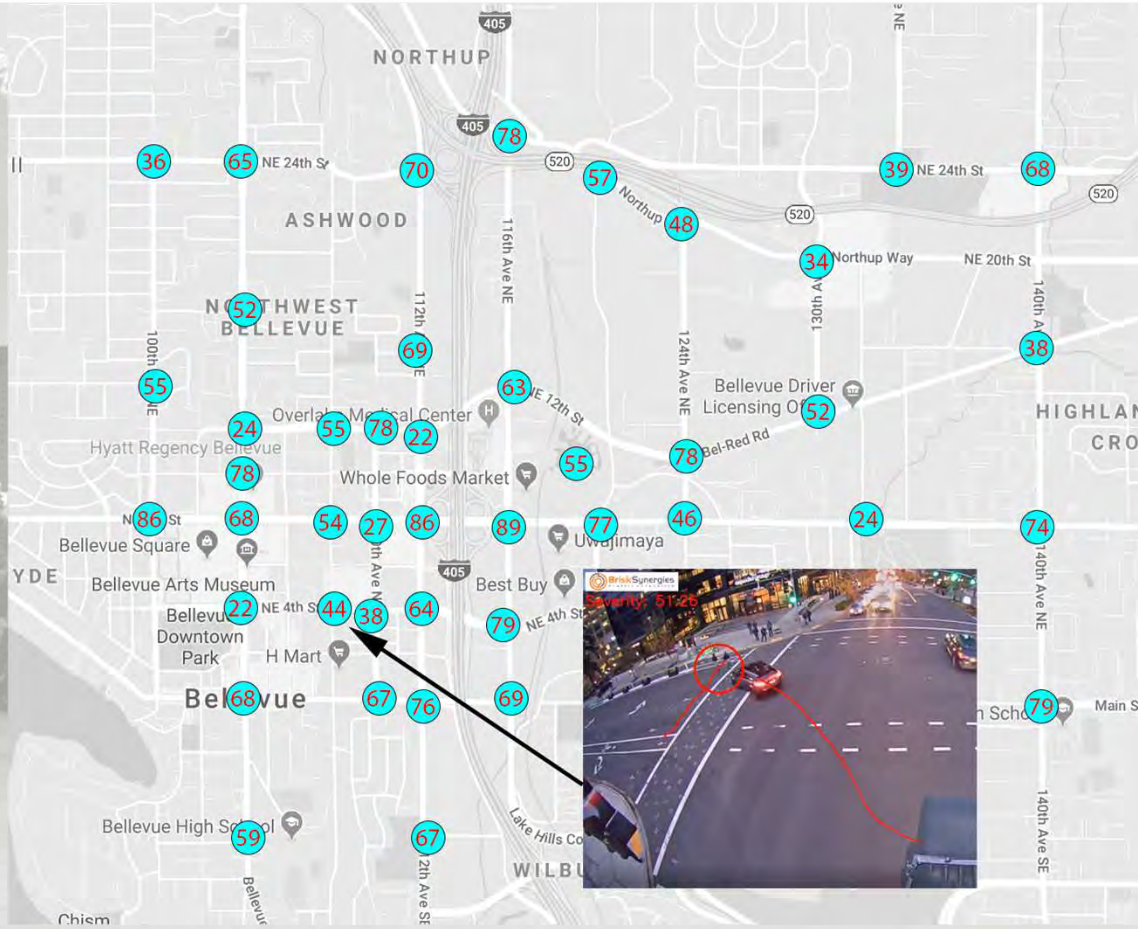
Brisk Synergies

Factoria & 38th SE Snapshot



Brisk Synergies

Future: Network screening and Safety Score



Charles Chung
charles.chung@brisksynergies.com

Innovative Tools for Advancing Complete Streets Vision Zero

Peter Koonce, PE
Portland, OR

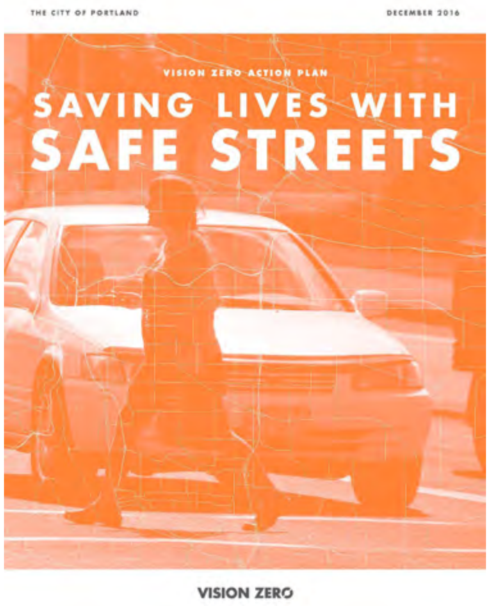
Vision Zero is Portland's goal to eliminate all traffic deaths and serious injuries

definite course of
adopted for the
expediency.
pol·i·cy
adopted and pur
government, ru
party - action
conforming to
reference to

In June 2015, the Portland City Council unanimously passed a resolution committing Portland to Vision Zero.

VISION ZERO ACTION PLAN

- Adopted Dec. 1, 2016
- Created with help from a 26-member group representing diverse stakeholders
- 32 specific actions

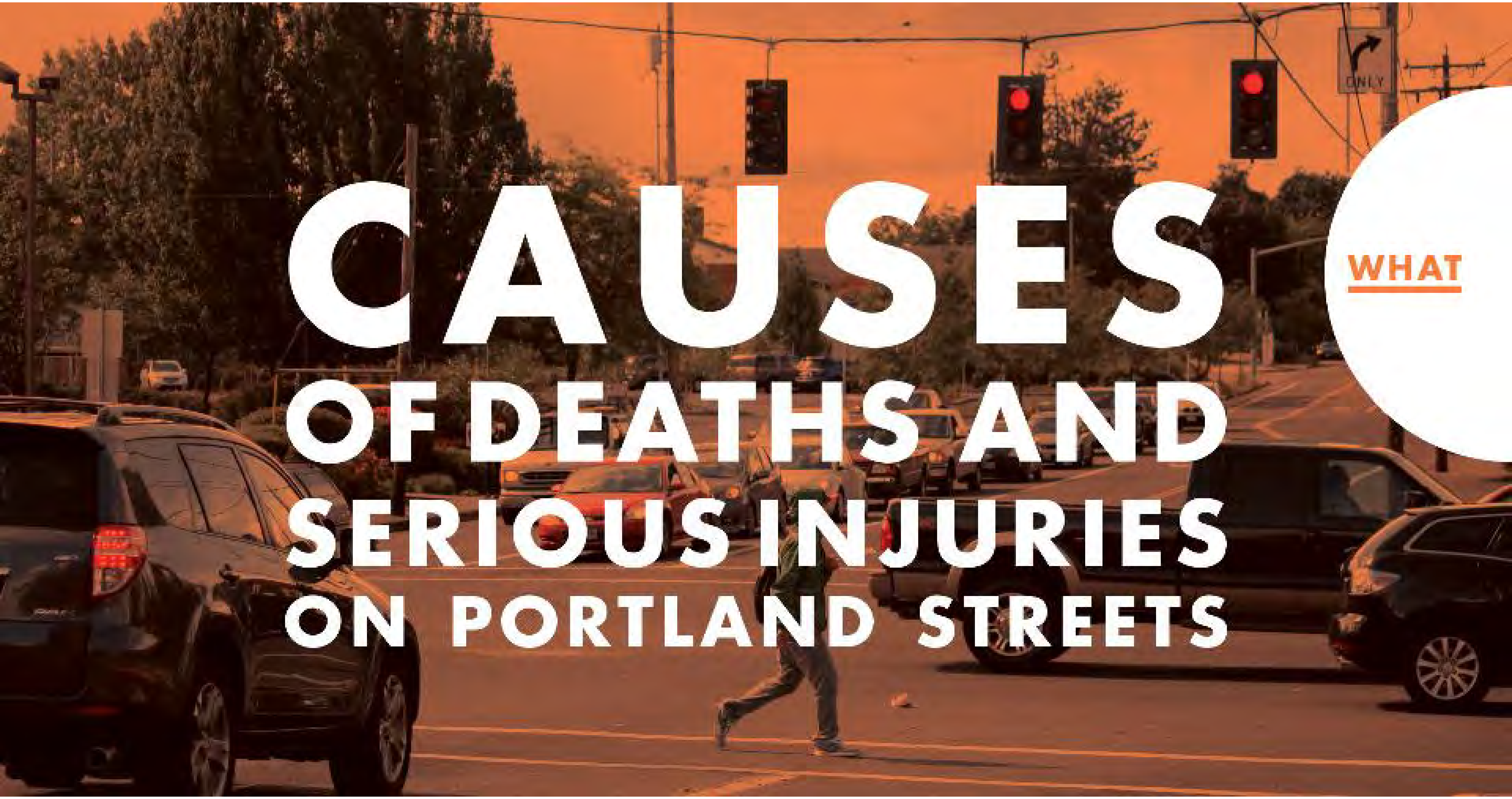


HIGH CRASH NETWORK

Composite of motor vehicle, bicycle, and pedestrian high crash networks

Source: PBOT

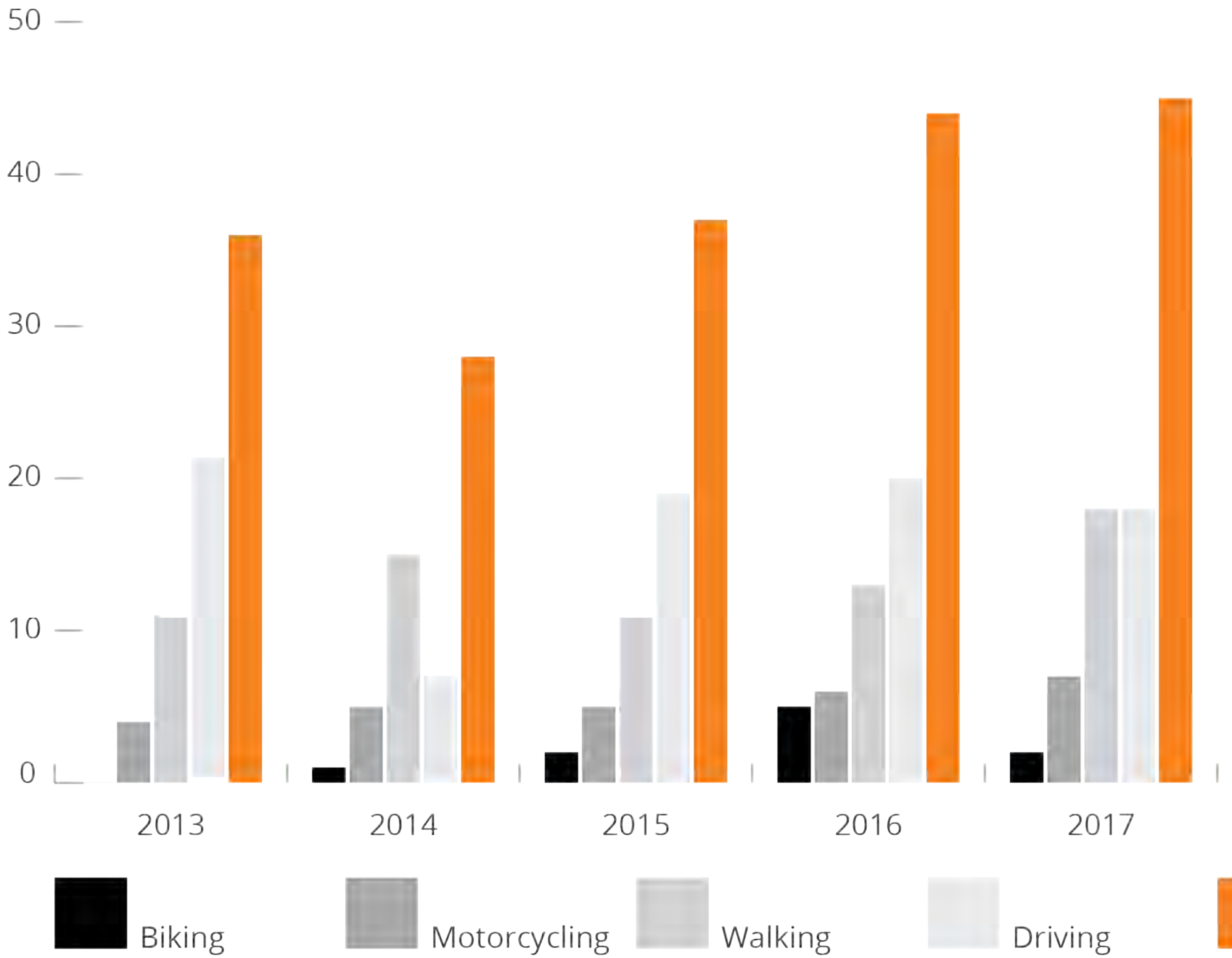
- = TOP 30 HIGH CRASH STREETS
- = TOP 30 HIGH CRASH INTERSECTIONS
- = COMMUNITY OF CONCERN



CAUSES OF DEATHS AND SERIOUS INJURIES ON PORTLAND STREETS

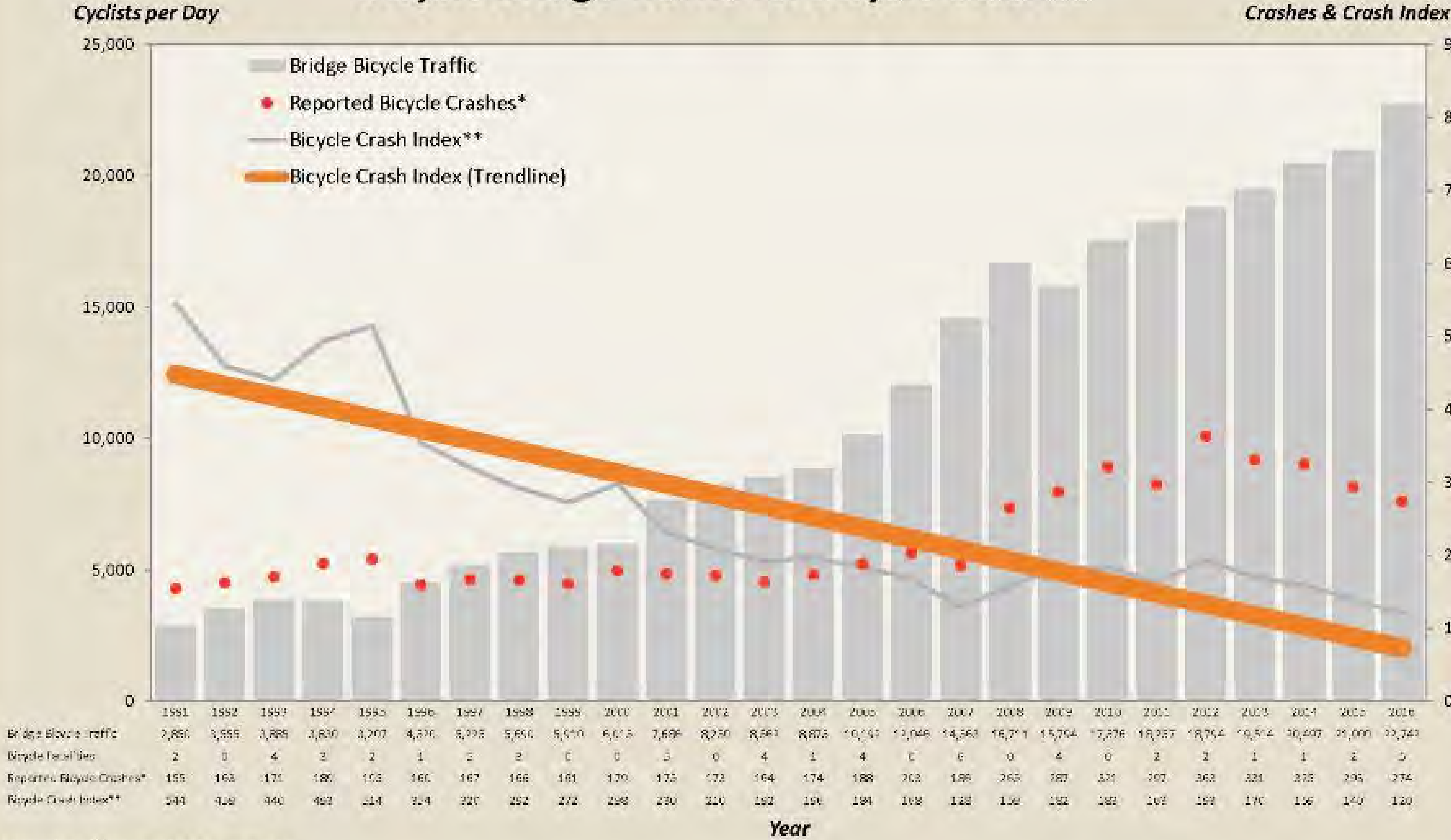
WHAT

Portland, 2013-17



45 deaths in 2017 is highest number since 2003

Bicycle Bridge Traffic vs. Bicycle Crashes



Extrapolated from peak 2-hour counts

* Beginning January 2008, the Portland Police Bureau made a decision to lower the threshold for reporting bicycle-involved crashes. This change means that crashes that would have previously gone unreported by Portland Police are now entering the reporting system. There have been no indications in the operation of our system that leads the city to conlude that the increase in reported crashes is representative of changes in actual crash activity within the city.

