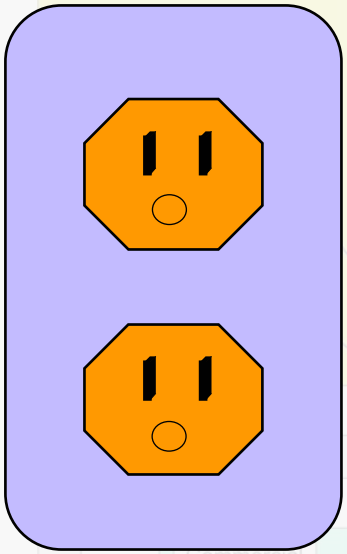
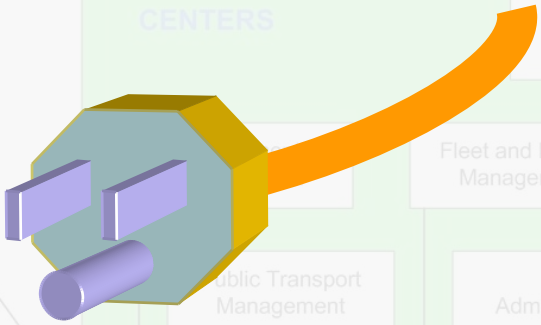
What is a “Standard”?

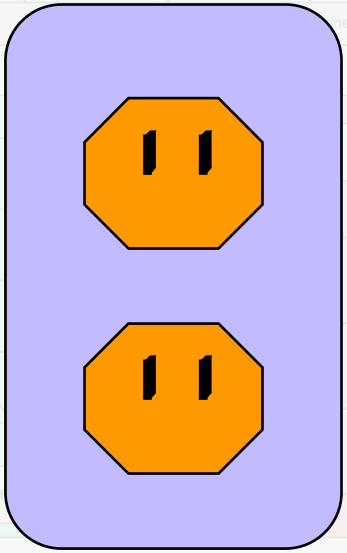




Merriam-Webster

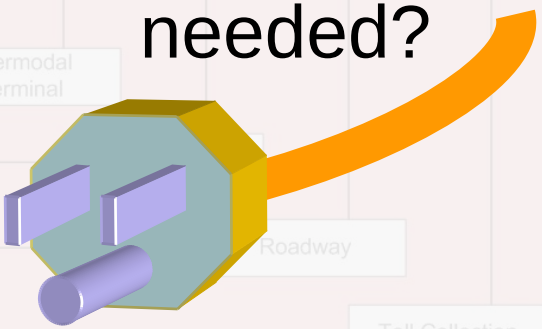
standard, n.

“ something established by authority, custom, or general consent as a model ”



Why are they needed?

