Proposal of Canadian Asia-Pacific Gateway Wireless ITS Testbeds –

The ACTIVE Testbed

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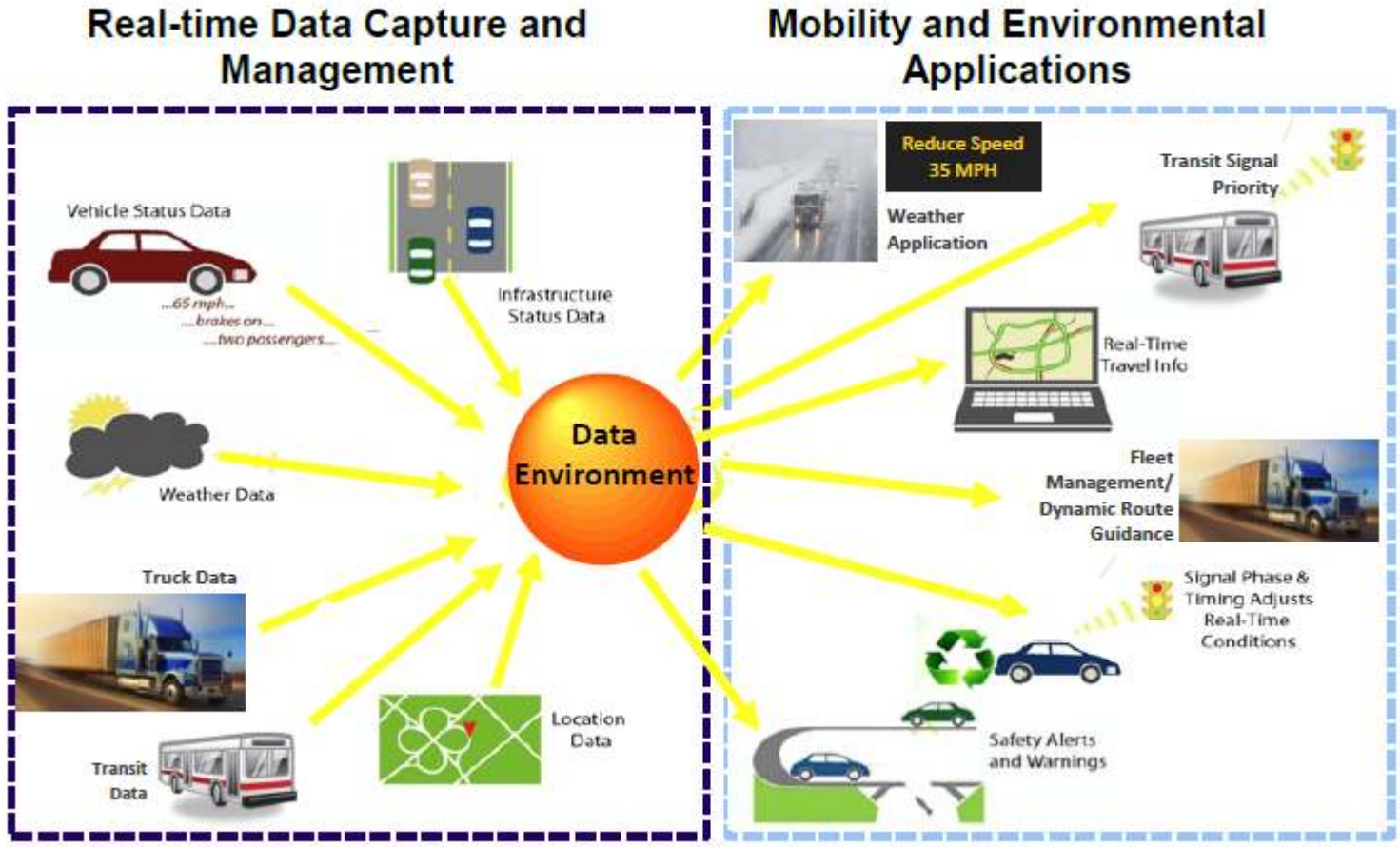
May 2013

What is Connected Vehicle?