**Crash Index represents an indexing of annual reported crashes to daily bicycle trips across the four main bicycle bridges.

HOW

TAKING ACTION

Vision Zero addresses the causes and contributors to vehicle crashes by improving dangerous streets and by reducing dangerous behaviors through policy change, education, community conversation, and enforcement. Education and outreach activities will accompany all areas of action.

ENGINEERING streets for safety

ENFORCEMENT of traffic laws

EDUCATING the community

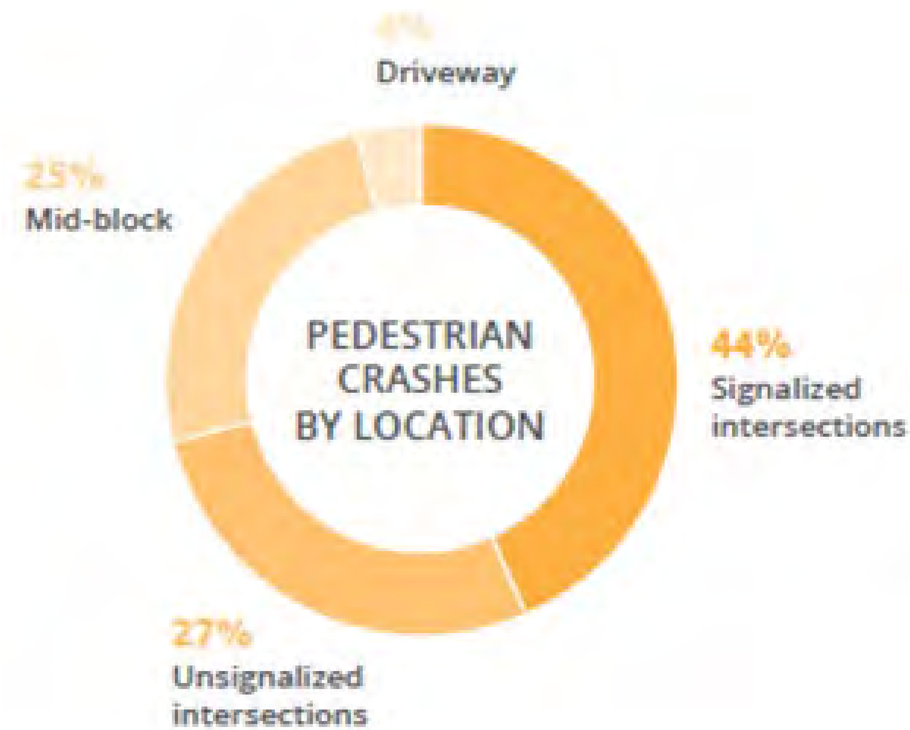
EVALUATION and accountability

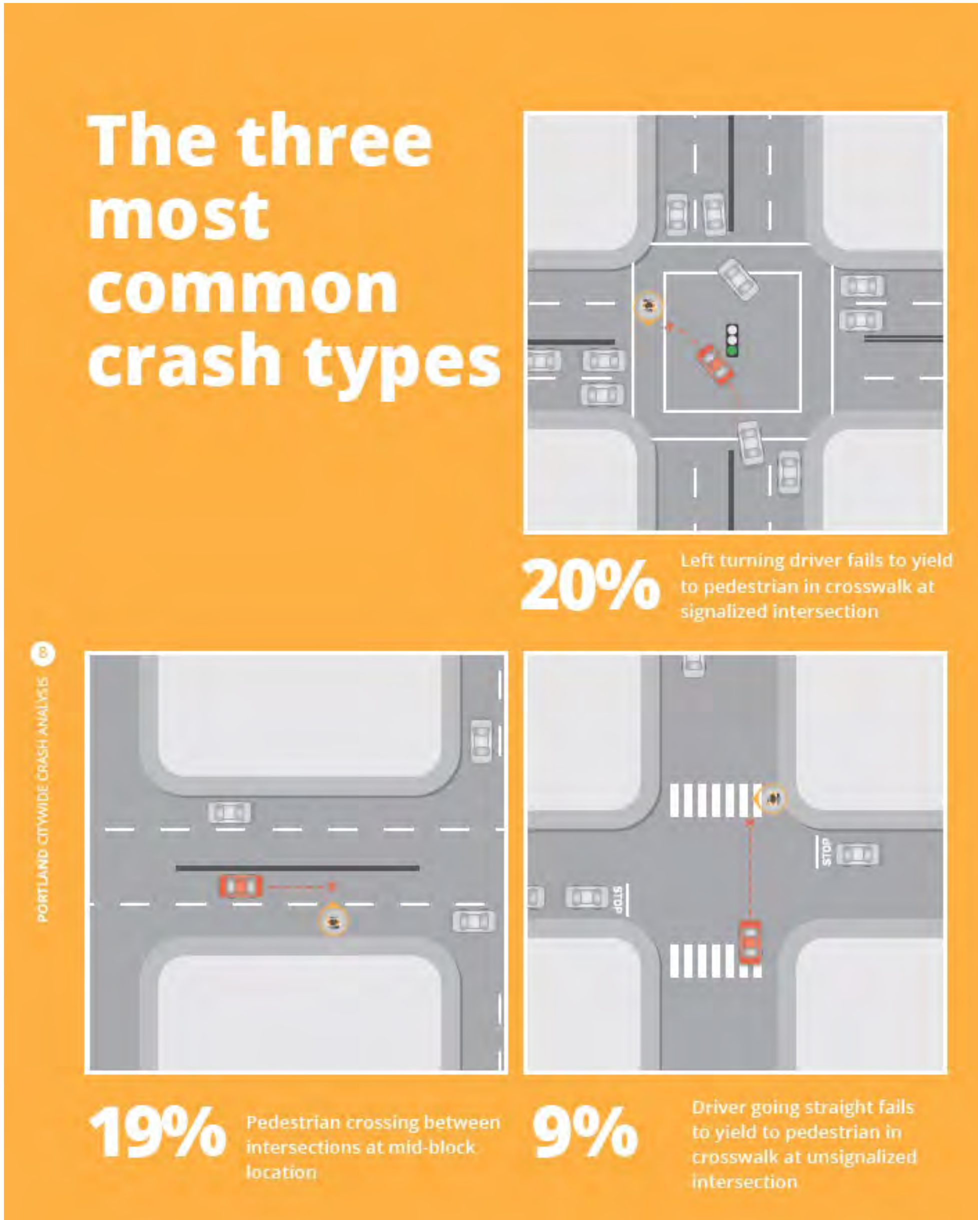
ENGAGEMENT for behavior and policy change

Pedestrian Safety

WHERE DO PEDESTRIAN CRASHES OCCUR?

Nearly three-quarters of pedestrian crashes take place at intersections.
Nearly half take place at signalized intersections.

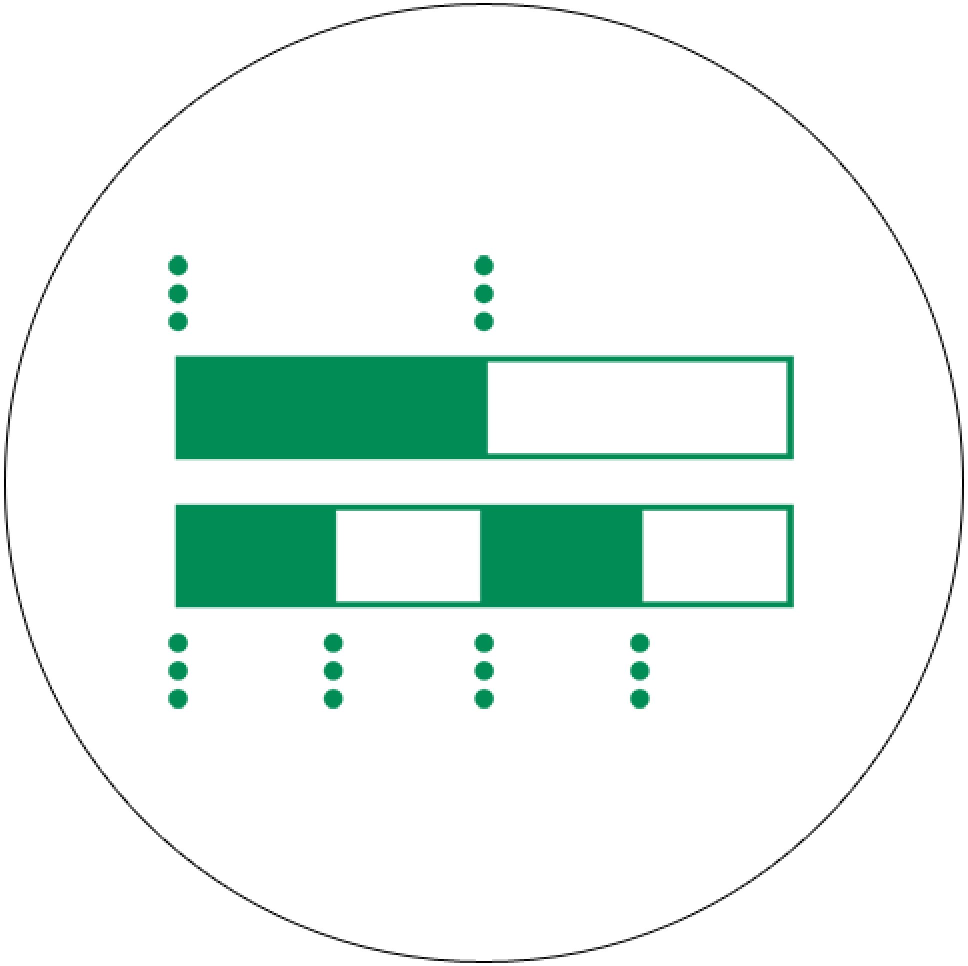




Advancing Best Practices by Rewriting the Rule Book

Signalization Principles

- Shorten Signal Cycles
- Prioritize Multimodal Travel
- Minimize Number of Signal Phases
- Set Slow progression speeds
- Adjust timing for off-peak
- Consider fixed time signals



Shorten Signal Cycle Lengths

- Long enough to accommodate pedestrian crossings
- Short enough to encourage compliance

Cycle lengths of 60–90 seconds are ideal

Prioritize Multimodal Travel

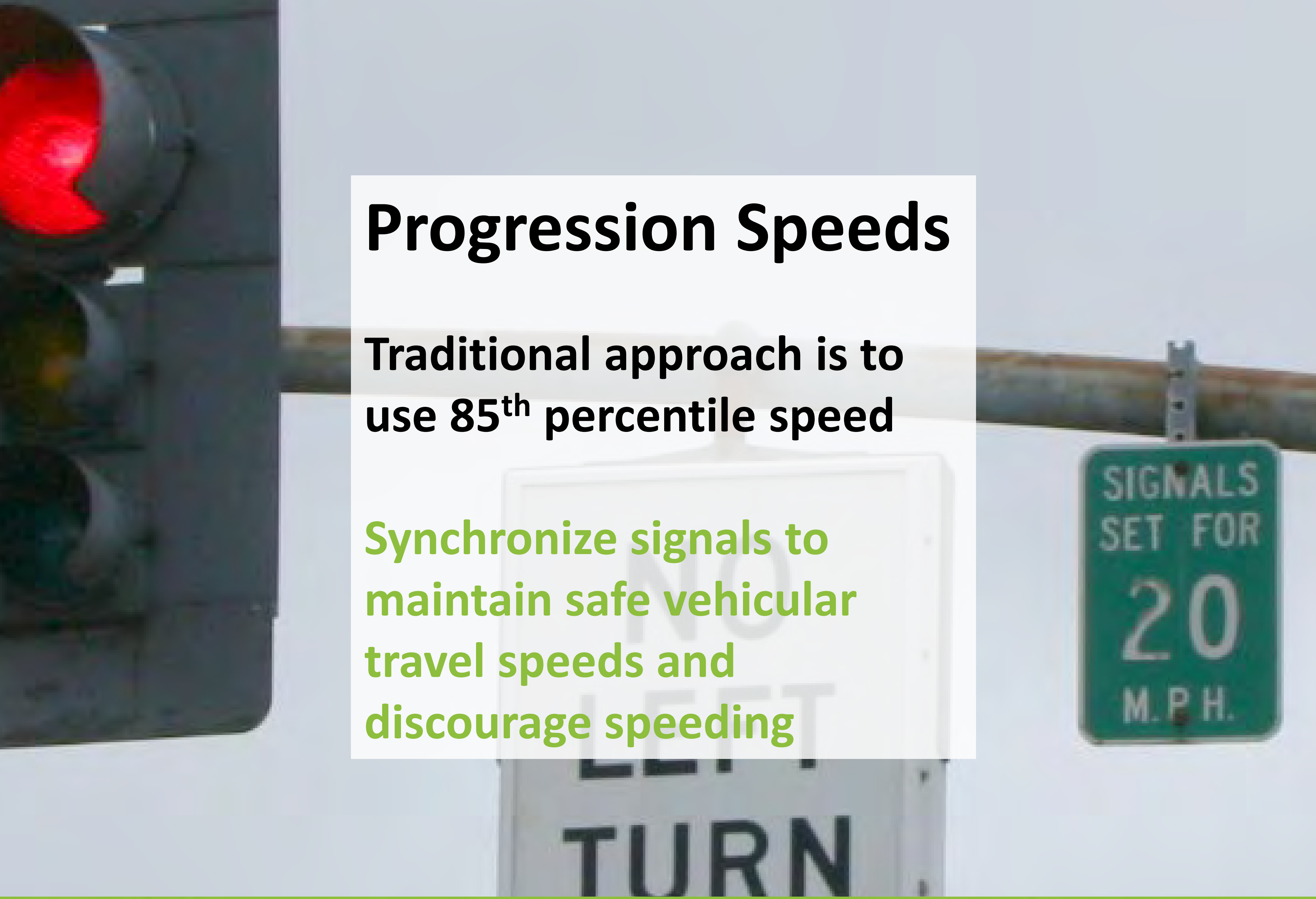
Short cycle lengths
reduce dwell times
and manage speeds

Transit signal priority can provide an added benefit to improve reliability and reduce delay

Progression Speeds

Traditional approach is to use 85th percentile speed

Synchronize signals to maintain safe vehicular travel speeds and discourage speeding



