Next Generation of Transportation - Open System Architecture Model

Future Mobility

“I never think of the future — it comes soon enough.”

Albert Einstein

Trends driving Future Transport

- **Urban Growth —** Since 2007, greater than 50% of people live in cities. By 2030, the estimate is greater than 60% will live in urban centers.

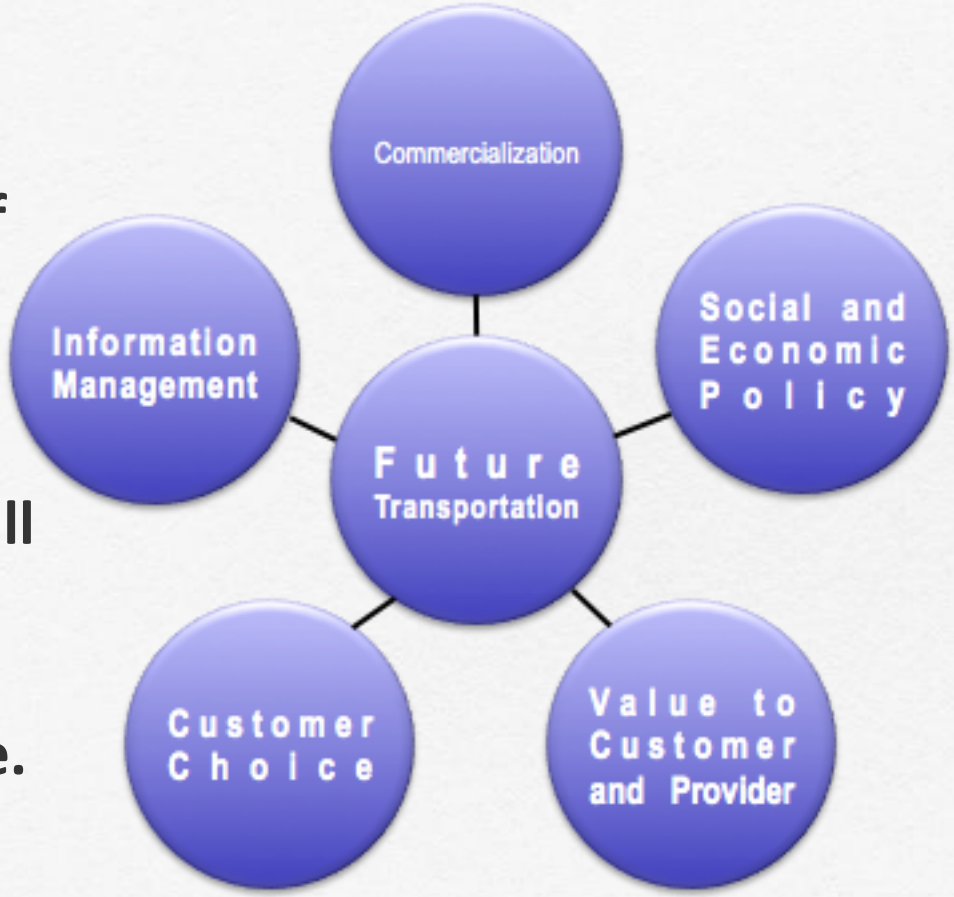
- **Energy —** Urban centers occupy less than 2% of the land mass, but consume 75% of the energy. High fuel prices will drive transportation transformation. Smart Grids and energy efficient transport will address this growth.

- **Transportation DNA —** All modes of transport will switch over to electrification with regenerative subsystems, drives and new designs. Fuel efficiency will increase dramatically.

- **Convergence —** Technology will continue to converge. Digital media, communications and connectivity will be ubiquitous. Digital “cash” and payments will dominate using mobile devices.

Next Generation Transport Eco-System

Future Mobility will mean more than just commuting. Analysis of local issues and industry trends demonstrates that commercialization, information management and social policy will drive change and create true customer choice and tangible value to users and providers alike.



