ITS Joint Program Office

ITS PCB Course Plan

November 8, 2017

Role of academic institutions

- There is a growing demand for degree and certificate programs in the ITS field

- ITS education requires a cross-disciplinary approach to developing knowledge and skills in both traditional subject areas (civil engineering) and non-traditional areas (computer science and urban planning)

- ITS PCB Program needs to work in partnership with community colleges, universities, and training programs of the USDOT to develop and deliver a consistent curriculum in ITS

ITS PCB Program Partnerships

US Department of Transportation

State, Regional, and Local Associations

Training and Academic Organizations

Professional Associations

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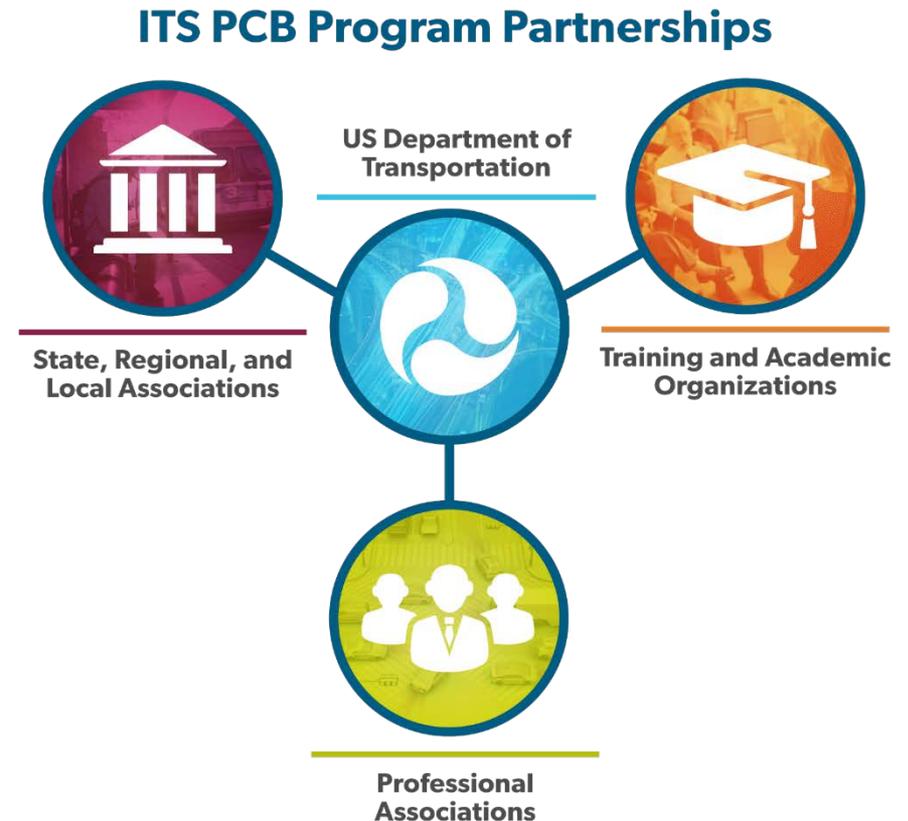
The ITS PCB Course Plan builds upon prior efforts

The 2015 Connected Vehicle Training and Education Implementation Plan addressed CV training needs for transportation professionals.

- The ITS *PCB Course Plan leveraged the previous implementation plan by building off the following:*

| Plan Methodology | Stakeholder Relationships | CV Course Database | Initial Findings |

Efforts leading up to the ITS PCB Course Plan

Conducted research and held **12** USDOT interviews to define CV training stakeholders

Held **4** consumer training focus groups to better understand CV training needs

Assessed over **70** ITS/CV related courses from the ITS PCB program and training partners

Start of ITS PCB Course Plan project

Conducted a training gap analysis based on courses available and KSA needs

2014

2015

2016

Defined initial CV KSA framework consisting of competencies and audiences

Developed an implementation plan for CV training courses

Held a **1.5 day** workshop with **21** training providers to identify CV trainings as well as competency and training consumers' needs

Aligned KSA framework to training course in a searchable database

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Training framework will aid users in identifying applicable training

Standardized definitions were developed for audience segments, program areas, competency areas, and competency levels.