Progression Speed: Cycling Streets

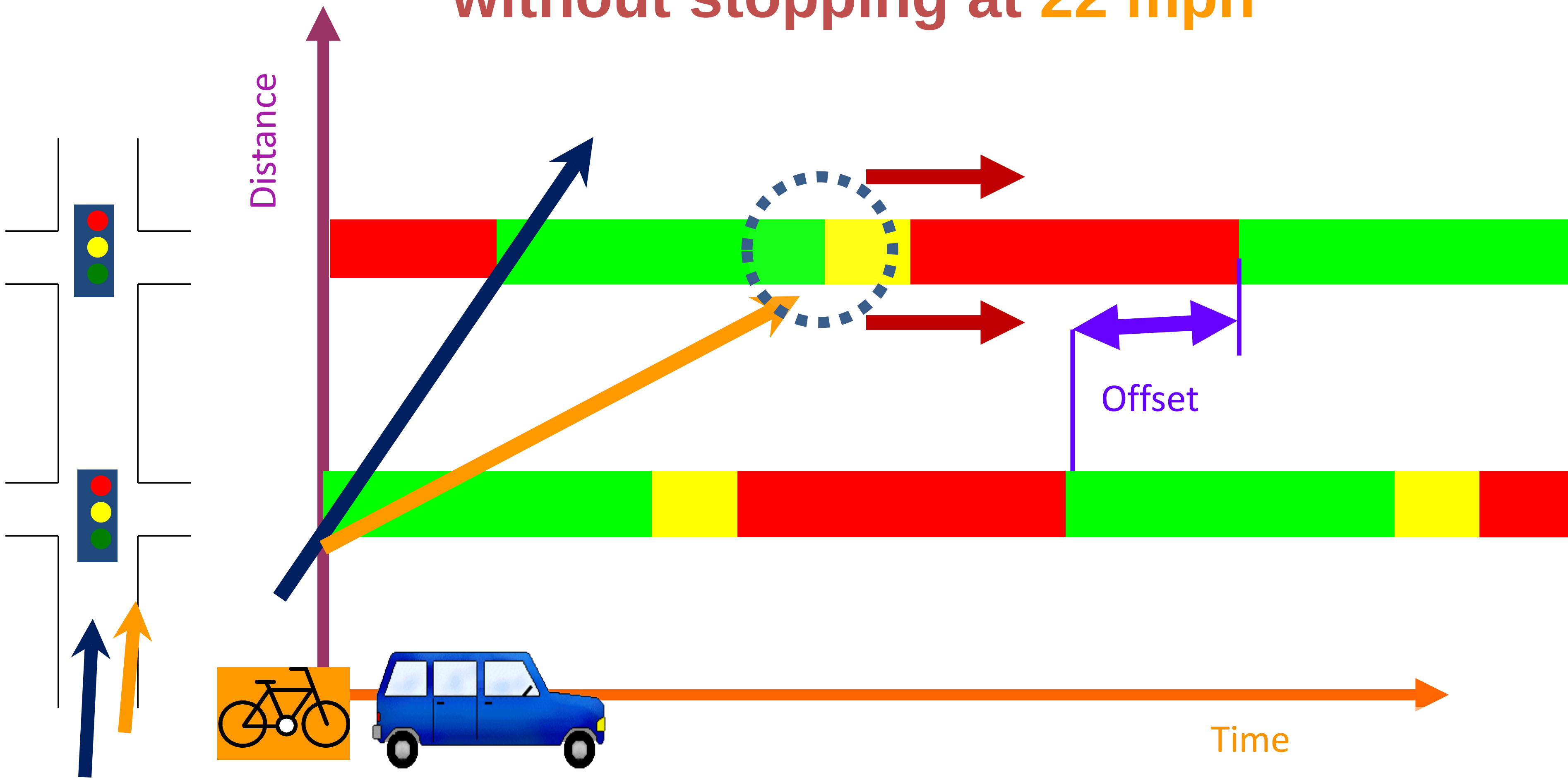
- Signals timed for 12–15 mph focused on bicycle traffic

portland bicycle greenwave

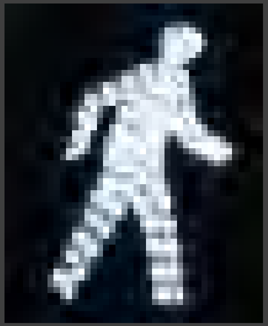
Progression Speed: Cycling Streets

- Signal timing set to speed limit - 30 mph

bicycle traffic "could" get through without stopping at 22 mph



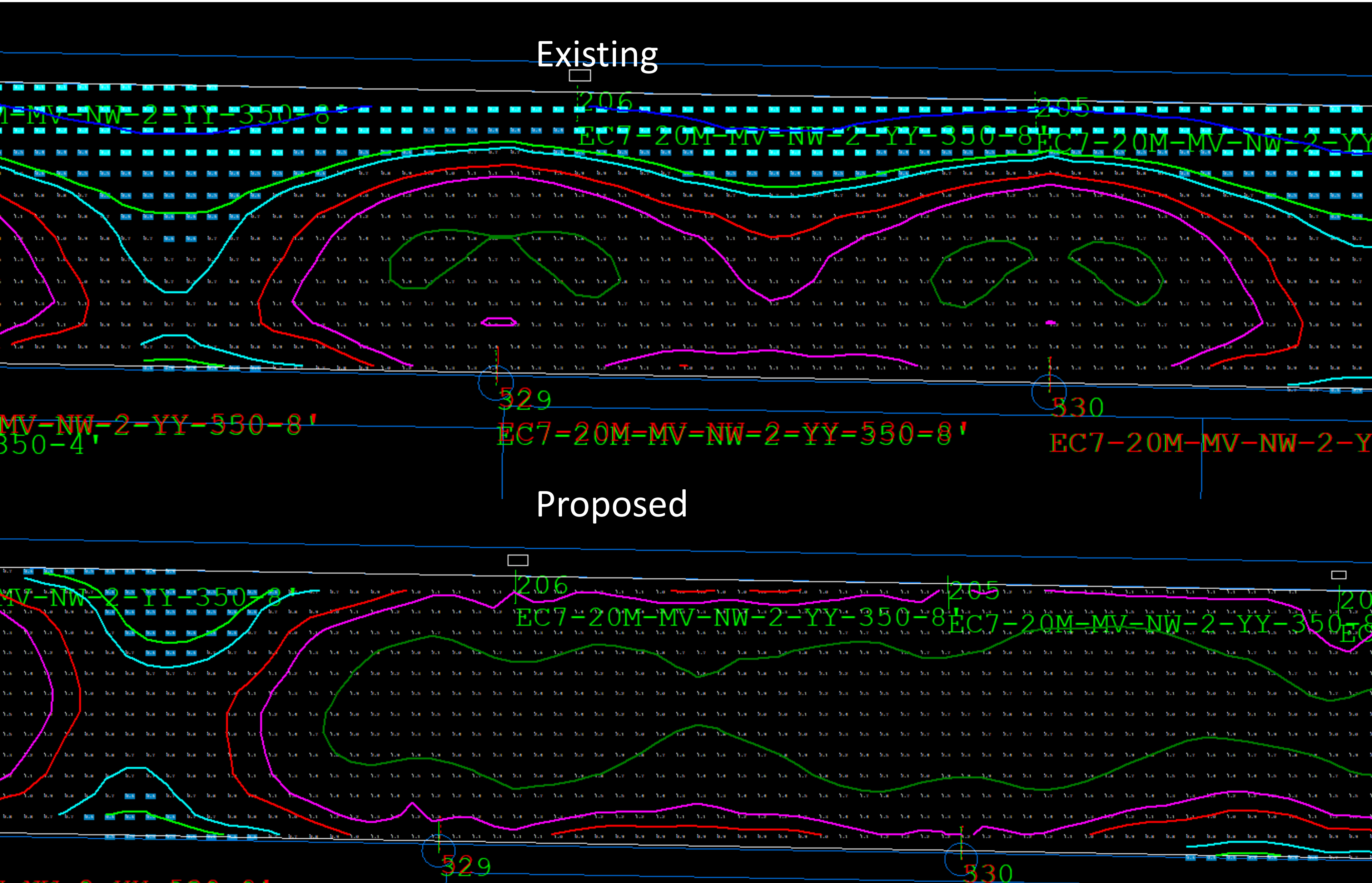
Signal Timing to Support Vision Zero



Evaluating the Suitability of LPIs at Signalized Intersections

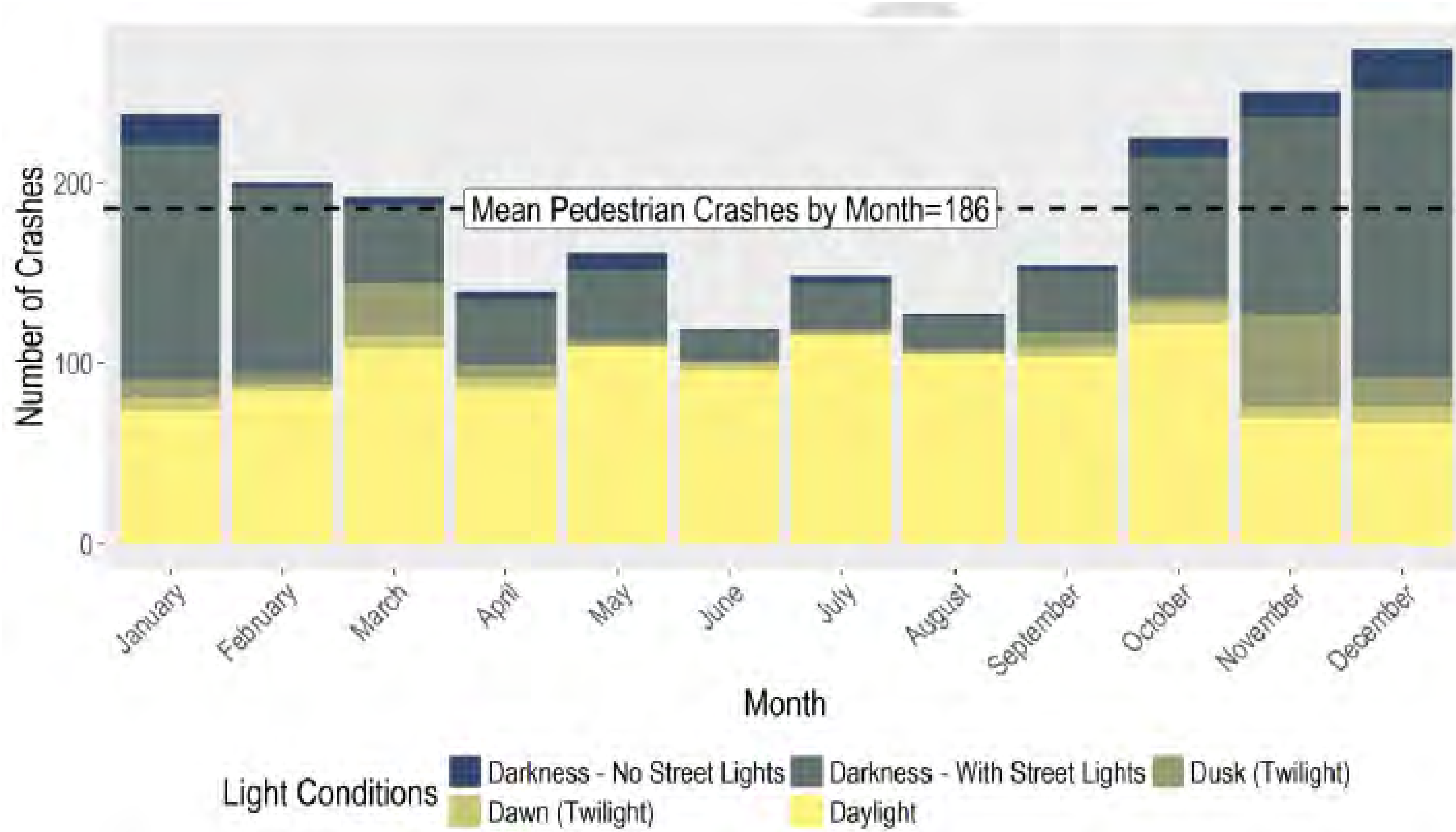
Street Lighting to support Multimodal Safety

Street Lighting Dark Spots




Two Sided –
more uniform

Lighting Deficiencies

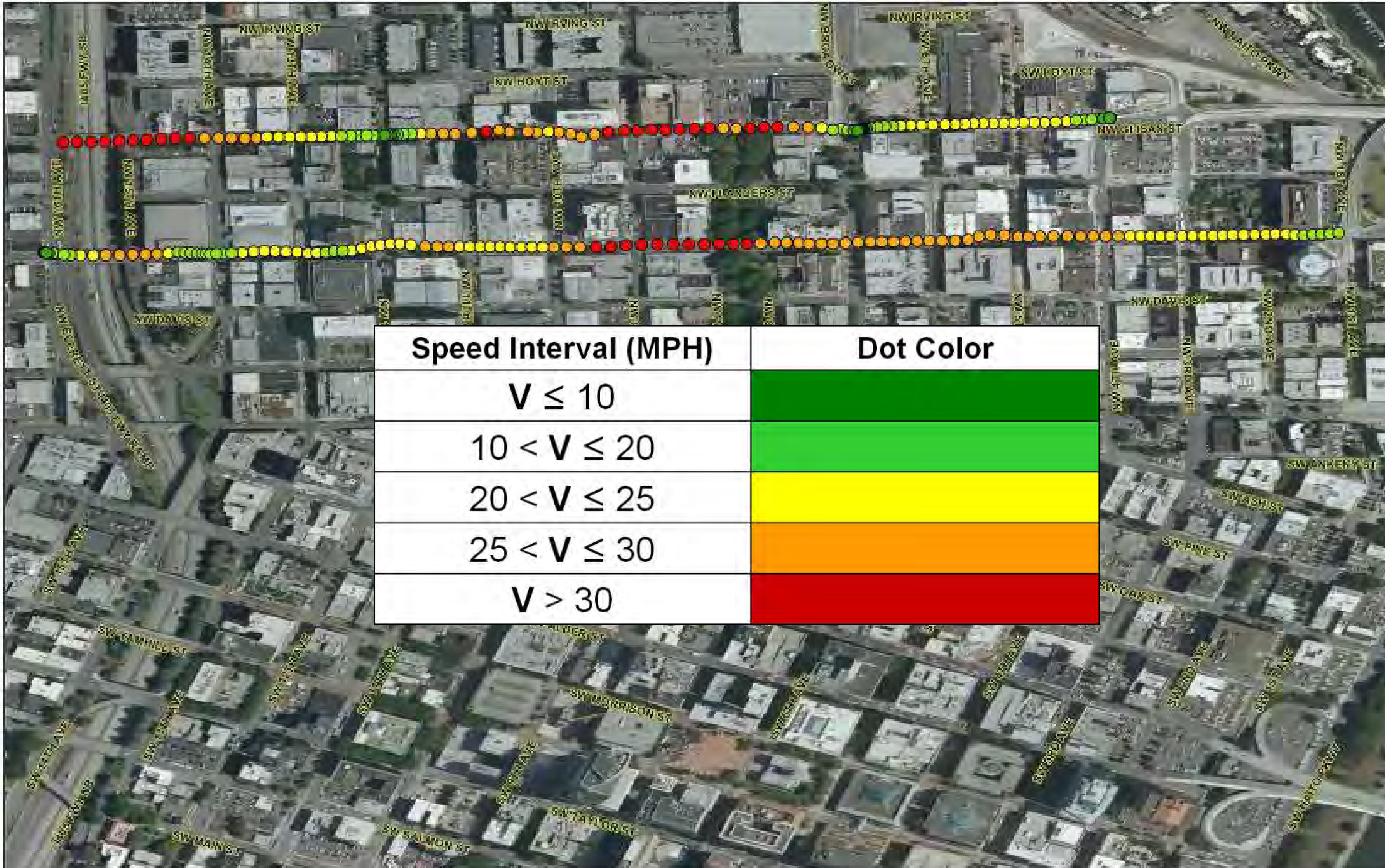


Using Signals to manage speed

Adjust Timing for Off-Peak

"Streets designed for peak intervals of traffic may fail to provide a safe and attractive environment during other portions of the day."

Speeds Before Changes



Speed Interval (MPH)	Dot Color
V ≤ 10	
10 < **V** ≤ 20	
20 < **V** ≤ 25	
25 < **V** ≤ 30	
V > 30	

Speeds After Changes

Speed Interval (MPH)	Dot Color
V ≤ 10	
10 < **V** ≤ 20	
20 < **V** ≤ 25	
25 < **V** ≤ 30	
V > 30	

Innovating to Improve Bicycle Safety

The Importance of Bicycle Safety

FACT: 40% of bicyclist fatalities in crashes occur at intersections.*

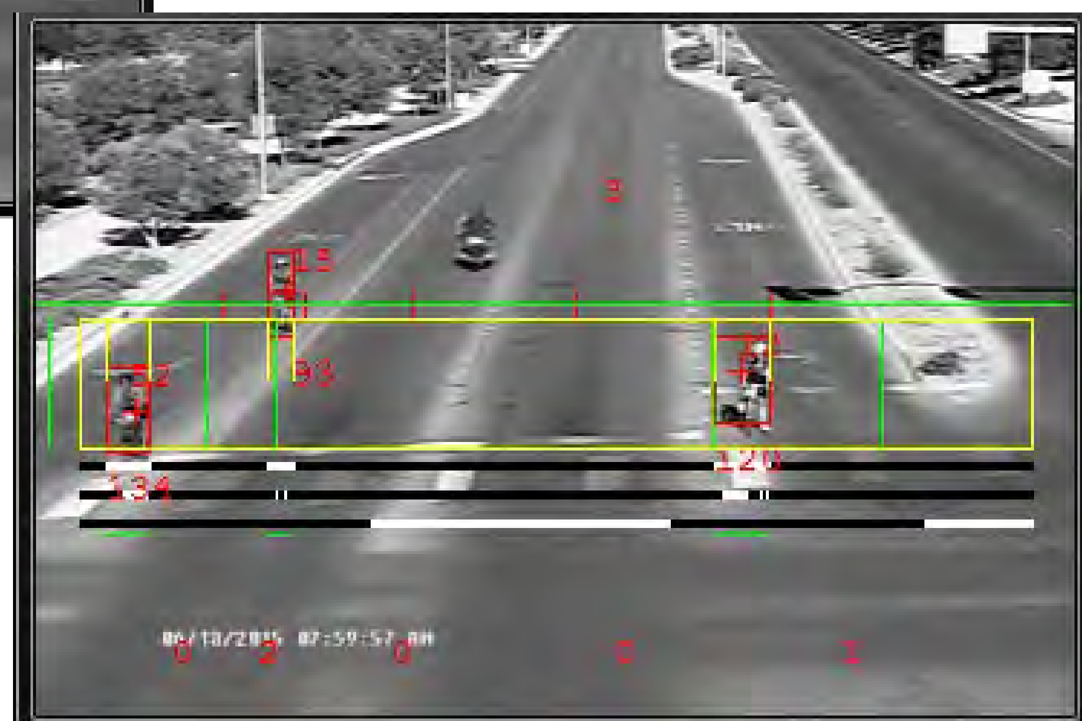
NEED: Reduce intersection conflicts by optimizing traffic signals.

