Evolving and Phasing Out Legacy ITS Devices and Systems

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ITS Alaska Annual Meeting
November 20, 2019

ENTERPRISE

Evaluating New TEchnologies for Road PRogram Initiatives in Safety and Efficiency (ENTERPRISE)

- FHWA Pooled Fund Research Program
- ITS research, development, demonstration, standardization, deployment and evaluation

Members:

- Illinois DOT
- Iowa DOT
- Kansas DOT
- Michigan DOT
- Minnesota DOT
- Ontario (MTO)
- Pennsylvania DOT
- Texas DOT
- Wisconsin DOT

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Project Purpose

- Many transportation agencies have deployed numerous ITS devices and systems - some in place for more than 20 years
- As technology changes, it is important to evaluate these "legacy" devices and systems:
  - Have operational or end user needs changed?
  - Should the devices be replaced, reused, repurposed?
  - Discontinue operation? Evolve in some other way?

This project investigated decision factors, approaches, criteria and tools for evolving or phasing out ITS devices and systems

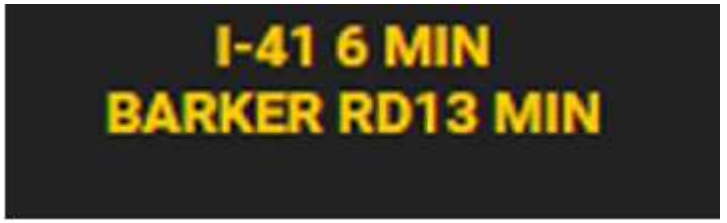
Examples – Why Evolve or Phase Out?

Device / System	How Evolved or Phased Out?	Why?
Highway Advisory Radio →	Eliminated →	• 511 websites and mobile apps provide information; HAR coverage not statewide, newer vehicles don't have AM radio • Some continued use of portable HAR units

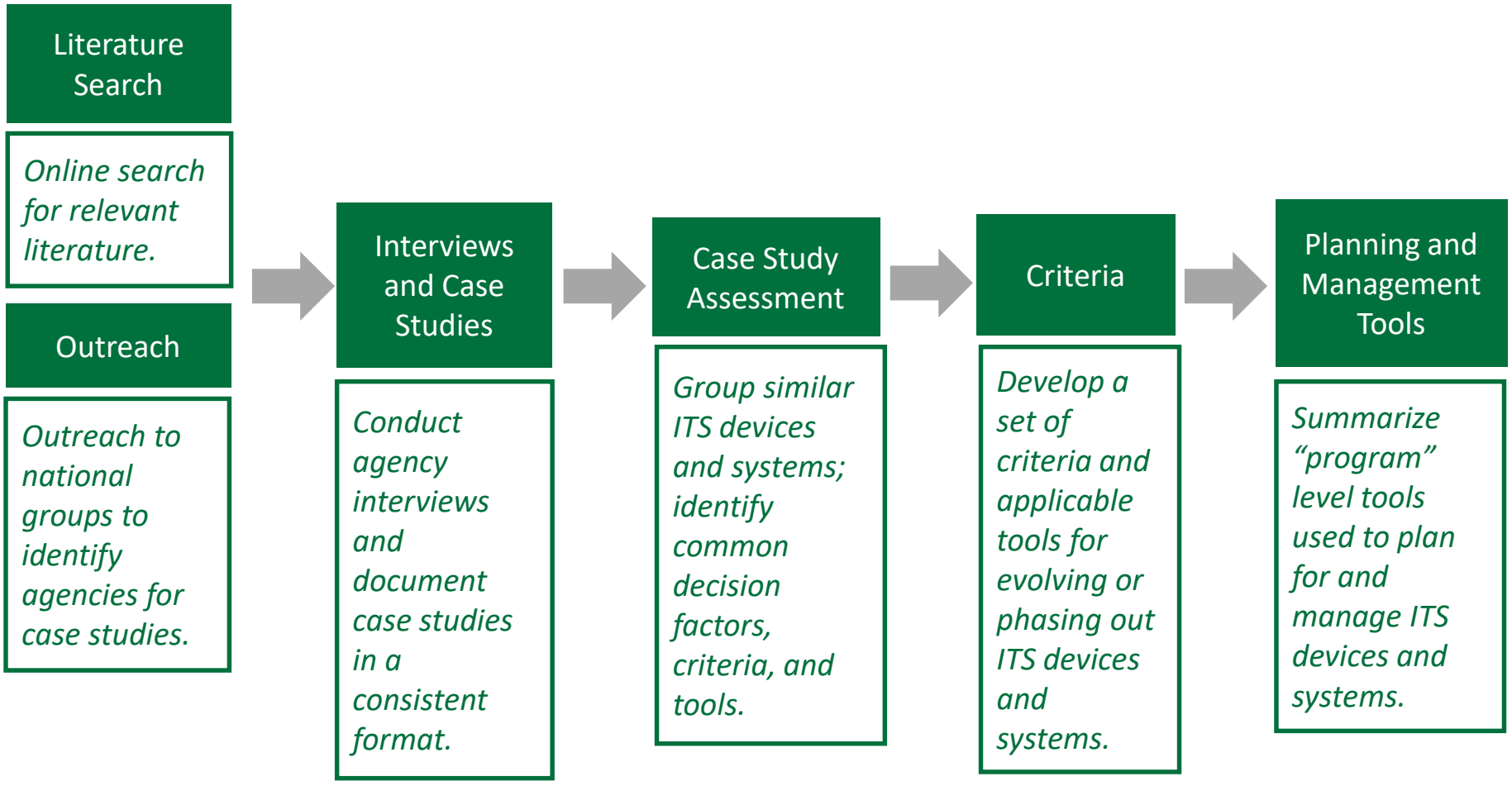
Some agencies have retained HAR to serve travelers in rural, mountainous areas with no cell coverage