- Definition
  - Connected Vehicle is a suite of technologies and applications that use ***wireless communications*** and ***multiple sensors*** to provide connectivity
- Objectives:
  - To improve Safety, Mobility and Environment
- Communications:
  - Vehicle to Vehicle (V2V)
  - Vehicle to Infrastructure (V2I)
  - Vehicle to Vehicle and Infrastructure (V2VI)

What is Connected Vehicle?

- Traditional ITS vs Connected Vehicle?



(Courtesy of US DOT RITA)

Connected Vehicle – next BOOM?

- Computer
  - In 1940s, The first electronic digital computers were developed.
- Internet
  - In 1982, the Internet protocol suite TCP/IP was standardized.
  - Commercial Internet service providers began to emerge in the late 1980s and early 1990s
  - As of June 2012, more than 2.4 billion people—over a third of the world's human population—have used the services of the Internet; approximately 100 times more people than were using it in 1995.
  - Data transfer, E-commerce, Social Network
- Smart Phone / Device
  - Mobile Internet - Data transfer, E-commerce, Social Network
  - iPhone, gPhone, Galaxy, etc.
- Internet of things
  - Connected Vehicle
  - Telematics (individuals) / Traffic Management (agencys)

Decision Makings by USDOT

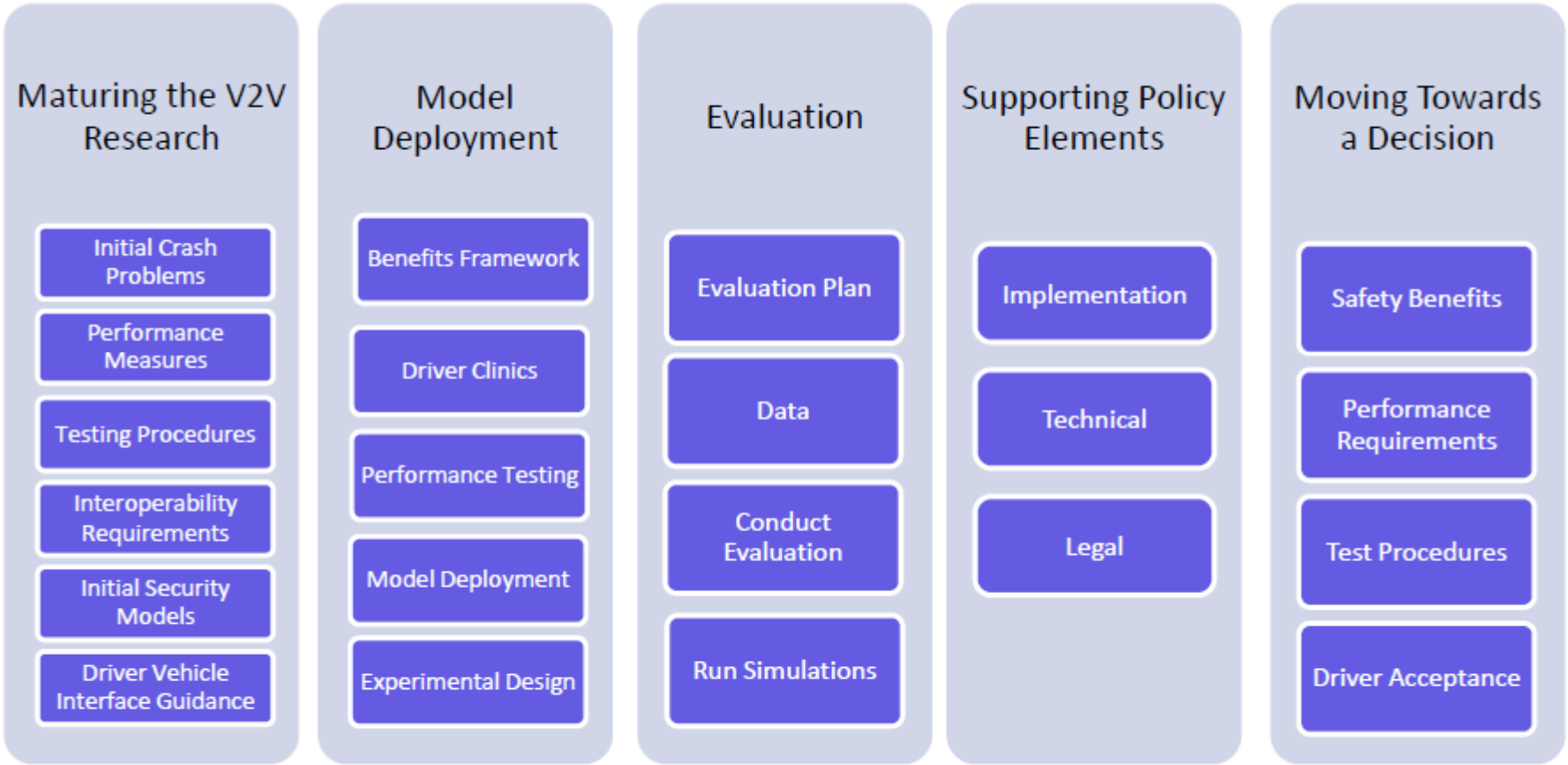
- 2013 Decision on Vehicle Communications for Safety (light vehicles)
- 2014 Decision on Vehicle Communications for Safety (heavy vehicles)
- 2015 Infrastructure Implementation Guidance

