TOLLING. MOVING SMARTER.

IBTTA Board Briefing Book

June 22-23, 2018

Harrisburg, Pennsylvania

IBTTA Board of Directors and Committee Meetings

June 22-23, 2018 | Harrisburg, PA

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DRAFT IBTTA Board and Committee Meetings
June 22-23, 2018

IMPORTANT NOTES:
All Meetings are open to all members except when the words "by invitation" appear.

FRIDAY, JUNE 22, 2018

8:30am – 11:30am
Executive Committee Meeting (By invitation)

8:30am – 10:30am
Platinum Sponsor Group (By invitation – Platinum sponsors only)

10:30am – 11:30am
Platinum Sponsor Group (By invitation – With board liaisons and IBTTA staff)

11:30am – 12:30am
Platinum Sponsor Group (By invitation – With executive committee, board liaisons, and IBTTA staff)

12:30pm – 2:00pm
Executive Committee Lunch (By invitation): TBD

3:00pm - 4:00pm
Foundation Board

4:00pm – 5:00pm
Nominating Committee (by invitation)

5:30pm – 7:00pm
Reception

SATURDAY, JUNE 23, 2018

7:00am – 8:30am
Breakfast

8:00am – 9:00am
Past Presidents Advisory Council (by invitation)

9:00am – 10:00am
Membership Subcommittee

10:00am – 11:00am
Finance Standing Committee of the Board

11:00am – 12:00pm
Government Affairs Committee

12:00pm – 1:00pm
Lunch

1:00pm – 5:00pm
IBTTA Board of Directors

Evening is Free

BOARD OF DIRECTORS AND EXECUTIVE COMMITTEE

Tim	Stewart	E-470 Public Highway Authority	PRESIDENT
Christopher	Tomlinson	State Road & Tollway Authority	FIRST VICE PRESIDENT
Samuel	Johnson	Transportation Corridor Agencies	SECOND VICE PRESIDENT
Klaus	Schierhackl	ASFINAG	INTERNATIONAL VICE PRESIDENT
Emanuela	Stocchi	AISCAT	IMMEDIATE PAST PRESIDENT
Nic	Barr	ITR Concession Company LLC	DIRECTOR 2018
Randy	Cole	Ohio Turnpike and Infrastructure Commission	DIRECTOR 2018
Mark	Compton	Pennsylvania Turnpike Commission	DIRECTOR 2018
Cedrick	Fulton	MTA Bridges and Tunnels	DIRECTOR 2021
Diane	Gutierrez-Scaccetti	State of New Jersey Department of Transportation	DIRECTOR 2020
Bill	Halkias	HELLASTRON	DIRECTOR 2021
John	Lawson	Virginia Department of Transportation	DIRECTOR 2019
Beau	Memory	North Carolina DOT, Turnpike Authority	DIRECTOR 2021
Julià	Monsó	Cintra	DIRECTOR 2018
Mark	Muriello	The Port Authority of New York & New Jersey	DIRECTOR 2021
Julián	Núñez	SEOPAN	DIRECTOR 2020
Kathryn	O'Connor	Rhode Island Turnpike and Bridge Authority	DIRECTOR 2021
Malika	Seddi	ASFA	DIRECTOR 2020
Benton	Tempas	Northwest Parkway LLC	DIRECTOR 2018
Juan	Toledo	Miami-Dade Expressway Authority	DIRECTOR 2020
Gary	Trietsch	Harris County Toll Road Authority	DIRECTOR 2019
Bruce	Van Note	Maine Turnpike Authority	DIRECTOR 2019
Joseph	Waggoner	Tampa-Hillsborough Expressway Authority	DIRECTOR 2020

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Joseph	Waggoner	Tampa-Hillsborough Expressway Authority	Chair
Lawson	John	Virginia Department of Transportation	Member
Memory	Beau	North Carolina DOT, Turnpike Authority	Member
Monsó	Julià	Cintra	Member
O'Connor	Kathryn	Rhode Island Turnpike and Bridge Authority	Member
Van Note	Bruce	Maine Turnpike Authority	Member

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Cecchi	Mario	M.Cecchi Consulting	Member
Compton	Mark	Pennsylvania Turnpike Commission	Member
Halkias	Bill	HELLASTRON	Member
Mike	John	Perceptics, LLC	Member
Moradi	Massoud	Atkins N.A.	Member
Philmus	Ken	Conduent	Member
Pope	David	Silicon Transportation Consultants	Member
Telles	Lisa	Transportation Corridor Agencies	Member
Ward	Cynthia	Metropolitan Washington Airports Authority	Member

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Christopher	Tomlinson	State Road & Tollway Authority	Member

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Lisa	Lumbard	Central Florida Expressway Authority (CFX)	Member
Donna	Manuelli	New Jersey Turnpike Authority	Member
Charles	McManus	Stantec Consulting Services Inc.	Member
Francis	O'Connor	Atkins N.A.	Member
Kent	Olson	Kansas Turnpike Authority	Member
Mary Jane	O'Meara	HNTB Corporation	Member
Teresa	Slack	Jacobs Engineering Group	Member
Steven	Snider	Halifax Harbour Bridges	Member
Timothy	Sturick	Thousand Islands Bridge Authority	Member
Darby	Swank	Kapsch TrafficCom	Member
Gary	Trietsch	Harris County Toll Road Authority	Member
Kary	Witt	HNTB Corporation	Member
Anthony	Yacobucci	Ohio Turnpike and Infrastructure Commission	Member

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Amy	Potter	Transportation Corridor Agencies	Member
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Susan	Buse	SBuse Consulting	Vice Chair
Rachel	Bell	Kansas Turnpike Authority	Member
Randy	Cole	Ohio Turnpike and Infrastructure Commission	Member
Michael	Davis	RS&H	Member
Howard	Eley	DBi Services, LLC	Member
James	Ely	HNTB Corporation	Member
Robert	Fischer	New Jersey Turnpike Authority	Member
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Tyler	Milligan	Milligan Partners LLC	Member
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Malika	Seddi	ASFA	Member
Benton	Tempas	Northwest Parkway LLC	Member

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Mark	Compton	Pennsylvania Turnpike Commission	Chair
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James	Beattie	AECOM	Member
Susan	Buse	SBuse Consulting	Member
Gerald	Carrigan	North Texas Tollway Authority	Member
Randy	Cole	Ohio Turnpike and Infrastructure Commission	Member
Buddy	Croft	Rhode Island Turnpike and Bridge Authority	Member
Howard	Eley	DBi Services, LLC	Member
James	Ely	HNTB Corporation	Member
Tim	Gatz	Oklahoma Turnpike Authority	Member
Jordi	Graells	SH-130 Holdings LLC	Member
Diane	Gutierrez-Scaccetti	State of New Jersey Department of Transportation	Member
Mark	Hicks	RS&H	Member
Shelby	LaSalle	Greater New Orleans Expressway Commission	Member
Merryl	Mandus	State Road & Tollway Authority	Member
Frank	McCartney	WSP USA	Member
Marty	Milita	Duane Morris Government Strategies	Member
Julià	Monsó	Cintra	Member
Mark	Muriello	The Port Authority of New York & New Jersey	Member
Ken	Philmus	Conduent	Member
Edward	Regan	CDM Smith	Member
Kevin	Reigrut	Maryland Transportation Authority	Member
Cynthia	Ward	Metropolitan Washington Airports Authority	Member
Kary	Witt	HNTB Corporation	Member
George	Zilocchi	HNTB Corporation	Member

INTERNATIONAL TASK FORCE

Jordi	Graells	SH-130 Holdings LLC	Chair
Snehal	Ambare	HNTB Corporation	Member
Josef	Czako	Moving Forward Consulting	Member
Bruno	de la Fuente	SEOPAN	Member
Priya	Jain	Atkins N.A.	Member
Pascal	Lemonnier	Egis	Member
Antulio	Richetta	IBI Group	Member
Klaus	Schierhackl	ASFINAG	Member
Malika	Seddi	ASFA	Member

NOMINATING COMMITTEE

Emanuela	Stocchi	AISCAT	Chair
Javier	Rodriguez	Miami-Dade Expressway Authority	Vice Chair
Buddy	Croft	Rhode Island Turnpike and Bridge Authority	Member
Diane	Gutierrez-Scaccetti	State of New Jersey Department of Transportation	Member
Mike	Heiligenstein	Central Texas Regional Mobility Authority	Member
Robert	Horr	Thousand Islands Bridge Authority	Member
Steven	Snider	Halifax Harbour Bridges	Member

PAST PRESIDENTS ADVISORY COUNCIL

Emanuela	Stocchi	AISCAT	Chair
Buddy	Croft	Rhode Island Turnpike and Bridge Authority	Vice Chair

SITE SELECTION COMMITTEE

Benton	Tempas	Northwest Parkway LLC	Chair
Mario	Cecchi	M.Cecchi Consulting	Member
Michael	Davis	RS&H	Member
Peter	Merfeld	Maine Turnpike Authority	Member
Servando	Parapar	Transporte, LLC	Member
Malika	Seddi	ASFA	Member

IBTTA FOUNDATION - BOARD OF DIRECTORS

Philip	Miller	AECOM	Chair
Federico	Di Gennaro	AISCAT	Director
Mike	Heiligenstein	Central Texas Regional Mobility Authority	Director
Priya	Jain	Atkins N.A.	Director
Marcelle	Jones	Jacobs Engineering Group	Director
Christine	Keville	Keville Enterprises Inc.	Director
John	McCuskey	WSP USA	Director
René	Moser	ASFINAG	Director
Rosa	Rountree	Egis	Director
Lisa	Thompson	HNTB Corporation	Director
P.J.	Wilkins	E-ZPass Group/IAG Service Corp.	Director
Kary	Witt	HNTB Corporation	Director

LIAISONS TO PLATINUM SPONSORS ADVISORY COUNCIL

Mark	Compton	Pennsylvania Turnpike Commission	Liaison
Andy	Fremier	Bay Area Toll Authority, Metropolitan	Liaison
Diane	Gutierrez-Scaccetti	State of New Jersey Department of Transportation	Liaison
Steven	Snider	Halifax Harbour Bridges	Liaison

IBTTA Strategic Plan
Adopted by the Board August 29, 2015

(Editor's Note: This strategic plan builds upon the work conducted by the IBTTA board of directors and interested parties during the board meetings in January 2015 and April 2015 and in subsequent correspondence between members and staff. The IBTTA Board of Directors adopted the plan below on August 29, 2015 recognizing that it is a living document and subject to ongoing review.)

OVERVIEW

On April 24, 2015, a strategic planning group consisting of Board members, other key stakeholders, and senior staff of the International Bridge, Tunnel and Turnpike Association (IBTTA) met to update its long-range strategic direction. Carolyn Lugbill, CAE, a Senior Consultant of Tecker International, LLC and president of Going Global Matters led the group through the planning process.

This planning document defines IBTTA's clear strategic direction. It is the planning group's consensus on what will constitute the Association's future success. It answers the following two fundamental strategic questions:

1. Why will IBTTA exist in the future? *Its reason for being and core purpose*.
2. Where is IBTTA going? *Its future direction and goals*.

Planning Strategically:

The existence of this strategic direction and its successful implementation signals the leadership team's desire to lead IBTTA strategically. Developing a strategic direction is not a one-time event, but an ongoing commitment and process. The strategic direction represents a compass that will be used to guide and focus IBTTA's future strategic decision-making and ongoing operational work.

Strategic Focus:

Organizational strategic focus or intent is very important. One of the challenges that IBTTA faces is the fact that there is more it can do for members and key stakeholders than it has resources to accomplish. The temptation to do everything can often lead a not-for-profit organization to try to be all things to all people. Planning strategically is the counter to the all-things syndrome. It is about identifying a limited number of goals that IBTTA must undertake to move successfully into the future.

Strategic Approach/Philosophy:

The approach in defining the new strategic direction was not to identify what IBTTA wants to continue doing today (its current operational plan). Rather, the leadership team determined what the Association is not doing today, but must engage in to be successful in the future.

This strategic direction is not about business as usual — ***it is about the change needed to***

stay relevant! This separates the strategic plan from the operational plan. Both are important. The strategic direction is a constant reminder, as the leadership team oversees the development of the annual operational plan, of what must be changed to stay relevant to what members are seeing in their real world.

Updating the Strategic Plan:

A strategic plan can only stay current and relevant if IBTTA insures that the plan is updated. It is the leadership team's *working document*. Therefore, the governing body has both the right and the responsibility to:

1) change the strategic plan any time it needs to be changed based on sound reasoning and assessment; and
2) Update the plan regularly on an ongoing basis.

Long-Range Strategic Planning Horizon (10 to 30 Year Envisioned Future)

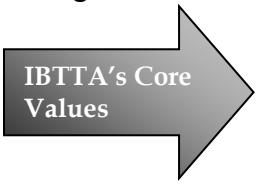
A 10 to 30 year planning horizon was developed, which consists of IBTTA's core ideology and 10 to 30 year envisioned future.

Core Ideology/Mission clarifies what must be preserved in an environment of increasingly rapid and unpredictable change. Core ideology consists of IBTTA's core values and core purpose.

The ***core purpose*** describes IBTTA's very reason for being or existing — *why the organization will or should exist into the future* (10 to 30 years). What would be lost if it ceased to exist? What sense of purpose will motivate members to dedicate their creative energies to IBTTA and its efforts over a long period of time?

To advance transportation solutions through tolling.

Core values are a small set of timeless, guiding principles that do not require external justification. They only have intrinsic value and importance to IBTTA and its members. Core values are so fundamental that they seldom change — *if at all*. They define the behavior required in order for the organization to achieve its core purpose. Core values are so deep-seated and valid that IBTTA would preserve the core values even if it were admonished for having these values.



We are:

- ***Ethical***

- ***Collaborative***
- ***Collegial***
- ***Credible***
- ***Accountable***
- ***Innovative***
- ***Inclusive***
- ***A knowledgeable resource***

The ***10 to 15 year envisioned future*** consists of a single, ***big audacious goal (B.A.G.) or vision***. The B.A.G./vision is a goal (that is, IBTTA's vision statement) that stretches beyond IBTTA's current three to five year goals. Because it is "audacious" it represents a significant challenge and its achievement will require IBTTA to move outside of its comfort zone. It is clear and compelling to all members. It has a clear finish line which will take both time and hard work to accomplish. The goal should stimulate leadership activity, commitment and participation beyond IBTTA's present leadership. It helps to set the direction for the succession of future three to five year strategic plans. IBTTA can only manage one B.A.G. at a time.

IBTTA will be recognized as the leading voice to advance transportation solutions through tolling.

A vivid description shows what IBTTA and user financed roads will look like when the association successfully achieves its Big Audacious Goal. The following description helps to clarify what is intended by the goal and provides measureable indicators of achievement.

In 2025:

Overall, the world has better, safer highways, bridges, and tunnels.

- There will be national and multinational interoperability.
- Congestion pricing will have been embraced by more urban areas, particularly in Tier 1 Regions, (i.e., New York, Chicago, etc.).
- Tolling has become a broadly accepted method of funding transportation solutions.
- States have the legal authority to toll interstate highways, if they so choose.
- Tolling should be considered for all new capacity.
- Road Usage Charging (RUC) or Vehicle Miles Traveled (VMT) fees will be in place in some

U.S. states.

- On board technology in connected vehicles will allow any jurisdiction to toll any road or implement RUC.
- Tolling will be a leading solution for congestion relief and for enhancing mobility through new capacity.
- Transportation pricing is in place in all metro regions.
- There will be more intelligent roads that interface with connected vehicles, creating more desirable options and resulting in fewer incidents.
- The user experience is much more personalized and specific, being able to meet users' expectations.

IBTTA has:

- Members from every entity that collects and/or supports the collection of tolls.
- An internationally recognized image and brand.
- A high level of collaboration with other associations.
- A $1,000,000 foundation endowment.
- 3,000 delegates at its Annual Meeting.
- A current and accurate data clearinghouse of industry information.
- Every Department of Transportation (DOT) or Ministry of Transportation (MOT) as a member.
- Increased financial strength in support of the organization's goals.
- Developed a well articulated public education campaign.
- 20% of its membership from major regions in Asia (i.e., India, China, Japan, etc.) and South America and Europe.

Strategic Long-Range 3 to 5 Year Goals

The following represents IBTTA's goals that encompass its three to five-year direction. These goals are outcome-oriented statements that lead IBTTA towards its envisioned future. These goals are not in any order of priority. All of the goals will need to be accomplished, if IBTTA is to fully achieve its three to five-year quest.

In 2020:

Goal A: Transportation policies will facilitate tolling and other forms of user charging.

Goal B: Continental interoperability of electronic toll collection (ETC) is functionally possible.

Goal C: IBTTA members, stakeholders and nonmembers will find indispensable value in the association's programs, products, services, and meetings.

Goal D: IBTTA will be recognized for having a current and accurate clearinghouse of "key" industry data.

Goal E: IBTTA will be known for having an effective functioning "SWAT" team of tolling experts/champions/advocates/ evangelists to effect positive outcomes in transportation.

LONG-RANGE GOALS & STRATEGIES

Strategies indicate how IBTTA will organize, focus and expend its resources and actions to maximize its effectiveness and efficiency in achieving its three to five year goals. The strategies must be reviewed and updated on an annual basis.

The strategies were rated in importance of when they should be undertaken (implementation timing). The three ratings include:

High: *Work on this strategy must be undertaken in the next program/fiscal year*.

Medium: *Work on this strategy should be undertaken in the next program/fiscal year if at all possible*.

Low: *Work on this strategy can wait until a subsequent program/fiscal year if necessary*.

Indicators of Achievement are used to determine the overall progress toward a goal. They indicate how close IBTTA is to achieving a goal as it executes the individual strategies for each goal. ***They measure goal achievement, not strategy achievement.***

Goal A: Transportation policies will facilitate tolling and other forms of user charging.

Strategies:

A1. (High) Encourage the removal of barriers to tolling.

A2. (High) Develop multi-state educational program pilots to increase the understanding and need for tolling and other forms of user charging to:

- better inform the general public, media, key stakeholders and policy makers.
- establish education programs that define appropriate uses of toll revenue.
- provide outreach to other bodies interested in sustainable and economic growth.
- identify worldwide best practices that encourage information exchange.
- clarify the message

A3. (Medium) Sustainability, economic growth, and environmental concerns – congestion tolling is a tool for these issues

Indicators of Achievement:

An increase in:

⇒ tolling on existing lanes of US Interstate highways

⇒ electronic tolling on-board units

⇒ awareness of real costs of transport infrastructure

⇒ membership and advocacy for tolling solutions

⇒ strategic partnerships that advance tolling solutions for members as well as non-members

⇒ partnerships for economic and mobility enhancements around the world

The existence of:

⇒ specific educational materials for political decision makers, stakeholders, media and the general public.

⇒ Information on user pays principle and cost transparency of transport infrastructure

⇒ Partnerships with tolled as well as non-tolled entities advancing transportation solutions through tolling

⇒ Restrictions lifted on the use of tolling at the federal, state and local levels to address transportation and economic development opportunities

Goal B: Continental interoperability of electronic toll collection (ETC) is functionally possible.

Strategies:

B1. (High) Develop a consensus definition of what interoperability would be from the customers' and operators' perspective, including:

- identifying all the constraints to be overcome.
- dealing with technical issues– standardization.
- Dealing with data exchange issues – availability of a harmonized/standardized data exchange hub as a solution.
- Addressing legal issues.
- working through contractual challenges.
- aligning and consolidating IOP initiatives.
- developing an operating plan for North America IOP solution.

Indicators of Achievement:

An increase in:

⇒ sufficient standards established, for example:

- DSRC communication protocols, and
- License plate standards.
- Data exchange hubs to minimize costs of transmission and data exchange
- Regional solutions that bridge to national interoperability
- Market demand and user support by entities and suppliers for interoperability

The existence of a:

⇒ consensus definition of what IOP should be from membership:

- Single tag for user
- License plate tolling
- Single invoice for the user
- Expansion of regional hubs that can be linked nationally

⇒ Plan for IOP – concept of operations for a uniform North American System and agreement and support from membership.

Goal C: IBTTA members, stakeholders, and nonmembers will find indispensable value in the association's programs, products, services, and meetings.

Strategies:

Meetings/Committees

C1**. (High)** Review and update the meeting schedules (correct days and times) to dramatically reduce meeting schedule conflicts.

C2. **(Medium)** Send marketing/meeting information to other agencies; include session summaries with measurable performance results that can be learned.

Leadership Development

C3**. (Medium)** Develop meetings for all levels, and put in place new leadership development programs for young professionals

C4. Review the Leadership Academy by developing:

- program targets;
- ways to improve the experience;
- ways to make the experience more consistent; and
- A mid-level management academy.
- Web-based learning opportunities from some of the material presented at the leadership academy

Products and Services

C5. **(High**) Develop new products, programs and services that create new sources of net non-dues revenue.

C6. (**High** – 2011) Improve the overall quality of data through standardization (data committee and staff).

C7. (**Medium**) Develop publications that members want and need (survey members on their wants and needs).

C8. (**Medium**) Create a Speakers Bureau.

Indicators of Achievement:

An increase in:

⇒ membership and membership retention.

⇒ non-dues revenue.

⇒ meeting participation.

⇒ paying non-members at meetings and programs.

⇒ attendance and participation of young professionals.

⇒ the level of engagement of governing bodies members (not just at Annual Meeting).

⇒ participation in and consistency of programs at the Leadership Academy.

⇒ hits on IBTTA's website resources.

A decrease in conflicts with competing meetings.

The existence of:

- ⇒ publications used by members (e.g., equal billing to "MUTCD).
- ⇒ improved quality/definitions – "standardize" IBTTA data.
- ⇒ a Speaker Bureau available as a resource.
- ⇒ a high quality Leadership Academy experience.

Goal D: IBTTA will be recognized for having a current and accurate clearinghouse of "key" industry data.

Strategies:

D1. (High) Identify "key" industry data to be compiled and tracked and what will not be tracked.

D2. (Medium) Establish team of staff and member participants to develop strategy for compiling and updating data including frequency, response incentives, etc.

D3. (Medium) Publish stories on how data has been used to positively impact the advancement of worldwide tolling and tolling organizations.

Indicators of Achievement:

An increase in:

- ⇒ public awareness and understanding of the toll industry business
- ⇒ knowledge of key industry data and interpretation of trends and actual developments
- ⇒ Consensus on "key" data is achieved and provided to member organizations
- ⇒ Responses by member organizations to "key" data requests
- ⇒ Use of data to positively impact tolling and tolling organizations
- ⇒ Non-member organizations and outlets are publishing and using "key" data
- ⇒ Hits on data by members and requests from non-members is tracked and increases shown
- ⇒

The existence of a:

- ⇒ Database properly filed and used
- ⇒ Ideal graphical means of presentation and comparison
- ⇒ Expanded use of "key" data by both member and non-member organizations
- ⇒ Increased participation by member organizations to provide and update "key" industry data

Goal E: IBTTA will be known for having an effective functioning "SWAT" team of champions/experts/advocates/evangelists to effect positive outcomes in transportation.

Strategies:

E1. (High) Enlist "SWAT" team members

E2. (High) Develop strategies for communication plan and information to be used by SWAT Team Champions. Keep information updated and available.

E3. (Medium) Build succession planning for new SWAT Team Champions

Indicators of Achievement:

An increase in:

- ⇒ Calls for and opportunities to provide transportation/tolling advocacy
- ⇒ Identified SWAT Team Members
- ⇒ Positive impacts on transportation through SWAT Team efforts
- ⇒ Collaboration with other industry professionals (AASHTO, AMVA, etc.) on SWAT Team efforts

The existence of a:

- ⇒ Broad acceptance and use of the SWAT team
- ⇒ Positive contacts with stakeholders by the SWAT team
- ⇒ Defined number of contacts organized and in the responsibility of the SWAT team
- ⇒ Identified SWAT Team Champions
- ⇒ Information/talking points for use by SWAT Team Champions
- ⇒ Alliances with other industry professionals in combined SWAT Team initiatives
- ⇒ Collaborative calls, webinars, meetings of SWAT Team Members to discuss and refine outreach/evangelism efforts

ASSUMPTIONS ABOUT THE FUTURE

In order to make progress toward an envisioned future, an organization must constantly anticipate the strategic factors likely to affect its ability to succeed and to assess the implications of those factors. This process of building foresight about the future will help IBTTA to constantly recalibrate its view of the relevant future, a basis upon which to update the strategic plan.

These seven assumptions were gleaned from the work done in January and listed on the slides presented at the April 2015 Strategic Planning meeting:

- There will be an increase in IBTTA membership among cities and departments of transportation.
- There will be increased emphasis on transportation solutions that are multimodal.
- There will be an increase in the use and integration of mobile-based technology. Moreover, mobile based technology will lower cost and increase revenue.
- There will be an increase in the movement away from using fossil fuels for transportation.
- There will be an increase in the use of virtual offices and working remotely.
- There will be an increase in the use of tolling to support mobility needs, including HOT lanes, transit and other modes.
- There will be an increase in attention given to mileage based user fees to replace the gas tax.

The items below are additional assumptions highlighted in table discussions at the Strategic Planning meeting in Portland.

- There will be a change in the demographics and needs of our customers.
- There will be increased emphasis on getting more throughput out of existing infrastructure capacity through active traffic management and other means.
- There will be an increase in transportation solutions that are "multi-party," (e.g., DOT with a Metropolitan Planning Organization (MPO) that consists of a toll operator with a customer service center and commercial real estate).
- There will be an increase in the complexity and diversity of parties involved in financing infrastructure projects.
- There will be an increase in the public demanding greater transparency in the allocation of resources for infrastructure funding.
- Connected vehicles may change the way the tolling industry does business, and IBTTA will need to be a participant in this dialogue.
- Autonomous driving.

# # #

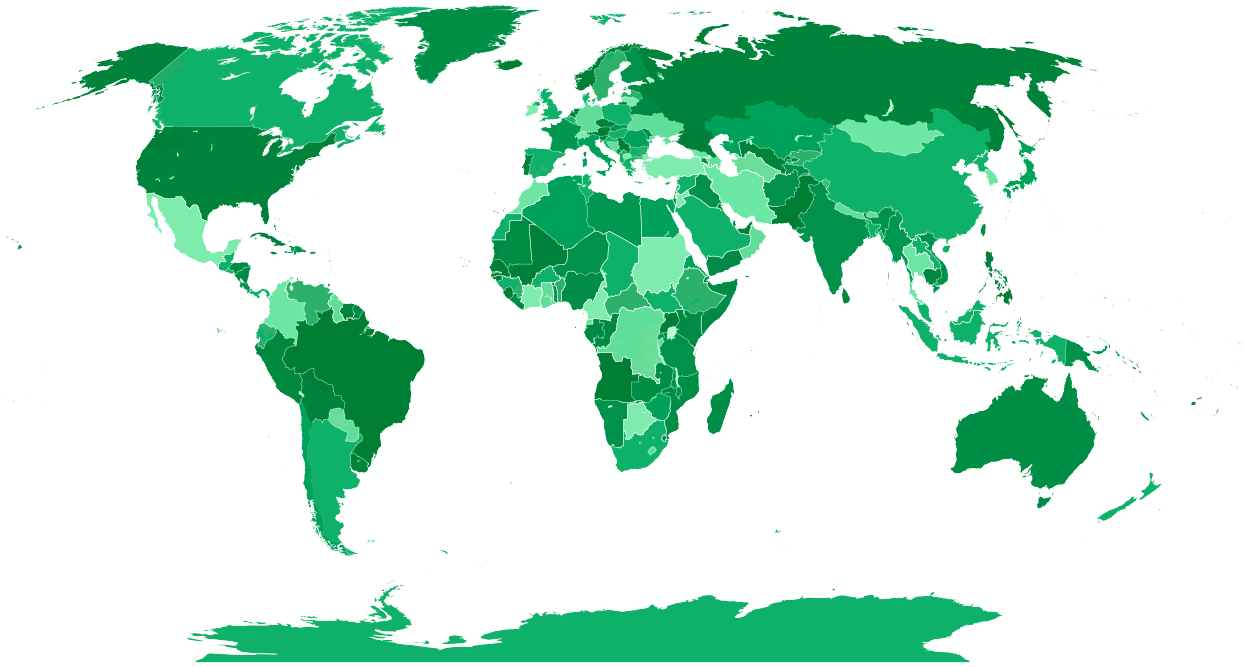
IBTTA

TOLLING. MOVING SMARTER.

GLOBAL TOLLING & MOBILITY NEWSLETTER

A SCAN OF TOLLING & MOBILITY DEVELOPMENT AROUND THE GLOBE

SPRING/SUMMER 2018



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Supported by: Pia Brandstetter, Nika Hayden, René Moser, ASFINAG

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ABOUT IBTTA

The International Bridge, Tunnel and Turnpike Association (IBTTA) is the worldwide association for the owners and operators of toll facilities and the businesses that serve them. Founded in 1932, IBTTA has members in 26 countries on six continents. Through advocacy, thought leadership and education, members are implementing state-of-the-art, innovative user-based transportation financing solutions to address the critical infrastructure challenges of the 21st Century.

INTRODUCTION / EXECUTIVE SUMMARY

In the spring/summer edition of the Tolling & Mobility Newsletter 2018 we will give you an overview of new exciting topics in the fields of Moving Smarter, Tolling and Interoperability, Technology, Finance and Funding as well as Policy and Legislation. The following summary reviews the highlights of Africa, Asia and Oceania, Europe, North and South America.

Moving Smarter: The term and concept of a smart city is in everyone's interest. In Africa, the "smartness" of Lagos is in seeing technology as an enabler for development and Nairobi uses ITS to handle congestion and move smarter. Asia's smart city market is burgeoning and the ambitions for smart city innovations are increasing. In Europe, the Austrian mobility research is heading in the right direction according to the Transport Research Arena 2018 in Vienna. In Barcelona trials for an electric car sharing project are carried out. In North America a Connected Vehicle Platform was set up to operate more efficiently in emergency situations. In South America Airbus and Audi are offering an end-to-end transportation to have a seamless and convenient travel experience and the smart city initiatives are therefore steadily developing.

Tolling and Interoperability: Africa worries about the e-toll collection, because it is a significant risk to the local agency. In Jakarta toll fees are increasing in order to ease traffic congestion and Saudi Arabia plans to toll some parts of the highways. In Europe, Croatia will introduce a new toll collection system, Slovenia has implemented an electronic tolling system called DARSGO and Amsterdam is about to toll the cars in the city center. In North America Kapsch is going to replace the existing roadside tolling equipment and deliver a system to Georgia which enables electronic toll and parking transactions.

Technology: In Africa, a smart mobility system app raises a high funding amount whereas a newly invented speed gadget can tame road carnage. In Dubai, drivers will soon use a digital number plate and in Singapore the electronic road pricing system turned 20. In Europe, Sweden unveils an electrified road to charge the vehicle while driving. In UK the growth of MaaS app is increasing. In North America artificial intelligence solutions should help to reduce delays while the Canadian government is investing in electric vehicles.

Finance and Funding: In Africa, new road projects are acquired as well as carried out and road developments receive funding to improve the transport infrastructure. In Asia, toll road operators are worried about the revamp of toll charges because it would have an impact on concessionaires and on national finances. Whereas in Australia federal funds will help to finance transport infrastructure upgrades. Taking a closer look to Europe, in Slovenia the bidding is strong for the construction of the second Karawanks tunnel tube and in Germany there was a lorry toll increase in 2018. North America continues testing and developing on vehicle-miles traveled fee systems and is also worrying about uncollected tolls and fees. In North America, the funding for an infrastructure project in Puerto Rico has been secured. In South America a time extension for financing a highway project in Paraguay has been requested.

Policy and Legislation: An African organization has to struggle with major internal governance issues whereas the regional manager of SANRAL prefers extending the cooperation with the road industry. In Asia, a successful conclusion of contract for a highway project in India was achieved and a Vietnamese toll road operator requests to raise investments. In Europe a toll dispute was set with the German government and the European Commission published the 3rd mobility package to modernize Europe's transport system. In North America, there are disagreements in raising federal fuel taxes and whether a vehicle mileage tax should be pursed. In South America the Brazilian Federal Government would like to implement road projects, but is facing some setbacks and Colombia has to face the struggle of the complex construction of a dual carriageway.

MOVING SMARTER

AFRICA

SMART LAGOS: STATUS, PROSPECTS AND OPPORTUNITIES

www.howwemadeitinafrica.com/smart-lagos-status-prospects-and-opportunities/

Lagos, the commercial capital of Nigeria, is a source of mixed emotions for its more than 20 million inhabitants. All suffer one grief or another from the city's punishing traffic jams, noise pollution from ubiquitous standby-generators, and so on. The Lagos Development Plan (2012-2025) embodies what the authorities hope to achieve over the next decade. The "smartness" in Lagos Smart City or Lagos, the smart city, is in seeing technology as an enabler for development, whether it is in the provision of infrastructure, security or investment incentives, with the goal being to make Lagos attractive to investors who would then create much needed jobs. There have been some laudable initiatives by the government with regards to transport infrastructure, like the completion of one of the phases of a city railway (albeit not yet operational), reform of the bus mass transit system, expansion and tolling of a key highway in conjunction with the private sector (a first) and so on.

NAIROBI LOOKS TO ITS TO EASE TRAVEL PROBLEMS

www.itsinternational.com/categories/utc/features/nairobi-looks-to-its-to-ease-travel-problems/

Shem Oirere looks at plans to tackle chronic congestion in the Kenyan capital – where commuters can typically expect it to take up to two hours to complete a 15km journey. Traffic jams in the Kenyan capital, Nairobi, are estimated to cost the country $360 million a year in terms of lost man-hours, fuel and pollution. According to Wilfred Oginga, an engineer with the Kenya Urban Roads Authority (KURA), the congestion has been exacerbated by poor regulation and enforcement of traffic rules, the absence of adequate traffic management systems and poor utilization of existing road facilities.

ASIA AND OCEANIA

AMADEUS TAKES AIM AT ASIA'S BURGEONING SMART CITIES MARKET

www.ttgasia.com/2018/05/07/amadeus-takes-aim-at-asias-burgeoning-smart-cities-market/

Asia's Smart Cities market is burgeoning, and Amadeus Asia-Pacific is firing on all cylinders to be the leader in the travel and tourism segment that holds the promise of millions of dollars' worth of contracts. Amadeus identifies at least three Smart Cities projects in Singapore, Thailand's Eastern Economic Corridor and Hong Kong that it wants 'in' and believes two cities in Australia will also soon offer opportunities. In Singapore, it is already in talks with the Economic Development Board, Singapore Tourism Board and Changi International Airport, according to Simon Akeroyd, Amadeus Asia-Pacific's vice president, corporate strategy and business development.

DIDI'S EXPANSION OUT OF CHINA SHOWS AMBITION FOR SMART CITY INNOVATION

http://techwireasia.com/2018/04/didis-expansion-out-of-china-shows-ambition-for-smart-city-innovation/

UBER's rival in China is moving fast. Didi Chuxing, hailed as China's Uber is trying to make a mark in the international market by buying its way around the globe. As it edges Uber off the international market, its sights are set on developing its fleet and technology. With the amount of investment Didi is pouring into various countries worldwide, it could promote smart city development much quicker than anticipated.

EUROPE

TRA 2018: MOBILITY RESEARCH IN AUSTRIA DEFINITELY HEADING IN THE RIGHT DIRECTION

www.traconference.eu/tra-2018-mobility-research-in-austria-definitely-heading-in-the-right-direction/

Transport Research Conference concludes that more cooperation and experience bring trust in new technologies. According to international researchers at the Transport Research Arena (TRA) 2018, which ended mid-April in Vienna, Austria's transport research is well on track and internationally competitive. The high number of national initiatives are viewed very positively, as they bring a great deal of experience and help innovative transport systems to be implemented in the best possible way. Experts see mobility research and development heading generally in the right direction across the EU.

BARCELONA: SEAT TRIALS CAR-SHARING EVS

www.fleeteurope.com/en/smart-mobility/spain/news/seat-trials-car-sharing-evs

In Barcelona, Seat is providing 100 of its Mii citycars (electric version) for a car-sharing project. The cars will be available for use by the 1,000 employees of the Seat Metropolis: Lab and the business network Pier 1, which involved incubators and start-ups. The cars will be reserved via an app that creates a digital 'key' for entry. The range of the Mii is 160 km and it can be recharged by rapid posts in 35 minutes. Seat believes that by 2025 some 36 million people worldwide will be making use of car-sharing services.

NORTH AMERICA

IDEX LAUNCHES CV PLATFORM TO AID EMERGENCY SERVICES

www.itsinternational.com/categories/utc/news/idex-launches-cv-platform-to-aid-emergency-services/

US equipment provider Idex Fire & Safety has launched a connected vehicle platform to help first responders working in fire and emergency medical services carry out safer and more efficient operations. Captium, built on the Microsoft Azure Government cloud platform, is intended to allow responders to share key data via a web and mobile dashboard, offering secure over-the-air updates. Jeff Zook, marketing manager for connected solutions at Idex, says: "Real-time access to the health of networked electrical controllers, multiplexing systems and water flow components can help save valuable time."

FORD'S 'SMART MOBILITY' IS STILL A LONG WAY FROM PROFITABLE

www.forbes.com/sites/greggardner/2018/04/26/fords-smart-mobility-is-still-a-long-way-from-profitable/#3a16e6b2784c

In its first-quarter earnings, Ford Motor reported it lost $102 million during the period on its Smart Mobility segment. During a January presentation to analysts the company said that segment lost about $300 million for all of 2017. This comes as Ford is exiting such unprofitable businesses as small and midsize car production in North America, and reevaluating whether it should remain in South America or Europe. Ford deserves credit for the transparency about its sizable investments in self-driving cars, ride-sharing, shuttle services intelligent highways and multi-mode transportation. Rival General Motors Co. has been perceived as a leader in these areas without sharing the related impact on its bottom line.

SOUTH AMERICA

FROST & SULLIVAN REPORT GLOBAL SMART CITIES TO SURPASS $2 TRILLION BY 2025

www.digitalsignagetoday.com/news/frost-sullivan-report-global-smart-cities-to-surpass-2-trillion-by-2025/

Smart cities are expected to create a market value of more than $2 trillion by 2025, according to a report by Frost & Sullivan. The growth of AI is a key driver of this market. In Latin America, many cities including Mexico City and Buenos Aires are currently developing smart city initiatives. In Brazil, smart city projects will make up almost 20 percent of the $3.2 billion IoT market in the country by 2021, according to the report.

AIRBUS AND AUDI PARTNER ON AIR AND GROUND MOBILITY SERVICES

www.itsinternational.com/sections/transmart/news/airbus-and-audi-partner-on-air-and-ground-mobility-services/

Airbus' on-demand helicopter Voom and Audi vehicles will provide São Paulo and Mexico City with an end-to-end transportation service for air and ground this summer. The companies say they intend to offer users a seamless and convenient travel experience. Voom has already been trialed in São Paulo as part of a strategy to help ease congestion by making helicopter travel more accessible and affordable. The service also became available in Mexico City from March 2018. CityAirbus, an electric vertical take-off and landing vehicle, is scheduled to be operational before the end of the year.

TOLLING AND INTEROPERABILITY

AFRICA

POOR COLLECTION OF E-TOLLS POSING THREAT TO SANRAL'S FUTURE

http://ewn.co.za/2018/04/20/poor-collection-of-e-tolls-posing-threat-to-sanral-s-future-parly-told

The South African National Roads Agency (Sanral) says the poor collection of e-tolls is posing a threat to its future as a going concern. It's told Parliament's Transport Committee that it's awaiting a political directive on what to do about e-tolling. But despite recent indications to that effect, Deputy Transport Minister Sindi Chikunga stopped short of confirming that they will be scrapped. She says that budget cuts to Sanral are a serious concern and that economic growth cannot be expected if roads are not properly maintained. Sanral says that the impasse over e-tolls in Gauteng is posing a significant risk to the agency. Chief executive officer Skhumbuzo Macozoma says an R128 billion in investment has been lost due to resistance to tolls in other provinces.

STAGE SET FOR TOLLING ON MAJOR ROADS

www.businessdailyafrica.com/news/539546-4263196-lllrt9z/index.html

The expected award of a lucrative multi-billion-shilling tender for the construction of the Nairobi-Nakuru-Mau Summit Road, will set the stage for motorists to start paying to stay on the highway. The Sh150 billion contract, which will be awarded in May, will see construction of the 180-kilometer road start in November and run for three years. The plan is to collect funds that will be used to maintain the country's major arteries such as Mombasa-Nairobi highway, the Nairobi Southern by-pass, Thika Super Highway as well as the Nairobi-Nakuru-Mau Summit highway.

ASIA AND OCEANIA

GOVERNMENT TO INTRODUCE PROGRESSIVE TARIFFS FOR TOLL ROADS

www.thejakartapost.com/news/2018/05/11/government-to-introduce-progressive-tariffs-for-toll-roads.html

The government plans to introduce progressive tariffs for toll roads, particularly in Greater Jakarta, in trying to ease traffic congestion. The Greater Jakarta Transportation Management Authority (BPTJ) will also consider applying an electronic road pricing (ERP) mechanism on other roads, according to BPTJ head Bambang Prihartono. With progressive tariffs, drivers will pay higher fees when toll roads are busy and enjoy lower fees when traffic is smooth.

SAUDI ARABIA AIMS TO BUILD BUSES, OPERATE TOLL ROADS: TRANSPORT MINISTER

https://in.reuters.com/article/saudi-economy-transport/saudi-arabia-aims-to-build-buses-operate-toll-roads-transport-minister-idINKBN1I70B6?il=0

Saudi Arabia has held preliminary discussions with foreign firms about manufacturing buses domestically and plans to convert part of its highway system into toll roads to help make its transport system more efficient, the transport minister said.

"We are developing the public transport system with a lot of buses, so we want to see how we can leverage this to develop domestic industry," Nabeel al-Amudi said in an interview on the sidelines of a business conference in Jeddah.

EUROPE

NEW TOLL COLLECTION SYSTEM COMING TO CROATIAN MOTORWAYS

www.total-croatia-news.com/business/27363-changes-coming-for-toll-payments-on-croatian-motorways

Four bidders have sent their offers to prepare a study for the development of an electronic toll collection system. The Ministry of the Sea, Transport and Infrastructure in Croatia has received four bids for its public tender for expression of interest for drafting a study on the development of electronic toll collection system in Croatia, which is part of the project of modernization and restructuring of the road sector.

DARSGO SYSTEM

www.darsgo.si/portal/en/novice#novica

On April 1, 2018, the Republic of Slovenia has implemented the electronic tolling of vehicles whose maximum permissible weight exceeds 3.5 tons. Tolling is made possible with the help of a special DarsGo unit, which is installed in the vehicle. The entire motorway and expressway network with the total length of 618 km is divided into 126 toll sections. Each section hosts a tolling gantry above the motorway, through which a vehicle passes.

AMSTERDAM TO TOLL CARS IN CITY CENTER

https://nltimes.nl/2018/05/03/amsterdam-toll-cars-city-center

The Amsterdam College of mayor and aldermen submitted a proposal to impose a toll on cars in the city center. They believe that making motorists pay to drive through the city center will be an effective measure to reduce traffic in the area, AD reports. This proposal was made based on the results of a large-scale license plate survey on the south and west side of the city center.

NORTH AMERICA

KAPSCH TO UPGRADE MARYLAND'S TOLL COLLECTION EQUIPMENT

www.itsinternational.com/categories/charging-tolling/news/kapsch-to-upgrade-marylands-toll-collection-equipment/

Kapsch TrafficCom will replace all the Maryland Transportation Authority's (MDTA's) roadside tolling equipment. For the upgrade, valued $67m (£47m), Kapsch will utilize radio-frequency identification (RFID) toll readers, automated number plate recognition (ANPR) cameras and scanners in the mixed-mode lanes. The company will also install its stereoscopic vehicle detection and classification sensor (nVDC) in the all-electronic toll lanes.

KAPSCH TO DELIVER CUSTOMER SERVICE SYSTEM IN GEORGIA

www.itsinternational.com/categories/charging-tolling/news/kapsch-to-deliver-customer-service-system-in-georgia/

Kapsch TrafficCom's Customer Service System (CSS) will be used by the Georgia State Road and Tollway Authority (SRTA) to process electronic toll and parking transactions. The modular product is also intended to provide an interoperability platform for future multi-modal service invoicing. The back-office solution will be deployed with the intention of allowing SRTA to offer drivers a seamless experience by processing transactions for all of its toll facilities as well as support partner facilities within a single user account.

TECHNOLOGY

AFRICA

EGYPT-BASED SMART MOBILITY APP RAISES $8 MILLION IN FUNDING

www.forbesmiddleeast.com/en/egypt-based-swvl-raises-8-million-in-series-a-funding/

Swvl, the Egyptian app-based mass transit system, announced an $8 million Series A that was led by regional venture fund BECO Capital, Africa-based investor DiGAME and global VC fund Silicon Badia. Other VC firms Raed Ventures, Arzan VC, Oman Technology Fund, and chairman of EDventure Holdings Esther Dyson, also participated in the round. The round comes as both primary and secondary. "The $8 million round is the biggest round of funding for a tech start up in Egypt and one of the biggest rounds in the Middle East," said Mostafa Kandil, co-founder and CEO of Swvl. With the funding, Swvl will solidify its position in Egypt and establish the company as a global leader in the affordable smart mobility space, offering fixed routes for a fixed flat fare at prices that are up to 80 percent cheaper than on-demand ride-hailing services.

OUR SPEED GADGET CAN TAME ROAD CARNAGE

www.businessdailyafrica.com/corporate/tech/Our-speed-gadget-can-tame-road-carnage/4258474-4541252-13noerfz/index.html

Two young men in Nyeri County have devised a speed monitoring device that they say will help cut road accidents as it cautions drivers against hazards on the highway. Colin Mundia and Patrick Mukunga have designed a system dubbed "Speed Master" that will primarily monitor vehicle's location and determine the speed limit applicable in that particular area. A breach of speed limit will see the system alert the authorities and fine the offender instantly.

ASIA AND OCEANIA

DUBAI TO LAUNCH DIGITAL VEHICLE NUMBER PLATES

www.bbc.com/news/world-middle-east-43710817

Drivers in Dubai may soon be using digital number plates under new plans. In a trial starting next month, vehicles will be fitted with smart plates with digital screens, GPS and transmitters. The new plates will be able to inform emergency services if a driver has an accident. Dubai has recently spearheaded a number of new transport initiatives as it seeks to become an international technology hub.

ELECTRONIC ROAD PRICING TURNED 20 IN APRIL: NOTABLE MILESTONES OVER THE YEARS

www.straitstimes.com/singapore/transport/electronic-road-pricing-turns-20-in-april-notable-milestones-over-the-years

Singapore's Electronic Road Pricing (ERP) – touted as the world's first electronic toll system of its kind – turned 20 this in April. While most drivers believe that the ERP has influenced their travel patterns significantly, going by a recent poll by The Straits Times and the Automobile Association of Singapore, many remain skeptical about its effectiveness in controlling congestion. Since it was implemented here in 1998, other countries have gone on to adopt similar systems. Recently, Jakarta said it is aiming to introduce ERP in 2019.

EUROPE

SWEDEN UNVEILS ELECTRIFIED ROAD TO CHARGE VEHICLES WHILE DRIVING

www.itsinternational.com/sections/general/news/sweden-unveils-electrified-road-to-charge-vehicles-while-driving/

Swedish minister for infrastructure Tomas Eneroth and director general of the Swedish transport administration Lena Erixon attended the inauguration of an electrified road outside of Stockholm, on April 11th. The eRoadArlanda will aim to enable commercial and passenger vehicles to be recharged to help make fossil-free transportation a reality. Around 2km of electric rail has been installed along public road 893 between the Arlanda Cargo Terminal and the Rosersberg logistics area. The solution transfers energy to the vehicle from a rail in the road through a moveable arm. Electric trucks will use the road.

MAAS APP WHIM 'TO COVER 60 COUNTRIES IN NEXT FIVE YEARS'

www.itsinternational.com/sections/transmart/news/maas-app-whim-to-cover-60-countries-in-next-five-years/

Whim, the Mobility-as-a-Service (MaaS) app which gives users access to transport packages on a pay-as-you-go or monthly subscription basis, has announced ambitious growth plans. "Within the next five years, we want to cover 60 countries," Whim co-founder Kaj Pyyhtia told ITS International. At present Whim, which is owned by MaaS Global, is available in just two countries but Pyyhtia insists the target is achievable. The service was launched in Birmingham, UK, last week, to cover the West Midlands region, and has been running for two years in Helsinki, Finland. It is due to launch in Antwerp, Belgium, covering the Flanders area, shortly.

NORTH AMERICA

OPTIBUS LAUNCHES AI SOLUTION TO HELP TRANSIT OPERATORS REDUCE SERVICE DELAYS

www.itsinternational.com/categories/utc/news/optibus-launches-ai-solution-to-help-transit-operators-reduce-service-delays/

Technology company Optibus has launched its artificial intelligence optimization solution to help transit operators reduce delays and provide an improved service for passengers. Called On Time, the platform's proprietary algorithms analyze

data created during daily transit operations and help transit operators determine issues that impact a timely service – such as rush hour traffic, driver behavior and vehicle type. The system collects and analyses historical operational data from GPS systems and other external sources to detect potential delays and present alternative scenarios for scheduling changes and vehicle resource allocation. In addition, the company says the platform identifies the cost implications of these changes and creates a cost effective and punctual transit plan.

CANADIAN GOVERNMENT INVESTS IN ELECTRIC BUS INFRASTRUCTURE

www.itsinternational.com/sections/transmart/news/canadian-government-invests-in-electric-bus-infrastructure/

The government of Canada will invest CAN$1.2m into the South Coast British Columbia Transportation Authority's (TransLink's) demonstration project to install overhead charging stations for electric buses in Vancouver. The funding follows a commitment to support initiatives that provide citizens with more options for environmentally friendly driving.

FINANCE AND FUNDING

AFRICA

LINKING KENYA AND UGANDA WITH A NEW ROAD PROJECT

www.worldhighways.com/categories/road-highway-structures/features/linking-kenya-and-uganda-with-a-new-road-project/

Rainfall patterns and type of soil in an agricultural rich area shared by the neighboring East African countries of Kenya and Uganda was a key consideration in arriving at the decision to upgrade to bitumen standards 73km of the 118km Kapchorwa-Kitale road that links the two countries. […] The Ugandan Government sought parliament's approval of a US$105.7 million loan from the African Development Bank (AfDB) for the road project.

MOZAMBIQUE ROAD DEVELOPMENT RECEIVES FUNDING

www.worldhighways.com/categories/auctions-equipment-supply-servicing-finance/news/mozambique-road-development-receives-funding/

Financing worth US$150 million is being provided by the World Bank, which will be used to help pay for road development work in Mozambique. The funding will be aimed at upgrades to roads in Mozambique's Nampula and Zambezia Provinces. One of the key upgrades will be to a 70km section of the road connecting Namacurra with Quelimane. The aim of the work is to improve transport for the agricultural sector in the respective provinces.

ASIA AND OCEANIA

TOLL ROAD OPERATORS FALL ON WORRIES ABOUT REVAMP

www.thestar.com.my/business/business-news/2018/05/18/toll-road-operators-fall-on-worries-about-revamp/

KUALA LUMPUR: Share prices of toll road operators fell on investors' worries about a revamp in the toll structure by the new Federal Government. […] StarBiz reported that changes to toll charges on expressways would impact concessionaires and the national finances. While it remains unclear whether the new administration plans to remove toll charges entirely, ending tolls in stages or to pursue a toll rate restructuring will have some impact on concessionaires, bond holders and the government's own purse strings.

AUSTRALIAN STATES RECEIVING FEDERAL FUNDING FOR TRANSPORT

www.worldhighways.com/categories/auctions-equipment-supply-servicing-finance/news/australian-states-receiving-federal-funding-for-transport/

Federal funds will help finance transport infrastructure upgrades in the Australian states of Victoria, Tasmania and South Australia. Road and rail projects will be carried out in all three states, with the road works intended to cut congestion and improve journey times. Victoria State is planning a transport budget of US$5.88 billion (A$7.8 billion), with key projects including $1.32 billion for the North East Link Road and widening a stretch of the Princes Highway between Traralgon and Sale for $99.5 million.

EUROPE

BIDDING STRONG FOR SLOVENIA TUNNEL PROJECT

www.worldhighways.com/categories/road-highway-structures/news/bidding-strong-for-slovenia-tunnel-project/

Bidding is strong for a project to build the new Karavanke tunnel in Slovenia, with the award due soon and construction expected to commence in 2018. So far nine bids have been received for the link, which lies close to Slovenia's border with Austria. A bid of €89.3 million has been made by the Turkish contractor Cengiz Insaat, while at the other end of the scale a bid of €140 million has come from a partnership of Slovenian firm Pomgrad and Swiss company Marti. A partnership comprising Implenia Österreich, Implenia Switzerland and Slovenian firm CGP Novo Mesto has bid of €114.8 million, while a partnership between Slovenian company Gorenjska Gradbena Družba and Czech contractor Metrostav bid of €104.4 million.

GERMANY EXPECTS BIG INCREASE IN REVENUES FROM TRUCK TOLLS

https://uk.reuters.com/article/germany-transport/germany-expects-big-increase-in-revenues-from-truck-tolls-idUKL8N1RU61T

Germany expects sharply higher revenues from lorry tolls in 2018 after charges were expanded to all 40,000 km of federal roads this year in line with EU guidelines, Transport Minister Andreas Scheuer said on Tuesday. […] the ministry was projecting around 7.2 billion euros in annual revenues from the truck toll in coming years, meaning it now expects to collect 36 billion euros in all by the end of 2022 for road construction and maintenance.

NORTH AMERICA

MILEAGE-BASED USER FEES CAN REPLACE GAS TAXES, EVENTUALLY

https://reason.org/commentary/mileage-based-user-fees-can-replace-gas-taxes-eventually/

States need to continue testing and developing vehicle-miles traveled fee systems. A mileage-based user fee may be more effective than a gas tax increase, write Rebeca Castaneda and Baruch Feigenbaum of the Reason Foundation. A 2017 study of a pilot mileage-based fee in Oregon found that "the system works" and pointed out areas for improvement, such as distinguishing between public and private roads.

OUT-OF-STATE DRIVERS OWE MASSDOT $15 MILLION IN MA TURNPIKE TOLLS UNDER GANTRY SYSTEM

www.masslive.com/politics/index.ssf/2018/04/out-of-state_drivers_owe_massd.html

Out-of-state drivers traveling along the Massachusetts Turnpike without E-ZPass transponders owe the state more than $15 million in uncollected tolls and fees – payments the Massachusetts Department of Transportation is largely unable

to collect. MassDOT reported that more than two million out-of-state drivers had traveled on Interstate 90 without transponders under the new system, which replaced toll plazas with scanners mounted atop gantries.

PUERTO RICO INFRASTRUCTURE REBUILD BUDGET SECURED

www.worldhighways.com/categories/auctions-equipment-supply-servicing-finance/news/puerto-rico-infrastructure-rebuild-budget-secured/

Funding for major infrastructure rebuilding work in Puerto Rico has now been secured. The US Federal Emergency Management Agency (FEMA) has provided a budget of US$135 million, which will be used to repair roads and bridges in Puerto Rico that were damaged by hurricane Maria. This budget should be sufficient to pay for 90 percent of the work needed. However, the source of the remaining 10 percent of the infrastructure repair budget has yet to be announced.

SOUTH AMERICA

TIME EXTENSION FOR PARAGUAY PROJECT FINANCING

www.worldhighways.com/categories/auctions-equipment-supply-servicing-finance/news/time-extension-for-paraguay-project-financing/

A time extension has been offered to the consortium that will build Paraguay's Ruta 2 and Ruta 7 highway projects. This extended period has been authorized by Paraguay's Ministry of Public Works and Communications (MOPC). The highway contract is being handled by the Rutas del Este consortium, which is made up of the contractors Mota Engil, Ocho A and Sacyr. Originally the financing package for the highway deal was to have been in place by April 14, 2018. However, the consortium's deadline for the PPP project has now been extended to October 2018. The contract involves building 149km of highway and is expected to cost US$527 million. The consortium has been handling negotiations over loans for the project, with the Inter-American Development Bank (IADB) being involved as one of the potential backers.

POLICY AND LEGISLATION

AFRICA

OUTA GOVERNANCE IS 'OUT OF LINE'

https://mg.co.za/article/2018-04-26-00-outa-governance-is-out-of-line

The Organization Undoing Tax Abuse (Outa), a champion of good governance at state bodies, has itself experienced major internal governance issues, according to documents obtained by the Mail & Guardian. In the past 18 months, Outa has seen the exit of five directors and a chief operating officer. Four of the directors and the chief operating officer left Outa within a year of joining. Originally called the Opposition to Urban Tolling Alliance, Outa challenged the e-tolls system implemented by the South African National Road Agency Limited (Sanral) in Gauteng.

NEW REGIONAL MANAGER WANTS TO EXTEND SANRAL'S COOPERATION WITH ROADS INDUSTRY

http://pressoffice.mg.co.za/SANRAL/PressRelease.php?StoryID=282735

Sanral intends to extend its consultation and communication with industry players in the built and engineering environments to ensure a greater understanding of its strategic objectives. […] Sanral has adopted a new long-term strategy, Horizon 2030, to redefine its objectives at the start of its third decade as the agency responsible for the design and management of South Africa's primary road network.

ASIA AND OCEANIA

ADANI-LED CONSORTIUM WINS CHHATTISGARH HIGHWAY PROJECT

www.worldhighways.com/categories/auctions-equipment-supply-servicing-finance/news/adani-led-consortium-wins-chhattisgarh-highway-project/

A consortium led by Adani Enterprises has won a US$175 million highway contract in Chhattisgarh from the National Highways Authority of India. Work in Chhattisgarh, one of India's 29 states, will be done under a 15-year Hybrid Annuity Model and take nearly two years. Chhattisgarh is heavily forested with many rivers and dramatic waterfalls, making it one of India's major supplier of hydro-electricity. The deal is the Adani Group's first project in transport infrastructure, according to a report by India's Business Standard newspaper.

VIETNAM TOLL ROAD OPERATOR WANTS METRO PACIFIC TO RAISE INVESTMENT

http://thestandard.com.ph/business/corporate/264979/vietnam-toll-road-operator-wants-metro-pacific-to-raise-investment.html

Vietnam toll road operator CII Bridges and Roads Investment Joint Stock Co. is seeking additional capital from Filipino investor Metro Pacific Tollways Corp. Pham The Chinh, general director of Ho Chi Minh City-based CII B&R, said his company would ask MPTC to invest an additional $50 million to fund Ha Noi Highway Expansion BOT project and Binh Trieu 2 Bridge (Part 2–Phase 2) BOT project.

EUROPE

TELEKOM, DAIMLER SETTLE TRUCK TOLL DISPUTE WITH GERMAN GOVERNMENT

www.reuters.com/article/us-germany-transportation-toll-collect/telekom-daimler-settle-truck-toll-dispute-with-german-government-idUSKCN1IH2MH

A consortium that owns motorway truck toll company Toll Collect has agreed to pay the German government 3.2 billion euros ($3.8 billion) to settle a dispute over the late introduction of the system, Deutsche Telekom and Daimler said. The deal was first reported by German business newspaper Handelsblatt, which quoted government sources.

The government in 2004 sought damages from Toll Collect – which is 45 percent-owned by German carmaker Daimler, 45 percent by Deutsche Telekom and 10 percent by Vinci unit Cofiroute – over delays to the introduction of the world's first satellite-based truck toll system.

EUROPE ON THE MOVE: COMMISSION COMPLETES ITS AGENDA FOR SAFE, CLEAN AND CONNECTED MOBILITY

http://europa.eu/rapid/press-release_IP-18-3708_en.htm

The Juncker Commission is undertaking the third and final set of actions to modernize Europe's transport system. […] The objective is to allow all Europeans to benefit from safer traffic, less polluting vehicles and more advanced technological solutions, while supporting the competitiveness of the EU industry. To this end, today's initiatives include an integrated policy for the future of road safety with measures for vehicles and infrastructure safety; the first ever CO2 standards for heavy-duty vehicles; a strategic Action Plan for the development and manufacturing of batteries in Europe and a forward-looking strategy on connected and automated mobility. With this third 'Europe on the Move', the Commission is completing its ambitious agenda for the modernization of mobility.

NORTH AMERICA

COMMERCE SECRETARY WILBUR ROSS SAYS TRUMP IS CONSIDERING RAISING GAS TAXES

www.cnbc.com/2018/02/22/trump-is-open-to-raising-gas-taxes-says-commerce-sec-wilbur-ross.html

U.S. Commerce Secretary Wilbur Ross on Thursday confirmed that President Donald Trump is open to raising federal fuel taxes, saying it's logical to charge drivers for road improvements. Three years ago, Ross denounced calls to raise the gas tax, saying it would hurt the middle class. But he is now part of an administration faced with the challenge of funding its $1.5 trillion infrastructure plan.

LAWMAKERS SHOULD PURSUE VEHICLE MILEAGE TAX TO SAVE HIGHWAY TRUST FUND: STUDY

http://thehill.com/policy/transportation/infrastructure/384680-lawmakers-should-pursue-vehicle-mileage-tax-to-save

Lawmakers should pursue a vehicle-mileage tax to rescue the struggling Highway Trust Fund, a right-leaning think tank argues in a new study. The American Action Forum (AAF) makes the case for a mileage-based tax and provides other suggestions for a long-term fix to the ailing fund, which pays for road projects and is headed for another shortfall at the end of 2020. “A mileage-based tax is a more stable alternative to the gas tax. Immediate implementation of a federal mileage-based tax, however, is unrealistic,” the study says.

SOUTH AMERICA

BRAZIL ROAD CONCESSIONS FACE TENDER PROBLEMS

www.worldhighways.com/categories/auctions-equipment-supply-servicing-finance/news/brazil-road-concessions-face-tender-problems/

Brazil’s Federal Government is keen to open a series of road projects to tenders but is facing several setbacks. However, the country’s state governments are now pushing ahead with projects instead. Around US$4.38 billion worth of road concessions are planned by state governments, for some 5,000km of routes in all. These would include road upgrade and maintenance works, with concessions of up to 30 years.

COMPLEX COLOMBIA CAPITAL CONTRACT CONSIDERED

www.worldhighways.com/categories/road-highway-structures/news/complex-colombia-capital-contract-considered/

A complex construction contract is being considered for Colombia’s capital, Bogota. Work is expected to commence for the Avenida Longitudinal de Occidente (ALO) south road project in 2019. This 24km dual carriageway link will be complex to construct as it will feature 46 bridges, as well as two intersections. Construction work is expected to cost in the region of US$336 million.

INTERNATIONAL INDUSTRY EVENTS CALENDAR

2018

IBTTA 2019 Conference Planning Ideas Roundtable
Portland, Oregon, USA, July 22, 2018
www.IBTTA.org

IBTTA Summit on Finance & Policy
Portland, Oregon, USA, July 22-24, 2018
www.IBTTA.org/portland

IBTTA Global Tolling Summit
Salzburg, Austria, September 5-7, 2018
www.IBTTA.org/salzburg

25th World Congress on ITS
Copenhagen, Denmark, September 17-21, 2018
www.itsworldcongress.com

IBTTA Board of Directors & Committee Meetings
Baltimore, Maryland, USA, October 12-14, 2018
www.IBTTA.org

IBTTA 86th Annual Meeting & Exhibition
Baltimore, Maryland, USA, October 14-16, 2018
www.IBTTA.org/baltimore

2019

IBTTA AET, Managed Lanes & Technology Summit
Orlando, Florida, USA, March 31 – April 2, 2019
www.IBTTA.org/orlando

IBTTA 87th Annual Meeting & Exhibition
Halifax, Nova Scotia, Canada, September 15-17, 2019
www.IBTTA.org/halifax

IBTTA Global Summit of Portugal
Lisbon, Portugal, October 27-29, 2019
www.IBTTA.org/lisbon

GLOSSARY

AA	Automobile Association
ABB	Asea Brown Boveri
ADB	Asian Development Bank
AET	All-Electronic Toll
AfDB	African Development Bank
AAF	American Action Forum
AG	Stock company
AI	Artificial Intelligence
ALPR	Automatic License Plate Recognition
ALO	Avenida Longitudinal de Occidente
ANPR	Automated Number Plate Recognition
ARRB	Australian Road Research Group
ASECAP	Association euro penne des concessionnaires d'autoroutes et d'ouvrages à péage – European Association of Operators of Toll Road Infrastructures
AV	Autonomous Vehicle
AVI	Automatic Vehicle Identification
BOOT	Build-Own-Operate-Transfer
BOT	Build-Operate-Transfer
BPTJ	Greater Jakarta Transportation Management Authority
CABEI	Central American Bank for Economic Integration
CAGR	Compound Annual Growth Rate
CAV	Connected and Autonomous Vehicle
CCCC	China Communications Construction Company
CCR SA	Companhia de Concessões Rodoviárias
CCTV	Closed Circuit Control Center
CEO	Chief Executive Officer
C-ITS	Cooperative Intelligent Transportation Systems
CO2	Carbon Dioxide
COP	Climate Change Summit
CRBC	China Roads and Bridges Company
CRT	Concessionária Rio Teresópolis
CSIR	Council of Scientific and Industrial Research
CSS	Customer Service System

CTR	Austin's Center for Transportation Research
DC	District of Columbia
DDI	Diverging Diamond Interchange
DG Environment	Directorate-General for Environment
DG MOVE	European Commission's Directorate-General for Mobility and Transport
DOT	Department of Transportation
DPR	Detailed Project Report
DRC	Democratic Republic of Congo
DSRC	Dedicated Short-Range Communication
EBRD	European Bank for Reconstruction and Development
EC	European Commission
ECERDC	East Coast Economic Region Development Council
EETS	European Electronic Toll Service
EGNOS	European Geostationary Navigation Overlay System
EIB	European Investment Bank
EP	European Parliament
EPC	Engineering, Procurement and Construction
ERF	European Union Road Federation
ERP	Electronic Road Pricing
ETC	Electronic Toll Collection
EU	European Union
EV	Electronic Vehicles
FEMA	Federal Emergency Management Agency
FETC	Far East Electronic Toll Collection Company
FHWA	Federal Highway Administration
FIA	Federation Internationale de l'Automobile
GALILEO	European satellite navigation system
GDOT	Georgia Department of Transportation
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
HMI	Human Machine Interface
HOT	High Occupancy Toll
HOV lane	High Occupancy Vehicle lane
IADB	Inter-American Development Bank

IBTTA	International Bridge, Tunnel and Turnpike Association
IEC	International Electro Technical Commission
IIRSA	Initiative for the Integration of the Regional Infrastructure of South America
INEA	Innovation and Networks Executive Agency
IoT	Internet of Things
ISO	International Organization for Standardization
ITC	International Trade Commission
ITF	International Transport Forum
ITS	Intelligent Traffic System
ITSSA	Intelligent Transport Society of South Africa
JLR	Jaguar Land Rover
KFD	National Road Fund
KPC	Kuantan Port City
KURA	Kenya Urban Roads Authority
LTA	La Trobe Autonobus
MaaS	Mobility-as-as-Service
MdTA	Maryland Transportation Authority
MOPC	Ministry of Public Works Commission
MOT	Ministry of Transport
NHAI	National Highways Authority of India
NPRA	Norwegian Public Roads Administration
NTE	North Tarrant Express
nVDC	Vehicle Detection and Classification Sensor
OBE/OBU	On Board Equipment/On Board Unit
OCTA	Orange County Transportation Authority
OECD	Organization for Economic Cooperation and Development
ORT	Open Road Tolling
OUTA	Organization Undoing Tax Abuse
PANYNJ	The Port Authority of New York & New Jersey
PIARC	Association Mondale de la Route – World Road Association
PKM	Peshawar-Karachi Motorway
PPP	Public-Private Partnership
RACV	Royal Automobile Club of Victoria
RFID	Radio Frequency Identification

RIA	Road Infrastructure Agency
RIDOT	Rhode Island Department of Transportation
RMS	Roads and Maritime Services
RSU	Road Site Units
SANRAL	South African National Roads Agency Ltd.
SCDOT	South Carolina Department of Transportation
SRTA	State Road and Tollway Authority
SUMP	Sustainable Urban Mobility Planning
SwRI	Southwest Research Institute
TCC	Traffic Control Center
TEN-T	Trans-European Transport Network
TMETC	Tata Motors European Technical Center
TMT	Technology, Media and Telecommunications
TRA	Transport Research Arena
TRB	Transportation Research Board
TRY	Turkish Lira
TTI	Texas A&M Transportation Institute
TxDOT	Texas Department of Transportation
UAS	Unmanned Aerial Systems
UHF	Ultra-High-Frequency
UK	United Kingdom
UN	United Nations
UNECE	Economic Commission of the United Nations for Europe
US	United States of America
V2I	Vehicle-to-Infrastructure
V2V	Vehicle-to-Vehicle
V2X	Vehicle-to-Everything
VAT	Value Added Tax
VW	Volkswagen
WHSD	Western High-Speed Diameter
WIM	Weigh In Motion

IBTTA EXECUTIVE COMMITTEE

Agenda
Friday, June 22, 2018
8:30am – 11:30am
Harrisburg, Pennsylvania

1. Call to Order
2. Board Topics
3. Rationale for Three-Year Planning Forecast
4. CASE Discussion
5. Procurement
6. Future President's Book
7. European ITS Platform Forum
8. Peer Exchange Program
9. Platinum Sponsor Advisory Council
10. IBTTA Foundation
11. April Financials
12. Other Business
13. Adjourn

IBTTA Foundation Board
Agenda
Friday, June 22, 2018
3:00pm to 4:00pm
Harrisburg, PA

1. Call to Order
2. Chairman Remarks and Welcome to New Board Members
3. Approval of Minutes
4. Report on Veterans Activities
5. Report on Service Project
6. Report on Budget and Golf Fundraising Event
7. Report on Scholarship Program
8. Report on Silent Auction
9. Other Business
10. Adjourn

IBTTA Foundation Board of Directors
March 12, 2018 | 11:00am – 12:00pm EST
Conference Call Minutes

Attendees:
Phil Miller, Chair
Lauren Hakos
Mike Heiligenstein
Christine Keville
John McCuskey
Rosa Rountree
Lisa Thompson
PJ Wilkins
Kary Witt

Staff:
Pat Jones
Wanda Klayman

1. **Call to Order**. The meeting was called to order at 11:00am EST by Phil Miller, Chair. See attendees above.
2. **Approval of Minutes**. Pat Jones gave the summary below of the last meeting. He will commit these minutes to writing prior to the next Foundation Board meeting.
   a) Board expansion was discussed — decision made to expand the board to 15 people and to develop a process for nominating and deciding on new members. Marcelle Jones will chair the group.
   b) Appointed a group to develop policies (Christine, Kevin & Lisa) and bylaws to be sure we're in compliance.
   c) Kary Witt presented the 2018 Foundation budget which was approved by the Board.
   d) John McCuskey discussed his service as the Chair and turned over the reins to Phil Miller for 2018.
   e) Pat gave report on scholarship fund.

3. **Chairman's Report** (Phil Miller)
   a) Reviewed his experience at the closing dinner with the 2018 Leadership Academy. He enjoyed the group, was pleased to be in attendance and thought they were very enthusiastic, etc.
   b) Future meetings: Recommended having a brief board meeting in early to mid-May timeframe to elect nominees to the three additional board seats. He would like to hold

an in-person board meeting in conjunction with Annual Meeting in Baltimore. Leaving it open re: summer meeting. A call will also take place at the end of year in Nov/Dec to review 2019 proposals and "re-enlistment" for people whose terms are expiring.

c) He raised the idea of developing a strategy and/or mission statement to determine role of the Foundation. No items at this point but is soliciting comments/ideas from other foundations or ideas from the group.

d) Kary Witt suggested possibly doing a face-to-face meeting in Harrisburg in conjunction with the spring Board meeting. Staff will follow-up with Phil re: timing.

4. **CEO Report** (Pat Jones)

a) Pat reported that the 2018 Leadership Academy was a great class – they were fired up, very excited to be there and got a lot out of the proceedings. He mentioned that Phil attended and gave a very inspiring talk Thursday evening which the class appreciated.

b) Scholarship America group is monitoring and accepting applications for people interested in the scholarship program. A small report is in the Board briefing packet. He reported that IBTTA is aggressively promoting the program on social media and through all IBTTA channels. Last year's scholarship recipients are both promoting to their colleagues.

c) Rene Moser who is leading the research effort had a skiing accident is out of commission. Pat would like to re-engage in the effort and perhaps wrap the research effort around the Government Affairs Committee's discussion of public affairs and advocacy.

d) John McCuskey — Miranda Simon has accepted an engineering position in Minneapolis.

e) Kary Witt suggested getting testimonials from Andrew and Miranda, last year's winners. He also suggested that the Board reach out to their academic contacts and send a notice to the Deans or others that may be able to reach potential candidates.
ACTION ITEM: Kary asked Pat to send a promo blurb to everyone that they can use for their outreach effort. Pat agreed and sent it on March 12.