ACTION: Use enhanced detection system to extend green phases for slow moving bicyclists.

**Source: NHTSA Traffic Safety Facts, 2008*

iteris

Bicycle Specific Detection/Analytics & Signal Timing




© Jonathan Maus/BikePortland

Center for Accelerating Innovation

Road Diets: Not just another Fad Diet

Peter Eun

FHWA Resource Center Safety & Design

Bellevue Vision Zero February 13, 2019

What is *"Every Day Counts"*(EDC)?

State-based model to identify and rapidly deploy proven but underutilized innovations to:

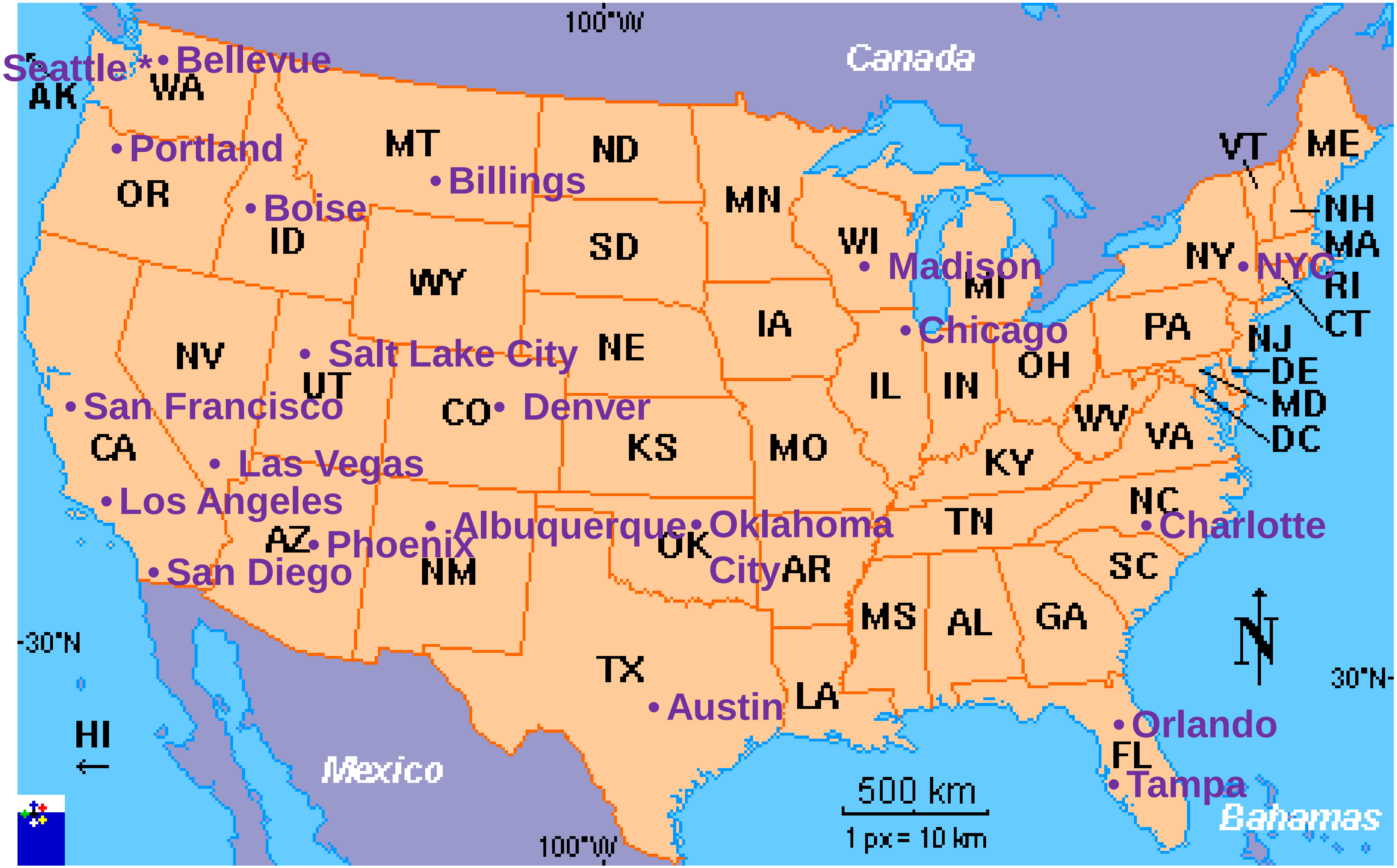
- ✓shorten the project delivery process
- ✓enhance roadway safety
- ✓reduce congestion
- ✓improve environmental sustainability

- EDC Rounds: two year cycles
- Initiating 5th Round (2019-2020)
- Road Diets Round 3
- Road Diets Under STEP Round 4 and 5

Classic Road Diet: 4 to 3 lanes

Before

After



EDC

U.S. Department of Transportation
Federal Highway Administration

WARNINGS

- A Road Diet may not be right for those streets over 25,000 Average Daily Traffic, so talk with your engineer before trying a Road Diet
- Some common side effects may be:
  - Improved safety for drivers, pedestrians, bicyclists
  - Improved economics for businesses
  - Improved parking opportunities
  - Higher standard of living

Safety Benefits for Pedestrians

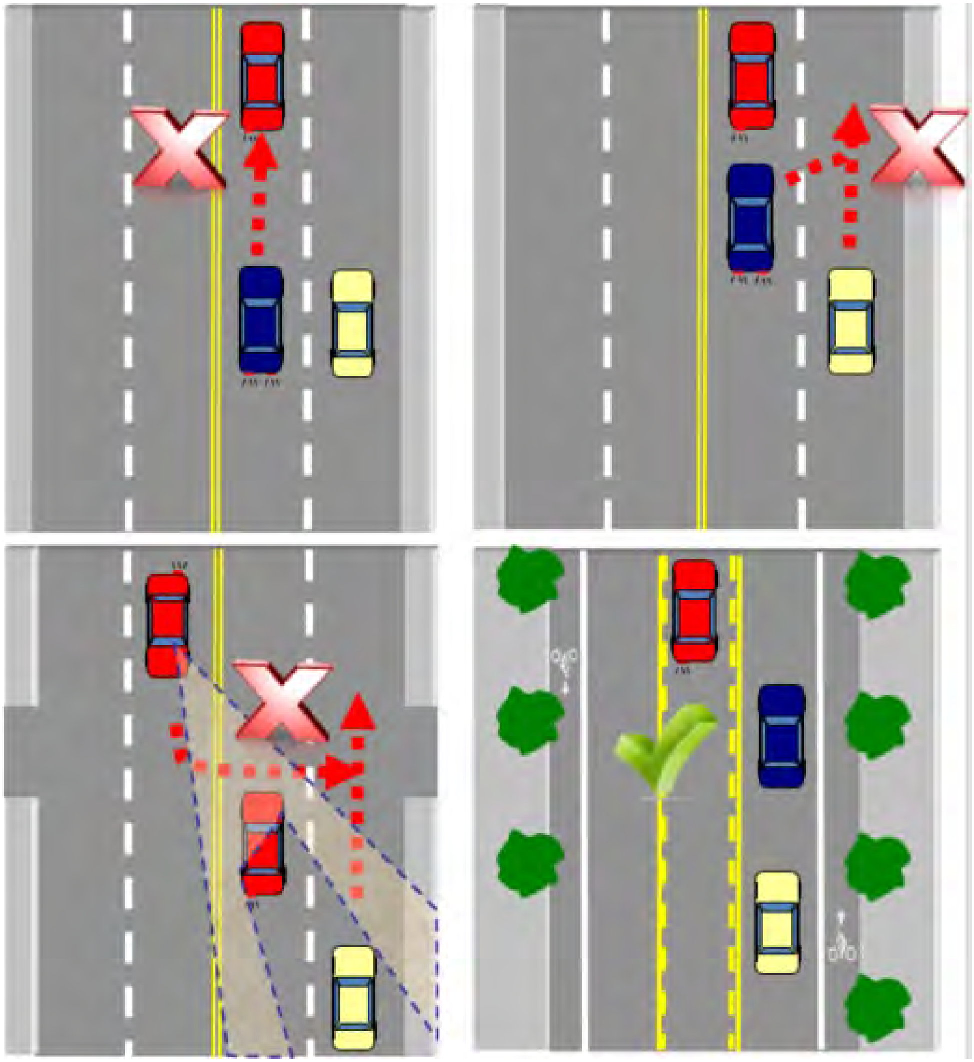
4 Lanes Vs. 3 Lanes

Photo by Dan Burden

Safety Benefits for Bicyclists

4 Lanes Vs. 3 Lanes

Safety Benefits for Drivers



Road Diets and Vision Zero

Countermeasure: Converting four-lane roadways to three-lane roadways with center turn lane (road diet)

Compare	CMF	CRF(%)	Quality	Crash Type	Crash Severity	Area Type	Reference	Comments
	0.53	47		All	All	Suburban	Persaud et. al, 2010	When this CMF was initially ... [read more]
	0.748	25.2		All	All	Urban	Pawlovich et al., 2006	CMF calculation is for reduction ... [read more]
	0.812	18.8		All	All	Urban	Pawlovich et al., 2006	CMF calculation is for reduction ... [read more]

http://www.cmfclearinghouse.org/results.cfm

Economic Benefits

- Indianapolis IN
  - $300 million new development 2008 - 2012
- Charlotte NC
  - $43 million increase non-residential tax value of properties fronting Road Diet

ROAD DIET

Safety | Livability | Low Cost

M·Y·T·H·B·U·S·T·E·R·S

Road Diets' Economic Impacts

Myth: A Road Diet will reduce vehicle throughput and hurt business.

An ever-increasing number of transportation agencies are implementing Road Diets, which reallocate vehicle lanes for a number of uses, including accommodating pedestrians, bicyclists, and transit. Road Diets are also a means of traffic calming that can reduce speeding-related crashes and improve overall roadway safety. However, a common concern associated with Road Diets is that the configuration could be harmful to the economic health of the neighborhood due to a reduction of traffic volume along the corridor.

"More people on foot are better for businesses."

Jeanette Sadik-Khan
Former New York City DOT Commissioner

BEFORE

AFTER

Evolution of a street: Road Diet on 9th Ave., Manhattan, NY.

A closer look: What changes for the local businesses?

Road Diets have serviced many communities nationwide and research shows they can positively impact business sales and property values.
For local businesses, a Road Diet can improve economic vitality by changing the corridor from a place that people "drive-through" to one that they "drive-to." Replacing vehicle travel lanes with on-street parking options, walking areas, and bicycle lanes can make the street a more attractive "park once" area. With these improved facilities, a motorist is more likely to park, walk around, visit restaurants or shops, and enjoy the setting, benefiting the economy and public safety of the neighborhood. Bicycle and pedestrian transportation groups often organize social events that benefit nearby businesses. Recent studies have shown that roadway modifications, which increase pedestrian volumes, can result in a decline in a neighborhood's crime rate.[1] Several cities have quantified their Road Diet's effect on economic growth.

1 Two-Way Street Conversion: Evidence of Increased Livability in Louisville, William Riggs & John Gilderbloom, Journal of Planning Education and Research, March 2016 vol. 36 no. 1 105-118

https://safety.fhwa.dot.gov/road_diets/resources/pdf/fhwasa17019.pdf

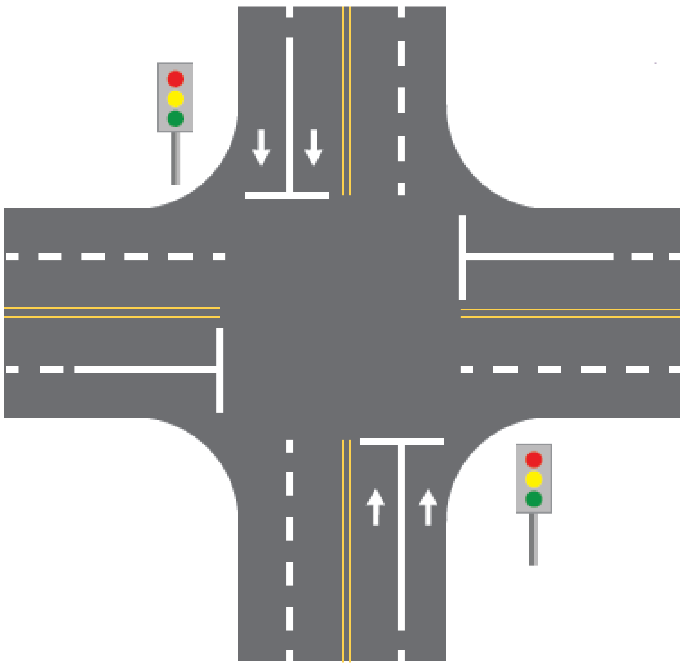
General Guidelines for Traffic Volumes

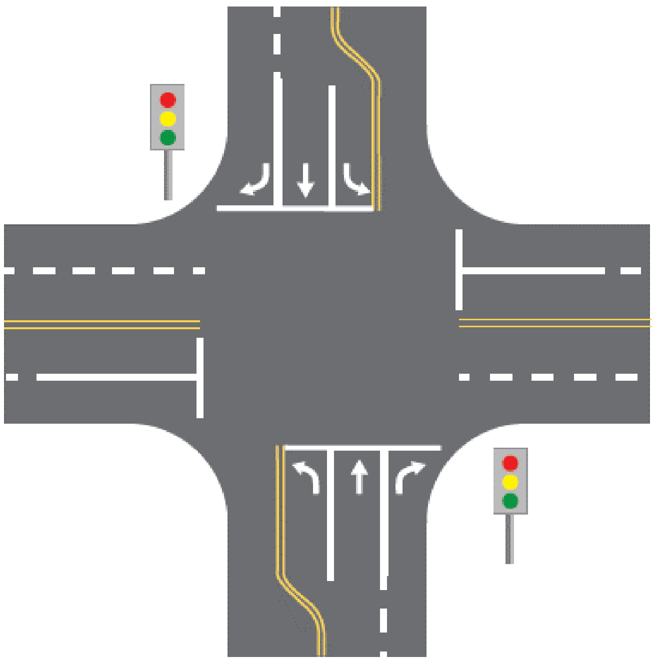
LESS THAN 10,000 ADT	10,000 – 15,000 ADT	15,000 – 20,000 ADT	GREATER THAN 20,000 ADT
Great candidate for Road Diet	Very good candidate for Road Diet	Good candidate for Road Diet	Potential candidate for Road Diet
In most instances traffic will likely not be negatively affected.	Agencies should conduct intersection analysis to study potential traffic operational effects and consider signal retiming as needed.	Agencies should conduct a corridor analysis since traffic operations may be affected at this volume depending on the "before" condition.	Agencies should complete a feasibility study to determine whether this is a good location for a Road Diet. Operations may be affected at this volume.

There are examples across the country where Road Diets have been successful with ADTs as high as 26,000

Intersections “Control” Capacity

Converting four through lanes to two through lanes may make it possible to install dedicated turn lanes at the intersection





Example of intersection with added turning movements.