Decision Makings by USDOT

- National Highway Traffic Safety Administration (NHTSA) Vehicle Safety and Fuel Economy Rulemaking and Research Priority Plan 2011-2013, including the following items:
  - Safety Need
    - Safety Problem, Preliminary Benefit Estimate, Preliminary Cost Analysis (In-vehicle Equipment, Infrastructure)
  - Practicability
    - Performance (applications, Driver Vehicle Interface, In-vehicle Equipment, Infrastructure), standards, security system and user acceptance
  - Compliance
    - Objective procedures (applications, hardware, security, etc.)

(Courtesy of US DOT RITA)

USDOT Strategic Plan-V2V



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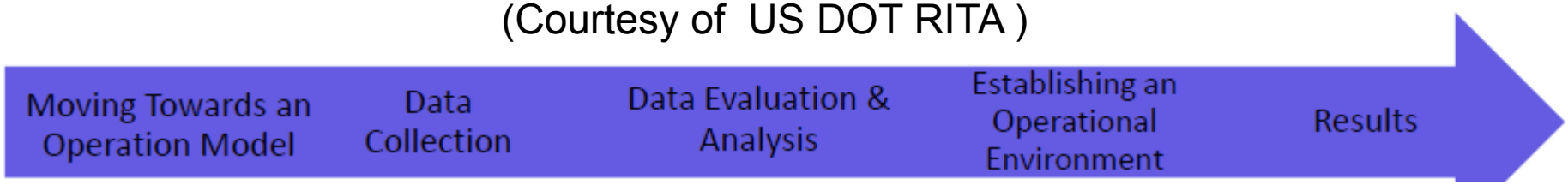
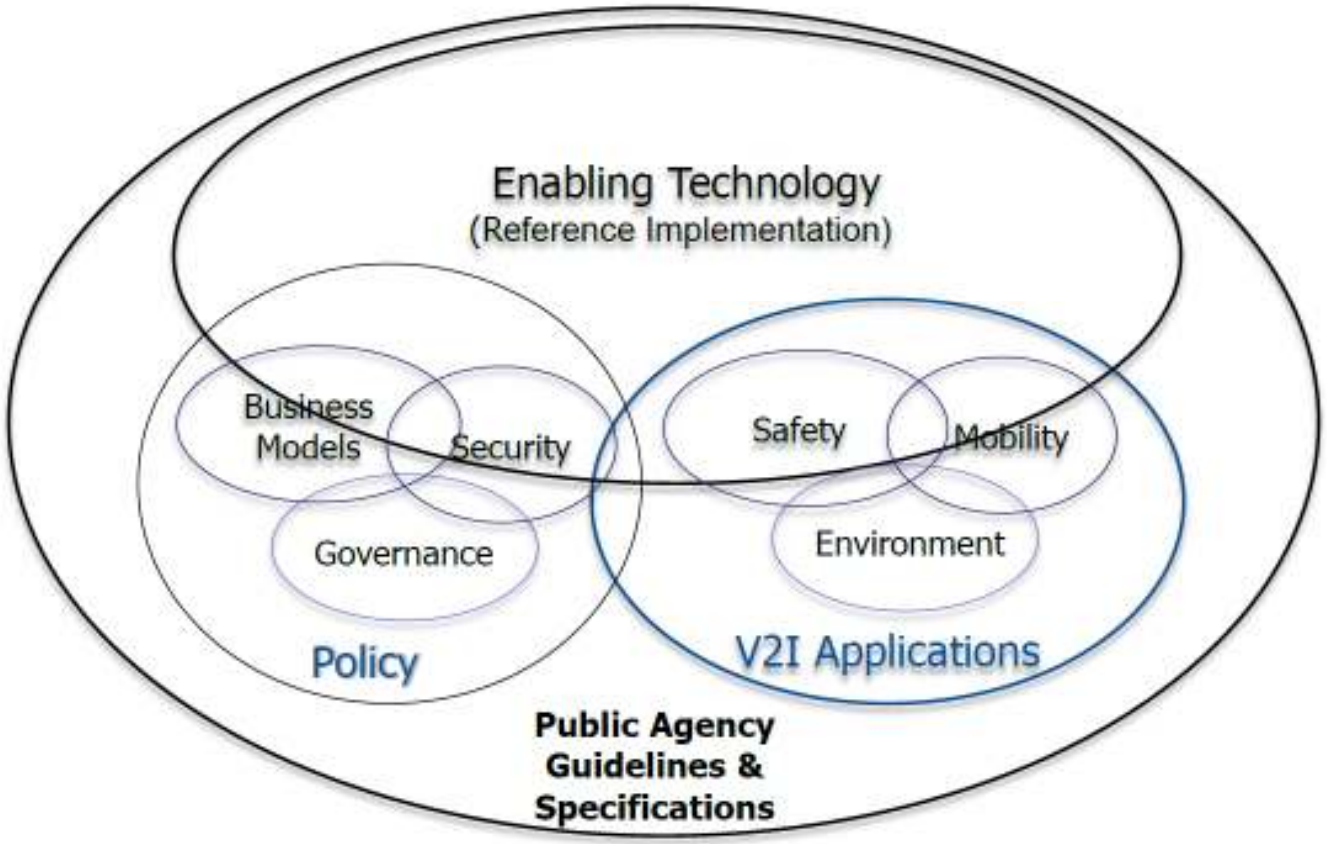