5. Committee Reports

a) <u>Budget</u> (Kary Witt). Kary reported that the financial reporting is quarterly and since we haven't ended Q1, there is no quarterly report yet. In early to mid-April, we'll have the report that he'll circulate to the committee with flags on any items that need review. All revenues and expenses so far this year have been related to the Leadership Academy and are within the adopted budget. Phil asked if Kary was aware of whether we've spent too much on the golf tournament? Wanda responded that we are at break-even and that our expenses are on par with the 2018 budget. At this point, she asked for help from the group in promotion of the golf outing to meet our revenue goals.

b) <u>Fundraising</u> (Lisa Thompson). Lisa reiterated the fact that we need help with the Golf Tournament, especially since it's one of the larger sources of operating revenue for the

Foundation. "If anyone on the phone can help, that'd be great." She also recommended an "electronic thermometer" be added to the website since we can now accept credit cards for individual donations. She also expressed the idea of raising enough money to eventually offer a 3rd scholarship down the road which the group may want to designate to a veteran or other groups.

c) Leadership Academy (Lauren Hakos). Lauren reported that she too heard great things about the 2018 Academy. The Academy alumni group is working on a number of initiatives including: 1) assembling a speakers bureau - Martin Tyson, Tim Morrison and Lauren are all reaching out to alumni to start to build this list which should be very useful for Chief Meeting Organizers (CMOs) and team leaders building programs. 2) Lauren would like to emulate the 2017 alumni leadership workshop at the annual meeting. Turnout was less than planned in Atlanta, but it was still very successful. She'd like to revisit the idea for Baltimore. She was excited about the green graduation caps icon (designating a person as a Leadership Academy graduate) next to the name of speakers in the AET program.

d) Service Project (PJ Wilkins). PJ report that the service project will take place on Sunday, June 24th from 8am-4pm in conjunction with the Maintenance Workshop in Harrisburg, PA. The project will be at Milk and Honey farms in conjunction with the Central PA food bank. Milk and Honey Farms provides food support for many groups including military veterans and their families. The planning team is headed to the site on March 19th to scope the projects and cost associated with completing any projects that we agree to. PJ mentioned that he was very supportive of this project and asked the group to get involved with fundraising and promotion.

e) Veterans Initiative (Rosa Rountree). Rosa is waiting for the next meeting to be scheduled since there's a lot going on with the Veterans Committee. So far, they've reviewed their charter and assigned people to lead different efforts. They'd like to have a military leader for 2019 Leadership Academy class. The offer was made for 2018 but it was too late. Intent is to show to members of the Academy class the value that military leaders and veterans bring. The group is also working on the employment initiatives and trying to determine how IBTTA and its members can be recognized as a top 25 group that hires veterans as part of their employment campaigns. The group has taken two paths – civilian and military. Lots of legwork has been done already and Ron Fagan has done a remarkable job culling through everything in the marketplace. Mark Toal from the Department of Labor may be able to come and speak to us. Rosa would like to have either Mark or another person speak at the AET Workshop. Mark is conducting a webinar for the committee, so they can understand what's happening with veterans moving into civilian jobs. As for the military track, the group is looking at veterans'

programs, some of which extend to hiring spouses. Rosa is also moving forward with helping with the service project and has already reached out to groups in Harrisburg.

f) Board Expansion (Christine Keville). Christine Keville reported on the work of the Board Expansion Committee chaired by Marcelle Jones and the development of the selection process led by Christine Kelville and Lisa Thompson. **There was a motion and second to approve the Foundation Board Nomination and Election Process. The motion PASSED**.

6. Other business

No additional business was raised.

7. Adjourn

The meeting was adjourned at 11:57am.

Respectfully submitted,

Patrick D. Jones
Executive Director & CEO, IBTTA
Secretary, IBTTA Foundation

Attachments
Nomination Process Report
Resolution on Nomination and Election Process
Veterans Committee

IBTTA FOUNDATION NOMINATION PROCESS
Report and Recommendations
February 2018

IBTTA Foundation Board Chair, Phil Miller, appointed a committee of the Foundation Board to review the nomination process and update where needed. The committee consists of Christine Keville, as chair; Lisa Thompson, Marcelle Jones, and Kevin Hoeflich.

The committee received a copy of the Board Bylaws for review and list of current members and their respective terms. The committee met via conference call on February 6, 2018 to discuss formalizing the process associated with nominations and appointment/election to the Foundation Board:

1. **Nomination Form:** While the Foundation Board did have a form for persons interested in serving on the board, it has been updated. Please see attached. The new form will ask a series of brief but informational questions to determine capability and interest.
2. **Nomination/Appointment Committee:** After discussion with the committee, it was determined that to formalize the process and ensure fairness/diversity in selection, a Nominating/Appointment Committee would be formed. The members of committee were selected by Foundation Chair Phil Miller, in consultation with IBTTA Board President Tim Stewart. Members of the committee shall be Christine Keville (Chair), Phil Miller, Kary Witt, Marcelle Jones and immediate past Foundation Chair John McCuskey.
3. **Educating Members of Foundation Board Service:** We will have a page on the Foundation website that encourages people to apply for the Board with a link to the application form. We will also encourage applications through IBTTA. Preferably, the application deadline would coincide with IBTTA's board application deadline.
4. **Nominate and Appointment:** Nominating Committee meets to review the applications and select the best candidates to fill the available slots. The preferred deadline for appointments would be by mid-May of each year.

RECOMMENDATIONS:
Given the momentum that the Foundation has experienced and interest in serving, the Committee recommends the following actions:

1. IBTTA will post the solicitation for Board membership, with the attached application form, on a page on the Foundation web site.
2. The appointed Nominating Committee review applications shortly after the submittal deadline to facilitate mid-May appointments.
3. The Foundation Chair will personally request applications from those individuals who have expressed interests in serving. The terms will be staggered, consistent with the current term rounds.

Resolution on Process for Application, Nomination and Election of Foundation Directors

Approved by the IBTTA Foundation Board March 12, 2018

Whereas the IBTTA Foundation wishes to have a coherent process for accepting applications from individuals who wish to serve on the board, for vetting those applications and for nominating and electing candidates to serve on the Foundation Board; and

Whereas the 2018 Chair of the Foundation, Phil Miller, appointed a group of directors to develop such a process; and

Whereas the process is described in the document titled "IBTTA Foundation Nomination Process Report and Recommendations February 2018";

Now therefore be it resolved that that IBTTA Foundation Board adopts this process to govern the process of electing individuals to serve on the Foundation Board.

Veterans Initiative Subcommittee Report
March 12, 2018

Rosa Rountree Chairs the Veterans Initiative Subcommittee. There are 16 participating members.

The group met in January, and it was decided that this group would meet often. We are anticipating a March meeting.

The group was given our charter to include our vision, mission, and objectives for review and comments. Once approved, the updated charter will be provided to the Foundation Board for approval.

We have placed a request to the Leadership Academy Chancellor to have someone from the military leadership present at the 2019 Leadership Academy. We have several Generals that are willing to participate at their own expense.

We are planning to connect with the local military facility to support our Service Project in Harrisburg. It is an opportunity to raise the IBTTA Veterans Initiative awareness with the active service men and women.

One of our tentative goals is to establish a connection with the military men and women before transitioning to civilian and becoming one of the top 25 entities in hiring veterans. Ron Fagan is leading this effort. He has identified two paths: Civilian and Military.

Civilian Path: Mark Toal manages the National Veterans Employment for U.S. Department of Labor. There are 2,400 job centers across the country. Mark will be providing a how to connect webinar to the subcommittee members and the IBTTA Membership if there is a desire.

We have requested a speaker spot for Mark Toal to present at the AET Managed Lanes Workshop. It has not been denied but not confirmed. We do have a confirmed spot for Mark's participation at the Maintenance Workshop. Our desire is for Mark to have an opportunity to present to a large audience.

Military Path: COL Whitehurst has connected Ron to the U.S. Army Transition Assistance Program (TAP) Management. Once we develop our message, we have access to 74 U.S. Army Installations. COL Whitehurst continues to reach out to the other military branches including the Coast Guard.

Including in the military path, is the Hiring Spouses Program and the Eastern Seal Veteran Homeless Rehabilitation Program.

IBTTA Foundation Board of Directors

May 9, 2018 | 11:00am – 12:00pm EDT

Conference Call Minutes

Foundation Board Attendees:

1. Phil Miller, Chair
2. Federico di Genarro
3. Mike Heiligenstein
4. Marcelle Jones
5. Christine Keville
6. John McCuskey
7. Rene Moser
8. Lisa Thompson
9. PJ Wilkins

Guests and Staff Attendees:

Andy Fremier, Leadership Academy Chancellor
Pat Jones
Wanda Klayman

Introduction

The meeting was called to order at 11:05am. **There was a MOTION and SECOND to approve the minutes of the March 12, 2018 Foundation Board meeting. The motion PASSED.**

Election of New Directors

Phil Miller said that the election today is specifically to fill the three open seats to bring the board to a total of 15 members.

Foundation Nominating Committee Chair Christine Keville said that the committee reviewed and discussed all applicants and looked at criteria including geographic and gender diversity and their overall involvement in IBTTA and the industry. It was noted that there are not toll operators in the current group and that it would be good to have more toll operators on the Foundation board.

There was a MOTION and SECOND to approve the Resolution electing as the new directors as follows:

- Terri England (term expiring at the end of 2020)
- Pat Horan (term expiring at the end of 2019)
- Tyler Milligan (term expiring at the end of 2018)

The motion PASSED.

There being no further business, the meeting was adjourned at 11:30am EDT.

Respectfully submitted,
Patrick D. Jones
Executive Director & CEO, IBTTA
Secretary, IBTTA Foundation

Attachment: see below

Resolution to Elect Directors to the IBTTA Foundation Board of Directors
APPROVED by the IBTTA Foundation Board of Directors on May 9, 2018

Whereas the IBTTA Foundation is organized to pursue education, research, charitable good works and other efforts in accordance with its Articles of Incorporation and Bylaws;

Whereas the following individuals have expressed interest in serving on the IBTTA Foundation Board of Directors and are deemed to be qualified to serve;

Now, therefore, be it resolved that the IBTTA Foundation board of directors elects the following individuals to serve as directors of the IBTTA Foundation for the terms so indicated:

- Terri England (term expiring at the end of 2020)
- Pat Horan (term expiring at the end of 2019)
- Tyler Milligan (term expiring at the end of 2018)

IBTTA PAST PRESIDENTS ADVISORY COUNCIL

Agenda
Saturday, June 23, 2018
8:00am – 9:00am
Harrisburg, PA

1. Call to Order
2. Honorary Member Candidates
3. Potential Board Candidates
4. Peer Exchange Pilot Program
5. “Future Presidents Handbook”
6. Other issues
7. Adjourn

"**Future IBTTA Presidents' Handbook – Proposed Table of Contents**"

Introduction

Purposes of the publication, explaining that the IBTTA Past Presidents Advisory Council finds it useful and worthwhile to draft a Handbook for future IBTTA Presidents to help future Presidents get familiar with the tasks and duties they will have to fulfil when leading the Association during their mandate.

1. **Role of the IBTTA President in leading the Association**

- His/her role as defined by the IBTTA By-Laws
- The importance of the Presidential theme for the one-year mandate
- Ensuring the continuity between the predecessors and the successors

2. **Relationships with the IBTTA governance bodies and committees**

- Working to respect the collegiality of the Executive Committee and of the Board of Directors
- Interacting with the IBTTA committees and Task Forces
- Ensuring a permanent contact and exchange of views with PSAC

3. Representativeness of IBTTA

- Representing the Association in various political and institutional relationships
- Relationships with the media
- Ensuring the IBTTA's relationships with the International tolling industry

Conclusions

IBTTA MEMBERSHIP SUBCOMMITTEE

Agenda
Saturday, 23, 2018
9:00am to 10:00am
Harrisburg, Pennsylvania

1. Introduction by Rob Horr, Chair

2. Approval of April and May minutes

3. Membership Revenue Collection Update—Review of dues collection and meetings revenue (sponsorship and exhibits), to date.

4. Rob to recap the progress of the five goals for 2018

5. Discussion Topic—Engaging Current Members through Committees/Working Groups.
    a. Short overview of "best practices" for successful committees (from ASAE)
    b. CAV Working Group as example.
    c. Discussion about value of committees, what topics or interest areas to consider, how to move forward.

6. Other Business

7. Adjourn

MINUTES: IBTTA Membership Subcommittee of the Finance Committee
Thursday, January 18, 2018, Coral Gables, Florida
2:30 pm to 3:30 pm

In Attendance

Susan Buse, Co-chair
Randy Cole
Mike Davis
Butch Eley (phone)
Jim Ely
Rob Horr, Chair
Tyler Milligan
Fran O'Connor
George Zilocchi

Staff

Pat Jones
Wanda Klayman
Mary Cadwallader

1. **Introduction by Rob Horr, Chair**
   Rob Horr reminded the committee of the membership growth in 2017 but much more to do in 2018 to keep members and continue to grow. He reviewed the mission of the committee and the 2018 goals, based on a report requested by **Tim Stewart**. More about the goals in number 3, below.

2. **Dues Collection—Update on 2018 membership dues and goals**
   Mary reviewed the membership revenue, to date and compared 2018 collection to 2017. The highlights as of Jan. 3—2018 vs. 2017:
   - $1,151,235 total collected (41% of budget) vs. $1,006,458 collected in 2017.
   - 106 members have renewed vs. 87 members
   - 3 new members = $9,990 vs. 9 new members = $68,478
   - 3 cancellations = $47,475 vs. 1 cancellation = $2,500
   - 17 Platinum Sponsors this year vs. 16 in 2017

3. **Recap of 2018 Goal Priorities**
   Rob recapped the 2018 goals and opened each one for discussion:
   - **Document Warehouse Library**
     - This is separate from TollMiner (data visualization) and will be for the foreseeable future. It will be a library of RFPs, policies and other sample documents that members can utilize. The intention is to start simply, identify the needs and devise a framework.
     - It was suggested that a small subset of the committee draft the policies/procedures (library contents, technology used) for input from other committee members.
     - There is some funding for this project.
     - 2018 goal is to develop procedures and requirements that provide the necessary result; find the best way to move forward within the confines of staff, procedures and budget; have 1-2 topic areas on the website by the end of the year.

- **Strategic Partnerships**
    - Engage other associations with IBTTA and encourage their participation at meetings. TRB, AASHTO, AAMVA were examples of partners to explore further.
    - 2018 goal is to have one joint meeting scheduled for 2019
- **International Outreach**
    - Ask **Jordi Graells**, chair of the International Task Force, to attend monthly calls and report on progress.
    - It was suggested that the site selection committee work with the international task force to align future sites with membership needs.
    - 2018 goal is to bring in 2 new international members
- **Explore North American regional efforts**
    - Identify ways to engage members and prospects through a regional focus such as with webinars, smaller meetings, etc.
    - **Jim Ely** sees synergies between regional membership efforts and the PSAC initiative of Tolling the Untolled States. It's a way to enhance the IBTTA brand while increasing active members, which increases associate membership. **Susan Buse** suggested a SWAT team that can work with untolled states to educate them on the risks and rewards of tolling. Staff to provide list of non-member US toll operators with short bios and contacts to the committee.
    - 2018 goal is to hold one webinar or regional meeting
- **Support Current Members**
    - Continue to find areas of the website to lock down
    - Increase engagement and participation outside of meetings
    - 2018 goal is to have at least one new member-only feature on website

4. **Set Target Dates and Assign Task Force Duties**
    - Keep the three task forces in place for now. All task forces will be involved in the Document Library project. In addition:
        - Dues Task Force will consider dues structure for 2019
        - Non-Dues Revenue Task Force will develop a plan for North American regional efforts and continue to investigate other revenue streams.
        - Exclusivity Task Force investigate areas to support current members.

5. **Other Business**
    - The committee will have monthly membership calls to stay focused on progress.
    - Staff to find lists to solicit DBE/WBE/MBEs during 2018.
    - The Dues subcommittee agreed on updated pricing for sponsorships & exhibits that will roll out in early February 2018. The committee and staff will review and report the success of these rates and revise them prior to 2019 planning.

6. **Adjourned at 3:35 pm**

Minutes for Membership Subcommittee Call, **February 7, 2018, 11 AM – 12 PM, EST**
In Attendance:

Susan Buse, Co-chair	John Mike
Rachel Bell	Tyler Milligan
Randy Cole	Fran O'Connor
Butch Eley	Malika Seddi
Jim Ely	Benton Tempas
Rob Fischer	Mary Cadwallader-Staff

Opening remarks by the Chair—Susan chaired the meeting, since Rob was traveling.

Updates on Dues Collection—Mary provided an update of 2018 membership collection. Summary and comparison documents are attached. Highlights as of Feb. 6, 2018 vs 2017 are:

a. $1,874,244 collected (67% of budget) vs. $1,774,721 collected in 2017.
b. 151 members have renewed (63%) vs. 134 renewals
c. 4 new members = $27,419 vs. 12 new members = $75,678
d. 3 cancellations = $47,475 vs. 1 cancellation = $2,500

Sponsorship/Exhibit Roll Out—A 2018 sponsor/exhibit brochure with new sponsorship items and pricing is final. Pricing was approved in late 2017 by the Dues Structure Task Force. An e-blast was sent to all associate members announcing the changes and a PDF is on the website.

2018 Goals—Mary provided a quick review of the goals provided to IBTTA President, Tim Stewart, as priorities for this Subcommittee for 2018. The goals are:

1. **Document Library** (a warehouse for sample documents of interest to the membership)
2. **Strategic Partnerships** (engage other associations with IBTTA to participate in meetings)
3. **International Outreach** (continue membership outreach that started in 2017)
4. **Explore North American Regional Efforts** (identify ways to engage members and prospects regionally, including outreach to Untolled States)
5. **Support Current Members** (increase engagement outside of meetings and find more members-only benefits)

Goal #1—Document Library – Most of the meeting was dedicated to a discussion about the document library. Susan facilitated the conversation generating feedback and input from the committee. A draft document helped identify potential topics, procedures to consider, and policies, pricing and process ideas for the library. Everyone contributed to the discussion and those revisions and updates have been added to the draft document. This document will be used to consider next steps and action items for the committee.

Adjourned at 11:58 am, EST

Minutes for Membership Subcommittee Call, March 7, 2018, 11 AM – 12 PM, EST

In Attendance:

Susan Buse, Co-chair	Rob Fischer
Rachel Bell	Tyler Milligan
Randy Cole	Benton Tempas
Jim Ely	George Zilocchi
Jordi Graells-Guest	Wanda Klayman-Staff
Rob Fischer	Mary Cadwallader-Staff

Opening remarks by the Chair—Susan chaired the meeting, since Rob was traveling.

Updates on Dues and New Member—Mary provided an update of 2018 membership collection. Summary and comparison documents are attached.

a. $2,092,634 collected (75% of budget)
b. 163 members have renewed (68%)
c. 10 new members = $47,849; 3 Active Members, 1 Associate and 6 DBEs
d. 4 cancellations = $49,975

Update on the Document Library

There were no questions about the document library notes from last month. A survey will go out to the membership in March, asking about interest in the library, willingness to add documents and for help identifying the most important topics to initiate the project.

Update on International Outreach (Jordi Graells)

Jordi updated the subcommittee about efforts of the International Task Force. He and Ema Stocchi have laid out a new strategy for 2018 that focuses on Europe and away, for now, from the regional plan:

- Help coach/mentor new International Active Members to keep them engaged in IBTTA
- Concentrate on Europe this year and work with ASECAP to help secure new members. Each task force member will be given 1-2 European countries to reach out to with a goal of 10 new members by the end of the year.

Goal #5—Current Member Support, Update on Membership engagement activities

1. **TollMiner—**Cindy and her team are working to get agencies to validate their data. There are 3 working groups (Communications, Terminology and Roadmap) to help move the project forward and they have had initial kick off calls. Cindy has given demos to CTOC and FHWA. FHWA is very interested in the project.
2. **Government Affairs and CAV Working Group efforts—**Good engagement in both member groups--30 people attended the DC meeting in February to meet with representatives from Capitol Hill and the White House. There are 45 members on the monthly call of the CAV working group. They've added a sub group looking at DSRC/5G standards and how/if the tolling industry can participate.

3. **Membership Directory and IBTTA Connection—**Added to stay connected with the membership on a regular basis and to offer new members.
4. **Webinars for 2018—**IBTTA is planning on 2-3 webinars this year to offer benefits to members that cannot attend meetings. Susan encouraged topic ideas to be sent to Mary. Some topics being considered are:
    - P3 reporting from Fitch (teaser for finance meeting in July)
    - Veteran's Outreach, Young Professional and/or DBE focus
    - Interoperability Project Wind Down and regional interoperability update

Adjourned at 11:47 am, EST

Minutes for Membership Subcommittee Call, **April 4, 2018, 11 AM – 12 PM, EST**
In Attendance:

Rob Horr, Chair	Tyler Milligan
Randy Cole	Fran O'Connor
Mike Davis	Malika Seddi
Butch Eley	George Zilocchi
Jim Ely	Pat Jones-Staff
Jordi Graells	Wanda Klayman-Staff
John Mike	Mary Cadwallader-Staff

Opening remarks by the Chair—Rob began the meeting at 11:02 am, EST

Approval of February and March Minutes—Minutes for February and March were approved.

Membership Dues and New Member Update —Mary provided an update of 2018 membership collection as of March 29. Summary and comparison documents are attached.

a. $2,417,192 collected (86% of budget)
b. 185 members have renewed (77%)
c. 16 new members = $65,339; 3 Active Members, 5 Associates and 8 DBEs
d. 4 cancellations = $49,975

Document Library Survey Discussion—Survey results and next steps
Rob opened the discussion highlighting the survey results that show a high level of interest in a Document Library and interest in a wide range of topics for inclusion. **Pat Jones** said that the survey reveals both promising and troubling results. While members expressed high interest in having a document library, they also expressed concern about their ability to share certain documents because of privacy and legal considerations. He reminded the subcommittee that there is little staff bandwidth and budget for this project.

Randy Cole agreed that there are similar collection concerns in the TollMiner working group but suggested that we start on a small scale, with 1-2 topics and see how members respond. **Tyler Milligan** agreed and suggested that we initially populate the Library with documents from subcommittee members, such as the Ohio Turnpike, once we come up with topic areas.

In response to **George Zilocchi's** concerns about budget, Mary mentioned that Tyler has configured a sample document collection space on Box.com, a cost-effective platform. The Subcommittee can use this as a "beta" testing area to identify and collect documents and help determine and improve the procedures and processes by which this service could later be rolled out to the members.

It was agreed that this small-scale effort is a realistic way to move forward.

Goal #4—Explore North American Regional Efforts
One of the goals that the committee discussed at the January board meeting in Coral Gables is to "Identify ways to engage members (and potential members) who are not attending conferences; such as webinars, smaller meetings, etc." Pat asked for some clarification of this item. For example, are we talking about creating a series of one-day regional meetings to attract people who don't normally attend our regularly scheduled meetings? How many regional meetings are we talking about? He said that staff are fully employed on the existing program of meetings and we don't have the bandwidth to offer additional "regional" meetings. If we want to do it, we would need to plan and budget for it and have clear guidance about what we want to achieve.

Randy Cole again raised the idea of creating "communities of practice." He said this would allow us to foster communication within designated job functions across organizations and serve as an effective way to connect more members without adding physical meetings. The idea is to create a mechanism for members to have peer to peer interaction without having to travel. Pat agreed that this idea should remain on our list of ideas to pursue in the future. Right now, we are focusing resources on current efforts such as TollMiner™ and the Document Library.

Butch Eley asked about efforts to partner with other groups and wave the flag for IBTTA. Pat and Wanda described our efforts to promote and attract interest in IBTTA programs and membership at Team Florida, TRB, and at two separate Infrastructure Week events in May. In addition, we are looking at partnering with other groups when we hold the 2019 AET meeting in Orlando. We will make periodic updates to this subcommittee about these types of outreach efforts.

Tyler Milligan offered to provide an analysis of past IBTTA meeting attendees to see if there is an opportunity to start small, with a one-day workshop in a geographical area that would provide ample attendance (perhaps Texas or the Northeast). The opportunity would have to be balanced against cost, time and effort involved.

Adjourned at 11:55 am, EST

Minutes for Membership Subcommittee Call, May 2, 2018, 11 AM – 12 PM, EST

In Attendance:

Rob Horr, Chair	Jim Ely	George Zilocchi
Susan Buse, Co-chair	Butch Eley	Staff
Randy Cole	John Mike	Wanda Klayman
Mike Davis	Fran O'Connor	Mary Cadwallader

Opening remarks by the Chair—Rob opened the meeting, thanking those who were able to meet in Charlotte to see the Box.com demo that Tyler Milligan provided.

Updates on Dues and New Member—Mary provided an update of 2018 membership collection as of May 1. Summary and comparison documents are attached.

a. $2,604,698 collected (93% of budget)
b. 201 members have renewed (84%), with 15-17 still planning to renew
c. 19 new members = $72,539; 4 Active Members, 7 Associate and 8 DBEs
d. 7 cancellations = $69,975

There are currently 22 DBEs listed as IBTTA members.

Feedback from Charlotte: New members expressed interest in participating on committees/working groups and DBEs asked how best to be introduced to current members.

Box.com Demo and next steps—Those who saw the Box.com demo by Tyler in Charlotte were impressed with the ease of use, searchability of entire documents and low cost. The subcommittee decided to move forward with Box and agreed to the following next steps:

- IBTTA will subscribe to Box.com for the Document Library. Mary will be primary administrator and authorize the Membership Subcommittee as users.
- The Membership Subcommittee will add RFPs to the Document Library, populating it for testing and feedback.
- A Working Group within the Subcommittee will begin outlining procedures, terminology and member communication requirements so that when the Library is ready to roll out to the full membership, systems are in place to make it effective and of value.

The Subcommittee emphasized that this project must continue to be low cost and as member-driven as possible. It was acknowledged that the Public Sector will be the primary users of the Library and that an important goal is for users to contribute documents as well as take from it.

Other Business—There will be NO June conference call since the subcommittee will meet in person in Harrisburg in late June. A status report will be circulated prior to that meeting. George suggested the Subcommittee evaluate progress of the 2018 goals to present at the June board meeting.

Adjourned at 11:49 am, EST.

SUMMARY OF DUES COLLECTIONS

Updated June 12, 2018

MEMBERSHIP REVENUES	2018 Renewals YTD	2018 New Member Dues YTD	2018 YTD	Amount Needed to Make Budget	2018 Budget	Total 2017 Revenues	
Active	$ 1,720,895	$ 36,079	$ 1,756,974	$ (31,883)	$ 1,788,857		
Associate	$ 356,180	$ 45,210	$ 401,390	$ (8,710)	$ 410,100	$ 2,478,496	Renewals
Sustaining	$ 525,000	$ -	$ 525,000	$ (75,000)	$ 600,000	$ 252,097	New Members
TOTAL	**$ 2,602,075**	**$ 81,289**	**$ 2,683,364**	$ (115,593)	**$ 2,798,957**	**$ 2,730,593**	**TOTAL**
			96% of budget				

MEMBERSHIP COUNT	2018 Renewed Members YTD	2018 New Members YTD	2018 Paid Members YTD	2017 Total Members	2017 Renewed Members	2017 New Members
Active	82	4	86	89	75	14
Associate	91	20	111	111	83	28
Sustaining	35	0	35	40	39	1
TOTAL	**208**	**24**	**232**	**240**	**197**	**43**
	87%					

	ACTIVE	ASSOCIATE	SUSTAINING	TOTAL	NUMBER	Total 2017 Cancellations	
Cancellations	$ 57,289	$ 43,995	$ 45,000	**$ 146,284**	**24**	**$ 61,098**	**13 members**

NEW MEMBERS YTD

Active Members
ROADIS-Spain
Globalvia-Spain (Pocohantas Parkway)
Oregon DOT
New Jersey DOT

Associate Members
Ascend Infrastructure--IL (DBE)
BRiC-TPS LLC--CA
Van Eperen Public Relations--MD (DBE)
Wilkins Strategies--TX (DBE)
Weris, Inc. (DBE)
Brand Advocates--NC (DBE)
AceApplications (DBE)
E-Transit
UBS Financial Services
Broad and Cassel
RideFlag-Canada
Stokes Creative (DBE)
Kidd International (DBE)
Leonardo--Spain
PSS
Password, Inc.
Phoscrete
KPMG
The CCS Companies
StarStar Mobile

MEMBER CANCELLATIONS YTD

Active Member
Sund Baelt Holdings-Denmark--Low activity in IBTTA
CCR S.A.--No response (Brazil)
Innovative Road Solutions--IBTTA Board member resigned
Roads and Transport Authority--Came in for Toll Excellence (UAE)
Sydney Motorway Corporation-No response (Australia)

Association and Sustaining Members
Mitsubishi Heavy Industries-JAPAN--No Response
Johnson, Mirmarin, Thompson-MD--no toll business to warrant cost
CH2M--bought by Jacobs
ACS Infrastructure-Florida--not enough toll business
Blue Cube
Hawkins Delafield & Wood--Dropped memberships for cost saving
ARH Inc (Hungary)
Arup (Ireland)
Calas Consulting, LLC
EST, Inc.--Rather pay non-member rates
Global Contact Services
Help, Inc.
Highway Toll Systems Co., Ltd.
Intag Technologies Inc.
Pannone Lopes Devereaux & O'Gara LLC
SARF (South African Road Federation)--Too expensive
Shenandoah LP
Tecsidelmex, S.A. de C.V.
Urban Engineers, Inc.

COMPARISON OF DUES COLLECTION

2018 vs 2017 Dues Collection Comparison (as of June 12)

MEMBERSHIP REVENUES	2018 Renewals YTD	2017 Renewals YTD	2018 New Member Dues YTD	2017 New Member Dues YTD	2018 YTD	2017 YTD	Revenue Variance
Active	$ 1,720,895	$ 1,542,645	$ 36,079	$ 127,619	$ 1,756,974	$ 1,670,264	$ 86,710
Associate	$ 356,180	$ 306,745	$ 45,210	$ 63,380	$ 401,390	$ 370,125	$ 31,265
Sustaining	$ 525,000	$ 570,000	$ -	$ -	$ 525,000	$ 570,000	$ (45,000)
TOTAL	**$ 2,602,075**	**$ 2,419,390**	**$ 81,289**	**$ 190,999**	**$ 2,683,364**	**$ 2,610,389**	**$ 72,975**

MEMBERSHIP COUNT	2018 Renewed Members	2017 Renewed Members YTD	2018 New Members YTD	2017 New Members YTD	2018 Paid Members YTD	2017 Paid Members YTD	Member Variance
Active	82	74	4	10	86	84	2
Associate	91	78	20	21	111	99	12
Sustaining	35	38	0	0	35	38	-3
TOTAL	**208**	**190**	**24**	**31**	**232**	**221**	**11**

2018	ACTIVE	ASSOCIATE	SUSTAINING	**TOTAL**	**NUMBER**
Cancellations	$ 57,289	$ 43,995	$ 45,000	**$ 146,284**	**24**
2017	ACTIVE	ASSOCIATE	SUSTAINING	**TOTAL**	**NUMBER**
Cancellations	$ 33,598	$ 12,500	$ -	**$ 46,098**	**7**

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Research from ASAE Foundation, 2017

Mutually Beneficial Volunteerism: Opportunities for Enhancing Association Volunteer Management Systems

Findings from the ASAE Volunteerism Research Study:

- **Value for Volunteers**—Volunteer's create value for an association, provide direct labor and maintain longer memberships.
- **Mutual Satisfaction**—The study found that staff and volunteers indicated above average satisfaction with their Association's volunteer systems.

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While there is satisfaction, the study found key areas for improvement:

Volunteer systems often lack:

- **Job Design**—A clear objective
- **Recruitment Process**—That is fair and inclusive
- **Selection**—Based on qualifications of the Volunteer
- **Training and Management**—Some kind of training and leadership in place
- **Assessment and Recognition**—Did the committee meet its objectives and did it meet the Volunteers' expectations?

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Volunteer systems need to:

- **Offer clear guidelines**—Clearly defining the work promotes the program, summarizes basic requirements and identifies the preferred skillset.
- **Identify contributions**—Communicate the desired results from forming the group. This helps motivate and give direction to Volunteers.
- **Ensure effectiveness**—List skills required and length of commitment up front. This offers greater success of the group and satisfaction for the Volunteer.
- **Provide training and guidance**—Identify any training and guidance in advance and offer it at the start of any new group.
- **Be open and inclusive**—Communicate Volunteer needs widely and in multiple ways within the association. This ensures a pool of new Volunteers and uncovers untapped expertise.

Reasons people don't volunteer:

No one asked

Not aware of the opportunities

Don't know the other volunteers

No opportunities that are virtual

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Current Volunteerism within IBTTA:
What are IBTTA's Strengths?

- ✓ We have strong commitment and dedication from our Volunteers.
- ✓ Our Volunteers are industry experts, in all different fields, that are willing to share their expertise with IBTTA.
- ✓ The governance committees and meeting planning groups are well-established, have a set recruitment and selection process and are recognized within IBTTA.
- ✓ The meeting planning groups provide significant skilled, hands-on help at minimal cost and offer Volunteers good experience and career benefit.

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More Strengths

- ✓ Our primary recruitment process is staff outreach or peer-to-peer, which the ASAE Study says is the most effective form of recruitment.
- ✓ The PSAC is an example of a Volunteer system for a specific class of membership (consultants and vendors).
- ✓ While we don't have a formal assessment process, outcomes are seen in well-received meetings and good governance of the association. The PSAC's assessment can be seen in the value their reports.

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Current Volunteerism within IBTTA: What are IBTTA's Weaknesses?

- ✓ Members typically are permitted to join IBTTA committees during a narrow time frame each year. An eager Volunteer has to wait.
- ✓ Outside of Governance and Meeting planning, we have limited opportunities.
- ✓ We have a small percentage of member Volunteers that sit on multiple committees.
- ✓ We don't have enough recruitment outreach, especially to unengaged members or members who don't attend meetings.
- ✓ Governance committees tend to convene at meetings, providing fewer options for those who don't attend.

"A speedy initial response to volunteerism leads to greater satisfaction. Slow response has a negative effect."

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More Weaknesses

- We provide some Board training but otherwise don't provide orientation, training or structured assessments in our Volunteer system.
- We don't ask Volunteers what their skills are. The ASAE Study stresses the, "importance of recruiting the right person for the role."
- We provide few opportunities that are smaller, task-oriented and time-limited. The CAV group is an example of an opportunity that fits these criteria. These options might engage more members who can't or don't attend meetings.
- We don't have a dedicated staff position in place to send periodic, direct invitations to all members.

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Ways to Improve IBTTA's Volunteer System

- Every committee, task force or working group must benefit IBTTA in some way or relate to the Strategic Plan.
- With new members or through a survey, ask those interested in volunteering to list their skillset that we record in the AMS or other system to refer to when forming new committees.
- Work internally or with Volunteers to develop new working groups and task forces, based on Association and Volunteer needs.
- With every new committee, task force or working group, define clear objectives and guidelines.

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Ways to Improve IBTTA's Volunteer System

- ✓ Designate a strong leader with a one-year commitment and clear vision.
- ✓ Design an assessment system (performance review) to determine success of the group and provide feedback to the Volunteer.
- ✓ Offer a general orientation for new Volunteers—as a webinar or video on website.
- ✓ Dedicate a position to send periodic invitations to members about Volunteer opportunities.

IBTTA FINANCE STANDING COMMITTEE OF THE BOARD

Agenda
Saturday, June 23, 2018
10:00am to 11:00am
Harrisburg, PA

1. Call to Order
2. Approval of Minutes, January 18, 2018
3. Status and Review of 2017 Auditors Report
4. Review of 2018 Financial Statements
5. Presentation and Discussion of 3-Year Financial Plan
6. Status of 2018 Goals
7. Investment Subcommittee Report
8. Membership Subcommittee Report
9. Other Business
10. Adjourn

MINUTES
International Bridge, Tunnel and Turnpike Association
Finance Standing Committee of the Board
January 18, 2018

Finance Committee Attendance:
Susan Buse, Vice Chair
Mary Jane O'Meara
Charlie McManus
Julia Monso
Kathi O'Connor
Fran O'Connor
Steve Snider
Tim Sturick
Chris Tomlinson
Bruce Van Note
Kary Witt
George Zilocchi (Chair)

Staff Attendance:
Pat Jones
Cathy Pennington

Call to order and Minutes
Chair George Zilocchi called the meeting to order at 3:35pm. **There was a MOTION and a SECOND to approve the minutes of the September 9, 2017 and November 27, 2017 Finance Committee meetings. The motion PASSED.**

Dues Collection and Trend Analysis
George mentioned the three-year trend analysis in the board book. He said it tells a good story and encouraged people to review it. He said he would like to include the trend analysis in the materials of future board meetings.

2018 Finance Committee Goals
George mentioned the four Finance Committee goals for 2018 which include:

- Preparing a multi-year financial plan;
- Monitoring the CFO performance;
- Performing an association risk assessment; and
- Achieving the reserve ratio goal of 50%

George said he would like to assign a working group to review the Finance Committee mission statement and refine it as needed.

Multi-year financial plan
One of the 2018 Finance Committee goals is to prepare a three-year financial plan. Cathy Pennington talked about three-year financial plan under development and the assumptions that drive the plan, for example:

1. **Dues revenue** – Is it stable? Will we increase or decrease dues rates? Etc.
2. **Workshops** – Number of events and estimation of profit (average income and expense based on prior three years)
3. **Personnel** – What changes do we anticipate in the number of employees and their compensation?
4. **Member benefits** – What will it cost to provide ongoing maintenance of database, other data projects, new staffing or software?

5. **Administration** – What is the cost of of upgrading accounting software (and then maintenance). Also, our lease is up in 2020. Will we extend the current lease or move to a new location? If moving, what are the costs of an office move, furniture, the new lease, etc.?
6. Assumption for increase/decrease in **investment portfolio**. Even though we don't budget for realized/unrealized investment gains, we use the investment balance in our calculation of the strength of the reserve. Thus, if we are going to actively budget to increase the reserve, we need to make an assumption about the markets.
7. **Other expenses** – assumption as to general inflation and cost increase.

There was a discussion about whether the Board should act first in the financial planning process by outlining the policy objectives and outcomes that the association wants to achieve. Should the financial plan drive policy decisions or vice versa?

Tim Stewart and George Zilocchi said the individual committee and task force goals, which the board heard a lot about on the previous day, are part of the foundation of the three-year financial plan. Those committee plans are expressions of some of the policies that the board wishes to achieve.

Steve Snider said that as a toll agency, I have a 10-year plan. We drop things into the plan even though my board hasn't approved them as part of annual budgets. The three-year plan is an exercise in taking what we're doing today and looking ahead to how know we might change in the future, etc. He said his 10-year plan has never been approved by the board. It's a tool for the board and the staff. I'd be happy if this were a financial forecast instead of a plan.

Tim said he understands that strategically the Finance Committee shouldn't get ahead of the board. Developing a plan does not lock the board into anything. It helps the board start identifying holes that might be created. We have to consider the staffing impacts going forward to evaluate what we might need. My belief is, you're not locking strategy and policy.

George said he believes that creating a multi-year financial plan starts a dialogue. Bruce Van Note said that policy is like clouds but that a financial plan is boxes on a conveyor belt.

Risk Assessment
Susan Buse talked about having staff conduct an association risk assessment. She outlined what it would entail. (In later discussions, the leaders of the Finance Committee and Audit Committee agreed that the association risk assessment should be rolled up into the internal controls audit that the Audit Committee will oversee.)

401k Retirement Plan Contribution
There was a MOTION and a SECOND to approve the Resolution on the Discretionary Non-Elective Contribution to the 401K plan. The motion PASSED.

The meeting was adjourned at 4:30pm.
Respectfully submitted,
Patrick D. Jones
Executive Director & CEO

Mission of a Reconstituted and Renamed Finance Standing Committee of the IBTTA Board

The Finance Standing Committee shall monitor the financial operations of the IBTTA.

The duties of the Finance Standing Committee shall include, but not be limited to, reviewing, evaluating and recommending:

a. The annual operating budget
b. Quarterly and annual comparison of actual expenses to budget
c. Major creation and changes in policies and procedures for financial activities
d. Major financial commitments being contemplated by the staff of the IBTTA
e. Significant current and anticipated expenditures, possible recommendations of areas for reductions of expenses for the association
f. Significant proposed transactions affecting the revenues and expenses of the association
g. Forecasts of long term plans

The Finance Standing Committee shall perform such other duties as may be prescribed from time to time by the President and Board of Directors.

International Bridge, Tunnel and Turnpike Association

Investment Policy
Adopted by the IBTTA Board of Directors on January 8, 2016
With revisions adopted September 9, 2017

Purpose:
The purpose of this statement is to set forth the policy and operational factors governing the investment management of the International Bridge Tunnel and Turnpike Association (IBTTA) Total Operating Reserve.

The Total Operating Reserve will be comprised of a short-term and long-term portfolio. This statement will serve to direct the management of investment assets within each portfolio by the designated investment advisor.

The determination of the amount in the short-term versus long-term portfolio will be determined annually by the Executive Director and submitted to the Board for approval as part of the annual budgeting process.

Operating Reserve – Guidelines and Restrictions

The primary objectives of this portfolio are:

- Safety: Investments of the Association shall be undertaken in a manner that seeks to ensure the preservation of capital in the overall portfolio. To attain this objective, diversification along credit and maturity lines is required in order that potential losses on individual securities do not exceed the income generated from the reminder of the portfolio.
- Liquidity: The investment portfolio will remain sufficiently liquid to enable the IBTTA to meet all operating requirements, which might be reasonably anticipated.
- Return on Investments: The investment portfolio shall be designed with the objective of attaining a market rate of return throughout budgetary and economic cycles, taking into account the investment risk constraints and the cash flow characteristics of the portfolio. The management of the portfolio should seek to optimize return while minimizing risk through diversification and asset allocation.

Cash Flow Expectations:

This portfolio provides a short term funding reserve for IBTTA that will be funded and reduced based on the amount of funds in the IBTTA checking account. It is expected that the reserve will receive a large initial contribution then be drawn down over the year. Funds can potentially be needed monthly.

Time Horizon:

This portfolio is considered short term in its investment time horizon. Investments should reflect a maturity target of approximately one year. The portfolio will reflect an allocation strictly to ultra short term investments in order to meet any monthly cash flow requirements.

Tax Status:

IBTTA is a nonprofit organization and is thus exempt from taxes. Investment decisions should reflect this tax status when purchasing or selling securities.

Risk Tolerance / Asset Allocation:

This portfolio is classified as conservative based on the stated objectives of preservation of capital and liquidity. The recommended target asset allocation is set to achieve these objectives while maximizing returns.

Asset Class	Target Allocation
Ultra Short Term Fixed Income	100%

The Ultra Short Term Fixed Income asset class will target a weighted average maturity of no greater than 14 months and a weighted average credit rating of AA, with an emphasis on US Treasuries and Agencies.

Eligible Investments and Restrictions:
The following are eligible investments for this investment portfolio:

- US Treasuries
- US Agencies
- Municipal and Corporate Bonds rated investment grade or higher by Moody's, S&P, or Fitch
- Mortgage Backed Securities issued by US Agencies
- Dollar denominated obligations of foreign issuers issued in the U.S.
- Foreign government and agency obligations
- Bonds with a maturity of 2 years or less at the time of purchase
- FDIC Insured Certificates of Deposit
- FDIC Insured Money Market Accounts
- Money Market funds that invest solely in eligible securities listed above, and whose credit quality is such that they must invest exclusively in high-quality securities (generally those that are in the top two tiers of credit quality)
- Mutual funds that invest solely in eligible securities listed above
- Exchange traded funds that invest solely in eligible investments listed above

Short-Term Portfolio Reserve – Guidelines and Restrictions

The primary objectives of this portfolio, in order of importance, are:

- Safety: Investments of the Association shall be undertaken in a manner that seeks to ensure the preservation of capital in the overall portfolio. To attain this objective, diversification along credit and maturity lines is required in order that potential losses on individual securities do not exceed the income generated from the reminder of the portfolio.
- Liquidity: The investment portfolio will remain sufficiently liquid to enable the IBTTA to meet all operating requirements, which might be reasonably anticipated.
- Return on Investments: The investment portfolio shall be designed with the objective of attaining a market rate of return throughout budgetary and economic cycles, taking into account the investment risk constraints and the cash flow characteristics of the portfolio. The management of the portfolio should seek to optimize return while minimizing risk through diversification and asset allocation.

Cash Flow Expectations:

This portfolio provides a short term funding reserve for IBTTA to cover expenses related to special projects/initiatives that are not covered by the annual budget, or to replenish the checking account. As such, there are no known cash flow expectations; however, funds may be needed periodically in order to meet these needs. Any change in IBTTA's need for cash flows from this account should be addressed through a change in this policy statement.

Time Horizon:

This portfolio is considered short term in its investment time horizon. The investment portfolio as a whole should reflect a maturity target of approximately five years or less.

Tax Status:

IBTTA is a non-profit organization and is thus exempt from taxes. Investment decisions should reflect this tax status when purchasing or selling securities.

Risk Tolerance / Asset Allocation:

This portfolio is classified as conservative based on the stated objectives of preservation of capital and liquidity. The recommended target asset allocation seeks to achieve these objectives while maximizing returns and minimizing volatility.

Asset Class	Target Allocation
Fixed Income	99.0
Cash	1.0

The fixed income asset class will target a weighted average maturity of no greater than five years and a weighted average credit rating of no lower than AA.

Eligible Investments and Restrictions:

The following are eligible investments for this investment portfolio:

- Cash Equivalents
  - Treasury Bills
  - Money Market Funds
  - FDIC Insured CDs
  - FDIC Insured Money Market Accounts
- Fixed Income Securities (rated investment grade by Moodys, S&P, or Fitch)
  - U.S. Government and Agency Securities
  - Fixed Income Securities of Foreign Governments and Corporations (up to 35% of the market value of the fixed income portion of the portfolio)
  - Corporate Notes and Bonds
  - Mortgage Backed Bonds
  - The fixed income portion of the portfolio shall have a weighted average maturity of 3 years or less.
  - The weighted average credit quality of the fixed income portion of the portfolio shall be not less than an 'AA' rating.
- Mutual Funds or Exchange Traded Funds (including similar pooled investments and separately managed accounts) shall be selected on the basis that they invest in those securities deemed to be allowable above.
- Diversification
  - No more than 10% of the portfolio combined may be in the securities of any one issuer with the exception of obligations of the US Government and its agencies, and federally insured instruments.
  - No more than 20% of the portfolio combined may be in the securities of a particular industry.

Benchmarking:

1. The portfolio will be compared to a benchmark comprised of the Barclays Capital Aggregate Bond Index, Barclays Capital Gov. 1-3 Year Bond Index, and the Merrill Lynch Three Month US Treasury Bill Index. Weights will be applied to each index based on the target allocation to each broad asset class.

2. The investment advisor will provide a benchmark for each fund and separately managed account held within the portfolio.

<u>Long-Term Portfolio Reserve – Guidelines and Restrictions</u>

Statement of Objectives:
The primary objectives of this portfolio, in order of importance, are:

- Safety: Investments of the Association shall be undertaken in a manner that seeks to ensure the preservation of capital in the overall portfolio. To attain this objective, diversification along credit and maturity lines is required in order that potential losses on individual securities do not exceed the income generated from the reminder of the portfolio.
- Return on Investments: The investment portfolio shall be designed with the objective of attaining a market rate of return throughout budgetary and economic cycles, taking into account the investment risk constraints and the cash flow characteristics of the portfolio. The management of the portfolio should seek to optimize return while minimizing risk through diversification and asset allocation.
- Liquidity: The investment portfolio will remain sufficiently liquid to enable the IBTTA to meet all operating requirements, which might be reasonably anticipated.

Cash Flow Expectations:

This portfolio is not expected to be a direct source of cash flow for IBTTA, however, withdrawals from this Reserve may be required in order to fund the Short Term Reserve. As such, an adequate amount of the fixed income portfolio will be held in short term securities. Any change in IBTTA's need for cash flows from this account should be addressed through a change in this policy statement.

Time Horizon:

This portfolio is considered long term in its investment time horizon. Investments seek long term growth as their primary objective. The funds in this account are not expected to be withdrawn in the next 5 years.

Tax Status:

IBTTA is a non-profit organization and is thus exempt from taxes. Investment decisions should reflect this tax status when purchasing or selling securities.

Risk Tolerance / Asset Allocation:

This portfolio is classified as moderate risk based on the stated objectives of long term growth of assets and preservation of capital. The recommended target asset allocation seeks to achieve these objectives while maximizing returns and minimizing volatility.

Asset Class	Minimum	Target Allocation	Maximum
Domestic Equity	26%	32.5%	36.5%
International Equity	14%	17.5%	18.5%
Fixed Income	39%	49%	59%
Cash	0%	1%	2%

The fixed income asset class will target a weighted average maturity of no greater than eight years and a weighted average credit rating of no lower than AA.

The domestic and international equity assets classes will reflect an allocation to all nine style boxes based on market capitalization (Large, Mid, Small) and style (Value, Blend, Growth.) The allocation to international equity will also include exposure to both developed and emerging markets.

Return Expectations:

Returns are expected to be commensurate with the risk tolerance and asset allocation of the investments and will reflect the portfolio's objectives of long term growth and stability. The portfolio performance will be gauged against a designated benchmark and is expected to track those benchmark returns over time.

Eligible Investments and Restrictions:

The following are eligible investments for this investment portfolio:

- Cash Equivalents
    - Treasury Bills
    - Money Market Funds
    - FDIC Insured CDs
    - FDIC Insured Money Market Accounts
- Fixed Income Securities (rated investment grade by Moodys, S&P, or Fitch)
    - U.S. Government and Agency Securities
    - Fixed Income Securities of Foreign Governments and Corporations (up to 35% of the market value of the fixed income portion of the portfolio)
    - Corporate Notes and Bonds
    - Mortgage Backed Bonds
    - The fixed income portion of the portfolio shall have a weighted average maturity of 10 years or less.
    - The weighted average credit quality of the fixed income portion of the portfolio shall be not less than an 'AA' rating.

- Equity Securities
    - Common Stocks
    - American Depository Receipts (ADRs) and Ordinary Shares of Non-U.S. Companies
- Mutual Funds or Exchange Traded Funds (including similar pooled investments and separately managed accounts) shall be selected on the basis that they invest in those securities deemed to be allowable above.
- Diversification
    - No more than 5% of the portfolio combined may be in the securities of any one issuer with the exception of obligations of the US Government and its agencies, and federally insured instruments.
    - No more than 20% of the portfolio combined may be in the securities of a particular industry.

The following are not eligible investments for this investment portfolio:
Purchasing the following:

- Private placement;
- Letter stock;
- Futures;
- Currency forwards;
- Options;
- Commodities;
- Securities whose issuers have filed a petition for bankruptcy.

Making the following transactions:

- Short sales
- Margin transactions
- Any speculative investment activities

Benchmarking:

3. The portfolio will be compared to a benchmark comprised of the Russell 3000 Index, FTSE All World Ex-U.S. Index, Barclays Capital Aggregate Bond Index, Barclays Capital Gov. 1-5 Year Bond Index, and the Merrill Lynch Three Month US Treasury Bill Index. Weights will be applied to each index based on the target allocation to each broad asset class.

4. The investment advisor will provide a benchmark for each fund and separately managed account held within the portfolio.

Rebalancing Procedures:

This portfolio will be rebalanced periodically to assure that the overall asset allocation target of the portfolio is maintained. Events including large deposits or withdrawals and significant market movements may trigger the need to rebalance the portfolio. Regardless of activity the portfolio will be reviewed on a quarterly basis at a minimum to assure the balance is adequately maintained. In order to minimize transaction costs, the manager will evaluate the benefit of rebalancing relative to the transaction cost. The advisor will maintain a rebalancing threshold of +/- 20% of the target allocation percentage for each asset class, with the exception of cash, which will have a rebalancing threshold of +/- 50% of the target.

<u>Total Operating Reserve Guidelines</u>

Monitoring:

The advisor will provide the IBTTA Finance Committee with a detailed report of the portfolio at least quarterly. The quarterly report will outline the following in a simple and graphical way:

- What have we invested where?

- How has our portfolio performed relative to our investment policy and designated benchmarks?
- What is the change in value of our portfolio over time (a quarter, a year, etc.)?
- What, if anything, should we be concerned about with respect to the market, our portfolio, or any other relevant factors?

Policy Revisions:

This policy will be formally reviewed annually to determine if the objectives, constraints, and allocations are appropriate and consistent with IBTTA's objectives. Additional conditions under which the policy might be amended include:

- A change in IBTTA's risk tolerance, timeline, tax status, or cash flow expectations
- Introduction of new investment vehicles
- A change in the objective of the portfolio

The IBTTA Finance Committee will work with the designated investment advisor to review the policy for its appropriateness after such changes, and will amend the policy when necessary.

Duties and Responsibilities:

The following parties to this policy will be charged with certain duties and responsibilities as it relates to management of the portfolio:

International, Bridge, Tunnel and Turnpike Association: Will be required to review and approve this Investment Policy Statement in its entirety. IBTTA will be responsible for working with a Designated Investment Adviser no less than annually to review and amend this policy statement. IBTTA is responsible for selecting an investment advisor who will comply with this policy statement, and is responsible for periodically reviewing the advisor's compliance with this policy statement.

Designated Investment Advisor: Will be responsible for implementing the investment strategy outlined in this policy statement by selecting investments and external managers that meet the investment criteria within this policy statement. The Designated Investment Advisor will be charged with timely reporting of investment performance to IBTTA. The Designated Investment Advisor is also required to perform all normal due diligence in selecting external investment managers, including a review of their ability to operate within the investment guidelines and restrictions outlined in this policy. The Designated Investment Advisor is responsible for selecting other appropriate parties as needed to implement this policy, including attorneys, custodians, and broker/dealers.

Investment Manager: Investment managers will be any party the Designated Investment Advisor selects to invest funds on behalf of IBTTA. For purposes of this policy, Investment Managers include Mutual Fund Managers, Exchange Traded Fund Managers, Separate Account Managers, Money Market Fund Managers, and any other party that the Investment Manager contracts to invest funds on behalf of IBTTA. The Investment Advisor is responsible for assuring that any Investment Manager selected is investing funds in a manner consistent with the eligible investments and restrictions outlined in this policy.

Authority:

IBTTA Board approval is required to make changes to this Investment Policy Statement.

Authorized agents for IBTTA for this account may direct transfers in or transfers out of the account governed by this policy. The authorized agents are: Executive Director of IBTTA and Director of Government Affairs of IBTTA.

Approval

I acknowledge that this Investment Policy accurately represents the guidelines and restrictions to which the International, Bridge, Tunnel and Turnpike Association Total Operating Reserve is to be managed.

_____ _____
PRINT NAME DATE

_____
SIGNATURE

_____ _____
PRINT NAME (Dennis Gogarty) DATE
President, Raffa Wealth Management, LLC

_____
SIGNATURE

Revisions adopted on these dates:
April 4, 2014
January 8, 2016
September 9, 2017

International Bridge, Tunnel and Turnpike Association
Executive Summary of Financial Results
For the Period Ending April 30, 2018

Description of Items	YTD Actual	2018 Budget	Variance - Actual v Budget	Actual as a % of Budget	2018 Forecast	2018 Budget	Variance - Actual v Budget	Actual as a % of Budget
Association Income								
Membership Dues	$ 2,521,265	$ 2,798,957	$ (277,692)	90%	$ 2,776,448	$ 2,798,957	$ (22,509)	99%
Meeting Income	1,179,103	2,357,319	(1,178,217)	50%	2,403,478	2,357,319	46,159	102%
Other Income	173	-	173	0%	2,135	-	2,135	
Total Income	$ 3,700,541	$ 5,156,276	$ (1,455,735)	72%	$ 5,182,061	$ 5,156,276	$ 25,785	101%
Association Expense								
Personnel & Benefits	$ 747,198	$ 2,372,266	$ (1,625,068)	31%	$ 2,372,266	$ 2,372,266	$ -	100%
Travel & Living	4,040	27,100	(23,060)	15%	47,100	27,100	20,000	174%
Program Related	212,471	779,900	(567,429)	27%	779,900	779,900	-	100%
Meeting Related								
Revenue Generating Meetings	102,703	1,322,700	(1,219,997)	8%	1,335,278	1,322,700	12,578	101%
Administrative Meetings	51,301	91,450	(40,149)	56%	91,450	91,450	-	100%
Office Administration	132,584	415,999	(283,415)	32%	434,359	415,999	18,360	104%
Association Administration	21,730	64,004	(42,274)	34%	64,004	64,004	-	100%
Total Expense	$ 1,272,027	$ 5,073,419	$ (3,801,392)	25%	$ 5,124,357	$ 5,073,419	$ 50,938	101%
Association Income over Expense Before Realized Investment Income	$ 2,428,514	$ 82,857	$ 2,345,658	2931%	$ 57,704	$ 82,857	$ (25,153)	70%
Realized Investment Income	13,327	12,000	1,327	111%	6,400	12,000	(5,600)	53%
Association Income over Expense Before Unrealized Investment Incon	$ 2,441,841	$ 94,857	$ 2,346,984	2574%	$ 64,104	$ 94,857	$ (30,753)	68%
Unrealized Investment Income	(31,829)	-	(31,829)	146%	-	-	-	0%
Association Income over Expense	$ 2,410,012	$ 94,857	$ 2,315,155	2541%	$ 64,104	$ 94,857	$ (30,753)	68%
Comprised of								
Meetings Meetings	$ 1,076,462	$ 1,034,619	$ 41,843		$ 1,068,200	$ 1,034,619	$ 33,581	
Programs Programs	$ (218,453)	(787,500)	569,047		(787,500)	$ (787,500)	-	
Administration Administration	1,552,003	(152,262)	1,704,265		(216,596)	(152,262)	(64,334)	
	$ 2,410,012	$ 94,857	$ 2,315,155		$ 64,104	$ 94,857	$ (30,753)	

International Bridge, Tunnel and Turnpike Association
Budget vs. Actuals: FY18
January - April, 2018

	Actual	Budget	over Budget	% of Budget
Income				
75xx Member Dues		59,120	(59,120)	0%
7501 Active Members	1,670,958	1,744,887	(73,929)	96%
7502 Associate Members	335,407	392,000	(56,593)	86%
7502.10 DBE/WBE/MBE/SBE	19,900	9,950	9,950	200%
Total 7502 Associate Members	**355,307**	**401,950**	**(46,643)**	**88%**
7503 Sustaining Members	495,000	593,000	(98,000)	83%
Total 75xx Member Dues	**2,521,265**	**2,798,957**	**(277,692)**	**90%**
76xx Meeting Revenues			-	
761x Registration Revenues		573,750	(573,750)	0%
7611 Delegate Registration (Non-Gov)	322,658	631,019	(308,362)	51%
7612 Delegate Registrations (Gov)	87,800		87,800	
7613 Guest Registrations	6,325		6,325	
7614 Exhibitor Registrations	750		750	
7615 Speaker Registraions	28,800		28,800	
7616 Technical Tours	6,120		6,120	
7617 Social Tours	2,000		2,000	
Total 761x Registration Revenues	**454,453**	**1,204,769**	**(750,317)**	**38%**
762x Non-Registration Revenues			-	
7621 Sponsorships	649,250	876,000	(226,750)	74%
7623 Exhibitor Space	75,400	276,550	(201,150)	27%
Total 762x Non-Registration Revenues	**724,650**	**1,152,550**	**(427,900)**	**63%**
Total 76xx Meeting Revenues	**1,179,103**	**2,357,319**	**(1,178,217)**	**50%**
77xx Investment Income - Total			-	
771x Investment Income - Portfolio			-	
7711 Dividends	5,841	20,000	(14,159)	29%
7712 Interest	3,823		3,823	
7713 Realized Gain/Loss	10,371		10,371	
7714 Unrealized Gain/Loss	(31,829)		(31,829)	
7716 Investment Advisory Fees	(6,708)	(8,000)	1,292	84%
Total 771x Investment Income - Portfolio	**(18,503)**	**12,000**	**(30,503)**	**-154%**
Total 77xx Investment Income - Total	**(18,503)**	**12,000**	**(30,503)**	**-154%**
Total 79xx Other Income	**173**	**-**	**173**	
Sponsorships	-		-	
Total Income	**3,682,039**	**5,168,276**	**(1,486,237)**	**71%**
Gross Profit	**3,682,039**	**5,168,276**	**(1,486,237)**	**71%**
Expenses				
8111 P&B - Salaries	551,467	1,646,100	(1,094,633)	34%

	Actual	Budget	over Budget	% of Budget
8112 P&B - At Risk Compensation		98,900	(98,900)	0%
8121 P&B - PR Taxes - FICA	42,239	100,534	(58,295)	42%
8122 P&B - PR Taxes - FUTA	493	600	(107)	82%
8123 P&B - PR Taxes - SUI	2,182	2,220	(38)	98%
8131 P&B - Group Health Insurance	64,201	186,500	(122,299)	34%
8132 P&B - Group Disability Ins	608	15,000	(14,392)	4%
8134 P&B - Life Insurance	26,451	40,000	(13,549)	66%
8141 P&B - Pension Contributions 401		100,000	(100,000)	0%
8143 P&B - Pension Expense 401K		1,000	(1,000)	0%
8151 P&B - Employee Parking	4,983	19,512	(14,529)	26%
8152 P&B - Employee Metrochecks	731	8,100	(7,369)	9%
8161 P&B - Consultants & Contractors	50,822	144,000	(93,178)	35%
8162 P&B - Payroll Service Charges	1,910	4,800	(2,890)	40%
8171 P&B - Professional Development	1,110	5,000	(3,891)	22%
	747,198	2,372,266	(1,625,068)	
8221 T&E - Airfare	2,404	13,000	(10,596)	18%
8222 T&E - Lodging	457	5,500	(5,043)	8%
8223 T&E - Rental Car		600	(600)	0%
8224 T&E - Parking and Other Trans	334	2,800	(2,466)	12%
8225 T&E - Meals	845	4,700	(3,855)	18%
8226 T&E - Incidentals		500	(500)	0%
	4,040	27,100	(23,060)	
8311 PR - Consulting Fees	61,809	296,000	(234,191)	21%
8312 PR - Consultants Expenses	228	7,400	(7,172)	3%
8320 PR - Promotion/Advertising	1,370	5,000	(3,630)	27%
8321 PR - Design		14,000	(14,000)	0%
8322 PR - Printing		8,450	(8,450)	0%
8323 PR - Postage	7	1,800	(1,793)	0%
8324 PR - Mailing		300	(300)	0%
8331 PR - Conference Registrations	4,400	3,000	1,400	147%
8332 PR - Hotel/Venue		1,000	(1,000)	0%
8333 PR - Photography/Video	1,125	1,000	125	113%
8334 PR - A/V	9,000	4,000	5,000	225%
8335 PR - Travel Expenses	1,509		1,509	
8341 PR - Reference Materials	2,785	13,700	(10,915)	20%
8351 PR - Tech Web Design	18,919	75,000	(56,081)	25%
8352 PR - Tech Development	67,938	175,000	(107,062)	39%
8355 PR - Tech Hosting Fees	42,765	174,000	(131,235)	25%
8361 PR - Telephone	196	250	(54)	78%
8365 PR - Computer Software/Hardware	420		420	
	212,471	779,900	(567,429)	

	Actual	Budget	over Budget	% of Budget
8411 MT - Outsourced Services	160	7,000	(6,840)	2%
8413 MT - Outsourced Meeting Mgt		2,000	(2,000)	0%
8414 MT Outsourced Security		2,500	(2,500)	0%
8420 MT - Promotion/Advertising	3,996	24,000	(20,004)	17%
8421 MT - Design	9,558	46,200	(36,642)	21%
8422 MT - Printing	3,372	35,000	(31,628)	10%
8423 MT - Postage	2,813	10,500	(7,687)	27%
8424 MT - Mailing		2,500	(2,500)	0%
8431 MT - Hotel/Venue	8,633	59,600	(50,967)	14%
8432 MT - Hotel Food/Beverage	15,608	491,000	(475,392)	3%
8433 MT - Photography/Video	814	9,500	(8,686)	9%
8434 MT - A/V Services	25,993	222,000	(196,007)	12%
8435 MT - Events	28,850	285,500	(256,650)	10%
8436 MT - Technical Tours	1,841	3,200	(1,359)	58%
8438 MT - Speaker/Consultant Fees	5,663	44,000	(38,337)	13%
8441 MT - Airfare	2,648	15,700	(13,052)	17%
8442 MT - Rental Car		200	(200)	0%
8443 MT - Other Trans	844	3,500	(2,656)	24%
8444 MT - Meals	6,480	8,500	(2,020)	76%
8445 MT- Incidentals	124	2,300	(2,176)	5%
8449 MT - Site Visits	2,852	3,500	(648)	81%
8451 MT - Awards/Recognition	2,130	4,500	(2,370)	47%
8452 MT- Sponsor Expenses	9,233	64,200	(54,967)	14%
8453 MT - Exhibitor Expenses	190	13,000	(12,810)	1%
8461 MT - Meeting Supplies	886	5,400	(4,514)	16%
8462 MT - Telephone	757	1,750	(993)	43%
8463 MT - Delivery and Freight	1	5,400	(5,399)	0%
8480 PayPal Fees	245		245	
8481 MT - Discount Fees VISA/MC	6,205	22,000	(15,795)	28%
8482 MT - Discount Fees AMEX	5,846	10,500	(4,654)	56%
8483 MT - Wire Transfer Fees	152	1,700	(1,548)	9%
8484 MT - Insurance	8,112	7,500	612	108%
	154,004	1,414,150	(1,260,146)	
8511 OA - Office Rent	96,878	311,949	(215,071)	31%
8512 OA - Add'l Office Passthroughs	3,751	17,000	(13,249)	22%
8521 OA - Office Telephone	2,187	6,000	(3,813)	36%
8522 OA - Staff Cell Phones	3,140	16,500	(13,360)	19%
8531 OA - Office Supplies	1,892	6,000	(4,108)	32%
8532 OA - Office Services	289	3,000	(2,711)	10%
8541 OA - Equipment Maint & Rental	2,890	9,000	(6,110)	32%
8542 OA - Purch Office Equip & Furn		3,000	(3,000)	0%

	Actual	Budget	over Budget	% of Budget
8551 OA - Postage, Delivery, Courier	276	1,500	(1,224)	18%
8563 OA - Printing Business Cards		400	(400)	0%
8564 OA - Printing Stationery		300	(300)	0%
8571 OA - Subscriptions/Reference	1,015	150	865	677%
8581 OA - On-line Services	10,674	24,500	(13,826)	44%
8582 OA - Computer Software	1,269	2,500	(1,231)	51%
8583 OA - Computer Hardware	805	10,000	(9,195)	8%
8591 OA - Depreciation Expense	7,520	4,200	3,320	179%
	132,584	415,999	(283,415)	
8611 AA - Audit and Legal Services	693	28,000	(27,307)	2%
8612 AA - Consulting Services	4,586	5,000	(414)	92%
8631 AA - Bank Service Charges	401	2,500	(2,099)	16%
8642 AA - Licenses and Fees	2,047	1,100	947	186%
8651 AA - Association Insurance	7,657	15,500	(7,843)	49%
8661 AA - Dues/Memberships	6,345	11,904	(5,559)	53%
	21,730	64,004	(42,274)	
Total Expenses	**1,272,027**	**5,073,419**	**(3,801,392)**	**25%**
Net Operating Income	**2,410,012**	**94,857**	**2,315,155**	**2541%**

Description of Items		2015 Actual	2016 Actual	2017 Forecast	2018 Budget
Income	Membership Dues	$ 2,526,673	$ 2,513,875	$ 2,722,497	$ 2,798,957
	Annual Meeting	$ 647,160	$ 857,683	$ 586,115	$ 928,350
	Workshops	$ 1,155,868	$ 1,174,188	$ 1,457,519	$ 1,428,970
	Other Income	$ 981	$ 586	$ 1,941	$ -
	Total Revenue	$ 4,330,682	$ 4,546,331	$ 4,768,073	$ 5,156,277

		2015 Actual	2016 Actual	2017 Forecast	2018 Budget
Expense	Personnel & Benefits	$ 1,879,005	$ 2,172,168	$ 2,385,599	$ 2,372,266
	Travel & Living	$ 11,409	$ 14,066	$ 27,193	$ 27,100
	Program Related	$ 619,695	$ 444,017	$ 544,056	$ 779,900
	Workshops	$ 703,331	$ 629,449	$ 715,693	$ 633,050
	Annual Meeting	$ 516,236	$ 659,651	$ 592,304	$ 689,650
	Administrative Meetings	$ 61,817	$ 74,462	$ 88,967	$ 91,450
	Office Administration	$ 407,057	$ 396,653	$ 413,841	$ 415,999
	Association Administration	$ 79,244	$ 467,030	$ 59,923	$ 64,004
	Total Expense	$ 4,277,794	$ 4,857,496	$ 4,827,576	$ 5,073,419
	Net Income Before Investment Income	$ 52,888	$ (311,165)	$ (59,503)	$ 82,858
	Realized Investment Income	$ 34,943	$ 35,513	$ 14,860	$ 12,000
Excess of Income over Expense before Unrealized Inv Inc		$ 87,831	$ (275,652)	$ (44,643)	$ 94,858
	Unrealized Investment Income	$ (59,606)	$ 70,036	$ 125,330	$ -
	Net Income After Investment Income	$ 28,225	$ (205,616)	$ 80,687	$ 94,858

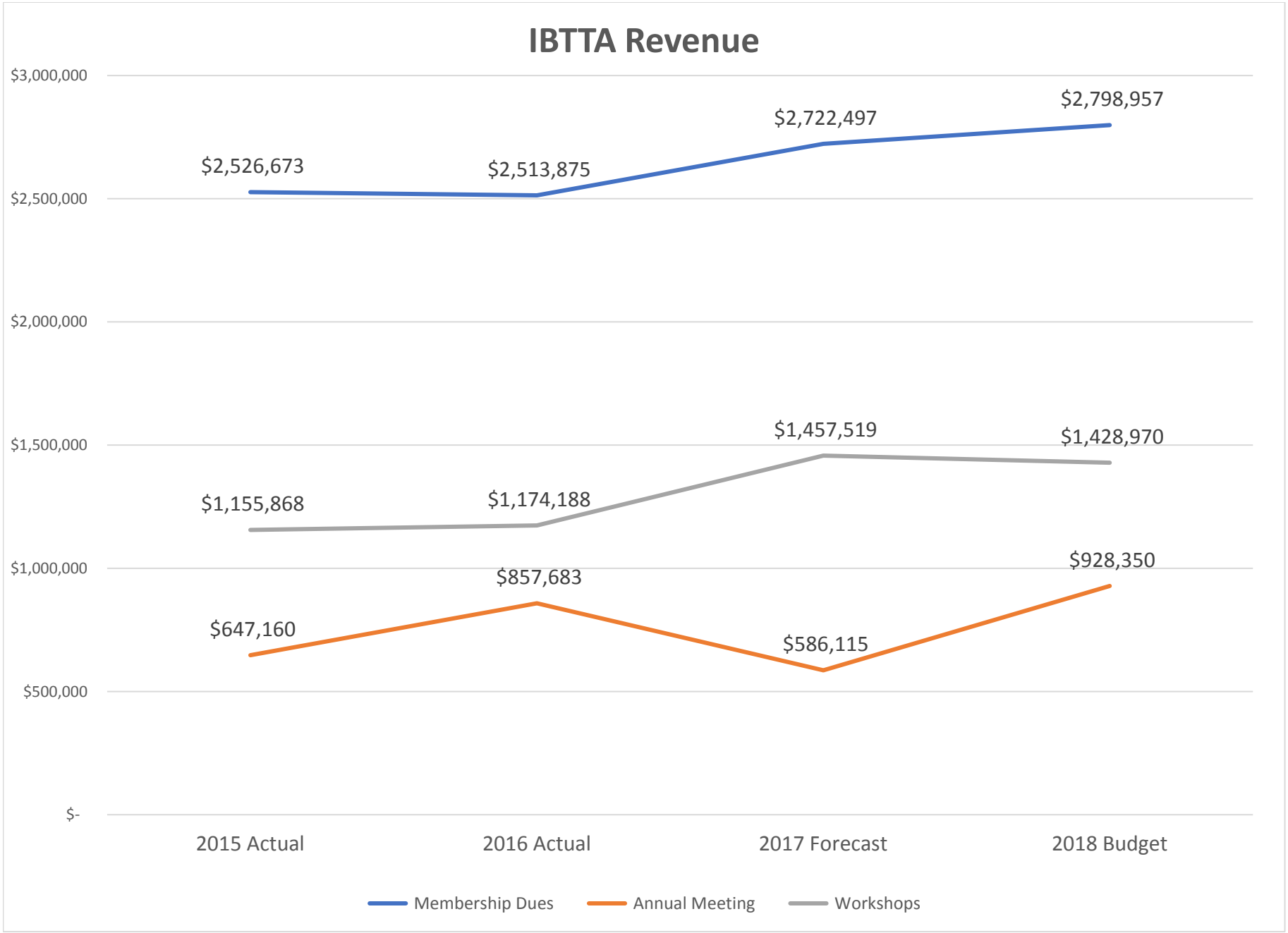
	2015 Actual	2016 Actual	2017 Forecast	2018 Budget
Membership Dues	58%	55%	57%	54%
Annual Meeting	15%	19%	12%	18%
Workshops	27%	26%	31%	28%
Other Income	0%	0%	0%	0%
	100%	100%	100%	100%