Intersections

- Signal timing or phasing changes at intersections to optimize operations and safety benefits
- Roundabouts Single Lane
  - ~ 20,000 ADT

LaJolla Blvd – San Diego, CA

- Before
  - 5-lane
  - ADT 22,000
  - 40-45 mph

- After
  - 2-lane boulevard
  - ADT 23,000
  - 15-25 mph

  - 90% decrease in fatalities
  - 77% noise reduction
  - 35% increase in trade

Kirkland WA Lake Washington Blvd Road Diet

- Enter/Exit Driveways
- Speeding reduction
- Noise Levels
- Greater buffer with fixed objects

	LOCATION	TERMINI	2017	2015	2013	2011	2009	2007	2005	2002	2001
29	LAKE (WA. BLVD.)	S OF LAKEVIEW DR	21559	22190	19982	21116	19859	21776	22699	22934	23259
30	LAKE (WA. BLVD.)	N OF NE 38TH PL	22172	22836	21773	24451	22108	23149	23423	24188	24783
31	LAKE (WA. BLVD.)	S OF NE 38TH PL	23281	21376	20912	21700	25952	25330	24477	24464	27216

https://www.kirklandwa.gov/depart/Public_Works/Transportation_and_Traffic/Traffic_Count_and_Crash_Analysis_Summaries.htm

https://nacto.org/docs/usdg/road_diets_fixing_big_roads_burden.pdf

Safe Transportation for Every Pedestrian (STEP)

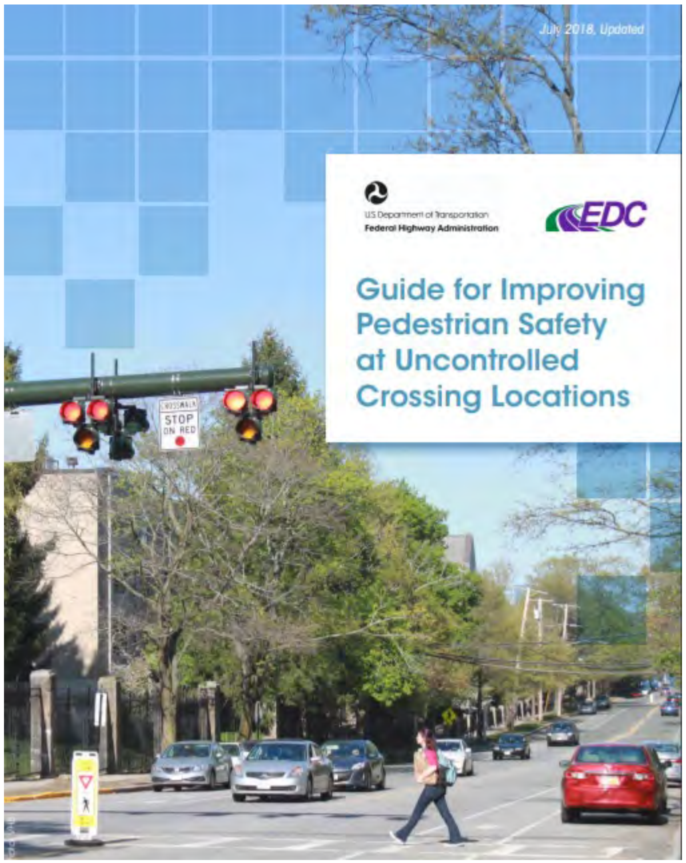


Table 1. Application of pedestrian crash countermeasures by roadway feature.

Roadway Configuration	Posted Speed Limit and AADT								
	Vehicle AADT <9,000			Vehicle AADT 9,000–15,000			Vehicle AADT >15,000		
	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph
2 lanes (1 lane in each direction)	❶ 2 4 5 6	❶ 5 6 7 9	① 5 6 ❼ ❾	❶ 4 5 6	❶ 5 6 7 9	① 5 6 ❼ ❾	❶ 4 5 6 7 9	① 5 6 7 9	① 5 6 ❾
3 lanes with raised median (1 lane in each direction)	❶ 2 3 4 5	❶ ❸ 5 7 9	① ❸ 5 ❼ ❾	① 3 4 5 7 9	① ❸ 5 ❼ ❾	① ❸ 5 ❼ ❾	① ❸ 4 5 7 9	① ❸ 5 ❼ ❾	① ❸ 5 ❾
3 lanes w/o raised median (1 lane in each direction with a two-way left-turn lane)	❶ 2 3 4 5 6 7 9	❶ ❸ 5 6 7 9	① ❸ 5 6 ❾	① 3 4 5 6 7 9	① ❸ 5 6 ❼ ❾	① ❸ 5 6 ❾	① ❸ 4 5 6 7 9	① ❸ 5 6 ❾	① ❸ 5 6 ❾
4+ lanes with raised median (2 or more lanes in each direction)	❶ ❸ 5 7 8 9	❶ ❸ 5 7 8 9	① ❸ 5 8 ❾	① ❸ 5 7 8 9	① ❸ 5 ❼ 8 ❾	① ❸ 5 8 ❾	① ❸ 5 ❼ 8 ❾	① ❸ 5 8 ❾	① ❸ 5 8 ❾
4+ lanes w/o raised median (2 or more lanes in each direction)	❶ ❸ 5 6 7 8 9	① ❸ 5 ❻ 7 8 9	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ 7 8 9	① ❸ 5 ❻ ❼ 8 ❾	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ ❼ 8 ❾	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ 8 ❾

Given the set of conditions in a cell,

- \# Signifies that the countermeasure is a candidate treatment at a marked uncontrolled crossing location.
- ● Signifies that the countermeasure should always be considered, but not mandated or required, based upon engineering judgment at a marked uncontrolled crossing location.
- ○ Signifies that crosswalk visibility enhancements should always occur in conjunction with other identified countermeasures.*

The absence of a number signifies that the countermeasure is generally not an appropriate treatment, but exceptions may be considered following engineering judgment.

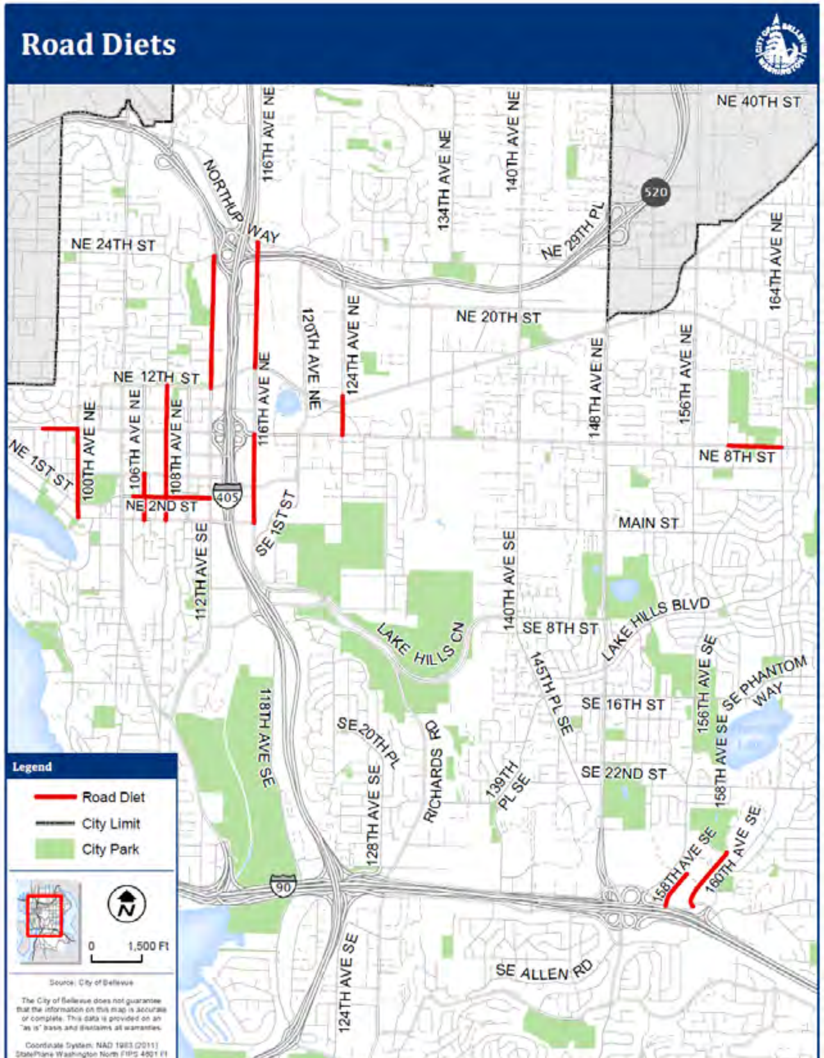
1. High-visibility crosswalk markings, parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crossing warning sign
2. Raised crosswalk
3. Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line
4. In-Street Pedestrian Crossing sign
5. Curb extension
6. Pedestrian refuge island
7. Rectangular Rapid-Flashing Beacon (RRFB)**
8. Road Diet
9. Pedestrian Hybrid Beacon (PHB)**

*Refer to Chapter 4, "Using Table 1 and Table 2 to Select Countermeasures," for more information about using multiple countermeasures.

**The PHB and RRFB are not both installed at the same crossing location.

https://www.fhwa.dot.gov/innovation/everydaycounts/edc_4/step.cfm

Bellevue's Roads that went on a Diet



- **112th Ave NE** - NE 12th St to NE 24th St - 4 to 3 lanes with striped shoulders circa mid 90's
- **124th Ave NE** - North & South of Bel Red - 4 lane & converted a southbound through to left turn pocket - 1990
- **NE 8th St** - 97th to 100th - 4 to 3 lanes 1992
- **116 Ave NE** - Main to NE 8th St - 6 to 5 lanes with a unloading area - 1993
- **116th Ave NE:** NE 12th St to Northup Way (2016) – 4-to-3 conversion; converted second NB thru lane into bike lanes, maintained TWLTL
- **NE 8th St** - 160th to 164th - 4 to 3 lanes with striped shoulders - 1993
- **108th Ave NE:** Main St to NE 12th St (2018) – removed second southbound lane to add protected bike lanes and several right turn pockets as part of downtown demonstration bikeway project
- **100th ave NE** - Main to NE 8th St - 4 lane configuration and converted a southbound through to a TWLTL - 1997
- **106th Ave NE** - Main St to NE 4th St - 4 to 3 lanes with striped shoulders - 1998
- **158th** - Eastgate Way to Boeing - 4 to 3 lanes with striped shoulders - 1999
- **160th Ave SE** - Eastgate to Boeing - 4 to 3 lanes with striped shoulders - 2000

Contact Information

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U.S. Department of Transportation
Federal Highway Administration

Use of UAV Technology in Collision Investigations

Captain Jay Cabezuela
Washington State Patrol
Criminal Investigation Division

WSP UAV Program History

- UAV pilot project approved and started January 2017
- UAV technology evaluated and selected for purchase by April 2017
- 9 detectives selected to use the UAV technology in King, Pierce, Thurston and Snohomish counties
- Program goals-
  1. Reduce road closure time associated with collision investigations
  2. Improve the quality of forensic mapping capabilities
  3. Improve officer safety
- All goals were achieved during the pilot project
- UAV program expanded to all detectives statewide in January 2018
- In 2019, the UAV program is approved to expand further statewide to include CTS troopers in addition to detectives

Amtrak Derailment

December 18, 2017
Interstate 5 Milepost 115
DuPont, Washington

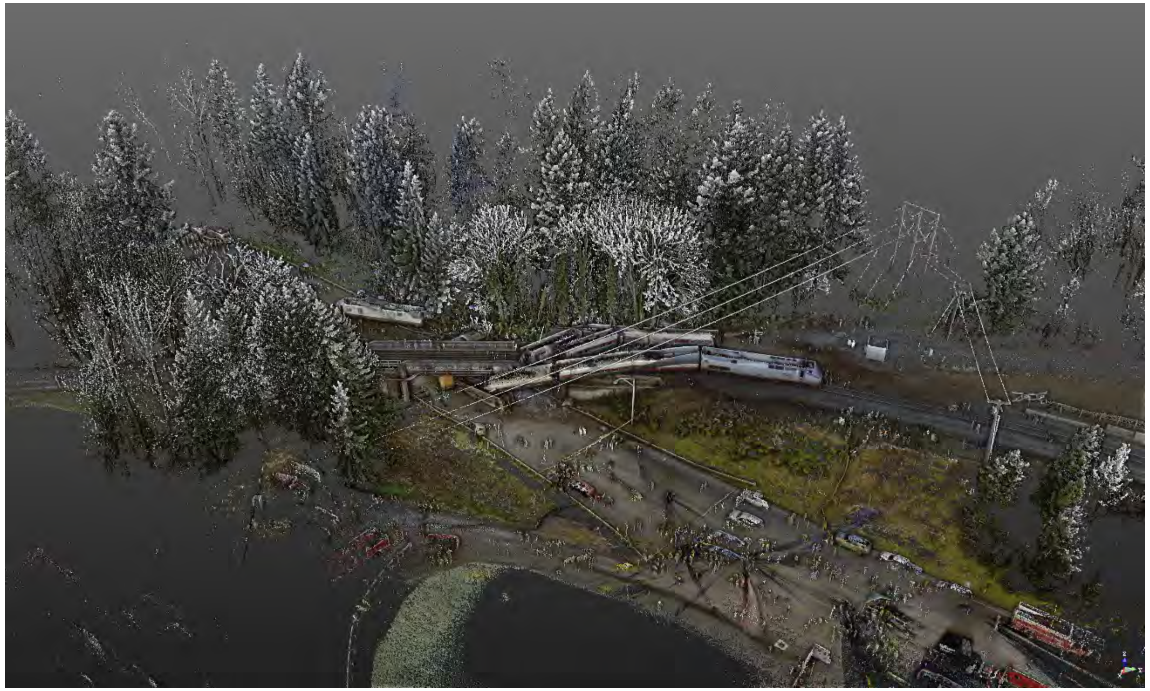
WSP
WASHINGTON STATE PATROL

WSP used 4 TX-5 scanners working simultaneously (82 scans with 4 scanners) approx. 3.5 hours total.

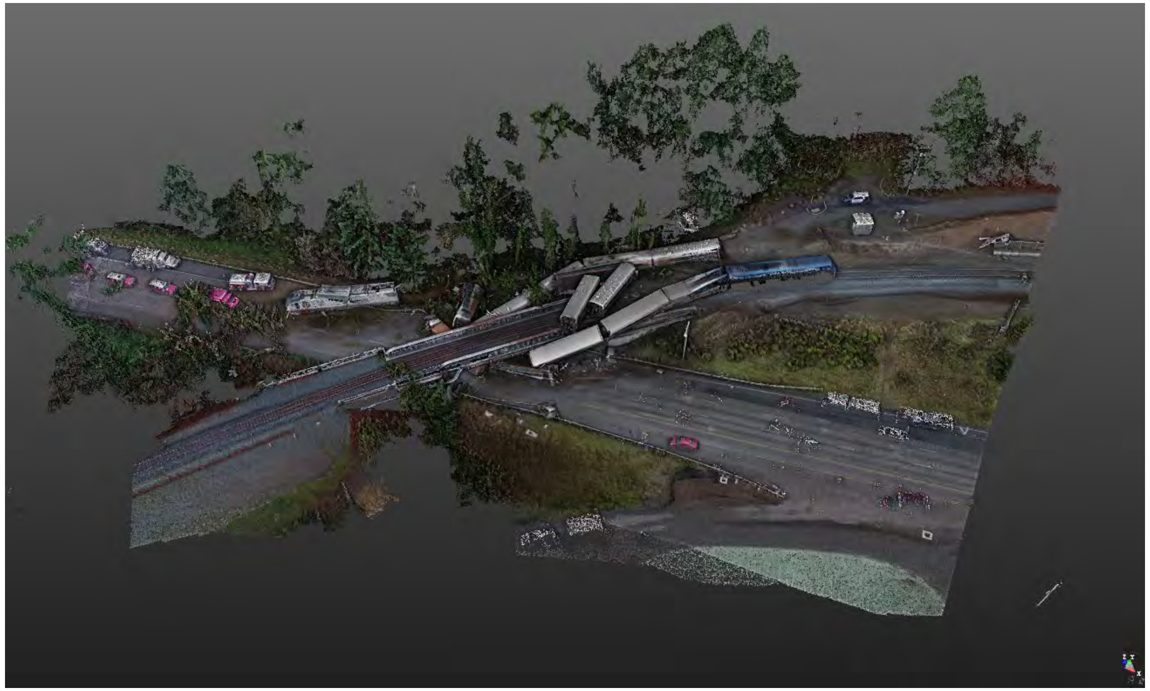
WSP detective simultaneously utilized photogrammetry with a DJI quad copter UAV taking overhead photographs flight time 89 minutes

Scanner and UAV Data Brought Into RealWorks

- Scanner



- UAV



Closer Look at the Data Before Combined

- Scanner
- No top, great sides

- UAV
- Top great, no sides

Closer look at merged portion to highlight capabilities (top and sides together)

Point Cloud Animation (PIX4D)