USDOT Strategic Plan-V2I



(Courtesy of US DOT RITA)

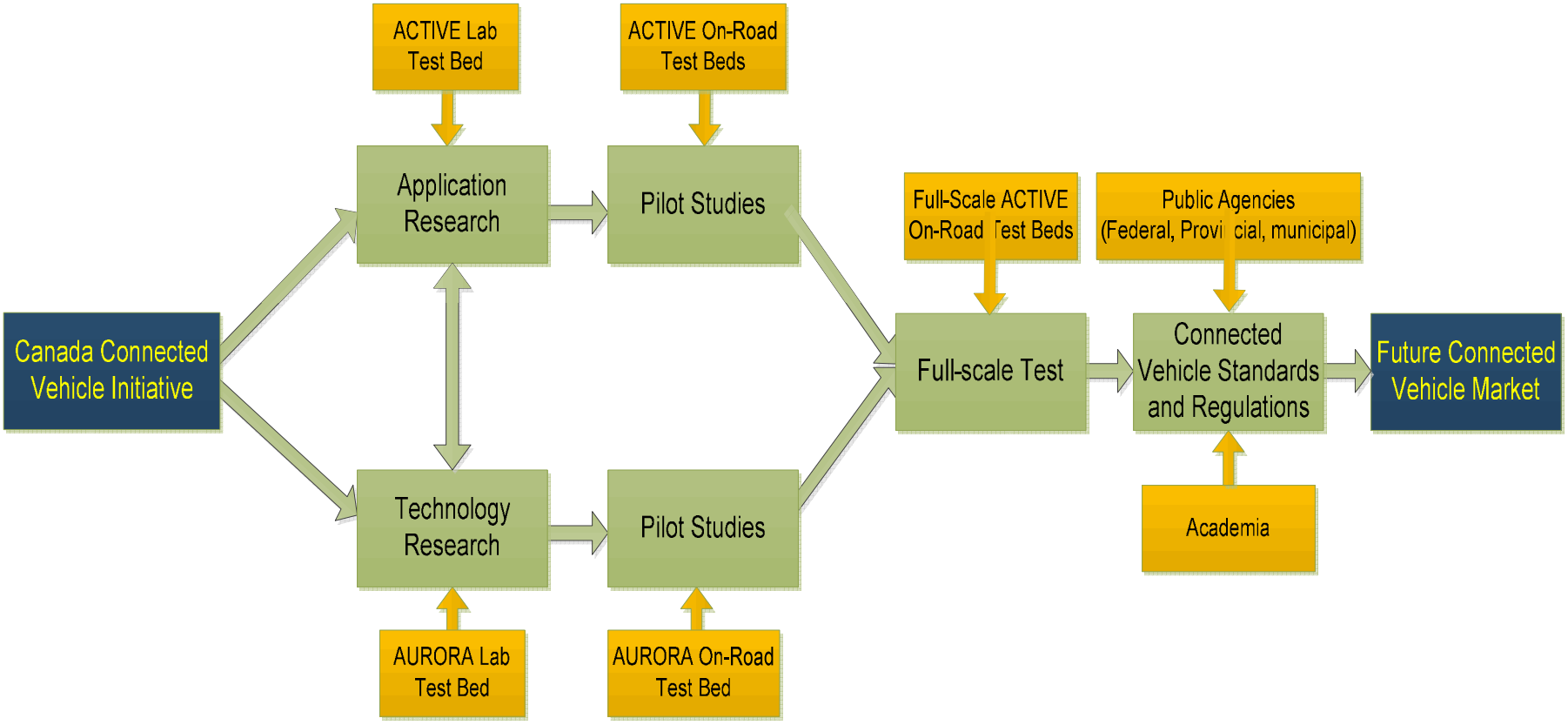
ACTIVE-AURARO

- *Proposal Title:* An infrastructure proposal to build a network of wireless communication testbeds for multimodal transportation to promote commercialization and innovation, and advance education and training in the Asia-Pacific Gateway
- *University of Alberta:* ACTIVE - ***A***lberta ***C***ooperative ***T***ransportation ***I***nfrastructure and ***V***ehicular ***E***nvironment
- *University of British Columbia:* AURORA - ***AU***tomotive testbed for ***R***econfigurable and ***O***ptimized ***R***adio ***A***ccess