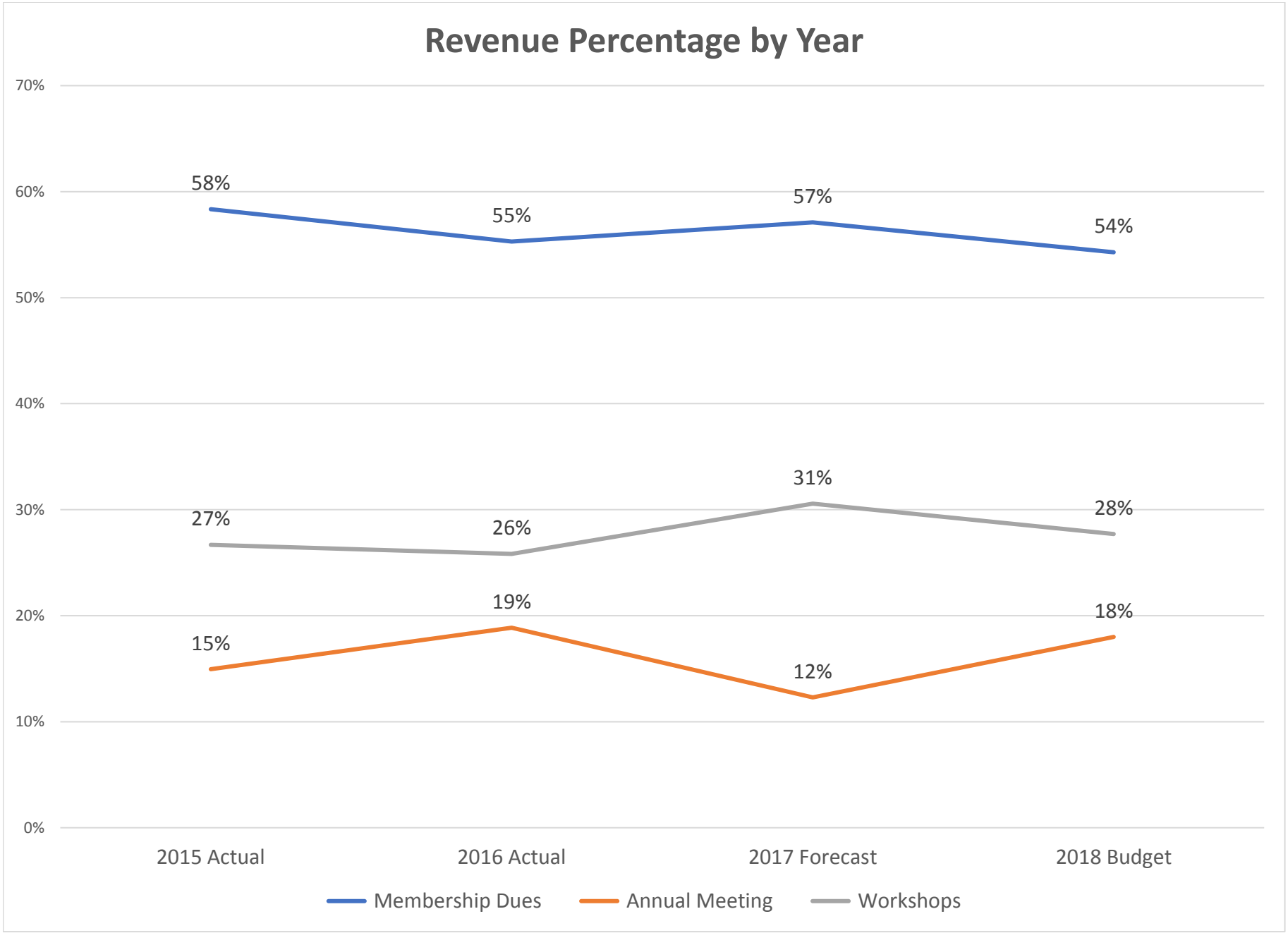
	2015 Actual	2016 Actual	2017 Forecast	2018 Budget
Personnel & Benefits	44%	45%	49%	47%
Meetings	29%	27%	27%	26%
Program Related	14%	9%	11%	15%
Office and Association Admin	11%	18%	10%	9%
Admin Meetings & Travel	2%	2%	2%	2%
Total Expense	100%	100%	100%	100%

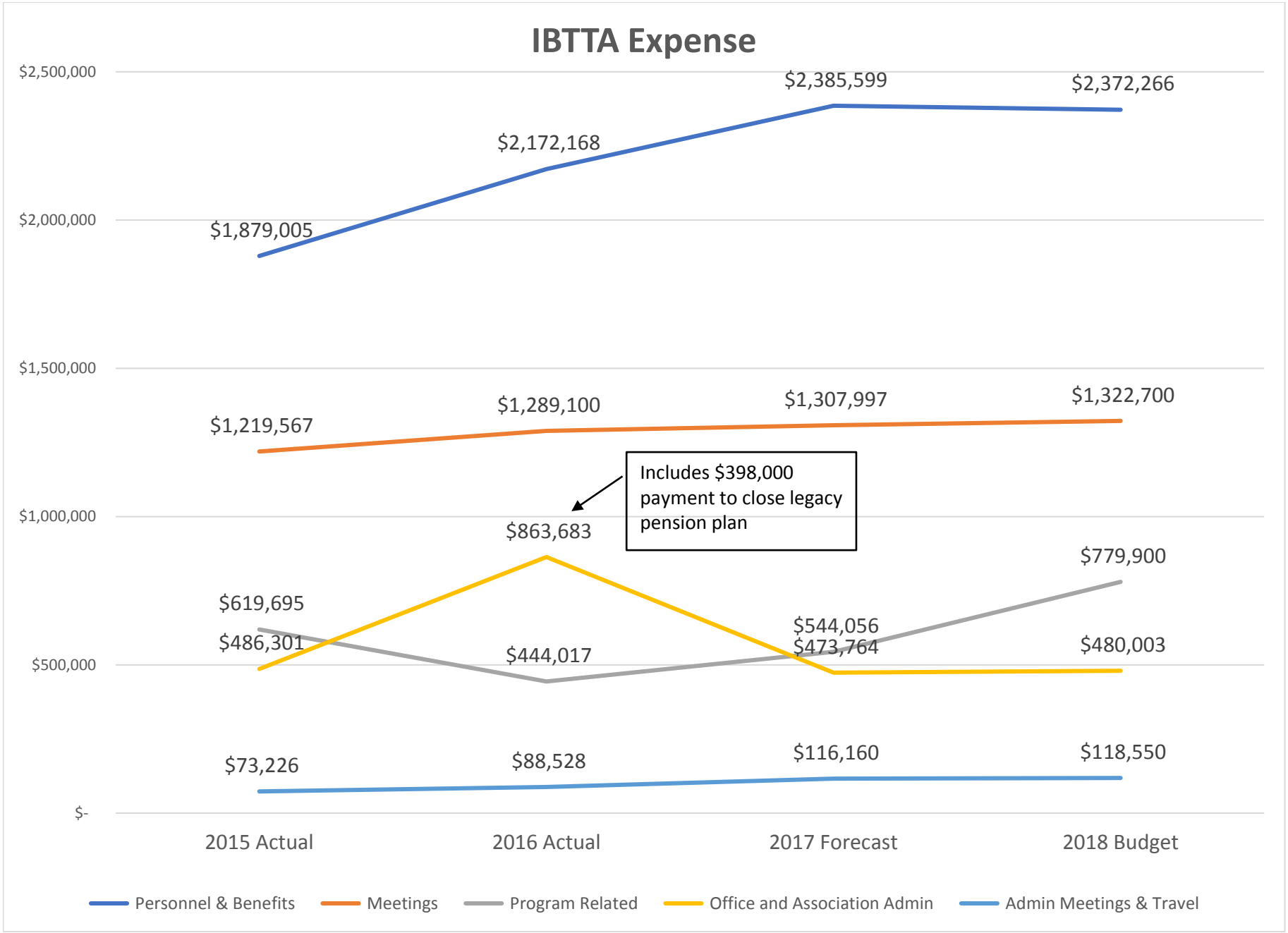
Additional View for Graphing

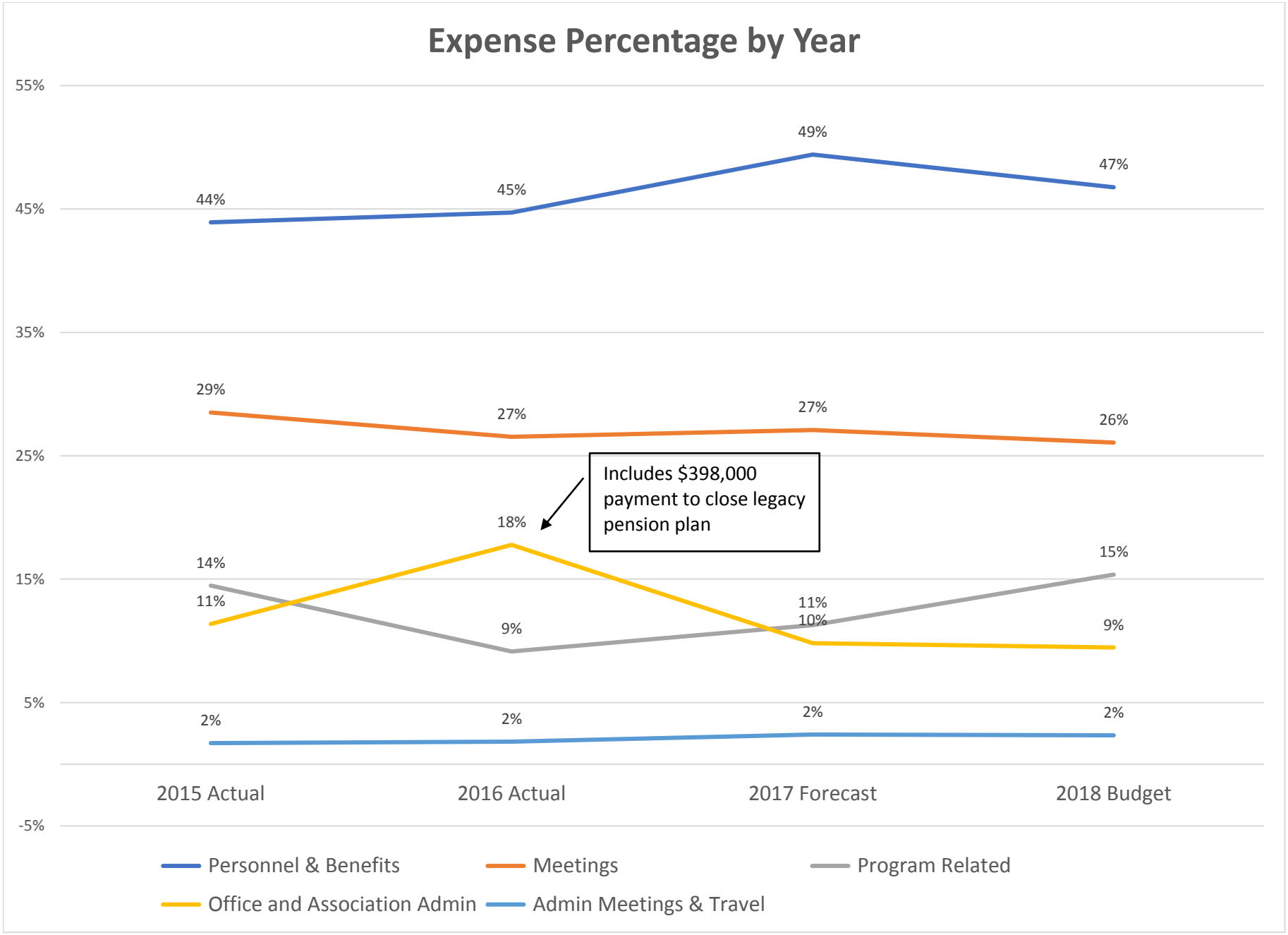
	2015 Actual	2016 Actual	2017 Forecast	2018 Budget
Personnel & Benefits	$ 1,879,005	$ 2,172,168	$ 2,385,599	$ 2,372,266
Meetings	$ 1,219,567	$ 1,289,100	$ 1,307,997	$ 1,322,700
Program Related	$ 619,695	$ 444,017	$ 544,056	$ 779,900
Office and Association Admin	$ 486,301	$ 863,683	$ 473,764	$ 480,003
Admin Meetings & Travel	$ 73,226	$ 88,528	$ 116,160	$ 118,550
Total Expense	4,277,794	4,857,496	4,827,576	5,073,419

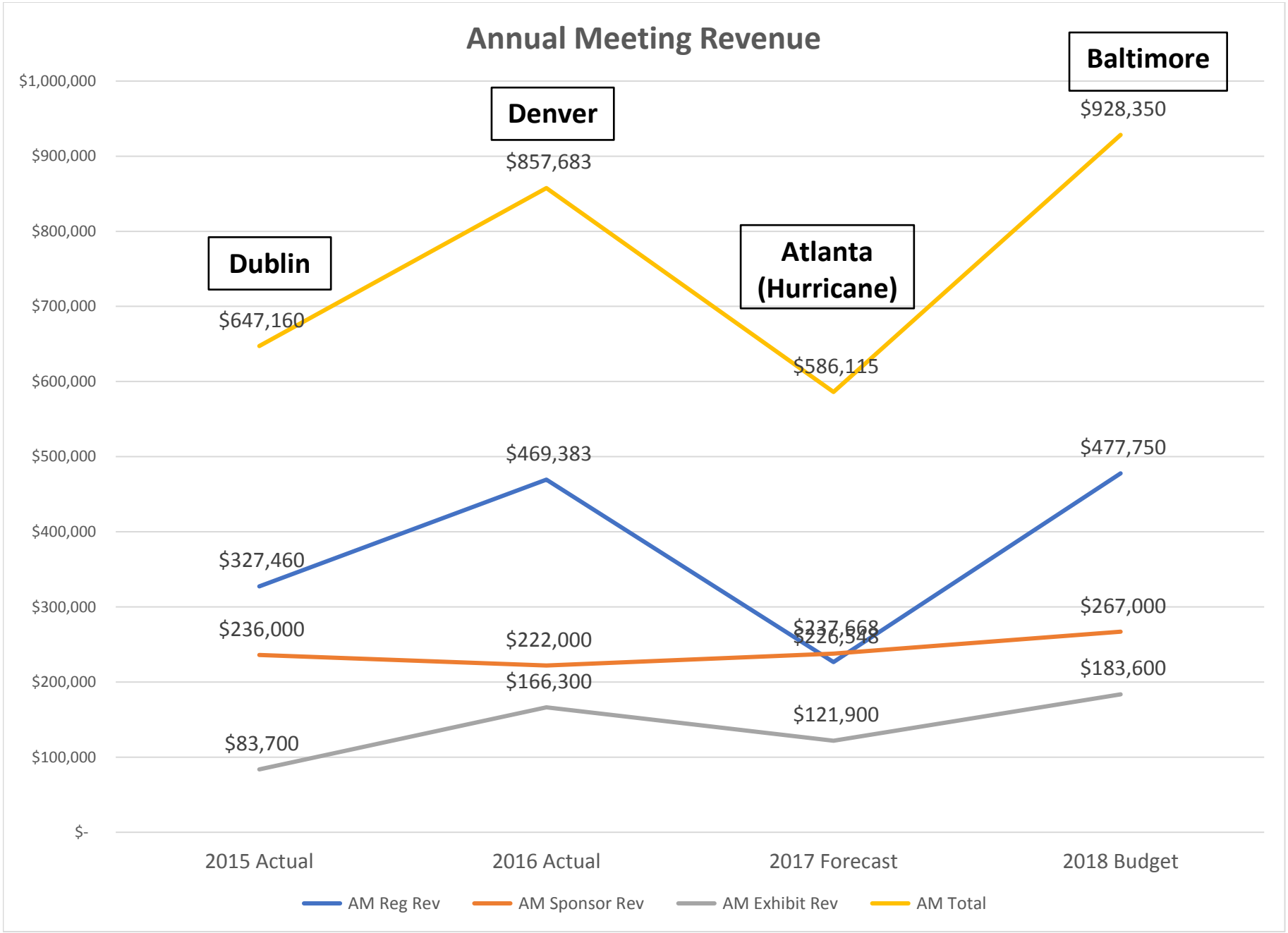
Description of Items	2015 Actual	2016 Actual	2017 Forecast	2018 Budget
AM Reg Rev	$ 327,460	$ 469,383	$ 226,548	$ 477,750
AM Sponsor Rev	$ 236,000	$ 222,000	$ 237,668	$ 267,000
AM Exhibit Rev	$ 83,700	$ 166,300	$ 121,900	$ 183,600
AM Total	$ 647,160	$ 857,683	$ 586,115	$ 928,350
Workshop Reg Rev	$ 627,438	$ 644,688	$ 807,955	$ 727,020
Workshop Sponsor Rev	$ 468,830	$ 442,000	$ 552,164	$ 609,000
Workshop Exhibit Rev	$ 59,600	$ 87,500	$ 97,400	$ 92,950
Workshop Total	$ 1,155,868	$ 1,174,188	$ 1,457,519	$ 1,428,970

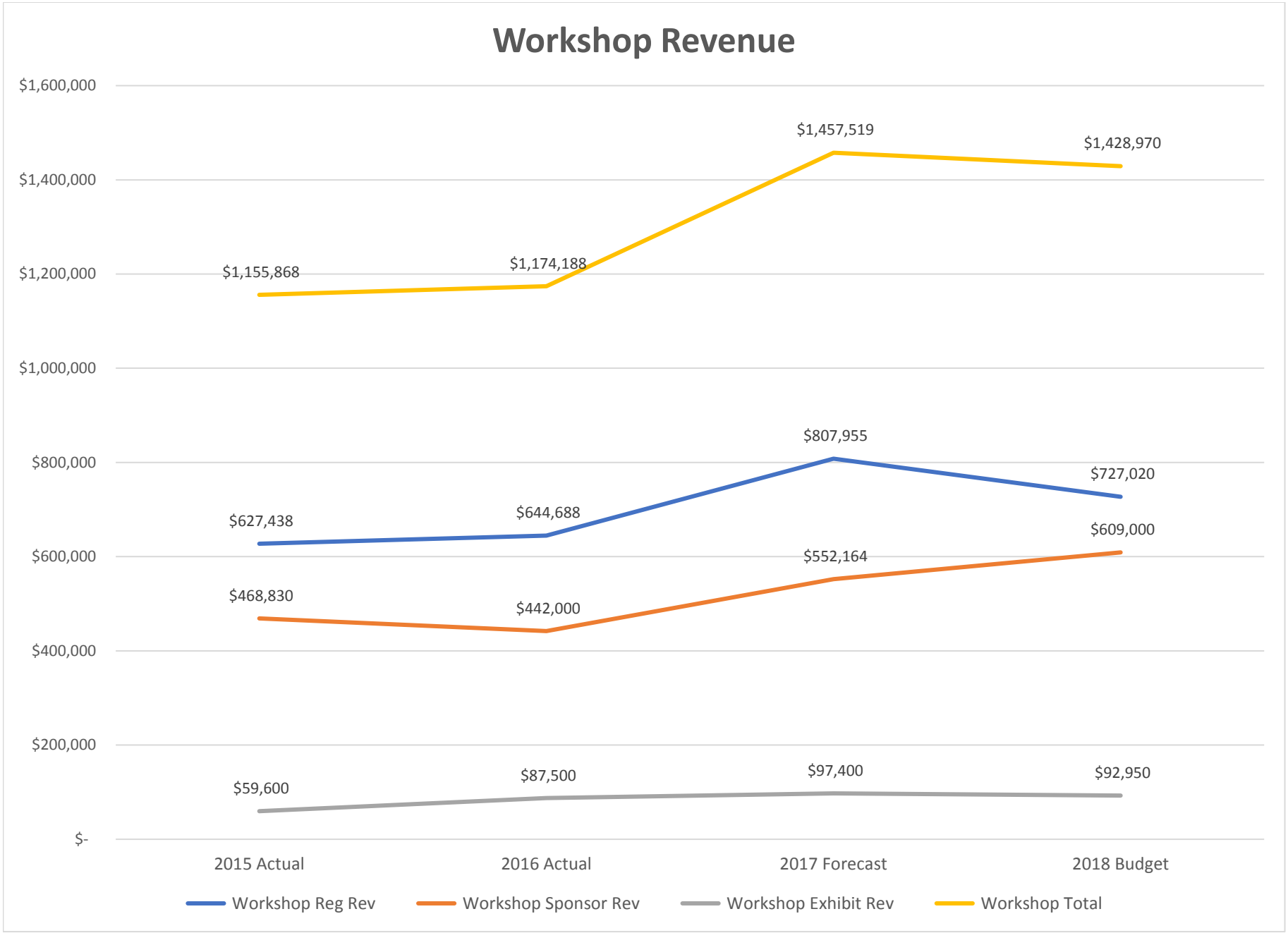

IBTTA Revenue
$3,000,000
$2,500,000
$2,000,000
$1,500,000
$1,000,000
$500,000
$-
$2,526,673
$2,513,875
$2,722,497
$2,798,957
$1,155,868
$1,174,188
$1,457,519
$1,428,970
$647,160
$857,683
$586,115
$928,350
2015 Actual
2016 Actual
2017 Forecast
2018 Budget
Membership Dues
Annual Meeting
Workshops

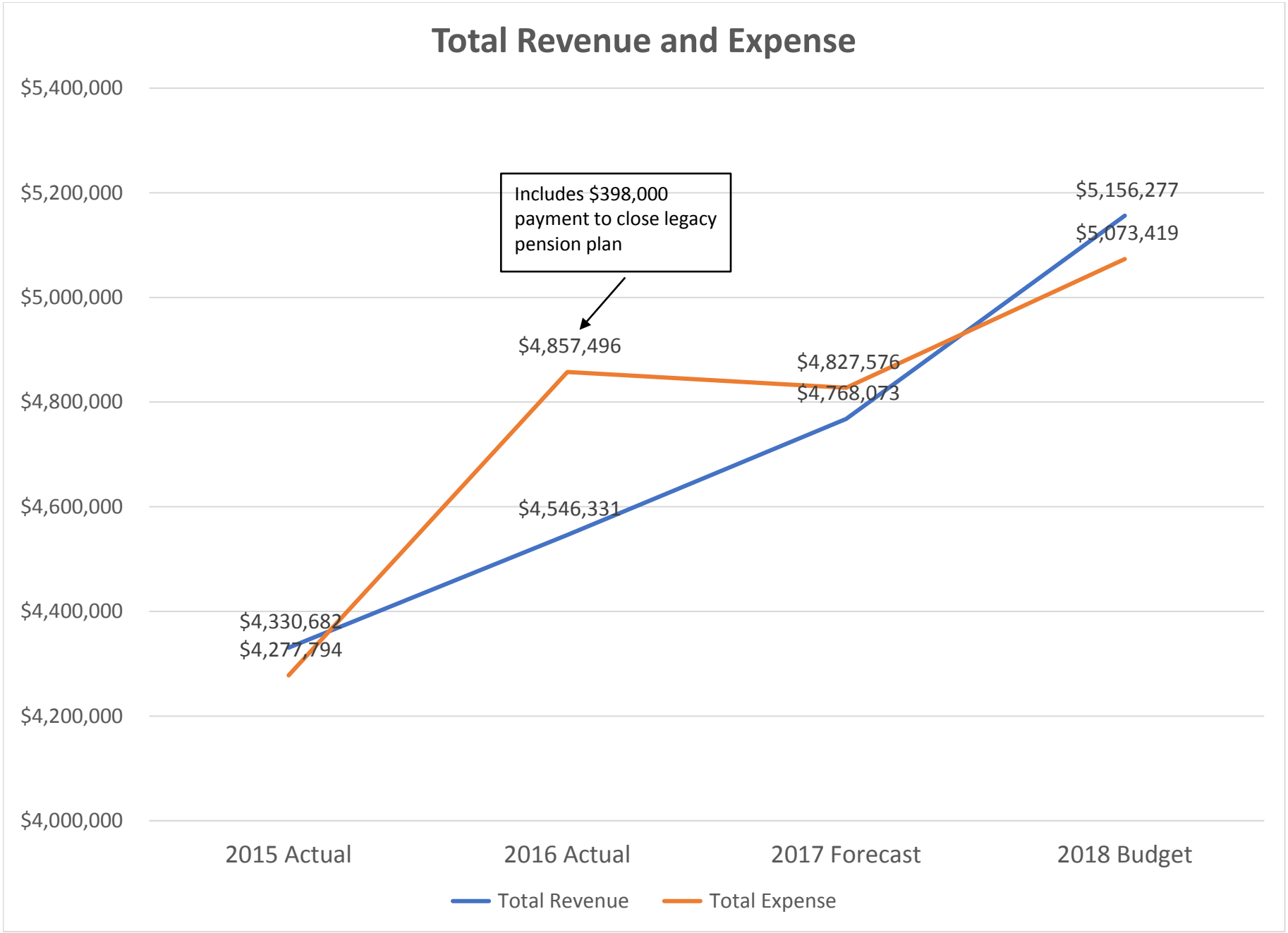

Revenue Percentage by Year
70%
60%
50%
40%
30%
20%
10%
0%
58%
55%
57%
54%
27%
26%
31%
28%
15%
19%
12%
18%
2015 Actual
2016 Actual
2017 Forecast
2018 Budget
Membership Dues
Annual Meeting
Workshops


IBTTA Expense
$2,500,000
$2,000,000
$1,500,000
$1,000,000
$500,000
$-
$1,879,005
$2,172,168
$2,385,599
$2,372,266
$1,219,567
$1,289,100
$1,307,997
$1,322,700
$863,683
Includes $398,000 payment to close legacy pension plan
$619,695
$486,301
$444,017
$544,056
$473,764
$779,900
$480,003
$73,226
$88,528
$116,160
$118,550
2015 Actual
2016 Actual
2017 Forecast
2018 Budget
Personnel & Benefits
Meetings
Program Related
Office and Association Admin
Admin Meetings & Travel


Expense Percentage by Year
55%
45%
35%
25%
15%
5%
-5%
44%
45%
49%
47%
29%
27%
27%
26%
14%
18%
11%
9%
11%
10%
15%
9%
2%
2%
2%
2%
Includes $398,000 payment to close legacy pension plan
2015 Actual
2016 Actual
2017 Forecast
2018 Budget
Personnel & Benefits
Meetings
Program Related
Office and Association Admin
Admin Meetings & Travel


Annual Meeting Revenue
Baltimore
Denver
Dublin
Atlanta (Hurricane)
$928,350
$857,683
$647,160
$586,115
$469,383
$477,750
$327,460
$236,000
$222,000
$237,668
$226,548
$267,000
$166,300
$183,600
$121,900
$83,700
$1,000,000
$900,000
$800,000
$700,000
$600,000
$500,000
$400,000
$300,000
$200,000
$100,000
$-
2015 Actual
2016 Actual
2017 Forecast
2018 Budget
AM Reg Rev
AM Sponsor Rev
AM Exhibit Rev
AM Total


Workshop Revenue
$1,600,000
$1,400,000
$1,200,000
$1,000,000
$800,000
$600,000
$400,000
$200,000
$-
$1,155,868
$1,174,188
$1,457,519
$1,428,970
$627,438
$644,688
$807,955
$727,020
$468,830
$442,000
$552,164
$609,000
$59,600
$87,500
$97,400
$92,950
2015 Actual
2016 Actual
2017 Forecast
2018 Budget
Workshop Reg Rev
Workshop Sponsor Rev
Workshop Exhibit Rev
Workshop Total


Total Revenue and Expense
$5,400,000
$5,200,000
$5,000,000
$4,800,000
$4,600,000
$4,400,000
$4,200,000
$4,000,000
Includes $398,000 payment to close legacy pension plan
$4,857,496
$4,827,576
$4,768,073
$5,156,277
$5,073,419
$4,546,331
$4,330,682
$4,277,794
2015 Actual
2016 Actual
2017 Forecast
2018 Budget
Total Revenue
Total Expense

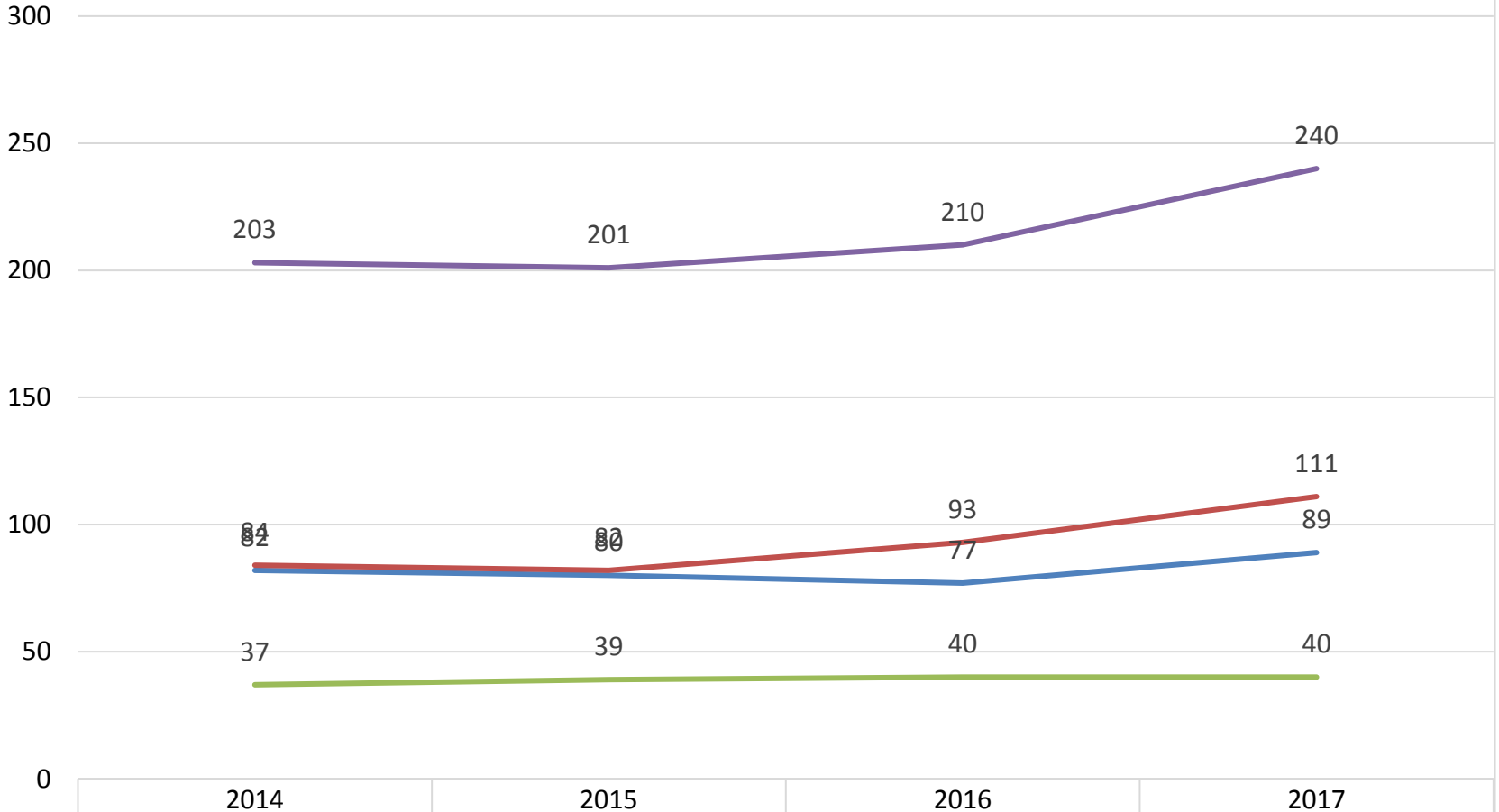
ORGANIZATIONS

	2014	2015	2016	2017
Active Renew	78	73	71	75
Associate Renew	60	68	71	82
Sustaining Renew	37	38	38	39
Active New	4	7	6	14
Associate New	24	14	22	29
Sustaining New	0	1	2	1
TOTAL	203	201	210	240
CANCELLED ACTIVE	3	10	8	2
CANCELLED ASSOCIATE	18	14	12	12
CANCELLED SUSTAINING	4	0	1	0
TOTAL CANCELLED	25	24	21	14
Active	82	80	77	89
Associate	84	82	93	111
Sustaining	37	39	40	40
TOTAL	203	201	210	240
Total RENEW	175	179	180	196
Total NEW	28	22	30	44
Percent "NEW"	14%	11%	14%	18%
Percent "CANCELLED"	12%	12%	10%	6%
Percent "ACTIVE"	40%	40%	37%	37%
Percent "ASSOCIATE"	41%	41%	44%	46%
Percent "SUSTAINING"	18%	19%	19%	17%
Pct. increase organizations or dues	2%	-1%	4%	14%
ACTIVE RETENTION RATE	96%	89%	89%	97%
ASSOCIATE + SUST. RETENTION RATE	82%	88%	90%	91%
TOTAL RETENTION RATE	88%	88%	90%	93%

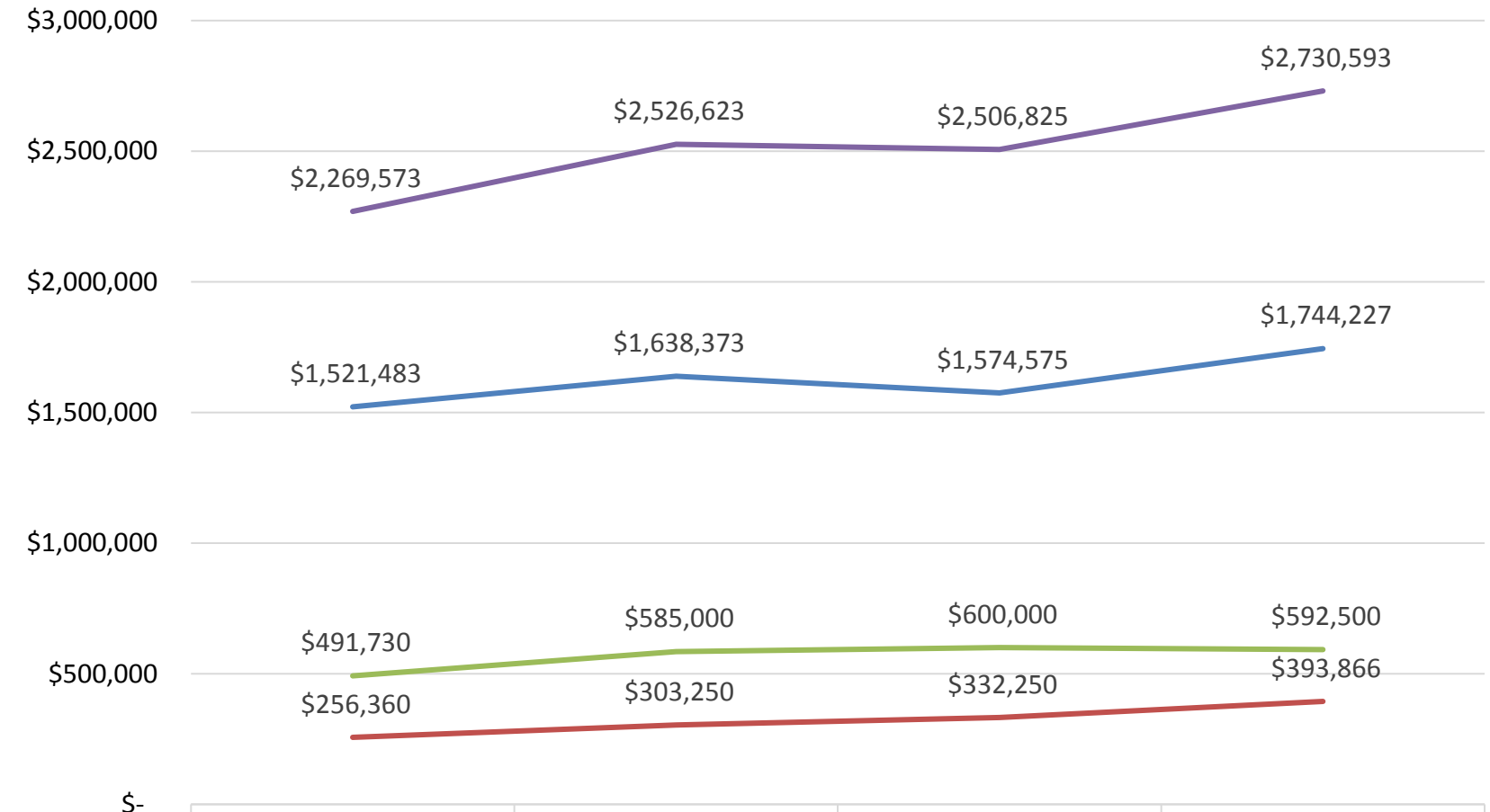
DOLLARS

	2014	2015	2016	2017
Active Renew	$ 1,484,690	$ 1,519,045	$ 1,530,625	$ 1,573,006
Associate Renew	$ 253,860	$ 267,750	$ 271,000	$ 317,990
Sustaining Renew	$ 491,730	$ 570,000	$ 570,000	$ 585,000
Active New	$ 36,793	$ 119,328	$ 43,950	$ 171,221
Associate New	$ 2,500	$ 35,500	$ 61,250	$ 75,876
Sustaining New	$ -	$ 15,000	$ 30,000	$ 7,500
TOTAL	$ 2,269,573	$ 2,526,623	$ 2,506,825	$ 2,730,593
CANCELLED ACTIVE	$ 9,347	$ 142,267	$ 142,936	$ 33,598
CANCELLED ASSOCIATE	$ 95,270	$ 46,000	$ 41,000	$ 30,000
CANCELLED SUSTAINING	$ 53,160	$ -	$ 15,000	$ -
TOTAL CANCELLED	$ 157,777	$ 188,267	$ 198,936	$ 63,598
Active	$ 1,521,483	$ 1,638,373	$ 1,574,575	$ 1,744,227
Associate	$ 256,360	$ 303,250	$ 332,250	$ 393,866
Sustaining	$ 491,730	$ 585,000	$ 600,000	$ 592,500
TOTAL	$ 2,269,573	$ 2,526,623	$ 2,506,825	$ 2,730,593
Total RENEW	$ 2,230,280	$ 2,356,795	$ 2,371,625	$ 2,475,996
Total NEW	$ 39,293	$ 169,828	$ 135,200	$ 254,597
Percent "NEW"	2%	7%	5%	9%
Percent "CANCELLED"	7%	7%	8%	2%
Percent "ACTIVE"	67%	65%	63%	64%
Percent "ASSOCIATE"	11%	12%	13%	14%
Percent "SUSTAINING"	22%	23%	24%	22%
Pct. increase organizations or dues	5%	11%	-1%	9%
ACTIVE RETENTION RATE				
ASSOCIATE + SUST. RETENTION RATE				
TOTAL RETENTION RATE				

Number of IBTTA Members



	2014	2015	2016	2017
Active	82	80	77	89
Associate	84	82	93	111
Sustaining	37	39	40	40
TOTAL	203	201	210	240



	2014	2015	2016	2017
Active	$1,521,483	$1,638,373	$1,574,575	$1,744,227
Associate	$256,360	$303,250	$332,250	$393,866
Sustaining	$491,730	$585,000	$600,000	$592,500
TOTAL	$2,269,573	$2,526,623	$2,506,825	$2,730,593

DRAFT IBTTA Financial Forecast 2019-2021 v2 2018.6.16.xlsx

PLEASE NOTE: You are looking at EXPENSE SCENARIOS that DON'T ACCOUNT FOR FUTURE REVENUE GROWTH.
DON'T PANIC: Revenues will grow in 2019-2021, but we have not yet accounted for revenue growth in these scenarios.

Description of Items		2018 Budget	2019	Dif '19 - '18	2020	Dif '20 - '19	2021	Dif '21 - '20
Association Income								
Membership Dues *		$ 2,798,957	$ 2,798,957	$ -	$ 2,798,957	$ -	$ 2,798,957	$ -
Meeting Income *		2,357,321	2,357,321	$ -	2,357,321	$ -	2,357,321	$ -
Other Income	A	-	-	$ -	-	$ -	10,000	$ 10,000
Total Income *		$ 5,156,278	$ 5,156,278	$ -	$ 5,156,278	$ -	$ 5,166,278	$ 10,000
				$ -		$ -		$ -
Association Expense				$ -		$ -		$ -
Personnel & Benefits	1	$ 2,372,266	$ 2,731,434	$ 359,168	$ 2,961,677	$ 230,243	$ 3,050,527	$ 88,850
Travel & Living	2	27,100	27,642	$ 542	28,195	$ 553	28,759	$ 564
Program Related	3	779,900	767,560	$ (12,340)	731,911	$ (35,649)	746,549	$ 14,638
Revenue Generating Meetings	4	1,322,700	1,349,154	$ 26,454	1,376,137	$ 26,983	1,403,660	$ 27,523
Administrative Meetings	5	91,450	93,279	$ 1,829	95,145	$ 1,866	97,047	$ 1,903
Office Administration	6	415,999	424,319	$ 8,320	432,805	$ 8,486	341,461	$ (91,344)
Association Administration	7	64,004	65,284	$ 1,280	66,590	$ 1,306	67,922	$ 1,332
		$ 5,073,419	$ 5,458,672	$ 385,253	$ 5,692,460	$ 233,788	$ 5,735,926	$ 43,466
Association income over expense before investment income		$ 82,859	$ (302,394)	$ (385,253)	$ (536,182)	$ (233,788)	$ (569,648)	$ (33,466)

A 2021 initial revenues from Toll Miner database

1 2019 adds 2 FTE: Corporate Secretary/Foundation Mgr & Research Associate for Toll Miner
2020 adds 1 add'l FTE: Foundation Mgr; 3% overall increase

2 2% overall cost increase

3 2% cost increase overall; 2019 less $26k in duplicate AMS hosting, reduce AMS devel $50k; add $25k Toll M
2019 creation of new SME Pools for: Technology, Lobbying ($25k/year)
2020 decrease Toll Miner $50k

4 2% overall cost increase; 4 workshops + annual meeting each year

5 2% overall cost increase

6 2% overall cost increase; 2020 office move - cost offset by rent savings; 2021 rent savings
from small office at lower rate/sq ft ($100k)

7 2% overall cost increase

*PLEASE NOTE: You are looking at EXPENSE SCENARIOS that DON'T ACCOUNT FOR FUTURE REVENUE GROWTH.
* DON'T PANIC: Revenues will grow in 2019-2021, but we have not yet accounted for revenue growth in these scenarios.

IBTTA Finance Standing Committee of the Board

2018 Planning Report to President Elect Tim Stewart

September 2017

I. Committee and Sub Committees - STRUCTURE

a. Finance Committee

i. Number of Member Representatives

- **The Committee presently comprises 25 members. This is far too large to ensure a workable group with active participation by all.**
- **Our organization and its finances would be better served with a committee numbering 15. This may be difficult to affect in one year and a phasing in may be necessary.**

ii. Committee Member Representation

- **Committee membership should be from a cross-section of Active, Sustaining, and Associate Members.**
- **Membership should also include Active, Sustaining, and Associate Members with financial backgrounds.**

b. Sub Committees

i. **Presently the Finance Committee has two (2) Sub Committees – the Investment Sub Committee and the Membership Sub Committee.**

- **It is recommended that the Investment Sub Committee continue in 2018 as a "Sub" to the Finance Committee.**
- **Recently there have been suggestions that the Membership Sub Committee be established as a standalone committee. It is recommended that this be the subject of further discussion.**

II. Staff Liaisons

a. Pat Jones, Wanda Klayman & Cathy Pennington

III. Committee Charter/Mission Statement

a. **Attached is a copy of the current Finance Committee Mission Statement. This statement has been in existence for a number of years and it should be reviewed and updated accordingly.**

IV. 2018 Goals

The Finance Committee reviews and recommends the yearly Operating Budget and monitors the financial and investment activities of the organization. In addition, it promotes membership growth and revenue enhancement.

2018 Goals

1. **Preparation of a Multi-Year financial plan.**
2. **Develop and monitor the performance and responsibilities (including CFO duties) of the Renner Team to ensure an acceptable performance level relating to Finance Committee issues.**
3. **Association Risk Assessment - the purpose of which is to identify, and/or plan to avoid/mitigate, hazards that could have a negative effect and outcome on the organization's ongoing ability to conduct business. Such as Business Interruption, Cyber Security, etc.**
4. **Raise the Reserve Ratio to the 50% goal.**

V. Funding

a. **Although the need for additional funding is not anticipated at this time, the implementation of the Finance Committee 2018 Goals may in whole or in part require some financial allocation.**

###########

Government Affairs Committee

Agenda
Saturday, June 23, 2018
11:00am – 12:00pm
Harrisburg, PA

1. Call to Order
2. Self-introductions
3. Update on Congressional & Federal activities
4. Discussion of Legislative priorities
5. Remaining action items
6. Other Business
7. Adjourn

MINUTES
International Bridge, Tunnel and Turnpike Association
Meeting of Government Affairs Committee
4 pm EDT, May 9, 2018 -Teleconference

Attending:	Mark Compton	Larry Bankert
	Susan Buse	Buddy Croft
	Butch Eley	Jim Ely
	Mark Hicks	Ken Philmus
	Tim Stewart	Kary Witt
	George Zilocchi	
Staff:	Neil Gray	Kathy Ruffalo

Chair Mark Compton called the meeting to order at 4:00 PM

Kathy Ruffalo gave an update on Capitol Hill activities – there is little expectation of a significant broad-based "infrastructure" package this year – there will be action on the FAA reauthorization and the Water Resources Development Act (WRDA) which will address specific "infrastructure" segments and may serve as vehicles for other infrastructure related provisions.

Because the hanging issue is how to pay for significant infrastructure efforts there may be an opportunity for conversations about tolling since enabling it doesn't actually cost the federal government anything.

While there may not be clear opportunities for impacting a specific piece of legislation on the highway program this year, we will remain observant for opportunities that might arise and continue to work with Hill staff as they work their way through the session.

No replacement for D.J. Gribbin has been announced and it would appear that the White House attention on infrastructure has moved onto other issues.

The group discussed the relative lack of focus on issues we can impact at the Federal level leading to a conversation about how we might be more impactful at the state level helping to engender more conversation about tolling opportunities. Stronger education of local "influencers" is needed – not just the legislatures/DOT/Governors, what are we/can we be doing along these lines?

Call ended at 4:48 PM

Action items:

- Hold an in-person meeting in conjunction with Board Meeting in Harrisburg, PA (time has been reserved in the Board Meeting program on Saturday, June 23, 2018, 11:00am – 12:00pm)

- Neil will reach out to FHWA staff exploring if they can share info about states that were interested in the ISRRPP program but did not apply.

- Share a copy of the existing Memorandum of Understanding (MOU) between IBTTA and AASHTO

  Follow-up – I have spoken with Cindi Essenmacher and she cannot share this information – even in their briefing to the FHWA Administrator last week they didn't share this with their own leadership. Is a reflection of the extreme sensitivity many DOT's have for being seen even showing interest in the topic in advance of fall elections.

  FHWA anticipates reissuing the ISRRPP availability notice in within the next 6 weeks and they will adopt a rolling application process. They appreciate that the political sensitivity is coming from the state legislative offices, the Governors and the legislatures, and they are considering how best to provide information/education/outreach to these folks. I have volunteered IBTTA's assistance in any fashion that would be helpful to their efforts.

Respectfully submitted,

Neil Gray
Director of Government Affairs

Call with Susan Buse, Bill Cramer and Neil Gray

May 24, 2018, 3:30 PM

This call was a follow-up to the Government Relations Committee call on May 9th. During the GR call we concluded that it is unlikely that the Congress will advance significant legislation in 2018 relating to the highway program though we will remain alert for opportunities to interject Interstate tolling into any conversations or actions that might arise.

Reflecting the uncertain state of federal highway financing, it is apparent that more focus will be going to the state and local governments trying to meet their basic transportation needs. The GR Committee talked about increasing focus on sharing information at/to the state level.

Susan Buse had a particular set of thoughts on this approach, and since any outreach communications would likely interact with the Communications team's efforts I thought it would be helpful to have Bill Cramer engaged in the conversation to ensure we weren't competing with efforts already planned or underway.

Susan made clear that her thoughts/concerns were related to sharing information with the political leadership of the State and local governments as opposed to the State DOT's. This is in tune with FHWA's findings related to the low response rate for the ISRRPP opportunity. The prevailing reason for not participating in the program was the reluctance and political concerns of the Governors and the legislatures – not the DOT's.

Susan offered the following points:

She is not suggesting anything like a major media campaign

1) FHWA had to explore why states didn't respond to an opportunity (ISRRPP)
2) Interviews from CT legislators concerning the tolling efforts in that state were very distressing and dismissive of tolling, and showed a profound lack of understanding of tolling.
3) As discussed in the GR call – if the Feds aren't pursuing highway legislation anytime soon, creating a lull, should we not use this as an opportunity to focus on the states?

Surveys show that the public tends to favor tolling once they are exposed to it – how can we better communicate this?

The AASHTO/IBTTA webinar was very good – and shows that there is a commonality and cooperation between the State DOT's and the tolling operators. While this is good the DOT's are subject to the political concerns and leadership of their respective states.

While the FHWA is going to target political leadership, Susan is suggesting more focus on non-elected leadership; community leaders, other professional organizations, media etc. The idea being to educate the constituents and work the politicians from the bottom up. Break down the notion that all voters think tolls are bad and supporting a toll project is political suicide.

Should we team up more with reputable academic institutions like TTI, CUTR, the Mineta Institute, etc. to help communicate findings to the state political leaders about the utility and acceptance of tolling?

Bill Cramer noted that nothing Susan was suggesting conflicts with the plans already engaged or those planned. The communications team is already proposing to approach 3-4 potential target states on an annual basis to engage the thought leadership and educate media in order to educate the public in those locales. Bill is happy to work with the GR Committee and hear from them the two or three states they think IBTTA should target. Bill would like to suggest the GR Committee consider Oregon, Utah, Wisconsin and Connecticut.

Neil Gray noted that FHWA is considering a similar need to educate the political leadership of states and hopes to do more along these lines when they re-issue public notice of the availability of the 2 remaining slots in the ISRRPP program. IBTTA has offered to serve as a resource for any such efforts on FHWA's part.

Neil also suggested that, without disrespecting TTI, CUTR of the Mineta Institute, a northern tier or plains state may not accord the same weight to these institutions and their experiences, and there might be an some utility in engaging/targeting other transportation expert centers closer to their space.

We determined we would compile notes from this call and share them with Mark Compton, and on his approval would be shared, or the topic discussed, with the rest of the GR Committee in the near future.

Report for 2018 Legislative Issues

1. Issues noted in IBTTA Government Affairs Committee Brainstorming Session, February 2018

	1	2	3	4	5	Responses
Full flexibility at state level to toll (Interstates)	0	0	0	2	10	12
Count	0.0%	0.0%	0.0%	16.7%	83.3%	
Row %						
Expand opportunities for asset monetisation	2	2	5	2	1	12
Count	16.7%	16.7%	41.7%	16.7%	8.3%	
Row %						
Project delivery streamlining (Environmental/Contracting/TIFIA Pipeline)	0	0	1	4	7	12
Count	0.0%	0.0%	8.3%	33.3%	58.3%	
Row %						
CDL requirements – changes – fix Section 529	1	2	8	0	0	11
Count	9.1%	18.2%	72.7%	0.0%	0.0%	
Row %						
Loosen restrictions on technology Innovation (Connected & Automated Vehicles - CAV)	0	1	7	3	1	12
Count	0.0%	8.3%	58.3%	25.0%	8.3%	
Row %						
Address public acceptance and perception of tolling	0	0	1	2	9	12
Count	0.0%	0.0%	8.3%	16.7%	75.0%	
Row %						

	1	2	3	4	5	Responses
Definitions of Federalization project Count Row %	0 0.0%	3 25.0%	6 50.0%	2 16.7%	1 8.3%	12
Better leverage AASHTO/AAMVA and other group contacts Count Row %	0 0.0%	2 16.7%	2 16.7%	2 16.7%	6 50.0%	12
EB5 Program (Green cards/workforce issues) Count Row %	3 25.0%	4 33.3%	3 25.0%	2 16.7%	0 0.0%	12
License plate Simplification (enforcement and reciprocity) Count Row %	1 8.3%	2 16.7%	2 16.7%	3 25.0%	4 33.3%	12
Identify IBTTA's role regarding Connected and/or Automated Vehicles? Count Row %	0 0.0%	0 0.0%	3 25.0%	8 66.7%	1 8.3%	12
Safety (operational and customers) Count Row %	1 9.1%	0 0.0%	3 27.3%	3 27.3%	4 36.4%	11
Challenge of shifting from HOV to HOV2 and possibly HOV3 Count Row %	2 20.0%	1 10.0%	6 60.0%	1 10.0%	0 0.0%	10
How to validate vehicle occupancy (headcounts) Count Row %	0 0.0%	1 9.1%	5 45.5%	4 36.4%	1 9.1%	11
Tolling interoperability (regional/national) Count Row %	0 0.0%	1 8.3%	3 25.0%	5 41.7%	3 25.0%	12

	1	2	3	4	5	Responses
National transportation accounts – look beyond current thinking & technology Count Row %	0 0.0%	1 8.3%	4 33.3%	5 41.7%	2 16.7%	12
P3 guidelines – still important? Count Row %	1 9.1%	5 45.5%	2 18.2%	2 18.2%	1 9.1%	11
Relief for lost tolls associated with emergency events (FEMA) Count Row %	3 25.0%	2 16.7%	5 41.7%	2 16.7%	0 0.0%	12
How to relate to VMT/MBUF/RUC (tolling vs road pricing) Count Row %	0 0.0%	3 25.0%	1 8.3%	5 41.7%	3 25.0%	12
Protecting currently assigned radio spectrum for transportation purposes – safety Count Row %	0 0.0%	0 0.0%	6 54.5%	3 27.3%	2 18.2%	11
Class action lawsuits on enforcement of violations ($ caps) Count Row %	0 0.0%	1 9.1%	5 45.5%	3 27.3%	2 18.2%	11
Rental car and truck leasing challenges Count Row %	1 8.3%	3 25.0%	5 41.7%	0 0.0%	3 25.0%	12
Totals Total Responses						12

2. Suggestions? Are there other significant issues we should be considering?

Response

Policy and uniform approach to other related industry stakeholders. Examples: Waze, TNCs (Uber, Lyft, etc.)

Memorandum of Understanding on Cooperation between
the American Association of State Highway and Transportation Officials (AASHTO)
and
the International Bridge, Tunnel and Turnpike Association (IBTTA)

1 – Preamble

The **American Association of State Highway and Transportation Officials** (AASHTO) is a nonprofit, nonpartisan association representing highway and transportation departments in the 50 states, the District of Columbia, and Puerto Rico. It advocates transportation-related policies and provides technical services to support states in their efforts to efficiently and safely move people and goods. Its primary goal is to foster the development, operation, and maintenance of an integrated national transportation system. AASHTO is an international leader in setting technical standards for all phases of highway system development.

The **International Bridge, Tunnel and Turnpike Association** (IBTTA) is the worldwide association for the owners and operators of toll facilities and the businesses that serve tolling. Its mission is to advance toll financed transportation. Each year the association engages thousands of transportation professionals from toll agencies, concessionaires, and allied businesses through educational meetings, knowledge sharing, and advocacy. Founded in 1932, IBTTA has members in more than 20 countries on six continents.

Both associations seek to:

- promote safe, efficient, and sustainable surface transportation;
- advance the user-pays principle in the design, development and funding of surface transportation infrastucture;
- advance public policies, laws and regulations that allow states to use toll financing, wherever they may choose, to rebuild and maintain their existing interstate highways because traditional revenue sources – including the gas tax alone – are inadequate to meet present or future needs.

The associations agree on the following Memorandum of Understanding (MOU) aimed at the establishment of closer cooperation in the fields described below subject to the applicable internal rules and charters of both organizations: AASHTO and IBTTA.

2 – Fields of Cooperation

- Supporting the deployment of road tolling as a tool to fund the development, operation and maintenance of road infrastructure, with maximum flexibility for states to use this tool.
- Supporting the harmonization of laws between and among states, provinces and territories in North America to permit interoperability of electronic tolling systems including the effective enforcement of sanctions against toll violators.

- Supporting the development of road funding and financing mechanisms that allow states to develop road, bridge and tunnel infrastructure that promotes customer service, performance and sustainability.

3 – Methods of Cooperation

AASHTO and IBTTA will:

- Exchange calendars of important meetings and activities of both associations related to the above fields of cooperation with a view of mutual participation in these meetings whenever possible.
- Exchange data of mutual interest related to surface transportation funding, finance, operations, maintenance, security, toll enforcement and related topics.
- Establish a joint "Cooperation Committee" composed of an equal number of representatives from both associations that shall meet periodically, and at least annually, to discuss issues of mutual concern.

4 – Closing Clauses

The cooperation under this Memorandum of Understanding reflects the desire of both parties for joint actions in the fields described.

This MOU is perpetual. Either party may terminate this MOU on 60 days' written notice to the other party.

This MOU will enter into force upon signature by the chief elected officers of the two organizations following its adoption by their respective boards of directors.

In witness whereof, the undersigned, being duly authorized thereto, have signed the MOU in two copies in Detroit, Michigan on October 17, 2011.

FOR AASHTO

Susan Martinovich, President

FOR IBTTA

Frank McCartney, President

IBTTA Board of Directors
Agenda
Saturday, June 23, 2018 | 1:00pm to 5:00pm | Harrisburg, PA

1:00pm Call to order, self-introductions, and setting the stage – Tim Stewart and Pat Jones

1:15pm ***The Reimagined Car*** – presentation and discussion with Rich Davey, Boston Consulting Group

2:00pm ***Electric Automation: Opportunity or Threat?*** – presentation and discussion with Kirk Steudle, Michigan DOT

2:45pm BREAK

3:00pm ***Impact of Connected Vehicles on Tolling*** – presentation and discussion with Marty Stone, Egis Projects, Inc. USA; Member, IBTTA Platinum Sponsor Advisory Council

3:15pm ***Connected and Automated Vehicle Working Group: Review of Progress and Key Initiatives*** – presentation and discussion with Joe Averkamp, Parsons; Member, IBTTA CAV Working Group

3:30pm ***General board discussion***: "What should be IBTTA's role in the evolution of connected, automated, shared and electric vehicle systems?"

4:00pm Peer Exchange Program – presentation and discussion with Chris Tomlinson

4:15pm Committee reports

- Executive Committee
- Foundation Board
- Site Selection Committee
- Nominating Committee
- Past Presidents Advisory Council
- Membership Subcommittee
- Finance Standing Committee of the Board
- Government Affairs Committee

4:45pm Resolutions and other business

- Minutes of January Board meeting
- New Members

5:00pm Adjourn

MINUTES

IBTTA Board of Directors Meeting

January 18-19, 2018

Coral Gables, Florida

Table of Contents

MINUTES
International Bridge, Tunnel and Turnpike Association
Meeting of Board of Directors
January 18-19, 2018

BOARD MEMBERS IN ATTENDANCE:
Greg Bedalov, Randy Cole, Mark Compton, Bill Halkias, Samuel Johnson (Second Vice President), John Lawson (by phone), Beau Memory (by phone), Julia Monso, Mark Muriello, Kathi O'Connor, Diane Scaccetti, Klaus Schierhackl (International Vice President), Malika Seddi, Tim Stewart (President), Ema Stocchi (Immediate Past President), Benton Tempas, Juan Toledo, Chris Tomlinson (First Vice President), Bruce Van Note, Joe Waggoner.

Thursday, January 18, 2018 Board Session

1 – Call to Order
IBTTA President Tim Stewart called the meeting to order at 8:40 a.m. and asked for self-introductions.

2 – Orientation and Key Themes for the Future
Tim Stewart led the board through a **presentation** describing his theme for the year, "Trust and Accountability." He provided an overview of the board's responsibilities which include:

- Setting the organization's direction
- Ensuring necessary resources
- Providing oversight

Tim also described the duties of individual board members, including:

- Duty of care
- Duty of loyalty
- Duty of obedience

Pat Jones gave a brief overview of IBTTA's strategic plan and emphasized that everything we do is or should be tied to the strategic plan. He also provided a summary of key issues on the minds of board members based on phone interviews he conducted with board members in November and December. Tim's and Pat's presentations appear in the attachments to the minutes.

3 – Leaders of Board Committees, Foundation, and Advisory Groups Discuss Vision and Goals for 2018 and Beyond
During this segment of the board meeting, Tim Stewart asked the leader of each board committee, the IBTTA Foundation, and advisory groups to give an oral report on their activities including the top three goals they want to accomplish in 2018 in support of the Vision and Mission of IBTTA.

Audit Committee, Joe Waggoner, Chair
Joe Waggoner talked about the need to have the appropriate skill set on the Audit Committee, including the desire to have someone who is a CPA. Since the current Audit Committee charter says that committee members must come from the IBTTA board, perhaps we should modify the charter to allow a CPA who is a non-board member to serve on the Audit Committee. The committee will develop a recommendation for the board to consider.

Awards Committee, David Machamer, Chair (participating by phone)
David Machamer said that he is pleased with the operation of the committee. Top goals for 2018 are to exceed the number of award applicants from 2017, republish the standard operating procedures around submission qualifications, and increase membership awareness of the awards program. There is a **background paper** following the minutes.

Compensation Policy Committee, Ema Stocchi, Chair
Ema Stocchi said the Compensation Policy Committee was formed in 2007 under the leadership of Jim Ely as President and Steve Snider as Chair of the Committee. The Committee operates today in much the same way as it did when it began 10 years ago. The committee follows the board adopted policy, which says: "The purpose of this policy is to ensure that IBTTA staff are appropriately compensated and that staff compensation shall not deviate materially from the market as defined by a compensation study prepared by an independent firm with expertise in preparing association compensation studies."

Tomorrow, the committee will ask the board to approve the "Revised Compensation Policy and System for IBTTA Staff" which is on page 178 of the Board Book. The revised policy uses the market mean (as opposed to median) to define what is competitive within the various labor markets in which they compete for talent.

CAV Working Group, Lev Pinelis, Chair (participating by phone)
Lev Pinelis described the origins and activities of the CAV Working Group since its formation in May 2017. He said the working group's main goals for 2018 are to:

- Seek broader visibility of the working group;
- Make connections across ITS and CAV industry for collaboration; and
- Continue information sharing while pursuing specific efforts or projects to explore CAV-related opportunities for the tolling industry.

Lev's presentation is in the attachments to the minutes.

Finance Standing Committee of the Board, George Zilocchi, Chair
George Zilocchi talked about the history of the committee. He said the committee's main goals for 2018 are to:

- Prepare a multi-year financial plan;
- Monitor the performance of the external CFO;
- Perform an association risk assessment; and
- Raise the association reserve ratio to the 50% goal.

The committee's mission and **2018 goals** are in the attachment to the minutes.

Finance – Investment Subcommittee, Susan Buse, Chair
Susan Buse talked about the role of this subcommittee. The subcommittee meets quarterly to review the investment reports with the investment advisor to answer three questions:

- Is the portfolio compliant with the investment policy?
- Are the fees and actions of the advisor compliant with their contract?
- Are the earnings consistent with relevant market benchmarks?

The subcommittee's **detailed report** is in the attachment to the minutes.

Finance – Membership Subcommittee, Rob Horr, Chair
Rob Horr discussed the committee's goals for 2018. One important goal is to create a document warehouse or library. This is different from the TollMiner project. The document library is intended to be a place online in which members can access templates for RFPs, job descriptions, policies and other documents that are important to toll facility operators. The subcommittee's **detailed report** is in the attachment to the minutes.

Finance – Membership – International, Jordi Graells Chair (participating by phone)
Jordi Graells said the main goal of this subcommittee is to recruit new members from outside the U.S. We have a good start in Latin America and other places. We are focused this year on Europe on potential members in Slovakia, Bulgaria, Serbia, Morocco, Poland, Czech Republic, Ireland. All these countries belong to ASECAP but don't belong to IBTTA. I think we have a good case to work with them and have them join IBTTA. Tim Stewart urged anyone who has leads or connections to member prospects to communicate with Mary Cadwallader and the Membership Subcommittee. There is **additional information** on the subcommittee's work in the attachment to the minutes.

IBTTA Foundation, John McCuskey, 2017 Chair
2018 Foundation Chair Phil Miller could not attend the board meeting, so 2017 Foundation Chair John McCuskey made the presentation in his place. He said the Foundation is working on a formal nomination and election protocol to expand the board from 12 to 15 members. He pointed to the success of the first year of the Scholarship program in 2017. Other Foundation board members will report on the programs they lead. The IBTTA Foundation's **detailed report** is in the attachment to the minutes.

Leadership Academy, Maggie Wilkins, 2017 Chancellor (participating by phone) and Andy Fremier, 2018 Chancellor

Maggie Wilkins talked about the successful and well-received 10th anniversary workshop and reception for the Leadership Academy alumni. Andy Fremier talked about his desire to keep the Academy moving on a positive course and to learn as much as possible from the Academy regents and alumni. A **detailed report** on the Leadership Academy is in the attachment to the minutes.

IBTTA Foundation Research initiatives, Rene Moser (participating by phone)
Rene Moser talked about ways to strengthen the Foundation's research efforts including endorsing projects by IBTTA members, which was done with AISCAT and ASFINAG in 2017, and cooperating with TRB and other groups. Mark Muriello said that opportunities to cooperate with TRB are strong right now because they are emphasizing establishing liaisons with other groups. A **detailed report** on Foundation research is in the attachment to the minutes.

IBTTA Foundation Veterans Initiative, Rosa Rountree
Rosa Rountree talked about IBTTA Foundation efforts to learn what programs are happening already to support veterans so we can tailor our efforts appropriately. A **detailed report** on the Foundation Veterans Initiative is in the attachment to the minutes.

Moving America Forward Campaign, Bill Cramer
Bill Cramer showed a short video that highlights positive articles about tolling in 2017.

Government Affairs Committee, Mark Compton, Chair
Mark Compton talked about IBTTA's government affairs efforts in the context of the immediate issues on Congress's plate, key dates, known details of the administration's infrastructure initiative, and IBTTA's recent meetings with White House officials and Congress. He said that our next steps are to continue to build support in Congress for the issue of tolling and develop FAST Act reauthorization priorities. He said the Government Affairs Committee will have a planning session and fly-in to visit Congress and the White House in Washington, DC on February 7-8. A **short report and Mark's slide presentation** are in the attachment to the minutes.

Nominating Committee, Ema Stocchi, Chair
Ema Stocchi talked about the work of the Nominating Committee. It meets in the spring to evaluate candidates based on several factors including:

- Experience in the industry;
- Participation in IBTTA committees and meetings;
- Geographic distribution; and
- Diversity of background and experience.

The committee will meet in June to review applications and formally nominate candidates to serve in officer and director positions for 2019 and beyond.

Past Presidents Advisory Council, Ema Stocchi, Chair
Ema Stocchi said that one duty of the Past Presidents Advisory Council is to identify candidates to receive the Honorary Member designation. In recent years, the IBTTA President has charged the Past Presidents with other important assignments. In 2015, President Javier Rodriguez asked the Past Presidents to come up with a plan to expand membership. That led to the creation of the Membership Subcommittee of the Finance Standing Committee of the Board, which is led by two Past Presidents, Rob Horr as Chair, and Susan Buse as Vice Chair. This committee continues its work and has achieved good success in growing membership numbers, revenues, and retention.

Site Selection Committee, Benton Tempas, Chair
Benton Tempas said the committee's role is to exercise due diligence of the board in overseeing staff selection of appropriate sites for future IBTTA meetings. The staff and committee members confer on a regular basis. There is a **report** of the Site Selection Committee in the attachment to the minutes.

Platinum Sponsor Advisory Council, Fran O'Connor, Chair
Fran O'Connor said the Platinum Sponsor Advisory Council has three main goals:

- To be recognized as a group of companies providing thought leadership to the Association and Industry, as well as a group that sees the value in increasing their financial support to the association;
- To work on meaningful, disruptive, impactful, large issues that the industry and Association are facing, or may face in the foreseeable future; and
- To integrate our mission, topics, and involvement with the strategic plan, meeting planning content, and the business direction of the Association

Recently, the council has worked on four major issues

1. Connected vehicles;
2. Toll payments or mobility as a service;
3. Security; and
4. Tolling the untolled states.

A **detailed report** of the Platinum Council is in the attachment to the minutes.

TollMiner Working Group, Randy Cole, Chair
Randy Cole talked about the work of TollMiner using story and metaphor. The way to get a point across is with stories and facts and data. I'm a big advocate for connected and

autonomous vehicles. The number 1 cause of death for those between 15 and 17 is auto crashes. There are many studies and reports out there that say, "according to." How often is IBTTA quoted using the phrase "according to"? It's time for us to be one of those "according to" entities. This is not just a data warehouse. It can't be a survey and static. We need data flows that tell the story of our industry and tell the value of what we bring. Like the parable of the landowner and the three servants to whom he gave various talents, we cannot bury our talents; we cannot be afraid of our data. We need to show the whole world in real time what it is. It drives me crazy when I'm asked what other states or agencies are doing and I have to say, "I'll get back to you." We need to capture these data flows and make them available to our members.

Interoperability Discussion
Tim Stewart introduced the topic and called on Neil Gray. Neil described the **paper he wrote for FHWA**. The paper restates the history of our effort with NIOP.

Mark Muriello said that we need to separate the FHWA cooperative agreement from the achievements we have gained. We accomplished a lot even before we got into testing. We did the requirements documents and business rules BEFORE the feds got involved.

The board then heard presentations from a representative from each region.

Western Region, Samuel Johnson
Major accomplishments.

- We got organized and formed a western region with MOU among states and toll agencies in the west. Credit goes to Andy Fremier and Patty Rubstello. That got us organized. We have a voting structure.
- In California we adopted 6C as our statewide protocol that goes into effect less than a year from now.
- California has already incorporated the IBTTA documents into our technical documents.
- Now we're working with friends in the Southeast and Central regions to see what tweaks we need to make.
- The hard part are the interregional business agreements. Soon we hope to be able to move transactions with the Central and Southeast regions.

Central Region, James Hoffman (by phone)
Without the work that IBTTA put into national standards and business rules, we wouldn't be where we are today. We've been interoperable in Texas since 2014 and interoperable with Oklahoma since 2014. It's been a very good process even though we stubbed our toe a time or two along the way. Anticipate by third quarter of this year we will have Central and Southeast hubs connected. So far, the discussions with other regions have been very cordial with great cooperation. The Central Region won an award for rolling out the hub.

Southeast Region, Diane Scaccetti

We stood up our hub toward the end of last year. We should bring the full back office up in the next 6-8 weeks. We're also working with ATI to figure out how to connect to Illinois.

E-ZPass, PJ Wilkins
PJ Wilkins gave a brief **slide presentation**. I am a believer in the regional approach to NIOP. We have 4,000 lanes and 38 agencies. Some agencies just put in new single protocol readers. Once all members have the multi-protocol capability, it will be easier. TDM is not likely to go away. We have 36 million transponders. We hope to be able to use all 3 protocols. To get there, we either have to lower our standards or drop the requirement that we have to WRITE to the tag. We have used a peer to peer network for 25 years. How would we procure a hub, what would it do, and how do we pay for it? Most likely path to a hub is a phased approach.

Tim Stewart complimented Marty Stone, the godfather of the NIOP process, for all the hard work he did before handing it off to Dave Kristick.

Friday, January 19, 2018 Board Session

Tim Stewart called the meeting to order at 8:40 a.m. and asked for self-introductions. He then invited board members and other attendees to offer reflections on what they had heard during the previous day. Here are some representative comments from the board:

- I am impressed at how many committees there are and how much work is getting done.
- I was concerned about the progress with nationwide interoperability but hearing about the hubs made me feel more comfortable about the progress that's being made.
- I learned a lot about the diversity of the work of the Foundation. What makes IBTTA great? Much of it is happening in the committees.
- I was impressed that staff has helped manage the work of these committees to avoid overlap and keep them focused.

Global Tolling and Mobility Newsletter, Klaus Schierhackl, International Vice President
Klaus Schierhackl gave an overview of the Global Tolling Newsletter which highlights some of the major developments in tolling around the world. He also talked about the Global Tolling Summit in Salzburg in September and mentioned several options to maximize learning opportunities and experiences while traveling there by way of Vienna or Frankfurt.

Resolutions

Membership. There was a motion and a second to elect new members. **The motion PASSED.**

401k Retirement Plan Contribution. There was a motion and a second on the Resolution on the Discretionary Non-Elective Contribution to the 401K plan. **The motion PASSED**.

Revised Compensation Policy. There was a motion and a second to adopt the revised

compensation policy. **The motion PASSED.**

Minutes. There was a motion and a second to approve the minutes of the board meetings of September 9, 2017 and November 30, 2017. **The motion PASSED.**

Audit Committee Charter. Joe Waggoner described a new provision in the Audit Committee charter that would include at least one member of the committee who has a CPA license. Since Audit Committee members must be IBTTA board members, if one of the members does not have a CPA, the IBTTA Nominating Committee will look to the overall membership to select a CPA. The intent is to provide a level of expertise to the Audit Committee to maintain the committee's independence. There was a motion and a second to approve the revised Audit Committee charter. **The motion PASSED.**

Site Selection. The committee presented the proposed schedule of 2019 meetings and venues with secondary destinations for several meetings. There was a motion and a second to accept the proposed meeting calendar and give staff discretion to move the meeting to a secondary destination, if necessary. **The motion PASSED.**

Procurement Calendar. Chris Tomlinson said that he plans to seek input from toll agency members to support a procurement calendar to help with planning future procurements. Details to follow.

Neil Schuster. Tim Stewart acknowledged the passing of Neil Schuster who served as Executive Director of IBTTA for 16 years.

Adjournment. The meeting was adjourned at 10:00 a.m.

Respectfully submitted,

Patrick D. Jones
Executive Director & CEO

IBTTA Board of Directors

January 18, 2018

Today's Agenda

- Self Introductions
- 2018 Theme
- Board Responsibilities
- Strategic Plan Overview
- Key Issues on the Minds of Board Members
- "What Will Constitute Success in 2018?"
- Vision and Goals of Committees and Advisory Councils

Self Introductions

2018 Theme:
Trust & Accountability

Board Roles and Responsibilities

- Set organization direction
- Ensure necessary resources
- Provide oversight

Set Organization Direction

- Engage in strategic thinking and planning
- Set the organization's mission and vision for the future
- Establish organizational values
- Approve operational or annual plans

Ensure Necessary Resources

- Hire capable executive leadership
- Ensure adequate financial resources
- Promote positive public image
- Ensure the presence of a capable and responsible board

Provide Oversight

- Oversee financial management
- Minimize exposure to risk
- Measure progress on strategic plan
- Monitor programs and services
- Provide legal and moral oversight
- Evaluate the CEO and Board

Duty of Care

- Be informed and ask questions.
- The duty of care describes the level of competence that is expected of a board member, and is commonly expressed as the "**duty of care that an ordinary prudent person would exercise in a like position and under similar circumstances**."
- This means that a board member owes the duty to exercise reasonable care when he or she makes a decision as a steward of the organization.

Duty of Loyalty

- Show undivided allegiance to the organization's welfare.
- A standard of faithfulness; a board member must give **undivided allegiance when making decisions** affecting the organization.
- A board member can never use information obtained as a member for personal gain and **must act in the best interest of the organization.**
- Board members must comply with policies regarding code of conduct and ethical behavior.

Duty of Obedience

- Requires board members to be **faithful to the organization's mission.**
- They are not permitted to act in a way that is inconsistent with the central goals of the organization.
- A basis for this rule lies in the public trust that the organization will manage donated funds to fulfill the organization's mission.

The Strategic Board Agenda

Discussion of Mega Issue(s)

Review and Adjustment of Strategy

Policy: Public & Operational

Routine Board Business

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Strategic Plan

- **Mission**: To advance transportation solutions through tolling.
- **Big Audacious Goal**: IBTTA will be recognized as the leading voice to advance transportation solutions through tolling.