Competency Area		Competency Level	
Architecture	Data Management	Introductory	
Legal	Operations	Practitioner Basic	= KSA
Procurement	Standards		
Strategy/Challenges	System Security	Practitioner Advanced	
Systems Engineering	Technologies/Applications		
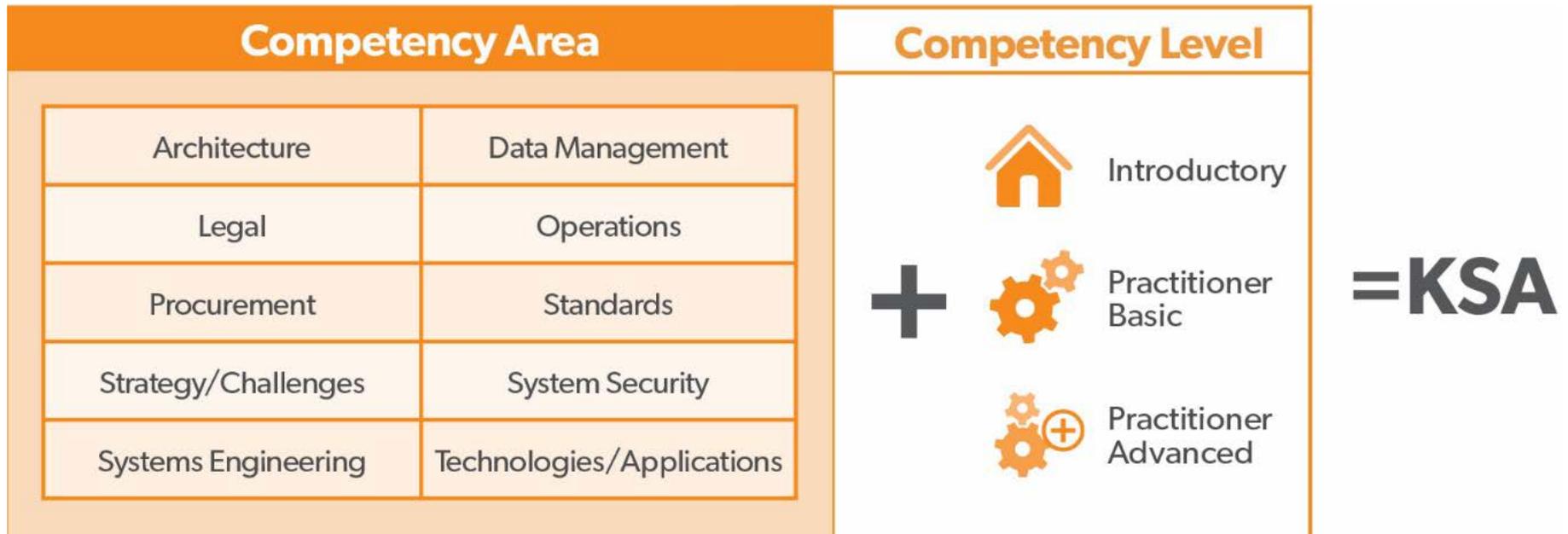
18 audience segments, 13 program areas, 10 competency areas, and 3 competency levels

Competency Areas (1 of 2)