Examples – Why Evolve or Phase Out?

Device / System	How Evolved or Phased Out?	Why?
Dynamic Message Signs (DMS)	• Relocated	• Low use, higher need elsewhere
	• Removed or limiting deployments	• Lack of use, anticipating future CAVs with in-vehicle messaging



Project Approach



Literature Search, Outreach, Interviews

Agencies Represented in the Case Studies (16)

- **Alaska DOT&PF** – Lisa Idell-Sassi and Val Rader
- **Caltrans** – Brian Simi and Steve Hancock
- **Delaware DOT** – Don Weber and Jeff Van Horn
- **Illinois DOT –** Kevin Price
- **Iowa DOT** – Sinclair Stolle and Tim Simodynes
- **Maryland DOT State Hwy Administration** - Glenn McLaughlin and Joey Sagal
- **Massachusetts DOT** - Lorenzo Parra, Marco Pereira, Michael Fitzpatrick, and Eusebius Oyigbo
- **Michigan DOT** – Mike Wroblewski
- **Minnesota DOT** – Kelly Braunig and Brian Kary
- **Missouri DOT** – Ashley Buechter and Alex Wassman
- **Ohio DOT** – Jason Yeray and Bryan Comer
- **Ontario Ministry of Transportation (MTO)** – Hoi Wong and Wendy Ng
- **Pennsylvania DOT** - Doug Tomlinson, Pierce Sube, and Jerome Frederick
- **Wisconsin DOT** – David Karnes and Mark Lloyd
- **Case studies from literature:** *NCDOT, Kentucky Transp. Cabinet, MoDOT*

Nearly 60 Case Studies

Alaska DOT&PF
- 4th Generation 511 System *(evolving, discontinuing component)*
- Decreased Use of Permanent DMS in the Central Region *(evolving)*
- Communications for Traffic Signals and Connected Vehicles (*evolving*)

Caltrans
- ATMS Software (*replacing*)
- Highway Advisory Radio (*evolving*)
- Vehicle Detection (*evolving*)
- Traffic Cameras (*evolving*)
- TMC Video Walls (*evolving*)

Delaware DOT
- Communications Systems (*evolving*)
- Software Systems for TMC Operations and Traveler Information (*evolving*)
- Travel Advisory Radio (*evolved*)
- Non-Intrusive Weather Monitoring Devices (*evolving*)
- Bluetooth Traffic Detection Devices (*evolved*)

Illinois DOT
- Statewide Traveler Information Phone Service (*eliminating*)

Iowa DOT
- 511 Citizen Reporting Feature (*discontinued component*)
- 511 3G Website (*discontinued component*)
- Highway Advisory Radio (*eliminated*)
- DMS (*removing, relocating, reusing*)
- Intersection Conflict Warning Systems (*removed, evolved*)
- Automated/Remotely Operated Interstate Gates (*eliminated*)

Kentucky Transportation Cabinet
- 511 Phone Service *(eliminated)*

Maryland DOT SHA
- 511 Phone Service (*evolving*)

Massachusetts DOT
- Traffic Detection (*evolving*)
- Analog to Digital Traffic Cameras (*evolving*)
- Highway Advisory Radio (*phased out, repurposed*)
- Tunnel Monitoring Technologies (*evolving*)
- DMS Management System (*eliminated*)