Major Goals

- Transportation **policies** will facilitate tolling and other forms of user charging.
- Continental **interoperability** of electronic toll collection (ETC) is functionally possible.
- IBTTA members, stakeholders and nonmembers will find indispensable **value** in the association's programs, products, services, and meetings.
- IBTTA will be recognized for having a current and accurate **clearinghouse of "key" industry data.**
- IBTTA will be known for having an effective functioning **"SWAT" team** of tolling experts, champions, advocates, evangelists to effect positive outcomes in transportation.

Key Issues on the Minds of Board Members (p. 64)

- Deeper peer to peer networking beyond formal meetings
- Public Private Partnerships
- Revenue Protection
- Let’s get practical
- Connected and Autonomous Vehicles
- Digitalization of Information
- Opponents and Supporters

Discussion: What Will Constitute Success in 2018?

Vision & Goals of Committees and Advisory Councils

Presentation and Discussion

From: Machamer, David [mailto:dmachame@pikepass.com]
Sent: Monday, October 16, 2017 2:01 PM
To: Tim Stewart <tstewart@e-470.com>
Cc: Pat Jones <pjones@ibtta.org>; emanuela.stocchi@aiscat.it
Subject: RE: 2018 IBTTA Committee Planning

Tim, below is a compilation of the TEA committee's responses to your questions. Thanks. David.

From: Tim Stewart [mailto:tstewart@e-470.com]
Sent: Monday, September 18, 2017 11:04 AM
To: Benton Tempas; Buddy Croft; Machamer, David; George Zilocchi; John McCuskey; John Mike; Jordi Graells; Joseph Waggoner; Mark Compton; Philip Miller; Robert Horr; Susan Buse
Cc: Emanuela Stocchi; Pat Jones; Christopher Tomlinson; sjohnson@thetollroads.com
Subject: [Warning External Email] 2018 IBTTA Committee Planning

Hello IBTTA Committee and Task Force Chairs and Vice Chairs,

Thank you for your leadership and work on behalf of IBTTA! Also, thank you to those who met with Ema and me in Atlanta to discuss the current status of the Committees & Task Forces and plans for the remainder of 2017 and 2018. It was a great opportunity to hear from you about what you are currently accomplishing and have planned for the remainder of 2017. It has been a great year under Ema's leadership with several things still being accomplished!

As we prepare for 2018, we discussed the current Committee and Task Force structures, leadership and goals. With these items in mind, I asked that you please provide me, with a copy to Pat & Ema, by October 16, 2017 the following information.

1. What changes, if any, would you recommend to your current Committee or Task Force structure?
   1. As potential new members consider joining the TEA Committee give an overview of the duties and time that is needed to review submittals, etc. This ensures the new member knows of the time committal requirement.
   2. Continue to hold firm on the deadline date for TEA submittals.
   3. Review, update, and republish the scoring math for both the individual awards and President's Award, including tie-breaker treatments.
   4. Consider expanding the private sector awards to the same categories as the public sector. If this is done we may need to consider adding members to the committee.

2. Who is the primary staff contact(s) for information, resources and support from the IBTTA staff for your Committee or Task Force?
   Wanda Klayman, Cheryl Arnold, Bill Cramer, and Anna Sohriakoff.

3. If you have a Committee or Task Force Charter, Mission Statement or both, are there revisions needed and if so what revisions?
   The TEA Committee does not have a Charter or Mission Statement that I am aware.

4. What are your three top goals you would like to accomplish during 2018 in support of your Committee or Task Force efforts and the Vision and Mission of IBTTA?
   1. Surpass the number of awards received in 2017.

2. Committee to review, update, and republish SOP's around submissions and submission qualification, including how to treat the Private sector on the President's award.

3. Committee should work with IBTTA staff on ways to increase IBTTA Membership awareness of the awards, drive additional excitement, and increase the perceived value of winning an award.

5. To achieve the stated goals, will you require funding or additional support to complete these and if so can you please quantify?
   Not at this time.

The information you provide will be extremely helpful as we plan our meetings and budget for 2018. Once we receive the responses, we can plan how best to incorporate your feedback and goals into our 2018 plans beginning with the January meeting in Miami.

You are an awesome team of leaders, movers and shakers! IBTTA could not be what it is without you! Thank you for your service!!

I look forward to your responses.

Warmest Regards,

Tim Stewart
Executive Director
E-470 Public Highway Authority
22470 E. 6th Parkway, Suite 100
Aurora, CO 80018
Office - 303-537-3745

IBTTA Connected and Autonomous Vehicles (CAV) Working Group – January 2018 Update

- IBTTA members have been pursuing CAV technology on their own.
- IBTTA CAV Working Group launched in May 2017 for collaboration from a tolling industry perspective.
- A “grassroots” effort to expand understanding of CAV impacts on member operations.
- It’s an information sharing resource for individuals in the tolling industry.

Working Group Objectives

- Share local and regional initiatives in the CAV space.
- Discuss infrastructure owner and operator issues stemming from CAV developments.
- Collaborate on ways the tolling industry can respond to the emerging CAV field of practice.

Accomplishments

- 42 working group members from across public sector, private operators, and consultants.
- Gathered a consolidated view of member initiatives/projects in the CAV space, a living document that gets updated.
- Building a resource library of studies, reports, and case studies: https://www.ibtta.org/connected-and-autonomous-vehicle-working-group
- Holding monthly calls with 1-2 presenters focusing on the intersection of CAV and tolling.

Recent presentations to the group

Date	Topic	Presenter
July 2017	CAV Scenarios for High Speed Controlled Access Facilities	Steve Kuciemba, National ITS Practice Leader WSP USA
Aug 2017	Connected Vehicle Pilot – Tampa, Florida	Bob Frey, Planning Director Tampa-Hillsborough County Expressway Authority
Aug 2017	Connected and Automated Vehicle – Initiatives in Florida	Marco Barbarossa, Project Manager Atkins / Florida's Turnpike
Sep 2017	The role of a Regulatory Framework to Accelerate CAV Introduction in Europe	Federico Di Gennaro, Proposal and Project Manager AISCAT Servizi
Sep 2017	Cellular – V2X Commercial Readiness	James Misener, Senior Director, Technical Standards Qualcomm
Oct 2017	Utilizing DSRC Technology for Connected Mobility	Randy Cole, Executive Director Ohio Turnpike and Infrastructure Commission
Dec 2017	Connected Vehicle Applications for Tolling	Bob Edelstein, SVP, ITS Practice Leader AECOM

Next steps

- Establish a sub-group to explore tolling standards development in the DSRC and CV space.
- Hold in-person Working Group meeting at IBTTA Charlotte, April 2018.
- Pat Jones and Lev Pinelis will attend AV Public Policy Roundtable hosted by AASHTO and AAMVA on January 23 in DC, attended by leaders from 20+ transportation associations.
- Expand agenda beyond information sharing.
- Collaborate with Platinum Sponsor Advisory Council's work on CV.

Additional information and feedback to IBTTA

- Staff contact: Mary Cadwallader.
- No changes planned in CAV Working Group structure.
- Top three goals for 2018:
  - Seek broader visibility of the working group.
  - Make connections across ITS and CAV industry for collaboration.
  - Continue information sharing while pursuing specific efforts or projects to explore CAV-related opportunities for the tolling industry.
- The CAV Working Group may require funding based on evolution of its mission and work.

IBTTA Finance Standing Committee of the Board

2018 Planning Report to President Elect Tim Stewart

September 2017

I. Committee and Sub Committees - STRUCTURE

a. Finance Committee

i. Number of Member Representatives

- **The Committee presently comprises 25 members. This is far too large to ensure a workable group with active participation by all.**
- **Our organization and its finances would be better served with a committee numbering 15. This may be difficult to affect in one year and a phasing in may be necessary.**

ii. Committee Member Representation

- **Committee membership should be from a cross-section of Active, Sustaining, and Associate Members.**
- **Membership should also include Active, Sustaining, and Associate Members with financial backgrounds.**

b. Sub Committees

i. **Presently the Finance Committee has two (2) Sub Committees – the Investment Sub Committee and the Membership Sub Committee.**

- **It is recommended that the Investment Sub Committee continue in 2018 as a "Sub" to the Finance Committee.**
- **Recently there have been suggestions that the Membership Sub Committee be established as a standalone committee. It is recommended that this be the subject of further discussion.**

II. Staff Liaisons

a. **Pat Jones, Wanda Klayman & Cathy Pennington**

III. Committee Charter/Mission Statement

a. **Attached is a copy of the current Finance Committee Mission Statement. This statement has been in existence for a number of years and it should be reviewed and updated accordingly.**

IV. 2018 Goals

The Finance Committee reviews and recommends the yearly Operating Budget and monitors the financial and investment activities of the organization. In addition, it promotes membership growth and revenue enhancement.

2018 Goals

1. **Preparation of a Multi-Year financial plan.**
2. **Develop and monitor the performance and responsibilities (including CFO duties) of the Renner Team to ensure an acceptable performance level relating to Finance Committee issues.**
3. **Association Risk Assessment - the purpose of which is to identify, and/or plan to avoid/mitigate, hazards that could have a negative effect and outcome on the organization's ongoing ability to conduct business. Such as Business Interruption, Cyber Security, etc.**
4. **Raise the Reserve Ratio to the 50% goal.**

V. Funding

a. **Although the need for additional funding is not anticipated at this time, the implementation of the Finance Committee 2018 Goals may in whole or in part require some financial allocation.**

###########

Mission of a Reconstituted and Renamed Finance Standing Committee of the IBTTA Board

The Finance Standing Committee shall monitor the financial operations of the IBTTA.

The duties of the Finance Standing Committee shall include, but not be limited to, reviewing, evaluating and recommending:

a. The annual operating budget
b. Quarterly and annual comparison of actual expenses to budget
c. Major creation and changes in policies and procedures for financial activities
d. Major financial commitments being contemplated by the staff of the IBTTA
e. Significant current and anticipated expenditures, possible recommendations of areas for reductions of expenses for the association
f. Significant proposed transactions affecting the revenues and expenses of the association
g. Forecasts of long term plans

The Finance Standing Committee shall perform such other duties as may be prescribed from time to time by the President and Board of Directors.

Committee Membership

- Current members are 2 finance professionals from active member agencies and 1 non-finance professional from a sustaining member organization plus the chair of the sub-committee who is also the vice-chair of the Finance Committee
- Recommend no change

Liaisions

- Staff - Cathy Pennington, Pat Jones
- the chair of the Finance Committee also often participates in the conference calls and meetings
- Raffa Wealth Management - as IBTTA's investment advisor

Charter and Mission

- The Finance Committee charged this sub-committee with monitoring the investment activities of the IBTTA and ensuring the Investment Policy (see attached) enacted by the Board of Directors is being followed

2018 Targets/Goals

1. Quarterly review and discussion of results

a. The sub-committee will meet quarterly (by phone or in person) to review the investment reports with Raffa and answer 3 questions:
   i. Is the portfolio compliant with the Policy
   ii. Are the fees and actions of Raffa compliant with their contract
   iii. Are the earnings consistent with relevant market benchmarks

2. Implementation of ultra-short-term investments

a. In 2017 the Board approved a new category of investments to make the most of cash balances during the year. The Sub-committee will work with staff and Raffa to implement this activity.

3. Annual review of Investment Policy

a. The sub-committee will discuss with Raffa annually any suggestions for improvements to the Investment Policy and recommend any changes to the Finance Committee for consideration by the Board

Funding

- No funding is required for this Sub-Committee.

International Bridge, Tunnel and Turnpike Association

Investment Policy
Adopted by the IBTTA Board of Directors on September 9, 2017

Purpose:
The purpose of this statement is to set forth the policy and operational factors governing the investment management of the International Bridge Tunnel and Turnpike Association (IBTTA) Total Operating Reserve.

The Total Operating Reserve will be comprised of a short-term and long-term portfolio. This statement will serve to direct the management of investment assets within each portfolio by the designated investment advisor.

The determination of the amount in the short-term versus long-term portfolio will be determined annually by the Executive Director and submitted to the Board for approval as part of the annual budgeting process.

Operating Reserve – Guidelines and Restrictions
The primary objectives of this portfolio are:

- Safety: Investments of the Association shall be undertaken in a manner that seeks to ensure the preservation of capital in the overall portfolio. To attain this objective, diversification along credit and maturity lines is required in order that potential losses on individual securities do not exceed the income generated from the reminder of the portfolio.
- Liquidity: The investment portfolio will remain sufficiently liquid to enable the IBTTA to meet all operating requirements, which might be reasonably anticipated.
- Return on Investments: The investment portfolio shall be designed with the objective of attaining a market rate of return throughout budgetary and economic cycles, taking into account the investment risk constraints and the cash flow characteristics of the portfolio. The management of the portfolio should seek to optimize return while minimizing risk through diversification and asset allocation.

Cash Flow Expectations:

This portfolio provides a short term funding reserve for IBTTA that will be funded and reduced based on the amount of funds in the IBTTA checking account. It is expected that the reserve will receive a large initial contribution then be drawn down over the year. Funds can potentially be needed monthly.

Time Horizon:

This portfolio is considered short term in its investment time horizon. Investments should reflect a maturity target of approximately one year. The portfolio will reflect an allocation strictly to ultra short term investments in order to meet any monthly cash flow requirements.

Tax Status:

IBTTA is a nonprofit organization and is thus exempt from taxes. Investment decisions should reflect this tax status when purchasing or selling securities.

Risk Tolerance / Asset Allocation:

This portfolio is classified as conservative based on the stated objectives of preservation of capital and liquidity. The recommended target asset allocation is set to achieve these objectives while maximizing returns.

Asset Class	Target Allocation
Ultra Short Term Fixed Income	100%

The Ultra Short Term Fixed Income asset class will target a weighted average maturity of no greater than 14 months and a weighted average credit rating of AA, with an emphasis on US Treasuries and Agencies.

Eligible Investments and Restrictions:
The following are eligible investments for this investment portfolio:

- US Treasuries
- US Agencies
- Municipal and Corporate Bonds rated investment grade or higher by Moody's, S&P, or Fitch
- Mortgage Backed Securities issued by US Agencies
- Dollar denominated obligations of foreign issuers issued in the U.S.
- Foreign government and agency obligations
- Bonds with a maturity of 2 years or less at the time of purchase
- FDIC Insured Certificates of Deposit
- FDIC Insured Money Market Accounts
- Money Market funds that invest solely in eligible securities listed above, and whose credit quality is such that they must invest exclusively in high-quality securities (generally those that are in the top two tiers of credit quality)
- Mutual funds that invest solely in eligible securities listed above
- Exchange traded funds that invest solely in eligible investments listed above

Short-Term Portfolio Reserve – Guidelines and Restrictions
The primary objectives of this portfolio, in order of importance, are:

- Safety: Investments of the Association shall be undertaken in a manner that seeks to ensure the preservation of capital in the overall portfolio. To attain this objective, diversification along credit and maturity lines is required in order that potential losses on individual securities do not exceed the income generated from the reminder of the portfolio.

- Liquidity: The investment portfolio will remain sufficiently liquid to enable the IBTTA to meet all operating requirements, which might be reasonably anticipated.
- Return on Investments: The investment portfolio shall be designed with the objective of attaining a market rate of return throughout budgetary and economic cycles, taking into account the investment risk constraints and the cash flow characteristics of the portfolio. The management of the portfolio should seek to optimize return while minimizing risk through diversification and asset allocation.

Cash Flow Expectations:

This portfolio provides a short term funding reserve for IBTTA to cover expenses related to special projects/initiatives that are not covered by the annual budget, or to replenish the checking account. As such, there are no known cash flow expectations; however, funds may be needed periodically in order to meet these needs. Any change in IBTTA's need for cash flows from this account should be addressed through a change in this policy statement.

Time Horizon:

This portfolio is considered short term in its investment time horizon. The investment portfolio as a whole should reflect a maturity target of approximately five years or less.

Tax Status:

IBTTA is a non-profit organization and is thus exempt from taxes. Investment decisions should reflect this tax status when purchasing or selling securities.

Risk Tolerance / Asset Allocation:

This portfolio is classified as conservative based on the stated objectives of preservation of capital and liquidity. The recommended target asset allocation seeks to achieve these objectives while maximizing returns and minimizing volatility.

Asset Class	Target Allocation
Fixed Income	99.0
Cash	1.0

The fixed income asset class will target a weighted average maturity of no greater than five years and a weighted average credit rating of no lower than AA.

Eligible Investments and Restrictions:

The following are eligible investments for this investment portfolio:

- Cash Equivalents
  - Treasury Bills
  - Money Market Funds

    - FDIC Insured CDs
    - FDIC Insured Money Market Accounts
- Fixed Income Securities (rated investment grade by Moodys, S&P, or Fitch)
    - U.S. Government and Agency Securities
    - Fixed Income Securities of Foreign Governments and Corporations (up to 35% of the market value of the fixed income portion of the portfolio)
    - Corporate Notes and Bonds
    - Mortgage Backed Bonds
    - The fixed income portion of the portfolio shall have a weighted average maturity of 3 years or less.
    - The weighted average credit quality of the fixed income portion of the portfolio shall be not less than an 'AA' rating.
- Mutual Funds or Exchange Traded Funds (including similar pooled investments and separately managed accounts) shall be selected on the basis that they invest in those securities deemed to be allowable above.
- Diversification
    - No more than 10% of the portfolio combined may be in the securities of any one issuer with the exception of obligations of the US Government and its agencies, and federally insured instruments.
    - No more than 20% of the portfolio combined may be in the securities of a particular industry.

Benchmarking:

1. The portfolio will be compared to a benchmark comprised of the Barclays Capital Aggregate Bond Index, Barclays Capital Gov. 1-3 Year Bond Index, and the Merrill Lynch Three Month US Treasury Bill Index. Weights will be applied to each index based on the target allocation to each broad asset class.

2. The investment advisor will provide a benchmark for each fund and separately managed account held within the portfolio.

Long-Term Portfolio Reserve – Guidelines and Restrictions

Statement of Objectives:

The primary objectives of this portfolio, in order of importance, are:

- Safety: Investments of the Association shall be undertaken in a manner that seeks to ensure the preservation of capital in the overall portfolio. To attain this objective, diversification along credit and maturity lines is required in order that potential losses on individual securities do not exceed the income generated from the reminder of the portfolio.
- Return on Investments: The investment portfolio shall be designed with the objective of attaining a market rate of return throughout budgetary and economic cycles, taking into account the investment risk constraints and the cash flow characteristics of the portfolio.

The management of the portfolio should seek to optimize return while minimizing risk through diversification and asset allocation.

- Liquidity: The investment portfolio will remain sufficiently liquid to enable the IBTTA to meet all operating requirements, which might be reasonably anticipated.

Cash Flow Expectations:

This portfolio is not expected to be a direct source of cash flow for IBTTA, however, withdrawals from this Reserve may be required in order to fund the Short Term Reserve. As such, an adequate amount of the fixed income portfolio will be held in short term securities. Any change in IBTTA's need for cash flows from this account should be addressed through a change in this policy statement.

Time Horizon:

This portfolio is considered long term in its investment time horizon. Investments seek long term growth as their primary objective. The funds in this account are not expected to be withdrawn in the next 5 years.

Tax Status:

IBTTA is a non-profit organization and is thus exempt from taxes. Investment decisions should reflect this tax status when purchasing or selling securities.

Risk Tolerance / Asset Allocation:

This portfolio is classified as moderate risk based on the stated objectives of long term growth of assets and preservation of capital. The recommended target asset allocation seeks to achieve these objectives while maximizing returns and minimizing volatility.

Asset Class	Minimum	Target Allocation	Maximum
Domestic Equity	26%	32.5%	36.5%
International Equity	14%	17.5%	18.5%
Fixed Income	39%	49%	59%
Cash	0%	1%	2%

The fixed income asset class will target a weighted average maturity of no greater than eight years and a weighted average credit rating of no lower than AA.

The domestic and international equity assets classes will reflect an allocation to all nine style boxes based on market capitalization (Large, Mid, Small) and style (Value, Blend, Growth.) The allocation to international equity will also include exposure to both developed and emerging markets.

Return Expectations:

Returns are expected to be commensurate with the risk tolerance and asset allocation of the investments and will reflect the portfolio's objectives of long term growth and stability. The portfolio performance will be gauged against a designated benchmark and is expected to track those benchmark returns over time.

Eligible Investments and Restrictions:

The following are eligible investments for this investment portfolio:

- Cash Equivalents
  - Treasury Bills
  - Money Market Funds
  - FDIC Insured CDs
  - FDIC Insured Money Market Accounts
- Fixed Income Securities (rated investment grade by Moodys, S&P, or Fitch)
  - U.S. Government and Agency Securities
  - Fixed Income Securities of Foreign Governments and Corporations (up to 35% of the market value of the fixed income portion of the portfolio)
  - Corporate Notes and Bonds
  - Mortgage Backed Bonds
  - The fixed income portion of the portfolio shall have a weighted average maturity of 10 years or less.
  - The weighted average credit quality of the fixed income portion of the portfolio shall be not less than an 'AA' rating.
- Equity Securities
  - Common Stocks
  - American Depository Receipts (ADRs) and Ordinary Shares of Non-U.S. Companies
- Mutual Funds or Exchange Traded Funds (including similar pooled investments and separately managed accounts) shall be selected on the basis that they invest in those securities deemed to be allowable above.
- Diversification
  - No more than 5% of the portfolio combined may be in the securities of any one issuer with the exception of obligations of the US Government and its agencies, and federally insured instruments.
  - No more than 20% of the portfolio combined may be in the securities of a particular industry.

The following are not eligible investments for this investment portfolio:
Purchasing the following:

- Private placement;
- Letter stock;
- Futures;
- Currency forwards;
- Options;
- Commodities;

- Securities whose issuers have filed a petition for bankruptcy.

Making the following transactions:

- Short sales
- Margin transactions
- Any speculative investment activities

Benchmarking:

3. The portfolio will be compared to a benchmark comprised of the Russell 3000 Index, FTSE All World Ex-U.S. Index, Barclays Capital Aggregate Bond Index, Barclays Capital Gov. 1-5 Year Bond Index, and the Merrill Lynch Three Month US Treasury Bill Index. Weights will be applied to each index based on the target allocation to each broad asset class.

4. The investment advisor will provide a benchmark for each fund and separately managed account held within the portfolio.

Rebalancing Procedures:

This portfolio will be rebalanced periodically to assure that the overall asset allocation target of the portfolio is maintained. Events including large deposits or withdrawals and significant market movements may trigger the need to rebalance the portfolio. Regardless of activity the portfolio will be reviewed on a quarterly basis at a minimum to assure the balance is adequately maintained. In order to minimize transaction costs, the manager will evaluate the benefit of rebalancing relative to the transaction cost. The advisor will maintain a rebalancing threshold of +/- 20% of the target allocation percentage for each asset class, with the exception of cash, which will have a rebalancing threshold of +/- 50% of the target.

<u>Total Operating Reserve Guidelines</u>

Monitoring:

The advisor will provide the IBTTA Finance Committee with a detailed report of the portfolio at least quarterly. The quarterly report will outline the following in a simple and graphical way:

- What have we invested where?
- How has our portfolio performed relative to our investment policy and designated benchmarks?
- What is the change in value of our portfolio over time (a quarter, a year, etc.)?
- What, if anything, should we be concerned about with respect to the market, our portfolio, or any other relevant factors?

Policy Revisions:

This policy will be formally reviewed annually to determine if the objectives, constraints, and allocations are appropriate and consistent with IBTTA's objectives. Additional conditions under which the policy might be amended include:

- A change in IBTTA's risk tolerance, timeline, tax status, or cash flow expectations
- Introduction of new investment vehicles
- A change in the objective of the portfolio

The IBTTA Finance Committee will work with the designated investment advisor to review the policy for its appropriateness after such changes, and will amend the policy when necessary.

Duties and Responsibilities:

The following parties to this policy will be charged with certain duties and responsibilities as it relates to management of the portfolio:

International, Bridge, Tunnel and Turnpike Association: Will be required to review and approve this Investment Policy Statement in its entirety. IBTTA will be responsible for working with a Designated Investment Adviser no less than annually to review and amend this policy statement. IBTTA is responsible for selecting an investment advisor who will comply with this policy statement, and is responsible for periodically reviewing the advisor's compliance with this policy statement.

Designated Investment Advisor: Will be responsible for implementing the investment strategy outlined in this policy statement by selecting investments and external managers that meet the investment criteria within this policy statement. The Designated Investment Advisor will be charged with timely reporting of investment performance to IBTTA. The Designated Investment Advisor is also required to perform all normal due diligence in selecting external investment managers, including a review of their ability to operate within the investment guidelines and restrictions outlined in this policy. The Designated Investment Advisor is responsible for selecting other appropriate parties as needed to implement this policy, including attorneys, custodians, and broker/dealers.

Investment Manager: Investment managers will be any party the Designated Investment Advisor selects to invest funds on behalf of IBTTA. For purposes of this policy, Investment Managers include Mutual Fund Managers, Exchange Traded Fund Managers, Separate Account Managers, Money Market Fund Managers, and any other party that the Investment Manager contracts to invest funds on behalf of IBTTA. The Investment Advisor is responsible for assuring that any Investment Manager selected is investing funds in a manner consistent with the eligible investments and restrictions outlined in this policy.

Authority:

IBTTA Board approval is required to make changes to this Investment Policy Statement.

Authorized agents for IBTTA for this account may direct transfers in or transfers out of the account governed by this policy. The authorized agents are: Executive Director of IBTTA and Director of Government Affairs of IBTTA.

Approval

I acknowledge that this Investment Policy accurately represents the guidelines and restrictions to which the International, Bridge, Tunnel and Turnpike Association Total Operating Reserve is to be managed.

_____ _____

PRINT NAME DATE

_____

SIGNATURE

_____ _____

PRINT NAME (Dennis Gogarty) DATE
President, Raffa Wealth Management, LLC

_____

SIGNATURE

Previous Versions Adopted
April 4, 2014, January 8, 2016

Current Version Adopted
September 9, 2018

1. Committee Membership

- Currently 15 members with an even number of private and public sector representatives and 1 international representative
- In addition, the International Task Force has 8 members (including the international member of the sub-committee)
- Recommend no change

2. Liaisions

- Staff - Mary Cadwallader

3. Charter and Mission

Summary of Past Presidents' Recommendation on Membership and Revenue (based on August 29, 2015 letter to IBTTA President Javier Rodriguez)

- Do not increase member dues at this time.
- Seek new sources of non-dues revenue to keep dues levels affordable.
- Consider implementing a lower dues level for smaller members. ***done***
- Expand the exclusivity of member benefits to include members only information on the web, members-only roundtables, etc.
- Task the IBTTA Foundation with developing a Research Plan and pursuing grants.
- Use the Past Presidents in an Ambassador role to identify new members, explain the value of membership, and shepherd new members into IBTTA.
- Make membership recruitment and retention a priority of every IBTTA President.
- Make IBTTA more present at regional tolling groups (e.g. TeamFL, TeamTX, etc.) to connect with potential new members.

4. 2018 Targets/Goals/Dates

1. Best Practices/Document Warehouse (clearing house)

- Implement on-line access to RFPs, job descriptions, policies and other relevant documents submitted by members
- Assign to the New Revenues Task Force to define and develop a plan to solve any gaps in current IBTTA website capability and to set policies, protocols, procedures and prices

2. Strategic Partnerships

- Gain new members by engaging with other organizations
- Work with staff to identify potentials (TRB, AASHTO, AAMVA, NASL, etc.) and a plan of action

3. International Outreach

- Bring new non-North American members into IBTTA, especially in areas such as Eastern Europe, India and South Asia
- Assign to the International Task Force to define a work plan including regional communication

4. Explore North American regional efforts

- Identify ways to engage members (and potential members) who are not attending conferences; such as webinars, smaller meetings, etc.
- Assign to the Non-Dues Revenue Task Force to develop a plan

5. Support Current Members

- Continue to "lock down" website information for members-only and develop programs or services to serve specific member needs such as: host webinar for DBE/small businesses; share best practices in diversity and EEOC programs; information on cyber security or asset management
- Assign to the Exclusivity Task Force to identify opportunities and to involve members in implementation of goals 1-4 above

5. Funding

- Enhancements to the website and on-line capabilities may be needed. We suggest retaining the same amount in the 2018 budget as allocated in the 2017 budget for such technical improvements.

From: Jorge Graells Ferrandez [mailto:graells.jordi@icloud.com]
Sent: Tuesday, October 31, 2017 12:03 PM
To: Tim Stewart <tstewart@e-470.com>
Subject: Re: International Task Force

Hi Tim,

Thanks for your message below. I actually had not put any suggestion in written, but only verbally in our phone talks:

1. Regarding the Government Affairs Committee, I guess we need the Exec Comm to set up specific objectives for the Govt Affs Comm to attain each calendar year, and ensure the appointment of the members in charge of each objective within the Committee, all by the beginning of each year, then put Neil Gray and Kathy Ruffalo to serve these objectives and members in charge only. A half an hour briefing of what is going on at the hill at the confcalls is hardly useful.

2. Regarding the International Task Force, we need to identify volunteers ("coaches") within the current IBTTA membership with personal contacts at toll road operators in Mexico, Eastern Europe, Scandinavia,Turkey and South Asia (India, Thailand, Malaysia, Singapore, Indonesia). At the end of the day, many active members stay at IBTTA because of personal attachment of their members to other members, essentially.

I guess this is all for now.

Best regards,

Jordi Graells
571-228-3502
graells.jordi@icloud.com

To: Tim Stewart, First Vice President IBTTA

Cc: Emanuela Stocchi, President IBTTA

Pat Jones, CEO & Executive Director, IBTTA

From: John McCuskey, Chair IBTTA Foundation

Re: IBTTA Committee and Task Force Structure

10/17/2017

I have addressed the five questions in this memo from your request of 9/18/2017, however because of the unique structure of the IBTTA Foundation, I've included some background material as well. I look forward to future discussions regarding growing the Foundation's work.

Purposes and Objectives of the Foundation (Foundation By-Laws Article II,B)

1. To plan and conduct training, educational and professional development activities for persons involved in the tolling industry;
2. To establish and operate scholarship programs to assist tolling professionals interested in attending above activities;
3. To sponsor and support research into scientific, technical or professional development matters related to the tolling industry.
4. To support charitable good works that may include helping charitable causes in cities where IBTTA holds conferences and through other appropriate activities.
5. To solicit funds to accomplish any of the aforesaid purposes and to accept funds from federal, state and local governments, corporations, other foundations, trusts and individuals;
6. To engage in any other lawful activities in furtherance of the above purposes and not otherwise prohibited in its Articles of Incorporation.

Foundation Committees 2017

- Scholarship
- Leadership Academy / Student Challenge
- Community Service Project
- Research
- Veteran's Initiative
- Fund Raising

- Golf Tournament
- Budget

Foundation Members and Terms

- 2017

Marcelle Jones	Jacobs
Christine Keville	Keville
Rene Moser	Asfinag
Rosa Rountree	Egis

- 2018

Federico DiGennaro	Aiscat
P.J. Wilkins	EZPass Group
Kary Witt	Golden Gate Bridge
John McCuskey	WSP

- 2019

Phil Miller	AECOM
Lisa Thompson	HNTB
Priya Jain	Atkins
Mike Heiligenstein	CTRMA

- Board of Regents

Maggie Wilkins	Wilkins Solutions
Kevin Hoeflich	HNTB
Lauren Hakos	Ohio Turnpike
Kary Witt	HNTB – Bd Liaison

Questions and Answers regarding the Foundation for 2018:

1. What changes, if any, would you recommend to your current Committee or Task Force structure?

   Answer:
   Background - The IBTTA Foundation is an independent 501(c))3 organization. As such, much of the structure of the Foundation is set by its By-Laws. The current Foundation Board consist of 12 members appointed for staggered 3 year terms. Each year 4 members need to be reappointed or replaced. In September of 2016 the IBTTA Board voted to amend the By-Laws and allow the

Foundation Board to expand up to 15 members. There has been some discussion about increasing the Board to the full 15 members from the current 12 members. According to the By-laws, the members of the Foundation Board elect the new/replacement board members each year (Article IV,B,4). This would infer it is up to the Foundation Board to expand itself. This language is a bit convoluted as it references the original 6 Foundation Board members first elected by the IBTTA Board. It reads as follows:

"As terms expire, all remaining terms of office shall be for three years each. The six directors of the Foundation Board that are chosen by the IBTTA board may elect up to nine (9) *(changed from 5)* additional members of the Foundation Board of Directors, who also shall serve staggered three year terms."

The Chair of the Foundation is appointed by the President of IBTTA with the consent of the IBTTA Board. This was clarified and adopted in 2017.

"The Chair of the Foundation may serve multiple one-year terms. The Chair is the chief elected officer of the Foundation and presides at all meetings of the Foundation Board of Directors. The Foundation Chair is authorized to create and dissolve committees of the Foundation. An example of a committee of the Foundation Board of Directors is the Leadership Academy Board of Regents" (Article V,A,1).

Comments:

Foundation Board Election/Selection - When Buddy decided to re-energize the Foundation in 2016, he asked people to volunteer for the Board and more-or-less appointed them. As I noted above, the way the By-Laws read, the Foundation Board technically elects its own members. For 2017, we reappointed the 4 members that were termed out in 2016.

Going forward, we may want to look at this process. Do we want to involve the incoming President with the selection of new Board Members (as Buddy did) or should there be a board member selection committee for the Foundation Board? The By-Laws language covering the election/reappointment of Foundation Board members should probably be clarified.

Committees – With Ema's encouragement to enlarge the Foundation presence, I appointed working committees this year based on the Board Members volunteering according to their interests. Some of the committees and chairs were either already appointed/assigned like the Leadership Academy or working through the IBTTA staff for the annual Community Service Project. Before 2016 these two committees were operating somewhat independently in that they were functioning on their own with the IBTTA staff doing all the heavy lifting, but without active oversight under the Foundation umbrella of activities.

In addition to the two mentioned above, we made great progress this year with the Scholarship, Veterans Initiative and Fund Raising committees. The Research Committee also got a boost from our International members including us with their research projects. While there is a lot of interest, the research committee has proven the most difficult to get solid organizational traction.

Phil Miller, Chair of the Veterans Initiative Committee has done a great job organizing the committee and they have developed a Committee Charter which is attached. Likewise, Rene Moser has prepared a paper for the Research committee to help move along the research organization and identify realistic tasks. It too is attached.

We had great participation from the Foundation Board members. Like the greater IBTTA organization, Foundation committees draw from more than the Foundation Board for membership. I believe this helps expand the reach of the committee and adds inclusiveness with greater participation from the IBTTA membership.

The newest committee, the Budget Committee headed by Kary Witt, will be as important as the service committees. With the expansion of the Board last year, interest in the budget, financial performance and reporting naturally grew. All the Foundation Board members work with the same type of fiscal matters in their jobs, so it is an expected extension of their interest when they joined the Board. One of the main tasks for 2018 will be to sync up the budget with the fund raising to create a realistic 2018 budget with some longer-term fiscal planning for the Foundation. This takes the burden of crafting an annual budget off of Pat's shoulders and puts it into the Foundation.

2. Who is the primary staff contact(s) for information, resources and support from the IBTTA staff for your Committee or Task Force?
   Answer: Multiple staff members relative to the Foundation Board and its various committees.

3. If you have a Committee or Task Force Charter, Mission Statement or both, are there revisions needed and if so what revisions?
   Answer: As noted above, the Foundation is legally organized under its own independent By-Laws. There are some tweaks that could be made to clarify current processes, particularly concerning Board membership.

4. What are your three top goals you would like to accomplish during 2018 in support of your Committee or Task Force efforts and the Vision and Mission of IBTTA?
   Answer: 2018 Goals by committee

   Leadership Committee – Maintain high performance consistency with the current class structure; Review the future role on expansion and involvement with the IBTTA Membership Committee.

   Scholarship – Analyze the financial impacts of expanding to 3 scholarships.

   Community Service Project – Get the committee more involved in the selection process.

   Research – Use Rene's charter as a basis to move the research component forward.

   Veterans Initiative – As outlined in the veteran's committee charter for 2018:

   a. Establish IBTTA Veterans Initiative Web Presence for Recruiting

b. Provide an IBTTA Member forum for Military / First Responder Issues

Budget – Develop a 2018 budget and sync the fund-raising efforts (Golf Tournament/annual meeting Silent Auction) with the overall efforts of the Foundation, not individual events.

5. To achieve the stated goals, will you require funding or additional support to complete these and if so can you please quantify?
   Answer: No, the Foundation should function independently.

To: **Tim Stewart, First Vice President, IBTTA**
Cc: **Emanuela Stocchi, President, IBTTA**
Pat Jones, CEO & Executive Director, IBTTA
John McCuskey, Chair, IBTTA Foundation

From: **Maggie Wilkins, Chancellor, IBTTA Leadership Academy**
Re: **IBTTA Committee and Task Force Structure**

11/8/2017

Tim,

Thank you for the opportunity to provide feedback regarding the IBTTA Leadership Academy Board of Regents. I have provided answers to the five questions you asked each Committee and Task Force to consider, found below in the document.

First, I would like to provide some background information and details related to 2017 regarding the Academy and the Board of Regents.

I was asked to serve as the 5th Chancellor for the Academy late in 2016. The Academy was founded in 2008 and previous Chancellors for the Academy are as follows: Kary Witt, Rob Horr, Jim Ely and Jorge Figueredo.

Together with two Regents serving for 2017, Kevin Hoeflich and Kary Witt, we were tasked with providing recommendations for the curriculum for the class of 2017. We then worked with Pat Jones, Wanda Klayman and the Director of the Academy, (contracted through IBTTA), Dr. Barbara Gannon, to finalize the curriculum, faculty and the agenda for the 2017 class. I represented the Board of Regents onsite in Washington DC during the week of the Academy. During the year, Lauren Hakos replaced Kary Witt on the Board of Regents.

2017 was a busy year for the Academy, with a class of 35 in February, and as it signified a unique milestone, the 10th year anniversary of the first Leadership Academy class. As the Academy is widely regarded as one of the highlights connected with the IBTTA family, we wanted to provide a celebration honoring the ten successful years of the Academy and the nearly 280 Graduates representing 115 organizations and 13 countries, and over 300 faculty affiliated with the program, as well as provide an educational workshop and planning session to enhance the event. *Please note, countries represented by the Graduates are as follows:*

Argentina
Canada
Germany
Greece
Israel
Italy
Mexico
Norway
Portugal
South Africa
Spain
United Kingdom
United States

IBTTA sponsored a 10th Anniversary Celebration reception preceded by a Future Strategic Planning Workshop for the Academy in conjunction with the Annual Meeting in Atlanta on September 9, 2017. We had over 75 Graduates that RSVP'd for the event, however, with Hurricane Irma bearing down, we had just under 25 Graduates that were able to participate. The planning workshop was very successful, however, with many future planning discussions and recommendations as a result. I have included a snapshot of those recommendations below:

WHAT KEEPS YOU UP AT NIGHT?

- How to hire and retain effective employees?
- Is the tolling industry nimble enough to meet changing trends in mobility?
- Balancing client expectations with internal business requirements and contractual terms
- Dealing with emerging or unknown technology changes that impact the industry-first and foremost, the emergence of autonomous vehicles
- Is the message, culture and vision I have for the company being diluted? How do I keep the passion and heart of the company going as it grows?

PERSONAL/PROFESSIONAL DEVELOPMENT

- Revisit Pre-Class Assessment
- Post Pre-Class Assessment
- Morning Workshops: Allows us to relax
  - Add how do we deal with people who are the same or different?
  - Assign roles to force people out of their comfort zone
- 5 Year Follow-Up Leadership Workshop
  - Reduced Rate offering
- Crisis Management
- What's the Latest Communications
- Time to Breathe

And, when asked to describe one word that captured their Leadership Academy experience, the Graduates responded:

Questions and answers regarding the Leadership Academy Board of Regents Foundation Committee for 2018:

1. **What changes, if any, would you recommend to your current Committee or Task Force structure?**

It is recommended that the Chancellor of the Board of Regents reports directly to the Foundation Chair and liaison directly with IBTTA staff and the Director of the Leadership Academy as necessary in the planning and develop of the curriculum and annual class structure. The Chancellor will coordinate and meet with the designated Board of Regent members to discuss curriculum recommendations, Academy related activities, and Foundation related educational programs as requested.

2. **Who is the primary staff contact(s) for information, resources and support from the IBTTA staff for your Committee or Task Force?**

Pat Jones and Wanda Klayman

3. **If you have a Committee or Task Force Charter, Mission Statement or both, are there revisions needed and if so what revisions?**

The Leadership Academy Board of Regents is a committee under the Foundation Board. There is no formal structure outlined, no charter or mission statement. I would recommend preparing a formal document that outlines roles (Chancellor, Regents) and responsibilities, terms and term limits, and Foundation Board interaction and reporting expectations. In addition, it is not clear whose responsibility it is to appoint the Chancellor and members of the Board of Regents; is it the responsibility of the IBTTA Executive Director and CEO, the IBTTA President, or the Foundation Board Chair? This can be clearly defined in a mission statement to be included in the Foundation Bylaws.

It is also recommended that the Board of Regents for the Leadership Academy have fiduciary and budget insight, responsibilities and recommendations for the Academy related budget and expenditures. This function and process does not currently exist.

4. **What are your three top goals you would like to accomplish during 2018 in support of your Committee or Task Force efforts and the Vision and Mission of IBTTA?**

- Establish 3 committees under the Board of Regents to research, explore, and interact:
    - Research and make recommendations regarding other Educational Opportunities
    - Post Academy Programs for Graduates of the Academy, including surveys to graduates and sponsors
    - IBTTA Meeting Involvement from the Graduate Community as a resource
- Include an Annual Leadership Academy Planning Workshop and reception at each IBTTA Annual Meeting
- Establish a second educational offering for 2019 to be determined by Foundation Board through recommendations from the Board of Regents committee on Educational Opportunities

5. **To achieve the stated goals, will you require funding or additional support to complete these and if so can you please quantify?**

Funding for the Annual Leadership Academy Planning Workshop and reception in conjunction with the IBTTA Annual Meeting is requested. Specific numbers can be provided by IBTTA from the budget for the 2017 Annual Leadership Academy Planning Workshop, which included fees for Dr. Gannon's support, workshop and reception costs. It is not anticipated that further funding would be required. Additional support would be comprised of voluntary participation from a Regent sponsor and committee members to be identified. Some IBTTA coordination and support will be required.

IBTTA Foundation

Ideas to strengthen the research pillar

René Moser, October 12, 2017

The IBTTA Foundation is the research, educational and charitable arm of IBTTA. The Foundation supports and conducts research on transportation and tolling; conducts training and professional development programs including the IBTTA Leadership Academy; supports charitable good works and operates a scholarship program.

This paper describes different ideas how the research pillar of the Foundation could be further strengthened.

1) **Endorsement of projects of IBTTA members**

   IBTTA could focus its research activities on endorsing projects of its members. To be eligible for an endorsement the project should at least involve 3 IBTTA members. In specific cases projects can also be supported by surveys sent to the IBTTA membership. There should not be more than 2 surveys per year.

2) **Strengthening the cooperation with TRB**

   IBTTA could extend one of its meetings (e.g. the AET, managed lanes & technology summit) to invite research professionals of TRB to exchange on latest research activities and achievements. Vice versa IBTTA members could present research needs as input for TRB's research roadmaps.

3) **Pooled-research / launching an IBTTA research call**

   E.g.: ASFINAG has joined forces with the Austrian Ministry of Transport, Innovation and Technology and the Austrian Federal Railway Company years ago to launch a joint research call every year. The research needs are defined by the 3 organizations and the call is managed by a professional agency. The total budget of every years call is EUR 4 Mio.

   It would be great if something similar could be organized also by IBTTA, maybe in cooperation with TRB. We could start with e.g. 2 or 3 topics and a budget of approx. USD 500,000. We as Foundation could propose research needs, interested members join and share the required budget.

4) **Establishment of a research working group / database**

   Another possibility would be to set-up a working group on research, similar to the Connected and Automated Vehicles – CAV working group. All interested members could join and one or two of the group volunteer to present relevant research achievements. A group call every two months seems to be appropriate. Further, a database of research activities could be elaborated as part of IBTTA's website members area. It would already be great if members would agree to publish a brief abstract of ongoing / recently finished research activities to allow others to get in contact with them if they are interested in further details.

5) **Awareness raising – adding a research category to the Toll Excellence Awards**

   To make the IBTTA family aware of the importance of research an additional category could be added to the Toll Excellence Awards – Research achievements and how they have proven to be of added value for the tolling industry (working title).

I. Purpose

The International Bridge Tunnel and Turnpike Association (IBTTA) established the IBTTA Foundation (the Foundation) as its research, educational and charitable arm. The Foundation supports training and professional development, and conducts charitable good works programs.

During 2016, IBTTA leadership placed an increased emphasis on Foundation activities, to include development of professional, educational and/or charitable support for military veterans. The IBTTA Veterans Initiative was formed to help serve this role.

IBTTA members who were also US military veterans expressed strong support; many members are already engaged in their own volunteer veterans-assistance activities. Initial meetings and phone calls identified some specific areas of interest, primarily in helping veterans find employment with the IBTTA active and associate membership. This is considered to be a charitable service for members of the military community. This can also be a valuable service to help IBTTA membership recruit good employees with skills in areas such as IT and operations.

Initial contacts and meetings identified that there are a very large number of existing organizations which provide some assistance and services. There does not appear to be a need to create new types of assistance or services, but rather a need to help coordinate and promote these services. Individual members of the Veterans Initiative group conducted numerous activities on their own, and some information was collected and disseminated for consideration. Now, a more formalized structure is needed to shape IBTTA's support and organization of this work.

IBTTA commissioned the development of this Charter to: (1) establish the mission of the Veterans Initiative; (2) to identify goals for 2018; and (3) to identify the support and organization that IBTTA is being asked to provide for the Veterans Initiative subcommittee.

II. Mission of the Veterans Initiative

Two missions are identified as the core purposes of the Veterans Initiative:

1. Develop IBTTA-To-Military Recruiting Channels.

The Veterans Initiative will be to first and foremost to aid military personnel (either separating from active service or reserves or national guards) in finding employment opportunities with the IBTTA membership and help IBTTA members find qualified candidates out of military organizations.

The nature of this support will begin with some specific activities in the Goals for 2018; those may be amended or modified over time as the successes of initial activities are measured.

2. Provide an IBTTA Member forum for Military / First Responder Issues

Many of the regularly participating professionals who attend IBTTA functions are prior military veterans, and of course as providers of premium civil infrastructure, many active IBTTA

members have official responsibilities to coordinate activities and resources with states' National Guard organizations. As part of the quarterly meeting schedule, the Veterans Initiative organization will provide a forum for discussion, reviews, and exchanges of information with respect to toll operations support during civil, criminal or military emergencies and situations.

III. Veterans Initiative Goals for 2018

Two specific goals are identified for 2018:

1. Establish IBTTA Veterans Initiative Web Presence for Recruiting

IBTTA has a large web presence already to include a separate Foundation page. The Veterans Initiative will leverage this resource to provide a range of information and services related to recruiting and job placement. Capabilities should include:

- General narrative information about the toll industry and the types of placement opportunities available to prior military / part-time military,
- Links to existing military services such as the Veterans Job Bank (VJB) and other resources identified by the US Veterans Administration and individual branches of the military,
- Recruitment information / job postings by IBTTA members, and
- Resume postings by IBTTA members for friends / colleagues transitioning or already out of full-time military service.

To meet this goal, the Veterans Initiative will form a task force in the Fall of 2017 to collaborate and develop this information and recruiting resource.

2. Research and Report on Existing IBTTA Member Support in Hiring for Veterans

A survey with follow up interviews should be conducted in fall 2017 through early 2018 after the holiday season with a report compiled and presented to the Foundation Board during the first quarter of 2018. It is hoped this survey would help describe the existing state of member efforts in the area of veterans recruiting as well as provide some benchmarks to describe what is done in our industry today.

IV. IBTTA Support and Organization

1. Foundation Board Subcommittee Chair and Members

a. The Chairman of the IBTTA Foundation shall be responsible to appoint a Veterans Initiative Subcommittee chairman and committee, to provide leadership and oversight to committee activities and to conduct committee meetings.

b. The Veterans Initiative Subcommittee chairman term shall be limited to three years.

2. Veterans Initiative Membership

a. Director of Veterans Initiative Activities

The Director would be responsible for coordinating meetings with IBTTA, tracking and assisting with activities, and the day to day purchasing of any services or materials as approved by the Foundation Board. This role is not yet filled.

b. All IBTTA Members

Participation in Veterans Initiative activities is open to all employees of active and associate members of IBTTA.

The Veterans Initiative developed around United States military veterans' needs and opportunities, but is not meant to be exclusive, or restricted from anyone in IBTTA membership regardless of their citizenship.

All participants in the Veterans Initiative shall adhere to a "code of conduct" that complies with (applicable) values, standards and rules as adopted by the IBTTA Board of Directors in its Policy of Ethical Behavior. The expected code of conduct includes conflicts of interest; corporate opportunities; confidentiality; fair dealing; protection and proper use of association assets; compliance with laws, rules and regulations; encouraging the reporting of any illegal or unethical behavior; and such issues related to the committee's members and responsibilities.

3. IBTTA Staff Liaison

The initial meetings and planning for Veterans Initiative activities have been greatly assisted by Wanda Klayman, If possible Wanda should be retained as our staff liaison.

4. Meeting Schedule

For 2018, the Veterans Initiative Subcommittee and members will meet by phone and/or in person quarterly in or around the times of the following conferences:

i. Jan 16-18: IBTTA January Board Meeting
ii. April 22-24: AET, Managed Lanes and Technology Summit
iii. July 21-24: Summit on Finance & Policy
iv. Oct 14-17: Annual Meeting

Report from IBTTA Government Affairs Committee Chair Mark Compton

As we prepare for 2018, we discussed the current Committee and Task Force structures, leadership and goals. With these items in mind, I asked that you please provide me, with a copy to Pat & Ema, by October 16, 2017 the following information.

1. *What changes, if any, would you recommend to your current Committee or Task Force structure?*
   ***I don't have any recommended changes at this time**.*
2. *Who is the primary staff contact(s) for information, resources and support from the IBTTA staff for your Committee or Task Force?*
   Neil Gray
3. *If you have a Committee or Task Force Charter, Mission Statement or both, are there revisions needed and if so what revisions?*
   This is a work in progress. This year we are working to establish the direct link between the Board, Strategic Plan and our advocacy efforts. We are developing strategies where "advocacy will match opportunity". The Administration has deemed transportation as part of the 2018 agenda. We need to discern our role in this and also determine beyond tolling what matters to our constituency.
4. *What are your three top goals you would like to accomplish during 2018 in support of your Committee or Task Force efforts and the Vision and Mission of IBTTA?*
   1) ***Successful "Washington fly-in" that creates buy – in, shared vision and energizes the committee to act.***
   2) ***Completion of the "List of 50" assignment.***
   3) ***Establish a more frequent two-way communication tool for the Committee – ie biweekly conference calls, better information flow***
5. *To achieve the stated goals, will you require funding or additional support to complete these and if so can you please quantify?*
   1) ***The support of the fly in has been tremendous***
   2) ***Establishing effective two-way communication flow – Committee to Board and Staff and vice versa. We need a strong message and position but we'll need to be agile during the policy-making period this year. In order to continue to refine that message and position as various IBTTA members and staff receive feedback from policy-makers, we'll need an effective way to communicate and track. Bill Cramer could be helpful. Perhaps SmartBrief for some outward communication to the members or another online mechanism. Maybe Bill could create a portal of some sort for us to deposit relevant articles and tracking discussions with policy-makers in almost a CRM-fashion.***

IBTTA Government Affairs Committee Planning Session and Fly-In

When: February 7-8, 2018.

What: A chance for the IBTTA Government Affairs Task Force to gather in Washington, DC to strategize about mission, vision, goals, and tactics and make visits on Capitol Hill.

Purpose:

1. Provide clarity to the mission, vision, and goals of the Government Affairs Committee
2. Engage members of the committee in meaningful and productive activity
3. Build community, camaraderie, and a sense of belonging among the committee members

Preliminary Schedule:

Day 1

11:00am – 12:00pm	Arrive at IBTTA Offices (or alternate location TBD), Washington, DC
12:00pm – 1:00pm	Lunch
1:00pm – 2:00pm	Expert policy and political briefing with key Washington insiders
2:00pm – 5:00pm	Government Affairs Committee Planning Session
5:00pm – 6:00pm	Reception
Evening	On your own

Day 2

Morning	Breakfast at hotel (TBD)
9:30am – 10:00am	Transportation to Capitol Hill
10:00am – 4:00pm	Visits with Transportation Committees and Members
12:00pm – 1:30pm	Lunch to discuss results and feedback from visits and plan next steps
4:00pm	Departure

Preliminary Agenda for Day 1 Planning Session

1:00pm – 5:00pm

- Introductions
- Expert policy and political briefing with key Washington insiders
- Art of the Possible – The 2018 legislative and policy agenda for the President and Congress
- Key issues in tolling at the federal and state level
- What IBTTA is doing now
- Ways that IBTTA can make a difference in 2018 and beyond

Potential policy experts and guests

- Key House and Senate Committee Staff
- Jim Tymon, AASHTO
- Garrett Eucalitto, National Governors Association
- Rob Puentes, Eno Center for Transportation
- Cynthia Essenmacher, Center for Innovative Finance Support, Federal Highway Administration
- Amanda Anderson, Public Policy and Federal Affairs, Uber
- Jay Carney, SVP Corporate Affairs, Amazon
- Steve Hartell, Director of US Policy, Amazon
- Andrew Woelfling, Director of Smart Mobility, Ford Motor

Government Affairs Committee Report to IBTTA Board

January 18, 2018

Immediate Items on Congress' Plate

- Government agency funding – current 1/19 deadline for continuing resolution
- Foreign Intelligence Surveillance Act expiration – 1/19
- Disaster assistance supplemental
- Deferred Action for Childhood Arrivals (DACA) – 3/5
  - Border security, chained migration, "lottery" system
- Tax "extenders" – including several Medicare and energy taxes
- Children's Health Insurance Program funding
- Debt limit – end of February
- FAA reauthorization – 3/30

Key Dates

- State of the Union – Jan. 30
- Release of infrastructure initiative – Jan. 31?
- Administration's release FY2019 budget – First week of February (?)
- IBTTA "fly-in" – February 7-8

Known Details of Administration's Infrastructure Initiative

- Four "buckets"
  - State and local government "incentive" grants
  - Grants for "transformative projects"
  - Rural infrastructure "block grants"
  - Regulatory reform and project streamlining

Next Steps for Infrastructure Initiative

- Release shortly after State of the Union
- House and Senate Committees to hold hearings
- Expect to see numerous Congressional proposals
- Example – Brown, Whitehouse, Wyden bridge bill
- Need to identify a “pay-for” in order to advance proposal

IBTTA's Recent Activity

- Met with White House staff regarding infrastructure initiative
- Met with House and Senate authorizing committee staff to discuss tolling/infrastructure initiative
- Appropriations – Met with Appropriations Committee and Member staff re tolling language
- Interoperability
  - Sun Sentinel editorial that riled up Florida congressmen
  - FHWA cooperative agreement

IBTTA's Potential Next Steps

- Interstate tolling – continue to build support in Congress
- Respond to and build on Administration proposal ("user fees," "private sector," "self help," etc.) – propose changes, if needed
- Provide information on the effects of tax law on municipal debt, private activity bonds, etc.
- Develop IBTTA's FAST Act reauthorization priorities – what do we want to accomplish?
- Participate in FAST Act reauthorization activities – hearings, meetings, etc.

From: Benton Tempas [mailto:BTempas@nwpky.com]
Sent: Tuesday, October 31, 2017 5:42 PM
To: Tim Stewart <tstewart@e-470.com>
Cc: Pat Jones <pjones@ibtta.org>; Emanuela Stocchi <emanuela.stocchi@aiscat.it>; sjohnson@thetollroads.com
Subject: RE: 2018 IBTTA Committee Planning

See below for responses to your questions. Thanks for doing this as it is very helpful to flush out potential opportunities. Sorry about the delay, I was trying to wait for some information before responding. I would be happy to discuss this further, and also discuss at the January Board meeting if need be.

1. What changes, if any, would you recommend to your current Committee or Task Force structure?
   Our structure currently works, however we could use some improvement on communication. This is something I as the chair have not been doing well enough, and promise to improve communication between staff, committee and the board in 2018.
2. Who is the primary staff contact(s) for information, resources and support from the IBTTA staff for your Committee or Task Force?
   Wanda is my primary contact.
3. If you have a Committee or Task Force Charter, Mission Statement or both, are there revisions needed and if so what revisions?
   There is a 2009 draft mission, however it doesn't seem to have been formally adopted. We will review and will bring to the board a recommended mission to adopt.
4. What are your three top goals you would like to accomplish during 2018 in support of your Committee or Task Force efforts and the Vision and Mission of IBTTA?
   Our top goal for 2018 will be to clarify our mission. Next, we will work on reviewing the 2019 locations as well as the forecasted annual and AET meeting schedules. Third, to see if we can work on a 2-3 year calendar of all workshops for better forecasting and alignment with other association workshops.
5. To achieve the stated goals, will you require funding or additional support to complete these and if so can you please quantify?
   No funding is required; however we will need some additional support from staff for meetings and research.

Thank you again for the opportunity,
Benton

From: John Mike [mailto:John.Mike@perceptics.com]
Sent: Wednesday, October 18, 2017 1:47 PM
To: Tim Stewart <tstewart@e-470.com>; Pat Jones <pjones@ibtta.org>; emanuela.stocchi@aiscat.it
Cc: fran.o'connor@atkinsglobal.com
Subject: RE: 2018 IBTTA Committee Planning

Tim,

As outgoing chair of the Platinum Sponsors Advisory Council, I personally thank Pat and Emma for their support and guidance during our 2017 operating year. We look forward to your guidance as we move forward with our collective mission. My apologies for being a few days late on this important topic. In response to your solicitation I offer the following:

- **What changes, if any, would you recommend to your current Committee or Task Force structure?**
  - Currently the PSAC group operates in a modified format as compared to the other Task Force groups. We have operated for the first 18 months as a rather autonomous group without working group participation by IBTTA staff. This structure allowed us to get through and manage the formative stage of our Council. The members have been canvassed and believe it is now time to ask for the participation of a IBTTA Staff member during our working sessions. We collectively believe that this will enhance communications throughout the association and help build stronger synergy between like endeavors. We embrace the Board Liaisons participation and look forward to collaborative work efforts with this group.
- **Who is the primary staff contact(s) for information, resources and support from the IBTTA staff for your Committee or Task Force?**
  - To date we have not had a primary staff contact assigned to the PSAC group. Wanda and Pat have always made themselves available in support of any request we have made.
- **If you have a Committee or Task Force Charter, Mission Statement or both, are there revisions needed and if so what revisions?**
  - I have attached our Business Process document to this email. Currently we do not anticipate any changes to this for the remainder of 2017. It will be revisited in January of 2018, under the leadership of Fran O'Connor.
- **What are your three top goals you would like to accomplish during 2018 in support of your Committee or Task Force efforts and the Vision and Mission of IBTTA?**
  - To be recognized as a group of companies providing thought leadership to the Association and Industry, as well as a group that sees the value in increasing their financial support to the association.
  - Work on meaningful, disruptive, impactful, large issues that the industry and Association are facing, or may face in the foreseeable future
  - To integrate our mission, topics, and involvement with the strategic plan, meeting planning content, and the business direction of the Association
- **To achieve the stated goals, will you require funding or additional support to complete these and if so can you please quantify?**
  - Typically, the PSAC group meets in concert with a scheduled IBTTA meeting. IBTTA has provided the funding for meeting space, meeting communications, and light refreshments during these PSAC meetings. Our request is that this continue. We have not quantified the cost of such.

Platinum Sponsors Advisory Council Structure and Process
June 23, 2016

The PSAC consists of representatives of each Platinum Sponsor with one representative and one alternate. Both can attend meetings but only one can vote when a deciding vote of the entire Council is needed.

The PSAC shall have a Chair and Vice Chair elected by the Council who each will serve for one year with the Vice Chair succeeding the Chair. The first Chair and Vice Chair, however, will serve through 2017. In leading the Council, the Chair and Vice Chair will administer the group and represent the Council as agreed to by those who are members of the Council at the time of election. Any member of the PSAC can volunteer to serve as Chair or Vice Chair and would need to be elected by a majority vote of those in attendance at the meeting (one vote per company) either in person or by telephone. Each Platinum Sponsor company at the time of election will cast one vote by secret ballot and if nobody achieves a majority then a second ballot will be taken with just the top two finishers. A second round of voting could occur for Vice Chair or the second finisher for Chair can be so designated.

A first order of business will be for the PSAC to present to the IBTTA Board several mega issues in order of importance that the PSAC believes warrant greater attention within the IBTTA Strategic Plan. Additional mega issues can be presented to the IBTTA Board from time to time should the Council so decide.

While Council votes will typically be one per Platinum Sponsor, the selection of these top issues will be through a group ranking system. After some clarification of the subjects each company will "cast" votes for the 3 identified issues they feel most important for attention by the Association. They can cast them all on one issue or distribute them. A simple tally of the "votes" will produce the ranking. In this manner each company can indicate more than one important issue and the process can have additional benefit of the overall knowledge of the members. The Council can adjust this approach if so desired by majority vote. At least two (2) issues with the highest ranking will be shared with the Board for mutual agreement for research and discussion.

The below list from two meetings ago is a dynamic one and is in alphabetical order and subject to change by the PSAC prior to voting.

Automated Vehicles
Big Data
Connected Vehicles
Internet of Things
Mobility as a Service/Mobility on Demand/Payment Systems
Mileage Based User Fees/Road User Charging
Smart Cities
Transportation Financial Sustainability

When the Board confirms agreement with the issues to be mutually discussed, the PSAC, including the Board liaisons, will create work groups to develop and then mutually work on a plan on how as to how to address the issues and provide a work product to the Board as a whole for use in the strategic planning process.

Since these issues are emerging and of significant industry impact, we would also expect discussion of them at IBTTA conferences, led by PSAC workgroup members, who would be speakers on the program.

Dec. 2017 - An overview of the IBTTA efforts to achieve National ETC Interoperability

In 2010 the International Bridge Tunnel and Turnpike Association (IBTTA) began working to meet the requirements of what MAP-21 would call for (in 2012) – a nationally interoperable system of electronic toll payments – with the creation of a Interoperability (IOP) Steering committee and multiple working groups addressing specific aspects of the issue.

A major barrier to developing a national electronic toll collection (ETC) system was the development of individual ETC systems introduced by many agencies since the advent of ETC in 1989. Significant time and resources have been expended by individual agencies to develop systems suitable for their local needs and to market, issue and service these systems to their local customers. These agencies now manage tens of millions of customer accounts and any restructuring of either the mechanical or business systems associated with ETC presents complicated and expensive challenges that can irritate their customers so any such changes are very carefully considered.

Taking on this problem required the cooperation of the toll agencies as well as their equipment suppliers and technical support contractors. IBTTA has always felt that a collaborative effort of the agencies was a much more plausible path to success than a forced and unfunded governmental mandate.

In 2015 IBTTA issued an RFP and entered into a contract to pursue a testing process that would identify one protocol among the multiple protocols in use across the country that could be determined as the "national" tag. The traditional path to such testing would involve extensive use of manned vehicles driving laps at varying speeds and with differing combinations of ETC tags being used in a live environment. Such testing is prohibitively expensive.

The IBTTA effort focused on creating a lab based testing process that could replicate and replace live testing with a goal of identifying a single protocol that could best address any toll agency's current ETC setup and data needs. The intent of identifying a single "national" protocol was to allow individual agencies the opportunity to, in the short term, offer any customer desiring an interoperable tag a choice and recommendation as to how they could best address that need. In the longer term, as existing ETC systems needed replacement or upgrading, having identified a single "preferred" protocol among the several in use, agencies would migrate towards a common protocol and in doing so become increasingly interoperable.

IBTTA's effort was fiscally constrained from the start and it was engaged as an entirely self-funded process which didn't contemplate or seek any Federal assistance. As engaged, the project envisioned performing the work as funds were raised or otherwise made available. IBTTA was only made aware of the FHWA Notice of Funding Opportunity (NOFO) in January 2016, and was able to finalize the agreement with FHWA in September 2016, more than a year after the original testing contract was engaged.

A critical element of the effort to build a lab-based surrogate for live testing was a cross-check mechanism that would test whether the lab based method was, in fact, an accurate surrogate for live testing. In August we received the preliminary results of that cross-check which tells us that the lab based path does not, in fact, accurately reflect the real-world roadway interactions with enough precision. Therefore, the lab testing approach we had proposed is not viable going forward.

This is not to say that lab testing does not provide useful and valuable information. Lab testing **has** confirmed the candidate protocols' adherence to specifications (known as "conformance testing") and multi-protocol handshake degradation requirements (Test Rounds 1 & 2). "Degradation" in this instance refers to any loss of precision in identifying any one tag if another protocol tag is in the same environment, i.e. "is it harder to read

you own “local” tag if non-local tags are also in the vehicle mix.” Because “bad reads” equals revenue loss and customer dissatisfaction this is a critical concern for toll agencies.

In Test Rounds 3 & 4, we were able to confirm adherence to the handshake degradation requirement in the field but were not able to statistically correlate all of the performance requirements between the lab and field environments as originally envisioned. This was due to our inability to replicate conditions between the lab and field environments (dual or multilane environments).

The specific elements of the work plan incorporated in the FHWA agreement that would not be performed are the Test Rounds 5 and 6 which focused on Read/Write performance (highlighted on table below). It is deemed unhelpful to pursue this testing as planned since the lab test environment has been determined to not accurately reflect real world events.

In order to follow the testing path further, we would have to conduct massive numbers of live driving laps with professional drivers on a dedicated high-speed facility at a minimum cost of $800,000 and potentially much higher. This would significantly exceed our current contract with OmniAir and our membership has expressed little enthusiasm for raising or spending further funds in support of the effort, mainly because we are seeing rapidly growing regional interoperability which has occurred parallel to our testing effort.

The IBTTA Board of Directors discussed these findings in September. We are confident that the work effort and testing completed thus far **does** provide useful information that IBTTA can report to FHWA and the public to fulfill the requirements of the agreement. Furthermore, we are **not** be seeking additional funding either from IBTTA members or from US DOT.

IBTTA and our members fully intend to continue working on the **business practices** associated with interoperable transactions to fulfill the interoperability intent of MAP-21. That intent is found in this language: “all toll facilities on the Federal-aid highways shall implement technologies or business practices that provide for the interoperability of electronic toll collection programs.”

In short, it is our belief that no additional testing is needed to accomplish that objective. IBTTA is not seeking any additional funding from FHWA beyond the scope of the original agreement.

Separately and parallel to IBTTA's work on protocol testing, our member agencies are using the work products from the testing effort to coordinate, design, finance and implement multi-state toll Interoperability solutions that weren't envisioned in 2010 or even 2015 as we entered the formal testing process. These "regional interoperability hubs" are already in operation in Texas, Oklahoma, Kansas, Florida and Georgia. The Ez-Pass Consortium maintains its own hubs as part of it’s ongoing business practice and covers the greater Northeast of the country (16 states). In the next 18 months we will see additional "regional hubs" that will link the states of NC, SC, GA, FL, TX, OK, KS and CO. Also, currently planning to join this effort through a Western Region Toll Operator MOU are CA, OR, WA, UT, NV and AZ.

In summary, while the efforts of our protocol testing path have not performed as we hoped, we believe there has been significant progress made to fulfill the intent of the MAP-21 requirements and that both our efforts, and those enabled through FHWA's participation, have been useful. These efforts have contributed significantly to the efforts to achieve national interoperability in the near future.

NIOP Timetable

2016

- Testing developed by OmniAir → ROSC provides oversight
- Phase 1 – Conformance Testing (completed)
  - 6C - Passed
  - TDM - Passed
  - SeGo – Passed
- Phase 2 – Performance Testing – Planning efforts (completed)
- Lab Test track tool developed (completed)

2017

- Testing led by OmniAir → ROSC provides oversight
- Test Approach Doc –Approved by Steering Committee 3/2017
- Statistical methodology established (completed)
- Final review of Test Plan (completed)
- Responding to Agency & Vendor comments (completed)
- ~~Phase 2 – Performance Testing~~
  - ~~Lab~~
  - ~~Field~~
- Update Industry survey and model (completed)
- ~~Schedule: Final Lab test report results 9/2017 (planned target~~)

Test Round Number	Description	Tests	Lab Trials	Field Trials	Total Trials
Round 1	Single Protocol Correlation	12	600		600
Round 2 (Pass/Fail)	Dual Protocol Handshake Performance	12	600		600
Round 3	Handshake Correlation	18	900		900
Round 4	Variable Correlation	24		1,200	1,200
Round 5 (Pass/Fail)	R/W Performance	12	19,308-45,744		19,308-45,744
Round 6 (Pass/Fail)	R/W Performance	3		4,827	4,827
TOTALS		75	21,408-47,844	6,027	27,435-53,971

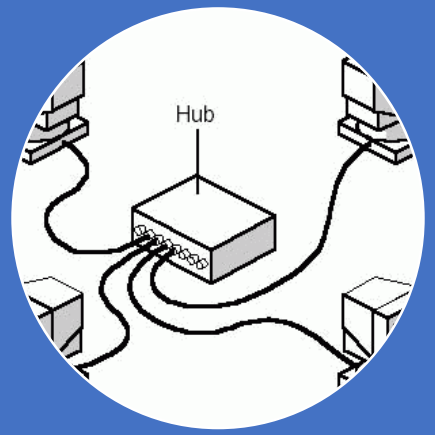
E-ZPass Group Interoperability Update

IBTTA Board of Directors

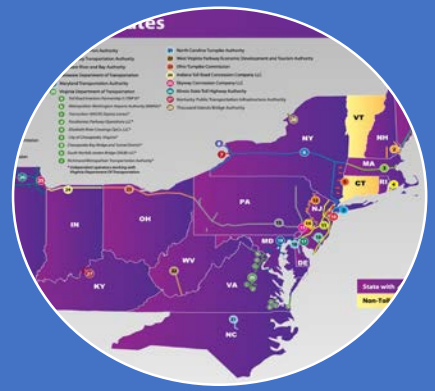
January 18, 2018

E-ZPass Group Update

Technology



Back Office

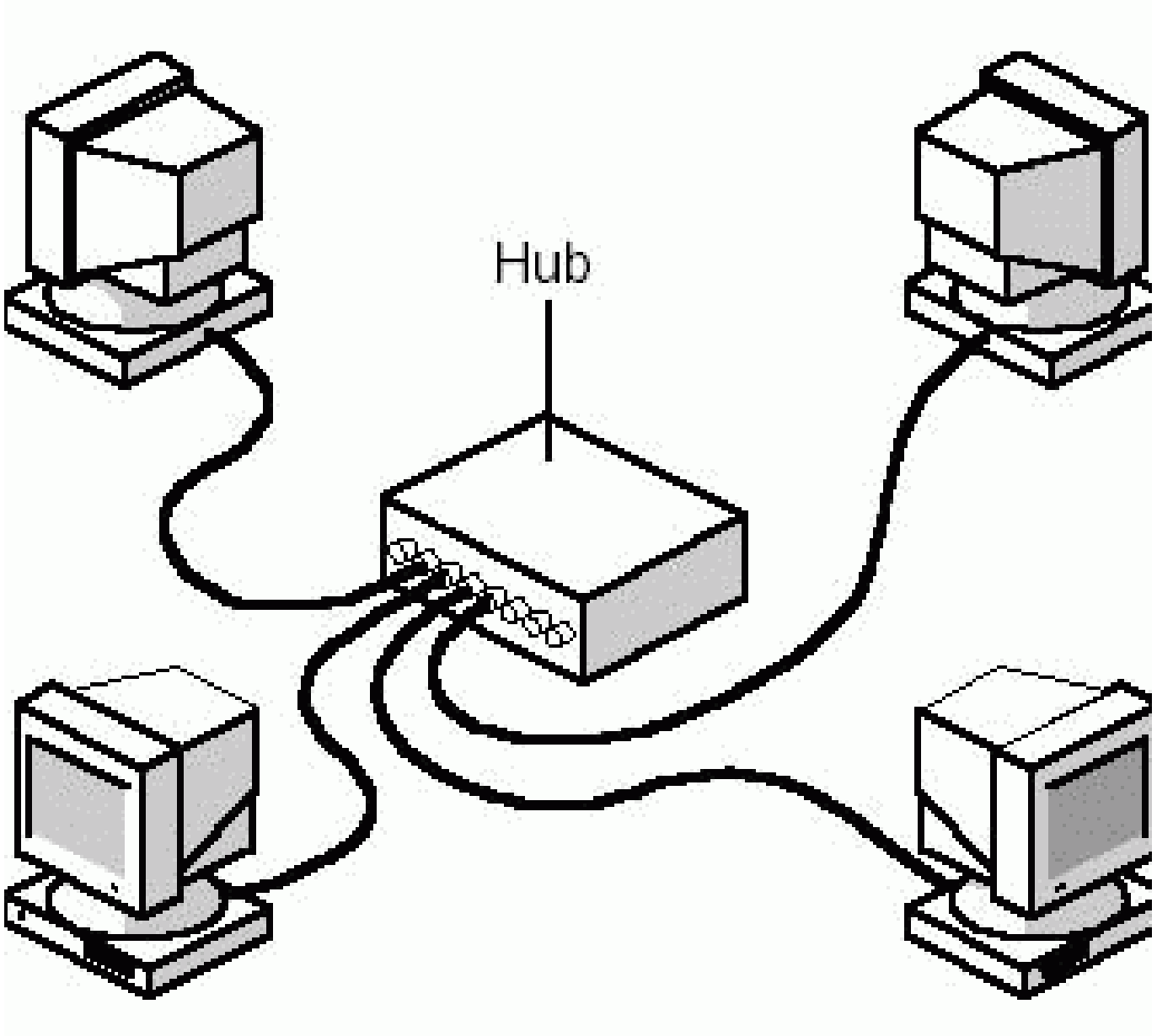


Membership

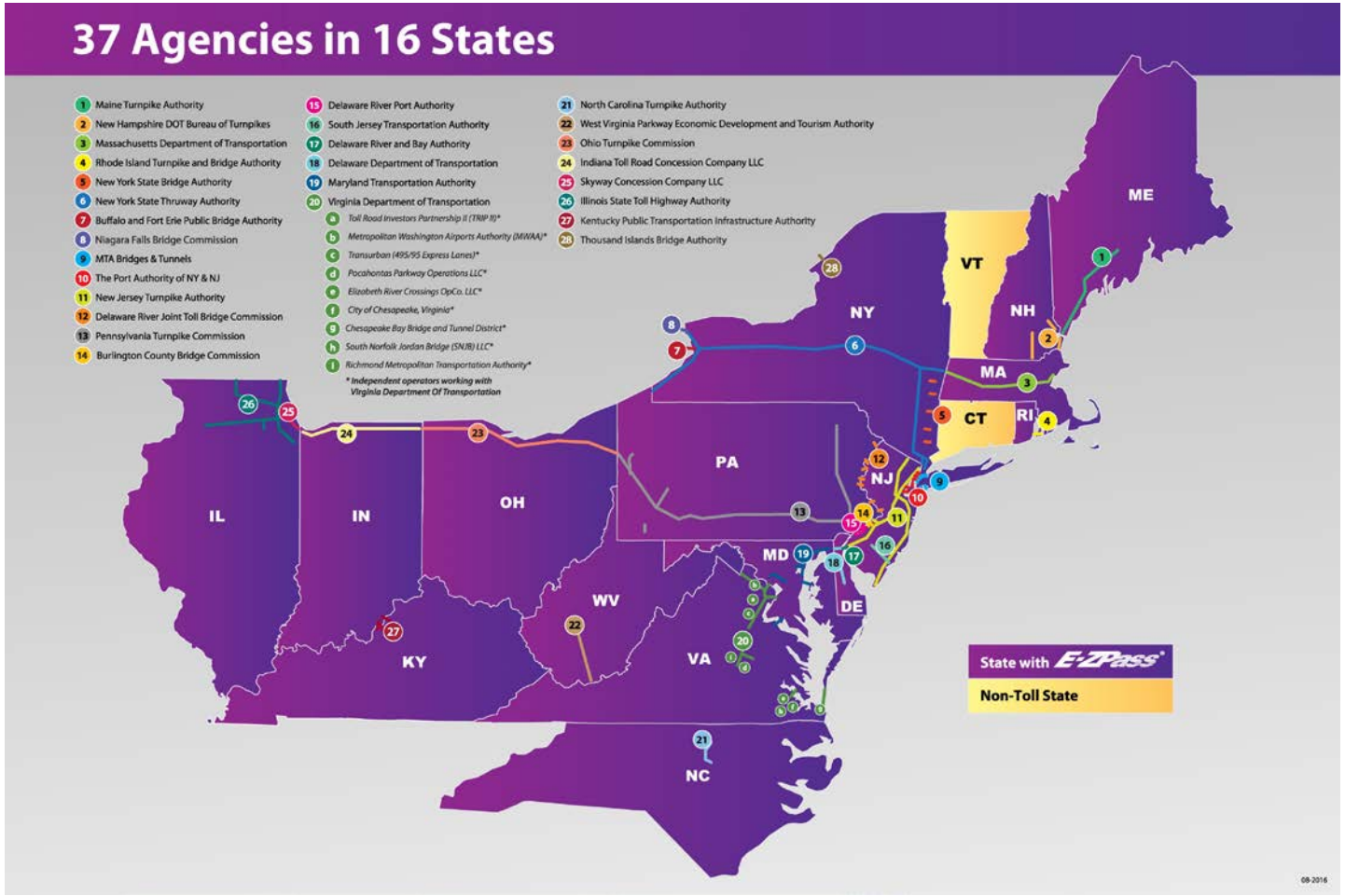
Technology

Tags and Readers

Back Office - Hub



Membership Footprint



NEAR-TEARM FOCUS

Resolution to Elect New Members
To be adopted by the Board January 19, 2018

Whereas Article II Section 2 of the IBTTA Bylaws stipulates that all members "shall be elected to the Association by resolution of the Board of Directors."

