

ITU-T WORKSHOP “ICTs: Building the Green City of the Future”

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**Building Sustainable Green Smart City of the Future enabled *by ICT*:
Global Perspectives of ITS**

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Shanghai, China, 14 May 2010



1- Initiatives / Perspectives

Shanghai, China, 14 May 2010



Building the Green Smart City of the Future:

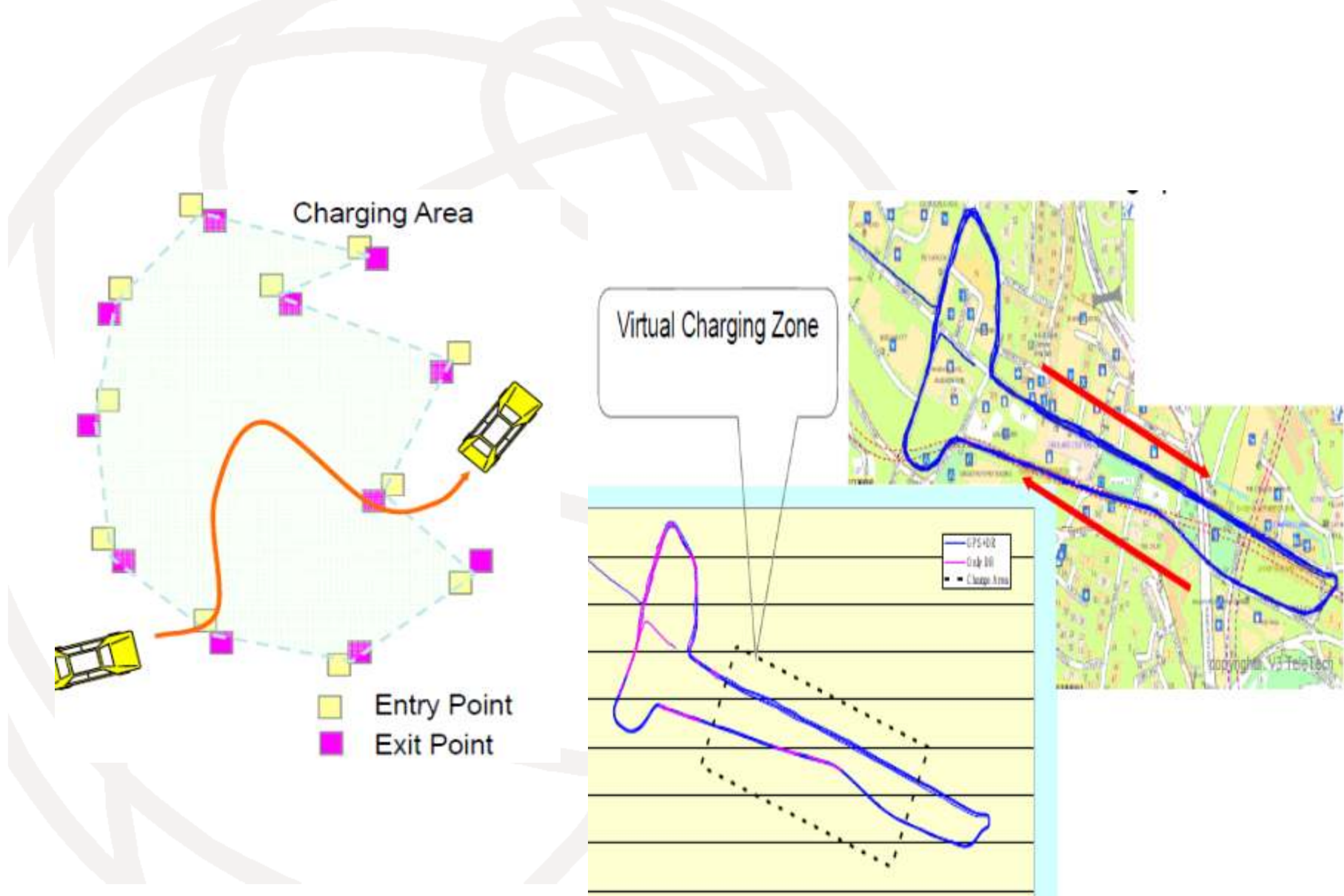
How to reduce traffic congestion, especially in cities and around?