Michigan DOT
- No specific device case studies; overarching obsolescence planning tool

Minnesota DOT
- 511 Citizen Reporting Feature (*discontinued component*)
- 511 3G Website (*discontinued component*)
- Intelligent Lane Control Signals (*eliminated*)

Missouri DOT
- Highway Advisory Radio (*eliminated*)
- Bypass Map Layer on Statewide Traveler Information Map (*evolving*)
- Traffic Detection Devices (*evolving*)
- 511 Phone Service *(eliminated)*

North Carolina DOT
- 511 Phone Service *(evolved)*

Ohio DOT
- Radar Speed Detection Devices (*eliminated*)
- Loop Detection Devices for ITS Operations (*eliminated*)
- Highway Advisory Radio System (*phasing out, repurposing, reusing*)
- Selective Deployment of DMS (*evolving*)
- Communications for ITS Devices and Operations (*evolving*)
- Transition Communications Provider Services to FirstNet (*evolving*)
- Upgrade ATMS Software (*replacing*)

Ontario Ministry of Transportation
- Vehicle Detection Stations (removing, *evolving*)
- Fiber to Wireless Communication for Control of DMS (*evolving*)
- CCTV Video Streaming On-Demand (*evolving*)
- Central Software ATMS to Field-based "Field Traffic Master" (*evolving*)
- Automated DMS Signing Strategy for Road Closures (*evolving*)
- Transition from Agency-owned ITS Systems to Service-based Solutions (*evolving*)

Pennsylvania DOT
- Highway Advisory Radio (*eliminating, reusing, repurposing*)
- 511 Phone Service (*evolving*)
- Color Dynamic Message Signs (*evolving*)
- Conversion of a Traffic Management Center into an Incident Command Center for Emergency Operations (*evolved*)
- Traffic Detection (*evolving*)

Wisconsin DOT
- Highway Advisory Radio (*eliminating*)
- 511 Phone Service (*replacing*)
- Trip Routing Tool on 511 Website (*discontinuing component*)
- Advanced Traffic Management System (*replaced*)
- Dynamic Message Signs (*relocating*)
- Build Fleet of Temporary ITS Devices (*reusing, evolving*)

Case Studies

How are agencies evolving or phasing out their ITS devices and systems? Why?

Case Study Summary - Example

ENTERPRISE

"Evolving and Phasing Out ITS Devices and Systems"

Case Study Summary – AKDOT&PF

Agency	Alaska Department of Transportation and Public Facilities (AKDOT&PF)
Information Source(s)	• 4/2/19 interview with Lisa Idell-Sassi, AKDOT&PF • 4/3/19 interview with Val Rader, AKDOT&PF
ITS Devices or Systems in this Case Study	1) 4th Generation 511 System (evolving, discontinuing component) 2) Decreased Use of Permanent DMS in the Central Region (evolving) 3) Communications for Traffic Signals and Connected Vehicles (evolving)

AKDOT&PF Case Study #1: 4th Generation 511 System (evolving, discontinuing component)	
Overview	Alaska DOT&PF is currently evolving to a 4th generation 511 system, to be more automated and easier to use on a mobile platform. As part of this upgrade to a 4th generation 511 system, the "Text View" feature on the full 511 website will be eliminated. "Text View" shows all events in text format and can be sorted by region, highway, type, location/milepost, description, or time of event. AKDOT&PF plans to maintain 511 phone service due to its high usage in rural areas.
Decision Factors	• **Enhanced Usability from Mobile Devices** – The goal for the next 511 mobile system is to be more automated, more real-time, and easier to use on a mobile platform. The new system will maximize features for mobile devices and be more responsive, adapting to different mobile screen sizes. • **Usage** – Currently, usage from mobile devices is much higher than use of the full 511 website, driving the need to evolve to a system that is more accommodating to mobile users. The "Text View" feature on the full 511 website is being eliminated because it is not widely accessed.
Feedback	None – not yet implemented.
Tools Used to Inform Decisions	AKDOT&PF uses Google Analytics to monitor 511 web usage monthly for performance measures and to help make decisions about future generations of the 511 system.

