ITS Research Needs and Collaboration in the Asia-Pacific Region

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Outline

- Introduction
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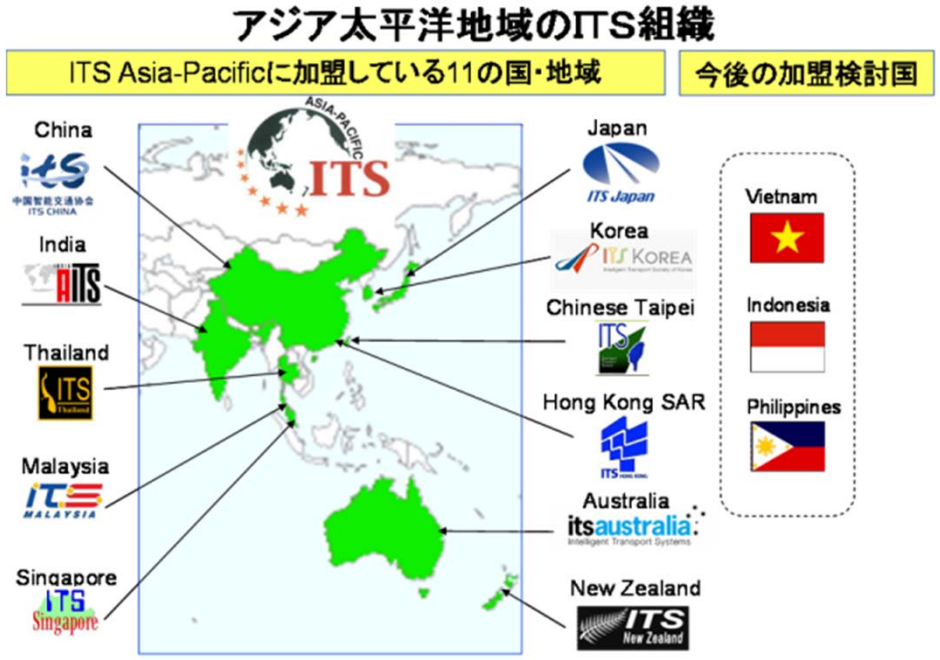
- ITS/Telematics industry and market
- Identifying ITS research needs
- ITS International collaboration mechanism
- Conclusions

Introduction

- **Background**
  - Traffic characteristics and advanced ICT technologies development in the A-P area
  - Problems associated with transport systems: users' internal costs and external costs of the society as-a-whole
  - ITS characteristics:
    - multi-discipline
    - inter-discipline
    - integration

- **ITS collaboration in the Asia Pacific area**
  - Eastern Asia Society for Transport Studies (EASTS) Kawana meeting, 1994
  - APEC/TPT-WG ITS Group inaugural meeting, 1997
  - ITS Asia-Pacific BOD, 11 countries / areas signed the 1st Memorandum of Understanding, 1999
  - Subcommittee on Asia Transportation Activities, ATA, A0010(3) under TRB Committee on International Activities, A0010, 2010
  - The 11th & 12th ITS Asia-Pacific Forum and Exhibition (Kaohsiung and Kuala Lumpur meetings)