X



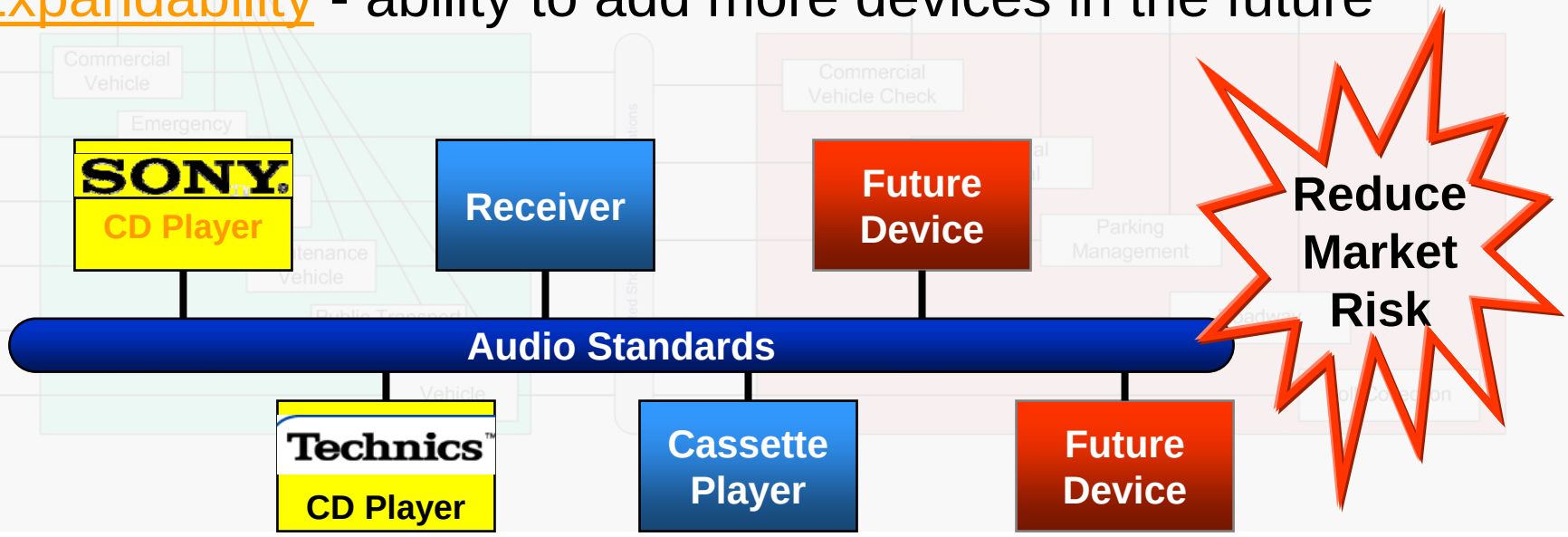
Interface Options

- Open (the whole idea of ITS standards)
  - Developed through open consensus-based process
  - Controlled and maintained by a standards organization
  - Example: TCP/IP
- Proprietary
  - Available from single vendor with License Fee often required for use
  - Controlled by commercial entity with for-profit motives
- Closed
  - Provided by Single Vendor, not available for aftermarket enhancements
  - Example: DSRC Beacon-Tag Interface

The Development of ITS System Architecture

Goal: All ITS Standards are Open Standards

- Interchangeability - multiple brands of a device on the same communications channel
- Interoperability - many different types of devices on the same communications channel
- Expandability - ability to add more devices in the future



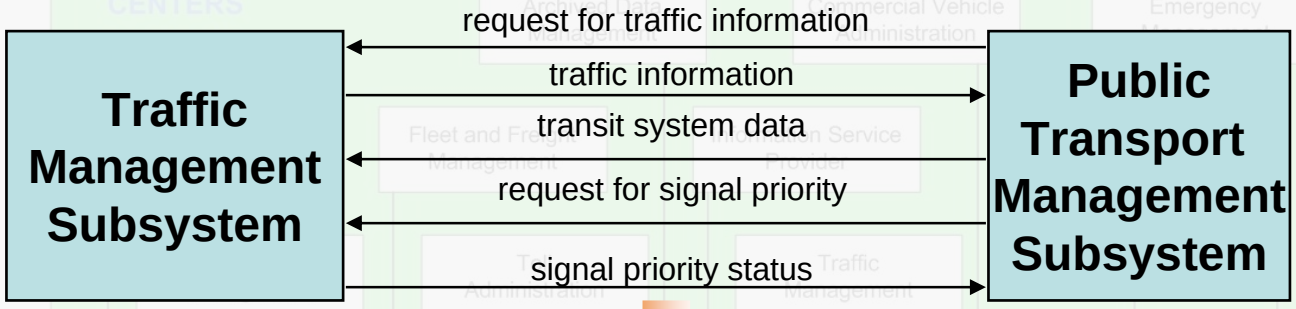
ITS Standards

- ITS Standards are being created to define Interfaces between Physical Architecture Entities
  - Subsystem to Subsystem
  - Subsystem to Terminator
- Types of Standards
  - Data Elements (D)
    - “words”
  - Message Set (M)
    - “sentences”
  - Communications Profile (C)
    - “rules for sending the sentences across an interface”