AKDOT&PF Case Study #2: Decreased Use of Permanent DMS in the Central Region (evolving)	
Overview	The use of Dynamic Message Signs (DMS) varies by region at AKDOT&PF. The Central Region is moving toward decreased use of permanent DMS signs and plans to instead deploy more portable DMS in which locations and messages are automatically ingested into 511 systems for viewing by travelers. While this case study documents decision factors for decreased use of DMS in the Central Region, other AKDOT&PF regions may deploy additional DMS based on needs within the region.
Decision Factors	• **Usefulness of Messages to Drivers** – AKDOT&PF allows some general public service messages to be posted to DMS but would prefer to utilize DMS for traffic-related messages as the primary purpose. • **Streamlined Operations** – Reducing the number of DMS will help streamline the workflow of posting and removing messages and help increase DMS message accuracy and timeliness. The current process involves the Anchorage Police Department posting messages since they are a 24/7 operation and have the best situational awareness in the field. The DOT maintains DMS infrastructure and assists with posting messages as needed. • **Alternative** – AKDOT&PF plans to increase deployments of portable DMS that allow messages and sign coordinates to be automatically sent to 511 systems for display to travelers. Portable DMS can be housed in maintenance stations and moved to different locations when needed and messages could be instantly available on 511.
Feedback	None – not yet implemented.

AKDOT&PF Case Study #3: Communications for Traffic Signals and Connected Vehicles (evolving)	
Overview	AKDOT&PF is moving away from using copper wiring for traffic signal systems and future connected vehicle communications. The agency is also decreasing use of 900 MHz radio communication and some WiFi, due to bandwidth requirements. AKDOT&PF plans to supplement existing mechanisms with other types of communications such as 4G LTE, 5G, or DSRC to accommodate future needs for connected vehicles and adaptive signal control.
Decision Factors	• **Decreased Reliance on Copper Wiring Infrastructure** – There are 280 signals connected by copper wiring in Anchorage. AKDOT&PF has invested in a fiber backbone, so new systems are connected using this fiber infrastructure. AKDOT&PF is also evolving to a more cellular-based infrastructure and does not plan to install additional copper wiring. Communications will be supplement fiber with 4G LTE, 5G, and radio as needed. • **Evolving Communications Needs for Signal Systems and CAV Infrastructure** - – AKDOT&PF will soon implement adaptive signal control. High resolution is required for performance measures. Greater bandwidth is needed. – Currently, AKDOT&PF is installing fiber for all new backbone infrastructure needs. However, connected vehicles will require increased bandwidth and low latency. DSRC or cellular networks will be implemented for short-range connected vehicle communications. AKDOT&PF is working on the security