Competency Area	Description
Architecture	• Systems development and implementation • Integration between systems and technologies • Workflow/procedures/processes • ITS national and sub architectures • Regional versus agency-specific implementation of ITS technologies
Data Management	• Data collection/data storage/data sharing/data mining/data scrubbing • Data integration • Data analysis and data driven decision making • Data security and cyber security
Legal	• National, regional, state, city or agency policies, regulations, and/or laws • Legal, legislative, social, and ethical considerations that may facilitate or limit ITS technologies
Operations	• Standard operating procedures • Benefits and costs of deploying ITS technologies • Transition from current back end operations to ITS-CV-AV enabled environments • Integration of new data sources into existing operational decisions • Linkages, interaction, limitations, and capabilities of ITS-CV-AV • Decision support systems
Procurement	• Products, services, equipment required for deployment • Comparative costs of systems/components • Predetermined specifications/requirements • Market vendors • Contracting/Negotiations

Competency Areas (2 of 2)

Competency Area	Description
Standards	• Technical specifications • Rules, guidelines, and definitions • Roles, benefits, and description of existing ITS related standards • Emerging technologies relationship to existing technical standards • Limitations of existing equipment • Protocols for easier integration of systems and automated exchange of data among agencies • Design standards
Strategy/ Challenges	• Long term planning and data driven decisions • Market trends • Costs and benefits of disruptive technologies • Funding strategies • Performance measures • Stakeholder relations and partnerships • Civil liberties and privacy • Best practices
Systems Engineering	• Deployment, feasibility, design • Systems engineering lifecycle • Analysis, modeling, and simulation
System Security	• Physical threats • Cyber security • Security Credential Management Systems (SCMS) • State/local/agency access security protocol
Technologies/ Applications	• Overview of ITS-CV-AV technologies, applications, best practices • Emerging trends and technologies in transportations • Benefits of ITS-CV-AV technologies

Competency Levels

Competency Level	Description
Introductory	The learner requires foundational level knowledge and awareness of concepts and topics in the identified competency area(s). The competency area itself may be highly technical but the learner's knowledge is that of awareness and understanding. The emphasis at this level is on concepts, frameworks, and vocabulary.
Practitioner Basic	The learner requires the ability to apply material in the identified competency area(s) at a basic level, to play a supporting or contributing role in the competency area(s) covered.
Practitioner Advanced	The learner requires advanced level understanding and/or mastery in the competency area. This competency level enables the learner to apply knowledge and understanding in complex and advanced scenarios, including formulating project or system designs, providing oversight, or performing another leadership role in the competency area(s) covered.

Program Areas (1 of 2)

Program	Description
Accessible Transportation Technologies Research Initiative (ATTRI)	Initiative to develop use of ITS technologies to improve transportation options for people with disabilities, including veterans and older adults.
Active Traffic Management	Use of ITS to dynamically manage recurrent and non-recurrent congestion.
Advanced Vehicle Safety Systems	In-vehicle ITS technologies that help drivers avoid collisions, monitor performance, and automatically signal for emergency assistance in the event of a collision. • Collision avoidance systems • Vision enhancement for crash avoidance • Lane departure warning systems • Drowsy driver warning systems • Safety readiness • Pre-crash restraint deployment • Vehicle-to-vehicle (V2V) • Vehicle-to-infrastructure (V2I) • Vehicle-to-pedestrian (V2P)
Commercial Vehicle Operations (CVO)	Use of ITS to improve truck operations. • Electronic clearance • Automated roadside safety inspection • On-board safety and security monitoring • Administrative processes (e.g., credentials, fuel and mileage information, permits) • Hazardous materials security and incident response • Fleet management • Freight operations management • Freight asset management • Route management • Parking management
Cyber Security	Application of system security processes and practices to protect ITS technologies from unauthorized access or attack.