The Development of ITS System Architecture

Architecture and Standards

ITS Architecture

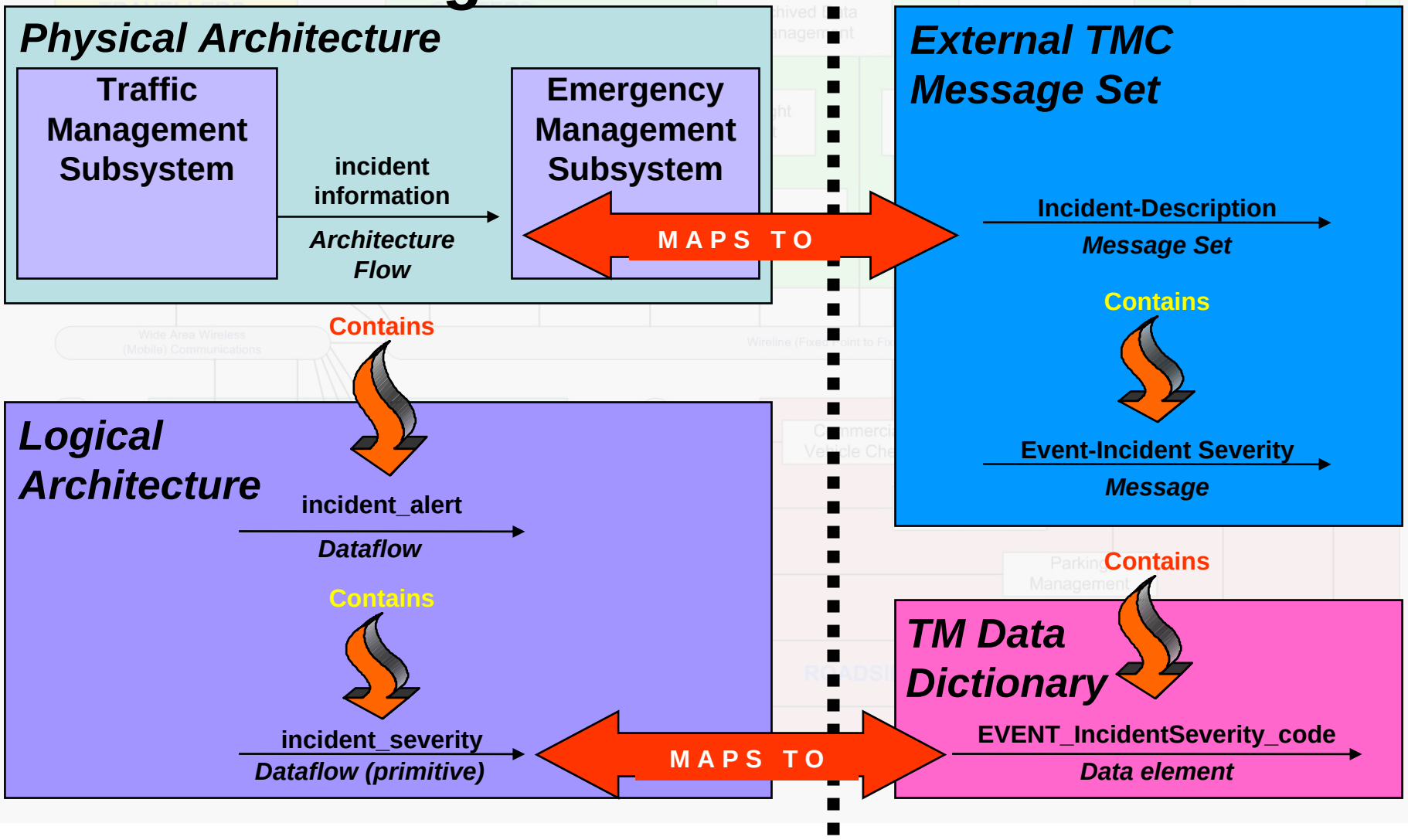


ITS Standards

Traffic Management Data Dictionary	Data Elements
Transit Communications Interface Profiles	Message Set
NTCIP* Centre to Centre	Comm. Profile