Final Results

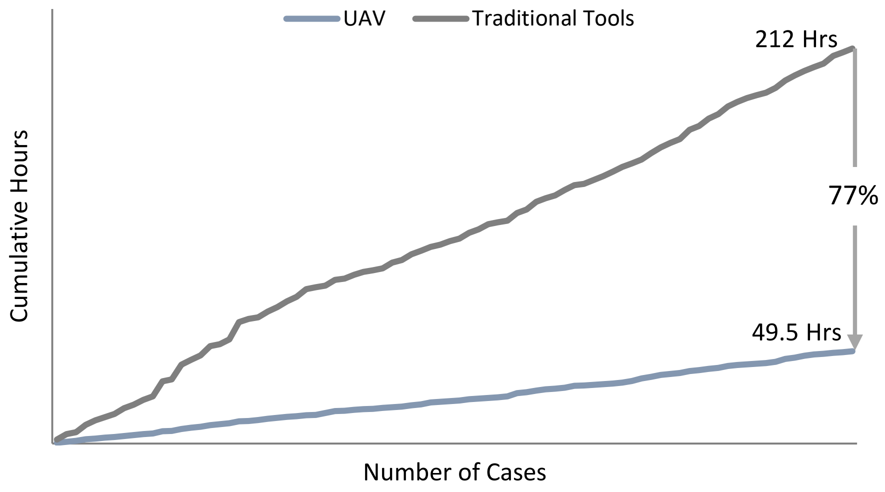
- Derailment scene completed documented by WSP detectives in 3.5 hours
- Final product delivered to NTSB within 24 hours
- Condensed point cloud was over 415 million measurable points (1.2 billion actual points captured)
- Photo realistic capture of the scene
- Actual aerial photos from the UAV to NTSB at scene
- Data is exportable in multiple formats through RealWorks
- Scene investigation was sped up significantly compared to traditional methods

WSP UAV Program Today

- All 42 CIU detectives personally issued DJI Mavic Pro UAVs
- Each of the 14 response units issued DJI Matrice UAVs
- 15 FOB troopers issued DJI Mavic Pro UAVs
- Statewide standardization of software, hardware and computers
- WSP fleet of 71 UAVs statewide for immediate response

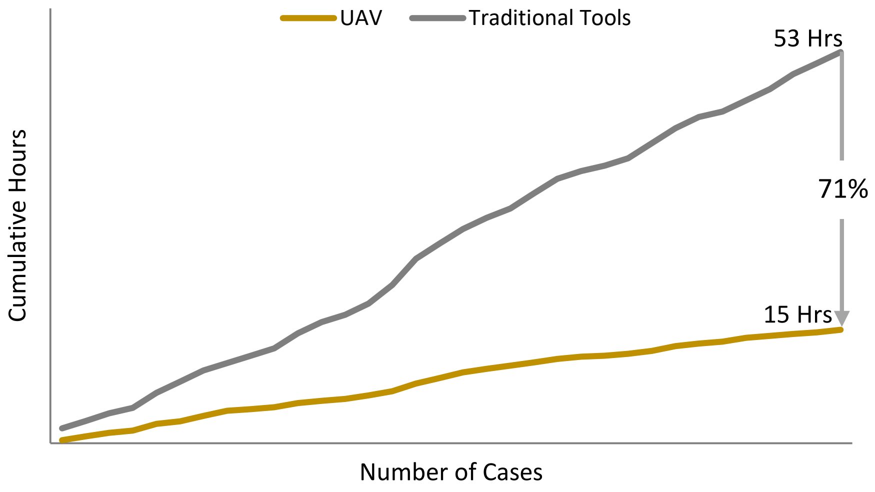
Results- 2018 Road Closure Time Reduction

CID Results



- 91 investigations
- 162.5 hours road closure time saved (77% reduction)
- At $350 per minute- saved $3,412,500

FOB Results



- 35 investigations
- 38 hours road closure time saved (71% reduction)
- At $350 per minute- saved $798,000

COMMENTS/QUESTIONS?

- What's the impact of speed on injury and death? If we lower the speed limit to 25 in town and 55 on highways, would it save lives?
- Does the city have a comprehensive strategy for improving the 7% of streets that see serious injury or fatalities?
- How can cities / agencies get better data from private fleet operators?
- The personal stories were a good reminder of why we have this goal!
- I attend many of these safety events but rarely hear the connection to the personal stories. That was a great element to keep in this discussion.
- The wayze data dashboard would be a good statewide resource.
- I love the comment by Franz about needing to be bold and make change happen. This is so important!
- I didnt realize Vision Zero was about reducing the severity of collisions and not the number of collisions overall.
- Advance partnerships & collaborations between emergency, planning, enforce-ment & judicial deptarments.\
- What does the city plan on doing with the survey results?
- 5 top behaviors contributing to crashes is too many. Focus on 1 or 2, 3 at most.

COMMENTS/QUESTIONS?

- Super blocks + big streets make walking + biking less desirable while increasing traffic
- Reaching zero deaths & serious injury is a shared responsibility of drivers, pedestrians, and bicyclists. All their behaviors contribute to the issue, but there can be solutions!
- Please include what public transp. is doing to reduce bike and pedestrian injuries
- How will you assure that the bike/pedestrian network is complete and connected?
- The fact that roads are plowed today but sidewalks are covered with ice * slush shows where our modal priorities are today.
- How will the city continue to promote safety with the recent rise in micromobility startups (scooters, unicycles)?
- Is pedestirans corsswalk at intersection the best placement?
- Would a mid-block rossing with ped-island in the middle of the road be safer?

COMMENTS/QUESTIONS?

- Chris made the case for VZ calling for modeshift. How will Bellevue set modshare targets to lvereage its VZ works?
- Interactive sessions would be helpful
- Autonomous vehicles are clearly the auto industry's play to promote driving. the safety benefits are unproven and, if they exist, are generations away. We should be promoting transit, walking, and biking, not driving. We have the tools now to do this.
- Great work elevating personal stories. I found it very powerful.
- How will Bellevue implement design improvements for trucks and feight? Volpe side guards and reduced truck size, reduce fatalities and serious injuries.
- What are the environmental impacts and energy requrements that come from mass data processing in AV research? (Server farms, greenhouse has emissions, etc.)
- AVs are not happening for years and years, but we know about and have VZ tools that can be deployed today. Use those.
- Why not replace emission testing with safety certification for vehicle registration?
- People with lower incomes are more likely to drive older less safe vehicles for longer distances - how can we remove this barrier?
- Safety improvement in the current fleet is due to R&D investment 15 years ago and much less to due to AVs.

COMMENTS/QUESTIONS?

- What are good stratgies to get public to rade lower vehicle speeds for safer streets
- How can you increase driver sensitivity in commute / employement areas to match awareness and watchfulness shown in school zones?
- When will Bellevue's City Council have the opportunity to change the Downtown Bellevue default speed limits? It's time!
- How can we make the leap from an uninviting multimodal area to an excellent one without suffering through "mediocre"?
- Encourage to communicate crash data by mode (% of collisions by mode) next to mode share (%of trips by mode)
- Continue to start staff discussions in setting speeds based on context and safety rather than throughput alone.

COMMENTS/QUESTIONS?

- Dear Lorraine, thank you for your passionate and personal presentation today. Stories matter and you are correct -- cars/ road design/ risk factors are critical. I do also ask cascade to support helmet use/laws too. This is transformative and the reason why we have you here to give such an important talk. Thanks!
- How do you make strides in traffic safety without making it a societal priority?
- I think there should be educational compaign on how there are more traffic road deaths then homocides in Bellevue.
- I enjoyed the minion analogy -- how do we begin to shift our societal culture from a general unacceptance of the fact that we are human -- we make mistakes and thus our public spaces should be designed to accommodate, or at least anticipate, a fraction of those mistakes.
- How do we change drivers' mindsets who've normalized driving wth distractions?
- Driver distraction is likely still under-reported.
- Impressive to know about the 27 seconds distraction after texting while driving.

VISION ZERO SUMMIT PHOTO ENGAGEMENT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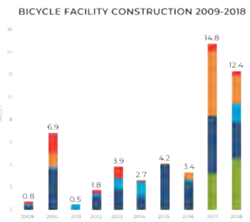
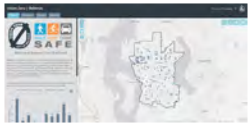
VISION ZERO ACTION PLAN | SCOPE OF WORK

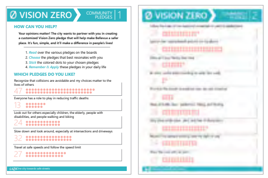
ZERO TRAFFIC-RELATED DEATHS AND SERIOUS INJURIES BY 2030.

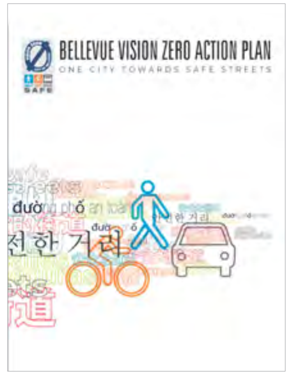
In 2015, the City Council passed a resolution providing a framework to achieve this goal. It states: "the life, safety and health of residents, employees and visitors to Bellevue is the City Council's highest priority." In 2016, the City Council passed an ordinance adopting Vision Zero amendments into the city's Comprehensive Plan.

Bellevue's Vision Zero Action Plan will advance specific strategies to achieve this ambitious and necessary goal. The plan will coordinate existing programs and identify opportunities where new efforts are needed to make Bellevue's streets safe for everyone, building on our past successes and incorporating best practices from other cities. Whatever your age, physical ability, or how you choose to travel—walking, bicycling, transit, driving, or otherwise—you should get wherever you want to be safely in Bellevue.









1 | COMMUNITY ENGAGEMENT

The City is engaging community stakeholders in setting the priorities for investment in Vision Zero strategies. We're promoting a spirit of shared responsibility to foster a safety culture, because everyone has a role in contributing to safe streets. The process will include multiple engagement opportunities with the community, partner agencies, and among City staff. Examples include a public online questionnaire, an internal staff audit, and the Vision Zero Summit. These are opportunities to evolve the culture of the City of Bellevue as an organization and as a community to realize safe streets for all.

2 | ASSESSMENT OF COLLISION DATA

Understanding when, where, and why collisions are most likely to occur can help target road safety improvement strategies. We're leveraging geographic information systems to review 2006-2017 collision data, identify factors that have contributed to people being killed or seriously injured, and produce charts and maps reflecting key takeaways. This will inform the development of new and/or improved strategies to move from the current reactive-based approach towards a more proactive, systems-based approach to safety.

3 | ASSESSMENT OF CURRENT FRAMEWORK

The City will review the road safety strategies it presently employs in engineering, education, encouragement, evaluation, equity, and enforcement. This includes, for example, documenting trends in Police citations issued, evaluating the impacts of past photo enforcement efforts, and assessing the evolution of project scoring criteria in the Transportation Facilities Plan. It also includes an internal audit across City departments to assess staff familiarity with and commitment to the Vision Zero initiative, helping to understand our organization's current culture and areas for development.

4 | BEST PRACTICES ASSESMENT

The City of Bellevue leverages the best technologies and innovative tools that are successful elsewhere and applicable here. We've reviewed the visions, goals, principles, and strategies of adopted Vision Zero plans from communities across the country to identify best practices and recommendations that are transferrable locally. Consistent with national and international guidance, we're striving to institutionalize a "safe systems" approach to road safety to advance strategies from multiple angles: street designs that emphasize safety, predictability, and the potential for human error, targeted education, and data-driven enforcement efforts.

5 | VZAP GOALS AND STRATEGIES

Informed by collision data and identified emphasis areas, an understanding of current policies and programs, proven best practices, and local applicability, the Action Plan will propose strategies to achieve measurable results over the next five years. It will identify the required financial and staffing resources necessary for phased implementation, the lead department responsible, potential funding sources, partnership opportunities with public, private, and non-profit organizations, barriers to success, and corresponding target performance measures and benchmarks to monitor progress.

6 | VZAP REPORT

The Vision Zero Action Plan Report will reflect key takeaways from all the above tasks, providing a clear path forward that the City can begin acting on immediately and building on over the coming years. As an action plan, the focus is on steps that can be taken in the 6-month, 2-year, and 5-year time frames, but it all relates back to the goal of realizing a safe system with zero deaths or serious injuries on Bellevue streets by 2030.

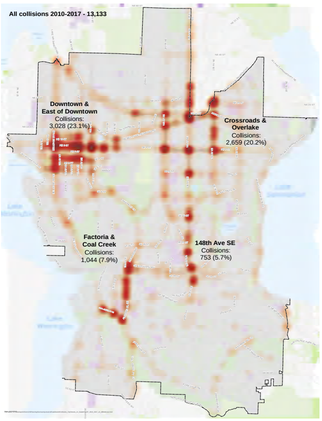
VISION ZERO ACTION PLAN | SUPPORTING DATA

THE INDICATORS

We recognize that getting to zero traffic-related serious injuries and fatalities by 2030 requires us to understand our collision data. A crucial part of our Vision Zero efforts have been directed toward understanding our data—where serious injury and fatal collisions are occurring in Bellevue, who is being impacted and what human behaviors are the largest contributors to these collisions. We investigated Bellevue's serious injury and fatal collision data from 2006 to 2017 to identify trends and contributing factors, and compared this data to those nationally, Washington State and peer cities for context. The collision data trends, in coordination with other considerations such as community input will be used in the City of Bellevue's Vision Zero Action Plan to identify specific strategies to eliminate traffic fatalities and serious injuries.

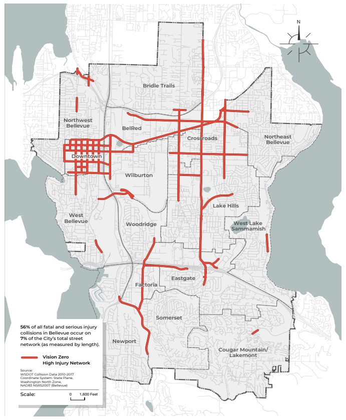
ALL COLLISIONS | HEAT MAP

BELLEVUE CITY STREETS 2010 - 2017



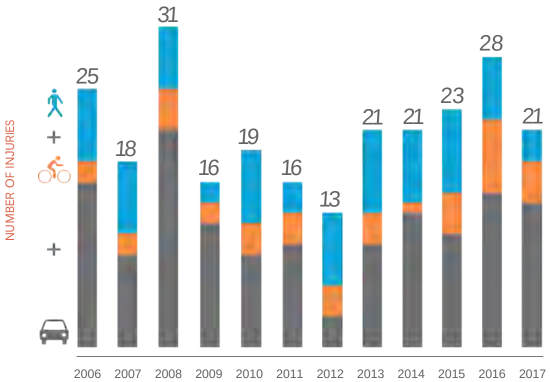
HIGH INJURY NETWORK MAP

BELLEVUE, WASHINGTON



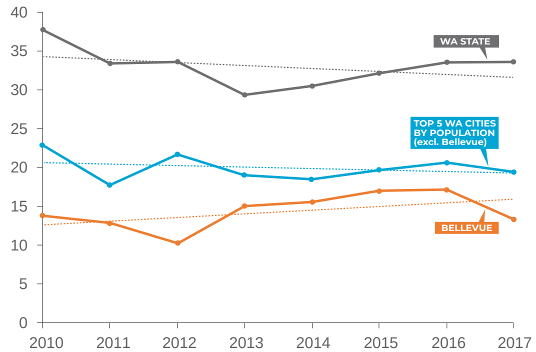
FATAL & SERIOUS INJURIES

BY TRAVEL MODE | 2006 - 2017



FATAL & SERIOUS INJURY COLLISIONS

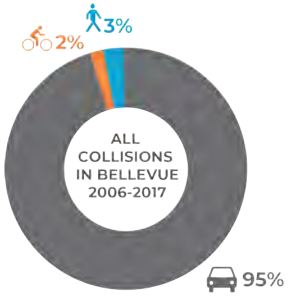
PER 100,000 POPULATION



ALL COLLISIONS, FATAL & SERIOUS INJURIES

BY TRAVEL MODE

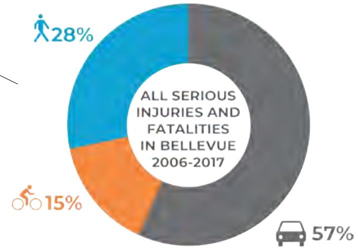
Among those involved in collisions, people walking and bicycling are much more likely to be killed or seriously injured compared to people in cars. For example, people walking are involved in 3 percent of all collisions in Bellevue, but they account for 28 percent of fatalities and serious injuries.



FATALITIES & SERIOUS INJURIES

BY TRAVEL MODE | 2006 - 2017

Fatalities and serious injuries by mode fluctuate year to year, ranging from as low as 13 to as high as 31 in a given year between 2006 and 2017. Fatalities and serious injury counts for people on bicycles and people in motor vehicles were slightly higher than average in 2016 and 2017.

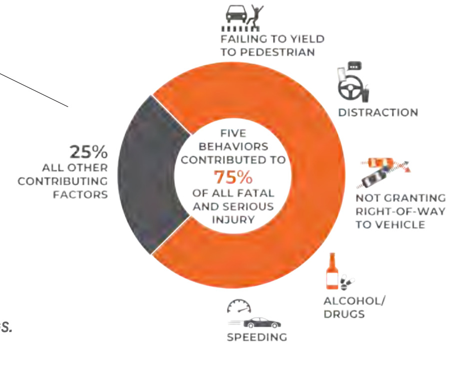


TOP 5 BEHAVIORS CONTRIBUTING TO FATAL & SERIOUS INJURY

2006 - 2017

In Bellevue, in order of frequency, the top five behaviors that contribute to 75 percent of all fatal and serious injury collisions are:

1. *FAILING TO YIELD TO PEDESTRIANS*
2. *DISTRACTION*
3. *SPEEDING*
4. *NOT GRANTING RIGHT-OF-WAY TO VEHICLE AND*
5. *DRIVING UNDER THE INFLUENCE OF ALCOHOL AND/OR DRUGS.*



BELLEVUE VISION ZERO SUMMIT | ONE CITY TOWARDS SAFE STREETS

SURVEY RESULTS | AN INTERNAL AND EXTERNAL LOOK ON SAFE STREETS

WHY ARE WE ASKING?