Whereas the organizations listed below have expressed the desire to become members of IBTTA and have paid their dues;

Now, Therefore, Be it Resolved, that the IBTTA Board of Directors elects these organizations to be members in the Association in the membership categories designated.

Agency/Organization	Member Type	City	State	Country
Ascend Infrastructure	DBE/WEB/MBE/SBE	Chicago	IL	UNITED STATES
BRiC-TPS LLC	Associate	Irvine	CA	UNITED STATES
Van Eperen	DBE/WEB/MBE/SBE	Rockville	MD	UNITED STATES

Resolution on Discretionary Non-Elective Contribution to IBTTA
Staff 401(k) Retirement Plan
To be Approved by the IBTTA Board of Directors
January 19, 2018

WHEREAS IBTTA has what is known as a "Safe Harbor" 401(k) plan in which the employer makes a matching contribution up to 4.5% of employee compensation. However, to reach the targeted employer contribution of 6% under the IBTTA 401(k) retirement plan, the board of directors must vote each year to make an additional contribution of 1.5% of employee compensation;

WHEREAS the total IBTTA contributions for 2017 to be accrued in 2017 and paid in 2018, including both the 401(k) match of **$69,461.75** and the Discretionary Non-Elective Contribution of **$24,846.75** amount to a total contribution of **$94,308.50**. This total amount is provided for in the 2017 budget; and

WHEREAS the Compensation Policy Committee voted by electronic ballot on January 12, 2017 to recommend that the IBTTA Board adopt this resolution.

NOW, THEREFORE, BE IT RESOLVED that IBTTA make a Discretionary Non-Elective Contribution to the IBTTA 401(k) Retirement Plan for the period from January 1, 2017 through December 31, 2017 in an amount equal to 1.5% of employee compensation totaling $24,846.75.

Additional Background Information

In May 2008, the IBTTA Board authorized the establishment of a Retirement Plan in the form of a 401(k) plan for IBTTA employees and authorized the Compensation Policy Committee to conduct the detailed technical analysis necessary to select the most appropriate safe-harbor 401(k) plan and proceed to implement such plan.

The Compensation Policy Committee selected the following safe-harbor option, to be used with the replacement plan, known as the IBTTA 401(k) Retirement Plan:

1. IBTTA will match, on a dollar for dollar basis, the first 3% of compensation contributed by an employee.
2. IBTTA will match, on a $.50 on the dollar basis, the next 3% of compensation contributed by an employee.
3. On an annual basis, in January for the previous plan year, the Board of Directors will authorize an additional contribution to employee accounts, stated as a percentage of employee compensation but without regard to the level of employee contributions.
   a) This percentage will be determined based on a review of financial results for the preceding year, but will be targeted to equal 1.5% of employee compensation.
   b) A recommendation will be developed and approved by both the Compensation Policy Committee and the Finance Committee prior to presentation to the Board.

Resolution on IBTTA Compensation Policy
To be Approved by the IBTTA Board of Directors
January 19, 2018

WHEREAS the IBTTA Board of Directors, adopted a Compensation Policy drafted by Quatt Associates, an independent compensation consultant, on October 6, 2007 "to ensure that IBTTA staff are appropriately compensated and that staff compensation shall not deviate materially from the market";

WHEREAS the 2007 Compensation Policy has served the association well for ten years;

WHEREAS the Executive Committee directed the issuance of an RFP to select a new compensation consultant in 2017 and selected PRM Consulting to be the association's new compensation consultant;

WHEREAS PRM Consulting recommended changes to the 2007 approved Compensation Policy;

WHEREAS the IBTTA Executive Committee and Compensation Policy Committee have reviewed and approved the revised Compensation Policy drafted by PRM and staff and recommend its adoption by the IBTTA Board as indicated in the November 14, 2017 minutes of the Compensation Policy Committee;

NOW, THEREFORE, BE IT RESOLVED that the IBTTA Board adopts the revised Compensation Policy attached to this resolution.

MINUTES
International Bridge, Tunnel, and Turnpike Association
Joint Meeting of the Compensation Policy Committee and Executive Committee
November 14, 2017
(By conference call)

Compensation Policy Committee members present: Buddy Croft (CHAIR); Emanuela Stocchi; Tim Stewart; Chris Tomlinson. **Future Executive Committee**: Samuel Johnson. **IBTTA Staff**: Pat Jones. **Guests from PRM Consulting**: Jim Moss.

Compensation Policy Committee Chair Buddy Croft called the meeting to order at 10:05 a.m. The Compensation Policy Committee met to review the market analysis performed by independent association compensation consultant PRM Consulting for every staff position including that of the executive director and CEO. The committee also met to review the proposed staff compensation budget for 2018 to ensure that it complies with the IBTTA Board approved compensation philosophy and policy.

Jim Moss reviewed the market surveys and methodology that PRM Consulting used to develop the compensation ranges for IBTTA staff. PRM developed a list of comparable associations based on size of budget. PRM also uses published surveys of association compensation. PRM reports the total cash compensation provided at the 25th percentile, the median, the mean, and the 75th percentile of the marketplace.

Moss reported that in the aggregate, IBTTA cash compensation is competitive, however three positions are slightly below the market. Jim Moss recommended the following changes to IBTTA's compensation philosophy:

- IBTTA should switch from targeting the market median to the market mean to better reward and recognize covered employees for their individual contributions.
- IBTTA should use standard market "best practices" to construct pay ranges (i.e., a 50% spread around the desired pay target).
- IBTTA should permit pay range penetration of an employee's actual pay up to the recommended maximums for their positions based on both their individual performance and tenure.

When asked whether IBTTA should conduct a full-blown compensation study every year, Jim Moss said he would recommend a full study every three to five years. In between the full-blown studies, IBTTA could utilize average market movement projections to update the individual pay ranges.

Pat Jones reviewed the proposed compensation budget for 2018 and responded to questions. The 2018 staff compensation budget reflects an overall increase of four percent for current positions. Jim Moss said that this increase is consistent with changes in the market. The

Compensation Policy Committee also determined that the proposed budget is consistent with IBTTA's compensation policy and philosophy.

Pat Jones left the conference call so that the Executive Committee could discuss his compensation package in executive session. The Executive Committee reviewed the report on CEO compensation prepared by Jim Moss and agreed on the CEO's 2018 cash compensation package based on the PRM Consulting Report and the CEO's employment agreement.

There was a motion and a second to recommend to the Board of Directors formal approval of the total 2018 staff cash compensation budget. The motion PASSED.

There was a discussion of the proposed new compensation policy that considers the recommendations to the Committee from Jim Moss. **There was a motion and a second to advance the proposed Compensation Policy to the Finance Committee and Board for consideration and adoption. The motion PASSED.**

The meeting was adjourned at 11:00am.

Respectfully submitted,

Buddy Croft, Chair, Compensation Policy Committee
Emanuela Stocchi, President, IBTTA

Revised Compensation Policy and System for IBTTA Staff
To be adopted by the IBTTA Board January 19, 2018

General Principles

The purpose of this policy is to ensure that IBTTA staff are appropriately compensated and that staff compensation shall not deviate materially from the market as defined by a compensation study prepared by an independent firm with expertise in preparing association compensation studies.

The IBTTA Board of Directors is responsible for establishing the compensation of the IBTTA Executive Director. Within the compensation policy and system approved by the IBTTA Board of Directors, the Executive Director is solely responsible for administering the compensation policy and system for all other IBTTA employees.

Recommended Governance on IBTTA Compensation

The IBTTA President shall annually appoint a Compensation Policy Committee (CPC) composed of at least three members of the Board. The CPC will ensure that IBTTA's compensation practices are reasonable within the framework of the established compensation philosophy, policy, and marketplace definition and sources. The Committee will then forward its recommendations about the total staff compensation budget to the Finance Committee and Board for its review and approval.

Staff Compensation Policy and Compensation System

The CPC shall meet with the Executive Director at least once annually to validate that the Executive Director is implementing the compensation system within the compensation policy approved by the Board. The Executive Director shall provide to the CPC such information as it needs to validate that the compensation policy is being followed.

Compensation will support the mission, strategy, operating plans, and values of IBTTA. IBTTA will pay for performance through both merit increases to base salary and discretionary bonuses. Bonus compensation will have both a team component tied to organizational success and an individual component tied to individual contribution to organizational success.

IBTTA's compensation system supports the concept of total pay delivery, which includes both salary increase and discretionary variable pay.

The compensation plan will establish a salary range for each position. The cash compensation range will have a target set at the **market mean total cash** for each position, with a minimum set at 80% of the target and a maximum set at 120% of the target. Pay above target will be reserved for employees who provide value-added performance to IBTTA, such as employees

who demonstrate a long service of outstanding performance. The marketplace will be defined as similar positions in like organizations located in Washington, D.C.

Compensation is considered competitive if it falls within a range of 90% to 110% of developed market rates below $100,000, or within 85% to 115% for amounts $100,000 or more.

IBTTA will consider adjustments to the salary ranges annually based on changes in the marketplace. When positions substantially change or when a new position is created, IBTTA will establish a market value and salary range for the position.

PRM Consulting Group, Inc, which was hired to conduct IBTTA's compensation study in 2017, recommends that IBTTA permit pay range penetration of an employee's actual pay up to the recommended maximums for their positions based on both their individual performance and tenure.

IBTTA will have a benefits package competitive with the marketplace. The compensation structure and systems will be understandable and clear to management and staff. The compensation structure will allow for flexibility and adaptability to change.

Executive Director Compensation

Compensation for the Executive Director follows the same principles outlined in the "Staff Compensation Policy and System." In addition, the Executive Director has an employment contract with IBTTA that outlines the level of compensation during the period of the contract and the distribution of compensation between base salary and discretionary bonus.

The Performance-Based Compensation System

Each staff member will be placed in a salary range based on the position's individual market pricing. The purpose of a salary range is to reward growth and performance while linking pay to the market. Payment within the salary range is based on:

- Level of skills, knowledge, and capabilities
- Performance history
- Experience in the position and experience at IBTTA

Staff members typically are hired at a salary toward the lower end of a salary range and move through the range as they show a record of continued strong performance and growth. As a general rule, no staff member will be paid below the minimum of the range. Employees move through their range as they receive annual merit pay increases. Increases are typically larger than average—assuming good performance—for those below the target of the range, so that their salaries move toward the market mean over a reasonable time.

For those persons being paid above the market, increases would be at or below the organizational average, since their wages are already above market. Only employees who consistently perform above the expectations of their positions, and who are consistently outstanding performers with long service will typically be paid above the market mean. Only a small number of employees will fall in this segment. Salary ranges will be reviewed each year to ensure continued competitiveness with the marketplace.

Everyone's annual merit increase will be based on the following elements:

- The annual adjustment in salary range for the standard performer that keeps the salary at pace with the marketplace
- Movement within range to reflect performance and experience so that the employee can be paid over time at the mean of the marketplace. The movement within range is based on a combination of:
    - Adjustment for performance
    - Position within range (persons lower in their range receive larger increases than persons with similar performance above the range target)

IBTTA's salary range movement and promotions will be tied to the performance management system. The IBTTA performance management system will be based on annual goals and objectives. At the beginning of every year, each staff member will identify his or her most important goals. Goals will be based on supporting key organizational goals, critical position responsibilities, and improvements in key skills and competencies. The performance management system will be used to help determine progression within an employee's salary range, bonus opportunity, and opportunity for promotion.

Budgeting for the Compensation System

Each year during budget preparation time (summer and fall), the IBTTA Executive Director shall, after consulting with the Compensation Policy Committee, recommend to the Finance Committee and the Board of Directors a budget for total cash compensation to be included in the next year's association budget. The budget will be based on expected marketplace changes in the Washington, D.C. area as reported by authoritative compensation sources.

International Bridge, Tunnel and Turnpike Association
Audit Committee Charter

Revised April 17, 2009

PURPOSE

The purpose of the Audit Committee is to assist the board of directors in fulfilling its oversight responsibilities for the association's accounting and financial reporting processes and audits of the financial statements of IBTTA, by reviewing (1) the integrity of the association's financial statements, (2) the independence and qualifications of its external auditor, (3) the association's system of internal controls, (4) the performance of the association's external audit process, and (5) compliance with laws, regulations, and ethics.

COMPOSITION

The Committee will generally consist of five (5) members of the board of directors. At least one of the five members ~~should~~ will hold a current Certified Public Account (CPA) license, ~~have accounting or related financial expertise~~ and each member shall be independent of staff. Alternatively, in order to meet the CPA requirement, the Nominating Committee will have the option to recommend one proposed Committee member of the five who is an IBTTA member in good standing and holds a current CPA license who is not a member of the board of directors. The Audit Committee Chair must be a member of the board of directors. The President will appoint the Committee members on the recommendation of the Nominating Committee, and select the Committee chair from those nominees ~~on the recommendation of the Nominating Committee~~.

MEETINGS

The Committee will meet as often as it determines is appropriate, but not less frequently than once annually. All Committee members are expected to attend each meeting, in person or via telephone. The Committee may periodically hold private meetings with management and the external auditor. The Committee may invite any officer or employee of the association, the external auditor, the association's outside counsel, or others to attend meetings and provide pertinent information. Meeting agendas will be prepared by the Committee Chair and provided in advance to members, along with appropriate briefing materials. A member of the Committee or an IBTTA staff person will keep minutes.

AUTHORITY AND RESPONSIBILITY

The Committee has authority to conduct or authorize examinations into any matters within its scope of responsibility. It has authority and responsibility to (1) appoint, determine compensation, retain, and directly oversee the work of the association's external auditor (2) resolve any disagreements between management and the auditors regarding financial reporting, and (3) pre-approve all audit services and any other assignments. It has authority to:

- Seek any information it requires from employees—all of whom are directed to cooperate with the Committee's requests—or external parties.
- Meet with association officers, external auditors, or outside counsel, as necessary.
- Send one of its members to meet, in total confidentiality, with any employee who would require so. In particular, a Committee member can interview any separating employee and report back to the Committee.

- IBTTA shall provide appropriate funding, as determined by the Committee, for payment of compensation to any registered public accounting firm engaged for the purpose of rendering or issuing an audit report or related work.
- A quorum shall consist of the Chair plus two members, in the absence of the Chair a quorum shall be a minimum of four members.

The Committee also has authority to:

Financial Statements

- Provide assurance to the board of directors that financial information reported by management reasonably portrays the IBTTA's financial condition, results of operations and plans and long term commitments and risks.
- Review and discuss with management and the external auditor significant accounting and financial reporting issues, including complex or unusual transactions and judgments concerning significant estimates or significant changes in the association's selection or application of accounting principles, and recent professional, accounting and regulatory pronouncements and initiatives, and understand their impact on the association's financial statements.
- Review with management and the external auditor the results of the audit and management letter, including any difficulties encountered in the course of the audit work, any restrictions on the scope of activities or access to requested information and any significant disagreements with management.
- Monitor audit results and implementation of recommended changes.
- Understand how management prepares interim financial information, and the nature and extent of external auditor involvement.

Internal Controls and Risk Management

Review the adequacy of the IBTTA's system of internal controls and obtain from the independent accountants and appropriate staff their recommendations regarding changes in the system of internal controls and other matters relating to accounting, administrative and operating procedures, and the IBTTA's financial statements. Review the correction of any internal controls deemed to be deficient.

External Audit

- Have the external auditor report directly to the Committee Chair.
- Obtain and review a report from the external auditor regarding its quality control procedures, and material issues raised by the most recent internal quality control review
- Evaluate, and present to the board of directors its conclusions regarding, the qualifications, performance and independence of the external auditor.

Compliance with Laws, Regulations and Ethics

The responsibility of the Audit Committee in the area of compliance with laws, regulations and ethics is to provide reasonable assurance to the board that the IBTTA is in compliance with pertinent laws and regulations, is conducting its affairs ethically, and is maintaining effective controls against conflicts of interest and fraud. The specific steps involved in carrying out this responsibility include:

- Advise the board of directors with respect to the association's policies and procedures regarding compliance with applicable laws and regulations and with IBTTA's codes of conduct, including review of the process for communicating the codes of conduct to association personnel and for monitoring compliance.
- Review with management the policies and procedures with respect to all expenses, and in particular the executive director's expense account.
- Obtain regular updates from management and association counsel regarding compliance matters and legal matters that may have a significant impact on the financial statements.
- Reviewing significant cases of employee conflict of interest, misconduct, or fraud and the resolution of the cases.

Reporting Responsibilities

- Regularly report to the board of directors about Committee activities, issues and related recommendations.
- Provide an open avenue of communication between the external auditor and the board of directors.
- Review any other reports and IBTTA issues that relate to Committee responsibilities.

Other Responsibilities

- Perform other activities related to this charter as requested by the President.
- Review and assess the adequacy of the Audit Committee charter annually and request board approval for proposed changes.

International Bridge, Tunnel and Turnpike Association
Audit Committee Charter
(With Revisions as Approved by the Board, January 19, 2918)

PURPOSE
The purpose of the Audit Committee is to assist the board of directors in fulfilling its oversight responsibilities for the association's accounting and financial reporting processes and audits of the financial statements of IBTTA, by reviewing (1) the integrity of the association's financial statements, (2) the independence and qualifications of its external auditor, (3) the association's system of internal controls, (4) the performance of the association's external audit process, and (5) compliance with laws, regulations, and ethics.

COMPOSITION
The Committee will generally consist of five (5) members of the board of directors. At least one of the five members will hold a current Certified Public Account (CPA) license, and each member shall be independent of staff. Alternatively, in order to meet the CPA requirement, the Nominating Committee will have the option to recommend one proposed Committee member of the five who is an IBTTA member in good standing and holds a current CPA license who is not a member of the board of directors. The Audit Committee Chair must be a member of the board of directors. The President will appoint the Committee members on the recommendation of the Nominating Committee, and select the Committee chair from those nominees.

MEETINGS
The Committee will meet as often as it determines is appropriate, but not less frequently than once annually. All Committee members are expected to attend each meeting, in person or via telephone. The Committee may periodically hold private meetings with management and the external auditor. The Committee may invite any officer or employee of the association, the external auditor, the association's outside counsel, or others to attend meetings and provide pertinent information. Meeting agendas will be prepared by the Committee Chair and provided in advance to members, along with appropriate briefing materials. A member of the Committee or an IBTTA staff person will keep minutes.

AUTHORITY AND RESPONSIBILITY
The Committee has authority to conduct or authorize examinations into any matters within its scope of responsibility. It has authority and responsibility to (1) appoint, determine compensation, retain, and directly oversee the work of the association's external auditor (2) resolve any disagreements between management and the auditors regarding financial reporting, and (3) pre-approve all audit services and any other assignments. It has authority to:

- Seek any information it requires from employees—all of whom are directed to cooperate with the Committee's requests—or external parties.
- Meet with association officers, external auditors, or outside counsel, as necessary.
- Send one of its members to meet, in total confidentiality, with any employee who would require so. In particular, a Committee member can interview any separating employee and report back to the Committee.

- IBTTA shall provide appropriate funding, as determined by the Committee, for payment of compensation to any registered public accounting firm engaged for the purpose of rendering or issuing an audit report or related work.
- A quorum shall consist of the Chair plus two members, in the absence of the Chair a quorum shall be a minimum of four members.

The Committee also has authority to:

Financial Statements

- Provide assurance to the board of directors that financial information reported by management reasonably portrays the IBTTA's financial condition, results of operations and plans and long term commitments and risks.
- Review and discuss with management and the external auditor significant accounting and financial reporting issues, including complex or unusual transactions and judgments concerning significant estimates or significant changes in the association's selection or application of accounting principles, and recent professional, accounting and regulatory pronouncements and initiatives, and understand their impact on the association's financial statements.
- Review with management and the external auditor the results of the audit and management letter, including any difficulties encountered in the course of the audit work, any restrictions on the scope of activities or access to requested information and any significant disagreements with management.
- Monitor audit results and implementation of recommended changes.
- Understand how management prepares interim financial information, and the nature and extent of external auditor involvement.

Internal Controls and Risk Management

Review the adequacy of the IBTTA's system of internal controls and obtain from the independent accountants and appropriate staff their recommendations regarding changes in the system of internal controls and other matters relating to accounting, administrative and operating procedures, and the IBTTA's financial statements. Review the correction of any internal controls deemed to be deficient.

External Audit

- Have the external auditor report directly to the Committee Chair.
- Obtain and review a report from the external auditor regarding its quality control procedures, and material issues raised by the most recent internal quality control review
- Evaluate, and present to the board of directors its conclusions regarding, the qualifications, performance and independence of the external auditor.

Compliance with Laws, Regulations and Ethics

The responsibility of the Audit Committee in the area of compliance with laws, regulations and ethics is to provide reasonable assurance to the board that the IBTTA is in compliance with pertinent laws and regulations, is conducting its affairs ethically, and is maintaining effective controls against conflicts of interest and fraud. The specific steps involved in carrying out this responsibility include:

- Advise the board of directors with respect to the association's policies and procedures regarding compliance with applicable laws and regulations and with IBTTA's codes of conduct, including review of the process for communicating the codes of conduct to association personnel and for monitoring compliance.
- Review with management the policies and procedures with respect to all expenses, and in particular the executive director's expense account.
- Obtain regular updates from management and association counsel regarding compliance matters and legal matters that may have a significant impact on the financial statements.
- Reviewing significant cases of employee conflict of interest, misconduct, or fraud and the resolution of the cases.

Reporting Responsibilities

- Regularly report to the board of directors about Committee activities, issues and related recommendations.
- Provide an open avenue of communication between the external auditor and the board of directors.
- Review any other reports and IBTTA issues that relate to Committee responsibilities.

Other Responsibilities

- Perform other activities related to this charter as requested by the President.
- Review and assess the adequacy of the Audit Committee charter annually and request board approval for proposed changes.

Revision dates:
April 17, 2009
January 19, 2018

Resolution to Elect New Members (to be adopted by the Board June 23, 2018)

Whereas Article II Section 2 of the IBTTA Bylaws stipulates that all members "shall be elected to the Association by resolution of the Board of Directors."

Whereas the organizations listed below have expressed the desire to become members of IBTTA and have paid their dues;

Now, Therefore, Be it Resolved, that the IBTTA Board of Directors elects these organizations to be members in the Association in the membership categories designated.

Agency/Organization	Member Type	City	State	Country
AceApplications, LLC	Associate	Orlando	FL	UNITED STATES
Broad and Cassel LLP	Associate	Orlando	FL	UNITED STATES
E-Transit, Inc.	Associate	Bridgeport	PA	UNITED STATES
Globalvia Inversiones Holding LLC	Active	Madrid		SPAIN
Kidd International, Inc.	Associate	Takoma Park	MD	UNITED STATES
KPMG LLP	Associate	Austin	TX	UNITED STATES
Leonardo/Selex ES Inc.	Associate	Greensboro	NC	UNITED STATES
Oregon Department of Transportation/OReGO Program	Active	Salem	OR	UNITED STATES
Passport Labs, Inc.	Associate	Charlotte	NC	UNITED STATES
Phoscrete Corporation	Associate	Deerfield Beach	FL	UNITED STATES
PSS	Associate	Cleveland	OH	UNITED STATES
RideFlag Technologies, Inc.	Associate	Mississauga	ON	CANADA
Roadis Transportation B.V.	Active	Indianapolis	IN	UNITED STATES
StarStar Mobile	Associate	Fort Lauderdale	FL	UNITED STATES
State of New Jersey Department of Transportation	Active	Trenton	NJ	UNITED STATES
Stokes Creative Group, Inc.	Associate	Vinentown	NJ	UNITED STATES
The Brand Advocates, Inc.	Associate	Miami	FL	UNITED STATES
The CCS Companies	Associate	Norwood	MA	UNITED STATES
UBS Financial Services, Inc.	Associate	New York	NY	UNITED STATES
Weris, Inc.	Associate	Sterling	VA	UNITED STATES
Wilkins Strategies	Associate	Felton	DE	UNITED STATES

BCG

THE BOSTON CONSULTING GROUP

The Reimagined Car:
Shared, Autonomous, Electric

JUNE 2018

With you today

Rich Davey

Associate Director
State/Local Practice Leader

- CEO of Boston 2024 Olympic Committee (2015)
- Massachusetts Secretary of Transportation (2011-2014)
- General Manager of the MBTA (2010-2011)

Introduction

Over the last few months the Boston Consulting Group has been engaged in an extensive study researching how new technologies and changing consumer behaviors will converge to drive a fundamental disruption to traditional vehicle usage

The purpose of this document is to summarize these findings in hopes of providing clarity to the economic rationale for why we believe this shift will occur, the potential benefits (and costs) to society, and most importantly, serve as a call to action for OEMs and suppliers who must immediately begin evolving their respective business models to ensure they are best positioned to thrive in this rapidly changing world

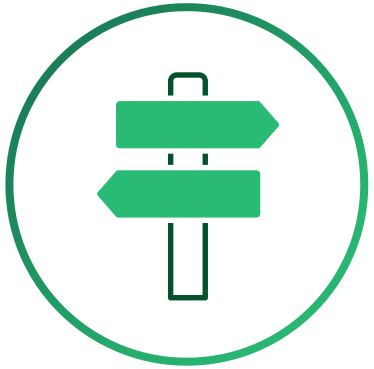
Convergence of technology and consumer trends

What do the economics point to as the potential for shared, autonomous, electric mobility by segment? What are the key enablers, hurdles?

Impact on society

With the emergence of new transportation models, what will be the benefits and costs to society?

Implications for the automotive industry



What must key stakeholders do to best position themselves to thrive in this rapidly changing world?

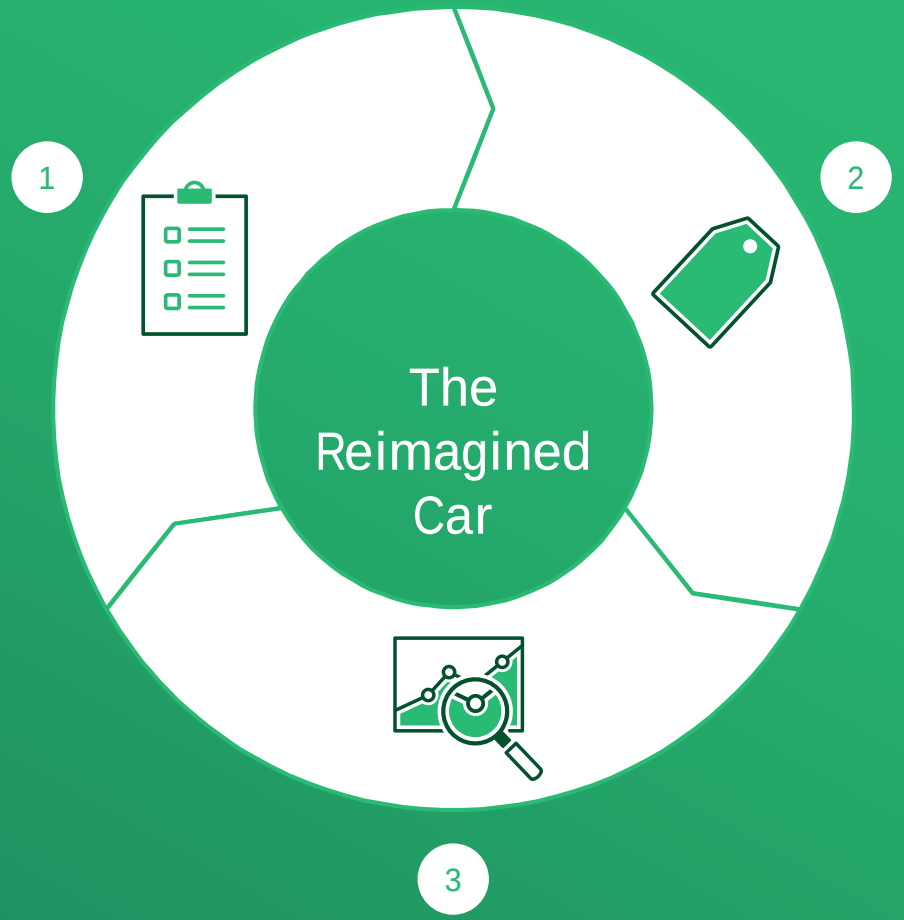
Our approach

Rooted in economics, informed by consumers, explored at the granular city level

1 **Consumer input (Consumer survey)**
- Based on survey of over 6,000+ individuals
- Deep understanding of consumer pain points and unmet needs
- Analysis of price sensitivity, willingness to pay, and “must haves”

2 **Shift in economics (Cost per mile analysis)**
- Upfront and operating cost of different vehicle architectures
- Comparison of “cost curves” for traditional and future state vehicles at varying utilizations
- Vetting of assumptions and analysis with industry experts

3 **Metro area granularity (Density/usage analysis)**
- Modeled 100+ cities, including all the very large cities (e.g., NY, Chicago, Houston, Atlanta), with daily traffic pattern analysis
- Analysis of required population density to support SAEV
- Optimization of fleet size for each category of population density



The world ahead

By 2030 ~25% of all miles traveled in the US via shared autonomous electric vehicles

A far safer/better world, with immense societal benefits and dramatic increases in personal productivity, well-being, convenience, and for many, a near doubling of discretionary income

Dramatic shift in vehicle mix, with product lifecycles and development timelines sharply cut and OEMs and suppliers forced to embrace more agile forms of innovation and engineering

Tens of billions of dollars in assets made obsolete and millions of people in vehicle production/driving-based professions who either need to be repurposed or retrained

Business models redefined as OEMs, suppliers, dealers, mobility providers, and aftermarket specialists rethink their fundamental basis of competition

A realigned industry ecosystem … ripe for accelerated innovation, stretching the art of the possible

Winners … and losers

Change is the law of life. And those who look only to past or present are certain to miss the future.

John F. Kennedy

100+ years of innovation, and personal mobility is still far from perfect—pain points of car ownership are numerous

Fiscal

For most, 2nd largest purchase after home

Vehicle loses significant value as soon as driven out of dealership

High costs of parking, maintenance, insurance, etc. (esp. in very large cities)

In the event of crash, expenses can be high

Time

Low productivity when driving

Long commutes can be tedious

Wasted time looking for parking, filling up gas, changing the oil, getting car fixed, etc.

Safety

More than 30K lives lost annually in the US due to car accidents

Distracted driving means the risk in driving will become far worse before it gets better (especially due to low adoption of ADAS)

Source: Survey data, BCG analysis

And other options are often not much better

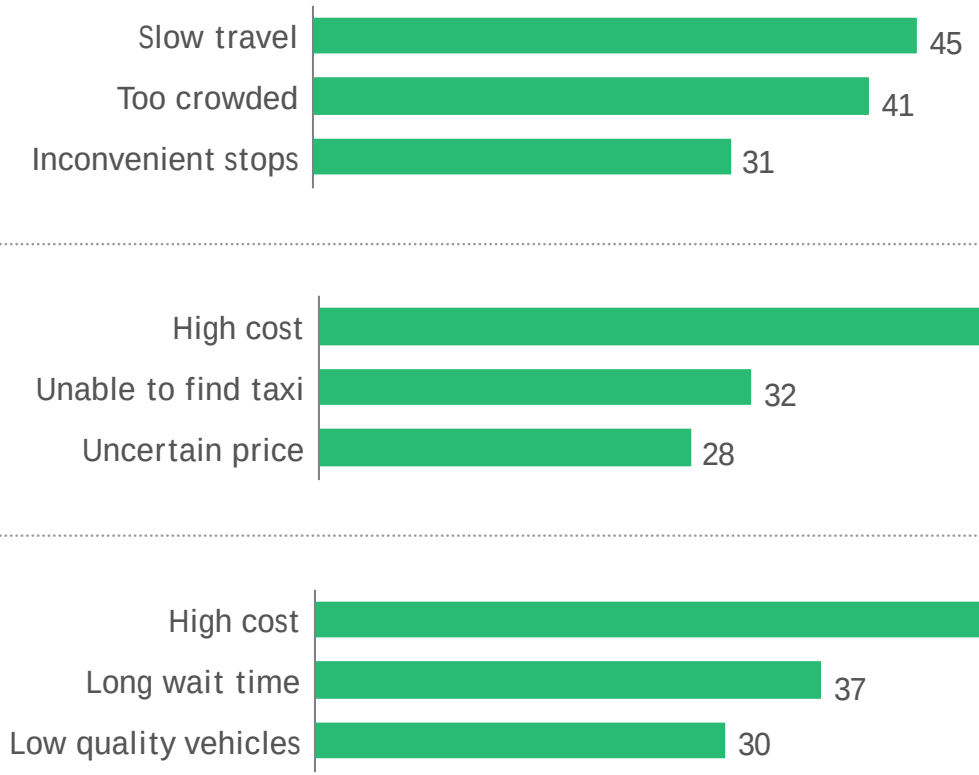
Public transportation

Taxi

Ride sharing

Source: Survey data, BCG analysis

Population with pain point in top three (%)



For all the promised benefits of new mobility, costs today are still quite high

BEV cars cost $7–10K more than the conventional ICE car today

Powertrain	Battery size[1]	System cost C segment[2]	Example vehicle
Mild Hybrid (MHEV)	48V	~$2.4K	 Buick eAssist
HEV	1-6 kWh lithium-ion	~$4.5K	 Toyota Prius
PHEV	7-25 kWh lithium-ion	~$14.0K	 BYD Tang
BEV	40-80 kWh lithium-ion	~$20.0K	 Nissan Leaf

Ride sharing more expensive than private or public transit today

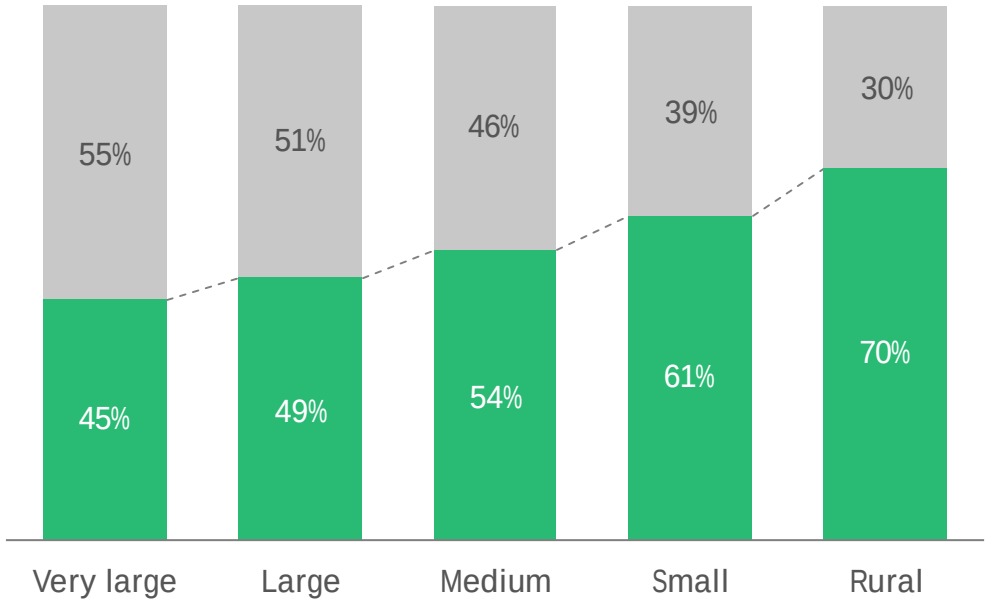
SOHO to Central park	Miles drive	~5 miles
	Duration or ride	~30 mins
Uber fare structure as of March 2017	Base fare	$2.55
	+ Cost per min	$0.35
	+ Cost per mile	$1.75
	+ Booking fee	–
	Minimum fare	$8.00
Total fare	Uber fare estimate	$25-33
Annual cost	Assuming 2 similar trips, 340 days	~$20,000

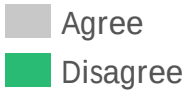
1. Battery Size for HEV/PHEV/BEV reflects C segment estimations 2. Includes full system cost (battery pack, motor, power, electronics, OEM margin etc,)
Source: BCG Analysis, JP Morgan Global xEV Components Report, International Council on Clean Transportation (ICCT) Report, Expert interviews

And many continue to have concerns with safety of ride sharing options, especially in rural areas and older populations

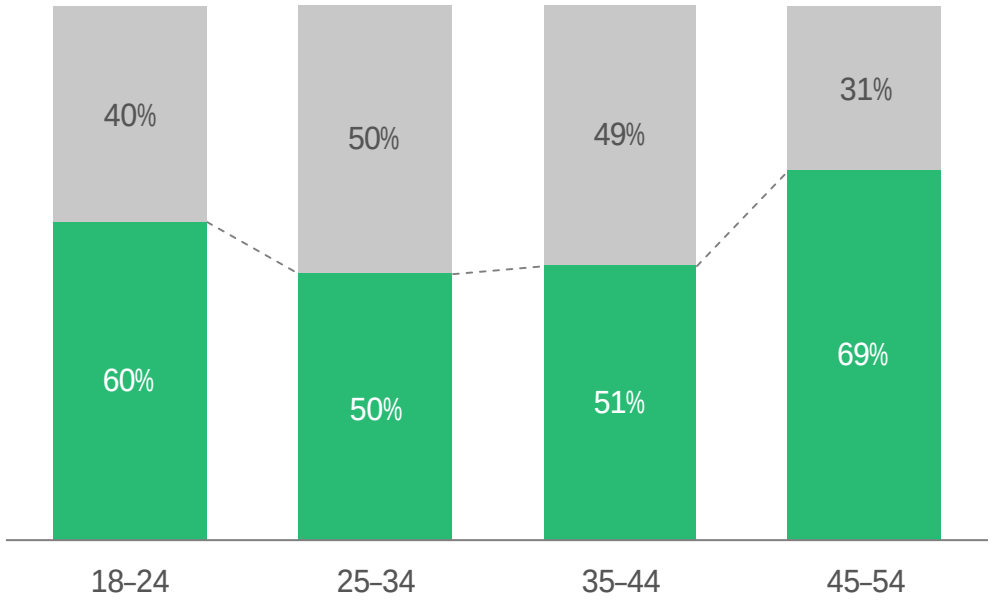
"I feel safe using ride sharing and pooled ride sharing services"

Responses by location





Responses by age



Source: Survey data, BCG analysis

However, when autonomy, ride sharing, and electrification converge as a unified offering, mobility will forever be changed

Autonomy

Eliminates “human driver” for ride sharing which dramatically lowers cost and enables greater vehicle utilization

Provides a safer experience and addresses lack of trust and confidence many have in ride-sharing (e.g., driver, accidents)

Sharing

Increases vehicle utilization, which drives cost down significantly

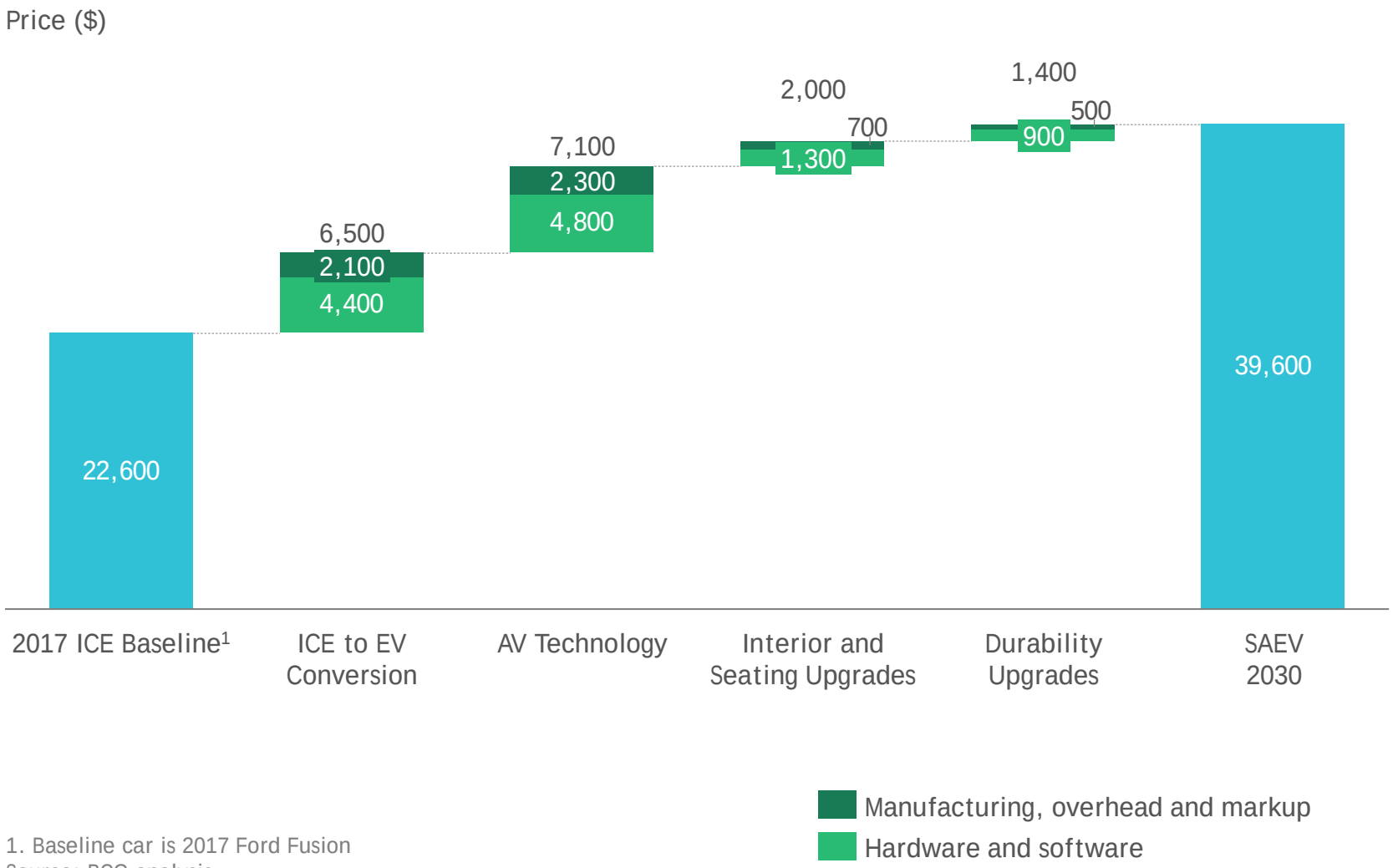
Have currently modeled single passenger per car- utilization even higher for pooled vehicles

Electrification

Higher utilization swings powertrain economics to BEV which further reduces costs relative to privately owned ICE

Offers a wealth of societal benefits (e.g., reduced pollution) which in turn creates pull from the cities looking to improve quality of life

Though we estimate the price of a “mature” SAEV to be ~75% higher than that of a 2017 conventional ICE …



1. Baseline car is 2017 Ford Fusion
Source: BCG analysis

What is included?

Electric battery

Supercharger

Motor, power electronics

LIDAR, V2V

Cameras, sensors

Localization SW

Cyber security

Durable leather surfaces

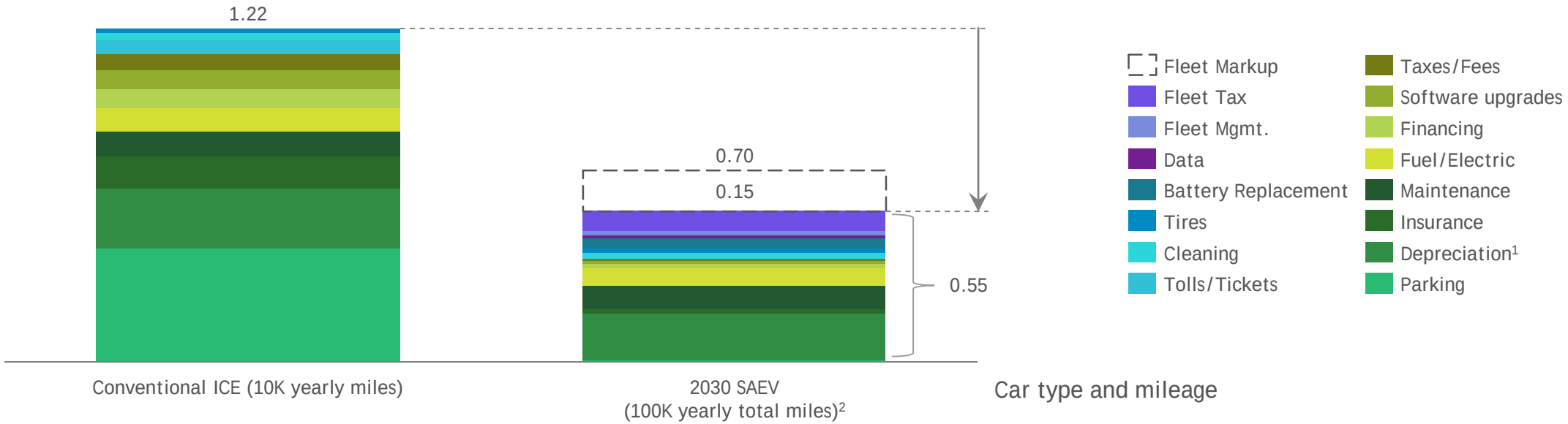
Smart surface tech

Higher quality suspension, cooling etc.

…

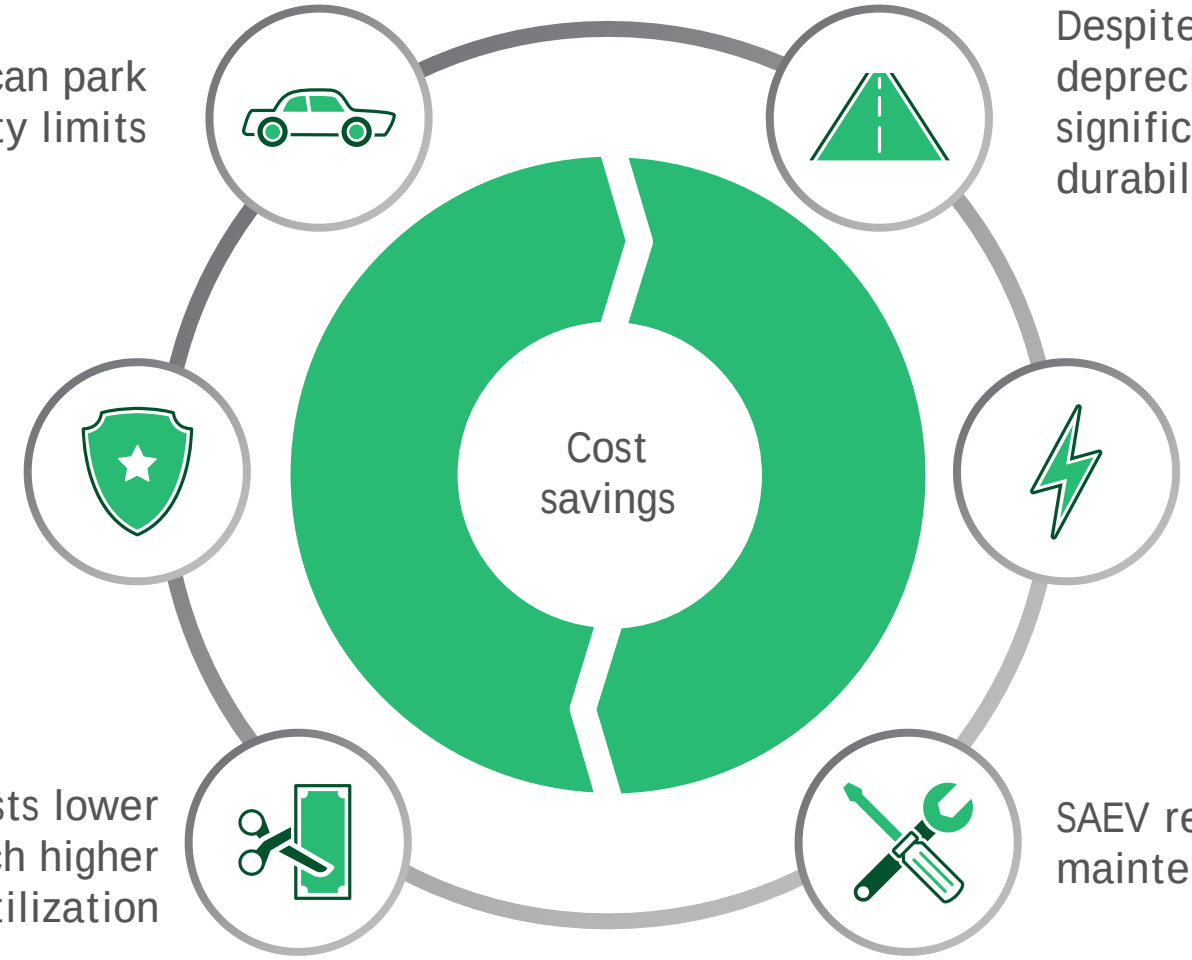
...SAEV will reduce cost per mile significantly at higher achievable utilizations, particularly in larger cities

Consumer cost ($) per mile per category, very large cities (e.g., NYC, Chicago)



1. Depreciation for Conventional ICE uses Kelly Blue Book benchmarks, over 5 year time period. Depreciation for SAEV calculated as flat-line depreciation over 3.5 years at relevant mileages, with no residual value at 300K miles (assumed SAEV life) 2. BCG analysis indicates that ~21% of SAEV miles driven will be passenger-less, and these "empty mile" costs will be passed on to the consumer. Source: BCG analysis

This significant cost savings will be driven by six key factors



SAEV can park outside city limits

Despite shorter car life, depreciation per mile is significantly lower due in part to durability upgrades

Insurance costs lower due to fewer accidents

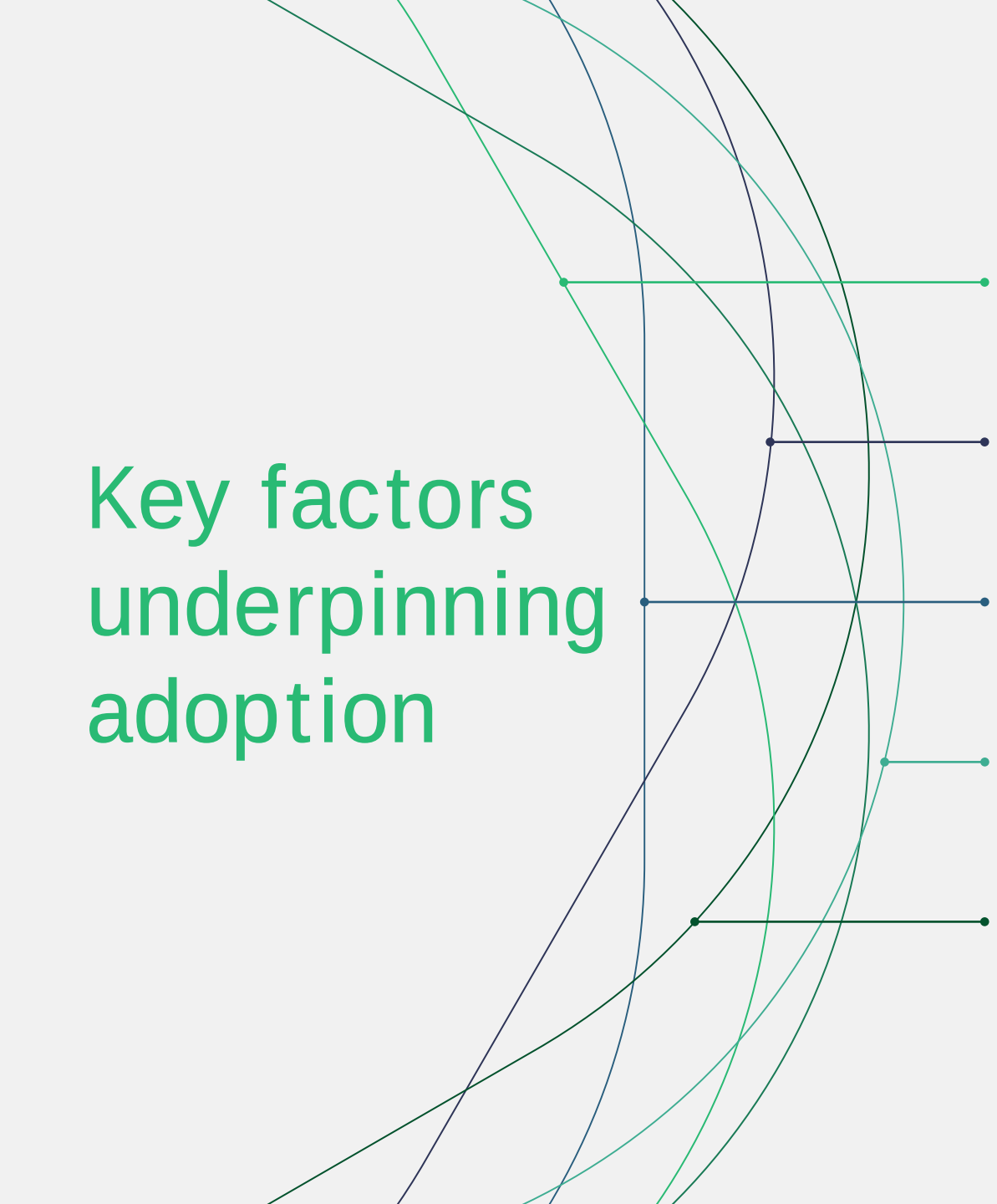
SAEV is powered by electricity, which is cheaper than fuel

Financing costs lower due to much higher utilization

SAEV requires lower maintenance

So, just how big of an impact will this convergence have?

Key factors underpinning adoption



- Severity of pain points
- End-user economics
- Willingness for trial
- Demand density
- Fleet investment economics

Adoption will depend on a variety of use case factors—e.g., pain points, economics, functional and emotional constraints

Jane

Lives in downtown Chicago

Drives ~7,500 miles per year, mostly within the city to get to/from work and to run errands

Faces high cost of parking, does not enjoy driving due to high congestion etc.

Substitute

Bruce

Lives in Naperville, a distant suburb of Chicago

Drives ~20,000 miles per year, mostly between different suburbs for work or to spend weekends with friends (e.g., golfing, camping)

No cost of parking, enjoys driving, especially on weekends

Complement

John

A 57 yr. old resident of Wheaton

Grew up in Detroit, got his drivers license the day he turned 16, passionate about driving

Views technology with high degree of skepticism

No amount of savings will convince John to give up his Mustang

No change

Use Case: A consumer like Jane would sell her car and substitute all travel to SAEV (I/II)

Jane

Lives in downtown Chicago

Drives ~7,500 miles per year, mostly within the city to get to/from work and to run errands

Faces high cost of parking, does not enjoy driving due to high congestion etc.

Open to the concept of SAEV if it could save her money

Factor	Private, conventional vehicle	SAEV ✓
Miles Driven	Jane drives 7,500 miles per year	SAEV operates ~100,000 total miles per year
Cost per Mile	Her conventional car costs (fixed and variable) $1.53/mile	The SAEV costs $0.70/mile to use
Annual Cost	Annual cost of travel for Jane is ~$11,475	Annual cost of travel for Jane is ~$5,250
Decision	Jane sells her car and substitutes all her travel to SAEV. By doing this, Jane saves $6,225 per year (~55%), and no longer has to worry about finding parking in the city and dealing with congestion	

Use Case: A consumer like Bruce would keep his car, but complement some travel with SAEV (II/II)

Bruce

Lives in Naperville, a distant suburb of Chicago

Drives ~20,000 miles per year, mostly between different suburbs for work or to spend weekends with friends (e.g., golfing, camping)

No cost of parking, enjoys driving, especially on weekends

Not comfortable switching primary travel to SAEV due to functional constraints/longer wait times and lack of compelling savings

Factor	Private, conventional vehicle ✓	SAEV
Miles Driven	Bruce drives 20,000 miles per year	SAEV operates ~100,000 total miles per year
Cost per Mile	His conventional car costs $0.55/mi (using medium city cost curve due to no cost of parking, lower insurance etc.)	The SAEV costs $0.67/mi to use (using medium city cost curve)
Annual Cost	Annual cost of travel for Bruce is ~$11,000	Annual cost of travel for Bruce is ~$13,400 (if travel is fully SAEV)
Decision	Given lack of savings and limitations of SAEV in his environment (e.g., functional constraints, long wait time, lack of availability near remote camp sites), Bruce keeps his car … leveraging SAEV only for select use cases such as evenings out with friends, trips to the city for meetings, to the airport, etc.	

Because of Bruce's use case, geography, and barriers to adoption, he would lose $2,400 per year (~20%) by fully switching to SAEV- but could benefit from use of SAEV as a complement[1]

1. E.g., if 2,500 miles are switched to SAEV, with Bruce electing to utilize his ICE for the remaining 17,500 miles, his yearly cost would be approx. $11,800- only a marginal increase over his spend today but significant lifestyle benefits.

In total, our survey suggests that between ~50–65% of people will have significant adoption barriers, at least initially

Consumer behavior differs significantly across city type

Past use
- Consumers in larger cities are more likely to have a history of non-private-vehicle use

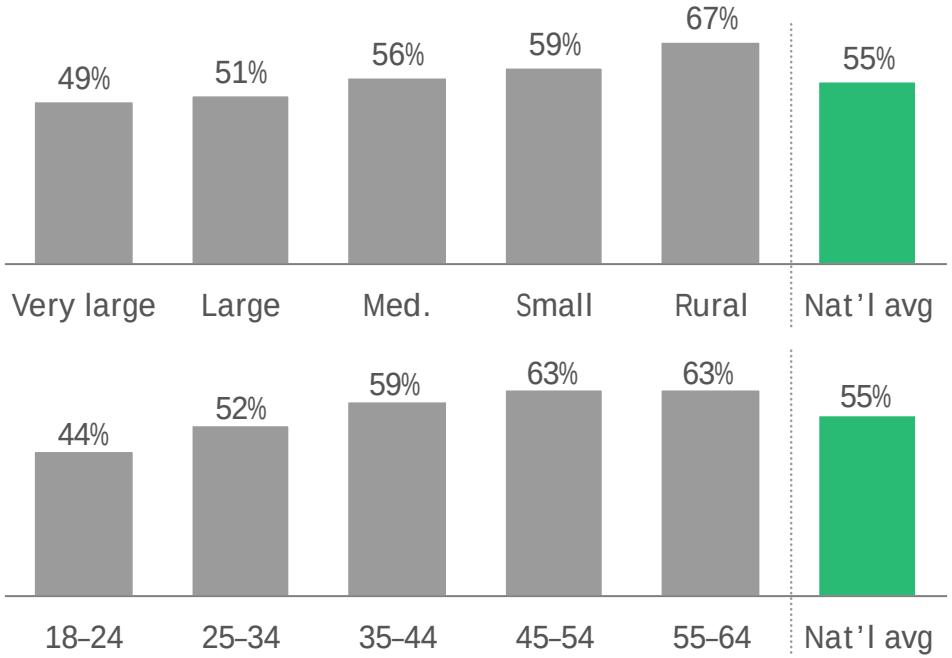
Functional constraints
- Consumers in larger cities carry less equipment that may not be compatible with SAEV (e.g., child seats)

Non-functional utility
- Consumers in larger cities are less likely to use their vehicle for specific work functions (e.g., farming)

Principled opposition
- Consumers in larger cities have fewer safety concerns with ride sharing services

Consumers report larger barriers as city size decreases and age increases

Population with significant barriers to adoption (%)



Barriers to adoption could erode over time as technology becomes more mainstream

Source: BCG analysis

We next created five geographic clusters based on population size to assess implications of demand density and fleet economics

Geography	Representative population (K)	US population (%)	Approximate no. of US cities	Example cities
Rural areas	~5	15%	-	Benson, AZ
Small cities	~250	10%	130	Beaumont, TX
Medium cities	~750	20%	90	Fresno, CA
Large cities	~1,750	25%	30	Cleveland, OH
Very large cities	~6,000	30%	15	Chicago, IL

Source: Texas A&M Urban Mobility Scorecard 2015

In total, we conservatively project 22–26% of total US miles traveled in 2030 to be served by SAEV…

Geography	Total Pop. (M)	Total miles driven (%)	Profit max share of total miles served	Revenue max share of total miles served
Very large cities	95	26%	47%	51%
Large cities	80	25%	39%	49%
Medium cities	65	18%	0%	0%
Small cities	33	10%	0%	0%
Rural areas	50	21%	0%	0%
US Overall	~320	100%	**22%**	**26%**

Revenue maximizing while still profitable

Source: Texas A&M Traffic Institute, US Census Data, BCG Analysis

Beyond shift in miles traveled, two additional sources of AV demand

Public transportation

There are likely to be a number of use cases where SAEV offers a lower cost, more convenient option relative to Public Transportation (e.g., short trips, inclement weather)

Recent conjoint analysis suggests 15-20% of short haul public transit likely to switch to SAEV – posing congestion risk unless properly managed

Private AV—PAV(E)

Non-SAEV users who would purchase PAV(E) given both their willingness and ability to pay for autonomous functionality

At forecasted costs expect level 4/5 adoption to be limited to more premium classes of vehicles, ~8% of total market in 2030

Source: BCG analysis

Public Transportation: Though SAEV will take some share from public transit, we see the two complementing each other well

From a big picture standpoint, important to note that U.S. public transit only serves 2% of total miles traveled

- Serving 20% of these miles would add 12B SAEV miles …
- … or 100K SAEVs which translates to 40K more SAEVs sold per year—a 1% increase

Nevertheless, when you de-average these figures it is clear there will be a number of cases in dense urban environments where due to benefits of point to point convenience and competitive cost, SAEV as envisioned will pull more from public transportation (especially bus)

For example, within the city of Boston, more than 40% of miles traveled during peak periods within city limits are via public transit, and of these, more than one third expressed a desire to switch to SAEV when it is available

Left unaddressed, this incremental demand will increase congestion

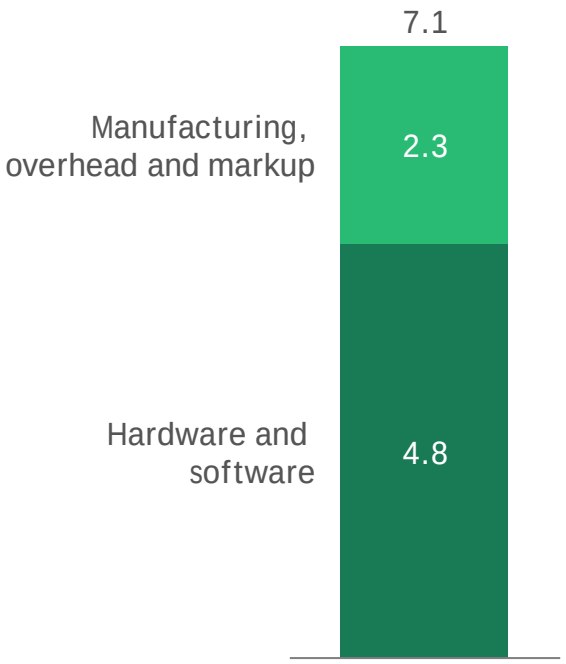
As expected, this is a major topic of interest for city planners and fleets and much work is being done now to get ahead of this threat. Based on our discussions with key stakeholders we are confident this threat can be managed

- Benefits from a more efficient ecosystem which can absorb many of these incremental miles
- Demand levers (surge pricing, dynamic area access pricing/tolls)
- Supply levers (allotment of city issued medallions/permits to operate a SAEV)
- More competitive public transportation (mini robo-buses)

PAV(E): Many people in very large and large cities are willing to pay the estimated cost for AV features

By 2030, adding AV features will cost about $7K…

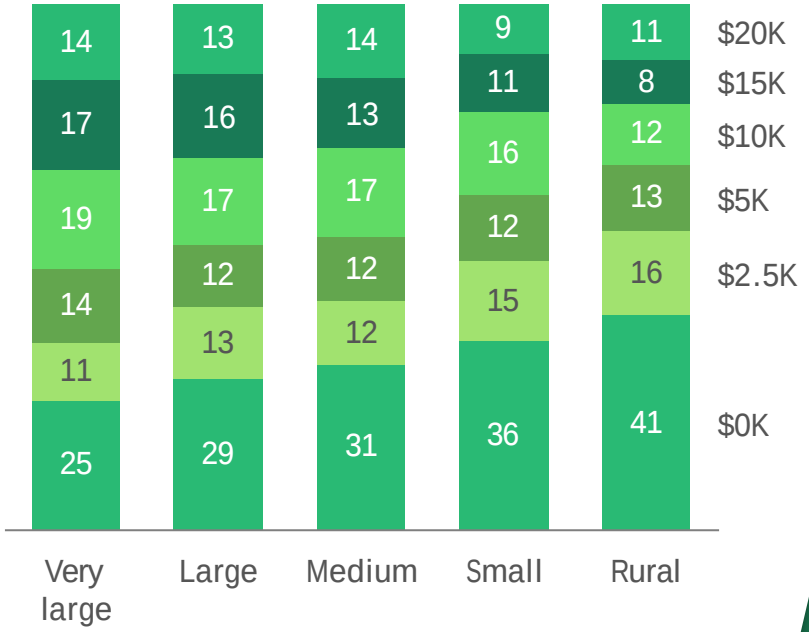
Incremental cost of AV features ($K)



…Which many people are willing to pay

Willingness to pay for AV features on $25K vehicle

Pop. (%)



Sources: Survey data, BCG analysis

However, only high income households will likely be able to afford AV

PAV(E): We expect consumers in upper income brackets will select privately-owned autonomous option

Geographies	Share of population not served by SAEV (%)	Share of population with a interest in and ability to afford PAV(E) (%)	Adoption of PAV(E) (%)
Very large cities	53	4	2
Large cities	61	3	2
Medium cities	100	3	3
Small cities	100	1.5	1.5
Rural areas	100	1	1
US overall (Weighted average)			**2**

Share of survey respondents willing to pay $7K+ for autonomous functionality (estimated price in 2030) and with $200K+ in annual income

1. IHS Data; Regional Sales Sub-segment "Premium" Source: BCG Analysis, BCG Consumer Survey
Note: Assumes those served by SAEVs will not also own a PAV(E). Assumes PAV(E) are primarily luxury vehicles and, therefore, have shorter lifecycles (5.5 years) versus average vehicles. Assumes the traditional cars which PAV(E) are replacing are also luxury vehicles and have the same lifecycle (5.5 years). Calculations use total number of vehicles on the road today as a base
Source: BCG Analysis, BCG Consumer Survey

~2% of people will replace their conventional ICE vehicles with PAV(E), translating to ~0.9 M new PAV(E) sold per year

Three key factors which could drive greater adoption of PAV(E)

Economics

Broad penetration of SAEV drives significant scale which further reduces cost of key components and makes PAV(E) more accessible

Regulation

Cities enact autonomy only zones—incenting customers in surrounding areas to purchase PAV(E) for convenience and accessibility

Mixed-use

Customers who otherwise could not afford to purchase a PAV(E) make their vehicle available for rent during non-use, thereby reducing cost of ownership

These factors could contribute to driving adoption of PAV(E) to as high as 10-12% of non SAEV

In total, Public transportation and PAV(E) increase annual SAEV sales and shift the mix further

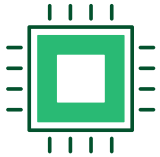
Net impact on annual vehicles added/removed by 2030[1]

Additional AV demand	SAEV	PAV(E)	Conv. vehicles
Public transportation	↑ 30K	…	…
Private transportation	…	↑ 890K	↓ 890K

1. Projections originally created using 2016 traffic and consumer data, and extrapolating to 2030 using IHS projected sales data
Source: BCG analysis

Although the exact adoption curve is tricky to predict, once the concept is mature/proven, the ramp-up will occur quickly

We expect hurdles to be overcome in the coming years



Technology

- Core technology exists; some hurdle preventing mass deployment (e.g., dynamic mapping, cybersecurity), but major players and start-ups investing heavily to solve the problems

Regulation

- Cities need SAEV to solve pressing concerns in areas of safety, accessibility, and reliability
- Many cities already testing concept, but broad regulation yet to be passed
- With measurable benefits in lower accidents, deaths, emissions, expect hurdles to be overcome quickly

Consumer willingness

- Barriers will erode over time as people become increasingly comfortable with technology and its benefit
- Entrepreneurs will emerge to meet needs of those consumers with more niche offerings – may have to pay more, or wait longer but if there is a meaningful market need someone will seek to meet it
- Today's children who are growing up in a truly digital world will have far lower resistance to change as older generations which made up our survey … as demographics shift we will no doubt see a decline in those which have emotional barriers to the technology

Fleets will approach SAEV as a clear go / no-go business case decision … as the economics of SAEV prove to work we should expect to see fleets buying SAEV in bulk to outfit served cities

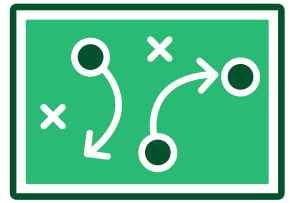
With the power of continued innovation, our projections could be conservative

New vehicle design and technology

New revenue models

New ecosystems/ partnerships

Optimized fleet strategy/management



Fleet management: As fleets gain experience they will learn how best to optimize fleets – increasing consumer experience while lowering costs; all of which will help propel SAEV offering

Fleet strategy and management

- How will fleets balance high demand in the city while still addressing needs in suburbs (e.g., morning commute)?
- How will fleets reduce traffic congestion and optimize driving patterns during a traffic jam?
- When (and how often) will fleets pull vehicles from the road for maintenance (e.g., slow weekends)?
- How will fleets charge vehicles efficiently in the middle of the day when demand is high (e.g., superchargers)?
- How will fleets route vehicles to high demand zones (e.g., sporting event)?

“There are plenty of difficult obstacles in your path. Don’t allow yourself to become one of them.”

Implications and next steps

Emergence of SAEV will create immense societal benefits

Improve road safety
- Reduce yearly nationwide accidents by 3M and fatalities by 25K (~60% decrease for average city)

More efficient public transport spending
- Improve service for high need areas by reallocating freed resources

Improve reliability and experience
- Provide seamless, multi-modal end-to-end mobility for consumers, with likely less wait time

Boost productivity
- Free up ~30B hours per year for productive and/or leisure activities

Save consumers money
- For urban consumers that use SAEV, can save up to $7K

Increase traffic efficiency
- Reduce congestion and average commute time (assuming proactive measures by cities taken_

Free up space
- Free up ~150K spaces (~25M sq. ft.) in a typical city for alternative use

Lower pollution
- Reduce well-to-wheel vehicle emissions by 15% (~100M tons CO2 annually)

Provide more equitable mobility and accessibility
- Improve end-to-end mobility options for elderly, children and people with disabilities

Source: International Organisation for Road Accident Prevention, European Parking Association, UCS, World Economic Forum; BCG analysis

Benefits

SAEVs will also bring significant societal risks

Ethical safety decision making
- How will an AV prioritize the health and safety of cars, passengers, and pedestrians in the event of an accident?