Attributes of the Future Transportation System

- Car focused / supply-focused
- Limited service model
- Internal Government Agency focus
- Single payment method
- Limited integrated network
- Financially subsidized
- Closed architecture
- Basis for Information Management

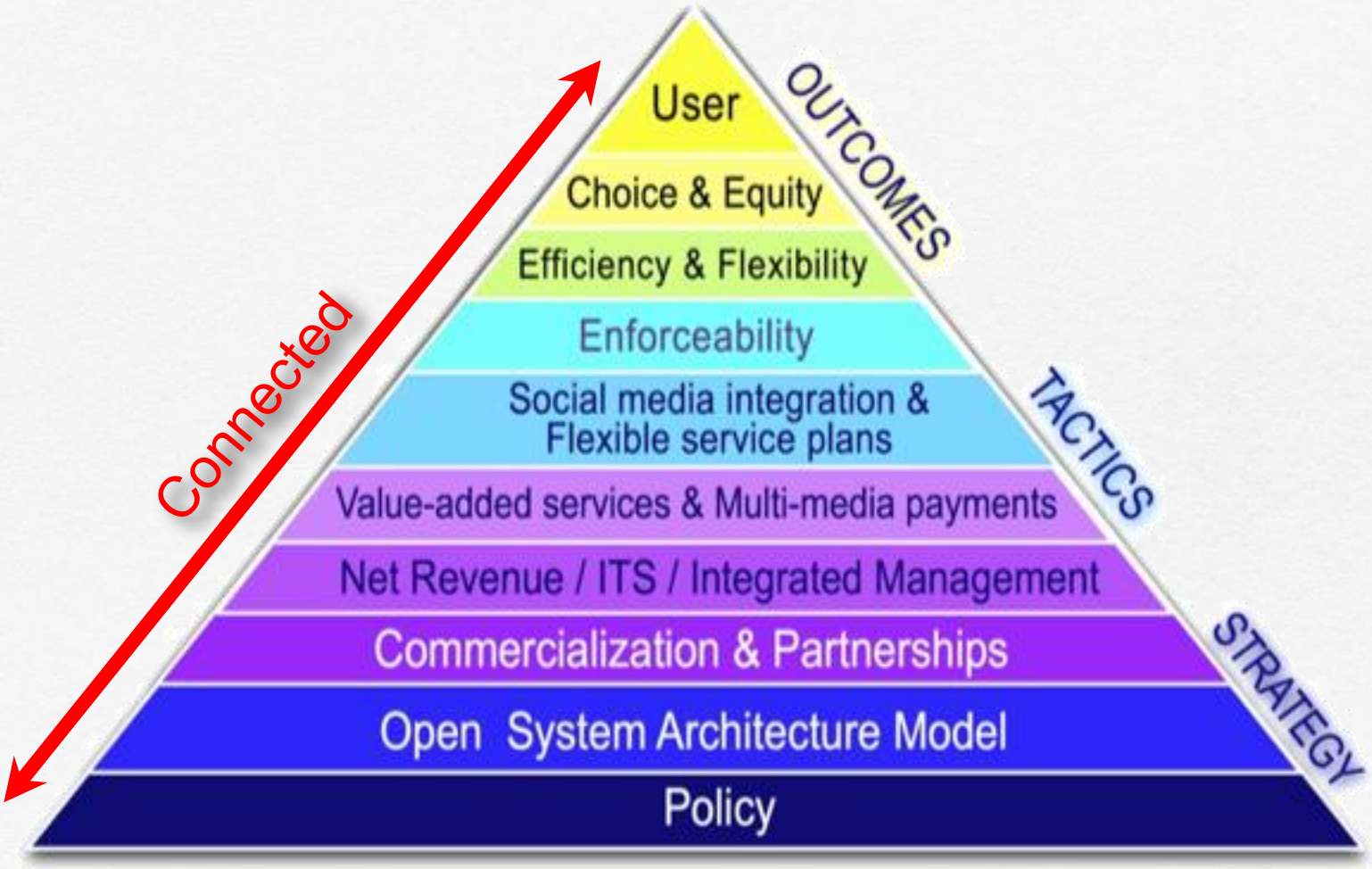
Networked

Next Generation

- Holistic travel focus for the customer
- Expanded shared service model
- Public & private alliances
- Multi-media payment methods
- Extensive & multimodal network
- Public & private revenue generation
- Open architecture
- Advanced Information Management