Program Areas (2 of 2)

Program	Description
Incident/Emergency Management	Use of ITS to detect, respond to, and clear traffic incidents quickly. • Emergency notification system • Commercial Mobile Alert System (CMAS) • Emergency vehicle management
Integrated Corridor Management (ICM)	Use of ITS to better utilize multi-modal capacity along an entire corridor, including parallel roadways and transit service.
Public Transportation Management	Use of ITS to improve the operations, planning, management, and safety of public transportation services. • En-route transit information • Personalized public transit • Paratransit accessibility • Public transportation security • Fleet management
Roadway Safety Systems	Use of ITS embedded in or adjacent to roadways to improve user safety.
Road Weather Information	Use of ITS to provide real-time information on road and weather conditions.
Smart Communities	The integration of ITS technologies and applications, information and communication technology (ICT), and Internet of Things (IoT), in an urban development to improve citizen's quality of life.
Transportation Demand Management	Use of ITS to reduce travel demand or to spread the demand over space or time by influencing pre-trip decision making. • Ride matching and reservations • Variable pricing • High-occupancy vehicle (HOV) lanes
Traveler Information	Use of ITS to provide static and real-time information on traffic conditions, schedules, road and weather conditions, special events, etc., both to users and to operators, managers, and maintenance professionals. • Pre-trip travel information • En-route driver information • Route guidance • Highway Advisory Radio

The ITS PCB Course plan developed 13 course recommendations to address key gaps

Year	Task	Key Activities
FY18	1	Implement initial core curriculum[1]
	2	Modify "Advanced Systems Engineering for Advanced Transportation Projects", provided by CITE
	3	Create an introductory level procurement course focusing on CV components
	4	Finalize CV200 series in an online format
	5	Customize the ITS Data Program's Open Source and Agile for ITS training for widespread delivery by the ITS PCB Program
FY19	6	Create an ITS-CV-AV focused introductory level data management course
	7	Modify "Automated Vehicles and Policy", provided by ITS PCB Program
	8	Modify, "Archived Data for Planning, Operations, and Safety", provided by CITE
	9	Incorporate the Connected Vehicle Reference Implementation Architecture (CVRIA) framework into practitioner basic architecture courses
FY20	10	Modify the existing practitioner basic course "Managing High Technology Projects in Transportation", provided by CITE
	11	Create a modular practitioner basic cyber security class (e.g., physical, cyber)
	12	Modify "Operations Performance Management: Real-time Operations to Long-term Planning", provided by CITE
	13	Create Practitioner Advanced Connected Vehicle Data Analytics Course to Optimize Operations

ITS core curriculum

Introductory Trainings	Provider	Status
CV101	CITE	No change
Automated Vehicles and Policy – Updated Webinar and Archives (Rec #7)	ITS PCB	Modify
Roles of Public & Private Sectors in ITS: Cooperative Partnerships	CITE	No change
Procurement Course on CV/AV and Smart Community (Recommendation #3)	TBD	Develop
Data Management Course (Rec #6)	TBD	Develop
Securing Transportation Systems Webcast	ITS PCB	No change
Introduction to Systems Engineering	CITE	No change
Vehicle-to-Infrastructure (V2I) ITS Standards for Project Managers	ITS PCB	No change
Vehicle-to-Vehicle (V2V) ITS Standards for Project Managers	ITS PCB	No change
Practitioner Basic Trainings	**Provider**	**Status**
CV 200 Series – 1) General, 2) Planning, 3) Deployment (Rec #4)	TBD	Develop
Deploying ITS: Strategic Planning and Implementation	CITE	No change
Introduction to the National ITS Architecture – incorporating CVRIA (Rec #9)	CITE	Modify
ITS Procurement	NHI	No change
Managing High Technology Projects in Transportation (Rec #10)	CITE	Modify
Operations Performance Management: Real-time Operations to Long-term Planning (Rec #12)	CITE	Modify
Fundamentals of Database Management Systems	CITE	No change
Archived Data for Planning, Operations, and Safety (Rec #8)	CITE	Modify
Cyber Policy Modular Course (Rec #11)	TBD	Develop
Advanced Systems Engineering for Advanced Transportation Projects (Rec #2)	CITE	Modify
Practitioner Advanced Trainings	**Provider**	**Status**
Connected Vehicle Data Analytics to Optimize Operations Course (Rec #13)	TBD	Develop