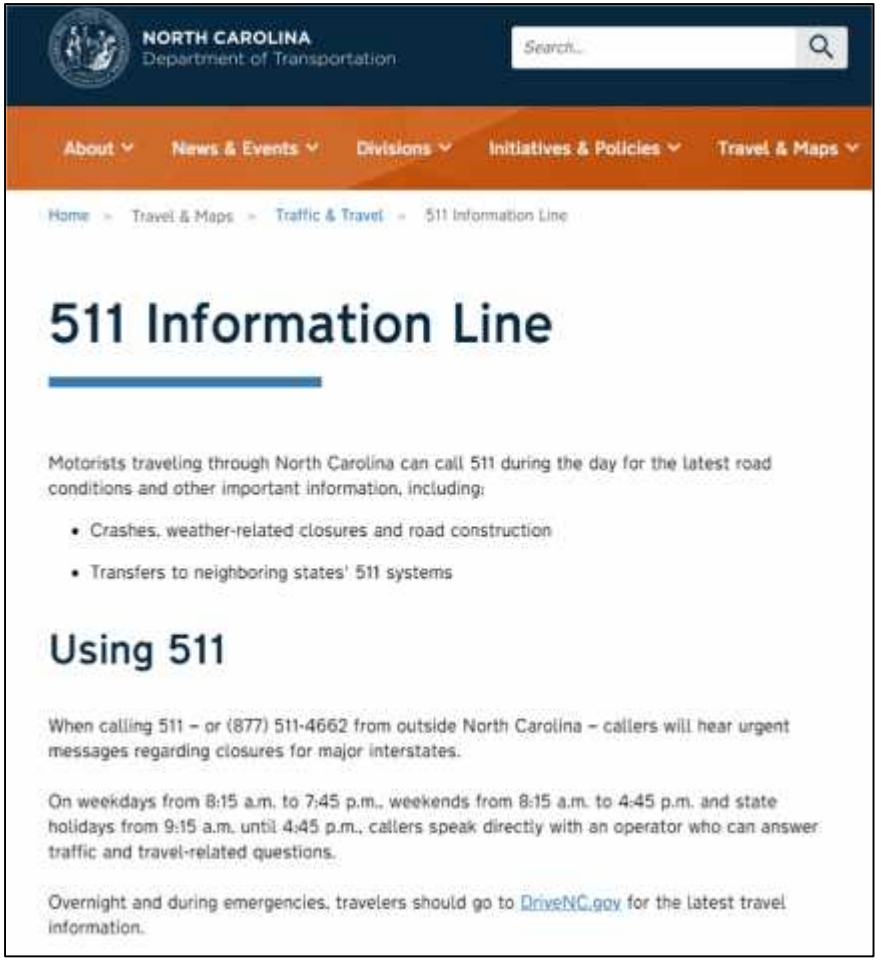
Case Studies

ITS Devices and Systems that Interface with Motorists as Primary Use	ITS Devices and Systems Primarily Used for Transportation Operations
) Highway Advisory Radio) Traveler Information Phone Service) Traveler Information Websites and Mobile Apps) Signs and Traffic Control Devices	) Traffic Detection) Monitoring Devices) Traffic Cameras) TMC Facilities and Operator Support) ITS Communications Systems) Agency-owned Devices vs. Service-based Solutions

Case Studies

ITS Devices and Systems that Interface with Motorists as Primary Use	ITS Devices and Systems Primarily Used for Transportation Operations
Highway Advisory Radio	***Traffic Detection***
Traveler Information Phone Service	Monitoring Devices
Traveler Information Websites and Mobile Apps	Traffic Cameras
Signs and Traffic Control Devices	TMC Facilities and Operator Support
	ITS Communications Systems
	Agency-owned Devices vs. Service-based Solutions

Traveler Information Phone Service



Traveler Information Phone Service

Traveler Information Phone Service	
Description of Change	Number of Case Studies
Complete elimination of traveler information phone service	3 (KYTC, MoDOT, IDOT)
Replacing IVR feature with recorded messages, live operators, or region-specific messages generated from other traveler info sources	3 (NCDOT, PennDOT, MDOT SHA)
Replacing/upgrading 511 phone service as part of an upgrade to the statewide traveler information system	1 (WisDOT)

Traveler Information Phone Service			
Agency and Case Study	Type of Change	Description of Change	Decision Factors
KYTC – 511 Phone Service	Eliminated	Discontinued 511 phone service in 2016. A state-run website and mobile traveler information partnership with WAZE are in place to provide traveler information.	) Usage) Input from Motorists) Cost
MoDOT – 511 Phone Service	Eliminated	Discontinued 511 phone service available only in the St. Louis area. The service was initiated for a major construction project, funded through sponsorship ads with no direct cost to MoDOT. When the service was terminated, MoDOT was unable to find a vendor under the sponsorship model.	) Cost
IDOT Statewide Traveler Information Phone Service	Eliminating	Shutting down the statewide traveler information phone service. During transition, the message directs callers to the website for traveler information. The service will soon be reduced to a voicemail box for callers to record roadway complaints which, with VoIP conversion, can be emailed to appropriate staff for follow up.	) Cost
NCDOT – 511 Phone Service	Evolved	Discontinued IVR and now provides information via a combination of live operators (utilizing inmates from a women's penitentiary) and recorded messages.	) Cost) Efficiency) Customer Satisfaction
MDOT SHA 511 Phone Service	Evolving	In 2017, Maryland DOT SHA changed its 511 phone service from an IVR system to a simple list of major events statewide. The agency is evaluating and considering sunsetting the telephone service, retaining web and social media, and developing a mobile app.	) Usage) Customer Feedback) Cost Savings) Available Services / Alternatives) Customer Base) Maintenance) Continuity of a Base Level of Service
PennDOT 511 Phone Service	Evolving	Changing the IVR feature on 511 phone to broadcast region-specific messages and offer real-time access to information once the user initiates a call. Converting HAR signs to inform motorists of conditions being reported in 511.	) Access from vehicle) Coverage) Cost) Safety) Ability to track usage) Other strategic considerations
WisDOT 511 Phone Service	Replacing	Replacing the current 511 system with a new system that has greater functionality, is more user friendly, and includes all the features of the existing system.	) Alternatives) Usage) Cost) Motorist feedback) Equity

Traveler Information Phone Service			
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IDOT Statewic Informat Service			
NCDOT - Service			
MDOT S 511 Pho			
PennDO 511 Pho			) Ability to track usage) Other strategic considerations
WisDOT 511 Phone Service	Replacing	Replacing the current 511 system with a new system that has greater functionality, is more user friendly, and includes all the features of the existing system.	) Alternatives) Usage) Cost) Motorist feedback) Equity

Key Evolutions (discontinued IVR):

- NCDOT – Combination of live operators and recorded messages
- Maryland DOT – Simple list of major events statewide
- PennDOT – Region-specific messages based on the caller's location, generated from Road Condition Reporting System

Main Decision Factors:

- Cost, usage, motorist feedback, increased usage of other info mechanisms
- E.g. Maryland DOT – 60,000 calls/month in 2012 to 10,000 calls/month in 2017. Operating cost without IVR dropped by roughly 70%.