Getting to zero traffic-related serious injuries and fatalities by 2030 is an ambitious, vital and culture-shifting goal. Shifting our traffic safety culture requires that we understand the current perceptions, attitudes and behaviors of those who use our transportations system (all travelers in Bellevue) and those who plan, design and construct it (our city employees). To truly understand our community's and organization's culture meant we had to ask these groups. In doing so, the results provide us with a starting point to share similar vocabulary and understanding of what we currently value in our transportation system. From here, we can create more informed strategies that help to change our collective traffic safety culture which is a critical step in developing our Vision Zero Action Plan and in getting to Zero.

WHAT WERE OUR METHODS?

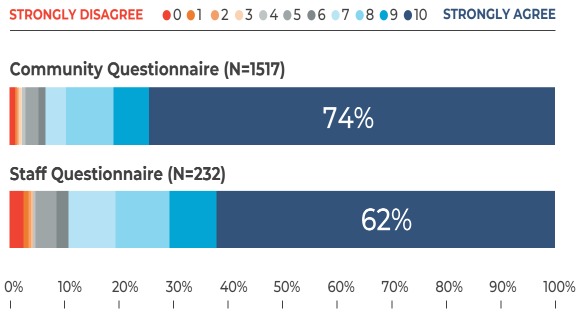
We conducted two separate online questionnaires—one to the Bellevue community and another to select internal city departments (City Manager's Office, Community Development, Fire, Parks and Community Services, Police, Transportation Departments). City departments were selected based on their level of involvement in setting and executing traffic safety policy, designing our transportation system, building and maintaining it, and using it for their day-to-day work. Invitations were sent via various communication channels and in concert with community partners such as the Bellevue School District and Cascade Bicycle Club. We received over 1,700 responses on the community questionnaire and over 230 staff responses. Several questions that were identical between the community and staff questionnaire allowed us to draw direct comparisons between attitudes and perceptions. Respondents were asked to rate their level of agreement on a scale of 0 (strongly disagree) to 10 (strongly agree).

PRELIMINARY TAKE-AWAYS

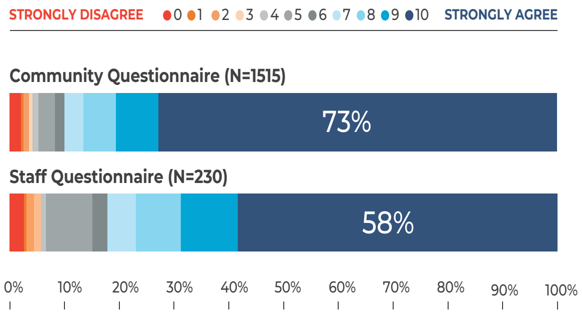
There is generally universal support from both the community and city employees that streets should be designed safely for people of all ages and abilities; about 90% of respondents noted strong agreement ("7" or above). However, the perception that Bellevue should provide a safe transportation system doesn't align with how they believe it to currently operate with as little as 50% of community respondents and 60% of employee respondents rating a "7" or above for Bellevue having a safe transportation system. When asked whether it is feasible to prevent deaths and serious injuries while traveling on Bellevue streets, approximately 15% of employees (compared to less than 5% of community respondents) selected a "3" or below thus illuminating a staff perception that deaths and serious injuries are inevitable consequences of our transportation system. While there is some overlap in respondents from the community and employees questionnaires, there are clearly points of departure in terms of expected and perceived attitudes on how safe our transportation should be and how safely it currently functions.

SAMPLE QUESTIONS

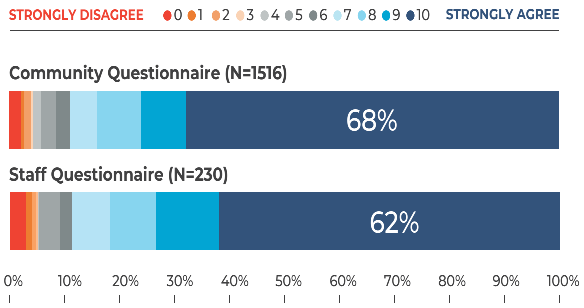
STREETS SHOULD BE DESIGNED TO BE SAFE FOR PEOPLE OF ALL AGES AND ABILITIES



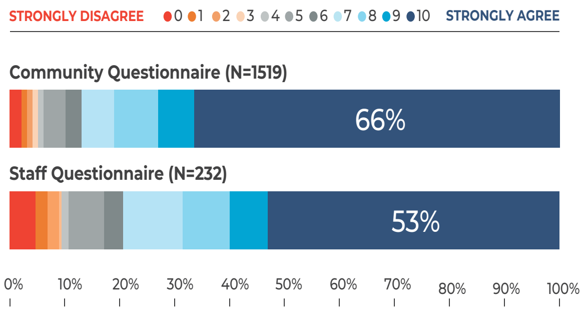
IT IS UNACCEPTABLE FOR ANYONE TO BE KILLED OR SERIOUSLY INJURED WHILE TRAVELING ON BELLEVUE STREETS



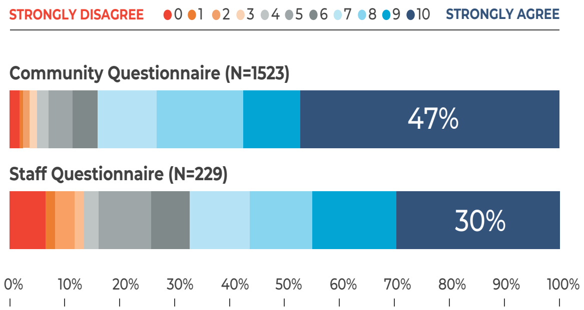
HUMAN LIFE SHOULD ALWAYS TAKE PRIORITY OVER MOVING VEHICLES FASTER



STREETS SHOULD BE DESIGNED TO BE SAFE FOR PEOPLE USING ALL MODES OF TRANSPORTATION



DEATHS AND SERIOUS INJURIES WHILE TRAVELING ON BELLEVUE STREETS ARE PREVENTABLE



THE CITY OF BELLEVUE PROVIDES A SAFE TRANSPORTATION SYSTEM FOR ALL USERS

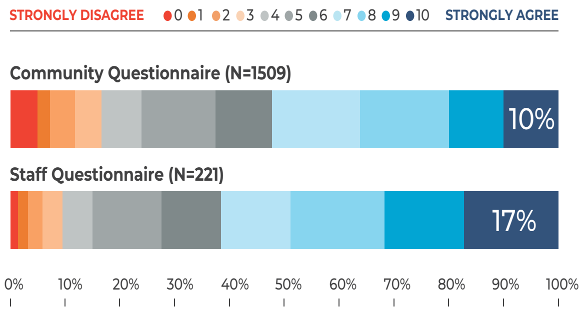


PHOTO ENGAGEMENT | PERSONAL VISION ZERO PLEDGES

THE COMMUNITY MEMBERS

Bellevue welcomes the world, so one of our Vision Zero challenges is to engage all and make sure we have a safe transportation system for EVERYONE. As a "majority/minority city, the progress we make towards a safer transportation system needs to be shared equitably across all groups. Which means, as we put together our Vision Zero Action Plan, we are reaching out to individuals and groups that are often under-represented.

THEIR VOICES

Everyone deserves the opportunity to tell their own story. In the Bellevue Vision Zero Action Plan we are showcasing statements from members of the community to connect statistics, policies, and engineering concepts – like speed limits, traffic signals, crosswalks, and bikeways – to the human lives that are impacted by the transportation system and the decisions people make when using it. Bellevue is advancing as One City Towards Safe Streets.

BELLEVUE VISION ZERO | ONE CITY TOWARDS SAFER STREETS

BELLEVUE VISION ZERO SUMMARY NOTES

February 13, 2019

Vision Zero: Everyone's Responsibility (David Braunstein, Together for Safer Roads)

- Globally, traffic fatalities are the 8th leading cause of death among all people. 90% of deaths are in low- and middle-income countries. It's the number one killer of young people age 5-29. More than 50% of deaths are among vulnerable road users (motorcyclists, pedestrians, and cyclists).
- It is critical to form partnerships to catalyze change. Together for Safer Roads works closely with global and local institutions to affect change. Their programs are all about convening across sectors to bring new resources to the table (e.g. Safer Cities, Safer Companies & Fleets, and Data & Digital Innovation).
- Sao Paulo case study: When Sao Paulo began its road safety initiative, agencies were working in silos and there was little in the way of public-private partnership. The City realized early on that involving the private sector in the governance process was key to their success. Since 2015, fatalities are down 15%, reversing a trend that could have seen more than 7,000 citizens lost without intervention.

USDOT's Safety Data Initiative: Foundation of a Systemic Safety Approach (Erika Sudderth, USDOT)

- USDOT is committed to systemic safety and using data to understand underlying patterns and trends.
- Aviation safety is one success story – commercial aviation fatalities have decreased 95% in the past 20 years.
- The Road to Zero Coalition was established to encourage implementation of proven countermeasures in the near-term.
- We need better data analysis tools to better understand trends. Therefore, the USDOT launched the Safety Data Initiative, which is trying to move to predictive analysis. The program's three focus areas include:
    - Integrating existing USDOT data with new big data sources (many of which are from the private sector).
    - Using advanced analytics to provide new insights into transportation safety risks.
    - Creating data visualizations to help policymakers arrive at safety solutions.
- Pilot Projects[1]
    - **Pedestrian Fatalities Pilot** - USDOT is assessing pedestrian risk nationally using US Census data at the census tract level.
    - **Waze Pilot** - Explored the opportunity to estimate police-reported traffic crashes in near-real time by combining crowdsourced crash data from Waze with crash data provided by State DOTs. In this pilot, DOT learned these models supported with Waze data produce reasonably good estimates of police-reported crashes. This pilot has laid the foundation needed for a future nationwide scale-up of a crash count tool.
    - **Crowdsourced Pilot in Bellevue** – USDOT is partnering with the City of Bellevue to combine crowdsourced traffic incident data with other collision data, and then create a dashboard.

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[1] More information can be found at https://www.transportation.gov/SafetyDataInitiative.

- **Visualization of Traffic Fatalities** – National Highway Traffic Safety Administration **(**NHTSA) is beta testing interactive visualizations of their Traffic Safety Fact Sheets focused on speeding and pedestrians using Tableau visualization software. By creating more interactive information, the hope is to present the data in a new way that may be helpful to policy-makers and the general public.
- **USDOT Safety Visualization Challenge -** DOT launched a safety challenge asking participants to come up with innovative ways to visualize data that will reveal insights into serious crashes on our roads and rail systems while improving our understanding of transportation safety. Five semi-finalists are developing their ideations for an analytical visualization tool into a proof of concept.

Transforming State Plans into Local Action (Roger Millar, WSDOT)

- A big challenge is that individuals think they are good drivers and immune to crashes.
- Data indicates that traffic fatalities and serious injuries are increasing. Impaired and distracted driving are major concerns.
- Between Marysville and Tumwater, there are 70 traffic incidents at day, and half are due to breakdowns. This is directly connected to housing affordability and equity, as people are needing to drive further to get to work as the region gets more expensive. Car maintenance is an equity issue.
- The transportation-land use connection is key. One factor in impaired driving is the fact that pubs are not permitted in residential neighborhoods.
- What can we do?
    - Make changes in the types of transportation projects that we build and fund in the state. Congestion projects receive a lot of money and attention ($900M), but traffic safety receives far less attention and funding ($50M).
    - Better serve non-motorist road users. 40% of trips are less than 5 miles in length. Yet, we drive for most trips less than a mile in length because our transportation system is built for motorists.
    - Mobility on demand apps are evolving to help users pick the best route for a trip and will integrate payment directly into the app. This will make it less attractive for people to make drive alone car trips.
    - Use technology to make our roads safer. We can use technology to prevent cars from operating if a driver has been drinking and prevent phones from working if their users are driving.

Bellevue's Vision Zero Commitment (Lynn Robinson, City of Bellevue)

- The City of Bellevue passed a Vision Zero resolution in 2015 and City ordinance in 2016.
- The City has been building new bike lanes through its neighborhood levy.
- In partnership with Brisk Synergies, Bellevue is using video analytics to flag dangerous incidents based on near-miss collisions.
- Young drivers account for 25% of drivers involved in fatal and serious injury collisions. For this reason, the City announced that it is launching a new campaign to address teenage distracted driving – TINO: Tune In/Not Out – in partnership with the Bellevue School District and Washington DECA. It's a campaign administered by students for students. Student DECA members will be leading this effort in their schools by administering surveys, collecting

testimonials, and using social media to engage other high school students. Schools will also have pop-up concerts to raise awareness on distracted driving.
- Bellevue School District is putting cameras on buses to monitor people driving around buses when the stop sign is out. There are already 107 violations so far this year.

Bellevue Vision Zero – Where We've Been and Where We're Going (Franz Loewenherz, City of Bellevue)

- While Bellevue has fewer fatal and serious injury collisions per 100,000 people than Washington State as a whole and the top 5 cities in Washington, the trend line for Bellevue is increasing while those are decreasing.
- Bicyclists and pedestrians make up a large proportion of fatal and serious injury (KSI) collisions even though a small proportion of trips. People walking are involved in 3 percent of all collisions in Bellevue, but they account for 28 percent of fatalities and serious injuries. People bicycling are involved in 2 percent of all collisions in Bellevue, but they account for 15 percent of fatalities and serious injuries.
- KSI collisions are also occurring on a small percentage of City streets. 56 percent of all fatal and serious injury collisions in Bellevue occur on 7 percent of the City's total street network (as measured by length).
- The City is working to develop a culture of safety among City of Bellevue staff, informed by the findings of the questionnaires.

Putting a Human Face on the Statistics (Greg Federicksen, NHTSA; Laurie Lee, Emergency Department at Overlake Hospital; Loraine Stewart, Cascade Bicycle Club; Linda Nguyen, PharmD; Kate Carley, Bellevue Police Department)

- Each of the speakers told a heart-felt story about how they have personally been affected by Vision Zero. The safety data represents human lives – it's easy to forget about the people behind the statistics.
- "Wear your seat belts and helmets."
- "We have to do better, and we have to do more."
- "This can happen to any one of us."

A Primer on the Safe Systems Approach (Chris Monsere, PSU)

- Many countries have seen large decreases in road fatalities since adopting Vision Zero approach – Norway, France, Germany, Sweden, etc. The US is trailing far behind.
- The Swiss Cheese Model of Crash Causation – there are many risks that factor into a collision. We need failures in multiple systems before a collision occurs. There are things we can do to close those gaps.
- Safe Systems Principles:
    - Humans make errors
    - Humans are vulnerable to injury
    - Responsibility is shared
    - No death or serious injury is acceptable
    - A proactive approach rather than reactive
- "To save lives, one has to pay in money, time, and freedom." (Hauer, 2010)

- Speed management is key for Safe Systems. Vehicle speed is the most important regulating factor for safe road traffic. Cities should design their roadways such that motorists are forced to travel at the intended speed (i.e. design speed). Some examples mentioned include:
    - Interstate Freeways – among the safest roadways
    - 2 + 1 cable barrier rural roads in Sweden – there's a cable barrier in the center of the roadway. This provides a lot of mobility, but helps eliminate head on collisions. Colorado DOT is exploring this.
    - Separated Bike Lanes
    - Safety enforcement cameras in London
- Key takeaways:
    - A systems thinking approach is required to make significant change.
    - The vast majority of people want safety, but there is a large gap in the public's understanding of how speed, mobility, and safety are related.
    - Leadership is required to make the "hard" choices.

SAFE VEHICLES

Video based detection of near miss events between transit vehicles and pedestrians/bicyclists (Yinhai Wang, Pactrans)

- PacTrans is working to address safety and mobility challenges in USDOT Region 10.
- Traffic deaths jumped 8.4% nationally in 2015, ending a 5-year trend. Why is this occurring?
- There is a correlation between the number of fatalities and near misses, so it is important to study near misses between transit vehicles and near misses with cyclists/pedestrians through the use of transit video cameras.
- Key takeaways:
    - There are more near-misses located on the front right side of motorists as opposed to the front left side.
    - There are some typical patterns of false-positives (e.g. stop signs) and false negatives (near misses that aren't captured by the technology).
    - Ongoing work: Pactrans is working to develop a vehicle-vehicle near-miss detection algorithm based on 3D object detection in onboard video. It is developing a smart data hub for real-time transit onboard video data reduction and transmission. And it is working on long-term, multiple-object tracking.