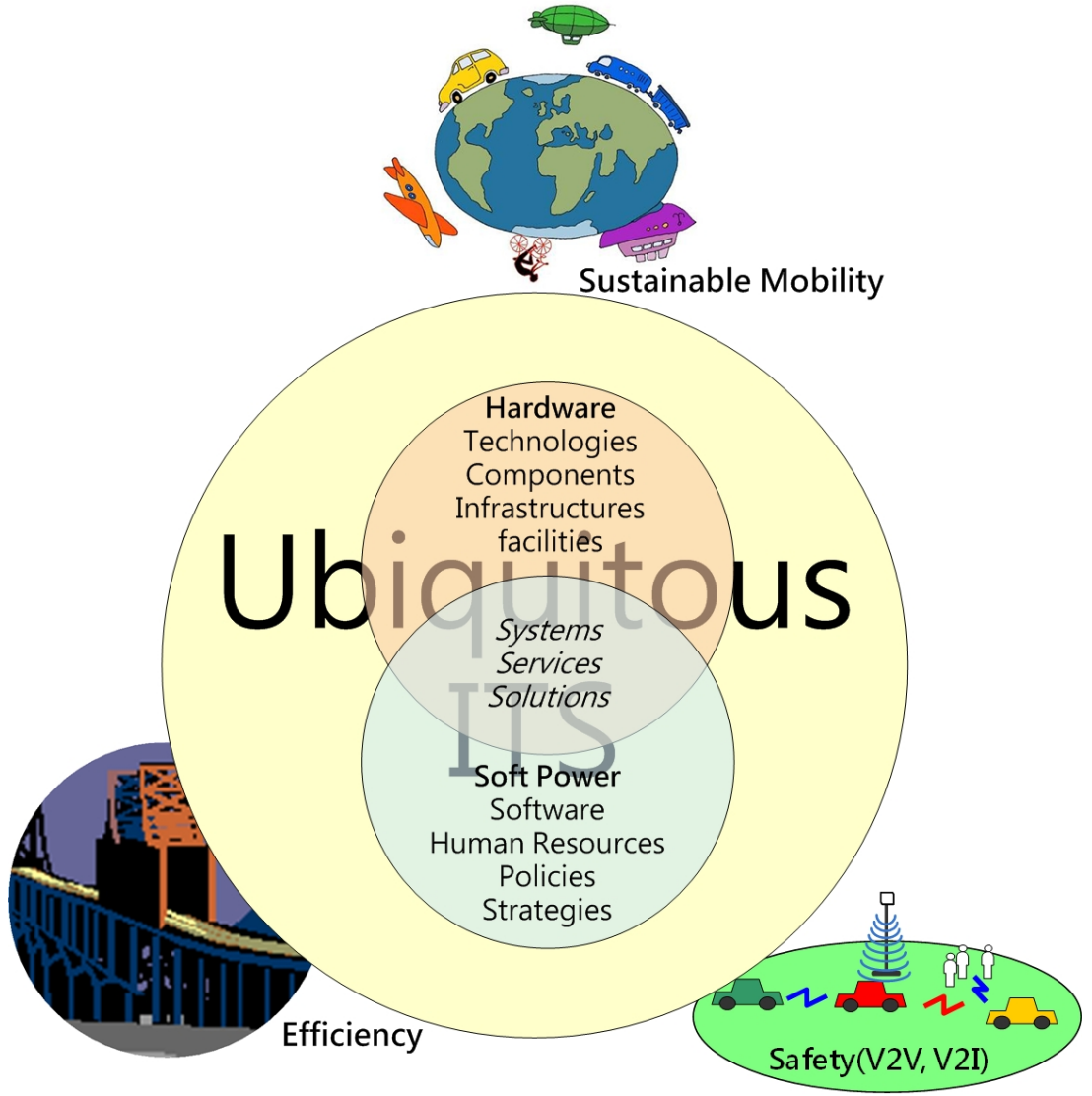


Source: ITS Japan, 2011

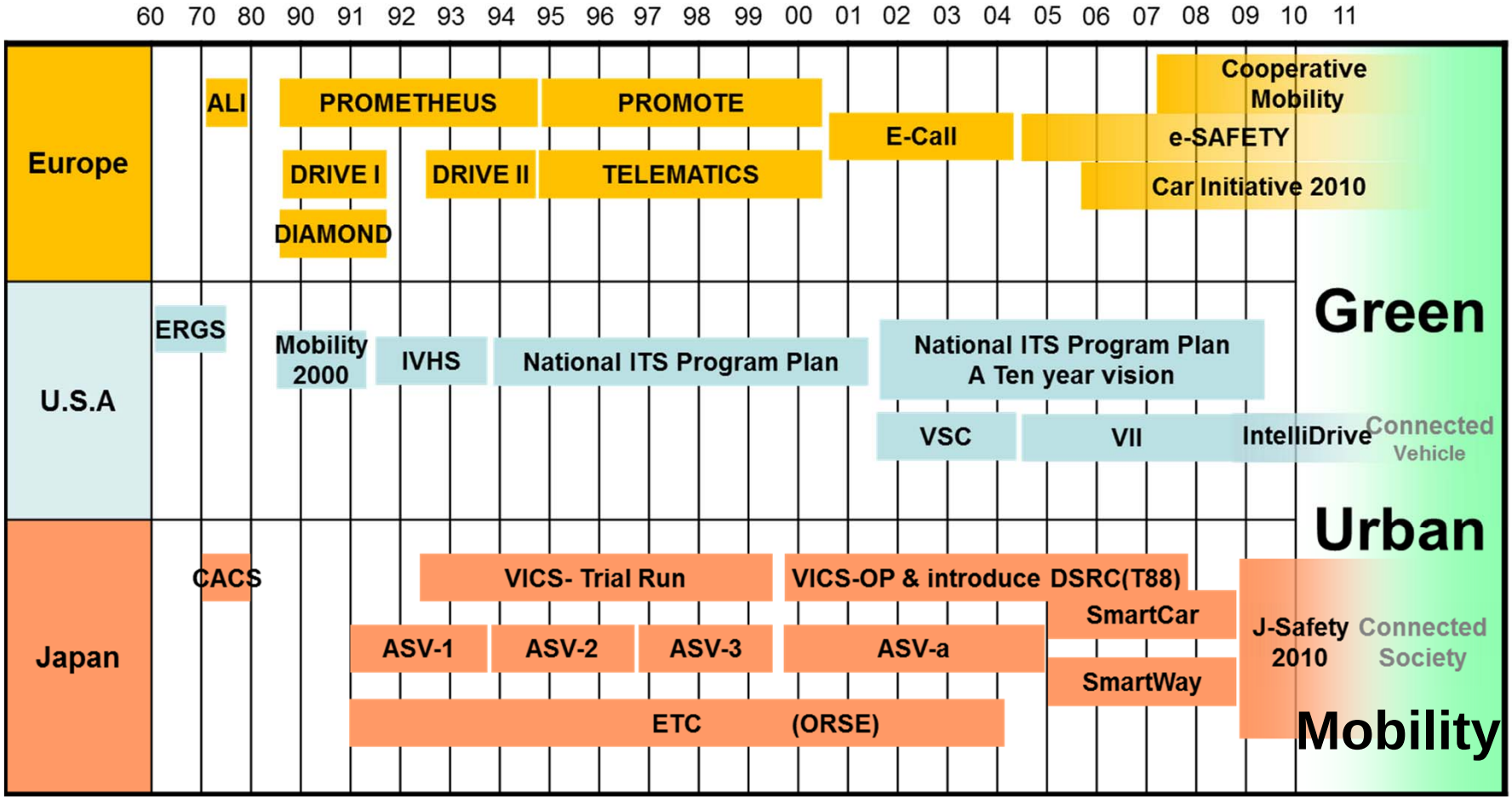
- **Research objectives**
  - summarize the most recent development and deployment of ITS in the Asia-Pacific region;
  - identify prioritized ITS research through literature review, questionnaire survey and in-depth interview; and
  - propose research collaboration model for ITS through the establishment of an international collaboration platform for information sharing and personnel exchange.