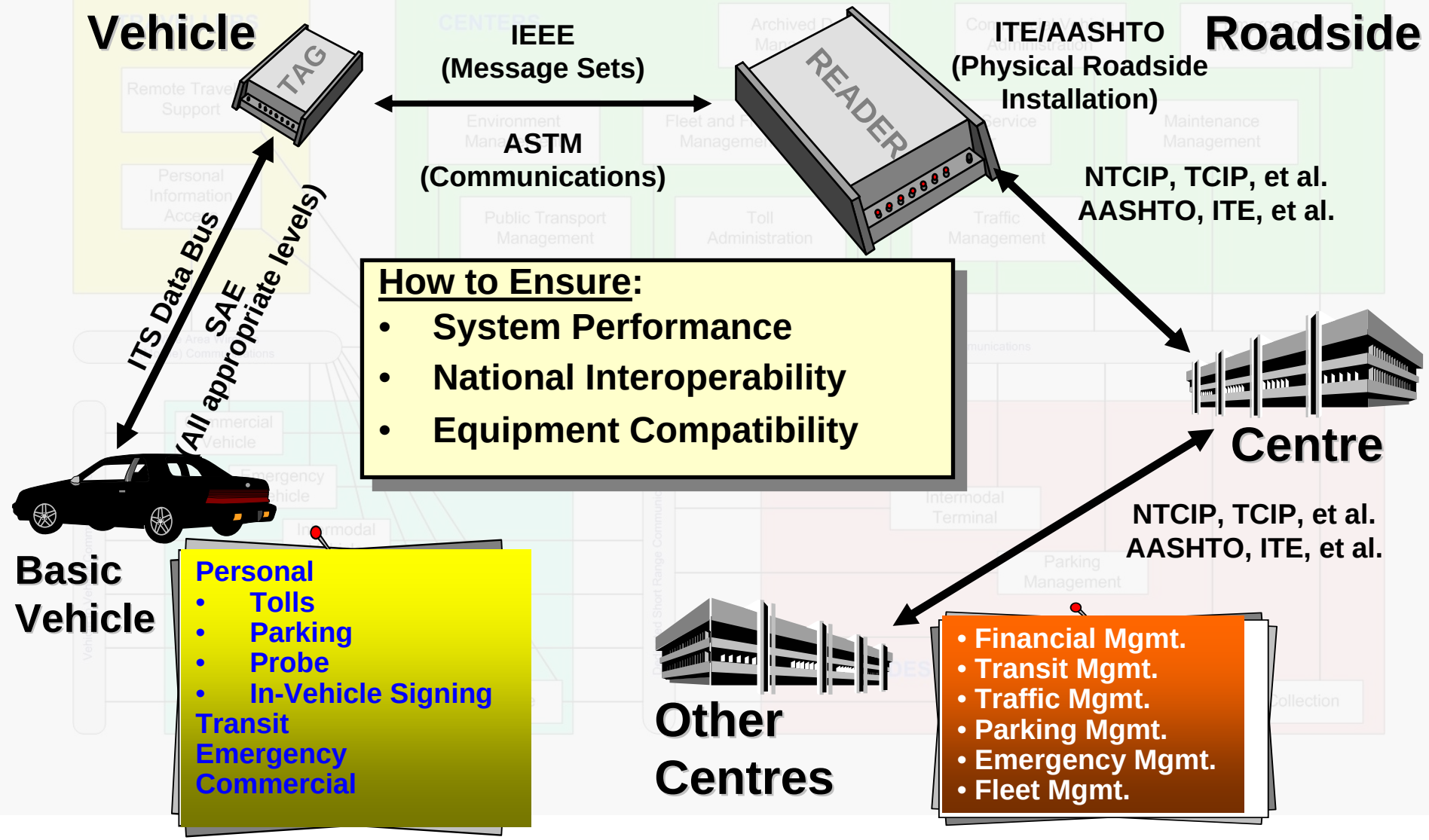
*NTCIP: National Transportation Communications for ITS Protocol

How is the Architecture Linked to Messages and Data Elements?