Other Factors: Access/equity, safety

Traveler Information Phone Service	
High-Level Decision Factors	Detailed Criteria and Applicable Tools
Usage	⎩ Decrease in usage of 511 phone service – systematic tracking over time – Number of calls, origination locations of calls, duration of calls ⎩ Increased usage of other traveler info mechanisms (e.g. web, mobile app) compared to phone service ⎩ Focus on traveler information mechanisms that are most effective during high usage periods (e.g. weather events)
Cost	⎩ Cost savings to discontinue 511 phone service (or cost to continue) ⎩ Cost savings to discontinue IVR-based system – Often significant cost savings to discontinue IVR – Compare to alternatives such as recorded messages, text to voice reports from Road Condition Reporting System, or live operators – Considers complexity of various systems and resources to maintain ⎩ Overall cost to operate and maintain multiple traveler information mechanisms ⎩ Cost of 511 phone service relative to other mechanisms
Motorist Feedback	⎩ Motorist surveys - determine how motorists obtain info via DOT-operated services or 3rd party providers ⎩ Input on IVR usability (e.g. ability to understand voice commands, cumbersome menu options, voice recognition in noisy environments) ⎩ Input on usefulness of information (e.g. minor incidents that don't impact traffic) ⎩ Customer preferences (e.g. speaking to live operators or IVR)
Access/Equity	⎩ Access to cellular service around the state is typically good ⎩ Assessment of equity to various motorist populations, to access alternatives to 511 phone service
Efficiency	⎩ Complexity of IVR based phone systems
Alternative(s)	⎩ Emergence of private sector services (e.g. Waze, Google maps, local media stations) ⎩ More demographic sectors are looking for information though other media compared to voice-based telephone services (i.e. mobile apps) ⎩ Continuity of service by maintaining phone service but discontinuing IVR
Safety	⎩ Distraction potential with phone use while driving: – Minimized distraction with hands-free access via Bluetooth and voice-activated phone capabilities – Manual dialing could still be a concern – Relatively safe compared to other mechanisms (e.g. touch-activated apps, radio tuning for HAR)

Signs and Traffic Control Devices

Signs and Traffic Control Devices

Signs and Traffic Control Devices	
Type of Change	Number of Case Studies
Limited or decreased deployment of DMS; often also relocating functioning DMS to more critical locations or reusing parts to extend the life of other DMS	4 (AKDOT&PF Central Region, Iowa DOT, ODOT, WisDOT)
Evolving from mono-chromatic to full-color DMS	1 (PennDOT)
Eliminating or evolving various advisory signs and traffic control devices (e.g. Intelligent Lane Control Signals, Intersection Conflict Warning Systems, and remotely operated interstate gates)	3 (MnDOT, Iowa DOT, Iowa DOT)

Signs and Traffic Control Devices

DMS Usage:

- Trend toward limited or decreased DMS deployments
  - Often with re-use or re-location to higher priority sites
- Driven by: Changing operational needs, understanding of actual usage of DMS for traffic messages, motorist feedback, and future CAV in-vehicle messaging

Iowa DOT DMS Decision Matrix

Scoring Criteria

- **Justification Categories (location type)**
  - ✓ Major interchanges
  - ✓ Metro entrances and exits or state entrance points,
  - ✓ Routinely congested corridors
  - ✓ Key locations for special events or incident management
- **Volumes**
- **Crash History**
- **DMS Usage**
- **TMC Operator Input**