- Every city in the world faces significant traffic management problems which are getting worse:
 - The traffic flow on urban roads is complicated and diversified (compared with that on expressways).
 - City traffic management operates today much like it has for the past years while traffic is increasing *times faster* than new roads are being built.
 - Congestion must be solved with technology, not more new roads.

Cities-Cars equation solved by ITS



Singapore: Urban Road Pricing (URP) System to reduce Traffic



Singapore: URP implementation

URP Goals

- Effective Traffic Demand Management
- Congestion-free city
- To improve environment
- Incentive to use public transport
- To finance new ITS investments
- Low operation cost

URP Benefits

(as estimated by MHI)

- Road Pricing is a effective tool for **traffic demand management**.
- Less traffic and less congestion equal less **air pollution**.
- Automated Road Pricing can generate **revenue** for further investment related to public transport (2 years return on investment).
 - ◆ Capital Investment: US\$125 million
 - ◆ Annual Revenue: US\$50 million
 - ◆ Annual Operation Cost: US\$10 million

MHI: Mitsubishi Heavy Industries



MIT: Smart Green City Car

- MIT's CityCar powered by four in-wheel electric motors
 - ◆ Each wheel unit contains drive motor and most of the mechanical complexity is in the wheels.
- CityCars are designed for intra-urban trips which are short between recharge opportunities.
- Lithium-ion batteries are housed in the floor of the CityCar. Recharging can be accomplished with parking and home charging units, and with units installed at workplace parking structures.
- MIT Prof. William J. Mitchell, Four Big Ideas That Could Transform the Automobile:
 - ◆ Design principles on electric-drive and wireless communications rather than the internal combustion engine and stand-alone operation
 - ◆ Develop the Mobility Internet for sharing traffic and travel data
 - ◆ Integrate electric-drive vehicles with smart electric grids
 - ◆ Establish dynamically priced markets for electricity, road space, parking space, and shared-use vehicles



Towards a EV-based Society

- **Toward Zero-Carbon City (Masdar City in Abu Dhabi) or Low-Carbon Society (Japan)**
- In realizing such type of society in Abu Dhabi or Japan, Smart EVs are needed for sustainable transport. Such cars needs technological innovation, cost reduction, subsidy and supplying infrastructures.
- Electric energy network systems to stimulate such society to integrate and supply EVs.



Japan: METI-NEDO

- In May 2007, Japan's Ministry of Economy, Trade and Industry (METI) laid out the idea of
 - Japan as the world's most environmentally-friendly motorized society and proposed building a low carbon emission economy based on intelligent transport systems (ITS).
 - METI proposed the *Concept of Energy ITS* to develop ITS technologies that improve energy efficiency.
- **Strategy of Japan:** realizing three innovations (automobile, fuel, infrastructure) and solving three problems (energy security, environment, competitiveness)



Abu Dhabi: Masdar Green Smart City

- Abu Dhabi Emirate (and Dubai) has very different and long-term vision from other Oil producers in the Middle-East.
- Vision of a post-oil society
- First world zero-carbon city (Masdar), 2015
 - Vs. 2050 Japan Plan (50% carbon reduction)
- Personalized Electric Transport System
 - Inside Transport: Small electric driver-less cabs
 - Out-In Transport: Rail Transport
- Masdar academic institution focusing on technologies needed for a zero carbon society, in collaboration with MIT