The Development of ITS System Architecture

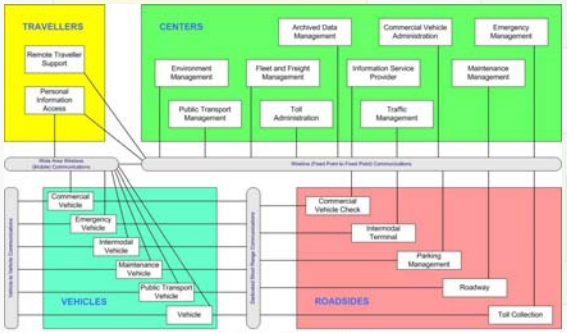
End-to-End ITS Requires Many Consistent and Interoperable Standards



The Development of ITS System Architecture

Standards Requirements

Architecture Definition



Standards Development

Standards Requirements

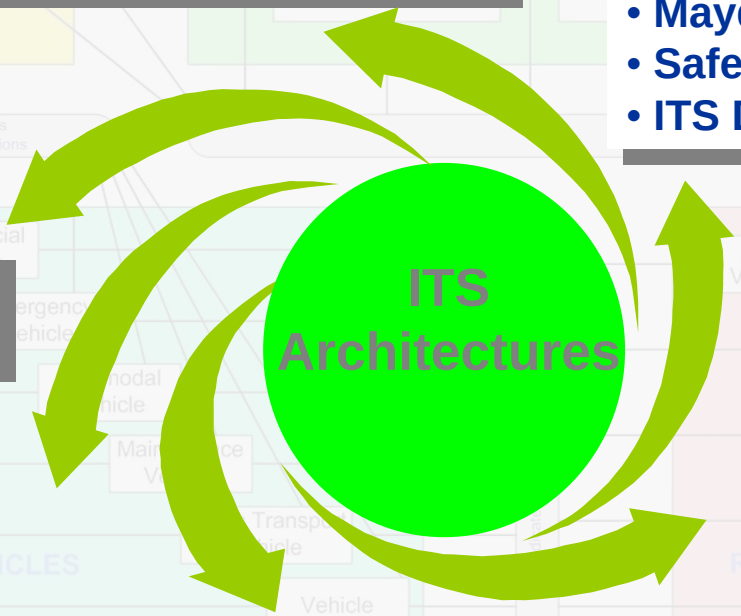
Dedicated Short Range Communications (DSRC)	Digital Map Data Exchange and Location Referencing	Signal Priority for Emergency and Transit Vehicles	
Traffic Management Centre to Roadside Devices	Information Service Provider Wireless Interfaces	Emergency Management Centre to Other Centres	
	Data Exchange for Commercial Vehicle Ops	Information Service Provider to Other Centres	
	Personal, Transit, and HAZMAT Maydays	Transit Management Centre to Transit Vehicle and Kiosks	
	Traffic Management Centre to Other Centres	Highway-Rail Intersections	Archived Data Management Interfaces

Standards Development Organizations (SDO)

- AASHTO
  - American Association of State Highway & Transportation Officials
- ANSI
  - American National Standards Institute
- ASTM
  - American Society for Testing and Materials
- IEEE
  - Institute of Electrical and Electronic Engineers
- ITE
  - Institute of Transportation Engineers
- NEMA
  - National Electrical Manufacturers Association
- SAE
  - Society of Automotive Engineers
- ISO
  - International Organization for Standardization

The Development of ITS System Architecture

Architectures Drive Standards



IEEE
- DSRC/AVI Message Sets
- Incident Management Message Sets
- Data Dictionary Template
- Message Set Template