Converged

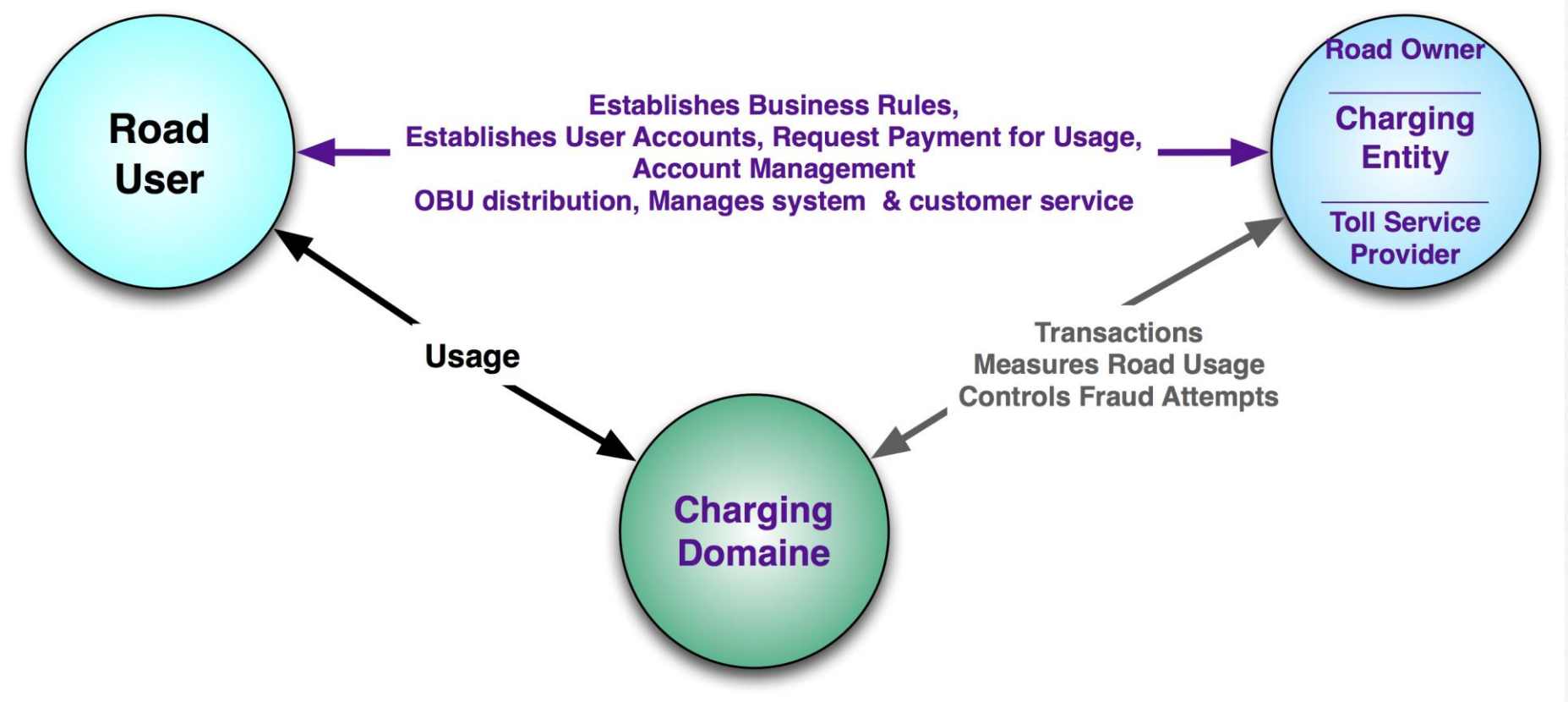
Next Generation Transportation will be open & flexible systems that drive public acceptance



“Closed System” Characteristics

An internally integrated system controlled by a single entity with essential components that cannot be substituted by other external components, which could perform the same functions.