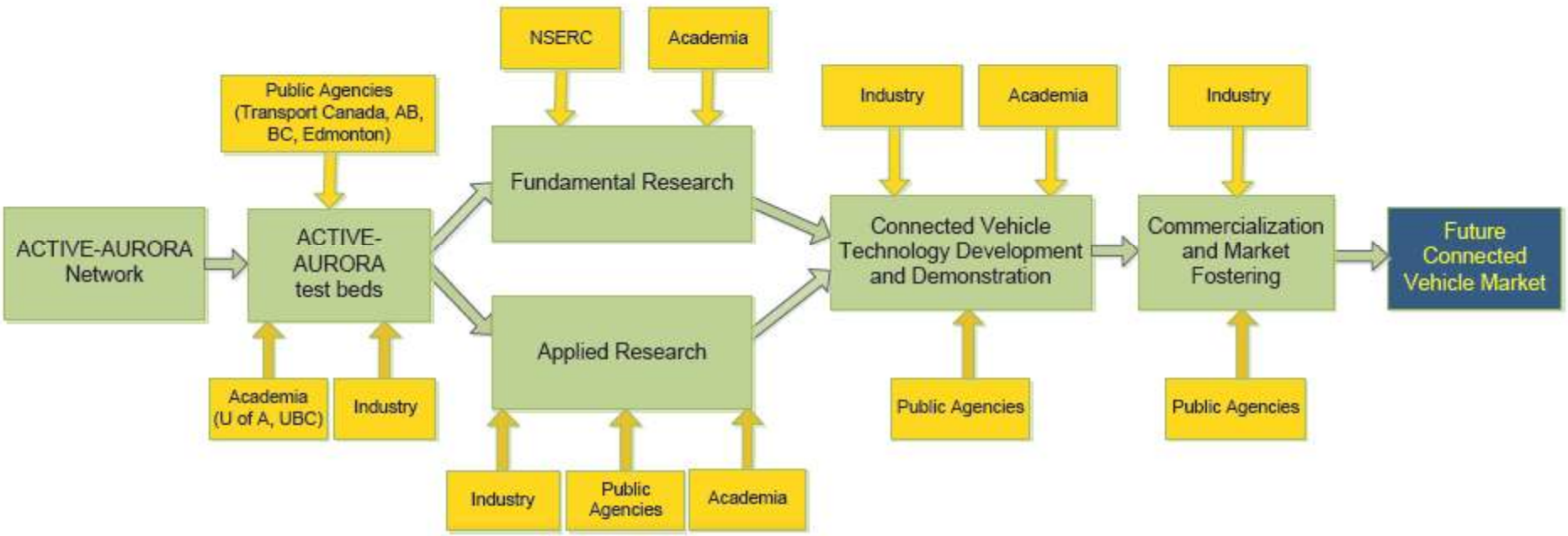
Objectives of ACTIVE-AURORA

- Determine factors that ***limit the performance*** of existing solutions;
- Develop models, simulation methods and experimental techniques that allow ***alternative solutions*** to be systematically evaluated and assessed according to actual roadway environments;
- Identify and demonstrate the ***best solutions*** with an intent to prepare for their adoption, commercialization, and translation into products and applications; and
- Support government agencies to establish ***standards and protocols*** related to Connected Vehicle technology by exploring its related policy and institutional issues.

ACTIVE-AURORA Testbed Network



CV Technology Development Process



CV Research Team

- University of Alberta
  - Dr. Tony Qiu
  - Dr. Karim El-Basyouny
  - Dr. Amy Kim
- University of British Columbia
  - Dr. Victor Leung
  - Dr. Dave Michelson
  - Dr. Garland Chow
- More ……

CST Research Facility - ACTIVE

- ACTIVE: Alberta Cooperative Transportation Infrastructure and Vehicular Environment
- ACTIVE will be facilitated by
  - ***Transport Canada*** (Infrastructure funding under review)
  - ***City of Edmonton*** (Whitemud Drive, Yellowhead Trail testbed)
  - ***Alberta Transportation*** (Anthony Hendry Drive testbed)
  - ***University of Alberta*** (ACTIVE Transportation Lab in NREF)
  - ***Canadian Foundation for Innovation*** (Infrastructure funding under review)
  - ***Alberta Enterprise and Advanced Education*** (Infrastructure funding approved)

CST Research Facility - ACTIVE

Phase 1: Anthony Henday Drive from Manning Drive NW to the Yellowhead Trail and the Whitemud *Drive from 156 Street to 122 Street (-2015 March)*

Phase 2: Anthony Henday Drive from Manning Drive NW to Yellowhead Trail, to Gateway Blvd from Yellowhead Trail to 170 street, Whitemud Dr. and 75 Street (2015 April-2017 March)