SAE
- Msg Set over Bandwidth Restricted Media
- Traveller Info Data Dictionary/Msg Set
- Location Referencing Specification
- Interactive Route Guidance Message Set
- Mayday Reporting Interface
- Safety and Human Factors
- ITS Data Bus (IDB)

ANSI
- CVO EDI

ITE/AASHTO/NEMA
- NTCIP
- TCIP Data Dictionary/Msg Set

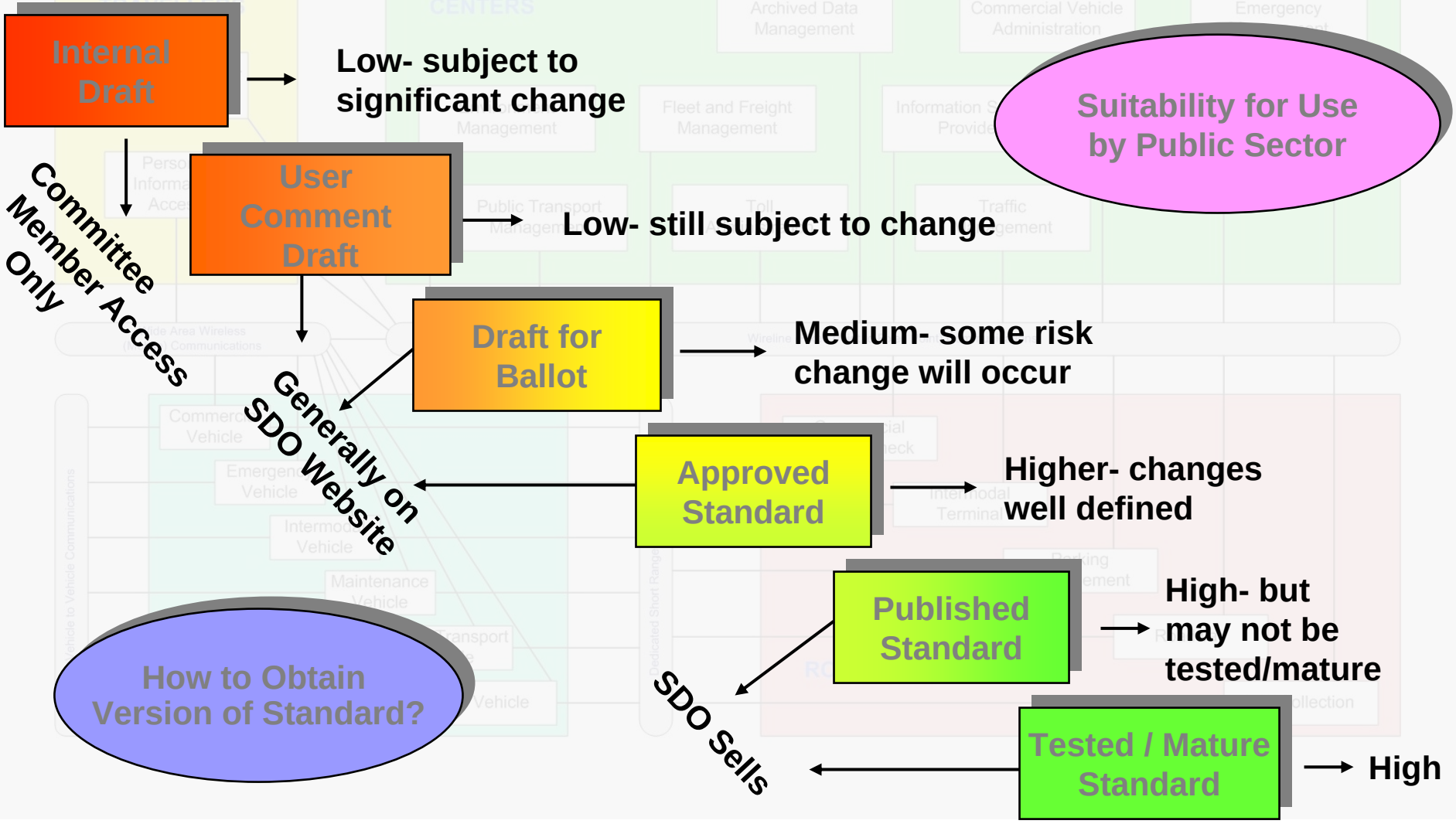
ITE/AASHTO
- Traffic Management Data Dictionary
- External TMC Message Set