Vehicle technologies in support of Vision Zero (Vijtha Chekuri, Automotive Industry Solutions at Microsoft)

- The automotive industry is rapidly changing, and the four main areas of change include connectivity, autonomous driving, shared services, and electric. As a result, automakers need to adapt.
- When looking at the five stages of autonomy, the industry is currently somewhere between stages 2 and 2.5 (i.e. hands off, partially automated). Tesla vehicles are stage 3. It will be a gradual evolution through the different stages.
- Autonomous vehicle sensors generate <u>huge</u> amounts of data that need to be processed, analyzed, and trained for optimal algorithms that work for the real world. It requires a huge amount of computing power.
- There are 54 Azure (i.e. the Cloud data centers) regions around the world.

- Microsoft is making huge advancements in AI, and they have a wide range of partners that they work with.
- Guiding principles:
    - Microsoft is not building a car for production – Microsoft is partnering with automakers and suppliers to enable them to build the best connected and autonomous cars possible.
    - Microsoft does not own the user experience – The user experience belongs to each automaker and should reflect their brand identify.
    - Microsoft does not own the data – The data belongs to the automaker and/or their customers. Microsoft will build services that brings together data from multiple data sources (automakers, suppliers, etc.), but data owners will always be able to control what is shared into a federated service.
    - Privacy is a human right – Microsoft fully supports GDPR and calls for "digital Geneva Convention."

The shared mobility revolution – safety challenges and opportunities (Regina Clewlow, Populus)

- Shared mobility services (e.g. Zipcar, Lyft, Uber, Lime, JUMP, etc.) have rapidly evolved in cities, and adoption of new mobility services is accelerating. Some of the factors that led to this rapid growth include GPS enabled smart phones, traffic, and venture capital.
- Cities are now requiring data from private mobility providers to manage progress toward public goals, such as safety, equitable access, and efficiency.
- The arrival of ride-hailing was found to be associated with a 2-3% increase in the number of motor vehicle fatalities and fatal collisions (Barrios et al, 2018).
- Cities are starting to work on active mobility management.
- Methods of gathering new data for shared mobility safety include:
    - Request data from operators (e.g. trips, vehicles, maintenance logs, complaints, injuries)
    - Request data through industry standard APIs – GBFS (General Bike Feed Specification) and MDS (Mobility Data Specification).
    - Incident management tracking through a third-party – tracking injuries, collisions, and other safety related incidents is a challenge. So cities are beginning to require that operators collect data in a consistent format through a third party with public-facing tools.
- "While historically, less than 3% of people might have commuted to work on a bike in the majority of cities, we are now seeing greater adoption of micromobility." Better data helps cities expand bike/scooter infrastructure.

SAFE SPEEDS

Setting of speed limits and the update to the MUTCD (Keith Allen, Bellevue Fire Department)

- In January 2018, the National Committee on Uniform Traffic Control Devices (NCUTCD) Task Force was tasked with coming up with recommendations for revising language in the MUTCD related to setting speed limits.[2] They administrated a survey that received 740 responses. It assessed factors used in setting speed limits – interestingly, political factors were not ranked highly.

- Few respondents have used the USLIMITS2 tool to set speed limits. It is seen as a black box process and people want to understand more about the inputs.
- When asked how participants would set speed limits if given the choice, the vast majority listed "Other." Most agencies have their own policies because context matters.
- The Task Force recommended two main changes to the MUTCD language:
    - A few factors were moved up and expanded upon. Three factors were added – road characteristics, road context, and road users (e.g. pedestrians and bicycles).
    - For the speed distribution of free-flowing vehicles, they maintained the 85th percentile threshold but placed emphasis on "pace" – speeds within 5 mph of the 85th percentile speed of free flowing vehicles.
- It is important to stay focused on the correct problem – excessive speeds, not speed limits.

Impact of Automated photo enforcement of vehicle speed in school zones (Beth Ebel, Harborview Injury Prevention & Research Center)

- Slowing down car traffic encourages kids to walk or bike to school, which has health benefits. Photo enforcement is one option that will help improve school safety.
- It is important to consider equity issues around photo enforcement. Who gets a warning versus who gets a ticket?
- In partnership with SDOT, this study utilized cameras that use embedded speed measurement tools, use photos of license plates that are linked to Department of Licensing records, and generate tickets by mail.
- Findings:
    - Rate of speeding violations decreased ~50% after police began issuing tickets based on automated photo enforcement, when compared to the period when drivers received written warnings.
    - Proportion of vehicles exceeding 20 mph limit decreased by ~50% in the citation period compared to the warning period.
    - Impact of automated enforcement was sustained over two years.
- Considerations for localities considering photo enforcements:
    - Thoughtfully select locations.
    - Talk with community partners, such as school principals, PTA, and local businesses, and report back to them.
    - Negotiate with photo enforcement partners – how will enforcement revenue be used to benefit the local community, and how can the data be collected in a useful format.
    - Set up an evaluation matrix that considers: before/after versus control sites; vehicle speeds (individual cars) and volume; number of active commuters; peak/non-peak periods and vacations; and phased implementation.

[2] More information at: https://ncutcd.org/wp-content/uploads/meetings/2019A/AttachNo12.18B-RW-03.SpeedLimitProcdedures.Approved.pdf

Examining systemwide speeds with big data, uncovering the extremes (Ted Trepanier, INRIX)

- INRIX's mission is to transform mobility worldwide. It is working to connect every car and city, so it sits in the space between the transforming automotive industry and cities/big data. How can we make the data from cars available to cities?
- There is a lot of different types of data from a lot of different sources (e.g. cameras, mirror sensors, LIDAR sensors, etc.), but the presentation focused on core GPS speed data. INRIX goes through a process to determine real-time speed.
- INRIX offers several products that can be used for safety analysis:
    - Trip Reports – looks at the origin/destination data for a given road segment
    - NPMRDS – Point Paired Speeds. To understand speed distribution, you have to use a speed profile. INRIX has speeds for every 5 minutes.
- INRIX is working with Bellevue on its speed profile. They're comparing speed statistics for specific magnitudes and time periods with high injury locations. They will identify where speeds are causing a safety issue, which they can then mitigate for.

Lessons learned from SDOT's reduction of speed limits (Mark Bandy, SDOT)

- Seattle's Vision Zero goal is to end traffic deaths and serious injuries by 2030.
- In 2015, Seattle voters passed a 9-year transportation levy that will allow them to make progress on engineering, education, enforcement, and evaluation.
- In 2016, default speed limits in Seattle were reduced to 25 mph on arterials and 20 mph on non-arterials. This has involved revising "gateway" signing and an education/public awareness campaign. This also required retiming traffic signals to match posted speed limit of 25 mph.
- What's next?
    - Prioritizing urban villages (i.e. neighborhood business districts) because they have lots of people walking and biking.
    - Evaluating speed limits on corridors that have been redesigned.
- For methodology on corridors, they're looking at 50th percentile speeds (USLIMITS2) and factors like traffic signal density, pedestrian/bike activity, parking activity, and driveway activity.
- One example of a treatment is adding an edge/parking lane line and a new speed limit sign.
- Lessons learned:
    - Some public audiences and elected officials had expectations that didn't match reality (i.e. not every arterial street in the city is 25 mph).
    - Reducing speed limits can increase requests for services (e.g. requests for traffic calming). Just because it's the signed speed limit doesn't mean that's the speed people will travel.
    - Speed limit revisions in Urban Centers/Villages provided more focused awareness.
    - 20 mph speed limit on non-arterial/residential roadways is widely supported.

SAFE PEOPLE

Local Strategies to Address the National DUI Epidemic (Darrin Grondel, WTSC)

- Impairment is still involved in ~50% of traffic fatalities in Washington State. This includes alcohol and drugs.
- Poly-drug driving is on the rise since 2011.
- Local Law Enforcement Implementation strategies included:
    - Law enforcement DUI training/mentoring

- E-Warrants for DUI – officers need a warrant to test blood for marijuana, and this enables law enforcement to get a warrant electronically, speeding up the process.
    - Law enforcement phlebotomy program (e.g. Lakewood and Pierce County)
- Other Strategies
    - Automated enforcement
    - DUI Therapeutic Court – helps people address some of the underlying factors behind why they are driving under the influence
    - DUI Resource Prosecutor program
    - Dedicated DUI officers
    - Monitoring of DUI arrests
    - Work with LCB on compliance checks
    - Alternative transportation programs
    - Active participation in the King County Traffic Safety Task Force

Understanding Distracted Driving – When is a Crash a Crime? (Amy Freedheim, King County)

- The law has evolved on what's considered a vehicular homicide. In the early 2000s, distracted driving from cell phones was not enough to prosecute a driver with vehicular homicide. In 2017, Washington State enacted a new law making it illegal to even hold a cell phone while stopped in traffic.
- Motor vehicle crashes are the 6th leading cause of preventable death, which is 4 times greater than gun deaths.
- There are three ways to commit intentional negligence (2nd degree assault) as opposed to unintentional negligence:
    - Being under the influence of alcohol/drugs/marijuana
    - Reckless manner (e.g. driving the wrong way on road, extreme speed, racing another vehicle)
    - Disregard for the safety of others (DSO) (e.g. distracted driving from electronics, drowsy driving, distraction – what was happening in the car) – there was a conscious disregard for safety that goes beyond ordinary negligence.
- There are several different types of distraction:
    - Manual – taking one or both hands off wheel
    - Visual – not looking at road ahead
    - Cognitive – mind not focused on driving
    - Other common distractions: eating, adjusting radio, irritable child, applying make-up, listening to audiobook, thinking about problems/issues, regulating heater/AC – but not all of these are aggravated negligence
- Electronic distraction has major risks. Crash risk has been shown to increase 3.6 times with the use of a hand-held device. They also result in "inattentional blindness." Mental distractions can last up to 27 seconds after using voice commands on cars/phones to make a call, send a text, or change the music. There is a 27 second recovery period for your brain. Further, it takes about 4.6 seconds to read/send text – at 55 mph, that's the equivalent of the length of a football field.
- Challenges for Law Enforcement: it is incumbent on law enforcement officers to collect information as quickly as possible on:
    - What activities was the driver doing?
    - Evidence of distraction (interviewing witnesses/forensics)
    - Evidence of choice to engage in activity that puts lives in danger

    - Phone usage. If law enforcement obtains the phone, they must get the passcode for it to be useful, but people are not required to provide it. You can figure out what apps were open because the driver may not have been texting or on the phone.

Safe System considerations for safer teens and other vulnerable populations (Offer Grembek, UC Berkeley SafeTREC)

- A safe transportation system is a system in which people cannot die <u>despite</u> human error. A dangerous transportation system is a system in which people can die with <u>no human error</u> (e.g. mine field, avalanche area). Our system is not safe and also not dangerous.
- There is a question of whether or not Safe People should be included as part of the Safe Systems approach. Alert and compliant road users are ancillary.
- One size does not fit all. Who is the road user we should design for? Need to plan for error-prone humans because people make mistakes and misjudgments.
- A 2015 study asked participants to name five of the most common factors that contribute to teenagers being hurt (or killed) in a car crash, other than lack of driving experience. This helped identify gaps in their knowledge.
- A Bicycle User Experience Survey found that comfort on different facility types varies.
- Drivers with a blood alcohol content (BAC) **below** 0.08 still have diminished performance that may not be accounted for in reaction time assumptions for current design standards. Roads are not necessarily built to accommodate people drinking and following the alcohol limits, so we should either change roadway design or BAC limits.

Looking beyond police reports (Thomas Orr, NORCOM 911)

- NORCOM is the 911 center for 6 agencies.
- There is a wide variety of unreported collisions – only 25% of NORCOM collisions involve police reports. In addition to official police reports, there are other collision data sources:
    - Computer aided dispatch reports
    - Records Management Systems
    - Fire/EMS Field Reports
    - Fire/EMS Aid Calls
- The agency currently operates in separate silos, which is challenging for unified collision data collection. There are separate systems for fire/EMS reporting, police reporting, IT systems, IT applications, and CAD systems. The reporting and IT systems would need to be unified for a more comprehensive/consolidated reporting of collisions.
- Given that there are separate silos, collisions (as recorded in police records) are underreported, NORCOM is working to combine police and fire collision data using RAADAR. There are instances where Fire responds and there was no police presence, and these collisions are not currently accounted for in the data. Several cities around the country have similar real-time data centers with consolidated report.
- Several components are needed to allow RAADAR to function fully, including information exchange agreements that address: public disclosure, liability, third party use, etc.

SAFE STREETS

Video Analytics Towards Vision Zero Partnership (Charles Chung, Brisk Synergies)

- Brisk Synergies uses video analytics to analyze traffic safety. They look at all the objects on the road, identify dangerous situations/near misses, and measure and quantify all the factors that are contributing to those situations. They then continuously monitor high-risk intersections, looking for trends, changes over time, and how roadway improvements have been affecting safety.
- Brisk Synergies is currently working with the City of Bellevue to monitor the citywide network, develop a road safety dashboard, conduct a safety diagnosis at high-risk locations, and identify recommendations for those locations.
- Some of the different types of video analytics being used in Bellevue include:
    - BriskVANTAGE – continuous video footage at high risk locations (e.g. NE 4th Street & 108th Avenue NE)
    - BriskLUMINA – snapshot analysis, video footage collected Monday through Friday during the peak hour over a few weeks

Innovative Tools for Advancing Complete Streets and Vision Zero (Peter Koonce, PBOT)

- The transportation industry is rewriting the rule book and changing long-held standards for street design. For instance, the creation of NACTO's Urban Street Design Guide was a game changer.
- Key Signalization Principles include:
    - Shorten signal lengths (60-90 seconds is ideal).
    - Prioritize multimodal travel (short cycle lengths reduce dwell times and manage speeds).
    - Minimize the number of signal phases.
    - Set slow progression speeds - synchronize signals to maintain safe travel speeds and discourage speeds. Move away from the 85th percentile speed approach. Consider the progression of bicycles and adjust signal timing so they can clear signals.
    - Adjust timing for off-peak travel – Google maps shows slow speeds as red, but perhaps speeds above 30 mph should be considered red from a safety perspective.
    - Consider fixed time signals.
- Street lighting can be used to support multimodal safety – analyze which locations are dark.
- Use bicycle specific video detection/analytics to influence signal timing.

Road diets, not just another fad diet (Peter Eun, FHWA)

- FHWA's "Every Day Counts" (EDC) Program works with states to identify and rapidly deploy proven but underutilized innovations to shorten project delivery process, enhance roadway safety, reduce congestion, and integrate automation.
- A road diet may not be appropriate for streets over 25,000 ADT. Important to consider what is the purpose of the road – jurisdictions may be ok with lower level of service for roadways that are intended to serve all modes.
- Road diets provide safety benefits for pedestrians, cyclists, AND drivers.
- Road diets have a higher crash reduction factor (CRF) in suburban contexts than urban contexts.
- Road diets have not been shown to hurt business, which is one of the big concerns.
- Jurisdictions may have to do analysis at intersections to ensure smooth operations.

- FHWA's new guide – *Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations* – promotes several different countermeasures, and road diets are one. There's a table that shows which countermeasures are appropriate depending on ADT and number of lanes.

Leveraging UAV technologies for safe streets (Jay Cabezuela, WA State Patrol)

- The Washington State Patrol is using Unmanned Aerial Vehicle (UAV) Technology (i.e. drones) to conduct crash and crime scene investigations. The pilot project started in January 2017, and 9 detectives were selected to use UAV technology in King, Pierce, Thurston, and Snohomish Counties. The goal of its program is to:
    - Reduce road closure time associated with collision investigations
    - Improve the quality of forensic mapping capabilities
    - Improve officer safety
- The UAV program was expanded to all detectives statewide in January 2018, and in 2019, the UAV program is approved to expand further statewide to also include CTS troopers.
- After the train derailment, it took 89 minutes to take photos using the UAV technology compared to 3.5 hours using four teams of scanners, which is how they previously collected footage. Combining both methods produced a photo realistic capture of the scene. There are advantages to each method:
    - Scanner: objects (e.g. train car) have no top, but the sides look great
    - UAV: the top looks great, but there are no sides
- The aerial footage can be used to create Point Cloud Animation (PIX4D). Using VR Goggles, you can walk through the PIX4D, look under train cars, and into windows, which can help with investigations.
- Scene investigation was sped up significantly compared to traditional methods. In 2018, this technology saved $3.4M in detective investigations (91 investigations) and $800k in patrol investigations (35 investigations).

A special thanks to...

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For additional information, please contact event coordinator:

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