Telematics/ITS R&D Opportunity

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前言 - 車載之交通安全議題

- 歐盟於2005年發生1.3M件道路交通事故，四萬一千人死亡、二百萬人受傷
- 美國每年約有六百萬件行車事故，四萬一千人死亡。
  - 財產損失約為$150 billion
  - 駕駛疏失約為76%事故發生的主因（可用車載技術克服）
Taiwan ITS Industry Development Objectives

– Gas consumption reduced by 20%
– Automobile accidents lowered by 20%
– Usage of public transportation increased by 60%
– OBU worldwide market share: 20%+、DSRC: 30%+
Market Potential

• **Total Revenue (2010)**
  
  - 全球 Telematics 市場規模 (包括: 硬體製造、軟體設計、內容整合、服務提供) 將達 $42 billion (IDC)
  
  - 在理想情況下 (消費者普遍接受、無其他法規限制、應用成熟), 全球 Telematics 市場總值高達 $100 billion (McKinsey)
Telematics 演進

- **1G Telematics (V2Zero)**
  - 為獨立運作之系統如車輛多媒體系統，地圖導航系統
  - 缺乏或僅有少部分無線通訊功能

- **2G Telematics (V2S)**
  - 透過通訊裝置與服務提供者互動
  - 以GPS為基礎提供駕駛行車動態導航、ETC及vehicle Infotainment等應用服務
  - GM OnStar, Toyota G-Book, 裕隆 TOBE

- **3G Telematics (X2X)**
  - 透過V2I, V2V, P2X等手段與建置將車、人及服務連結提供安全警示與防護、效率提升、殘障輔助與先進Infotainment服務
DSRC Applications By V2V or V2I

• Between Vehicles:
  – Approaching Emergency Vehicle Warning
  – Blind Spot Warning
  – Cooperative Adaptive Cruise Control
  – Cooperative Collision Warning
  – Cooperative Forward Collision Warning
  – Emergency Electronic Brake Lights
  – Highway Merge Assistant
  – Lane Change Warning
  – Post-Crash Warning
  – Pre-Crash Sensing
  – Vehicle-Based Road Condition Warning
  – Vehicle-to-Vehicle Road Feature Notification
  – Visibility Enhancer
  – Wrong Way Driver Warning

• Between Vehicles and Infrastructure:
  – Blind Merge & Curve Speed Warning
  – Emergency Vehicle Signal Preemption
  – Highway/Rail Collision Warning
  – Intersection Collision Warning
  – In-Vehicle Amber Alert
  – In-Vehicle Signage
  – Just-In-Time Repair Notification
  – Left Turn Assistant
  – Low Bridge Warning
  – Low Parking Structure Warning
  – Pedestrian Crossing Information at Intersection
  – Road Condition Warning
  – Safety Recall Notice
  – SOS Services
  – Stop Sign Movement Assistance
  – Stop Sign Violation Warning
  – Traffic Signal Violation Warning
  – Work Zone Warning

Source: 經濟部技術處車載資訊通訊先期研究計畫，資策會整理，2008年02月
Why & How Toward “Mandatory” Telematics Service

- **Safety:** Reduce societal costs of **CRASHES**
  - 43,000 deaths & 3 million injured/year, $230 billion in property damage in US

- **Efficiency:** Reduce societal costs of **CONGESTION**
  - Personal / business hours lost in traffic
  - Gasoline wasted
  - Inconvenience of missed schedules

### Cooperative Crash Warning/Prevention

- Reduce Affects of Driver Distraction
- Minimize Affects of Driver Error
- Cars that refuse to crash

### Micro-scope Congestion Mediation

- Improve traffic information
- Improve Situational Roadway Awareness
- Manage Traffic Flow

### Japan Smartway (04~07)

- 2006年制定“2012年交通事故死亡人数降至5000人以下”目标，并表示将采用汽车间通信等新技术。
- 目前Focus在V2I，预计2010年全国布建。
- 正在制定V2V DSRC标准。

### US VII Initiative

- 採用802.11p/WAVE DSRC標準。
- 2010年後提案呈交國會，2011~2012年全國布建
- 專案成立VII Consortium
- 補助8大車廠開發DSRC, OBE及RSE
- 於加州與密西根州進行field trial（2007-2008）

### Europe eCall Activity (06~10)

- 推動各國於2010年新車款將eCall列為標準配備
- 2008年起進行field tests
- 歐洲由民間組織發展DSRC之標準與應用，eCall只是一例(如Car2Car, PReVENT, GST等)，但採用802.11p機會很高。

車載應用情境 - 以T-system T-City為例

+ V2I & V2V for Safety Enhancement & Fine Grain Traffic Optimization
+ WSN for pedestrians Telematics

Source: T-City Project - Deutsche Telekom, 2007
<table>
<thead>
<tr>
<th>Application Development Roadmap (draft)</th>
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<tbody>
<tr>
<td><strong>2008</strong></td>
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<tr>
<td>---</td>
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<tr>
<td>• Enhanced route/travel guide &amp; navigation</td>
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<tr>
<td>• MAP &amp; media updates</td>
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<tr>
<td>• Appointment Confirmation / Changes</td>
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<tr>
<td>• Parking lot payment</td>
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<td>• ETC</td>
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<tr>
<td>• Specific commercial vehicle fleet management</td>
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<td>• Traffic sign/signal violation warning</td>
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<tr>
<td>• Assisted lateral control</td>
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<tr>
<td>• Pre-/Post-crash warning</td>
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<td>• Just-In-Time repair notification</td>
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<td>• In-vehicle signage/diagnostics</td>
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<tr>
<td>• Safety recall notification</td>
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<tr>
<td>• Intelligent Speed Advisory and Control</td>
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<tr>
<td>• Drive-Through Payment/Notification</td>
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Source: 經濟部技術處車載通訊先期研究計畫，資策會網多所整理，2008年03月

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Dependability Challenges

• Reliability:
  – Weather, collision, human error
  – Technologies: Image and voice recognition

• Scalability:

• Security and Privacy:
  – Authentication, Intrusion
  – Information sharing
  – Fraud

• Communication:
  – Multimodal: DSRC, WiFi, WiMax, etc.
  – Ad-hoc
  – Interference
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