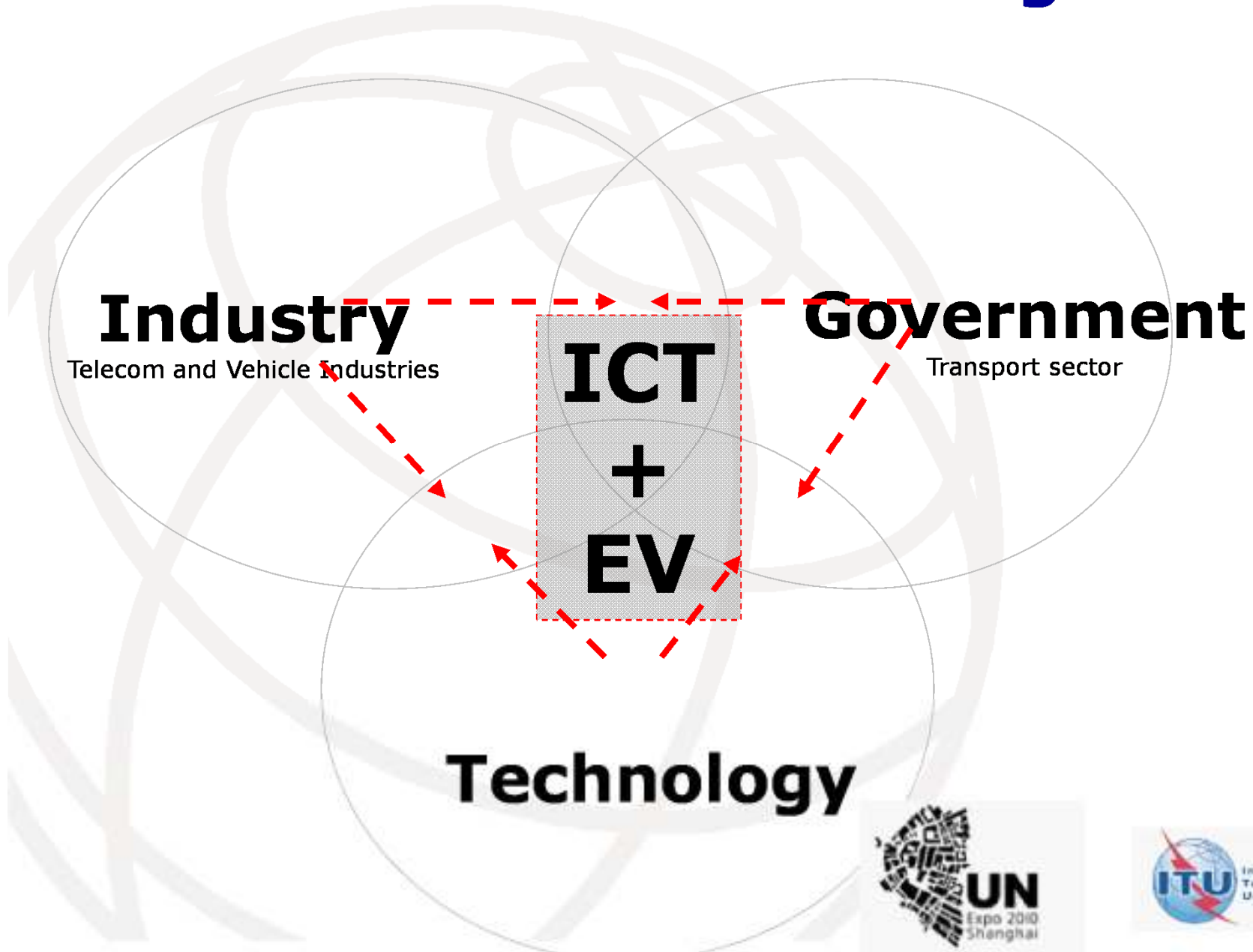


2-Convergence

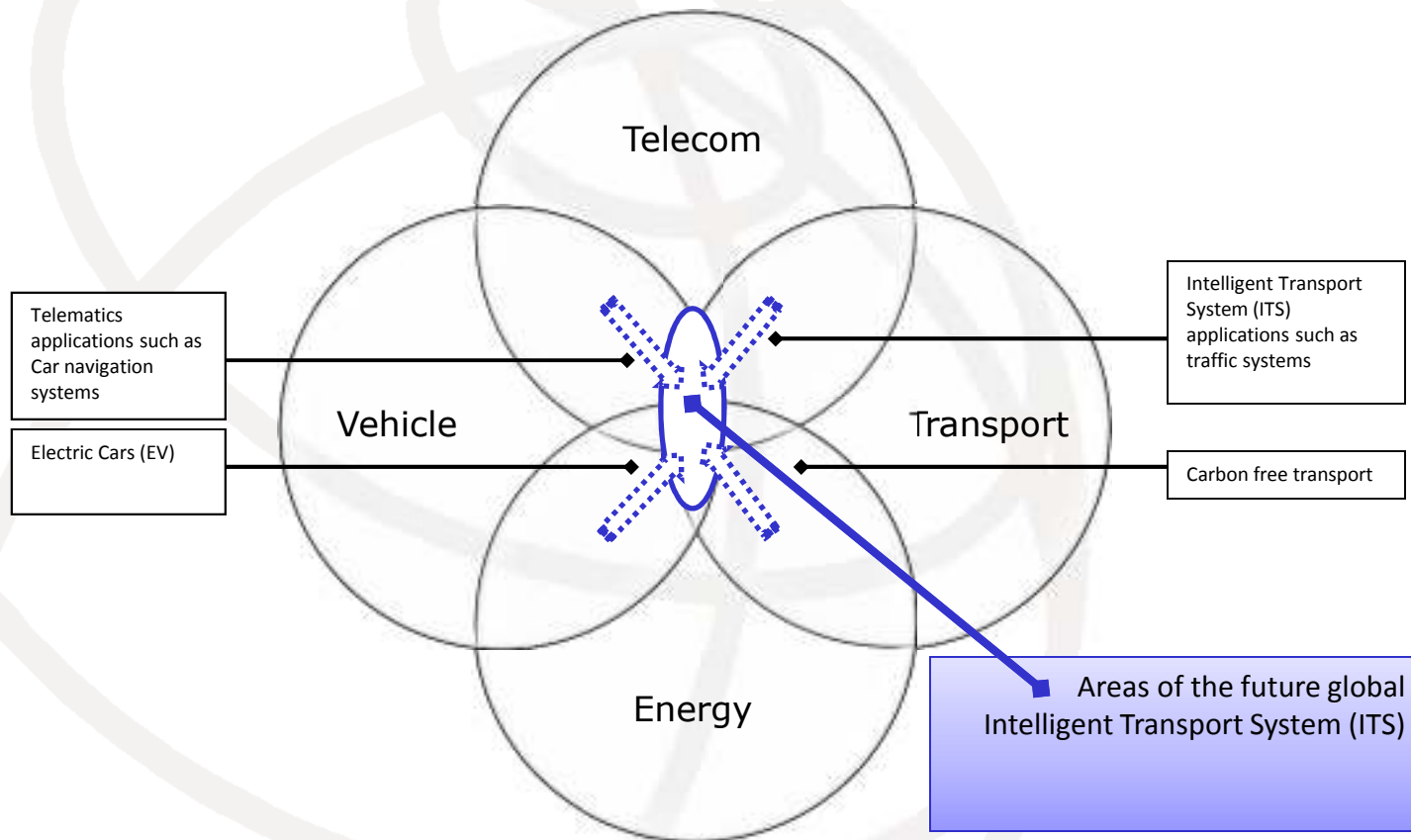
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ITS+EV as Challenge



Towards an Integrated Global ITS



Technology

- The most challenging and promising technological fields are coming from the convergence of two or more different fields of technologies, which will enable cross-sectoral and diversity of knowledge exchange to take place. Emerging technologies will grow out of these interactions.



Complexity and Systems

- When two or more systems (i.e. telecom, transport or energy) are linked, complexity increases
- Complex Systems, and System-based approach
- Complex systems (e.g. transportation, energy and telecommunication) need interdisciplinary, global and leadership approaches.
- System-based approach is needed to tackle complex issues/major societal problems such as transportation and energy.



3-Recommendations

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Challenges

- R&D, technologies, marketing and management are not enough for successfully implementing innovation
- Successful partnership models is the requirement for technologies, marketing and management in the Green City of the Future
 - Partnerships would on different and complex level:
 - Government-Industry-Academia (and eventually NGOs)
 - Industries: Transport-Vehicle-Energy-Telecom
 - Global Standardization bodies could be platform for global partnership
 - In such complex infrastructure system, the role of the government (State) is key, in particular as “Entrepreneurial State”