Infrastructure costs
- Costs associated with EV charging stations (likely addressed by fleet provider)
- AV infrastructure needs (likely to be more minor than most suggest – e.g., lane marking, not V2X)

Public transportation decline in demand
- Costly city assets will experience declining demand (e.g., short haul trains, buses), making them even more unprofitable than today

Government revenue loss
- Decrease in sources of revenue to government from taxes , tickets, and public transportation fares

Cybersecurity concerns
- Vulnerability of AVs to hacking or interference

Employment loss across industries
- 7.5M Americans employed in a driving-based profession may be at risk to change, along with supporting businesses (e.g., gas stations, dealerships) that will need to adapt

Costs

Source: BCG analysis, Bureau of Labor Statistics, Autoalliance.org

No shortage of pressing questions to tackle

Stakeholders	Key questions
OEMs	• How has the basis for differentiation changed? Where will you play on that spectrum? • To what extent must you realign your footprint, assets, capabilities, and innovation pipeline to meet the needs of this emerging way to play? • Are your internal processes, culture, and talent set-up to support this change? Is there time to evolve or is more disruptive large-scale change needed? • What is the credible operational and financial plan to transition to this new world? How best to balance near to medium-term needs of the business (and investors) with the bold bets required? • To what extent can acquisitions or partnerships help you go faster further?
Suppliers	• Which OEMs are likely to be winners vs. losers? • Does your portfolio of products fit the expected market evolution? • Are your internal processes set-up to support evolution? • How do you re-invent yourself as a winner? • How will you transition to the future, including a credible operational and financial plan?
Sales and Service	• Do you have a future in an environment with a dramatically changed mix and channel structure? • How will the sales and service model evolve to meet the change in demand? • Is your current structure sufficient to support evolution? • What tangential services could help maximize revenue and profits, and help you reinvent? • How will you transition to the future, including a credible operational and financial plan?
City regulators	• How will this new mode of transportation integrate into public transit system (complement, substitute)? • What is the role of the city (e.g., regulator, integrator, etc.)? What leverage do cities have (and how best to deploy) to drive future of mobility to desired place? • What infrastructure investments are required to develop the transportation model … and specifically, combat congestion (e.g., dynamic pricing/tolling, more competitive robo-buses, etc.)? • How will this impact revenues? What levers can offset the loss in revenues and support the necessary infrastructure investments?

We always overestimate the change that will occur in the next two years and underestimate the change that will occur in the next ten.

Bill Gates

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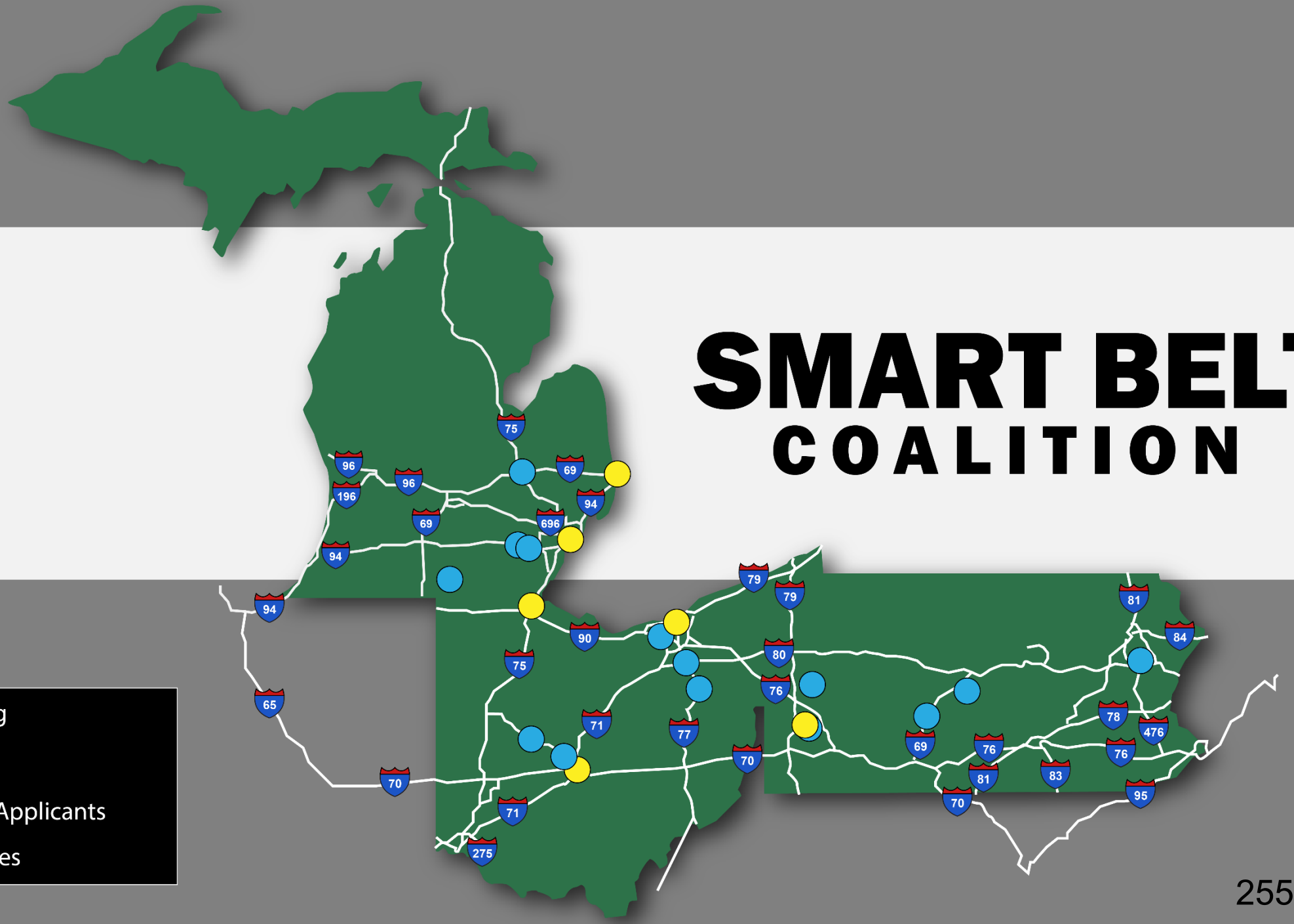
Electric Automation:

Opportunity or Threat?

Director Kirk Steudle
Michigan Department of Transportation


SMART BELT
COALITION
HAV Testing Facilities
Smart City Challenge Applicants
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Open Invitation: Michigan's Legislation

SENATE BILL No. 995

May 25, 2016, Introduced by Senators KOWALL, JONES, STAMAS, BRANDENBURG, WARREN, HERTEL, COLBECK, SCHMIDT, MARLEAU, HORN and ANANICH and referred to the Committee on Economic Development and International Investment.

A bill to amend 1949 PA 300, entitled

"Michigan vehicle code,"

by amending sections 2b, 602b, 643, 643a, and 665 (MCL 257.2b, 257.602b, 257.643, 257.643a, and 257.665), sections 2b and 665 as added and section 602b as amended by 2013 PA 231, and by adding sections 40c, 606b, and 665a; and to repeal acts and parts of acts.

THE PEOPLE OF THE STATE OF MICHIGAN ENACT:

Sec. 2b. (1) "AUTOMATED DRIVING SYSTEM" MEANS HARDWARE AND SOFTWARE THAT ARE COLLECTIVELY CAPABLE OF PERFORMING ALL ASPECTS OF THE DYNAMIC DRIVING TASK FOR A VEHICLE ON A PART-TIME OR FULL-TIME BASIS WITHOUT ANY SUPERVISION BY A HUMAN OPERATOR. AS USED IN THIS SUBSECTION, "DYNAMIC DRIVING TASK" MEANS ALL OF THE FOLLOWING, BUT DOES NOT INCLUDE STRATEGIC ASPECTS OF A DRIVING TASK, INCLUDING,

SENATE BILL No. 995

03186'15 KED

SENATE BILL No. 996

May 25, 2016, Introduced by Senators KOWALL, JONES, STAMAS, BRANDENBURG, WARREN, HERTEL, COLBECK, SCHMIDT, MARLEAU, HORN and ANANICH and referred to the Committee on Economic Development and International Investment.

A bill to amend 1949 PA 300, entitled

"Michigan vehicle code,"

(MCL 257.1 to 257.923) by adding section 665b.

THE PEOPLE OF THE STATE OF MICHIGAN ENACT:

SEC. 665B. (1) A MOTOR VEHICLE MANUFACTURER MAY PARTICIPATE IN A SAVE PROJECT IF IT SELF-CERTIFIES TO ALL OF THE FOLLOWING:

(A) THAT IT IS A MOTOR VEHICLE MANUFACTURER. A PERSON THAT IS NOT A MOTOR VEHICLE MANUFACTURER MAY NOT PARTICIPATE IN A SAVE PROJECT.

(B) THAT EACH VEHICLE IN THE PARTICIPATING FLEET IS OWNED OR CONTROLLED BY THE MOTOR VEHICLE MANUFACTURER AND IS EQUIPPED WITH ALL OF THE FOLLOWING:

(i) AN AUTOMATED DRIVING SYSTEM.

SENATE BILL No. 996

06007'16 KED

SENATE BILL No. 997

May 25, 2016, Introduced by Senators WARREN, KOWALL, JONES, STAMAS, BRANDENBURG, HERTEL, COLBECK, SCHMIDT, MARLEAU, HORN and ANANICH and referred to the Committee on Economic Development and International Investment.

A bill to amend 1949 PA 300, entitled

"Michigan vehicle code,"

by amending sections 2b and 601a (MCL 257.2b and 257.601a), section 2b as added by 2013 PA 231 and section 601a as amended by 2011 PA 115, and by adding section 665a.

THE PEOPLE OF THE STATE OF MICHIGAN ENACT:

Sec. 2b. (1) "AUTOMATED DRIVING SYSTEM" MEANS HARDWARE AND SOFTWARE THAT ARE COLLECTIVELY CAPABLE OF PERFORMING ALL ASPECTS OF THE DYNAMIC DRIVING TASK FOR A VEHICLE ON A PART-TIME OR FULL-TIME BASIS WITHOUT ANY SUPERVISION BY A HUMAN OPERATOR. AS USED IN THIS SUBSECTION, "DYNAMIC DRIVING TASK" MEANS ALL OF THE FOLLOWING, BUT DOES NOT INCLUDE STRATEGIC ASPECTS OF A DRIVING TASK, INCLUDING, BUT NOT LIMITED TO, DETERMINING DESTINATIONS OR WAYPOINTS:

(A) OPERATIONAL ASPECTS, INCLUDING, BUT NOT LIMITED TO,

SENATE BILL No. 997

05463'16 KED

SENATE BILL No. 998

May 25, 2016, Introduced by Senators HORN, KOWALL, JONES, STAMAS, BRANDENBURG, WARREN, HERTEL, SCHMIDT, MARLEAU and ANANICH and referred to the Committee on Economic Development and International Investment.

A bill to amend 1961 PA 236, entitled

"Revised judicature act of 1961,"

by amending section 2949b (MCL 600.2949b), as added by 2013 PA 251.

THE PEOPLE OF THE STATE OF MICHIGAN ENACT:

Sec. 2949b. (1) The manufacturer of a vehicle is not liable and ~~shall~~ MUST be dismissed from any action for alleged damages resulting from any of the following unless the defect from which the damages resulted was present in the vehicle when it was manufactured:

(a) The conversion or attempted conversion of the vehicle into an automated motor vehicle by another person.

(b) The installation of equipment in the vehicle by another

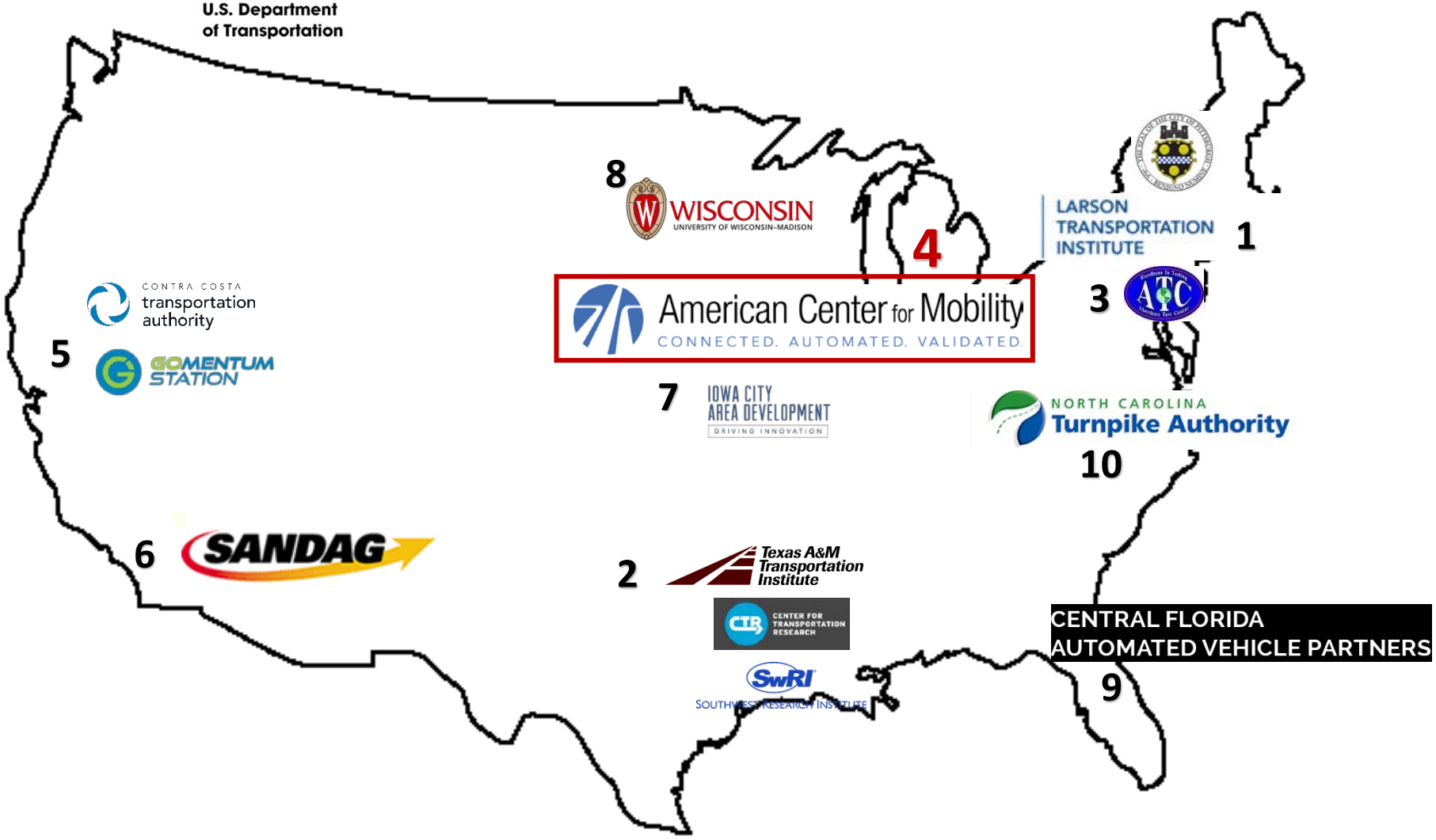
SENATE BILL No. 998

03484'15 TDR

U.S. Army TARDEC

U.S. Department of Transportation

FEDERAL TESTING GROUNDS



1. City of Pittsburgh and the Thomas D. Larson Pennsylvania Transportation Institute
2. Texas AV Proving Grounds Partnership
3. U.S. Army Aberdeen Test Center
4. American Center for Mobility (ACM) at Willow Run
5. Contra Costa Transportation Authority (CCTA) & GoMentum Station
6. San Diego Association of Governments
7. Iowa City Area Development Group
8. University of Wisconsin-Madison
9. Central Florida Automated Vehicle Partners
10. North Carolina Turnpike Authority

American Center for Mobility

CONNECTED. AUTOMATED. VALIDATED.

Michigan Technological University
Washtenaw Community College
University of Michigan
University of Detroit Mercy
Grand Valley State University
Macomb Community College
Oakland University
University of Michigan Dearborn
Wayne County Community College District
Eastern Michigan University
Wayne State
Western Michigan University
Kettering University
Lawrence Technological University
Michigan State University

https://www.michigan.gov/documents/snyder/MCF_Mobility_report_3_619285_7.pdf

Michigan Council on Future Mobility



FCA FIAT CHRYSLER AUTOMOBILES
Ford
Continental
STATE OF MICHIGAN SECRETARY OF STATE
GM
DISABILITY ADVOCATES of Kent County
The Hanover Insurance Group
DTMB Technology, Management & Budget
DIFS DEPARTMENT OF INSURANCE AND FINANCIAL SERVICES
MICHIGAN STATE POLICE
TOYOTA RESEARCH INSTITUTE
MDOT Michigan Department of Transportation
CITY OF GRAND RAPIDS
Deloitte.
MICHIGAN STATE UNIVERSITY

TRANSIT

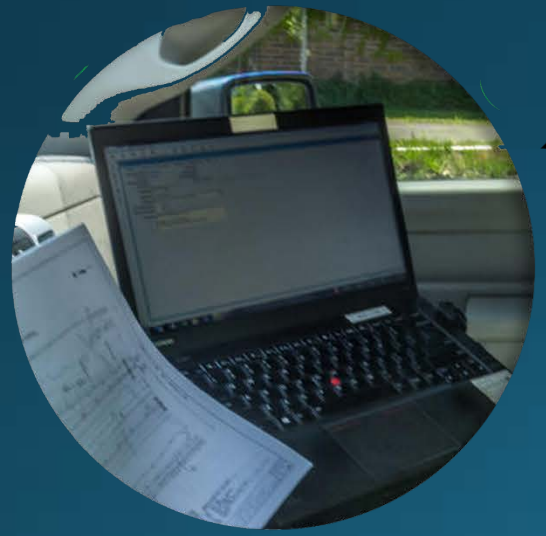
SIGNALS

MDOT values its ability
to assist local agency partners in
promoting safety and mobility.

TOGETHER,

WE LEAD

DATA ACCESS



FLEET

This is achieved by sharing
best practices and standards
developed in the
CV and AV environments

planet M

MICHIGAN

GLOBAL LEADER IN AUTOMATED TECH

7 GLOBAL OR NORTH AMERICAN R&D HQ's

8 ORIGINAL EQUIPMENT MANUFACTURERS

#1 CONCENTRATION IN ENGINEERING TALENT

UNRIVALED

AUTOMOTIVE MANUFACTURING RESEARCH & DEVELOPMENT

Impact of Connected Vehicles on Tolling

Martin Stone, Ph.D., AICP
Chief Operating Officer
Egis Projects, Inc. USA

IBTTA PLATINUM SPONSORS ADVISORY COUNCIL

Connected Vehicle Committee (at time of activities)

- Bob Edelstein, ITS National Practice Leader – AECOM
- Joe Averkamp, Senior Director – Conduent
- David Raines, Tolls Technology Senior Specialist – RS&H
- Suzanne Murtha, Project Director – ATKINS
- Jim Wilson, Senior VP and Regional Manager – TransCore
- Michael Kolb, Senior Consultant – TTI Consulting
- Scott Shogan, VP Connected/Automated Market Vehicle Leader – WSP
- Martin Stone, Chief Operating Officer – Egis Projects, Inc. USA

Connected Vehicle Committee

Identify the potential impacts of Connected Vehicles on the Toll Industry with the goal of presenting the key issues to the IBTTA Board of Directors in a manner that will make public toll agencies and private sector consultants, contractors and suppliers aware of the potential positive and negative consequences of the implementation of CV technologies.

Once presented to the IBTTA Board of Directors, the CV Committee may continue further investigation at the Board's direction.

Identifying Issues Related to Potential Impacts of CV

- Employed *Content Analysis:* 50-year-old process for consensus evaluation of the written word (MegaTrends, John Naisbit)
- Each member provided a list of their TOP 10 issues related to the POTENTIAL IMPACT OF CV TECHNOLOGY ON TOLLING
- Each ranked their list in the order of importance/impact on tolling
- Scoring = Each list was assembled into a matrix assigning points in reverse order of the individual ranking

CONNECTED VEHICLES – IMPACTS ON TOLLING

Results

- 30 unique issues
- 20 issues were identified within two or more of the lists
- None of the bottom 10 were ranked high enough to skew the evaluation
- All 30 were then grouped into three high-level areas of similarity

	How CV Technolgoies and/or CV Data May Impact Tolling	1	2	3	4	5	6	7	8	Total
1	Improves toll road mobility - makes toll roads attractive (capacity, reliability, etc)		10	8		9	6		6	39
2	As a form of toll collection - could disrupt DSRC for toll transactions	9	7				2	9	9	36
3	Improved toll road safety - makes toll roads attractive		9	7		10			5	31
4	Support "Mobility on Demand" payment apps - Mobility-as-a-Service	6					5	8	10	29
5	Identify vehicle types for express lane structuring - HOT/Express mangement/enforcement			10				10	7	27
6	Using CV data to identify infrastructure needs - improves O&M - V2I use cases -better manage toll roads		8	9			4	5		26
7	Collaboration among deployers - band sharing - communications intefaces			6			9	3	4	22
8	Support optimizing of MBUF applications	5						7	1	13
9	Security - cyber security and physical security of roadside infrastructure			5			7			12
10	Reduce toll revenue leakage	10								10
11	Lower CAPEX and OPEX from Infrastructure minimization – reduce roadside toll technology			4				6		10
12	Lack of funding for V2I					7			3	10
13	Patron privacy and anonymity						10			10
14	Support/optimization for dynamic pricing algorithms	8								8
15	Enhance TMC operations and customer service (stay ahead of congestion)	7							1	8
16	Standardization of public infrastructure - lower costs (reusable pilot and test beds)					8				8
17	Spectrum Management						8			8
18	Impact on willingness to pay toll premium (value of time)		5						2	7
19	Active traffic management/integrated corridor management - reduce traffic from toll roads	2						4		6
20	Lack of controls for V2V					6				6
21	Impact on volume and revenue (trends towards few cars driving more)		6							6
22	Transition from 915MHz RFID 5.9GHz DSRC, HD mapping or other					5				5
23	CV-Only lanes would impact fare structures - become more attractive to CV/AV							5		5
24	Support provide incentives for automated, hybrid, electric and shared vehicles	4								4
25	Potential fees/credits beyond tolls (especially for commercial vehicles)					4				4
26	Support for incident and emergency management functions	3								3
27	Alignment with state and federal policies					3				3
28	Orther uses of V2X data						3			3
29	Integration with Smart City enterprise data management	1								1
30	Impact on other technologies						1			1

CONNECTED VEHICLES – IMPACTS ON TOLLING

Results

- How CV could impact the management or O&M of toll facilities
- How CV could affect the attractiveness of toll facilities
- How CV could affect current and future toll technologies

	How CV Technolgoies and/or CV Data May Impact Tolling	1	2	3	4	5	6	7	8	Total
1	Improves toll road mobility - makes toll roads attractive (capacity, reliability, etc)		10	8		9	6		6	39
2	As a form of toll collection - could disrupt DSRC for toll transactions	9	7				2	9	9	36
3	Improved toll road safety - makes toll roads attractive		9	7		10			5	31
4	Support "Mobility on Demand" payment apps - Mobility-as-a-Service	6					5	8	10	29
5	Identify vehicle types for express lane structuring - HOT/Express mangement/enforcement			10				10	7	27
6	Using CV data to identify infrastructure needs - improves O&M - V2I use cases -better manage toll roads		8	9			4	5		26
7	Collaboration among deployers - band sharing - communications intefaces			6			9	3	4	22
8	Support optimizing of MBUF applications	5						7	1	13
9	Security - cyber security and physical security of roadside infrastructure			5			7			12
10	Reduce toll revenue leakage	10								10
11	Lower CAPEX and OPEX from Infrastructure minimization – reduce roadside toll technology			4				6		10
12	Lack of funding for V2I					7			3	10
13	Patron privacy and anonymity						10			10
14	Support/optimization for dynamic pricing algorithms	8								8
15	Enhance TMC operations and customer service (stay ahead of congestion)	7							1	8
16	Standardization of public infrastructure - lower costs (reusable pilot and test beds)					8				8
17	Spectrum Management						8			8
18	Impact on willingness to pay toll premium (value of time)		5						2	7
19	Active traffic management/integrated corridor management - reduce traffic from toll roads	2						4		6
20	Lack of controls for V2V					6				6
21	Impact on volume and revenue (trends towards few cars driving more)		6							6
22	Transition from 915MHz RFID 5.9GHz DSRC, HD mapping or other					5				5
23	CV-Only lanes would impact fare structures - become more attractive to CV/AV							5		5
24	Support provide incentives for automated, hybrid, electric and shared vehicles	4								4
25	Potential fees/credits beyond tolls (especially for commercial vehicles)					4				4
26	Support for incident and emergency management functions	3								3
27	Alignment with state and federal policies					3				3
28	Orther uses of V2X data						3			3
29	Integration with Smart City enterprise data management	1								1
30	Impact on other technologies						1			1

CONNECTED VEHICLES – IMPACTS ON TOLLING

How CV Technolgoies and/or CV Data May Impact the Management and O&M of Toll Facilities											
Potential Positive Impact on Management and O&M of Toll Facilities		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Total**	
6	Using CV data to identify infrastructure needs - could improve O&M - V2I use cases - better overall management of toll roads		8	9			4	5		**26**	**96**
7	Collaboration among deployers - band sharing - communications intefaces			6			9	3	4	**22**	
9	Security - cyber security and physical security of roadside infrastructure			5			7			**12**	
10	Reduce toll revenue leakage	10								**10**	
11	Lower CAPEX and OPEX from infrastructure minimization – reduce roadside toll technology			4				6		**10**	
16	Standardization of public infrastructure - lower costs (reusable pilot project deployments and test beds)					8				**8**	
17	Improved spectrum management						8			**8**	
Potential Negative Impact on Management and O&M of Toll Facilities		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Total**	**4**
24	Supports policy of providing incentives for automated, hybrid, electric and shared vehicles	4								**4**	

CONNECTED VEHICLES – IMPACTS ON TOLLING

How CV Technolgoies and/or CV Data May Impact the Attractiveness of Toll Facilities											
Potential Positive Impacts on the Attractiveness of Toll Facilities		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Total**	
1	Improves toll road mobility - makes toll roads attractive (capacity, reliability, etc)		10	8		9	6		6	**39**	**96**
3	Improved toll road safety - makes toll roads attractive		9	7		10			5	**31**	
15	Enhance TMC operations and customer service (stay ahead of congestion)	7							1	**8**	
21	Impact on volume and revenue (trends towards few cars actually driving more)		6							**6**	
23	CV-Only lanes could impact fare structures - become more attractive to CV/AV - increase utilization and revenue production from CV only lanes							5		**5**	
25	Potential fees/credits beyond tolls (especially for commercial vehicles)					4				**4**	
26	Support for incident and emergency management functions	3								**3**	
Potential Negative Impacts on the Attractiveness of Toll Facilities		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Total**	**13**
18	Negative impact on willingness to pay toll premium (value of time)		5						2	**7**	
19	Active traffic management/integrated corridor management on competing facilites could reduce traffic on toll roads	2						4		**6**	

CONNECTED VEHICLES – IMPACTS ON TOLLING

How CV Technolgoies and/or CV Data May Impact Current and/or Future Toll Technologies											
Use of CV Technologies to Support/Augment Toll Technologies		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Total**	
5	Identify vehicle types for express lane structuring and could be used to support HOT/Express mangement/enforcement			10				10	7	**27**	**35**
14	Support/optimization for dynamic pricing algorithms	8								**8**	
Potential Non-Tolling Payment Mechanisms/Potential Disrupter to Tolling		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Total**	
2	As a form of toll collection - could disrupt DSRC for toll transactions	9	7				2	9	9	**36**	**78**
4	Support for "Mobility on Demand" payment apps - Mobility-as-a-Service	6					5	8	10	**29**	
8	Support optimizing of MBUF applications	5						7	1	**13**	

Recommendations

Transfer the Committee information to the IBTTA CAV working group to investigate the following three subject areas:

- How CV could impact the management or O&M of toll facilities
- How CV could affect the attractiveness of toll facilities
- How CV could affect current and future toll technologies

CONTACT:

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Mobile: 813-335-4495

PARSONS

Connected and Automated Vehicle Working Group Update

Joseph Averkamp, Parsons
Lev Pinelis, Transurban
Suzanne Murtha, AECOM

June 23 2018

delivering a better world

IBTTA Connected and Automated Vehicles (CAV) Working Group – June 2018 Update

- IBTTA members have been pursuing CAV technology on their own.
- IBTTA CAV Working Group launched in May 2017 for collaboration from a tolling industry perspective.
- A “grassroots” effort to expand understanding of CAV on member operations.
- It’s an information sharing resource for individuals in the tolling industry.

Working Group Objectives

- Share local and regional initiatives in the CAV space.
- Discuss infrastructure owner and operator issues stemming from CAV developments.
- Collaborate on ways the tolling industry can respond to the emerging CAV field of practice.

Accomplishments

- 53 working group members from across public sector, private operators, and consultants.
- Building a resource library of studies, reports, and case studies: https://www.ibtta.org/connected-and-autonomous-vehicle-working-group
- Holding monthly calls with 1-2 presenters focusing on the intersection of CAV and tolling.
- Established sub-group exploring creation of tolling transaction message standards
- Held first in person Working Group discussion at IBTTA's conference in Charlotte, April 2018.

Recent presentations to the group

Date	Topic	Presenter
July 2017	CAV Scenarios for High Speed Controlled Access Facilities	Steve Kuciemba, National ITS Practice Leader WSP USA
Aug 2017	Connected Vehicle Pilot – Tampa, Florida	Bob Frey, Planning Director Tampa-Hillsborough County Expressway Authority
Aug 2017	Connected and Automated Vehicle – Initiatives in Florida	Marco Barbarossa, Project Manager Atkins / Florida's Turnpike
Sep 2017	The role of a Regulatory Framework to Accelerate CAV Introduction in Europe	Federico Di Gennaro, Proposal and Project Manager AISCAT Servizi
Sep 2017	Cellular – V2X Commercial Readiness	James Misener, Senior Director, Technical Standards Qualcomm
Oct 2017	Utilizing DSRC Technology for Connected Mobility	Randy Cole, Executive Director Ohio Turnpike and Infrastructure Commission
Dec 2017	Connected Vehicle Applications for Tolling	Bob Edelstein, SVP, ITS Practice Leader AECOM
Jan 2018	European Progress on C-ITS (V2I) Technical Standards	Marko Jandrisits, Program Manager V2X, ASFINAG
March 2018	Florida Truck Platooning Project Update	Marco Barbarossa, Project Manager, Transportation, Atkins/Florida Turnpike
April 2018	In person meeting and presentations.	Attending CAV Working Group members.
May 2018	Impact of Connected Vehicles on Tolling	Martin Stone, Chief Operating Officer, Business Development, Egis Projects, Inc.

In Person Round Table Discussion: April, 2018

Held in person CAV working group discussion as part of the IBTTA Charlotte managed lanes summit.

- 19 members attended and presented
  - individual project updates
  - Partnerships
  - CAV-related issues and ideas
- Two focus topic presentations given
  - “Cooperative Automated Transportation (CAT) Coalition” – Joe Averkamp
  - “Managed Lanes and Toll Operators, CAV Pioneers?” – Lev Pinelis

Tolling Standards Sub-group Progress

Engaged with SAE (Society of Automotive Engineers) committees and IEEE 802.11 committee with oversight from IBTTA, focused on:

- CV2X/5G- Cellular Vehicle-to-Everything
- DSRC- 802.11 standard

Opportunity to develop work plan and explore creation of tolling transaction message set standard, together with the two technical committees

Will clarify and review work plan with IBTTA to decide level of involvement in developing tolling standard.

Next steps

- CAV Working Group to take summer break in July and August. Group to reconvene in September.
- Collaborate with Platinum Sponsor Advisory Council's work on CV.

Additional information and feedback to IBTTA

- Staff contact: Mary Cadwallader.
- No changes planned in CAV Working Group structure.
- Top three goals for 2018:
  - Seek broader visibility of the working group.
  - Make connections across ITS and CAV industry for collaboration.
  - Continue information sharing while pursuing specific efforts or projects to explore CAV-related opportunities for the tolling industry.
- The CAV Working Group may require funding based on evolution of its mission and work.

EXECUTIVE SUMMARY

The Reimagined Car – Shared, Autonomous, and Electric

By Brian Collie, Justin Rose, Rahul Choraria and Augustin Wegscheider with The Boston Consulting Group, December 2017

This report examines the ways in which shared autonomous electric vehicles (SAEVs) will change mobility in the U.S., in fact the world. "Cities face challenges in urban planning and more, but those that move forward proactively stand to reap benefits. Automakers and suppliers' long-held business models will be shaken and, in some cases, toppled." Some companies will reinvent themselves as providers or suppliers of Mobility as a Service (MaaS); others will disappear.

The clear message in this report is about convergence. The convergence of technologies that we are all growing familiar with, ride sharing, autonomous vehicles and electric cars. The authors propose that by 2030, a substantial share of 175 million Americans who live in the largest cities will turn to SAEVs. The report further discusses the cost savings for consumers and remedies and reinvigoration of cities. With this convergence, motorists across the U.S, could take back 30 billion hours per year lost to traffic and typical cities will free up 25 million square feet dedicated to parking.

In the past, planes, trains and automobiles were all disruptive technologies. Like SAEVs, they were sparked by imagination and technology. People were hesitant, some fearful, of the unknown, but ultimately these modes of transportation became commonplace for every day commerce and convenience. SAEVs will also become an integral part of greater mobility.

You can read the full report here.

EXECUTIVE SUMMARY

Connected and Automated Vehicles: The Role of Toll Road Operators
Conduent Public Sector
2018

In this article, the author sets out to identify the differences between connected and automated vehicles, how these technologies will be utilized, and the policy changes required. He discusses how toll operators can leverage this inevitable disruption to improve capabilities for roadway management that will lead to better service for the public. CV and AV technology will bring significant change to roadway management and the key is to be flexible and adapt to changing conditions.

While connected and automated vehicles are similar, there are key differences. Connected vehicles refer to concepts around Vehicle-to-Vehicle (V2V) and Vehicle-to-Infrastructure (V2I) through commercial wireless networks that access content such as maps, points-of-interest and wireless payment methods. An automated vehicle is designed to perform as a human, requiring no special wireless communications. While it can perform routine driving tasks well, the current challenge for automated vehicles is non-routine situations. This will not always be the case as vehicle cognition continues to improve.

According to the author's analysis, 40% of the vehicle base will have connected or automated functionality by 2029. While there is not yet a clear path forward, there are seven topic areas related to CV and AV that potentially impact toll lanes. For connected vehicles topics include, the use of DSRC or V2X for tolling, infrastructure to vehicle communications of toll information and roadside applications. For automated vehicles topics include dedicated lanes, vehicle occupancy detection, improving lane markings and policy changes around licensing, violations, insurance and payment liability.

You can read the full article here.

Conduent Public Sector
Public Transportation & Mobility

CONDUENT

Connected and automated vehicles: The role of toll road operators

Connected and automated vehicles are all the rage. There are conferences to talk about them, test beds to evaluate them, government policy initiatives to regulate or mandate them. But what exactly are connected and automated vehicles, and how will they impact lives of toll road operators?

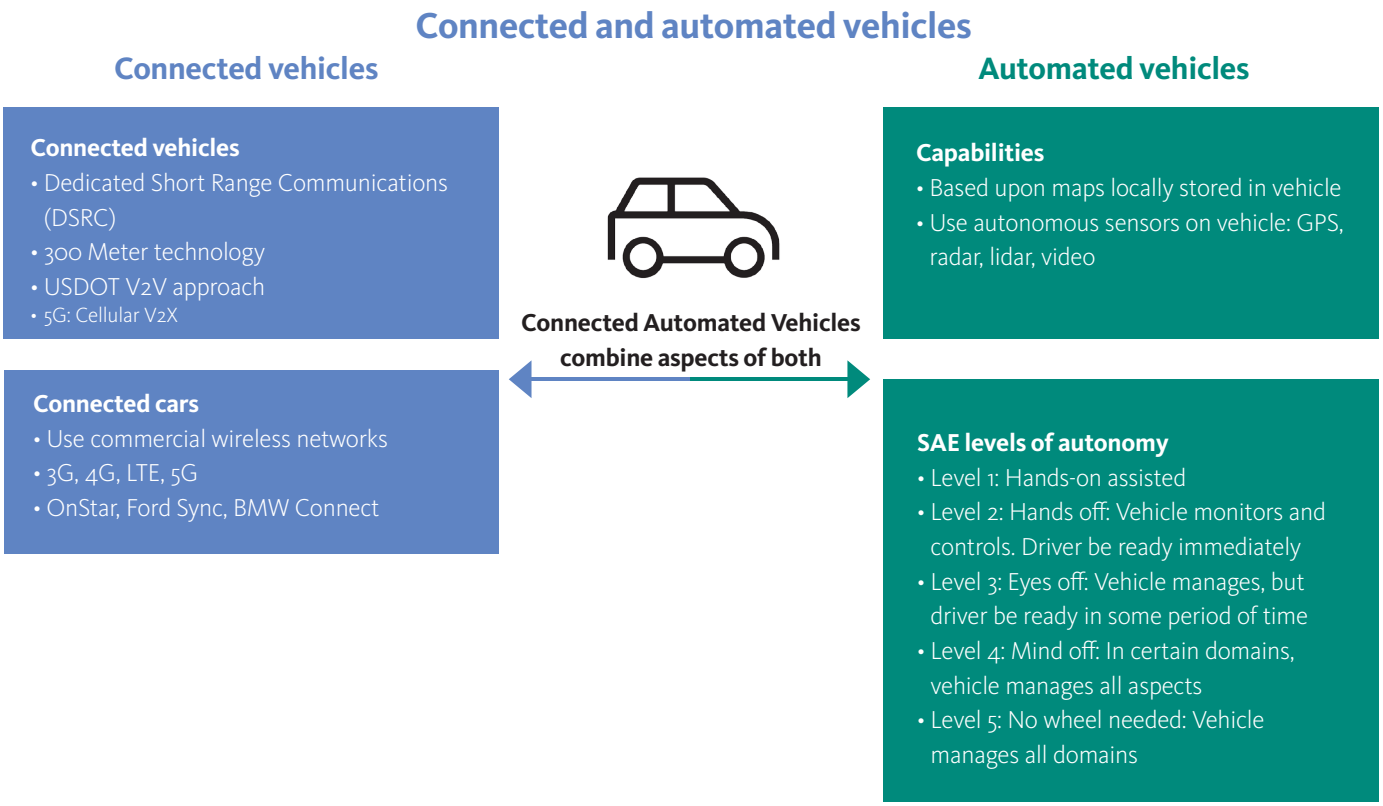
To begin, let's outline the various flavors of connected and automated vehicles, discuss the likely path to adoption, how toll road operators can leverage the capabilities, and some of the fundamental factors to consider as we move to deployment.

Connected and automated vehicles—is this really a term we should be using?

Concepts around connected vehicles have existed for some time. Ford launched the first original equipment telematics system (called Remote Emergency Satellite Cellular Unit –RESCU) that connected vehicles to a call center and provided the GPS location to the call center operator in 1996. OnStar, of course, eclipsed its cousin later in 1996, and offered a full array of services that went beyond emergency calling. OnStar today is the largest and most widely adopted version of a connected vehicle. Later in the mid-2000s, Ford would counter with their SYNC product which allowed users to bring their own Bluetooth-enabled phone, and connect to vehicle systems and wireless services.

Automated vehicles as a concept gained notice after the DARPA (Defense Advanced Research Projects Agency) challenge in 2007, and then attracted widespread attention when Google established the team which created their self-driving car. Automated vehicles are the most important phenomena to hit the automotive industry since electronic fuel injection, and have the potential to be the most disruptive change to the business model since Henry Ford began use of the assembly line.

Figure 2: Connected and automated vehicles



Connected and automated vehicles are similar in that they use technology advances to change the way we drive, but there are some key differences.

Many people use the expression "CAV" as though connected and automated vehicles are made from the same cloth. They are similar in that they use technology advances to change the way we drive, but there are some key differences.

As illustrated on the previous page in Figure 1, automated vehicles are characterized by their ability to work in an automated or autonomous fashion. The key to understanding automated vehicles (AV) is that most of the initial designs that are produced will basically mimic the functions of humans. The AV will evaluate the roadside using systems that are not based upon sending wireless data to the vehicle or through the use of telemetry. The AV as designed is essentially a substitute for the human, and uses RADAR (Radio Detecting and Ranging), and LIDAR (Light Detecting and Ranging) technologies. Self-driving car designers have no expectation of the roadway operator other than, if possible, the road-striping should be maintained. However, even this is a soft request, since snow obscures road markings anyway. For the most part, the automated vehicle is designed to perform as a human would – no special markings, no special signage, no special wireless communications – the vehicle will react to the situation as a human would. A human can be placed basically anywhere and drive themselves out of the situation; the driving ability of humans varies greatly, of course, as we all witness daily.

The advantage of the automated vehicle is that it can perform routine driving tasks in a spectacularly reliable fashion. Imagine stop-and-go traffic on a roadway. Human drivers can slowly ease forward in stop-and-go traffic, alternating between accelerate and brake, accelerate and brake, until one of the humans in the chain becomes distracted by a text, becomes bored, or looks away for some other reason. Then, suddenly, bumpers collide, vehicles are damaged, and the commute is disrupted.

Automated Vehicles can perform this task with remarkable repeatability. They never get bored, they never send a text, and they don't have emails to read. They have one task and one task only: move forward to the destination while avoiding a collision with other vehicles, objects, and infrastructure in the roadway.

The challenge for automated vehicles is non-routine situations. At the current state of the art, humans (some not all) can adapt better to changing conditions. Snowstorms, unexpected road closures, objects in the road, being dropped in a new location – humans are better equipped to maneuver out of unfamiliar circumstances than are automated vehicles. This will not always be the case, because as vehicle cognition increases, and based upon the vehicle's ability to maintain massive map databases which human brains cannot, vehicles will be able to overtake humans eventually even for the most complicated tasks.

For this reason, the Society of Automotive Engineers (SAE) has created a taxonomy that details the progression from no automation to full automation. As depicted in Figure 1, at full automation, no steering wheel is necessary. The vehicle can manage any situation that it finds. Many people state that they will never get into a vehicle that has no steering wheel, but the reality is we surrender control of travel all the time, whether to bus drivers, airplane pilots or someone else.

At the next level down is Level 4, where the vehicle can manage all tasks within certain domains. Toll roads will be the ideal place to deploy these types of vehicles. The vehicle driver will need to get the vehicle to the toll road, but from that point, the vehicle can manage all the tasks, and the driver can resume other functions – that is, "minds off" with respect to the driving function. Toll roads are ideal for this setting, since they are controlled roads with limited numbers of entry and egress points. Toll roads are also well-instrumented with sensors, electric power and communication, so they can be among the first places to provide vehicles with data wirelessly using telemetry and other cues.

Levels 1 and Level 2 automation (as depicted) are fairly prevalent today. Many vehicles have lane keeping systems or smart adaptive cruise control system. These generally fall into the Advanced Driver Assist System (ADAS) category of automation.

Level 3 is the most challenging case in that in this situation the vehicle is in charge, and the driver is in supervisor mode. The driver must be able to take back control of the vehicle with little notice (seconds), and humans have not performed well as supervisors of machines. Since the machine will work well most of the time, the driver will turn their attention away to other things – email, texting, talking on the phone – and may not be ready to quickly assume control. For this reason, few manufacturers are pursuing Level 3 automation – humans cannot be relied upon to quickly assume control. And what is the purpose of having the vehicle manage itself if you have to be poised at any moment to take back control? This would be a nerve-wracking experience.

For the purposes of connected vehicles, we have broken them down into twin paths. Connected vehicles generally refers to concepts around Vehicle-to-Vehicle (V2V) and Vehicle-to-Infrastructure (V2I) communication paths. Connected cars are systems that rely on commercial wireless networks (AT&T, Verizon, Sprint, T-Mobile), and are more related to accessing key content from the internet such as maps and directions, points-of interest, and the use of commercial wireless for payments.

In this taxonomy, connected vehicles (as opposed to connected cars) will rely on 5.9 GHz Dedicated Short Range Communications (DSRC) which is a communications standard intended to transmit over short distances relevant data such as the Basic Safety Message. This message is transmitted using communications protocols specified by SAE (J2735) and IEEE (WAVE 1609.1 through 1609.4). This does not rely on a central network switch or router, and each vehicle (On Board Unit – OBU) or roadway component (Roadside Unit-RSU) broadcasts their data and does not require management by a central network. Under this peering arrangement, the system will need security credential exchange to protect the operation.

Currently, DSRC is being considered by the National Highway Transportation Safety Administration (NHTSA) as a mandate for all future vehicles. A Notice of Proposed Rulemaking (NPRM) was issued by NHTSA in January, 2017 and comments were due on April 12, 2017. NHTSA is considering the feedback and evaluating whether to proceed with the rulemaking – a final rule is expected in 2019. Among the feedback that the NPRM generated was a proposal by the 5GAA (5th Generation Automotive Alliance) which is proposing that NHTSA use 5G, or the variation of 5G that the 5GAA has developed. (5G is the next generation of wireless protocols which are to follow the current deployments of 4G LTE). 5GAA is comprised of Qualcomm, Audi, Daimler, BMW, Samsung, Nokia, and several other key participants in the ecosystem. The 5G as proposed by 5GAA is essentially a Cellular V2X protocol which builds upon 4G. Conceptually, Cellular V2X could deliver all of the V2V, V2I, and V2X functionality, but will not use the DSRC protocol.

What does this mean for toll road operators?

There is considerable discussion underway about how toll roads can prepare for the coming wave of connected and automated vehicles. One suggestion is to have dedicated lanes for automated vehicles. Another suggestion is the use of DSRC or V2I for tolling. Others believe that these new types of vehicles require unique roadside markings, while others seek development of new policies for automated vehicles to regulate them.

Each of these elements may come to fruition and all are important to consider, but clearly some are more imminent. Let's break out the items into near-term, medium-term, and long-term. Consider near-term as occurring in the next five years, medium-term as occurring in the time frame from five years to fifteen years, and long-term beyond fifteen years.

Penetration of connected and automated vehicles into the installed base of vehicles

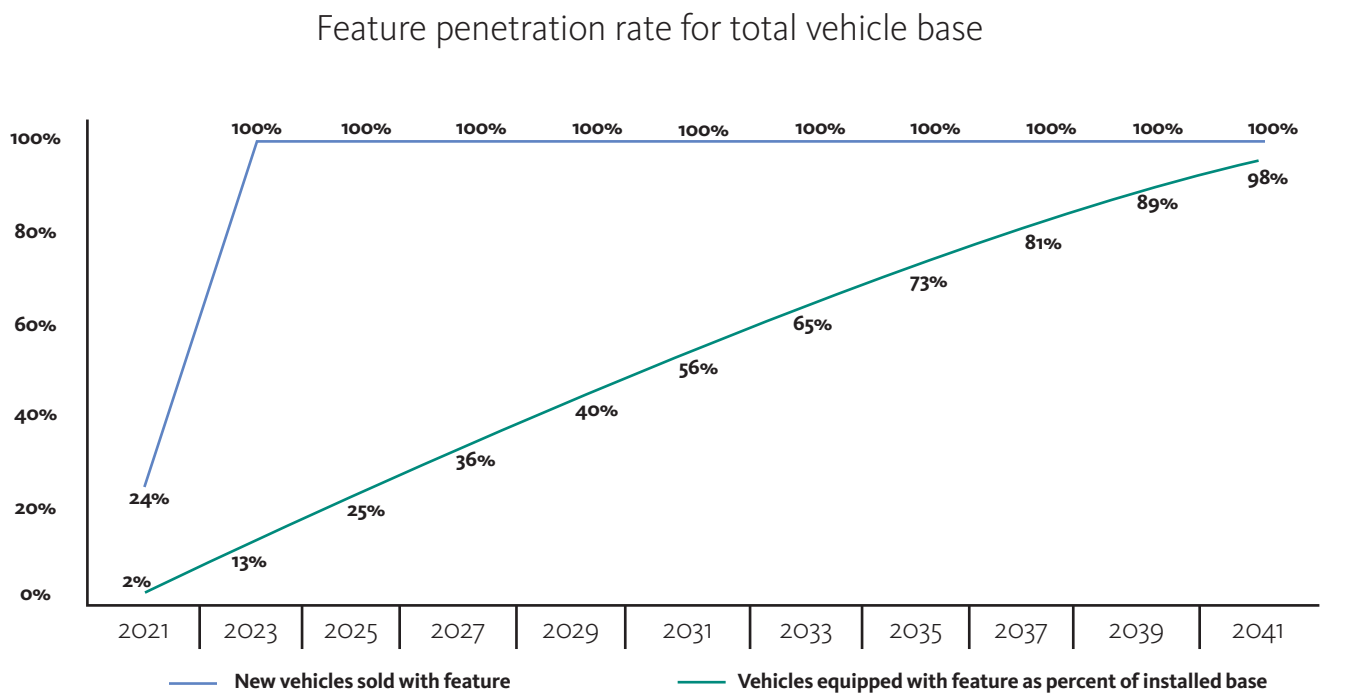
To understand the basis for the recommendations that follow, we need to establish a set of assumptions and evaluate how much time will elapse before the necessary penetration levels occurs. The analysis for each is similar in that it takes considerable time to penetrate the installed base of vehicles. Considering the United States market, see Figure 2 below.

Figure 2 illustrates the timeframe in which certain penetration levels will occur. This analysis assumes that the installed based begins at zero percent penetration in 2021, and by 2023, 100 percent of new vehicles are sold with the new functionality – be it connected capability or automated capability. This is modeled on the timing that NHTSA has presented in their NPRM for connected vehicles.

The simple math is that there are approximately 270 million vehicles in the US Installed Base of cars and light trucks. Currently there are approximately 17 million cars and light trucks sold each year in the United States. One simple technique would be to divide 270 million by 17 million, which would indicate the base would turn over in roughly 16 years. With somewhat more sophisticated analysis taking into account that 100 percent installation doesn't occur until 2023, and accounting for the fact that some vehicles remain in the installed base – that is the 17 million isn't replacing the oldest 17 million vehicles directly, in fact, the base is growing by about 6 million per year since 10 – 11 million are scrapped.

At this rate of adoption, the installed base will take until 2040 to be virtually turned over entirely. The fact is that if ride-hailing services such as Lyft and Uber slow the sales of new cars, or there is an economic downturn and 17 million is optimistic for new vehicle sales, then the turnover of the installed base will take longer.

Figure 2: Feature penetrate rate for US installed base of vehicles



What Figure 2 illustrates is that any feature change that is mandated or adopted on new vehicles will take some time to achieve near-universal acceptance. Certainly, there are some features and functions that can be delivered by sales of aftermarket devices, and this could accelerate the adoption curve. However, this acceleration is not likely to occur for automated vehicles – true vehicle automation is unlikely to be an add-on device. And for connected vehicles, the adoption curve could be pulled forward by some time period, say five years, but universal adoption is a long term phenomena.

Figure 3 (below) illustrates the framework for discussing potential impacts of connected vehicles and automated vehicles. The intent is to lay out which features and functions can be supported in the near-term, medium-term, and long-term.

Figure 3: Adoption of connected or automated vehicles over time periods

Time frame	Definition	Realistic penetration level	Description
Near term	Within 5 years	< 10%	Available to support some features
Medium Term	Within 5 – 15 years	33%	Available to support many features
Long Term	Beyond 15 years	75 – 100%	Near universal Adoption – likely to be sole means

Let's consider some of the topics that have been floated as potential impacts to toll lanes and illustrate where these developments will occur along the timeline.

1. **Dedicated lanes for automated vehicles:** This approach has some appeal in that automated vehicles can be designed to be narrower since the lane keeping system in the car is superior to humans. Therefore, 12-foot lanes could become 10-foot lanes where space it at a premium. Possibly, the AV lane could be created with no break down lane but just occasional turn off locations, which are well-mapped. Also, dynamic message signs could be replaced with infrastructure-to-vehicle connections which advise the automated vehicle of toll rates – at least for AV-only lanes. Realistically, this is a probably a medium-term development, and possibly a longer-term development. The challenge is that, in a 2 – 3 express lane set up, this would occupy 30 – 50 percent of the lane available, and the number of vehicles able to use dedicated AV lanes initially will be less than 10%. Even at aggressive growth rates (100 percent of new vehicles sold are AV by 2023), the penetration would be at 50 – 60 percent in 2032. This is definitely a medium-to-long-term development, and we will need to see what adoption rates look like.
2. **Use of DSRC or cellular V2X for tolling:** This approach has the appeal that if vehicles come with a capable communications platform in the vehicle to conduct transactions, the road operator/agency does not need to manage transponder inventory. This also is a medium-term development. Toll agencies are looking to upgrade their lane equipment to accommodate the movement to the National Tolling Protocol, which will deliver the goal of interoperability in time. The tolling industry is poised to install new readers which will use one of three existing tolling protocols: 6c, IAG, and SeGo. DSRC or Cellular V2X are not currently being considered but could provide a fast, highly reliable payment method for tolling. While it is appealing to leverage the "no cost" transceiver that comes with each vehicle, the delivery of these "no cost" transceivers will not achieve significant penetration until the middle of the next decade. By 2025 or so, it may make sense to add DSRC or Cellular V2X as an additional protocol to readers, but that will be contingent on NHTSA successfully issuing their mandate.

3. **Infrastructure-to-vehicle communications of toll information with connected vehicles:** This approach could provide drivers information that is relevant to their trip. While reliance on in-vehicle signage will not be a substitute for roadside signs for a long time, this is an approach that holds promise. Automated vehicles will be capable of reading signs but could be better served by delivery of data. Information related to dynamic pricing on toll roads would be very helpful for AVs, and could be delivered over any of the potential protocols. For this reason it may make sense to provide toll price information as an API (Application Peripheral Interface) feed so that AV applications (and even human-operated vehicles) can use the information to plan routes and recognize tolls paid. The approach of publishing APIs allows operators to provide the information without being concerned about the wireless delivery method. The challenge with this approach is that, while it can serve the public and assist in demand management, the return on investment may be low for the road operator. This innovation could be ready in the near term if an agency decides to implement this strategy.

4. **Managing vehicle occupancy detection with automated vehicles:** Among the changes that driverless vehicles will bring is that there will be no human driver in the front seat. Historically, HOV enforcement involves looking for passengers in the non-driving seats. This is a minor change to the approach for HOV enforcement but law enforcement on the roadside, and automated enforcement on the roadside will need to account for the fact that there is no driver to account for as you determine if the vehicles is HOV2+ or HOV3+ qualified. This is likely to arise when ride-hailing services deploy vehicles with no driver, and we will encounter vehicles that are truly Level 5 Automation. The key here is that we must exploit automated vehicle occupancy detection to be truly effective, since Level 5 may have no driver to pull over and cite. The technology change can be managed in the near-term, however, the policy change permitting remote, automated enforcement without a physical stop by an enforcement needs to be pursued in state legislatures, which may take time.

5. **Improving lane markings for automated vehicles:** This is an approach that can benefit automated vehicles, although most toll roads are among the best maintained with respect to maintaining proper lane markings, and keeping the roadside clear of snow and debris. Since this is fairly standard practice by toll authorities, and automated vehicles will encounter worse conditions than is typical on toll road, this is a solution that essentially exists today on toll roads. And this near term capability makes toll roads suitable for Level 4 Automation.

6. **Policy changes for automated vehicles:** Among the challenges which needs to be considered is assigning responsibility for vehicle/driver behavior. This takes many forms and will alter the way we manage enforcement. Consider the following:

- Ensuring that the vehicle is properly licensed. Historically, if a vehicle doesn't have a license plate or has an expired license plate, the enforcement officer pulls over the vehicle and issues a ticket. In the Level 5 Automation scenario, there may not be a driver at all. Consequently, the enforcement action must be taken against the owner of the vehicle. This lends itself to automated enforcement using an enhanced violation enforcement system. Owners of vehicles must be sent notices fining them for the vehicle violation. And there must be legislation in place that allows for meaningful follow up and collection.
- Moving violations such as speeding. Again, since there is no driver, there is no individual to pull over and cite for speeding. This again, lends itself to an automated enforcement solution where the speeding ticket will need to be issued without pulling over a driver. Today, most automated vehicles are designed to adhere to speed limits and to not perform other moving violations. This may not always be the case, so agencies must be prepared to enforce moving violations with automated vehicles. This is a near-term to medium-term phenomena.
- Proof of insurance. Historically, an enforcement officer will pull over the driver who has committed some offense, and request proof of insurance. Again, when we consider a ride-hailing vehicle that uses Level 5 Automation, there is no driver to produce proof of insurance. Automated enforcement must again be the tool that is available to agencies. The system must be able to capture license plate images, check them against state DMV files, and also against insurance databases to confirm the vehicle is insured. Again, legislation may be required to enact this change, but we may see this situation in the near future. While large companies managing large fleets of Level 5 Automated Vehicles may be found responsible for maintaining insurance, it is not clear if ride-hailing fleets will be comprised of individual owners or corporations. Proof of insurance via automated enforcement will need to be considered.
- Liability for payment of tolls. This is possibly the easiest issue to manage for Automated Vehicles as the liability for the toll will be on the account holder with the toll agency. If the vehicle owner does not have an account with the toll agency, the liability will be assigned to the vehicle owner who will be identified via a DMV look up and sent an invoice.

7. **Roadside applications using connected vehicles.** The American Association of State Highway Transportation Officials, ITS America, and the Institute of Transportation Engineers have formed a group designated the Vehicle-to-Infrastructure Deployment Coalition (V2IDC). This coalition has worked with automakers to identify useful applications that can leverage DSRC in vehicles. Since automakers are installing DSRC in vehicles (see 2017 Cadillac CTS), automakers are looking to how they can use the DSRC technology to improve driving by installing wireless communications on the roadside. Among the applications identified are:

- Signal Phase and Timing (SPAT). Using the DSRC channel, the signal phase at an intersection will be broadcast to any vehicle equipped to receive the SPAT message. This application is being promoted by the SPAT Challenge which seeks to find 50 cities that will install 20 intersections along a corridor by 2020. The 20-50-20 goal is being pursued and several DOTs are pursuing this implementation. Toll agencies are not involved in this process because they typically do not operate signalized intersections, but agencies should be aware of the approach taken by AASHTO and the V2IDC.
- Work zone safety. The V2IDC is seeking to promote the development and deployment of Work Zone Systems that use DSRC.
- Curve overspeed warning. Similarly, AASHTO and the V2IDC promote the use of DSRC on curves where sight lines are limited and DSRC can be used to identify vehicle stoppages ahead even in inclement conditions.
- End of queue warning. This is the fourth application that AASHTO and the V2IDC is promoting. DSRC can be used to signal at locations where traffic jams form repeatedly. A DSRC system could alert drivers to the fact that this is a high-likelihood area for traffic jams, and identify the end of queue.
- Simple data gathering. While AASHTO has not promoted this approach, a relatively easy entry point for toll agencies is to set up DSRC receivers for the purpose of speed collection. DSRC radios in vehicles are broadcasting ten times a second key data points about the vehicle: speed, direction, location of the vehicle. The data is anonymous and the basic safety message (BSM) does not include a VIN or other identifier. These sensors are not in a position to displace microwave vehicle detectors or radar sensors, but could be used as a calibration and audit tool to provide a basis for comparison with existing roadside sensors. The speeds provided by the BSM are very accurate, but initially there will be too few vehicles to record this data. Some states and agencies have opted to equip their maintenance fleet with OBUs that will broadcast to the roadside units so that there will be a baseline of measurement. Also, as more DSRC equipment is installed in vehicles, there will be more vehicles to sample speed from.

Connected and automated vehicles are coming

There are many implications to this change for roadway operators. The path forward is not entirely clear with respect to which wireless protocol will be used to deliver, but that is not the key to the discussion. The ability to set up tests and operationalize Connected Vehicle and Automated Vehicle applications can be pursued independent of the wireless protocol.

There will be many changes that will occur due to the introduction of CV and AV to roadside from technology to policy. The key is to align with partners that are knowledgeable and have the flexibility to adapt to changing conditions. This will bring a significant change to roadway management and ultimately lead to better service for the driving and riding public.

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CONDUENT

The Impact of New Mobility Services on the Automotive Industry

CAR
CENTER FOR AUTOMOTIVE RESEARCH

August 2016

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Emerging trends in mobility technology, such as the rise of ridehailing and carsharing services, have led many industry analysts to offer their views on how these trends will affect the automotive industry in the United States. The reports stemming from these efforts have resulted in highly conflicting visions of the future, ranging from a dramatic decline in vehicle sales to a windfall in revenue and profits.

Faced with this cloudy picture, researchers at the Center for Automotive Research decided to weigh in with their own analysis, one that is rooted in our cumulative knowledge of travel behavior, consumer preferences, and the operational characteristics of new mobility services.

Our analysis, based on sound data and summarized in this white paper, sheds light on what we believe are likely future directions. We welcome feedback on this effort and will continue to refine our viewpoint as technology, society, and service offerings continue to evolve.

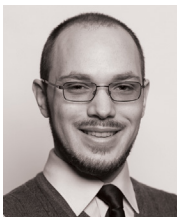
The Impact of New Mobility Services on the Automotive Industry

This white paper provides a summary of a longer report produced and published by the Center for Automotive Research (CAR). The report, and hence this white paper, was prepared primarily by CAR researchers Adela Spulber and Eric Paul Dennis, with guidance and input from Richard Wallace, Director, Transportation Systems Analysis. CAR researcher Michael Schultz provided data analysis and forecasts critical to the overall effort.


Adela Spulber


Eric Paul Dennis


Richard Wallace


Michael Schultz

August 2016

The full report is available on the CAR website, in the Publications section.

For additional information, contact Richard Wallace, rwallace@cargroup.org.

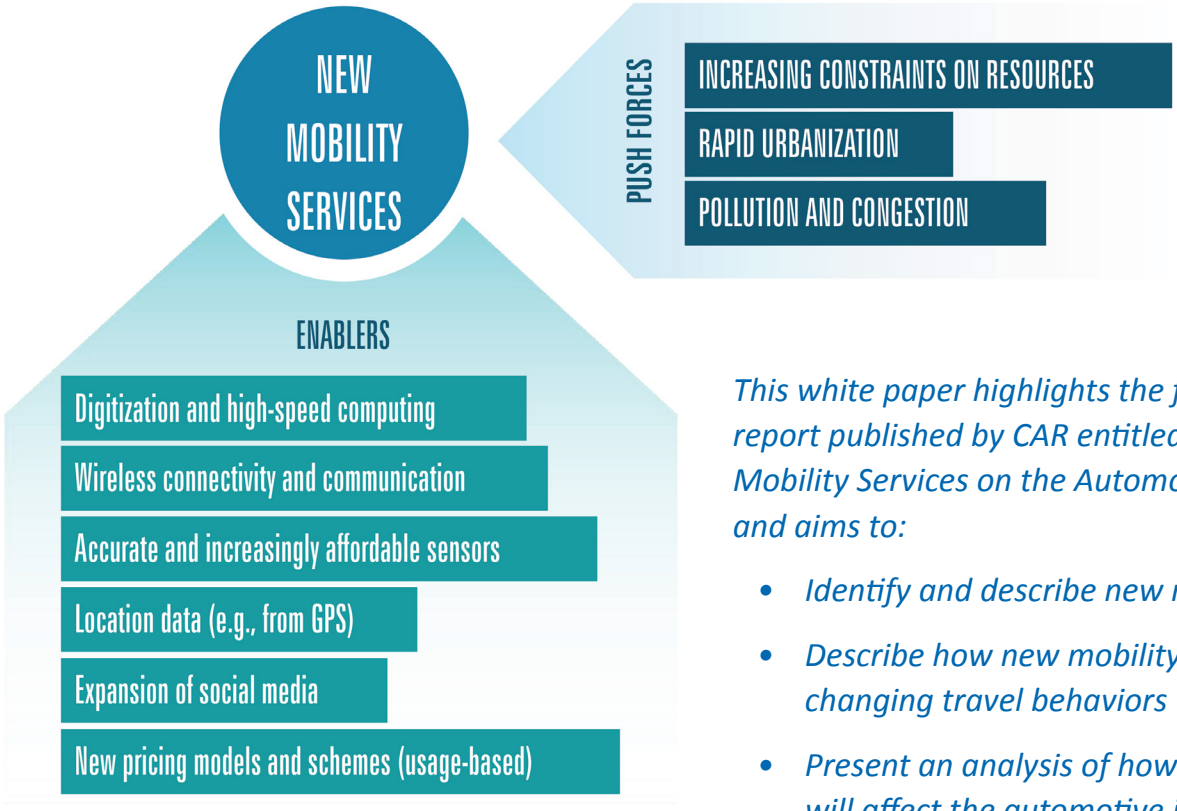
Introduction

The concept of mobility is increasingly being adopted by planners, policymakers, and industry to describe the systems that allow people to move about their world. This shift in language—from transportation to mobility—represents a shift in thinking about how a transportation system is best designed and managed. Mobility is a user-centric concept—recognizing that transportation products and services must be responsive to the needs, habits, and preferences of travelers and society.

Numerous new passenger transportation options, collectively called new mobility services (NMS), have been developing for the past fifteen years. These services offer transportation as an on-demand shared service, enabling users to have access to a vehicle (automobile, bicycle, van, etc.) for a short-term and on an as-needed basis. New mobility services often blur the lines between public and private transportation, and between what is shared and what is owned.

New mobility services are enabled by emerging technologies and wireless connectivity that allow for more convenient, efficient, and flexible travel. Carsharing, ridehailing, ridesharing, microtransit, bikesharing, and mobility-as-a-service are among the most noteworthy new mobility services currently being developed. Each has its own business model and underlying service characteristics.

Rapid urbanization, pollution, and congestion are just a few of the push forces that have prompted this wave of innovation in transportation. New mobility services are contributing to a mobility evolution. They are part of an incremental change in travel behavior, especially in urban areas, toward a multimodal system that is less car-centric. Worldwide, this gradual change will allow traditional transportation players, automotive manufacturers in particular, to adapt and maintain their market position, despite the increasing diversification of the transportation sector.



This white paper highlights the findings of a report published by CAR entitled Effects of New Mobility Services on the Automotive Industry and aims to:

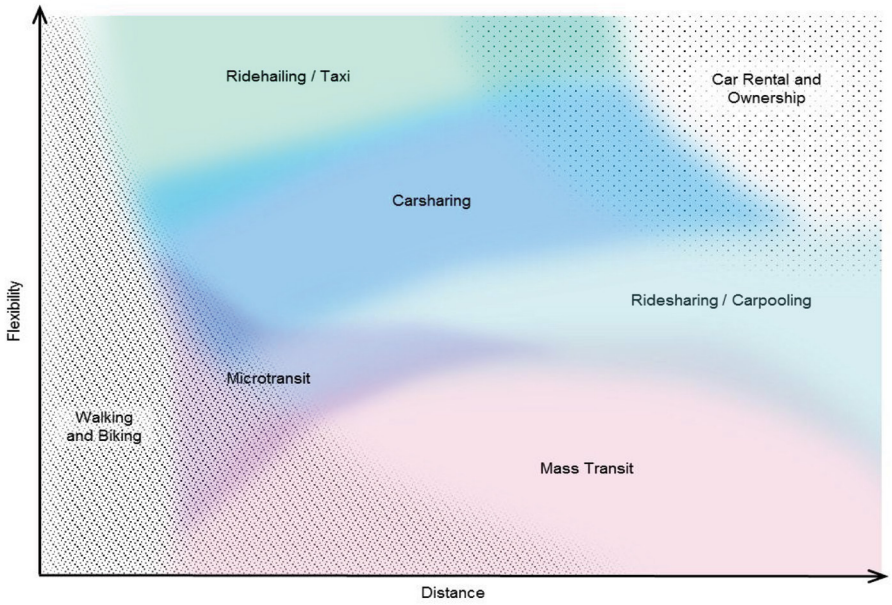
- *Identify and describe new mobility services*
- *Describe how new mobility services are changing travel behaviors*
- *Present an analysis of how those changes will affect the automotive industry*

Types of New Mobility Services

New mobility services have been characterized as more reliable, predictable, efficient, convenient, accessible, and seamlessly connected compared to established means of transportation, as well as offering easier options for payment. New mobility services also contribute to reducing parking demand, pollution, and congestion, as well as provide energy savings and transportation costs savings for users.

Each of these new mobility services fits a specific niche, but they also partially overlap with one another and with established means of transportation. Which service is best for a given trip depends on trip distance and amount of flexibility (time, destinations available) that the traveler has during the trip.

Ideal Use Cases for Different Modes of Transportation



Ridehailing services rely on smartphone apps to connect paying passengers with drivers who provide rides (for a fee) in their private vehicles. Transportation Network Companies (TNCs) design and operate these online platforms. Most TNCs function as digital marketplaces linking self-employed drivers with customers, while collecting a fee for making the connection.

Ridesharing is a type of carpooling that uses private vehicles, arranging shared rides on short notice between travelers with a common origin and/or destination. Travelers share trip costs in these systems, that organize either short- or long-distance ridesharing.

Carsharing is a short-term car rental, often by the hour. Electronic systems allow unattended access to the vehicles. Gasoline and insurance are included in this type of service. These characteristics distinguish carsharing from traditional car rental. Carsharing can be round-trip or one-way, free-floating or station-based.

Bikesharing is a system that provides free or affordable access to bicycles for short-distance trips, mostly in urban areas. Most programs are organized either by local non-profit organizations or by public agencies.

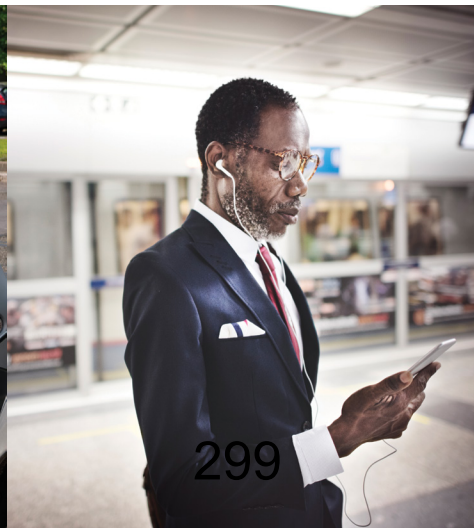
Microtransit is a wide category encompassing various private transit services that use small buses and develop flexible routes or schedules (or both) based on customer demand. Microtransit bridges the gap between single user transportation and fixed-route public transit and resembles current route-deviation services.

Mobility-as-a-Service (MaaS) is a mobility distribution model in which a person's transportation needs are met over one interface and are offered by a service provider. In general, transportation options (mass transit, carsharing, ridehailing, etc.) are bundled and the integrated solution is presented to the user through a smartphone app and is paid through a single account.

Shared autonomous vehicles (SAVs) are fully self-driving vehicles that do not need human operation, other than providing information regarding the destination of the trip.

Market Characterstics of New Mobility Services

Service	Markets	Examples
Ridehailing	More than 75 countries globally. In the United States, 650,000 driver-partners work with the two biggest operators, Uber and Lyft	Uber Lyft Didi Ola Gett
Ridesharing	Europe is the primary market globally. The biggest operator, BlaBlaCar, has 25 million members across 22 European and South American countries. Limited presence in the United States.	BlaBlaCar vRide Commutr
Carsharing	26 countries in North and South America, Europe, Asia, and Oceania. 1.2 million members and 16,700 vehicles in the United States.	Zipcar Car2go Enterprise CarShare
Bikesharing	Almost 1000 cities worldwide. 104 cities, 30,700 bicycles in the United States.	Motivate DecoBike Zagster
Microtransit	Many development exist in Europe, where the concept was developed. In the United States, service currently is limited to six major cities.	Bridj Chariot Via
Mobility-as-a-Service	Pilot projects in Europe and the United States. 70 cities in the United States and Canada have MaaS-like solutions from moovel N.A.	MaaS Global UbiGo Transloc Xerox moovel
Shared Autonomous Vehicles	Technology remains in-development. Some companies are testing their technology, especially via private shuttles on campuses.	Google EasyMile Uber Ford GM



Key Trends in Transportation Choices

Push Forces for New Mobility

The introduction and adoption of new mobility services is related to several broad trends, such as rapid urbanization, economic growth, increasing road congestion, increasing pollution from the transportation sector, and changing mobility preferences.

The uneven prevalence of these trends across the globe and within the United Stated implies that the potential for NMS to disrupt transportation, and the automotive industry with it, is similarly variable. Overall, the transportation choices U.S. residents make will be transformed by new mobility solutions to a lesser extent than in other parts of the world. The U.S. automotive market is relatively less vulnerable to disruptive NMS services than other markets.

New mobility services will bring disruption in urban transportation, but not in suburban America

The latest trends in U.S. demographics, population growth, and user preferences will boost the growth of new mobility services in the largest and densest cities, and also in smaller urban areas and inner suburbs. However, these new mobility services are far less convenient in less densely-populated areas, where a majority of the U.S. population lives. Thus, most U.S. residents will continue to live in areas where private vehicle ownership and use will be preferable to relying solely on new mobility services and public transportation.

Millennials and Baby Boomers will dictate mobility preferences

Millennials and, to some extent, Baby Boomers will be the driving forces of the adoption of new mobility services.

Millennials are now the biggest cohort of the American population and are leading a broad shift in travel behavior among Americans. This generation is more urban and less car-focused than its predecessors. Millennials are more likely to use public transit, bike or walk. Millennials are the early-adopters of new mobility services, from carsharing and ridesharing to bikesharing. They also are more open to autonomous cars, as well as greener vehicles. Because of their lifestyle and transportation preferences, Millennials will account for much of the expansion of new mobility services.