ITE only
- Advanced Traffic Controller (ATC)

ASTM
- DSRC Level 1 and 2

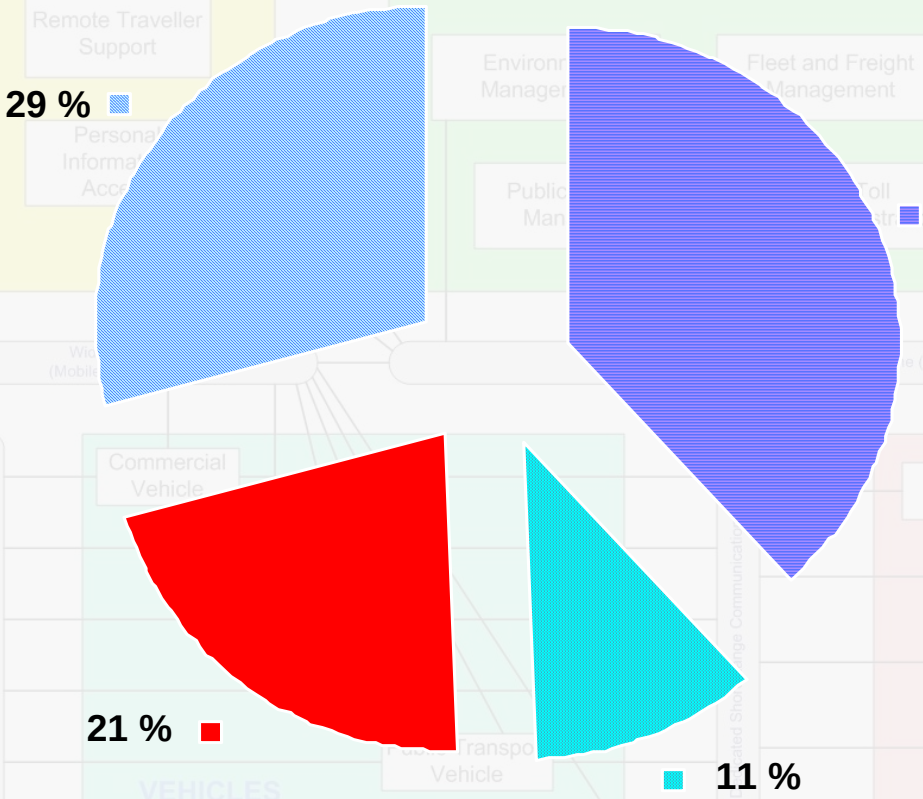
The Development of ITS System Architecture

Stages of Development of a Standard



The Development of ITS System Architecture

Standards for the U.S. National ITS Architecture



- Published 39 %
- Approved 11 %
- In Ballot 21 %
- Under Development 29 %

Source: www.its-standards.net

National Transportation Communications for ITS Protocol (NTCIP)

- Scope
  - Family of Standards
  - Joint Committee of AASHTO, ITE, and NEMA
  - Data/Messages/Communications Profiles
- Architecture Interfaces Covered
  - Roadside (RS) to Traffic Management (TMS)
  - Most Centre to Centre Interfaces
    - Traffic Management (TMS), Transit Management (TRMS), Archived Data Management (ADMS), Information Service Provider (ISP), Emissions Management (EMMS), Toll Administration (TAS)
  - Plus Transit Interfaces (see TCIP charts)