Overview of ITS

- **Ubiquitous ITS**



- **ITS development roadmap**



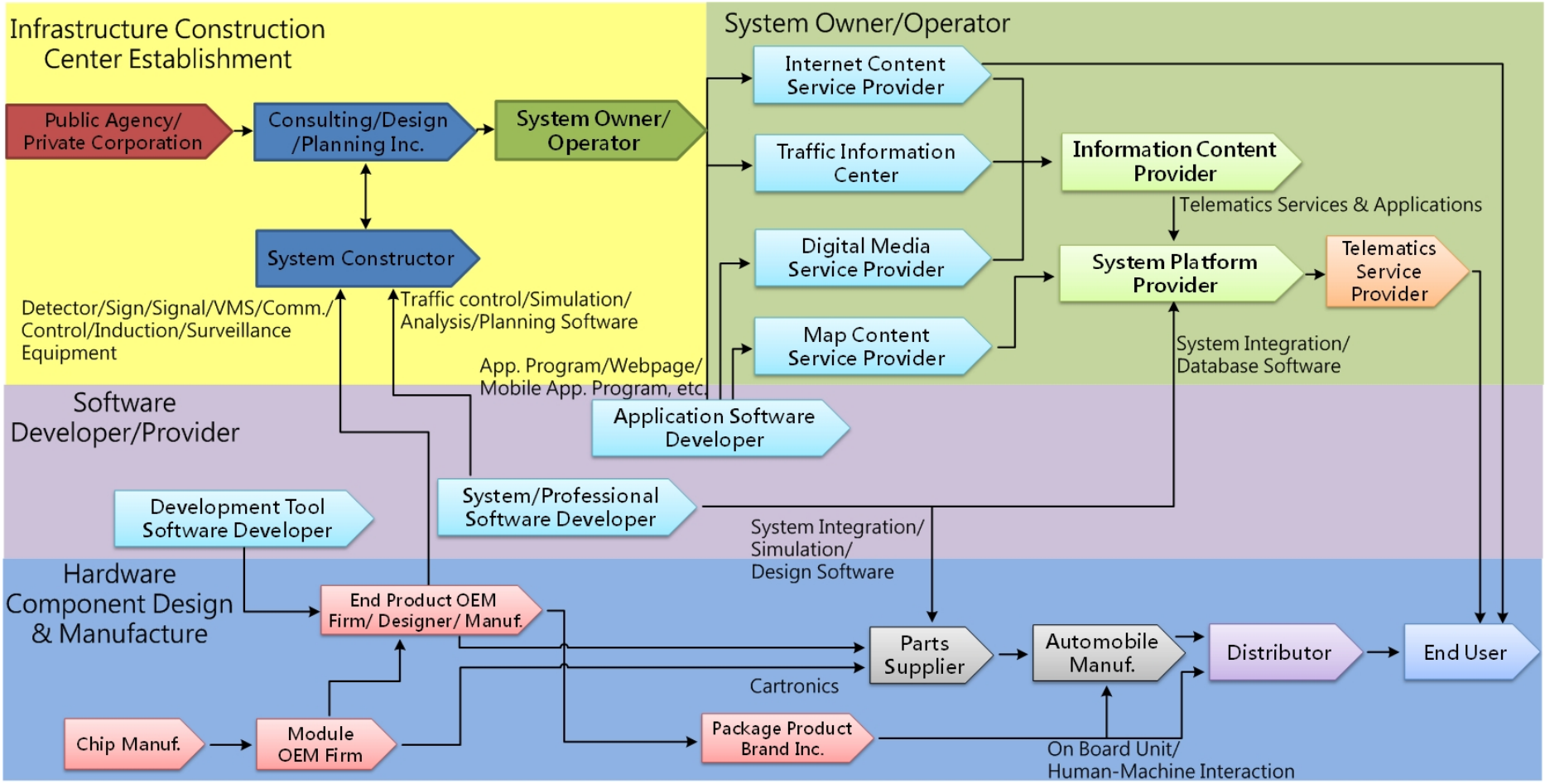
Advanced Traffic Management Systems (ATMS)	Traffic Control
	Signal Control
	Incident Management
	Automated Weather / Road Conditions Detection
Traveler Information & Services (TI&S)	Route Guidance
	Traveler Information Service
	En-route Travel Information
	Pre-trip Travel Information
	Parking Information
Advanced Public Transport Systems (APTS)	En-route Public Transport Information
	Public Transport Operations and Management
	Instant Arrival and Departure Information (Seamless Transportation)
Commercial Vehicle Operations (CVO)	Hazardous Material Incident Response
	Automated Roadside Safety Inspection
	Fleet Management and Monitor
Electronic Payment Systems (EPS)	Electronic Payment Systems (Electronic Ticketing Systems, e-card, etc.)
	Electronic Tolling Collection Systems
Emergency and Disaster Management Systems (EDMS)	Emergency Notification & Broadcasting
	Personalized Emergency Support Systems
	Emergency Vehicle Management
	Rescue Dispatch
	Public Emergency Support Systems
Advanced Vehicle Control, Communications, and Safety Systems (AVCCSS)	Electronic Stability Control
	Dynamic Traffic Management and Local Danger Warnings
	Adaptive Headlights and Brake lights
	Driver Condition Monitoring (physical, alcohol detection, etc.)
	Tire Pressure Monitor Systems
	Speed Alert
	E-Call
	Blind Spot Monitoring
	Vision Enhancement
	Obstacle and Collision Warning
	Lane Departure Warning
	Connected Vehicles (VANet, V2I and V2V)
Vulnerable Individual Protection Systems (VIPS)	Elder, Children and Disabled Protection and Welfare
	Pedestrians, Bicyclists and Motorcyclists Detection and Assistance
Telematics	Integrated Services (Travel and Route Information, Recreation, Rescue, etc.)
Environment and Sustainability	Eco-friendly Vehicle (Energy-saving, Hybrid or Electric Vehicles, etc.)