						Justification Categories						Volumes	Crashes	DMS Usage		
						2	3	4	5	Sum	Category Score	AADT Score	Crash Score	Usage Score	TMC Input	Overall Score
ID	TS ID	Route	Direction	MM	Location	8	6	2	5		20%	20%	20%	20%	20%	100%
1	2	I-35	SB	88.4	Corp Woods	1	1	1	1	21	10	9	10	10	10	97
Prop 19		I-35/80	NB	125.43	US 6	1	1	1	1	21	10	10	8		10	95
212									1	21	10	10	9	9	9	94
Prop 59									1	21	10	9	8		10	93
655									1	21	10	8	9	10	10	93
23									1	21	10	6	10	10	10	92
658									1	21	10	6	10	10	10	92
4									1	21	10	8	7	10	10	90
24									1	21	10	7	9	9	9	88
Prop 60									1	21	10	9	8		8	88
125									1	13	6	8	10	10	10	87
45									1	21	10	6	9	9	9	86
25									1	13	6	7	9	10	10	84
76									1	13	6	6	10	10	10	84
657									1	21	10	6	10	8	7	82
Prop 18									1	13	6	8	9		10	81
26									1	21	10	7	7	8	8	80
211									1	13	6	10	4	10	10	80
69									1	21	10	5	10	7	7	79
3									1	21	10	5	4	10	10	77
Prop 13									1	21	10	7	9		5	77
403									1	21	10	6	10	10	2	76
302									1	19	9	3	8	9	9	76
Prop 10									1	21	10	6	9		5	75
653	296	I-80	EB	122.2	I-80 @ 60th	1	1	1	1	21	10	7	7	4	8	72
63	248	I-380	NB	18.37	Wilson Ave	1	1	1	1	21	10	5	8	5	8	72
218	19	I-35/80	SB	124.72	Hickman SB	1	1	1	1	21	10	10	8	4	4	72
22	32	I-235	EB	6.15	31st St		1	1	1	13	6	6	8	8	8	72
Prop 20		I-35/80	EB	130.34	I72nd Street	1	1	1	1	21	10	8	1		10	71
656	299	I-235	EB	11.7	Guthrie											

Traffic Detection

Traffic Detection	
Type of Change	Number of Case Studies
Using or considering probe data to replace some or all physical field detectors	5 (ODOT, MassDOT, PennDOT, MoDOT, Caltrans)
Replacing pavement intrusive devices (e.g. loop detectors) with non-intrusive devices such as radar, Bluetooth, or microwave	3 (ODOT, MassDOT, MTO)
Use of updated Bluetooth technology, to enable real-time data collection	1 (DelDOT)

Traffic Detection

- Trend toward eliminating in-pavement field detectors for real-time operations
  - Difficult to maintain, disruption to operations
- Growing confidence in accuracy of probe data
  - Offers additional coverage compared to physical detectors
- Some physical detectors retained, for reporting to FHWA

ITS Communications Systems

ITS Communications Systems	
Type of Change	Number of Case Studies
Transitioning from traditional communications (e.g. copper wiring, T1) to newer technologies (e.g. high-speed ethernet, fiber, cellular, Wi-Fi, point-to-to point radio) for ITS devices	2 (DelDOT, ODOT)
Implementing 4G LTE, 5G, or DSRC to accommodate future needs for connected vehicles and advanced signal systems	1 (AKDOT&PF)
Changing from fiber to wireless for controlling DMS	1 (MTO)
Moving ITS devices to the First Responder Network Authority (FirstNet) communications network	1 (ODOT)

ITS Communications Systems

- Agencies are upgrading older comm's (copper, T1) to newer technologies (fiber, cellular, Wi-Fi)
  - Changing operational needs, evolving performance requirements
- Ohio DOT - Moving ITS devices to FirstNet
  - Lower monthly cost, less cost variability with government-based service
- Alaska DOT&PF – Infrastructure readiness for the future!

Other Case Studies

ITS Devices and Systems that Interface with Motorists as Primary Use	ITS Devices and Systems Primarily Used for Transportation Operations
Highway Advisory Radio	Traffic Detection
Traveler Information Phone Service	***Monitoring Devices***
Traveler Information Websites and Mobile Apps	***Traffic Cameras***
Signs and Traffic Control Devices	***TMC Facilities and Operator Support***
	ITS Communications Systems
	Agency-owned Devices vs. Service-based Solutions

Planning and Management Tools & Approaches

What over-arching tools and approaches are used to guide decision-making, at a program level?