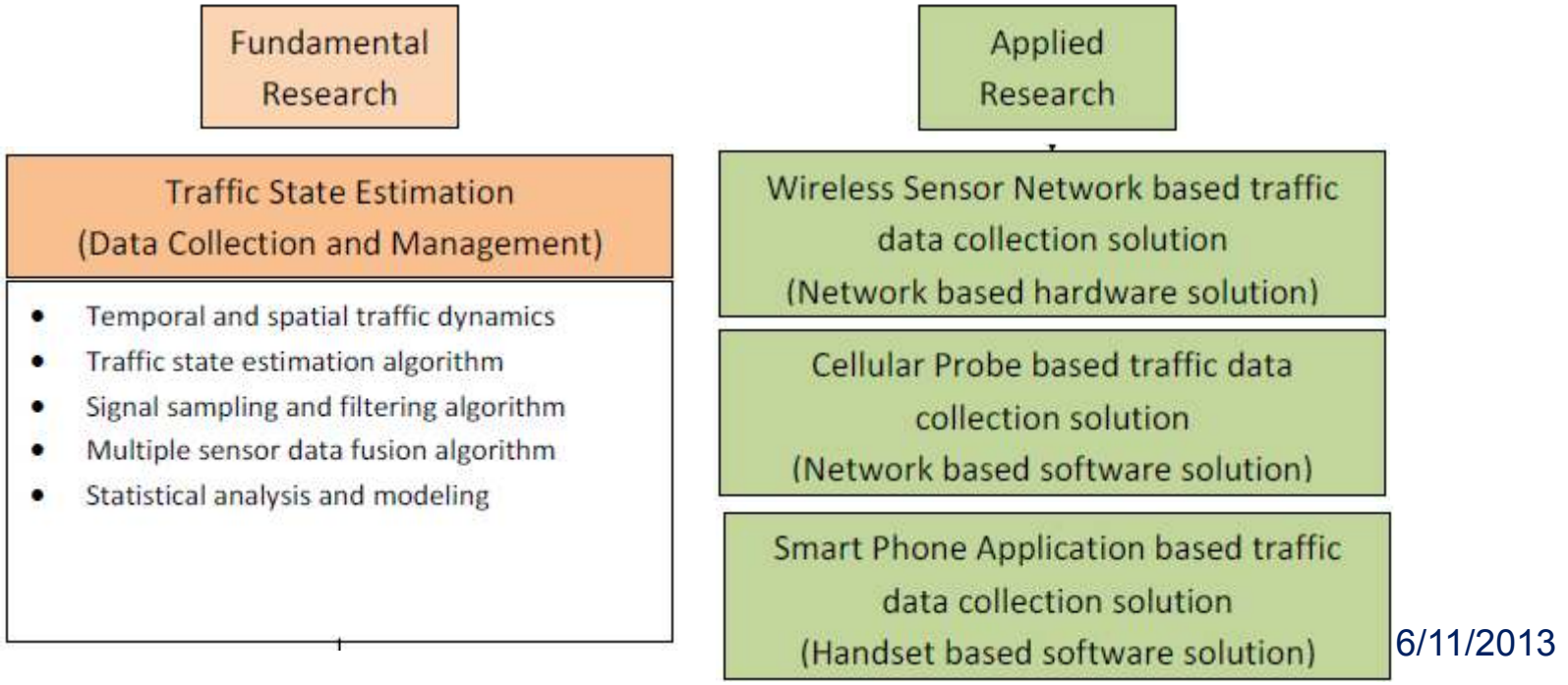
Phase 3: Cover most of the major roads in Edmonton Metro area. (2017 April -2018 March)

CST Research Facility - ACTIVE

- Operate and maintain a ***world-class*** Connected Vehicle test bed in Edmonton / Alberta
- Build and manage a ***system-wide***, and ***multi-modal*** data information network in the Edmonton area
- Collaborate with the industry and government agencies to facilitate the commercialization of certain key technologies and systems under the Connected Vehicle environment
  - Wireless communication solutions (Cellular network, WiMax, Dedicated Short Range Communication (DSRC), etc)
  - Customizing the existing Connected Vehicle research results for cold-climate regions, and winter / construction seasons.

ACTIVE CV Research Strategy

- Connected Vehicle based Traffic Data Capturing and Active Traffic Management
- To support Advanced Traveler Information System (ATIS) and Advanced Traffic Management System (ATMS)



ACTIVE CV Research Projects

1. Connected Vehicle based High-Level-Architecture Simulation for Active Traffic and Demand Management
2. Connected Vehicle based Transit Signal Priority Simulation – VISSIM / ASC3
3. Cellular Phone Based Speed / OD Estimation Pilot Study for Edmonton Regional Traffic Network
4. Driver Behavior Analysis and Modelling within the Connected Vehicle environment
5. Enhancing Smart Device-Based Connected Vehicle Technology in Traffic Data Capturing and Transportation Management
6. New?

Conclusion

- Connected Vehicle is approaching us, and it potentially will make transportation smarter!
- The involvement of public sectors, private sectors and academic institutes are required! Partnership is the key for success.
- More challenges and opportunities in the ITS field!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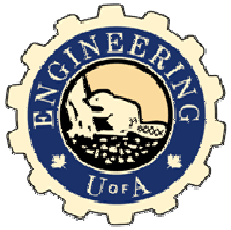
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Alberta
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Edmonton


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JUSTICE
SOLICITOR GENERAL


Transport
Canada
Transports
Canada


AMTA
ALBERTA MOTOR TRANSPORT ASSOCIATION


CAA
AMA


Drivewyze


TELUS


ROGERS


EPCOR

Open Discussion

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Research Innovation will make Transportation Safer, Smarter and Greener!