Lessons learned from the review

- **ITS pioneer: Japan & U.S.A**
  - Technology, information and automobile industries
  - Government agencies integration: Japan
    - Instant information saved lives in the 311 earthquake disaster
- **Asian metropolitans**
  - Highly demanded on surfaced transport
  - Limited lands resource
- **Needs from ITS development in the A-P region**
  - *Safety and security for transport systems (e.g. Smartway in Japan and Connected Vehicle in U.S.A.)*
  - *Public transport*
  - *Traveler information*
  - *Electronic fare payment and toll collection*

ITS/ Telematics industry and market

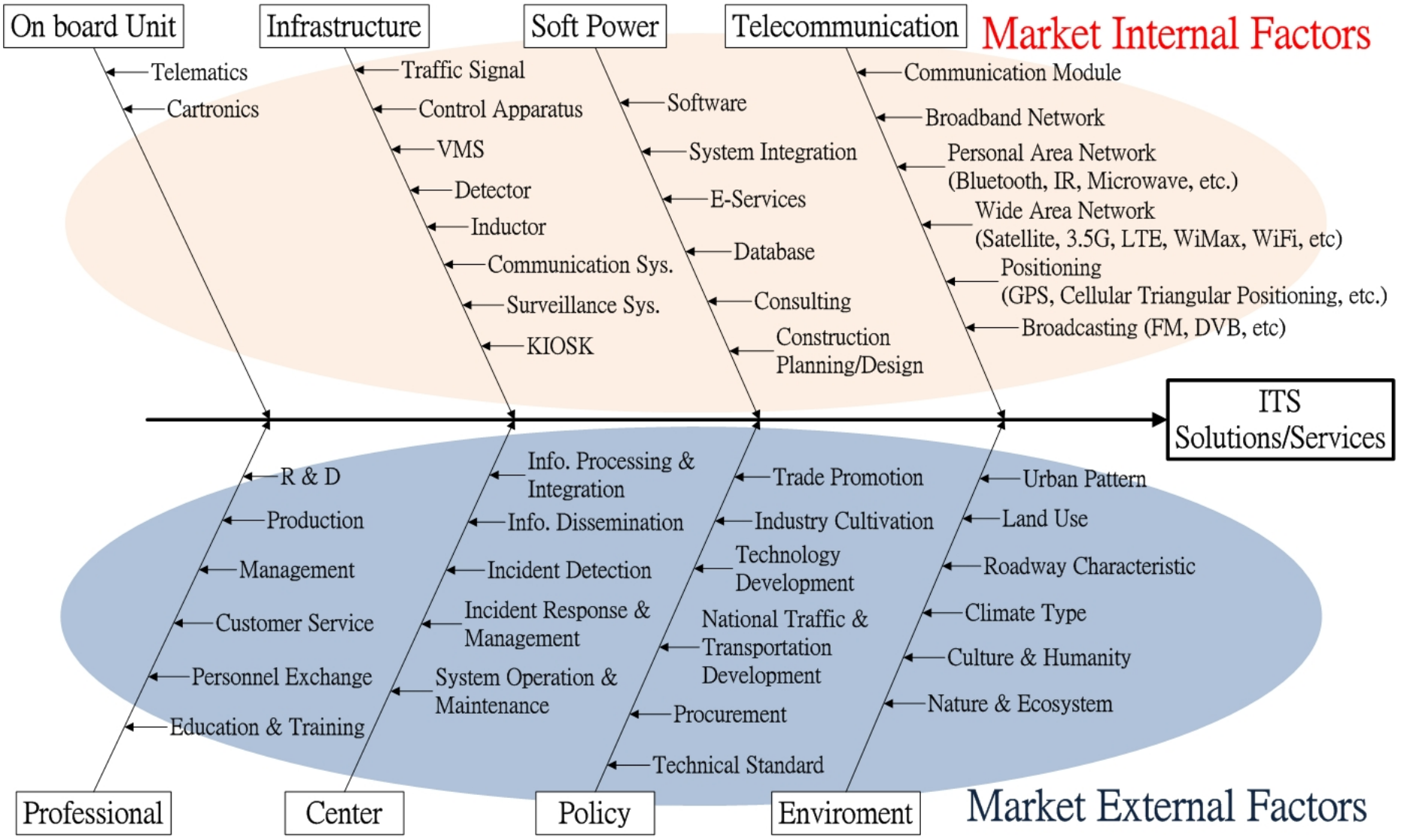
- **ITS industry supply chain**



- **ITS industry supply chain: Taiwanese ITS industry perspective**
  - ITS infrastructure construction
    - Contract issuing: government/ grand private enterprises
    - Contractor: planning & consulting/ constructor
    - System ownership: system owner/ operation team
  - System owner/ operator
    - Original information provider: Internet content, traffic information, digital media, map content
    - Information integration: Information content provider and system platform provider
    - Telematics service provider

- Software developer/ provider
  - Development tool software developer
  - System/ professional software developer
  - Application software developer
- Hardware component design & manufacture
  - Chip manufacturer
  - Module OEM firm
  - End product OEM firm/ designer/ manufacturer
  - Automobile parts supplier
  - Automobile manufacturer
  - Distributor
- End user