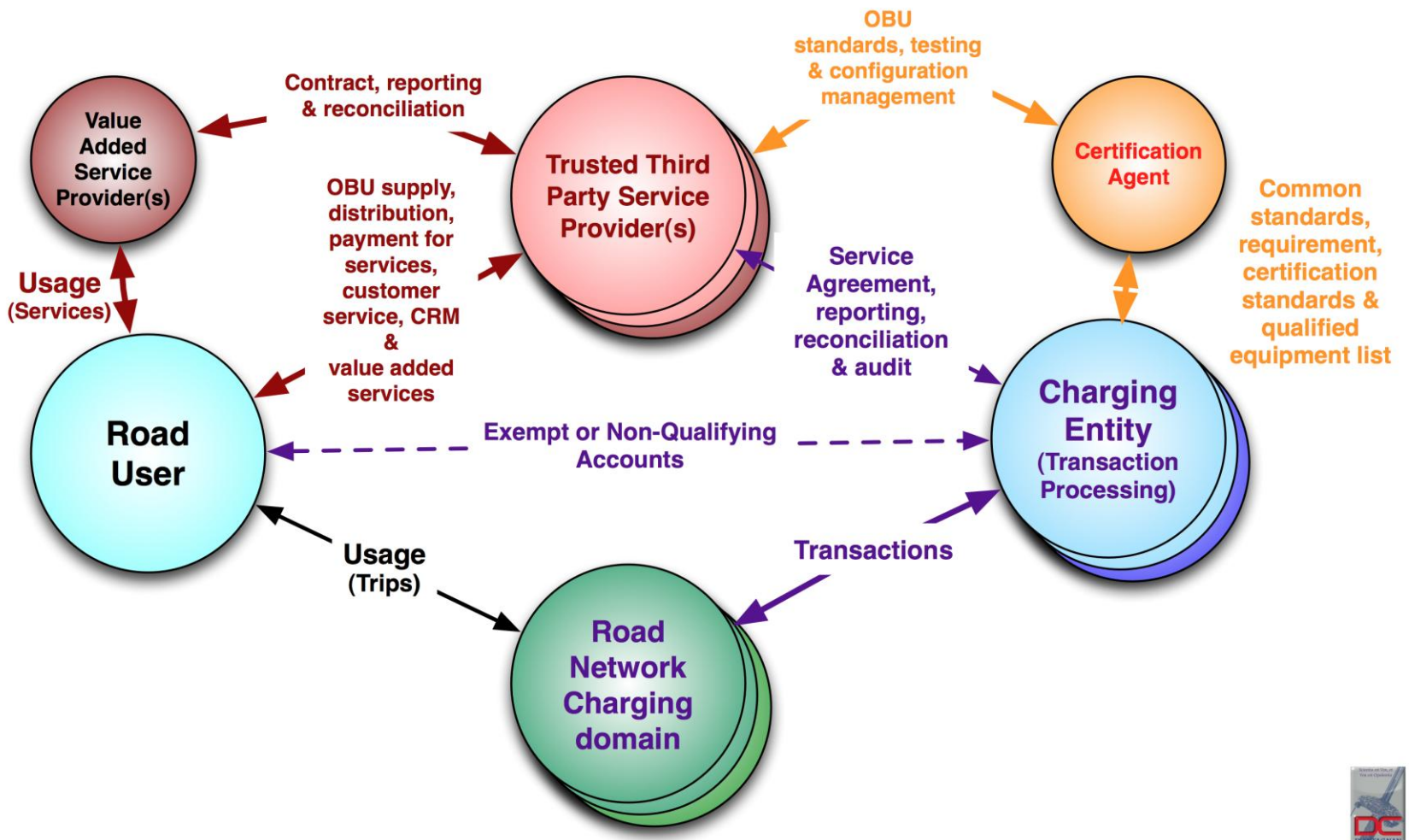
Closed System Architecture Model



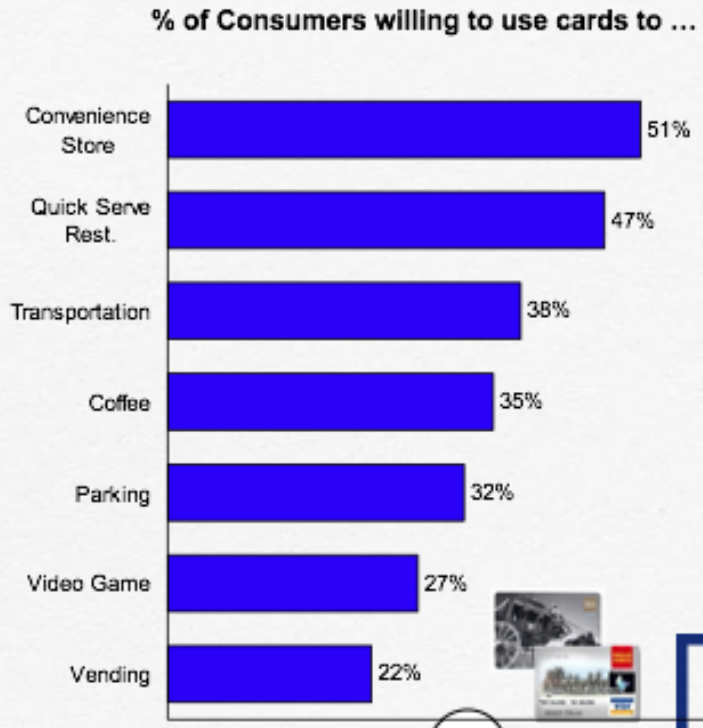
“Open System” Characteristics

An integrated system based on common standards and an operating system accessible to the marketplace whereby components performing the same function can be readily substituted or provided by multiple providers.