Transit Communication Interface Profiles (TCIP)

- Scope
  - Family of Standards
  - Primarily Transit-related ITS standards
  - Committee of NTCIP
  - Data/Messages
- Architecture Interfaces Covered
  - Transit Management (TRMS) to Other Centers
  - Transit Management (TRMS) to Transit Vehicles (TRVS)
  - Transit Management (TRMS) to Kiosks (RTS)

Traffic Management Data Dictionary (TMDD)

- Scope
  - TMS Data Dictionary Elements
  - ITE/AASHTO
- Architecture Interfaces Covered
  - Traffic Management (TMS) to Other Centers (including other TMS)
  - Data Elements include:
    - Links and Nodes, Events and Incidents
    - Ramp Metering, Vehicle Probes, Traffic Control
    - DMS, CCTV, HAR, Weather Forecast

External TMC Message Set

- This is the message set counterpart to the TMDD (data dictionary)
- Scope
  - Messages for TMS Interfaces
  - ITE/AASHTO
- Architecture Interfaces Covered
  - Traffic Management (TMS) to Information Service Provider (ISP), Other TMS, Transit Management (TRMS), Emergency Management (EMS) and Toll Administration (TAS)

Message Set for Incident Management

- Scope
  - Primary Emergency Services standardization effort in ITS
  - IEEE
  - Focus on Messages
- Architecture Interfaces Covered
  - Emergency Management Subsystem Interfaces
    - To Other Centers
    - To Terminators (e.g. Emergency Telecom. System)
    - To Emergency Vehicles (future)

ISO Technical Committee 204

- Scope
  - Family of Standards
  - International representation
  - Information, communication and control systems in the field of urban and rural surface transportation
  - 12 Working Groups
    - Architecture (WG1)
    - Database (WG3)
    - AVI (WG4)
    - Electronic Toll (WG5)
    - Fleet Management (WG7)
    - Public Transport (WG8)
    - Integrated Transport (WG9)
    - Traveller Information (WG10)
    - Dynamic Information (WG11)
    - Warning and Control Systems (WG14)
    - DSRC (WG15)
    - Wide Area Communications (WG16)

How do I specify which standards to use?

Just specify NTCIP Compliant"

WAIT!

You have choices to make!

What Device

- VMS
- Traffic signal controller

What Objects

- Mandatory
- Optional

What Communications Profile

- SNMP
- STMP

What Options?

Choose the standards and options that best meet your needs!

Where to Find More Information

- General Standards Information Sites
  - ITS America Standards Home Page (www.itsa.org/standards.html)
  - ITS Standards Home Page (www.its.dot.gov/standard/standard.htm)
  - ITS Standards Testing (www.its.dot.gov/standard/Testing.htm)
  - ITS Standards Fact Sheets (www.its.dot.gov/standard/Fact_sdo.htm)
- Specific Standards (available for user comment)
  - National Transportation Communications for ITS Protocol (NTCIP) standards (www.ntcip.org)
  - TCIP standards (www.tcip.org)

Where to Find More Information (2)

- Selected Standards Development Organization Sites
  - American National Standard Institute (ANSI) (www.ansi.org)
  - IEEE ITS Standards (grouper.ieee.org/groups/scc32/index.html)
  - Institute of Transportation Engineers (ITE) (www.ite.org)
  - International Standards Organization (ISO) (www.iso.ch)
  - Society of Automotive Engineers (SAE) ITS Standards (www.sae.org/TECHCMTE/gits.htm)

Summary - ITS Standards

- Open Interface Definitions for ITS
- Focused on Architecture Subsystem Interfaces
  - Map of Architecture Flows to Standards Activities
  - More than one standard applies to a single interface
- Types of Standards (3)
  - Data Elements (e.g. TMDD)
  - Message Sets (e.g. External TMC Message Set)
  - Communications Profiles (e.g. NTCIP Class B)
- ITS Standards are at different levels of maturity