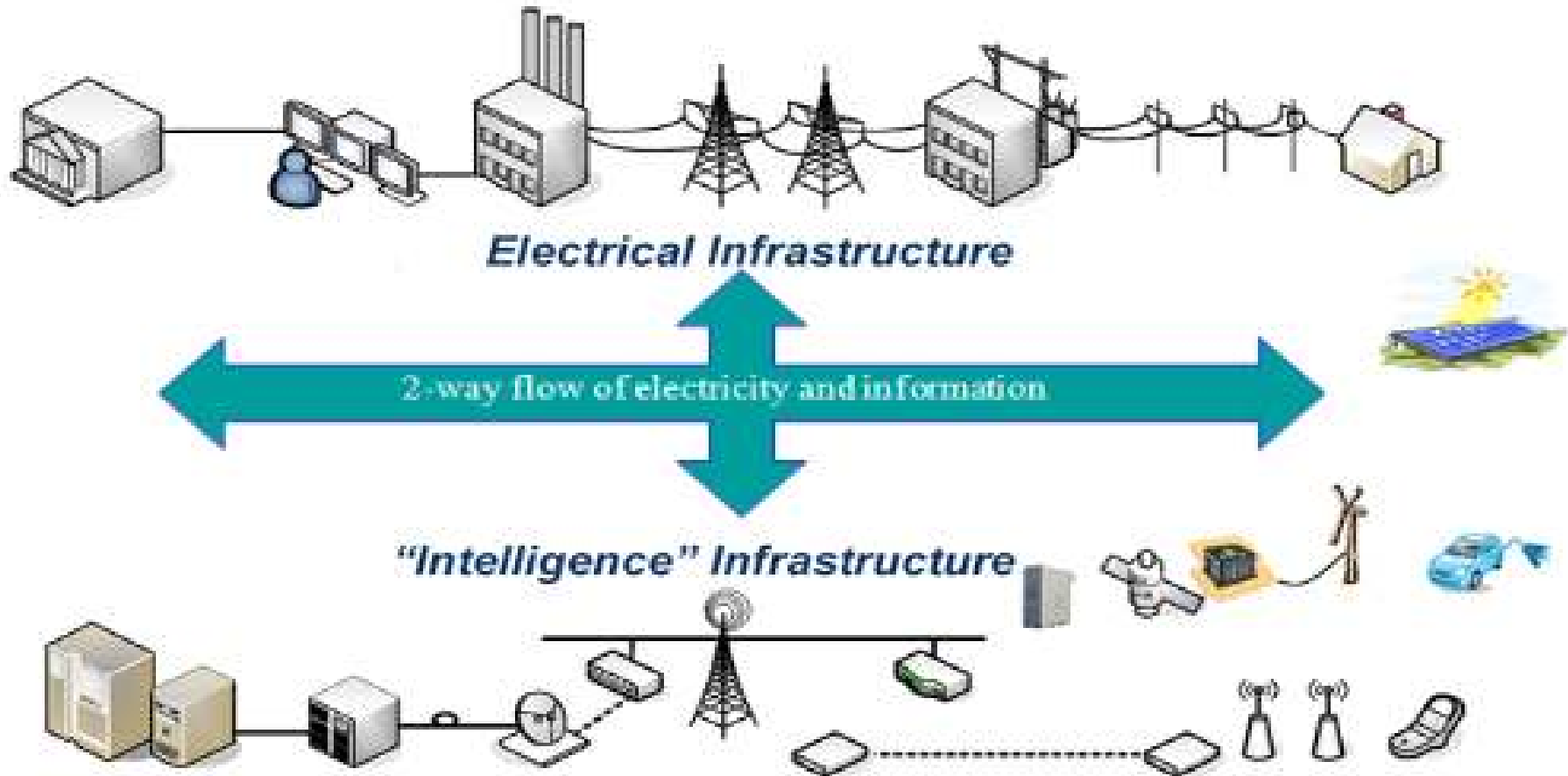


Key players/technologies

- Vehicle
- Telecom Networks
- ICT
- Utilities Network (including Charge Points)
- Standards-Making Bodies
- Business Models, Funding, Government



Linking ICT, Vehicle and Energy



Source: George Arnold, National Coordinator for Smart Grid Interoperability, National Institute of Standards and Technology, United States Department of Commerce

Standards

- The IT and computing industries have spent decades hashing out standards, leading to a significant movement supporting the use of open-standards that can drive innovation.
- **As the car becomes a networked device and adds more IT and computing intelligence, it will likewise start to rely on more IT-style industry-wide standards.**
- Standards are definitely leading the next-generation of electric vehicle technology.
 - ◆ Standards that will specify (1) how vehicles are charged by the power grid, (2) what the plug interface will look like and (3) what hardware should be used to make the connection.
- If we've learned anything from the IT industry, it's that open standards can do two crucial things: cut costs and drive innovation: They can bring down costs because as more companies move in, manufacturing can take place at a very large scale. And they drive innovation as they allow developers to freely or cheaply gain access to the tools to build the product and create new and better ideas.
- Strong standards will be what drives the power and data connection, ensuring cars can be charged for a set time over the power grid in any location and communicate over available data networks.