Baby Boomers primarily live in suburbs. However, as they get older, the mobility model build around the personal vehicle will become more of a challenge for them, because age-related health issues. The mobility challenges that an aging Baby Boomer generation will have in a suburban setting means that this cohort will have increasing needs for alternative mobility services, whether they are ridehailing, microtransit, or shared autonomous vehicles.

Key Factors Affecting Travel Behavior
Demographic Trends • Population age structure • Population growth and density
User Preferences • Social preferences for mobility • Preferences for residence
Transportation Options • Available means of transportation (mass transit, private vehicle, etc.)
Transportation Costs • Fuel prices, transit fares • Vehicle ownership costs • Road congestion
Infrastructure and Planning • Land zoning and development trends • Traffic management systems
Macrofactors • Economic growth • Global warming and pollution

State of Transportation in the United States

The private vehicle has a dominant place in U.S. transportation

In contrast with Europe and Asia, in the United States private vehicles have a dominant place in the transportation system, and this directly affects the growth prospects of new mobility services. In 2013, 76.3 percent of Americans commuted to work by driving alone, and this share has been increasing over the years.

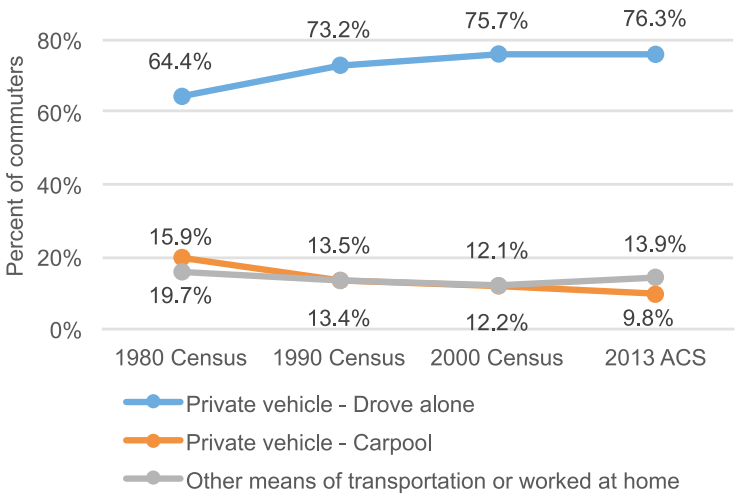
In the last 25 years, the share of people that carpooled to work fell nearly by half, dropping from 19.7 percent in 1980 to 9.8 percent in 2013. This is partly explained by the low costs of owning and operating a single occupancy vehicle. The U.S. has some of the lowest costs of driving in the world.

The use of public transit is highly concentrated in the United States within a few dense metropolitan areas. Only 5.1 percent of workers commute by public transit; however, despite the dominant place of the private vehicle, public transportation and bicycles have seen an increase in use since 2000. This trend is likely to continue in coming years.

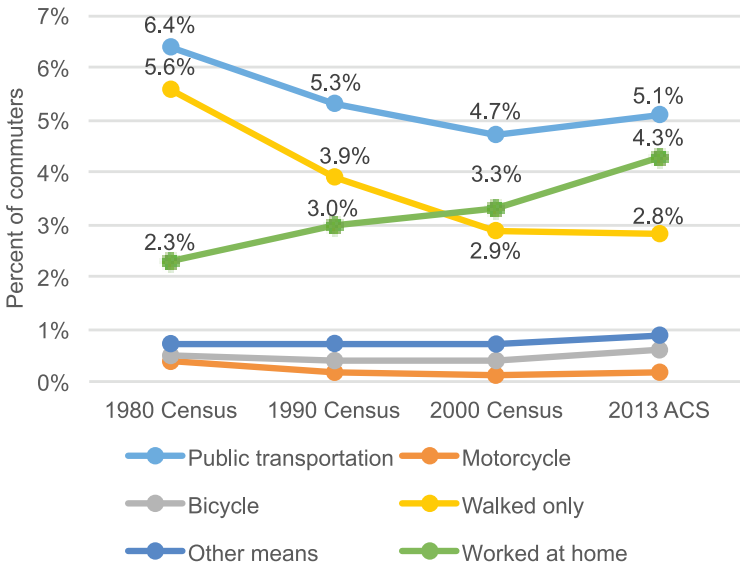
Peak car travel happened ten years ago

After the U.S. experienced "peak car travel" in 2005, the number of vehicle miles traveled (VMT) per capita started falling and the drop accelerated during the Great Recession. The lowest point was reached in the first months of 2014. After mid-2014, VMT per capita started increasing again, and in 2015 this number reached the same level as in 2001, roughly 9,500 miles. A new peak might yet be achieved in the next few years.

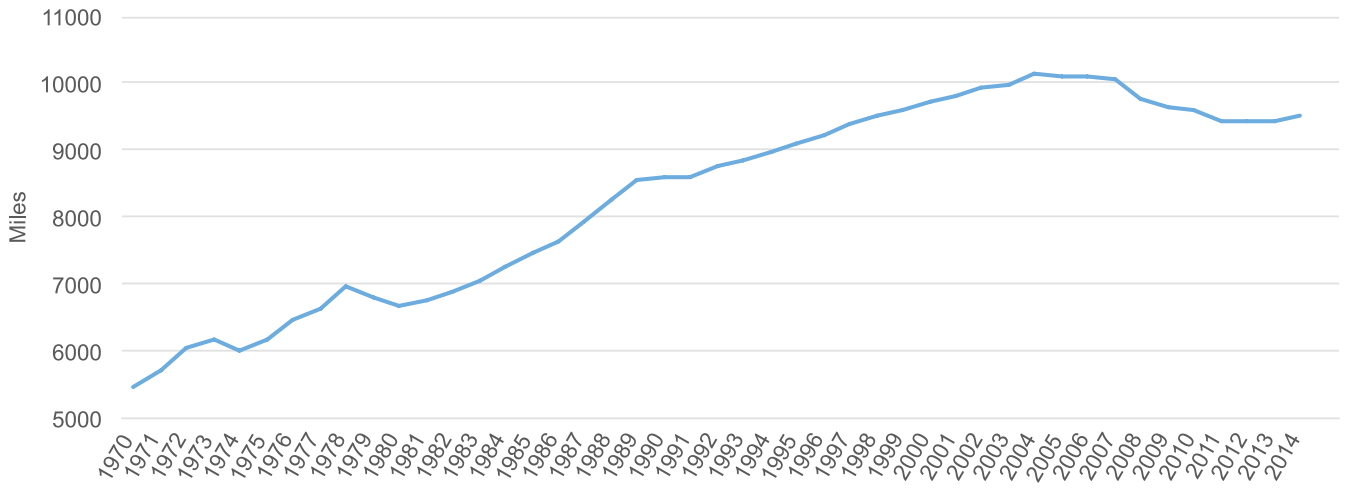
Usual Means of Transportation to Work



Usual Means of Transportation to Work



Annual Vehicles Miles of Travel per Capita in the United States



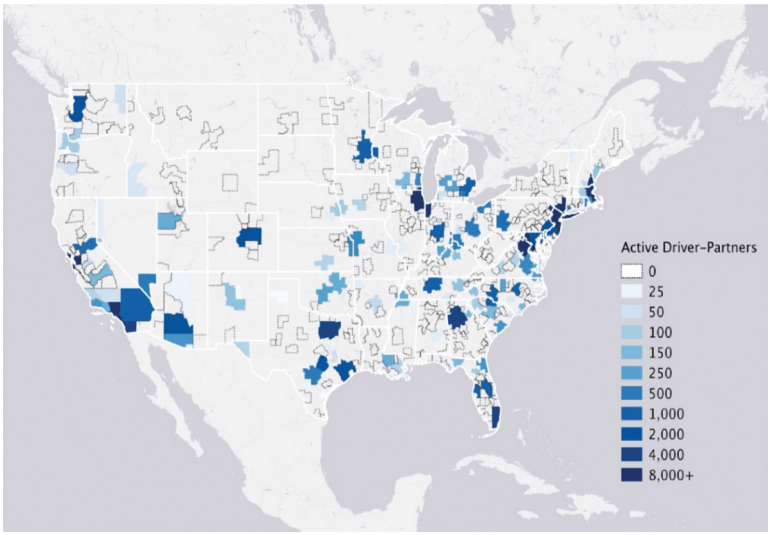
Target Users and Markets of New Mobility Services

Urban areas are the target markets for new mobility

Overall, new mobility services work best in denser and walkable urban areas with good public transportation networks. New mobility services are not used as a sole means of transportation, but instead are used in combination with other ones, especially public transit. Therefore, new mobility services are and will be used more intensively in areas with good public transit, but just occasionally in areas with little or no public transit; in such areas, new mobility services might be used for specific purposes, such as to or from an airport. In areas with low public transit coverage, a personal vehicle remains the dominant mode of transportation, thereby limiting the demand for hailing an Uber or renting a Zipcar.

Carsharing programs are now available in most large U.S. cities. Zipcar is in 46 of the 50 largest U.S. metropolitan areas (in terms of public transit ridership), and car2go is in nine out of the 50. In 2014, ridehailing operator Uber was making most of its revenue in a few big U.S. cities (New York City, San Francisco, Chicago, Washington D.C. and Los Angeles).

Active Uber Driver-Partners in the United States



The map indicates the number of Uber driver-partners who took at least four trips in November 2014, by Census Metropolitan Statistical Areas.

Source: Hall and Krueger, "An Analysis of the Labor Market for Uber's Driver-Partners in the United States," 2015

Characteristics of Carsharing Markets

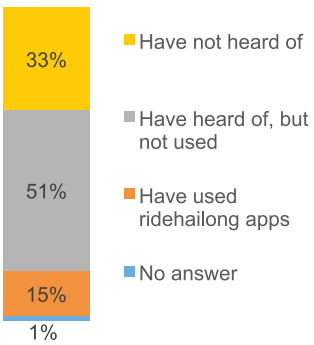
	Neighborhoods with Access to Carsharing	Regional Average
Demographics		
One-person households	51.8%	27.2%
Households with children	12.5%	32.4%
Rental households	71.5%	39.6%
Households earning more than $100,000	18.2%	17.9%
Persons with Bachelor's degree or higher	54.6%	34.0%
Means of Transportation to Work		
Drive alone	33.0%	69.4%
Carpool	6.6%	11.6%
Public transit	30.8%	8.8%
Bicycle	2.1%	0.8%
Walking	21.9%	4.4%
Vehicle Ownership		
Households with no vehicle	40.0%	11.3%
Average vehicles per household	0.84	1.66
Neighborhood Characteristics		
Housing units per acre	21.70	

Source: Millard-Ball et al., "Car-Sharing:Where and How It Succeeds," 2005

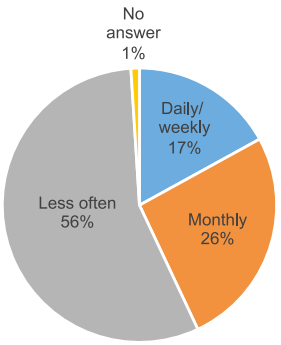
Urban dwellers with higher income and education levels are the early adopters

The users of new mobility services are mostly urban dwellers and have above average income and educational attainment levels. They also are less likely to own a vehicle and rely more heavily on public transportation, especially for the work commute. NMS users own 1.05 cars per household, compared to the national average of 2.06.

Use of Ridehailing among U.S. Adults



Frequency of Ridehailing Use in the U.S.



Source: Pew Research Center, " Shared, Collaborative and On-Demand: The New Digital Economy," 2016

Effect of New Mobility Services on Transportation

New mobility services are changing the transportation sector, either by providing entirely new mobility solutions or by reshaping traditional transportation means with technology (ridesharing with carpooling, microtransit with bus shuttles). From the point of view of the user, NMS contribute to a shift from one solution to every mobility need, the privately owned vehicle, to many custom solutions.

The more people use NMS, the more likely they are to take public transit and use and own fewer cars.

Overall, the growth of new mobility services has been associated with a decrease in the use of private cars and an increase in public transit use; however, some people also prefer NMS to public transit in certain circumstances. For example, research indicates that people prefer carsharing or ridehailing to public transit, if the transit trip takes longer or requires several changes. Overall, new mobility services substitute for more private vehicle trips than for public transit trips.

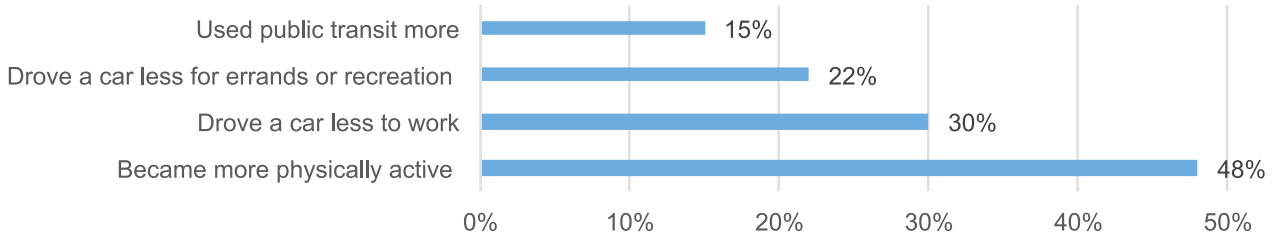
New mobility services have partly different use cases

New mobility services do not serve the exact same purposes as the private vehicle or public transit; they are partly complementary. These new transportation modes are used more often during the weekend than on weekdays. New mobility services are also associated more with leisure and social trips, than with the work commute. For example, ridehailing services are mostly used for social trips and between 8 PM and 4 AM, times when public transit service is least available and driving can be less convenient or safe.

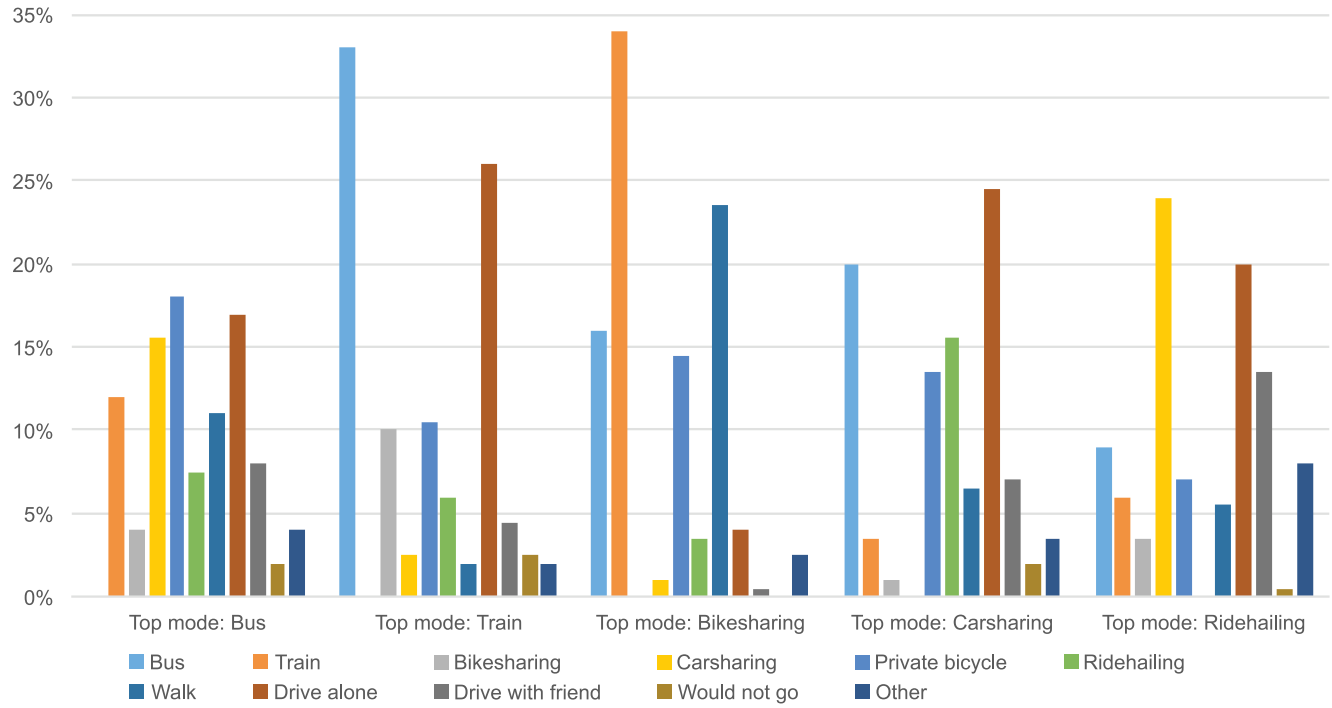
New mobility enhances multimodal transportation

Evidence suggests that new mobility services are generally used in combination with public transit and that they can extend the catchment area of public transit. By addressing the first-and-last mile issue related to public transit access, NMS can potentially contribute to bridging gaps in existing transportation networks and encouraging multimodality.

Changes in Personal Travel Behavior Since Using New Mobility Services



Alternative Transportation Mode Users Would Take if Their First Choice Was Unavailable



Source: Feigon and Murphy, "Shared Mobility and the Transformation of Public Transit," 2016

State of New Mobility Industry and Potential Growth

In the last decade, new mobility services have seen a substantial growth and expansion throughout the world. Their growth prospects are positive, because societal attitudes and public policy have become more supportive of new mobility services in the past years and this trend will likely continue. New mobility services have a bigger market share potential in areas where public transit is present and more used, such as in Europe and Asia. Thus, there is a bigger growth potential for NMS in Europe and Asia than in North America. Even in urban areas, NMS, like public transit, will not be suitable replacements for private vehicles for certain use cases: drivers that take pride in their vehicles or value extra comfort or privacy, parents transporting young children, and drivers who require special accessories in their vehicles, for example.

Ridehailing is expanding rapidly but faces regulatory headwinds

Since their beginnings in the late 2000s, ridehailing services have expanded at an extremely rapid pace within the U.S. and to all the other continents. Uber, by far the most international of the TNCs, is now available in about 75 countries and counting. Up until mid-2013, the main U.S. transportation network companies registered a 25-percent monthly increase in users. By mid-2014, however, the growth rate had slowed to a 10-percent monthly increase.

The growth of the ridehailing business is boosted by a high consumer preference, the ability to fill transportation needs not well met by other modes, and a yet ill-defined regulatory framework. Given their high growth potential, investors have taken an interest in ridehailing. Nonetheless, TNCs face significant obstacles in their growth, as competition among them stiffens, markets become saturated, and regulatory frameworks are better defined. Ridehailing has also been banned or restricted in several countries and cities. As such, TNCs are involved in various legal battles concerning a variety of aspects crucial to their business models (e.g., licensing fees, driver status and benefits, insurance, and passenger safety).

Ridesharing is expanding in Europe and South America, less so in the United States

In the U.S. real-time ridesharing has had a slow growth since its beginnings in the early 2000s, despite the 400 local services available as of July 2011.

New mobility solutions have expanded much more in Europe and South America. Specifically, long-distance ridesharing has become increasingly popular over the past years in Europe. For example, since its creation in 2006, the long-distance ridesharing community BlaBlaCar has expanded to 22 countries.

Bikesharing has experienced constant growth since 2000. Globally, nearly 1000 cities are now equipped with bikesharing systems.

Microtransit, Mobility-as-a-Service, and shared autonomous vehicles are in various phases of pilot projects across the globe. These developing new mobility services may prove to be as impactful, or more so, than more established models.

Carsharing is growing steadily in the United States and more rapidly in Europe and Asia

Europe is the biggest carsharing market, with about 2,206,000 members in 2014, followed by North America (1,625,000 members). By contrast, the Asia–Oceania region has registered the fastest growth recently and reached 1,006,000 members in 2014.

The biggest drivers of the carsharing growth are the increase in population density, the slight decline in vehicle ownership, the improvement of public transit networks, and policies aimed at multimodal transportation. Some of the biggest challenges for carsharing are parking permits, high initial expenses (acquiring vehicle fleet), insurance, and adapting to the differences between cities (density, transportation networks), and brand recognition.

As the carsharing market matures, operators are undergoing a process of consolidation, multi-nationalization, and mainstreaming. The carsharing space is transitioning from a multitude of nonprofits, co-ops and a few established businesses to an industry dominated by for-profit operators. Despite this, peer-to-peer carsharing might continue to grow.

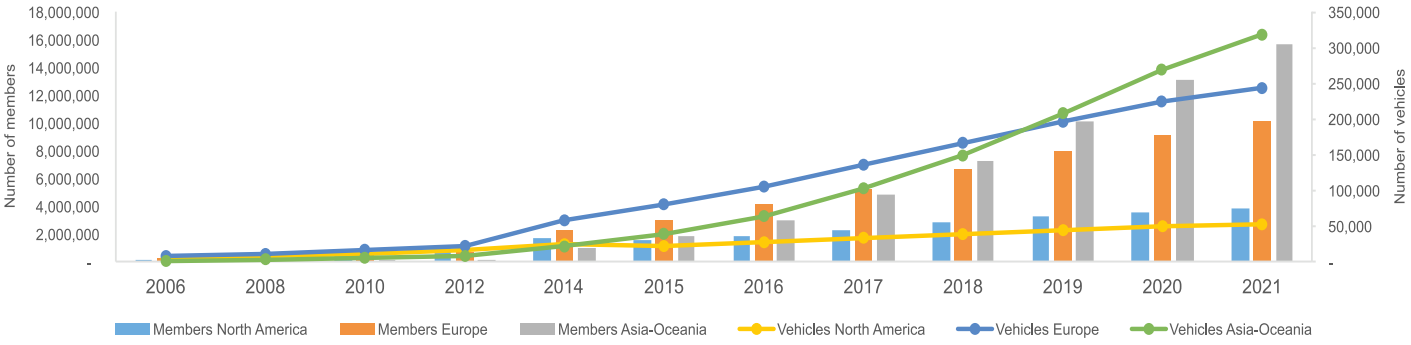
CAR estimates that by 2021, North American carsharing programs will reach 3.8 million users and 50,800 vehicles. Membership growth will be steady, but will gradually decrease as the market matures and saturates, from 23 percent in 2016 to 6 percent in 2021.

European programs are expected to grow to 10 million members and 242,600 vehicles. Likewise, annual membership growth will slow, from 35 to 10 percent between 2016 and 2021. It is expected that Germany will remain the largest European sub-market.

The Asia–Oceania region has the biggest growth potential (70 percent expected in 2016, gradually slowing down to 20 percent in 2021) and is likely to arrive at 15.7 million members and 317,000 vehicles.

Based on the current market potential, travel behavior trends, and historic growth patterns of existing operators, CAR estimates that carsharing programs will reach almost three million members and comprise more than 39,100 vehicles in the United States by 2021.

Carsharing: 2006 - 2014 Growth and 2015-2021 Projections



In the last few years, new mobility services have started to capture the attention of transportation users, the media, public authorities, and transportation sector in general. Through their innovative ways of improving mobility, NMS are gaining some control over the narrative of transportation. Just five years after the launch of NMS, two-thirds of Americans have heard of ridehailing apps, even though only 15 percent are using them; this is strong evidence of the broad reach of the concepts that are at the core of NMS.

The growth of new mobility services around the world and in the United States has many implications for the automotive industry, some of which are already visible today, others that have yet to fully reveal themselves. Increased use of new mobility services could reduce car ownership for people that do not use a private vehicle as their main mode of transportation, and instead use public transit, bike or walk. The shift towards new mobility services and away from the private vehicle will be responsible for some losses in sales of new and used vehicles, but these losses are likely to be very small compared to the overall number of transactions involving vehicles every year. In addition, services like carsharing and ridehailing will contribute to a greater vehicle turnover and a shorter vehicle life expectancy, partly counteracting forces that decrease vehicle sales.

The most important impact that new mobility services will have on the automotive industry will not be on the volume of vehicle sales, but rather it will be on how customers interact with vehicles, their expectations for vehicles, and their uses of these vehicles.

New mobility services are changing the way people use, value and relate to personal vehicles. NMS are changing people's expectations about vehicles. New mobility services will likely contribute to a change in preferences, away from vehicle ownership and towards "vehicle usership," exploring new business models that do not involve the user owning a vehicle and having all the inconveniences associated with that.

New Markets and Opportunities for Automakers

The increasing expansion and adoption of new mobility services are already prompting vehicle manufacturers to rethink their existing business models, as well as explore new ones.

The mainstreaming of new mobility services is an opportunity for automakers more than it is a threat. As transportation preferences slowly evolve, the automotive industry is trying to show customers they understand the shift toward on-demand shared mobility and have relevant new products and services to offer.

Some vehicle manufacturers have already announced their intention to become mobility companies, offering new services alongside the established core business of manufacturing vehicles. A few automakers have created subsidiaries in charge of mobility solutions or launched carsharing programs.

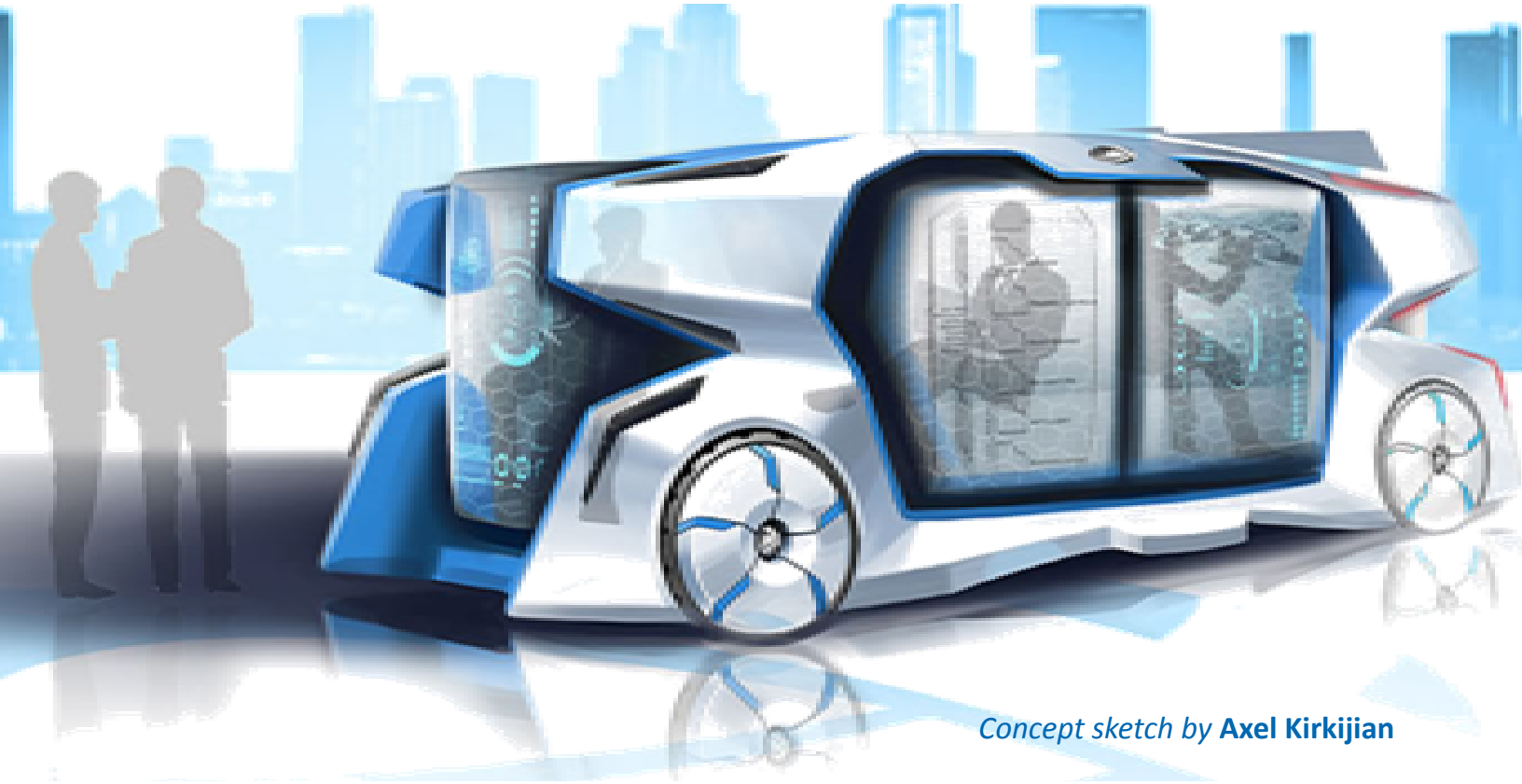
Opportunities for the auto industry:

- *Partnerships with new mobility and technology firms*
- *Investments and venture capital in mobility startups*
- *R&D and experiments on mobility solutions*
- *In-house mobility services*
- *Fleet sales to mobility providers*
- *New vehicle financing models*

In the last several years, automakers have started investing in, partnering with, or acquiring new mobility companies. Building relationships with NMS is an opportunity for vehicle manufacturers to diversify their activities and, especially, to strengthen their market share in urban areas and with the younger generations. Partnerships with NMS companies give automakers increased visibility to mobility users (that may one day become car buyers), as well as access to valuable consumer data and analysis. New mobility companies also have an interest in these deals, that come with an access to auto industry engineers or discounts on vehicles.

Automakers see the opportunity to turn ridehailing and carsharing companies into reliable customers for their vehicles.

With fleet sales, manufacturers are also hedging their bets on potential losses in private sales or changing structure in clientele. Selling to fleet managers represents not only a steady revenue stream from sales, but also an advertisement for their brand directed to carsharing or ridehailing users that may be tempted to buy a car one day. Ridehailing and carsharing companies could become reliable customers specifically for fuel-efficient, electric or luxury vehicles.



Concept sketch by **Axel Kirkijian**

Cost Comparisons between NMS and Private Vehicle

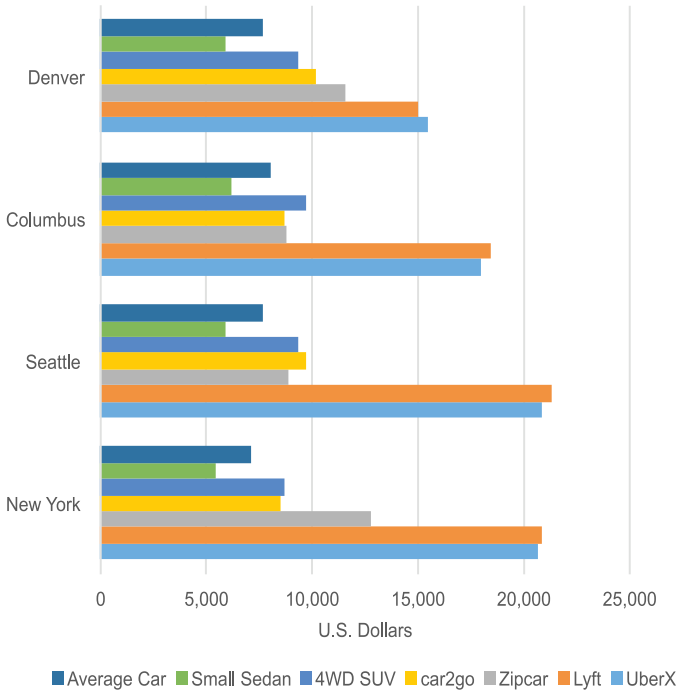
Overall, when new mobility services are used in combination with public transit, they are more cost competitive that the private vehicle. This is one of the key benefits leading to the success of NMS in the last years. For example, one study estimates that after joining carsharing, U.S. households save between $154 and $435 in transportation costs per year.

The costs and benefits of new mobility services as part of a multimodal solution are highly specific to a particular type of user. In order to broadly analyze costs, CAR compared the costs of using a personal car, on the one hand, and using only carsharing or a ridehailing service, on the other hand. This provides a rough estimate of the potential savings available to customers. The comparisons are either local, based on four case studies, or national, as detailed below.

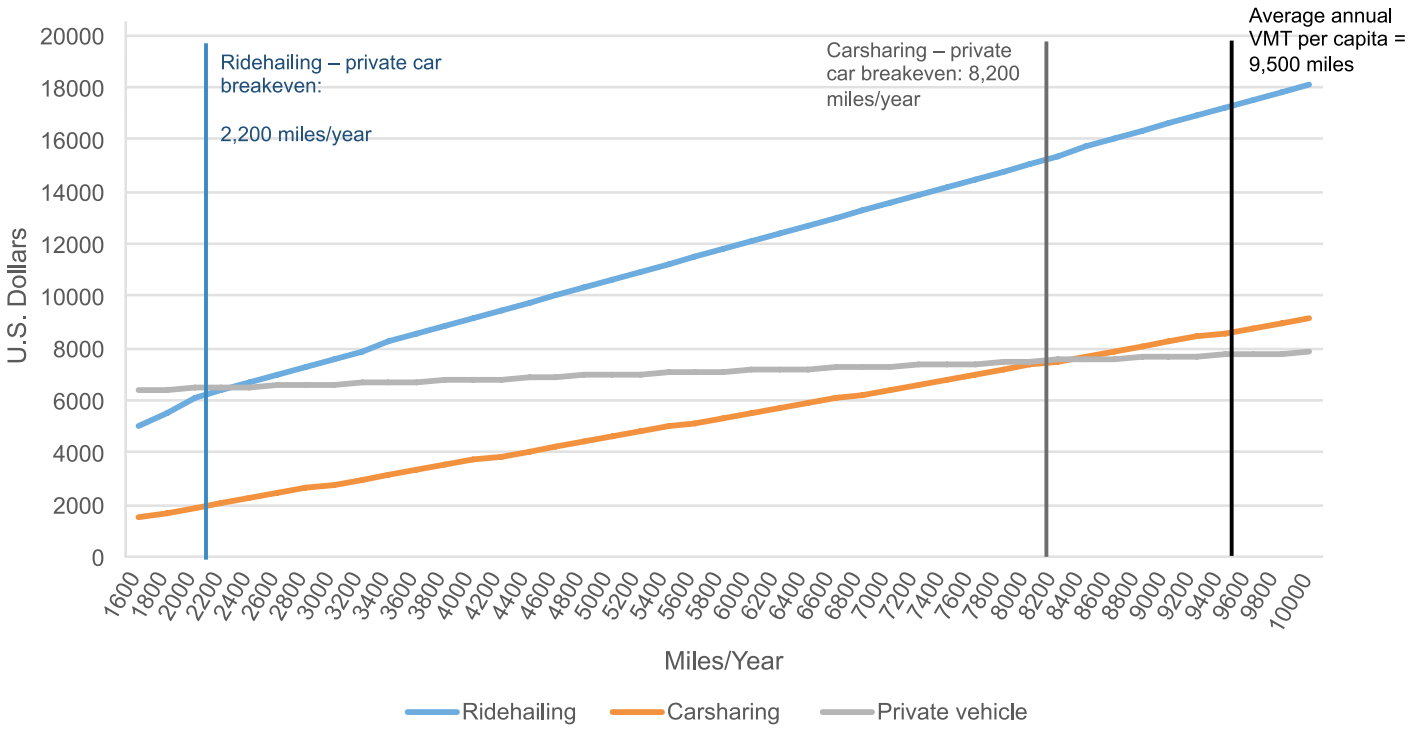
Using solely a ridehailing service is 1.5 to 3.8 times more expensive that owning and operating a private vehicle in the four cities used for this comparison. Overall, the breakeven point between ridehailing and the privately owned vehicle is at 2,200 miles traveled per year.

The analysis reveals that carsharing is more cost efficient than car ownership for drivers that own larger vehicles or have a low annual mileage, because of the high fixed costs of vehicle ownership. Overall, carsharing is more cost efficient than the private vehicle if the user travels less than 8,200 miles annually.

Annual Transportation Costs by Mode (City Level)



Annual Transportation Costs by Mode (National Average)



Effect on Light Vehicle Sales

As stated previously, most households that use carsharing services do not own a vehicle. Also, some carsharing members tend to sell their vehicles over time as a result of using the programs, or to forego or postpone the purchase of a vehicle.

In North America, 41 percent…	of carsharing members affirm they have foregone or postponed a vehicle as a result of using a carsharing service
In Europe, 32 percent…	
In Australia, 28 percent…	

One survey of carsharing members found that households that that reduced their number of vehicles after joining a carsharing service tend to be: single households, own more than one vehicle prior to joining the program, or live in rental housing.

Given the carsharing growth projections and the propensity of some carsharing members to forego purchasing their own vehicle, CAR estimates that in 2021 one car shared will replace 7.7 private vehicles in the United States and in North America. One shared vehicle is likely to replace about four private vehicles in Europe and the Asia – Oceania region in 2021.

In 2021, one carsharing vehicle will replace … private vehicles	
7.7	in North America
4.0	in Europe
3.8	in Asia - Oceania

The impact of carsharing on new and used vehicle sales will be partially offset by sales into carsharing fleets, which will be replaced at a rapid pace (likely about three years). In addition, if competition among operators increases, carsharing fleet operators have an incentive to provide their members with the newest and most attractive fleet.

Therefore, CAR estimated the loss in new or used vehicle sales induced by carsharing over a longer period of time, taking into account the replacement of the carsharing fleets. To calculate vehicle sales avoided because of carsharing, CAR used the number of private vehicles one shared car replaces and the historic and projected sizes of carsharing fleets. To account for carsharing fleets purchases, CAR estimated that a third of the fleets are replaced with new vehicles every year.

Carsharing will have a relatively small impact on new and used vehicle sales

CAR estimates that between 2010 and 2021, 137,507 sales will be lost in the Unites States (an annual average of 12,663 units) because carsharing members no longer need to buy their own vehicle. By comparison, 55 million new and used vehicles were sold annually in the U.S. on average in the 2010 – 2015 period.

For the whole of North America, an estimated 164,606 new and used vehicle sales will not be made between 2010 and 2021 as a result of carsharing, at an annual average of 15,163 units. The amount of lost sales is projected to be bigger in Europe (267,533 units) and especially Asia – Oceania (398,712 units in total). That would bring the global total to 830,850 lost sales due to the use of carsharing for the entire period between 2010 and 2021.

Net Loss of New and Used Vehicle Sales Due to Carsharing, 2010 to 2021

Region	Annual average	Total (2010 to 2021)
North America	15,163	164,606
United States	**12,663**	**137,507**
Europe	28,844	267,533
Asia - Oceania	49,213	398,712
Total	**93,220**	**830,850**

Broader Impacts and Policy Considerations

The mainstreaming of new mobility services will have broad implications, not just for the automotive industry, but also for the economy, personal mobility, and public policy.

New mobility services can be a potential for economic development, not just through direct contributions, but also by being a catalyst for innovation in domains beyond transportation, such as technology, communication, retail, etc. Even if the use of new mobility services will be limited to urban areas and a certain type of users, the concepts that are at the heart of NMS will serve as an inspiration to improve transportation policy in general and public transit in particular.

New mobility services are an innovation catalyst for the entire transportation sector

Many established modes of transportation have started borrowing concepts from NMS and using them to make their services more attractive to customers.

- Faced with the fierce competition from TNCs, traditional taxi companies have made steps to modernize and offer customers the same level of on-demand convenient service. Many of them have started using smartphone apps or websites for reservations, called 'e-hailing' apps.
- Carpooling has been transformed by technology and wireless communication. By becoming real-time and dynamic, carpooling is a viable and convenient alternative for the work commute.
- Using a bicycle has been make more simple and convenient in cities by bikesharing programs.
- Traditional car rental companies are adopting more carsharing technology at all stages of their business to make it more streamlined and on-demand.

New mobility services also represent an opportunity for public agencies to bring innovation to their transportation systems, in terms of public transit, parking policy, traffic management, etc. Already, an increasing number of municipalities and transportation agencies are partnering with new mobility service providers. Increasingly, transportation agencies are seeing NMS as an opportunity to provide more transportation options to their users and strengthen public transit by providing first-and-last mile options and bridge gaps in the service, for example during the evening and night, or in low density areas.

Conclusions

The rise of new mobility services is part of a mobility evolution, a bigger and long term gradual evolution of transportation preferences, towards on-demand shared mobility and a multimodal system that is less car-centric.

More users will choose to use new mobility services instead of, and in combination with, public transit and private vehicles. New mobility services also represent an opportunity to make transportation more efficient and affordable.

The growth of new mobility services will be limited to urban denser areas that offer a variety of transportation options, and to a certain type of users (urban dwellers with higher levels of income and educational attainment), especially in the United States.

Even if these new transportation options will not represent a substantial share of trips in the medium term, they will have a profound long term impact on the way society and the individual think about transportation, on their expectations, on the way transportation is organized and paid for.

Concepts at the core of new mobility services will profoundly impact the use of private vehicles.

New mobility solutions indisputably represent a catalyst for innovation in the automotive industry. While, in the medium term, losses in sales of vehicles linked to the use of NMS will be relatively small, new mobility services are prompting automakers to innovate, by developing mobility solutions of their own and experiment with new business models and revenue sources.

Thanks to the gradual change in travel preferences, traditional transportation players – automakers in particular – will have time to adapt and maintain their market positions, despite the increasing diversification of the transportation sector. The automotive industry needs to take advantage of the great potential for innovation brought by new mobility services.

New mobility opportunities for the automotive industry, bringing new….

- *Services*
- *Vehicle concepts*
- *Vehicle functionalities*
- *Ownership models*
- *Business partnerships*

The mainstreaming of new mobility services will have broader implications, not just for the automotive industry, but also for economic development.

New mobility services also represent an opportunity for public agencies to rethink their transportation systems and make them more efficient, affordable, and relevant for the needs of their citizens. Public authorities need to adopt the key concepts and modes of functioning that make NMS so appealing to their users. Partnerships with new mobility companies are one of the best ways of bringing innovation into transportation policy.

There is an opportunity to improve public transportation, making it more…

- *Relevant to the user*
- *Cost efficient for society*
- *Affordable for the user*
- *Flexible to the needs of the user*

The Center for Automotive Research's mission is to educate, inform, and advise stakeholders, policy makers, and the general public on critical issues facing the automotive industry, and the industry's impact on the U.S. economy and society. CAR produces industry-driven research and analyses; develops forecasts; fosters dialogue and convenes forums; and publicly disseminates our research through conferences, events, and the media.

EXECUTIVE SUMMARY

Global Investment Implications of Auto 2.0 – Morgan Stanley – April 2016

This is a broad based multi-national investment analysis of potential impacts of both growing adoption of vehicle automation as well as shared driving.

> *As the automotive business model moves from the sale of independently owned and operated machines to on-demand, shared, autonomous, and electric transport, we see profound investment implications that vary by region. Ten trillion miles and hundreds of billions of vehicle hours are up for grabs.*

The report contains regional synopses for: China, India, the US, Europe, Japan, Korea and Indonesia.

As an example, for the US: Key Takeaways

A high level of private vehicle ownership coupled with high levels of consumer debt make sharing more attractive than ownership, even if it implies profound changes to consumer lifestyles. Legal and political challenges do not appear insurmountable and are outweighed by the potential public safety, environmental, and infrastructure benefits.

> *1) Private car ownership can't be any higher. Average US household owns 2.2 cars with almost 20% of households owning 3 or more cars. Vehicle utilization drops significantly for each incremental car in the household.*
>
> *2) Consumers spend a significant portion of their median income on transportation costs. Vehicle transportation costs account for ~15% of average US household expense.*
>
> *3) Relatively low urbanization may preserve private ownership rates for longer, implying a full transition that may be a slow but steady process.*
>
> *4) Lack of unifying public policy at the Federal level can be an impediment but can be worked around through a city-by-city approach using a public-private partnership framework.*
>
> *5) Lobbying power of auto workers and dealers is very strong and will likely present hurdles at a congressional and local level.*
>
> *6) Proximity to the "cradle" of software/tech innovation (Silicon Valley) may offer a 'home field advantage' for the incubation of fully autonomous networks through public-private partnerships.*
>
> *7) Municipalities may have varying incentives/disincentives to foster the commercialization of shared autonomous networks. Some may invite the tech as a way to expand the tax base, improve existing infrastructure, and attract jobs. Others may fear the loss of the existing tax base from an accelerated obsolescence of outdated public transport networks/parking systems.*
>
> *8) Aging population, falling driving license penetration among millennials, and insurance premium consideration for new safety tech can all help provide conditions for increased penetration over time.*

You can read the full 97-page report here:

EXECUTIVE SUMMARY

The Right and Wrong Ways to Regulate Self- Driving Cars

By Larry Downes, Project Director at the Georgetown Center for Business and Public Policy
Published in the Harvard Business Review, December 2016

In this short article, written in 2016, the author highlights the need for the auto industry and those entering the auto industry to work in a collaborative and coordinated fashion with all levels of government.

The change is coming rapidly, with the steady progression of new technologies being placed in vehicles, the change for some may seem at times invisible. Yet autonomous vehicles will profoundly affect insurance, road design and construction, traffic management, taxi and limousine services, the materials and safety equipment in vehicles, and asset ownership.

“The states and countries that provide the most balanced regulatory environment, offering predictability and encouraging innovation with needed safe guards, will gain significant competitive advantage in the development and manufacture not just smart cars but of industries that support them.”

Efforts led by the legal system, lawmakers, policy officials and regulators such NHTSA Done correctly can encourage optimal investment in technologies that will increase social welfare, public safety, and sustainable energy consumption, as well as positively impact labor markets, land use, public health and more.”

“The cities, states and countries that get there first will attract new investment in industries having nothing to do with transportation.”

You can read the full article here.

EXECUTIVE SUMMARY

Hard Questions on Our Transition to Driverless Cars
Harvard Business Review
By Ashish Khanna and Simon Barrett
April 11, 2017

The authors contend that artificial intelligence (AI) is transforming the automobile which in turn will transform cities, commerce and daily lives. While automakers are already producing self-driving features, driverless vehicle adoption depends on overcoming infrastructure maturity, technology readiness and regulation. Based on these factors, the U.S. market is at the forefront of driverless adoption and driverless technology is currently undergoing large-scale testing. Some systems are already outperforming humans on the open road and it is a matter of time before autonomous taxis and commercial vehicles upend today's business models. Now is the time for business leaders to ask hard questions about this transformation related not only to infrastructure, cities and transportation but also to insurance, financial services, energy, health care, public policy and retail businesses.

As AI moves towards becoming a reality, the authors posit questions for leaders to consider: With long-term investment horizons in infrastructure, how do we de-risk investments and accommodate for different scenarios? How will autonomous vehicles affect congestion and how will road pricing models need to change? How will driverless vehicles complement existing public transit infrastructure? What insurance products will be relevant in a future where fleets and product liability become more important? How does the logistics footprint need to evolve as new mobility reduces distribution costs? How will society adapt to the loss of service jobs from automated driving and what new roles could fill this gap?

You can read the full article here.

EXECUTIVE SUMMARY

Information Becomes Infrastructure: Remaking the Highway Operating System
Tollways/Spring 2011
By Tom Bamonte

According to the author, self-driving cars are the horseless carriages of our era. The highway operating system has not fundamentally changed in over a century, but emerging technologies will allow vehicles to drive themselves and dramatically increase the capacity of highways. Self-driving cars will jump-start a new highway operating system that will feature intelligent vehicles and infrastructure and greater reliance on market pricing. This is an opportunity for toll operators.

While vehicles are getting smarter, highways are also becoming more intelligent, monitoring road conditions, delivering dynamic messaging and sharing traffic data. Innovation is likely to happen on the vehicle side but changes to how we build and maintain highway infrastructure will be necessary to reach the full potential of these new vehicles.

The current highway operating system is based on the notion that roads are "free" but the transformation of the highway operating system and extensive use of digital technology should bring more market pricing. By attaching prices to routes, time of travel and speed, the highway system can become more effective and efficient.

Self-driving cars are a wake-up call for highway authorities. They can take a back seat, waiting passively for vehicles to get intelligent enough to navigate on existing roadways. Or, they can collaborate with vehicle manufacturers to find the optimum blend of in-vehicle and highway technologies. Toll operators that utilize all-electronic tolling are well positioned to help facilitate this transition. They have a revenue stream based on usage, they can make necessary investments and they have an existing customer service orientation.

You can read the full article here.

BY TOM BAMONTE [1]

INFORMATION BECOMES INFRASTRUCTURE:

Remaking the Highway Operating System in the Era of Smart Cars

Google's successful deployment of a car that drives itself on existing highways tells us that the process of driving and hence the highway operating system itself is being reinvented. This change is being driven by vehicle manufacturers, intelligent transportation initiatives at the federal and state levels, and a variety of research initiatives in areas such as robotics and computer science.

THE HIGHWAY OPERATING SYSTEM HAS NOT FUNDAMENTALLY CHANGED IN OVER A CENTURY. EMERGING TECHNOLOGIES WILL ALLOW VEHICLES TO DRIVE THEMSELVES AND DRAMATICALLY INCREASE THE CAPACITY OF OUR HIGHWAYS.

Google CEO Eric Schmidt speaks for many in this movement when he said: "Your car should drive itself. It's amazing to me that we let humans drive cars. It's a bug that cars were invented before computers." [2] Sebastian Thrun, the lead researcher on the Google self-driving car project, predicts that by 2030 driverless cars will be a commercial reality. [3] The result will be a new highway operating system that offers

THE CURRENT HIGHWAY OPERATING SYSTEM IS BASED ON THE UNSUPPORTABLE NOTION THAT ROADS ARE "FREE."

much improved highway efficiency and enhanced safety.

For decades, the safe bet has been against the successful implementation of technology that takes humans out of the driver's seat. [4] However, the disruptive force of technological change that has transformed so many industries, products and services over the past few decades may finally be remaking a highway operating system that was established over a century ago and has not changed much since. This article will discuss some of the challenges and opportunities facing highway authorities generally, and toll operators in particular, as a result of these changes. [5]

THE DIGITAL WAVE FINALLY HITS THE HIGHWAY SYSTEM

The highway operating system has not changed in any fundamental way for decades. We still put human beings at the steering wheel of petroleum-fueled vehicles, just as Henry Ford did a century ago. Our physiological limitations as humans require us to maintain significant spacing between vehicles. This limits the carrying capacity of the highways, requiring costly physical expansions to meet growing traffic demand. Even with significant improvements in vehicle and roadway design that have improved highway safety, there are more than 30,000 fatal vehicle accidents annually in the U.S. alone. [6] Annual accident-related costs exceed the total federal, state and local annual capital investment in highways. [7]

The transformation of the current highway operating system is happening in three dimensions — vehicle design, intelligent vehicles and pricing. [8]

The Shift to New Vehicle Types

Electric-powered vehicles and possibly other alternatively powered vehicles will supplement and may eventually replace petroleum-powered vehicles. The shift to electric-powered vehicles will allow a much greater range of vehicle types. Digital technology and more compact power sources allow vehicle manufacturers to strip out cumbersome control mechanisms and reduce

vehicle size and weight. Today's stubby Smart Car points the way to more innovative vehicle designs in the future.

By our standards, many of these new vehicle types will seem small, underpowered and even flimsy. However, many of our trips, especially in crowded urban areas, do not require a vehicle that weighs over a ton, takes up much parking space, and is capable of going over 100 miles an hour. Accommodating a wider variety of vehicle types on roadways designed for current vehicles will be a challenge for highway authorities.

The Shift to Smarter Vehicles and Highways

The notion that technology will supplant you and I as drivers has been around for many decades. It appears, however, that technology has finally reached the stage where we can consider alternative models for operating vehicles on our highway system.

Vehicle manufacturers already are using digital technology in a variety of ways to make cars smarter and safer. Some of this technology works autonomously, such as adaptive cruise control, where the vehicle maintains appropriate spacing between itself and the vehicle ahead. [9] Other technology interacts with the driver, such as systems that warn drivers if they are swerving off the road or that an obstruction is ahead. [10] Driver fitness can be tested and enforced through equipment that determines if a driver is impaired as a result of intoxication. [11]

The Google cars that drove themselves on regular California streets and highways points the way to the increasingly realistic prospect of vehicles that drive themselves. [12] The Google vehicle was equipped with LIDAR sensors, GPS

technology, and standard radar sensors that already are being installed in vehicles. These technologies are no doubt susceptible to mass commercialization in the near future. Together, the technologies allow the vehicles to handle the challenges of driving without direct human intervention. The most important human intervention came, quite ironically, when a Google car was rear-ended by a vehicle driven by a human.

In addition to being able to navigate existing roadways, intelligent vehicles will communicate with each other to share their location, direction and speed in real time. When this vehicle-to-vehicle communication technology is combined with other in-vehicle technology such as adaptive cruise control, it becomes possible to reduce spacing between vehicles, thereby significantly increasing highway capacity. When aggregated, data broadcast from each vehicle will enable sophisticated trip planning and congestion management tools. [13] Before long, the "smartest" vehicle may be as coveted a designation as the "fastest" or "most fuel efficient" vehicle.

Highways are also getting smarter. Sensor equipment and cameras allow control rooms to better monitor road conditions. Traffic light control technology allows more effective use of traffic lights to manage traffic. Dynamic message signs allow targeted communications to drivers. Some forward-looking transportation agencies are making their data available to the developer community for use in smartphone apps and the like. Eventually, intelligent vehicles will be able to communicate directly with intelligent highways about pavement issues (e.g., icy patches ahead), traffic conditions and alternative routes.

A highway system that features, or at least approaches, self-driving cars and much higher levels of vehicle throughput per lane likely will be based on some blend of innovative highway and vehicle technologies. At one end of the spectrum is a smart highway/dumb car approach, where highway authorities operate the transportation network and direct the "dumb" vehicles. Under this approach, the highway network supplies the brains and vehicles are just smart enough to plug into the network. At the other end of the spectrum is a smart car/dumb highway approach, where nimble and intelligent vehicles take the

highway infrastructure as is and use sensors and vehicle-to-vehicle communications to organize themselves like a flock of birds.

Innovation is likely to be concentrated in the intelligent vehicle end of the spectrum in the near future as vehicle manufacturers use a variety of new technologies to compete for customers. Highway authorities for the most part are public monopolies offering a free product, which is not an institutional recipe for innovation. As with the rapid deployment of the automobile a century ago, while innovation is likely to happen primarily on the vehicle side at first, major changes to how we build and maintain highway infrastructure will be necessary to fully unlock the potential of these new vehicles. Together, these intelligent vehicle/intelligent highway technologies may fix the "bug" of having humans with all of our foibles and limitations in full control of large and heavy capsules of glass and steel hurtling down roads at 60 miles an hour or more and navigating complex environments filled with pedestrians, bikes and other vehicles. There is every reason to believe that these technologies will allow us to double highway capacity and reduce accidents by half.

Franco Vairani/MIT Smart Cities

The Shift to Market Pricing

The current highway operating system is based on the unsupportable notion that roads are "free." As we might have learned from the collapse of the Soviet economy, underpricing scarce commodities — in this case highway space, especially during busy periods — just leads to long and unproductive lines and poorly maintained infrastructure.

The transformation of the highway operating system through extensive use of digital technology should bring with it more market pricing. Researchers foresee intelligent cars working with their operators to identify the best routes of travel based on the operator's preferences regarding price, speed of travel and time of day. By attaching prices to routes, time of travel and speed, the highway system can be managed to maximize efficient

use of capacity. The more intelligent the highway system, the more effective the pricing of the various elements of that system. The more effective the pricing, the more efficient the highway system.

Parking, like highway facilities, will be dynamically priced and allow users to reserve spaces, identify open spaces easily and reduce the wasteful circling search for parking. Vehicle sharing services such as ZipCar may be the model for a variety of services that will allow people to spread the cost of vehicle ownership over a variety of easily available vehicles, each suited to a particular use — commuting, long-distance family trips or other specific purposes.

THE TIME IS COMING WHEN HIGHWAY AUTHORITIES WILL NEED TO DECIDE WHETHER TO EXPAND CAPACITY BY LAYING MORE PAVEMENT OR BY INVESTING IN TECHNOLOGIES THAT MAKE MUCH BETTER USE OF EXISTING LANES.

THE CHALLENGES AND OPPORTUNITIES FOR HIGHWAY AUTHORITIES FROM THE SHIFT TO A NEW HIGHWAY OPERATING SYSTEM

The Google self-driving car is a wake-up call for highway authorities. Highway authorities can take a backseat role, waiting passively for vehicles to get intelligent enough to navigate on existing roadways. Alternatively, highway authorities can facilitate the transformation to a safer and more efficient highway operating system by collaborating with vehicle manufacturers and others on finding the optimum blend of in-vehicle and highway technologies. The stakes are high. Regions and societies that find the right mix of in-vehicle and highway technology will gain a competitive advantage over those that fail to do so. This section looks at some of the challenges and opportunities faced by highway authorities in the years ahead.

Who Controls the Highway?

Today, highway authorities are secure in their control over the highway system. After all, it is the highway authorities that post the speed limits, place and time stoplights, and otherwise manage the traffic flow.

Flocks of smart cars equipped with technology managed by sophisticated private companies like Google could challenge the hegemony of highway authorities over the roads. The private sector could use in-vehicle technology to organize traffic flows on the highways, just as phone companies collaborate when managing traffic flow over the Internet. One can envision situations where traffic flows and speeds are actively managed by private sector operators. Subscribers to premium service plans might get preferred access to open and faster traffic lanes and queue-jumping capabilities when traffic is backed up, while regular plan subscribers or non-subscribers are held back in traffic.

Will highway authorities take a deregulatory approach and let the private sector organize and stratify traffic flows on public highways or will highway authorities assert their primacy in this regard? If highway authorities attempt to regulate use of in-vehicle technology to prevent queue jumping and other perks, can they do so without stifling the deployment of useful technologies? Do private entities own the highway-related information they harvest from smart vehicles or can public highway authorities assert a claim to such information? These and related questions go to the fundamental issue of who controls the highway network being used by intelligent vehicles.

Changing Investment Priorities

The changing highway operating system forces highway authorities to rethink their investment priorities. The traditional approach has been to try to build out of congestion by adding new lanes. As new technologies are deployed that allow closer spacing of vehicles, thereby increasing the capacity of existing roads, highway authorities will have to face a basic question: Does it make sense to invest billions of dollars in physically expanding highways when that money might accelerate the development of in-vehicle and roadway technology that can double capacity and substantially improve the safety of existing roads.

There is no good institutional arrangement today that allows highway authorities to easily make the investment choices that will facilitate the transition to the next operating system. After all, state procurement authorities, to say nothing of the public, might look askance at highway authorities funding research and technology

deployment efforts at companies like Google or General Motors rather than pouring concrete.

Yet, as the Google self-driving car indicates, the time is coming when highway authorities will need to carefully consider whether investing in expanded capacity through the traditional means of physical expansion of the roadway is a better investment of public dollars than supporting the transition to technologies that will make much better use of existing capacity. Urban areas where further physical expansion of highways is difficult and extremely costly have a strong incentive to speed the adoption of technologies that will allow increases in capacity without physical expansion of the roadways.

The transition to electric vehicles will power the need for investment in battery charging infrastructure at homes, in parking spaces and along roadways. Range anxiety — the fear that one will be stranded in a vehicle with dead batteries — is a key impediment to consumer adoption of electric vehicles. This anxiety must be dealt with by the adequate distribution of chargers plus some provision for mobile charging of stranded vehicles, just as a H.E.L.P. truck arrives today with a gallon of gas.

Substantial investments will have to be made in the technology necessary to communicate information to and from a growing number of intelligent vehicles. The wider range of vehicle types may require investments in new signage, lane markers and other

roadway assets to accommodate vehicles that may be smaller, slower and smarter than today's vehicles.

Information as Infrastructure

For decades the focus of highway authorities has been on the hard infrastructure — roadways and bridges. That infrastructure has communicated to vehicle operators primarily through fixed roadway signage with a static message (e.g., "curve ahead"). The new highway operating system will force highway authorities to rethink their core deliverables. Highway authorities will have to design and build highways that are capable of communicating with and supporting a growing network of intelligent vehicles. The very idea of a highway will have to be re-imagined so that its ability to sense and report on its condition is just as important as its ability to physically carry vehicles.

Smarter vehicles will place increased demands on highway authorities to increase the quantity and precision of the data generated and shared about roadway conditions. In a system that may include self-driving vehicles and much tighter spacing between vehicles, information about the location of work zones, slippery pavement, accidents, and other roadway conditions takes on new importance. Privacy and security concerns must be addressed. Information has to be accurate and accessible to different vehicle operating systems. Indeed, highway authorities conceivably could find themselves held liable for accidents that might result from absent or poor quality data.

THE PRICING INCENTIVES OF ALL-ELECTRONIC TOLLING WILL SPUR THE TRANSITION TO THE NEXT HIGHWAY OPERATING SYSTEM.

Information gathering and sharing will become as important as planning and constructing roads and bridges. Information will become infrastructure in the new highway operating system. [14]

Market Participation

Highway authorities will also have to decide whether to continue to rely on the "free" highway model or extend pricing to more highways. As discussed in the first subsection above, the private sector may be able to squeeze value and hence revenue out of the

Franco Varani/MIT Smart Cities

highway system by using in-vehicle technology to offer their subscribers premium transportation services. By extending tolling systems and using dynamic pricing techniques, highway authorities could capture for themselves some of the value being generated by a more intelligent highway system. The tolling industry provides highway authorities with tools to capture some of this value. The utility of current tolling tools is somewhat limited, however. Tolling costs, even in all-electronic environments, are relatively high. The existing electronic tolling systems are based on proprietary technologies zealously guarded by private entities. This means that there is no national interoperability and costs are high. The maddening proliferation of license plate types and the uneven quality of vehicle registration and vehicle owner information maintained by state departments of motor vehicles reduce the effectiveness of toll collection systems.

Nonetheless, there is the opportunity for expanded use of tolling, not just on limited access interstates but also on a greater variety of roads and bridges. [15] Tolling should look ever more attractive as gas tax receipts decrease with the rise of more efficient vehicles and vehicles fueled by petroleum alternatives.

Organization

The transformation of the highway operating system will require highway authorities to revamp their organization. In a word, the primacy of the Chief Engineer is over. Information technology and customer service must be on par with building and maintaining roadways and hard infrastructure.

Highway authorities will have to invest heavily in information technology to keep up with the innovations in both in-vehicle and highway technology. Investment in information technology means more than back office server farms and dynamic message signs that communicate road condition information to passing vehicles. It also means investing in tools that directly enhance customer service, such as making it easier for people to pay for travel either in advance or immediately after travel through means such as smartphone apps. It means making system data readily available to the developer community for use in travel time and trip planning apps.

The IT and customer service sections will require more staffing and executive attention. IT project management skills will become as important to highway authorities as good engineering skills. Running a "smart" highway system will put a premium on an intelligent workforce that is capable of envisioning and implementing IT and associated hard infrastructure investments.

Economic Development

The transformation of the highway operating system will have profound economic effects. The contrast between existing highways and future "smart" highways may be as profound as the contrast a century ago between a dirt road and a paved highway. Highway authorities, and especially those that are tax supported, have a vested interest in making sure their regions transition to the new highway operating system in a timely and cost-effective manner. Just as the towns linked to the national economy by dirt roads did not fare as well as towns connected to the economy through paved roads, metropolitan regions today will differentiate themselves by their deployment of the new highway operating system.

The new highway system will also generate new industries and employment opportunities. Highway authorities could facilitate the development of those industries by partnering with researchers and companies in

their service areas that are developing new products and services. Highway authorities can do this by sharing data, making their facilities available for testing of new products, and helping to underwrite research and new products. One can envision public-private partnerships between highway authorities, auto manufacturers and firms like Google that are interested in speeding the deployment of intelligent vehicle technology.

PUBLIC-PRIVATE PARTNERSHIPS BETWEEN HIGHWAY AUTHORITIES AND FIRMS LIKE GOOGLE WILL SPEED DEPLOYMENT OF INTELLIGENT VEHICLE TECHNOLOGY.

It is worth noting that the new highway operating system may provide a competitive edge to dense and built-out urban areas compared to relatively new and expanding urban areas. When the solution to congestion is expanding lane mileage, highway authorities can do so more easily in areas where land is cheap and undeveloped. Thus, over the past 50 years, the rapidly growing urban areas in the South and Southwest had an advantage over the more developed urban areas, especially in the Northeast, as the interstate system was being built out. The new highway operating system uses technology to increase the capacity of existing roadways. This will put developed urban areas on par with other regions because no new land will be required to increase highway capacity.

THE ROLE OF TOLL OPERATORS

Toll operators have an advantage over the highway authorities in charge of "free" roads, namely, a revenue stream based on usage rather than fuel consumption. Toll operators have some flexibility in dedicating a portion of that revenue stream to make the IT and other investments necessary to build an intelligent vehicle/intelligent highway system.

Toll operators should have an existing customer service orientation. They need to take the next step and re-imagine themselves as electronic commerce organizations similar to major online retailers and financial institutions, offering a safe

and efficient transportation service. Scrimping on investments of money and talent in the IT and customer service sectors of the business will just create an opening for the Googles of the world to use in-vehicle technology to take over more control of the highways. Conversion to all-electronic tolling may become a business imperative. Toll operators that continue to invest heavily in toll collection by hand will fall behind toll operators that build up their IT resources and expertise by focusing toll collection efforts on all-electronic tolling. Agencies with substantial legacy workforces will face difficult challenges in making this transition in a fair and cost-effective manner.

All-electronic tolling allows toll operators to more easily use pricing incentives to help spur the transition to the next highway operating system. These incentives include price breaks for vehicles using alternative fuels and technology such as adaptive cruise control that demonstrably increase safety. Such price incentives also have environmental benefits because they encourage the transition to more fuel-efficient vehicles.

Toll operators as a group can do two things to facilitate the transition to the next highway operating system. First, they need to make tolling systems interoperable so tolling has an immediate national scale. Second,

they need to work zealously to drive down the cost of collection, both by transitioning to all-electronic tolling and pressing vendors for more efficient electronic systems. By modeling the benefits of pricing and delivering superior service, toll operators will make it easier for more elements of the transportation system to become priced.

CONCLUSION

Roughly a century ago, those who managed the dusty roads filled with horse-drawn carriages glimpsed the first horseless carriage chugging down the road and wondered if that invention would change everything. It did, as we see from the interstates and the development patterns spawned by the mass-produced automobile. Self-driving cars are the horseless carriages of our era. They will jump-start a new highway operating system featuring intelligent vehicles and infrastructure and greater reliance on market pricing. The transition to that new system presents major challenges and opportunities for highway authorities and toll operators.

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1 The views in this article are the author's alone and are not necessarily shared by the Authority or the Illinois Attorney General.
2 http://techcrunch.com/2010/09/28/schmidt-on-future/
3 http://www.timesonline.co.uk/tol/news/science/article1403715.ece
4 http://www.nytimes.com/2007/12/04/science/04tier.html
5 "Highway authorities" refer to all entities responsible for building and operating highway while "toll operators" refer to the subset of highway authorities that charge tolls.
6 http://www.gao.gov/new.items/d04802.pdf
7 http://www.gao.gov/new.items/d04802.pdf
8 This section was especially informed by W. Mitchell, C. Borroni-Bird & L. Burns, *Reinventing the Automobile: Personal Urban Mobility for the 21st Century* (MIT Press 2010)
9 http://www.wired.com/cars/coolwheels/magazine/17-08/pl_motor
10 http://www.fmcsa.dot.gov/facts-research/systems-technology/product-guides/lane-departure.htm
11 http://www.dadss.org/
12 There are other intelligent vehicle initiatives in addition to the Google car. *See, e.g.,* http://ec.europa.eu/information_society/activities/intelligentcar/icar/index_en.htm (European Commission); http://vislab.it/ (Italian research company); http://autonomos.inf.fu-berlin.de/ (Freie Universitat Berlin); http://english.anhuinews.com/system/2010/10/28/003410092.shtml (Hefei Institutes of Physical Sciences). These initiatives have resulted in prototypes of driverless taxis summoned by iPhone Apps (http://reviews.cnet.com/8301-13746_7-20019613-48.html?tag=mncol;23n) and an 8,000 mile trip by a driverless vehicle from Italy to China (http://link.baia-network.org/profiles/blogs/italian-driverless-car-beats). Driverless vehicles are already in operation a Heathrow Airport, albeit on a dedicated roadway (http://www.engadget.com/2009/08/18/heathrow-taxi-pods-become-a-glorious-driverless-reality/)
13 Already companies are using data harvested from cell phones and other electronic devices traveling in vehicles to provide travel time and route recommendations to their customers. http://travel.nytimes.com/2010/11/14/travel/14practraffic.html; http://blogs.strategyanalytics.com/auto/?p=210
14 http://www.govtech.com/transportation/Smart-Highways-Smarter-Drivers.html
15 The U.S. 35 project in West Virginia is a good example of extending tolling to non-interstate highways. http://www.transportation.wv.gov/turnpike/Pages/Route35.aspx

Connected Roadway Classification System Development

NCHRP 20-24 (112)

A White Paper for Workshop Discussion

Introduction

Infrastructure Owners and Operators (IOOs) are responsible for the planning, design, construction, operation, and maintenance of their transportation network. With the introduction of connected vehicles (CVs) and automated vehicles (AVs), there is greater interest in how these roadways should be planned, designed, operated, and maintained to optimize safety and mobility. Roadways are designed for the driver's capabilities. Horizontal curves along highways are dependent on acceptable lateral acceleration for drivers. Vertical curves are dependent on safe stopping sight distance which involves the driver's perception/reaction time to react to an obstacle in the road. Fonts and materials on roadway signs are based on a driver visual acuity to read information. However, technologies and sensors on CVs and AVs have the potential to perceive the roadway environment to assist drivers in performing the driving task or perform the driving task themselves. To achieve safe and efficient vehicle operation, IOOs need guidance on what infrastructure is needed to support CVs and AVs operating on streets and highways.

One concept that has been suggested is to create a roadway classification system that would categorize the roadway infrastructure to support connected and automated vehicles. NCHRP 20-24 (112) Connected Roadway Classification System (CRCS) Development was initiated to create a classification system that would allow IOOs and the automotive industry to have a common description of this infrastructure. This white paper presents some perspectives on the purpose and function of a CRCS to support an industry workshop. The workshop will explore a framework and begin building consensus on a CRCS to be recommended to the industry.

Needs

Roadway classification enables clear communication of roadway readiness for CVs and AVs. As these systems emerge, a classification system provides the framework for discussion between the automotive and infrastructure industries. A classification system could also give drivers and passengers an understanding of their responsibilities on the roadways, removing the ambiguity that leads to inappropriate assignment of driving tasks. When is the human driving and when does the roadway support an automated vehicle? Roadway infrastructure classification may also provide a means of externally verifying and enforcing vehicle compatibility with the supporting infrastructure of the roadway, controls that ultimately lead to safer roads. Infrastructure classification may contribute to defining the where CVs and AVs can safely navigate based on universal understanding of vehicle capabilities. Finally, redundancy is key to creating a safe and robust automated driving environment. As in the aerospace industry, redundant systems need to be in place to function in the corner case situations when the primary system fails. The greater the degree of automation in vehicles, the greater

the need for redundant systems to protect both vehicle and passengers from malfunctions. A roadway classification system could further provide roadway infrastructure descriptions of the appropriate degree of redundancy to ensure a safe and robust driving environment.

Highway and Street Classification System

The American Association of Highway and Transportation Officials (AASHTO) publishes the guidance document "Geometric Design of Highways and Streets" (also known as the Green Book). In the first chapter of this guidance, the Green Book outlines a functional classification system for grouping highways. There are two categories for urban and rural, but both follow the classification system of:

- principal arterial roads,
- minor arterial roads,
- collector roads, and
- local roads

The stated purpose of the classification system is to facilitate communication among engineers, administrators, and the general public.

Colorado DOT CRCS

One of the challenges facing IOOs is the level to which they intend to equip their roadways for the impending rollout of CVs and AVs. Recognizing this, the Colorado Department of Transportation (CDOT) proposed a road classification system with six levels that relate to the roadway's ability to support CVs and AVs.

- Level 1: Unpaved and/or non-striped roads designed to a minimum level of standard of safety and mobility.
- Level 2: Paved roads designed to the AASHTO's guidance and pavement markings and signing meeting the Manual on Uniform Traffic Control Device (MUTCD) standards. There is not Intelligent Transportation System (ITS) equipment or infrastructure to collect connected vehicle data. Access to cellular date service may be available.
- Level 3: There is Intelligent Transportation System (ITS) equipment operated by a Traffic Operation Center (TOC) and/or, one-way electronic data share between DOT/Vehicle/User and/or, mixed use lanes.
- Level 4: Roadway or specific lane(s) has adaptive ITS equipment (i.e., smart signals hold for vehicles, highway lighting that turn on for vehicles, etc.) with Traffic Operations Center override only, and/or two-way data share between DOT/Vehicle/User, and/or lanes designated for vehicle levels 3 & 4 only.
- Level 5: (Advance Guideway System) roadway or specific lane(s) designed for vehicle level 4 only with additional features that may include inductive charging, advance/enhanced data sharing, etc. Additionally, no roadside signs are needed as all roadway information is direct to vehicles' on-board systems.
- Level 6: All lanes on a roadways designed for only vehicle level 4 systems--no signs, signals, striping needed.

Infrastructure and ITS Readiness

The selection of a roadway classification system has tremendous implications to IOO's. For a jurisdiction to be ready and to help enable the full range of CV and AV benefits, infrastructure investments will need to be made in advance of widespread consumer adoption of vehicle technologies. While implementing these infrastructure changes in advance of widespread use will enable testing in a real-world environment, this implementation still requires an up-front "investment" not always considered politically and financially tenable to state and local public agencies.

Installation of traffic signal interfaces and roadside equipment, which will be used to send information about the infrastructure to vehicles and/or receive messages broadcast from vehicles, will likely be the responsibility of state and local DOTs. The automotive industry and other private entities may be involved in the development of other aspects of CV and AV systems, in particular for vehicle-based safety applications and security management systems, respectively.

The communications technology between vehicles and infrastructure, whether it's based on DSRC, cellular, or an entirely different wireless system, will need to be fast, reliable, secure, private, and interoperable. Some responsibility of the IOO will be required, although the level to which is unclear. A backhaul communications network will be necessary to provide communication between the message handler/processor and management centers, typically via fiber-optic cable, which may already exist. Satellite communications, used for the transmission of time and location data from GNSS satellites, will also be utilized.

Messages transmitted via these communications channels share data between infrastructure and vehicles, and need to be standardized in terms of the message types that can be used and the data frames and data elements of which they can be comprised, in order to ensure consistent understanding.