- **ITS industry fishbone diagram**
  - Market internal factors
    - On board unit
    - Infrastructure
    - Soft power
    - Telecommunication
  - Market external factors
    - Professional
    - Center
    - Policy
    - Environment
- **ITS solutions/ services**



ITS Industry Fishbone Diagram

Identifying ITS research needs

- **Methodologies to identify ITS research needs in the A-P region**
  - In-depth investigation in the literature
    - Publications
    - Presentations
    - International research projects (e.g., APEC/TP-TWG, World Bank, etc.)
    - Project reports
    - Journal papers
  - Questionnaire survey

- **Rationale of the questionnaire design**
  - **Topics:** Common ITS development and cross-cutting areas
    - Safety and security
    - ETC and e-payment
    - Advanced surface transportation
    - Specification and standardization of ICT for ITS
  - **Critical factors:**
    - Technical aspects
    - Environmental conservation
    - Social welfare and fairness issues
    - Cost-effectiveness
    - Financial sustainability
    - Institutional aspects
    - Policy making and law enactment
    - Industrial promotion and assistance
    - Education and outreach

ITS research needs
Sub-area #1

- **Safety and security**
  - Intelligent vehicle, active and passive safety, vehicle security
  - Integrated disaster detection and warning system, emergency logistics management and rescue resources dispatching
  - Public transit safety and security
    - Public transit protection
    - Evacuation, retreatment, haven
    - Robbery, burglar, sexual harassment
  - Vulnerable individuals protection
    - Aged, disabled, pedestrian
    - Bicyclist, motorcyclist

ITS research needs
Sub-area #2

- **ETC and e-payment**
  - Data transmission, spectrum frequency, enforcement, card security (un-hacked) enhancement
  - Roadway volume control, pricing policy, O-D pattern and traffic volume prediction
  - Business model and opportunity of e-payment
  - ETC and e-payment system integration or joint use by integrated card readers

ITS research needs
Sub-area #3

- **Advanced surface transportation**
  - Urban
    - Data collection and application
    - Integrated traffic control center
    - Real-time traveler information and travel time prediction
    - Public transit and transfer information
    - BRT
    - CVO
  - Intercity/ Suburb
    - Corridor Management (freeway, intercity highway management, etc.)
    - Real-time traveler information & travel time prediction
    - Intermodal transportation (long-haul bus, DRTS, etc.)
  - Rural
    - Mt./Remote highway management & information
    - Intermodal transportation (DRTS, car-sharing, etc.)

ITS research needs
Sub-area #4

- **Specification and standardization of ICT for ITS**
  - Short range communication: DSRC, WiFi, WAVE, Infrared, Bluetooth, Zigbee, etc.
  - Long range communication: Satellite, 3G, HSDPA, LTE, WiMax, etc.
  - Broadcasting: FM, RDS/TMC, DVB, etc.
  - Positioning: GPS, Cellular-based/ Base station positioning
  - Other: VAnet
  - ITS device: ISO/TC-204 related
  - Device for transportation: traffic control, traffic management, storage, etc., NEMA /National standards related

ITS international collaboration mechanism

- **International transportation related organizations**
  - Asia-Pacific Economic Cooperation Transportation Working Group (APEC TPT/WG)
  - International Organization for Standardization (ISO)
  - World Congress on ITS (WCITS)
  - ITS Asia-Pacific Forum (ITS APF)

- **Cases and best practices of ITS International collaboration**
  - China
  - Europe CORDIS FP7
  - Japan
  - U.S.A.

- **Proposed ITS collaboration models**
  - APEC TPT/WG
    - Intermodal and Intelligent Transportation Systems Experts Group (IITSEG)
  - EASTS
    - International Research Group (IRG)
    - International Cooperative Research Activity (ICRA)
  - WCITS and ITS APF

Conclusions

- **Lessons learned from the in-depth review of the literature**
  - Safety and security, public transport, electronic fare payment and toll collection, and integrated traveler information service
- **Issues revealed in the domestic questionnaire survey**
  - Strength: ITS hardware component designer/ manufacture, and software developer and provider
  - Weakness: ITS total solution and system integrator, ITS policy/ support, and technical standards

- **Potential ITS collaboration models in the A-P region**
  - APEC TPT/WG
  - EASTS
  - WCITS and ITS APF

The end, thanks for your attention.

Comments, and Q&A!