Planning/Management Tools and Approaches

Categories	Tools and Approaches
Statewide ITS and TSMO Planning	⟩ Regional Operations Plans (PennDOT) ⟩ TSMO Traffic Infrastructure Process (WisDOT) ⟩ GIS Application for TSMO Planning (PennDOT) ⟩ Comprehensive Systems Engineering Process (MassDOT) ⟩ Overarching Criteria and Considerations (MTO)
Asset Management	⟩ Asset Management Planning (MoDOT) ⟩ Transportation Management System (TMS) and other Asset Tracking Tools (MoDOT) ⟩ Asset Management Software (WisDOT)
Strategic Technology Obsolescence Planning	⟩ ITS Device Obsolescence and Modernization Planning (Michigan DOT) ⟩ Antiquated ITS Devices Effort (PennDOT) ⟩ ITS Device Replacement Planning (Ohio DOT) ⟩ Device Consistency (Ohio DOT) ⟩ Continual Evaluation of ITS Technology Needs (MassDOT)
Organizational and Agency Philosophy	⟩ Centrally Located ITS Function within DOT (ODOT) ⟩ IT Services Integrated within ITS Office (ODOT)
Motorist Input	⟩ Customer Surveys and Motorist Feedback (WisDOT) ⟩ “Grassroots” Customer Feedback (DelDOT)

Michigan DOT Example

Michigan DOT - ITS Device Obsolescence and Modernization Planning

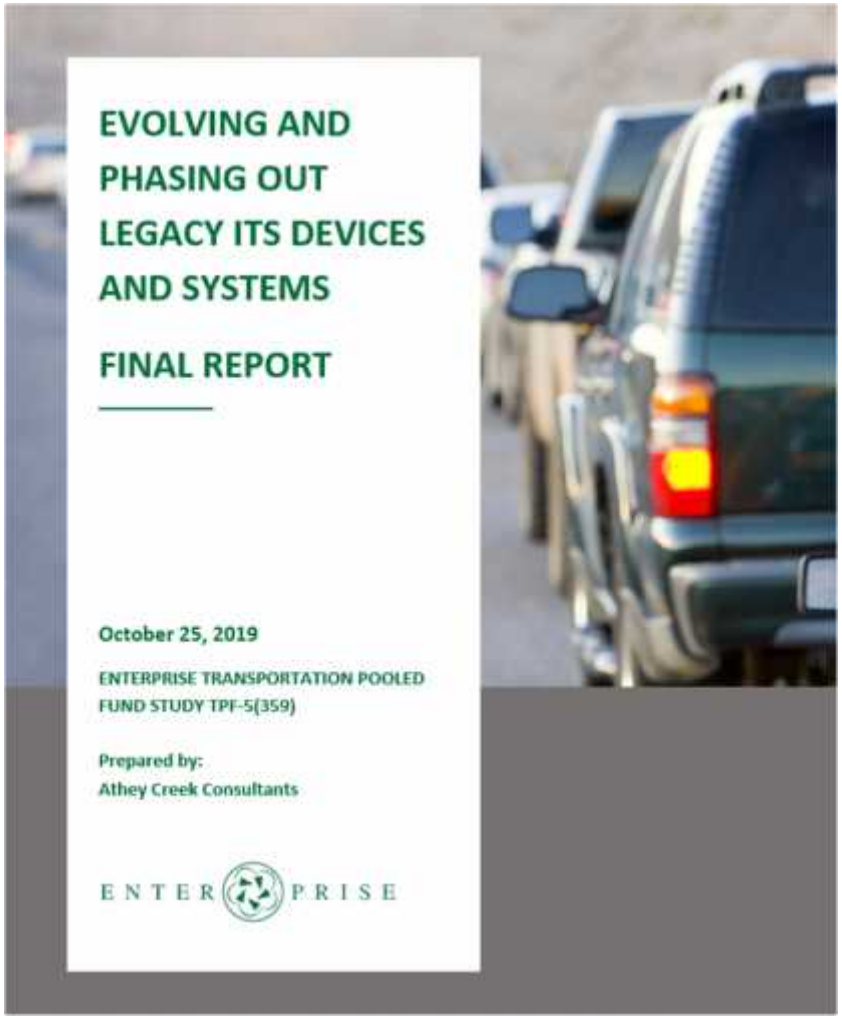
- Creating a 5-year ITS Device Modernization Plan (DMP)
  - Proactively evaluate all ITS devices, environmental sensor stations, and CAV devices that have reached a state of technical obsolescence and/or high probability of failure in next 5-10 yrs
- Annual DMP Maintenance:
  - Evaluate devices for state of the practice, maintenance history, and technological characteristics
  - Determine device value to the motoring public
  - Recommend devices for removal

Final Report

Final Research Report:

Published on ENTERPRISE Pooled Fund website: http://enterprise.prog.org/

- Projects ==> Completed
- *Evolving and Phasing Out Legacy ITS Devices and Systems*



http://enterprise.prog.org/Projects/2019/ENT_PhasingOutLegacyITS_Report_FINAL_Oct2019.pdf

Questions?

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