While traditional ITS systems have the potential to greatly benefit from the enhanced data collection enabled by CVs, these systems will likely need to be updated in order to be ready to do so. This could include infrastructure investments such as the installation of roadside units that can receive data from CVs, as well as updated policies, for example on data sharing due to the large involvement of private entities. Some ITS devices, such as pedestrian detection equipment, will continue to be used to detect data not available via other sources, so the data these devices provide will need to be able to be processed by roadside units and provided to CVs.

Redundant systems may be necessary to support vehicle-to-infrastructure (V2I) applications, particularly for those that enable safety-critical applications. Special provisions will also need to be made for temporary changes to traffic patterns, such as work zones and road closures, and ideally this information will be communicated both in advance (when known) and in real time.

Infrastructure investments that help prepare a jurisdiction for CVs and AVs will have an impact on the planning, design, construction, maintenance, and operations of a transportation network. Existing standards may need to be modified, especially those for existing roadway components such as road markings and signage, in order to make them compatible with both human drivers and automated vehicle systems, at least in the short/medium-term. Standards and regulations should be uniform across jurisdictions and state lines, so CVs can operate seamlessly throughout the country. Additional

infrastructure changes may prove to be necessary after CVs are widely adopted. An Infrastructure and ITS readiness approach to a CRCS could classify the roadway infrastructure as to its CV and ITS deployment status. The greater deployment of infrastructure detectors and sensors, roadside equipment, telecommunication technologies, and data back-haul equipment could enable high levels of CV and AV operations.

Vehicle Automation Classification Perspective

The Society of Automotive Engineers (SAE) and U.S. Department of Transportation (USDOT) have adopted vehicle automation levels that classify the AV operation. The full SAE Levels, which are now the standard in the US and internationally where SAE regulations are observed, are as follows:

- Level 0, the human driver does everything;
- Level 1, an automated system on the vehicle can sometimes assist the human driver conduct some parts of the driving task;
- Level 2, an automated system on the vehicle can actually conduct some parts of the driving task, while the human continues to monitor the driving environment and performs the rest of the driving task;
- Level 3, an automated system can both actually conduct some parts of the driving task and monitor the driving environment in some instances, but the human driver must be ready to take back control when the automated system requests;
- Level 4, an automated system can conduct the driving task and monitor the driving environment, and the human need not take back control, but the automated system can operate only in certain environments and under certain conditions; and
- Level 5, the automated system can perform all driving tasks, under all conditions that a human driver could perform them.

These levels of automation do not require anything from the infrastructure. The levels of automation are generally descriptive of the amount of automation and the relationship of the driver versus the vehicle. One approach to a CRCS would be to mirror these vehicle automation levels with roadway classification levels. That is, describe the infrastructure at each level of vehicle automation that would optimize the safety and efficiency of the vehicles. On the surface, this would seem straight forward. However, are infrastructure elements any less important at different levels of automation? Or are the infrastructure elements equally important for any level of automation? Maybe the infrastructure elements are actually more important at lower levels of automation and the question is more on where are those infrastructure elements deployed and on what functional classification of roadway?

Automotive Industry Classificaiton of Roadways

Today the automotive marketplace is bringing forward significant capabilities and beginning to classify roadways along with their vehicle products. For example, Cadillac is delivering a driver assistance technology called Super Cruise™ and "classifying" roadways that are Super Cruise™ Freeways.[1] Operation within these geofenced areas will still be dependent on local roadway characteristics such as whether lane markings are clearly visible to the sensors.[2] GM also announced plans to start production of its Cruise Autonomous Vehicle in 2019.[3]

"Super Cruise™ Freeway" map

Cadillac is also providing DSRC connectivity on Cadillac CTS sedans,[4] and Toyota has sold over 100,000 vehicles in Japan with DSRC.[5] Similarly, Volkswagen will be equipping vehicles with IEEE 802.11p connectivity beginning in 2019.[6]

Safety & Mobility Applications Perspective

Connectivity among vehicles, infrastructure, and other objects on the roadway can allow for a variety of safety and mobility applications to be deployed. These applications will be better enabled by many factors, including high adoption of CVs, comprehensive communications system coverage, support from external data sources, and consistency across jurisdictions and vehicle types.

A high level of adoption of CVs will be necessary to enable the most effective use of any V2V and V2I safety and mobility applications. With higher market penetration, not only will additional vehicles be able to obtain the safety benefits of being connected, but furthermore any vehicles and objects that are already connected will be able to gain more information about their environment. Consumers will be encouraged to adopt CVs if they are proven to be safe, secure, and effective, and aftermarket devices will allow for the acceleration of adoption relative to regular fleet turnover.

In the absence of full adoption of CVs, technology will need to be able to detect vehicles that they are not able to communicate with the network. This can be accomplished by using more traditional detection methods such as probes and sensors. Some mobility applications do not require a high level of adoption to be effective. Generally, these are industry-specific applications such as truck platooning, transit signal priority, and emergency vehicle preemption.

Comprehensive communications system coverage is essential to enabling any safety or mobility application. This network needs to be secure and private, so that it is not vulnerable to hacking, and will ideally be a designated licensed bandwidth. It also needs to be functional in extreme weather, as many

safety applications become even more critical during such conditions. Similarly, it needs to function in high vehicle speed mobility conditions.

The network also needs to be fast and have low latency. Units sending and receiving data must be able to recognize each other and transmit messages in milliseconds without delay for most safety-critical information to be useful. This is particularly true if a CV is not also an AV, and has a human operator who will need time to react. In this case, the message must also be quickly understandable and provide a clear response protocol. While in general there are some concerns with implementing low levels of automation as consumers may become overly reliant on them, this is a case in which utilizing a feature such as automated braking to enhance the ability of a driver to respond more quickly will likely outweigh the potential downside.

Some safety applications, such Pedestrian in Signalized Crosswalk Warning and Transit Bus Stop Pedestrian Warning, focus specifically on vulnerable road users. There are a number of ways through which pedestrian and bicyclists could be detected. Most are likely already carrying mobile devices, which can be connected to the network. Alternatively, pedestrians could be required to provide input to the system (such as pressing a button at a crosswalk) or will be sensed using traditional sensors and probes. Additional outside sources of data may also be required to support certain safety and mobility applications, such as incoming weather alerts and schedules for construction work and road closures.

Many mobility and safety applications have been designed with a specific use case in mind, and will likely need to be adapted when applied to new environments and slightly different use cases. Setting local policies will enable the best use of these applications, using stakeholder input to answer questions such as whether CVs should be prioritized over non-CVs and how much detail should be provided to vehicle operators about any external decision that have been made.

Business Case and Investment Perspective

Can't drive into the future using only the rear view mirror

In the past, the construction of roadways and roadside technologies has been negotiated between infrastructure operators and the traveling public, not vehicle manufacturers. This communication and cooperation has been brokered through interactions between politicians and the public, outlined by legislative mandates, defined in roadway standards, built with design guidelines, and implemented with various funding mechanisms. Rarely have OEMs been directly involved in decisions impacting how and where states and cities build their roadways.

Can the classification system from this project inform vehicles of roadway conditions and serve as a guide for public sector investment in connectivity?

Consequently, classifications for planning roadway investment and deployments are often described by public agencies according to functional classifications that describe roadway physical geometrics and their role in mobility. Automation has not been part of that discussion. For example, the 2013 edition of the U.S. DOT *Highway Functional Classification Concepts, Criteria and Procedures* does not contain any use of the word automated or automation.[7] Connectivity only refers to physically linking roadways together. There is no mention of the SAE

taxonomy for driving automation on roads nor of operational design domains (ODD) for automated vehicles.[8]

Man on the moon syndrome

If the government can "put a man on the moon" eight years after announcing the goal, why can't we build roads for automated and connected vehicles even more quickly?

The existing strategies to fund and build roadway infrastructure are built around products that have life cycles that last for decades – for example roads and traffic signals. State departments of transportation use funding methods based on fuel taxes, sales tax on fuel in some states, vehicle registration fees, transportation bonding, tolls, and general funds. Cities and other local communities are frequently constrained to using periodic capital programs. These traditional strategies limit an infrastructure agency's opportunity to adapt to rapid change in the marketplace – including automation and connectivity.

To address the rapid rise in technology public agencies are working to seed deployment and collaborate with auto manufactures on key safety and mobility applications. For instance, infrastructure owner operators (IOOs) are investing in connectivity through the AASHTO, ITE, ITS America sponsored "Signal Phase & Timing Deployment Challenge" to deploy connectivity at 20 traffic signals in each state by 2020. [9] While this is a start, the goal represents less than 1% of the traffic signals in the U.S.

With these funding approaches and the diversity of public agencies that maintain and operate roads, public sector progress could lag vehicle capabilities. Some of these agencies may be moving toward the goals stated in the American Association of State Highway and Transportation Officials (AASHTO)'s Connected Vehicle Field Infrastructure Footprint Analysis [10] - 80% of traffic signal locations implemented with V2I technology by 2040. Many vehicle automation and connectivity predictions have much shorter time lines.

Discussion Questions for the CRCS Development Workshop

The workshop discussion on the formulation of a connected roadway classification system will focus on whether the classification system could inform the automotive industry of the roadway readiness and serve as a guide for public sector investment.

Questions to be explored at the workshop include the following:

- Is it possible to create a CRCS?
    - Could a roadway classification system both inform the auto manufacturers of road readiness and serve as a tool to inform infrastructure investments? What would that classification system look like? How would it be structured?
- What are the needs from the different stakeholders?
    - State DOTs
    - Regional and local government agencies
    - Automotive industry (OEMs and suppliers)
- What is the general framework?
    - How does it relate to existing roadway functional classification?

    - How does it relate to the SAE Levels of Automation?
- What are the priorities?
    - What types of roads are priorities?
    - What are the major elements that are important to automotive manufacturers – signing, striping, edge-lines, lighting, communications with roadside devices such as signals, crosswalks?
    - How do those elements relate to the roadway types?

[1] http://www.cadillac.com/world-of-cadillac/innovation/super-cruise
[2] http://www.cadillac.com/ownership/vehicle-technology/super-cruise
[3] http://www.gm.com/mol/m-2018-mar-0315-orion.html
[4] http://media.cadillac.com/media/us/en/cadillac/news.detail.html/content/Pages/news/us/en/2017/mar/0309-v2v.html
[5] http://www.autonews.com/article/20180224/MOBILITY/180229894/v2v-federal-mandate-technology
[6] https://www.volkswagen-media-services.com/en/detailpage/-/detail/With-the-aim-of-increasing-safety-in-road-traffic-Volkswagen-will-enable-vehicles-to-communicate-with-each-other-as-from-2019/view/5234247/6e1e015af7bda8f2a4b42b43d2dcc9b5?p_p_auth=LJY4I29b
[7] https://www.fhwa.dot.gov/planning/processes/statewide/related/highway_functional_classifications/
[8] https://www.sae.org/standards/content/j3016_201609/
[9] https://transportationops.org/spatchallenge
[10] https://trid.trb.org/view/1326327

ACES: Autonomous, Connected, Electric, & Shared Vehicles

https://medium.com/@econosystemics/aces-autonomous-connected-electric-shared-vehicles-9d67f4468c6e

Bryan Long, Bio-based Cognitive Agent

I recently attended a talk by Dr. Stefan Heck, on the future of urban transportation. I'll shout out a thank-you to Acterra, the SF Bay area's premier environmental stewardship organization, for hosting the talk.

Dr. Heck is a founder and CEO of Nauto, a Palo Alto, California startup that is combining deep-learning AI algorithms with vehicle dash-cams to learn safe, and unsafe, driving behavior directly from real-world drivers.

Beginning his talk, Dr. Heck quantified the tremendous costs and inefficiency of our current urban transportation infrastructure and practices. A typical personal vehicle sits unused 96% of the time, taking up space. When in use, only about 14% of the energy released by burning gasoline actually moves the vehicle, and most of that is to overcome the inertia of the vehicle itself, rather than the body and cargo of the typical lone occupant. All that energy, and all those climate-changing emissions, mostly to move a heavy hunk of metal, glass and plastic from one parking spot to another!

The indirect costs of personal vehicles are also staggering. Federally-subsidized multi-lane freeways are inefficiently utilized. The land-value of parking spaces drives up the costs of housing and commercial property. The United States loses $300 B in social costs due to accidents, and $300 B in lost productivity due to traffic congestion. The environmental impact and social costs are enormous.

Solving this problem is about policy as much as technology. Dr. Heck advocates making cities friendlier to pedestrians and cyclists, which went over very well with the Acterra crowd. Most of our urban areas need policies that encourage rather than discourage higher density urban centers (He's talking to you, Palo Alto). Mid-rise buildings combining ground floor retail with office space and residences above, in the manner of many European cities, give efficient density in mid-size urban centers without the disruptive impact of high-rise towers. With residential, office and retail are concentrated, we could re-discover the physical and mental benefits of walking, and for trips up to 8 miles or so, we could ride electric bikes that fold up and go to the office with us.

The good news is that we are already seeing a dramatic decrease in car use by individuals under age 35. There are numerous factors contributing to this trend, including a preference for urban living among millennials, more electronic vs. physical social networking, greater environmental awareness, and openness to alternative modes of transportation. Broadly speaking, it appears that the American "love affair with the automobile" is gradually "aging out." An automobile is increasingly seen strictly as a utility, rather than part of one's identity.

The surprisingly rapid deployment and use of ride services like Lyft and Uber have made it far easier to go without a car in urban areas. If you own a car, you are more likely to use it, even when you could walk or bike. If you don't own a car, and instead rely on ride services, you will want to use a ride service only when really needed. At less than about 4000 miles per year, it is actually cheaper (in the SF Bay area, at least) to use Lyft or Uber than to own a car, even excluding parking. Using on-demand

carpooling can bring the break-even up to about 9000 miles, which is pretty close to what a typical urban driver puts on their car in a year.

Where policy and lifestyle changes prove resistant, technology can come to the rescue. Dr. Heck presented what he calls the ACES transformation: Autonomous, Connected, Electric, and Shared vehicles.

Sharing. Ride sharing (multiple passengers) will reduce the number of vehicles on the roads, while vehicle sharing (one vehicle used by many different people over the course of a day) will dramatically reduce the need for parking spaces, as well as the congestion and fuel waste caused by circling for parking places. Fewer cars on the road means lower road maintenance costs and no need to keep adding more lanes. Not mentioned by Dr. Heck, shared vehicles also have a faster payback and depreciation than personal vehicles, which allows earlier retirement and replacement by newer, better, and more efficient vehicles. This becomes ever more important as car technology changes more and more rapidly.

Electric. The energy-efficiency gain with electric vehicles is huge. The headline comparison given by Heck is that an electric motor is about 85% efficient compared to an internal combustion engine that is only about 30% efficient. A more accurate comparison would have to consider the greater weight of the electric vehicle, and the various energy losses from gasoline production and distribution versus those in electricity and battery production and distribution. Even with all that, the electric vehicle is probably about twice as energy efficient, and creates much less pollution and greenhouse gases. With battery technology advancing steadily, all-electric vehicles are becoming more cost-competitive. Even so, there has been resistance to adoption due to the inconveniences of charging the vehicle. This is a less important factor, however, with fleet vehicles, and will be even less of a factor once fully autonomous vehicles are deployed by fleet operators. Cars will simply head off to a charging station when needed, to be replaced on the road by a fully-charged vehicle. Battery-pack swapping will also be a great solution for fleets. Battery packs can be charged up using off-peak electricity, and quickly swapped into a vehicle to get it back on the road.

Connected and Autonomous. It is easier to take these together, because vehicle-to-vehicle and vehicle-to-cloud communications will be an essential part of all self-driving vehicles. Self-driving vehicles will not be alone on the road, nor autonomous in their actions. [See my article "The Autonomous Car that Won't Be."] Self-driving vehicles will share information, and act in coordination, to greatly improve safety and traffic flow. Already there are trials underway where vehicles form tightly-spaced "pelotons" that minimize energy loss to to air drag, reduce roadway congestion, and improve safety. For more on this, see my article "Autonomous Cars Will Run in Packs." Partially and fully "autonomous" vehicles will also be connected to cloud services that will provide real-time traffic control and optimization. Dr. Heck's startup, Nauto, looks to be an important player in cloud intelligence for connected vehicles.

In summary, ACES will completely transform our roadways, although it will take a while. A decade, perhaps. Nevertheless, I liked Dr. Hecks assertion that we have already or soon will hit "peak roadway," and will before long have opportunities to remove rather than add lanes to our streets and freeways. Synergistically, that will open right-of-way space for pedestrians, bicycles, hop-on-hop-off electric buses, and rail systems.

Unfortunately, Dr. Heck did not have the time or opportunity to really discuss what his start-up company, Nauto, is up to. Initially, as I understand it, the Nauto systems will help fleet managers and insurance companies better understand the causes of traffic accidents. That understanding can then be the basis for driver training and for new driver-assist technologies.

It isn't hard to see, however, that a thorough knowledge of human driving behaviors under a wide variety of conditions will be used to improve and inform self-driving vehicles. Direct observation of drivers and the road is an important third way of learning to drive, which can complement autonomous vehicle learning-by-doing in a controlled environment, as exemplified by Google, and radar-based mapping and vehicle sensor-based learning in real-world conditions, as exemplified by Tesla.

Having just won a $12 M Series A venture capital investment, Nauto is definitely a company to watch in the automated vehicle space.

THINK INFRASTRUCTURE SOLUTIONS

America **THINKS:** The Road to Autonomous Vehicles - 2018

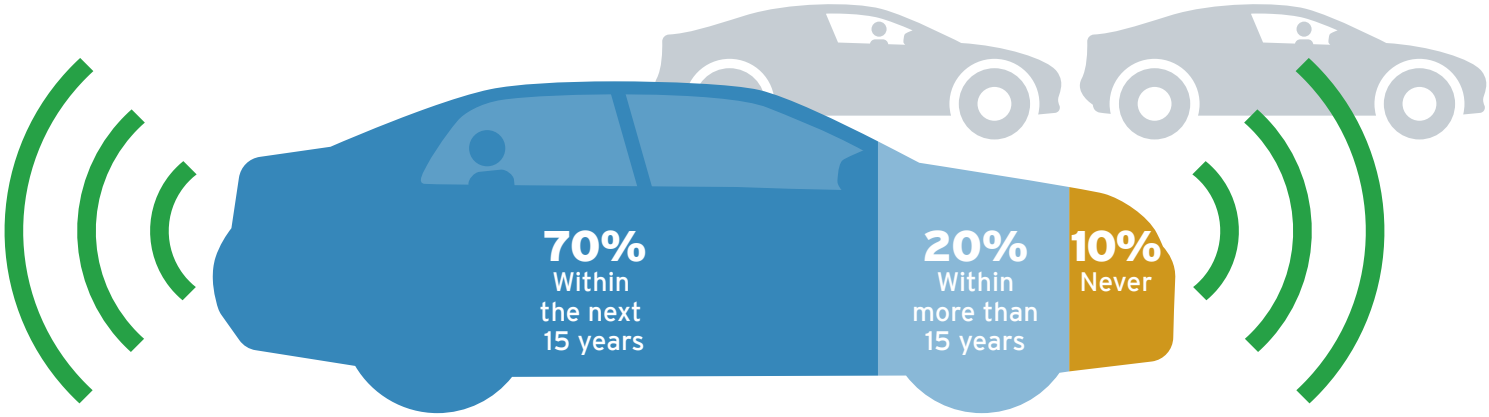
HNTB

AMERICANS EXPECT SELF-DRIVING VEHICLES TO BE COMMONPLACE WITHIN 15 YEARS

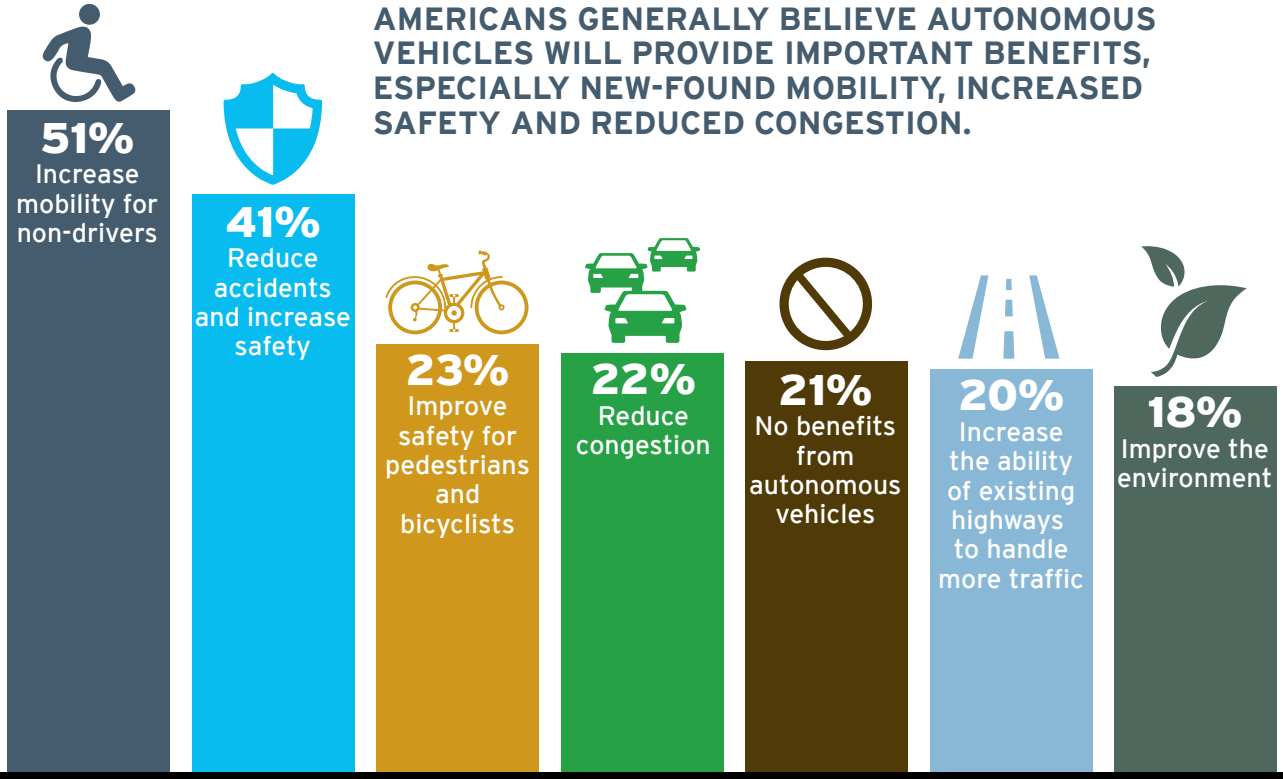
Within the next 15 years, autonomous vehicles will routinely travel American streets and highways, according to the findings of the latest HNTB America THINKS national public opinion survey. The survey also identifies expected benefits and uses of these vehicles, and further highlights the importance of new, advanced infrastructure that must be implemented to make this technology a reality.

AUTONOMOUS VEHICLES ARE COMING OUR WAY

Seven in 10 Americans expect self-driving vehicles in the foreseeable future.



AMERICANS GENERALLY BELIEVE AUTONOMOUS VEHICLES WILL PROVIDE IMPORTANT BENEFITS, ESPECIALLY NEW-FOUND MOBILITY, INCREASED SAFETY AND REDUCED CONGESTION.



Millennials have different expectations with reduced accidents and increased safety **(49 percent)**, improved safety for pedestrians and bicyclists **(33 percent)**, and reduced congestion **(27 percent)** to be among the most significant benefits of autonomous vehicles.

THINK
INFRASTRUCTURE SOLUTIONS

America **THINKS:** The Road to Autonomous Vehicles - 2018

HNTB

OVERALL, AMERICANS EXPECT AUTONOMOUS VEHICLES TO SERVE A WIDE ARRAY OF USES.

37%
Travel between transit/train stations and terminals or airports

34%
Ride-hailing services (e.g. taxi service)

33%
Travel around campuses, business parks and residential developments

32%
Local package delivery

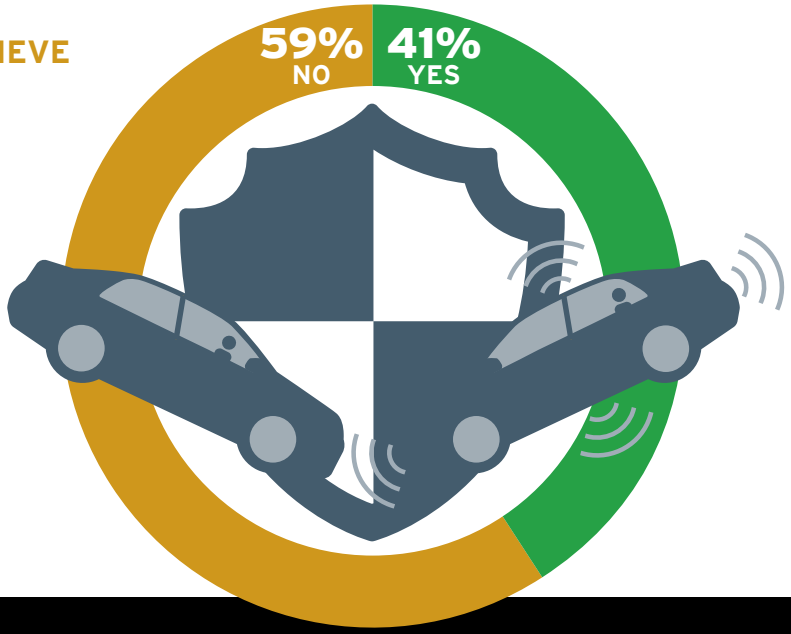
30%
Personal ownership and use

25%
Transit service in or between cities

18%
Long-haul trucking of goods

Compared to other age groups, seniors believe the most important uses of autonomous vehicles will be for first-/last-mile travel **(52 percent)**, mobility within defined areas **(46 percent)** and local package delivery **(46 percent)**.

A MAJORITY OF AMERICANS BELIEVE AUTONOMOUS VEHICLES ARE NOT AS SAFE AS VEHICLES OPERATED BY PEOPLE.



Millennials disagree with every other age group, with **54 percent** who believe self-driving vehicles are safer.

HNTB's America THINKS survey, *The Road to Autonomous Vehicles – 2018* polled a random nationwide sample of 1,010 adults 18 years of age or older from April 27 through April 30, 2018. Quotas were set to ensure reliable representation of the entire U.S. population ages 18 and over. The margin of error is +/- 3.1 percent. For more information, visit www.hntb.com or contact David Fridling (917) 438-0900; dfridling@hntb.com.

Who Pays For Roads Once Electric Vehicles Defund The Gas Tax?

https://www.forbes.com/sites

Jeff McMahon Jun 4, 2018 @ 12:01 AM

Most motorists will switch to electric vehicles because of their favorable economics, according to transportation experts, who therefore expect federal and state taxes on gasoline and diesel fuel to evaporate.

The U.S. collected $44 billion in fuel taxes in 2015, according to the Tax Policy Center.

"I think we'll see a coming rapid shift to electric vehicles," said Edward J. Regan of the consulting firm CDM Smith. "This is something that will also radically change things. Declining battery costs that are coming down very rapidly, increasing battery capacity—the cost of owning a fully electric vehicle will now match an internal combustion engine, especially on a life cycle basis, by 2022 or 23. This will just tangentially also have a major impact on how we fund transportation because it will likely lead to the demise of the gas tax."

The United States collects 18.4¢ on each gallon of gasoline, 24.4¢ on each gallon of diesel. That number has not changed since 1993. Atop the federal assessment, state taxes vary. Electric vehicles could wipe out this primary source of transportation funding, according to transportation experts who gathered at the Transport Chicago conference Friday.

"Electric vehicles have a lot of potential benefits in terms of reduced emissions," said Chris Kopp, the transit group director at HNTB. "They are probably going to require planners to start thinking about power-grid changes. But the big impact, for those who are ultimately figuring out how to spend transportation funds over the next 20 to 30 years, is what effect this has on our existing transportation sources, primarily the gas tax."

Kopp has analyzed Federal Highway Administration scenarios on the likely evolution of the transportation sector. In some of those scenarios, electric vehicles will be responsible for up to 90 percent of vehicle miles traveled.

Habib Shamskhou of the Advanced Mobility Group believes Oregon's road-usage charge program, launched in 2015, will spread.

"What they started in the state of Oregon I think is going to catch fire in the entire nation. There is no other way around it," Shamskhou said. "It's just a matter of time. Sooner or later, it's just a matter of time, collectively as a country or state by state we have to go with a user fee."

Kopp believes a vehicle-miles traveled tax is a likely candidate to replace the gas tax, because the connected-electric-autonomous vehicle revolution should also allay privacy concerns that have hampered a VMT tax so far.

"Autonomy and particularly autonomous fleets lend themselves really well to a vehicle-miles traveled tax. It reduces one of the issues that people have about privacy, about having their own car tracked. If you're going to hire Google or Uber or whoever to take you around in an autonomous vehicle you're not going to have that expectation of privacy."

If a VMT tax can survive politically, it could prove a boon for governments, because electric autonomous vehicles are also expected to increase vehicle miles traveled overall, mostly because of empty trips they'll be taking instead of sitting idle in parking lots or garages.

"This will result in a lot less vehicles but a lot more VMT— vehicle miles traveled," Regan said. "How does that happen?"

Instead of sitting idle, the car is moving, sometimes empty, to its next trip. A single car can do the job of many cars because it doesn't wave to wait, parked somewhere, for its driver. But it's likely to cover more miles as it moves from job to job. Regan predicted a 50 percent increase in VMT in one scenario he outlined, with the vehicle empty one third of the time.

By Jeff McMahon, based in Chicago. Follow Jeff McMahon on Facebook, Google Plus, Twitter, or email him here.

Will personal data be the price to pay for connected cars?

https://www.euractiv.com/section/digital/opinion/data-privacy-in-the-age-of-connected-cars/

May 28, 2018

Connected cars is one of the fastest growing use-cases in the Internet of Things (IoT). More like supercomputers on wheels, the data-gathering possibilities of these 'devices' are endless – and they're already driving out of showrooms today.

Our road network is destined to become a connected network of vehicles, each collecting inconceivable amounts of data on everything from location, performance, environment and not least, drivers – or as will be the case with automated cars – users. The promise from the automotive industry is that big data will lead to safer traffic, less congestion and cheaper mobility, but there's no denying the huge monetization opportunities either. And for those, personal data becomes gold dust.

That said, the imminent implementation of the new General Data Protection Regulation (GDPR) as well as the recent Facebook data scandal has privacy and protection of such personal data on everyone's lips. How can drivers control their data? What are the potential benefits and risks? 2025AD.com seeks insights from industry experts to give a solid foundation for public discussion and decision-making.

Driven by data

Cars have been generating data for quite some time already: on-board computers are nothing new. The data they produce however are usually of a technical nature (engine status, tire pressure, fluid levels, mileage …) and are only stored locally and temporarily. But the amount and type of available car data is growing exponentially as cars not only become more connected but more autonomous. The sharing of these data is where the potential lies. Organizations will be keen to get their hands on them to optimize their products and services or to develop new, personalized in-vehicle experiences for drivers and passengers. There will be benefits to be had – and it seems data will be the currency with which consumers will pay for them.

The more data you share the better?

Ben Volkow is CEO and co-founder of Otonomo, an Israeli start-up that specializes in collecting and selling car data. In a recent interview on 2025AD.com, Volkow talked about how consumers might benefit from lower vehicle costs in exchange for their data: "Drivers have the potential to realize more value from the data they own, both financial and otherwise. This could include a safer, more convenient on-road experience or personalized services, accessible while on the move, and ultimately this may even result in a lower vehicle cost of ownership."

But he also reflected on the need for stricter regulation. Indeed, rather than seeing the GDPR as stifling his firm's business prospects, Volkow sees it as an opportunity: "Regulation is an acknowledgement that our industry is changing our world. All of these rules will help drive

OEMs to commercialize the data they create – regulation is creating a foundation upon which for us to build. Otonomo is unlocking the potential of automotive data to 'pave the road' to a brighter and safer tomorrow." Read the full exclusive interview here.

Making moral machines

Trust and transparency: key ingredients for consumer acceptance, but not just when it comes to data privacy. If the public is to fully embrace self-driving cars in the future, it must trust that the machines can make ethically acceptable driving decisions in every conceivable scenario. For example, if a collision is unavoidable, should the car "choose" to collide with a car with a single occupant to avoid a school bus with 20 children? Is the car obliged to prioritize protecting its passengers above all else?

Some nations are leading the charge in setting up commissions to advise on such ethical conundrums: with Germany, far out in front. In a guest opinion piece on 2025AD.com, influential management thinker Professor Hermann Simon highlights the difficulty facing any legislating body on these thorny issues: "Based on what has so far been reported, the commission is refusing to put a value on human life… so how can a system work if we cannot quantify human life?" Read the full article here.

About 2025AD.com: A marketplace of ideas

Data privacy is just one of many topics on 2025AD.com – an open marketplace of ideas on connected automated driving. The thought-leading platform is powered by automotive supplier Continental, who envisaged a neutral place for everyone to exchange ideas, knowledge and opinion (often differing!) on this key topic of the future.

Under the headings of society, business and technology, 2025AD.com educates on the fundamentals of AD as well as deep-diving into a huge range of topics: from the who's who in the industry to boundary-pushing Artificial Intelligence. You'll find interviews and guest contributions by high-ranking experts, representatives and opinion leaders as well as multi-faceted infographics for free use. An opinionated analysis of the latest developments in the "Week in automated driving" column completes the picture.

However, at 2025AD's core is community. Both the website and the social media channels – Facebook, Twitter, and LinkedIn – encourage the community of over 10,000 decision makers, experts and enthusiasts monthly to get involved by commenting, taking part in polls or presenting their own visions, ideas and challenges. After all, only when society is on board will we see automated driving's potential realized.

Road Tech: new solutions to the challenges of traffic growth

https://www.politico.eu/sponsored-content/road-tech-new-solutions-to-the-challenges-of-traffic-growth/

By SANTIAGO RODRÍGUEZ, ABERTIS MOBILITY SERVICES CEO

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New road technologies can help tackle the challenges of global traffic growth, but concerted and collaborative effort is needed to spur progress.

By SANTIAGO RODRÍGUEZ, ABERTIS MOBILITY SERVICES CEO

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There is no question that traffic and congestion is getting worse, all around the world. There are now 1 billion vehicles on the road globally. The World Economic Forum says that number could grow by 600 million by 2025. By 2050, it could rise as high as 4 billion. This brings enormous costs and consequences. The cost of all the traffic jams so many people encounter every day was put at $1.4 trillion by the WEF. Nearly 1.3 million people die each year in traffic accidents, and another 20 to 50 million are injured. Vehicles are the source of approximately 17 percent of all carbon emissions as well, making it a primary cause of air pollution (and all the health conditions that come with it) and climate change.

The automotive sector, spurred by commercial opportunities and changing realities, has shown a strong will and ability to innovate in response to these challenges. More fuel-efficient cars and electric cars have been moves in the right direction. Self-driving cars and trucks could be a great leap forward. But that will require also a focus on an often-overlooked aspect of this — the roads themselves. They need not be solely a surface on which people drive. Roads are the critical and universal platform on which all these new mobility technologies need to operate.

Roads can, in fact, be an active participant in the effort to create a more intelligent, more efficient infrastructure and transport system.

Digitalized roads

Digital technology is revolutionizing global industries, from manufacturing to retail. Infrastructure and transport are no different. Previously limited to physical elements like barriers and traffic signs, road infrastructure increasingly includes digital technologies such as wireless networks, hyper-connectivity, and artificial intelligence. And it's also about findings new ways of approaching mobility services as a whole in this new sharing economy age.

For Larry Burns, former vice president for research and development at General Motors, "it is time the definition of infrastructure evolved to include not just the physical components, such as roads and bridges, but also digital and electronic components."

Crucially, this isn't about tech for tech's sake. These cutting-edge developments can help solve some of the greatest challenges that come with traffic growth and more people on the move.

Solutions for autonomous and electric cars

Every day brings a new story about progress from vehicle manufacturers on new technologies. Connected, autonomous vehicles could change the game for the sector, and electric vehicles are beginning to go mainstream. Yet roads are the critical and universal platform on which all these technologies need to operate.

As Bryant Walker Smith, assistant professor at University of South Carolina puts it, "we focus on what's really sexy, like self-driving cars. And we forget about all of the supporting technologies that could be really important." As José Papi, chairman of the Smart Transportation Alliance explains, "the automated vehicle cannot work unless there is smart infrastructure."

That's because autonomous vehicles must be aware of both static surroundings — such as roads and telephone poles — and other vehicles, by using a whole range of sensors.

Abertis' French and Spanish subsidiaries, for example, are already working with car manufacturers on the connectivity V2I (Vehicle to Infrastructure), crucial in the development of autonomous cars. There are strong signs of progress — but there's some way to go before roadside connectivity moves into the mainstream.

Smarter, more efficient roads can help reduce accidents. They can help drivers navigate (and avoid) traffic. They can nurture the concept of mobility-as-a-service. They can help generate electricity. They can make travel and commerce more efficient, and they can augment the capacities being developed by the automotive industries and others.

Seizing the opportunity

There is great promise in these developments, but the responsibility (and opportunity) cannot fall on private initiative alone. Government policies and regulations can spur innovation and are needed as well, but these must find a way to address today's challenges without limiting the mobility that is so necessary to so many.

Public-private partnerships are an important piece of that puzzle. Boston Consulting Group, which estimates an annual shortfall of U.S. $1 trillion-1.5 trillion between demand and investment in infrastructure, predicts that PPPs will play an increasingly important role in bridging the gap. A vital component of private financing is ensuring a model for revenue generation.

New approaches are vital as the world strives for a smarter, cleaner and safer mobility future. It is through partnership and collaboration with governments and innovators — large and small — that we will accelerate the emergence of cutting-edge road technologies and realize their potential.

The next five to 10 years will be crucial. If we work together — putting the best of the private and public sectors to work, finding the right financing mechanisms, and displaying the will and imagination needed —we can better connect cities and countries. That will spur growth and opportunity, without jeopardizing public health and while positively helping to address climate change.

At Abertis, we believe the key to unlocking progress lies at the intersection of advances in technology and road infrastructure innovation — because redesigning, and indeed redefining — roads for a world powered by tech is the way we'll overcome the challenges of traffic growth.

You can read this report at: www.abertis.com/en/roadtechreport
To know more about the Abertis Road Tech program, please visit: https://www.abertis.com/en/safety-and-tech/road-tech

Most people expect driverless cars to become common, and they worry about it

https://www.washingtonpost.com/local/trafficandcommuting/most-people-expect-driverless-cars-to-become-common-and-they-worry-about-it/2018/06/03/fa213ea0-64ed-11e8-a768-ed043e33f1dc_story.html?utm_term=.c8076b9e5568

By Ashley Halsey III June 4 2018. Email the author

Most Americans think autonomous cars will be quite common within 15 years, though 74 percent of people say they don't expect to have one and two-thirds say they wouldn't want to walk or ride a bicycle anywhere near one.

Confusing? That's in part because the results come from three different recent surveys on Americans' attitudes toward autonomous cars.

Taken together, however, they underscore widespread misgivings about the autonomous vehicles that people expect will be among them shortly, the challenge that automakers face in marketing them, and a need for safety reassurances from federal regulators.

Most Americans — 70 percent, according to an HNTB survey being released Monday — have softened to the idea that driverless cars factor in their future, whether they plan to ride in one or not.

Developments that portend the future of autonomous cars came in a double dose last week. First, a prominent technology investment firm — SoftBank Vision Fund — promised to invest $2.25 billion in General Motors' autonomous vehicle operation. Then Fiat Chrysler Automobiles announced it would provide "up to 62,000" Chrysler Pacifica hybrid minivans to Waymo, the pioneering autonomous-car company.

With several dozen companies working to develop autonomous cars or put them on the road, the vehicles' presence is inevitable. But before the cars "become commonplace within 15 years," as the HNTB survey says, a massive change in attitude will be necessary.

"Some of the things that popped out at me in all [three surveys] was that the majority of people are currently unwilling to ride in an automated vehicle," said Jim Barbaresso, who leads the Intelligent Transportation Systems Practice at HNTB, an infrastructure solutions firm.

In the HNTB survey, 55 percent of people said they wouldn't ride in an autonomous vehicle. A survey last month by AAA put that number at 73 percent, and one by the group Consumer Watchdog that came out three days later had nearly the same result at 74 percent.

When AAA's report came out, Greg Brannon, the group's director of engineering, made what may be a key point: "Any incident involving an autonomous vehicle is likely to shake consumer trust, which is a critical component to the widespread acceptance of autonomous vehicles."

[Uber shutting down self-driving operations in Arizona]

A simple reading of recent headlines might explain the misgivings.

Uber pulled its test autonomous cars from service after one of its vehicles struck and killeda pedestrian in Tempe, Ariz., in March. A Waymo test vehicle with a human at the wheel crashed when another motorist swerved into it last month, also in Arizona. When Tesla's vehicles in driver-assist mode have crashed, the technology has been confused with fully autonomous cars, creating bulletins such as "Tesla driver dies in first fatal autonomous car crash." And when a truck backed into a self-driving bus in Las Vegas in November, a headline said, "Las Vegas' self-driving bus crashes in first hour of service."

After several blasts of negative publicity, AAA found that the number of millennials who said they were unwilling to ride in a driverless car had increased from 49 percent at the end of 2017 to 64 percent last month, and that overall, nearly three-quarters of the people they quizzed said they wouldn't drive one.

But Barbaresso points out that in an era when the ubiquitous iPhone is less than a dozen years old, technology is bounding forward. He wasn't surprised when 7 in 10 people said they expected driverless cars to be common 15 years from now.

[Texas becomes the latest state to get a self-driving car service]

"It didn't surprise me because the technology is advancing quite rapidly," he said. "A lot can happen in 15 years. There's a reluctance to ride in an automated vehicle right now, but 15 years from now? The willingness to ride in such vehicles will increase dramatically over that period of time."

The HNTB report added nuance to the findings about people ages 18 to 34, noting that a majority of them think that autonomous cars are safer than those with human drivers and that they would make roads safer for pedestrians and cyclists. HNTB's survey ran counter to AAA, finding that 60 percent of millennials said they're ready to climb into one of the cars.

"Younger generations are certainly tech savvy," Barbaresso said. "The millennials, even the Gen Xs in some cases, appear to have greater willingness to ride in an automated vehicle versus other generations."

In 15 years, the youngest of the millennials will be 33 and the youngest Gen Xers will be 50. If autonomous cars are to become commonly accepted by then, Barbaresso says that it will take company marketing efforts that emphasize the cars' safety.

"I think public education, also. And the government agencies need to step up, too, to ensure safety," he said. "Automated vehicles are very polite. They follow traffic rules. Human drivers aren't necessarily the same way."

How even one automated, connected vehicle can improve safety and save energy in traffic

https://www.sciencedaily.com/releases/2018/05/180509104925.htm

May 9, 2018

Source: University of Michigan

Summary: Connected cruise control uses vehicle-to-vehicle communication to let automated vehicles respond to multiple cars at a time in an effort to save energy and improve safety.

Connected cruise control uses vehicle-to-vehicle communication to let automated vehicles respond to multiple cars at a time in an effort to save energy and improve safety.

University of Michigan researchers have demonstrated its effectiveness on public roads, even when just one automated vehicle is moving among human-driven cars.

Vehicle-to-vehicle communication, or V2V, refers to the ability of cars to wirelessly share data including their speed and position in real time. Connected cruise control can adjust a vehicle's speed based on information obtained through V2V. It's different from adaptive cruise control in that it tracks more vehicles than just the car in front of it.

The tests on public roads have shown how connected cruise control and V2V between automated and conventional cars performs in a common traffic scenario -- a chain-reaction braking and re-accelerating caused by one car at the head of several others. An automated vehicle utilizing connected cruise control was able to brake with 60 percent less of the G-force required by a car with a human driver.

And that smoother transition from braking to accelerating improved energy efficiency by as much as 19 percent for the automated vehicle equipped with V2V. It also surpassed the performance of other automated vehicles operating without V2V. The results were recently published in the journal *Transportation Research*.

"Automated cars utilizing V2V data will not only perform better, but they can also foster a friendlier environment where few safety hazards sneak into traffic and higher efficiency is possible for all cars on the road," said Gabor Orosz, a U-M associate professor of mechanical engineering who led the research.

Automated cars are coming, but they will face many challenges when sharing the roads with human-driven vehicles. On-board sensors cannot see around corners or see through buses and trucks. If a car suddenly appears within the sensors' view, the automated car has little time to respond and may need to brake hard to avoid a potential collision -- just like a human driver.

Similarly, if a vehicle a few cars ahead triggers a cascade of braking, on-board sensors only tell the automated car to respond when the car immediately ahead hits the brakes. Not seeing beyond the direct line of sight means lots of surprises to deal with in driving.

While experienced drivers often anticipate potential safety hazards to drive smoothly and stay safe, automated cars still have a long way to go if on-board sensors are their only information source.

"A significant amount of cars on the road will be equipped with V2V communication devices during the next few years, since major automakers such as General Motors, Volkswagen and Toyota are deploying such communication devices on their new cars," Orosz said.

"Most of these cars will still be human-driven, but they will broadcast their motion information such as position, speed and acceleration. When an automated car encounters these signals on the road, it can readily pick up such V2V data and see the traffic situation beyond the reach of on-board sensors."

The research group carried out a series of experiments on public roads in Southeast Michigan where the automated vehicle received motion information from up to six human-driven vehicles ahead.

In the experiments, Orosz's group recorded scenarios where braking got increasingly more severe while cascading along a chain of human-driven vehicles. When the speed decreased from 55 mph to almost zero and then reached 55 again, some humans decelerated heavily up to 0.8 G, sending anything not buckled down flying towards the windshield. However, the V2V-based automated driving algorithm maintained a steadier speed profile, gliding through the ripples of rapidly changing traffic. The deceleration of the automated vehicle was kept less than 0.3 G, not spilling a drop from a full cup of coffee.

"The V2V data allow the automated car to anticipate how the traffic in front might slow down once someone starts to brake several vehicles ahead," Orosz said. "The V2V-based connected cruise control then eases off the gas and prepares to brake early on, evening out the brunts when an automated car goes through stop-and-go traffic waves.

"In contrast, a sensor-based adaptive cruise control would only start to brake after the car immediately in front started to brake, a few seconds after the slowing down is broadcast by V2V. And those few seconds can be crucial when driving in dense traffic."

Safety and comfort are not the only benefits an automated car can harvest from V2V information from nearby human-driven cars. Orosz's group also found that the V2V-based automated driving algorithm can save energy in stop-and-go traffic compared to traditional sensor-based algorithms. After all, more steady speed means less energy wasted in braking and higher mileage for a gallon of fuel or a pack of battery. And even human-driven cars following the automated vehicle can save up to 7 percent energy, thanks to the smoother speed profile.

Self-driving technology is going to change a lot more than cars

https://arstechnica.com/cars/2018/05/self-driving-technology-is-going-to-change-a-lot-more-than-cars/

How self-driving technology could transform everything from retail to transit.

TIMOTHY B. LEE - **5/29/2018, 7:35 AM**

When people think about self-driving cars, they naturally think about, well, cars. They imagine a future where they buy a new car that has a "self drive" button that takes them wherever they want to go.

That will happen eventually. But the impact of self-driving technology is likely to be much broader than that. Our roads are full of trucks, taxis, buses, shuttles, delivery vans, and more—all of these vehicles will have self-driving equivalents within a decade or two.

The advent of self-driving technology will transform the design possibilities for all sorts of vehicles, giving rise to new vehicle categories that don't exist now and others that straddle the line between existing categories. It will also change the economics of transportation and delivery services, making on-demand delivery a much faster, cheaper, and more convenient option.

Recently we had the chance to talk to two self-driving vehicle startups that are at the forefront of these trends.

Earlier this month, the startup Drive.ai announced an autonomous shuttle service that will launch in July in the Dallas metropolitan area. The company's vehicles straddle the line between buses and taxis—like a bus, they're designed for shared service in a fixed area, but rather than being on a fixed route and schedule, they can be hailed on demand.

Meanwhile, Nuro is building self-driving cars for moving goods instead of people, and it recently applied for permission to test its fully driverless vehicles in Arizona. Because Nuro's cars don't need room for passengers—or all the safety equipment a human rider needs—Nuro's cars can be much smaller and lighter (and therefore cheaper and safer) than a conventional car.

You can think of this as a high-tech replacement for a pizza delivery guy, but Nuro co-founder Dave Ferguson argues that the potential market here is much bigger. Without the need to pay a driver, on-demand deliveries will become much cheaper, so a lot more stores will offer delivery services. Instead of running to the grocery store for a couple of ingredients, you'll be able to order them on your smartphone and have them show up at your door 30 minutes later.

Talking to these companies helped me appreciate how much both the design of vehicles and the economics of transportation services is driven by the need for human drivers. The roads of the future are going to have a richer assortment of vehicles of all sizes, shapes, and functions. Companies are only starting to explore what they might look like.

Self-driving technology will change the transportation landscape

To help myself think through the design space for self-driving vehicles, I created this two-dimensional grid showing some of the most common vehicles on the road today and the companies that are working on self-driving vehicles in the same categories:

	Moving people	Moving stuff
Owner-operated	Today: **Driving your own car** Self-driving versions: **Car companies, eventually**	Today: **Driving your car to the store** Self-driving versions: **Car companies, eventually**
Personal service	Today: **Taxi** Self-driving versions: **Waymo, Cruise, Uber**	Today: **Pizza delivery** Self-driving versions: **Nuro, Starship, Marble**
Shared service	Today: **Bus** Self-driving versions: **Drive.ai, Navya**	Today: **Package delivery** Self-driving versions: ¯_(ツ)_/¯

In most parts of America, the market is currently dominated by the top row of the chart: owner-operated vehicles. Most people get around town by driving their own cars. To buy stuff, they drive their own cars to the store, then drive home with their purchases.

But other people rely on third-party services to move themselves and their purchases. Today someone who wants to get around without owning a car can choose between a taxi or a shared mode of transit like a bus (or a train in some areas). Taxis are faster and more convenient, but they're expensive enough that only wealthy people can afford to use them on a daily basis.

The story is similar when it comes to moving stuff around. You don't have to drive to a store to buy stuff. You can also have it delivered. And there are two basic options here. Most products are delivered using a service like UPS or FedEx, and it takes a day or two to get your stuff to you. But some companies, like pizza restaurants, offer personalized on-demand deliveries measured in minutes rather than days.

The tradeoff here is similar to the taxi-vs-bus tradeoff. On-demand services are faster and more convenient for customers, but they're so expensive that they tend to only be used in cases (like pizza delivery) where slower, cheaper options aren't practical.

The self-driving revolution is going to fundamentally change the economics of all of these markets.

We can expect the owner-operated segment of the market—for both transporting people and stuff—to shrink over time. Of course, some people will still want to drive themselves around and shop in brick-and-mortar stores. But labor costs account for more than half of the cost of a conventional taxi service. So as the cost of self-driving hardware inevitably falls with scale, we can expect self-driving taxis to cost dramatically less than a conventional taxi costs today.

That should increase demand for taxi rides—both from former bus riders, who can now afford a more convenient option, and from some former drivers who are happy to give up the hassles of car ownership.

And we should see a similar shift in the transportation of stuff. As on-demand delivery options get more affordable, some people who would previously have driven to the store will let stores send stuff to them instead. Others will shift from two-day shipping on Amazon to 30-minute shipping using an on-demand service.

Self-driving technology will also blur the lines between these technologies. Right now, taxis and buses are physically very different: a taxis is usually just a conventional car with a "taxi" sign on top, while most city buses are enormous vehicles with room for dozens of passengers.

But Uber and Lyft have already started to blur the line between a taxi and a bus. Uber Pool and Lyft Line are shared services that preserve most of the benefits of a conventional taxi ride while offering fares that are closer to what you'd pay to take the bus.

When Lyft announced a new carpooling service that operated along fixed routes last year, it was greeted with mocking headlines like "Silicon Valley Invents Bus." But the mockery was unwarranted. Buses are an important mode of transportation for millions of people, and so if Uber and Lyft can figure out how to make bus service more efficient and convenient for customers, that would be a big accomplishment.

Self-driving cars will only accelerate this trend. City buses are as large as they are largely to minimize the number of drivers needed to drive people around. Once buses drive themselves, it will be economical to use smaller buses that run more often. And smartphone hailing technologies could allow buses to become more flexible in terms of both routes and schedules.

This is exactly the vision that Drive.ai is pursuing. When I talked to Drive.ai's Conway Chen, he refused to be pinned down on whether the company's service was a taxi service or a bus service. The reality is that it's somewhere in between.

Drive.ai's first service will be in the North Platinum Corridor, a commercial area in the Dallas suburb of Frisco. It's primarily a cluster of office buildings surrounded by big parking lots, but the area also includes some restaurants and a new development called Frisco Station, which will include some apartments.

Drive.ai will provide a fleet of bright orange vans that will move people around the North Platinum Corridor. The company expects that initial use will be concentrated around lunch time, with workers traveling from their offices to nearby restaurants.

Like a conventional bus service, Drive.ai's Frisco service will provide service between six fixed stops. But there's no fixed route schedule—shuttles will be hailed on demand.

And the system is bus-like in another way, too: the company has worked closely with local governments and area businesses on the development of the service, and it hopes to eventually receive financial support from them.

"Maybe these kinds of vehicles are the future of transit"

Thomas Bamonte, an official at the Central Texas Council of Governments who helped to organize the Drive.ai project, argues that this makes Drive.ai's service different from Waymo's forthcoming taxi service in Phoenix.

"I think it's probably good to think of them as complementary," Bamonte told Ars. "Waymo is a longer-distance taxi service. Drive.ai is exploring campus and district-scale deployment. You may see the emergence of two distinct forms of autonomous vehicles—one serving longer trips, one on internal districts."

An obvious question is why not just have one service that performs both functions. After all, Waymo's cars can do short-distance trips as well as long ones. And if people use Waymo cars to commute to work in the morning and return home in the evening, there will be a bunch of Waymo cars hanging around people's offices during the day—those cars could do lunchtime trips, too.

But coordinating closely with local governments or private partners, as Drive.ai is doing in Frisco, may provide real advantages. The owners of large apartment or office buildings might be willing to subsidize shuttles going between their properties and nearby attractions—like a subway stop or grocery store—in order to enhance the property's value.

And while self-driving technology will make taxi service cheaper, it may not make it cheap enough that everyone can afford to use it. So cities may want to develop a self-driving successor to the taxpayer-subsidized city bus. And it might look like an expanded version of Drive.ai's Frisco project, with self-driving shuttles taking people between hundreds of "bus stops" using dynamically planned routes.

"Maybe these kinds of vehicles are the future of transit," Bamonte told us. "So everything will come down to kind of on-demand buses, and the size of the vehicles will depend on the demand along the routes."

Another possibility, Bamonte said, is a "first-mile, last mile" model. Self-driving shuttles like Drive.ai's would take people from their homes to the nearest conventional bus or subway stop. People would then ride to a point near their destination, where another short-range shuttle would meet them and take them to their final destination. A well-designed system could charge passengers a single fare for the entire multi-leg trip and coordinate pickup and drop off times to minimize the wait between steps.

This model could improve the usability of conventional transit in low-density suburban areas where most homes are not close to a bus stop. At the same time, it could allow stops along a conventional bus route to be spaced farther apart, shortening the average travel time.

"We see this period of testing and deployment as an opportunity where communities can step back and say 'here's what we've done over the past half-century with land use planning, and transportation planning," Bamonte told us. "That's why having the Drive.ai deployment here is so exciting—it gives us a chance to see what may work."

Drive.ai isn't the only company working on shared mobility services in close partnership with local governments. A French startup called Navya has been pursuing a similar business model, operating a three-stop driverless shuttle route in downtown Las Vegas, and the company has also been operating a similar service in Lyon, France, since 2016.

The company has larger ambitions. In January, it demonstrated a taxi cab in Las Vegas capable of traveling up to 55 miles per hour. Navya's partner for a number of these projects has been Keolis, a French company that operates a number of public transit services around the world.

The bottom line is that riders of the future will enjoy a range of options when it comes to mobility services. With no driver, taxis will be much cheaper. Taking the bus will be more convenient, as the average wait between buses will be shorter. People may have the option to take a free shuttle to their nearest bus stop. And there are likely to be shared services that fall somewhere between a taxi and a bus, with flexible routes and schedules but lower costs than a conventional taxi.

The impact of autonomous vehicles on the retail sector could be even bigger. For all of Amazon's growth, the company still has only about 4 percent of the overall retail industry. The vast majority of people still buy stuff the old-fashioned way: by driving their car to the store, buying stuff, and driving the purchases home.

This means there's still huge potential for delivery services to disrupt conventional retail stores if they can be made faster, cheaper, and more convenient. And this is the market being targeted by a number of startups that are working on small autonomous vehicles.

Some of these companies, including Marble and Starship, are working on small robots designed to travel at walking speeds on urban sidewalks. But Nuro is working on a larger vehicle with a maximum speed of 25 miles per hour—eventually 35 miles per hour—that's designed to

operate on city streets. That higher speed means a greater range, making it a potential substitute for shopping trips people do in their cars today.

While Nuro's custom-designed cars are bigger and faster than some rivals' sidewalk robots, they're still much smaller and slower than conventional cars. And Ferguson, the Nuro co-founder, told us that has major safety advantages.

"If you're focusing purely on transporting goods and don't need to worry about people, you can do some pretty amazing things around how you design that vehicle and how you design the behaviors of that vehicle," Ferguson said.

Much of the weight of a conventional vehicle comes from the need to protect passengers in a crash. But if a vehicle is only designed for cargo, it can be much lighter and simpler.

The lack of passengers also means Nuro's software can always prioritize the safety of people outside the vehicle. This means that the vehicle can be extremely conservative about slowing down if it encounters a situation it doesn't fully understand. And of course, a lighter vehicle with a maximum speed of 25 or 35 miles per hour is far less likely to kill a pedestrian than a full-sized vehicle traveling at highway speeds.

"Our vehicle is half the width of a Toyota Corolla," Ferguson told us. "If you think about it from a pure safety and flexibility standpoint, we have an extra 3-4 foot of safety buffer in terms of width that we can dynamically position around the vehicle." For example, suppose there is a row of parked cars on one side of a Nuro vehicle; it can then hug the opposite side of its lane, giving it more time to brake if a child darts out between two parked cars.

Targeting lower speeds has also made some of the technical challenges easier, Ferguson told Ars. One of the big obstacles to fully self-driving passenger cars is the need for lidar with enough range—around 200 meters—to drive at highway speeds up to 70 miles per hour. The 25 mile-per-hour top speed of Nuro's initial model—and correspondingly short stopping distance—means that today's lidars have ample range to see potential obstacles in time to stop for them.

Self-driving vehicles could revolutionize retail

The technology is coming soon, Ferguson said. "We're hoping to run a limited service with a real partner and real customers within this calendar year."

And a service like this could have a dramatic impact on the retail sector.

"Right now, there's not really a way to say 'I'd like these three ingredients for dinner,'" he continued. "There's no way to have that delivered at any price."

But technology like Nuro would make it possible for almost any store to offer deliveries measured in minutes rather than hours or days. Ferguson said the exact cost will depend on a

variety of factors, but he argues that delivery costs could get down to a dollar in the long run. Stores may even cover these costs and offer free delivery.

Eventually, the very concept of a store could change radically. For standardized, non-perishable goods, there may be little reason for customers to set foot in a store at all. The retail industry could become dominated by fleets of delivery robots and distributed warehouses that stock them.

This model probably won't work for every store, of course. People like to try on clothes and inspect produce before they buy them, and some stores specialize in offering customers expert advice and hands-on product demonstrations. But even in these parts of the retail sector, innovations might be possible.

A car that can make rapid deliveries can also make rapid returns. So a clothing retailer might send customers a dozen outfits in a drone, then have it wait in her driveway while she tries them on and sends back the ones she doesn't want. Zappos pioneered a version of this business model for shoes a decade ago, but the faster turnaround and lower cost of autonomous deliveries could make it viable for a much wider share of the market.

I asked Ferguson if the Nuro model would worsen urban congestion problems, but he argued that the opposite is more likely. After all, most purchases today are accomplished by someone driving a comparatively enormous passenger car to a store and back. Replacing a human-driven trip with a Nuro trip doesn't increase the number of vehicles on the roads, and Nuro vehicles are much smaller, lighter, and less polluting than the average car.

Moreover, as on-demand delivery services grow, there will be substantial room for a single trip to serve multiple customers. Nuro's initial cars have two compartments, allowing it to serve two customers with each trip by default. But Ferguson says that those large compartments can easily be subdivided for retailers delivering small items. And of course, in the future Nuro could make larger versions of its robot with space to hold more merchandise.

So as the volume of orders grows, stores should be able to group together orders in nearby neighborhoods that happen around the same time. That means that at scale, a fleet of delivery robots could wind up taking up less space on the roads than the fleet of conventional human-driven cars we use to go shopping today.

And just as driverless cars are likely to blur the distinction between taxis and buses, we can expect driverless delivery vehicles to blur the line between on-demand deliveries and conventional package services. Nuro isn't planning to directly challenge UPS and FedEx, whose shared delivery model is relatively efficient. But in the long run, established delivery companies will face pressure to use autonomous vehicle technology to deliver packages in hours rather than days.

Digital license plates finally hit the road in California

https://www.theverge.com/2018/5/30/17409112/digital-license-plates-california-reviver-auto

By Andrew J. Hawkins@andyjayhawk May 30, 2018, 4:32pm EDT

Five years after California governor Jerry Brown signed legislation authorizing digital license plates to be sold in his state, the new-fangled digital display boards are finally hitting the streets. According to *The Sacramento Bee*, the new plates began rolling out this week, and unsurprisingly, they don't come cheap.

Motorists who choose to buy the digital plates can register their vehicles electronically and eliminate the need to physically stick tags on their license plates each year, which could save the state money. The digital plates come with their own computer chips, batteries, and wireless communication systems. They also may be able to display personal messages — if the DMV decides to allow that.

Dealerships are expected to sell the plates for an eye-popping $699, not including installation costs. Users also must pay a monthly fee of about $7. The plates are not available through the Department of Motor Vehicles. At present, digital plates are only permitted on the rear of the vehicle. California also requires front plates, so owners still must mount a standard plate there.

A spokesperson for the DMV said there are only 116 vehicles with digital plates currently. Under the pilot, the department must report back to the state legislature by July 2020 about how the plates are performing. "The purpose of the pilot is to identify and detail potential benefits, so we are still in the evaluation phase and won't make any determinations until the pilot concludes," the spokesperson added.

Bay Area company Reviver Auto is the sole contractor on the pilot. The firm makes the plate, and it's beginning to market it for sale at auto dealerships. Later this year, digital plates are also expected to roll out in Florida, Arizona, and Texas.

Neville Boston, founder of Reviver Auto, told the *Bee* he expects initial interest to come from companies for their vehicle fleets:

Some businesses will use them as mini-billboards to advertise their products or services, he said, but will be able to do so only when the vehicle is stopped. The license plate number will still appear on the screen when messages pop up, but it will be smaller and tucked into the upper right corner of the screen.

As with all new technology, cybersecurity and hacking are a concern. While the ability to track a vehicle's location using the plate's wireless communication system may be ideal for fleet owners, individual drivers may balk at the idea. The DMV spokesperson deferred questions about privacy to Reviver Auto. We'll update this story when we hear back from the company.

Autonomous Vehicles Will Probably Be Safer, But We Haven't Actually Proved It Yet

https://www.forbes.com/sites/samabuelsamid/2018/05/01/automated-vehicles-will-probably-be-safer-but-we-havent-actually-proved-it-yet/#6d3edaba414e

Sam Abuelsamid , CONTRIBUTOR. May 1, 2018

A lifetime in the car business, first engineering, now communicating Opinions expressed by Forbes Contributors are their own.

One of the core beliefs of almost everyone promoting automated vehicles is that they will be the panacea that cures the scourge of road fatalities. That will probably be true - eventually. But we don't actually have any real evidence of that just yet. As an engineer by training, I'd like to see some evidence of the efficacy of a technology before committing wholeheartedly to it and frankly that just doesn't exist yet.

Let's start with some background. In the past couple of years more than 37,000 people have died annually on American roads. Globally, more than 1.2 million people die each year. Those are huge numbers. However, we also need some context. Each year, we drive more than 3.2 trillion miles in the U.S. alone. Approximately 1.15 people die for every 100 million vehicle miles traveled. The reality is that while way too many people die, the probability of dying in a traffic accident are actually extraordinarily low. That's about one-third of the rate in 1975 when 44,525 people died in 1975 while only driving 1.33 trillion miles.

Insurance Institute for Highway Safety

The rate of traffic fatalities has been on general downward trend for more than 40 years.

We've been driving from more than 130 years and over the past half century there has been a more or less steady downward trend in fatality rates. We can attribute this to many factors including safer vehicles that protect both occupants and pedestrians better, new active safety features, better handling from new suspensions and tires, reductions in impaired driving and more seatbelt use.

Despite all that, most of the 6.3 million total crashes (including non-fatal) in 2015 can still be traced back to human error. That's one of the reasons everyone is so hot to trot on automated vehicles. The theory is if we take the error-prone human out of the loop we eliminate more than 90% of crashes.

Again, let's get a little context for that total crash number. That's a crash about 494,000 miles. For the average driver that goes about 15,000 miles a year, that's one crash every 32 years, most of which don't result in any death or serious injury.

Unfortunately, theory and reality often diverge.

Currently, California is the only state that requires companies testing automated vehicles on public roads to submit any kind of data on the performance of those vehicles. Even in the home state of Waymo and most of the startups trying to break into this space, the only metric we have is one of dubious value, disengagement rates. Essentially, companies have to report how often the human safety driver has to take over from the automation when the system either does the wrong thing or doesn't know what to do.

By this lone, questionable metric, Waymo has by far the best system currently being tested. In 2017, Waymo's fleet logged nearly 352,000 miles in California, with 63 disengagements. That is the mere human had to take control from the super-sophisticated artificially intelligent virtual driver every 5,956 miles. If we replaced all human vehicle miles traveled with Waymo's vans, that would be 571 million disengagements per year.

Given that the requirements for a Waymo safety driver to take control are unknown, we can't necessarily assume that every mistake by the virtual driver would lead to a crash. But even if only one in ten disengagements might have resulted in a crash of some sort, that's still one every 59,560 miles. That's 8.3 times more often than the average for human drivers.

That's with the company that has by far the lowest reported disengagement rate. Uber's rate was about once for every 13 miles of automated driving.

As an additional point of reference let's look at the fatality rates for automated vehicles on public roads. While many of the companies don't report much data, based on Waymo, Uber, GM and a few others, we can estimate that automated vehicles have accumulated about 10 million miles of driving on public roads. We have at least one known fatality, not including those that have died while using Tesla's AutoPilot that doesn't count among highly automated systems.

While it's only a single data point and thus not statistically significant, that extrapolates to 10 fatalities per 100 million miles of driving, nearly double the rate in 1975 and about 8.7 times worse than human drivers do today. Keep in mind that the automated vehicles are also generally only running in optimal weather conditions with only a smattering of exposure to the often terrible weather that humans are regularly challenged with to get to work, school and home.

Companies developing automated driving systems have also racked up billions of miles of simulated driving. However, since they don't share any of their data publicly, we have no idea how valid the simulation models are or even what the simulated crash rates are.

As an engineer and a technology enthusiast, I watched the steady progression of technology over the past four decades and been amazed. When I do a search in my Google photos archive for pictures of my dog or people or cars, I'm shocked at how good the image recognition is. However, I'm also dismayed by how many errors it makes compared to what I'm confident a three-year old can do. I spent many years working on electronic active safety control systems

and I understand the difficulty of a problem that was primitive compared to what automated vehicle engineers are trying to do.

I'm confident that in time, automated vehicles will get much better and will probably be safer than human drivers. But what data I've seen so far does nothing to convince me that we are anywhere near proving that we have reached that point yet. As with seemingly everything in life, there is no panacea.

The author is a senior analyst on the Transportation Efficiencies team at Navigant Research and co-host of the Wheel Bearings podcast

When Cars Do the Driving, Who Will Feel the Joy?

https://mobile.nytimes.com/2018/06/14/business/autonomous-cars-enthusiasts.html

By Robert C. Yeager

June 14, 2018

“It’s my 10 second rule,” said Dave Marek, Acura’s executive creative director, who oversees the carmaker’s designs around the world. “I want them to walk around our car and say: ‘Wow! I want to ride in that!’”Emily Berl for The New York Times

Dave Marek knows exactly what he wants to hear from potential buyers.

“It’s my 10-second rule,” said Mr. Marek, who as Acura’s executive creative director oversees the carmaker’s designs around the world. “I want them to walk around our car and say: ‘Wow! I want to ride in that!’ ”

But what happens to that passion when the driver’s only role is to sit passively as an autonomous car glides through traffic and zips down highways?

“Whether they’re autonomous or not, we will always want our creations to evoke emotion,” said Mr. Marek, also a part-time professor of transportation design at ArtCenter College of Design in Pasadena, Calif.

Not everyone shares his optimism. Cars have long been more than mere machines, and some drivers ask: Do autonomous cars risk being anonymous? At what level of automation could car enthusiasts become unenthusiastic?

At a “Why Driving Matters” panel in Scottsdale, Ariz., in January, McKeel Hagerty, whose namesake firm insures vintage autos and sponsored the discussion, spoke fondly of the 1967 Porsche he bought while a teenager — and still owns.

“The car requires your full attention,” he said, “and I love it for that.”

For many motorists, car memories come crowded with kids, trips, dogs and relatives. Mr. Hagerty recalled years of working on the old Porsche with his father and their shared joy when the car finally ran. “I can’t ever replace that,” he said.

“For me, being in a car without a lot of electronics means being present with myself,” Mr. Hagerty added. “I’m a different person when I’m driving on the open roads we have in northern Michigan. I don’t have my head down, looking at some digital device.”

Appearing on the same panel, Wayne Carini, a longtime restorer and the presenter of the “Chasing Classic Cars” television series, also described the emotional attachment people often feel for their cars. He spoke of his quiet drives with an autistic daughter.

“We don’t talk much,” Mr. Carini said, “but we’re doing something together. Cars are part of our lives.”

Even so, Mr. Marek and other automakers contend they can successfully collaborate with autonomy in ways that preserve — and even enhance — the attachment that owners feel to their vehicles. The British automaker McLaren, for example, heralds the ability of its six-figure sports cars to deliver exhilaration in the form of a “perfectly blended and balanced” driving experience.

“We sell entertainment, not transportation,” said Jens Ludmann, the company’s chief operating officer. McLaren’s success, he said, depends on its customers enjoying the driving experience.

“We have teams monitoring autonomy and connectivity to see whether and how some features could become part of that experience,” Mr. Ludmann said. For example, he suggested, future McLaren cars could be programmed to automatically pay parking and fueling fees on the street and indicate the best line through a corner on the track.

Other applications, Mr. Ludmann suggested, could include artificial intelligence — perhaps featuring augmented-reality systems with virtual competitors and automatic interventions to keep drivers safe during high-speed maneuvers.

McLaren buyers are already offered real-life driving coaches who provide track-based training using video cameras and reference laps to build a new buyer’s confidence and competence, corner by corner. Autonomous technology, Mr. Ludmann said, could someday provide McLaren owners with a virtual driving coach able to provide assistance whenever they feel the need, on the road or on the track.

“We don’t see autonomous operation as a threat,” he said. “After all, we are a technology company. We can pick and choose which areas of automation to explore.”

Automakers generally categorize autonomy across five levels: Level 1 is limited to warning lights and screens. Level 2 provides independent driver operation but with accident avoidance systems. Level 3 offers autonomy but requires a human driver who can take over at any time. Level 4 cars are capable of full autonomous operation under most circumstances, but a nominal driver remains present. Level 5 vehicles contain only passengers.

Neither McLaren nor Acura sees itself offering full-on Level 4 or Level 5 cars anytime soon. Even if that day comes, “I’ll want mine to be good-looking, and if I’m going to have a virtual driver, he better be Ayrton Senna,” Mr. Marek said, referring to the late Formula One champion.

McLaren could use autonomous vehicle technology as a virtual driving coach on the street or on the track, the company’s chief operating officer, Jens Ludmann, said.McLaren Automotive

Mr. Marek believes autonomous vehicles will offer new opportunities for innovation. For example, with minimal requirements for instrument panels, steering wheels and transmission

tunnels, designers will have greater freedom to craft spacious interiors at the same time they sculpt “shrink-wrapped” exteriors that hug engines, drive trains and wheels.

Mr. Marek, who judges classics at the annual Pebble Beach Concours d’Elegance in Carmel, Calif., predicted that in decades to come, people would go to car shows featuring autonomous vehicles and “marvel at the beauty they see.”

Even if those vehicles are the products of computer software, “design is timeless,” he said. “The sense of craftsmanship and human soul will always be there.”

Calvin Ku, an ArtCenter graduate student in transportation systems and design, believes “a partnership experience” should be the goal for autonomous car designers. In preparing his thesis, “Enthusiast Autonomous Experiences,” Mr. Ku took up horseback riding and tango dancing to study ways of strengthening the link between driver and vehicle.

He found that the relationship between horse and rider, and between dancers, deepens over time, until each partner learns to read the other’s movements instinctively. Similarly, autonomous cars and their drivers should become “intelligent companions in a dynamic, visceral and evolving relationship,” Mr. Ku wrote.

Enthusiast marques like McLaren already tune their cars’ computers to adjust spring rates, tire pressure, aerodynamic balance and more to driving conditions. Artificial intelligence could further allow autonomous cars to adjust themselves to each driver’s life patterns. Like a horse that senses it’s time to head for the stable, Mr. Ku said, “the car could realize it’s Friday and you want a vanilla milkshake, and take the next freeway exit.”

Once lingering safety concerns are resolved, the longtime auto executive Bob Lutz — credited with leading the introduction of the Dodge Viper, the Pontiac GTO and other iconic models — sees autonomous cars as inevitable. Populous urban areas can no longer solve their surface transportation problems solely with owner-operated cars, he said during the panel in Scottsdale.

Self-driving vehicles will “close some doors but open others,” Mr. Lutz said. Like the machines that freed their owners from the limitations of the horse and buggy, autonomous vehicles will broaden the horizons further.

“They’ll provide another kind of freedom,” he said, “saving time and allowing you to do anything you want. You can have breakfast, drink a martini or read a book. You can even go to sleep.”