Open System Architecture Model



Convergence of payment methods



1 Cash/Checks

2 Magnetic Stripe

- Plastic bank cards
- Exxon Speedpass fob
- PayPass enabled chip in Mobile Phone

3 Contactless Chip

- Car parking
- Vending machines
- Peer-to-Peer payment
- Entertainment Ticketing

4 Over the Air

Near Field Communications (NFC) enables mobile user cases with attractive revenue opportunities for transportation and adjacent service industries

Overview of Mobile NFC Use Cases

- **Juniper Research has forecast that 1 in 6 users worldwide will have an NFC-enabled phone by 2014.**
- **By 2016, the value of transactions made using NFC services will reach nearly $47 billion in the USA and $112.7 billion globally.**
- **500 million people around the world will use their mobile devices as travel tickets on metros, subways and buses by 2015 and that NFC will drive this growth.**
- **Frost & Sullivan forecasts that, by 2015, NFC technology will be the most-used solution for mobile payment.**

– Parking

Commercialization Opportunities will drive economic growth, productivity & user acceptance beyond traditional revenue models

- **Customers:** Increased convenience & new retail options through value-rich propositions
- **Providers:** Positive revenue supports expansion, job creation & improved services
- **Retailers: Increased brand awareness, sales and leverage of end-to-end transport value chain**
- **Government: Decreased subsidies to transportation, better long-term planning of infrastructure and O&M**

Case Study

“It isn’t technological barriers so much a closed minds that are holding back the necessary evolution …”

Bruce McCall, The New Yorker

NEW ZEALAND

HOME OF MIDDLE EARTH

And Road User Charging since 1977


New Zealand
You
Are
Here

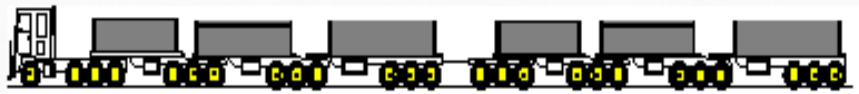
Some Facts About NZ:

- It is NOT part of Australia
- 268,680 km^2
- Population:
  - 3.95 million Humans
  - 80 Million Sheep
- 5 degrees Celsius
- New Zealanders are called Kiwis

New Zealand Highways

- 10,700 km of State Highways (interstate roads)
- Carries 46% of all NZ Traffic
- 6 Billion road trips a year
- 45 Billion km travelled (400 round trips to Mars)

Example of Specialized Vehicles

	**B-Double** 25 m, 62.5 tonnes
	**Double Road Train** 36.5 m, 79 tonnes
	**Triple Road Train** 53.5 m, 115 tonnes
	**AAB Quad** 53.5 m, 146.7 tonnes
	**ICON (Double B-Triple)** 53.5 m. 166 tonnes

Unique Vehicle Profiles

Back to the Core Agenda

Heavy eRUC's role and approach

- National Systems Strategy
- Applies to all diesel vehicles
  - Diesel Cars
  - Trucks
  - Special Vehicles
- Weight/Mass & distance
- Independent distance measurement device
- Refunds for off-road & private land
- Enforcement by Police and ECU
- Fines are 3X's factor
- Opt-in for GPS solution from TTSPs
- Specialized packages for Diary, Logging, Long Haul, Short Haul
- TTSP's gained 80% of market

eRUC OBU Internal Functional Design

Microwave and/or
Infrared

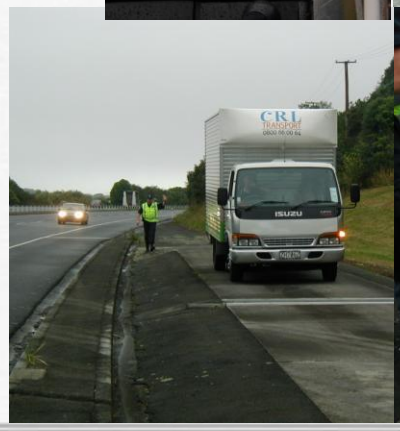
GPS
Chip Set

CAN BUS or
Wireless
(Bluetooth or WiFI)
Connection

eRUC On Board Unit
(OBU) BLOCK DIAGRAM
System Option 7 –
GPS, Cellular Modem and DSRC

Enforcement

- Single Police Force with special eRUC team of 10 units under one Senior Sergeant
- Four Weight Stations
- 24 Monitoring stations
- 115 Weight pits
- ECU monitors statistics and data
- ECU is authorized to audit company log books and records
- Data feeds safety records and system

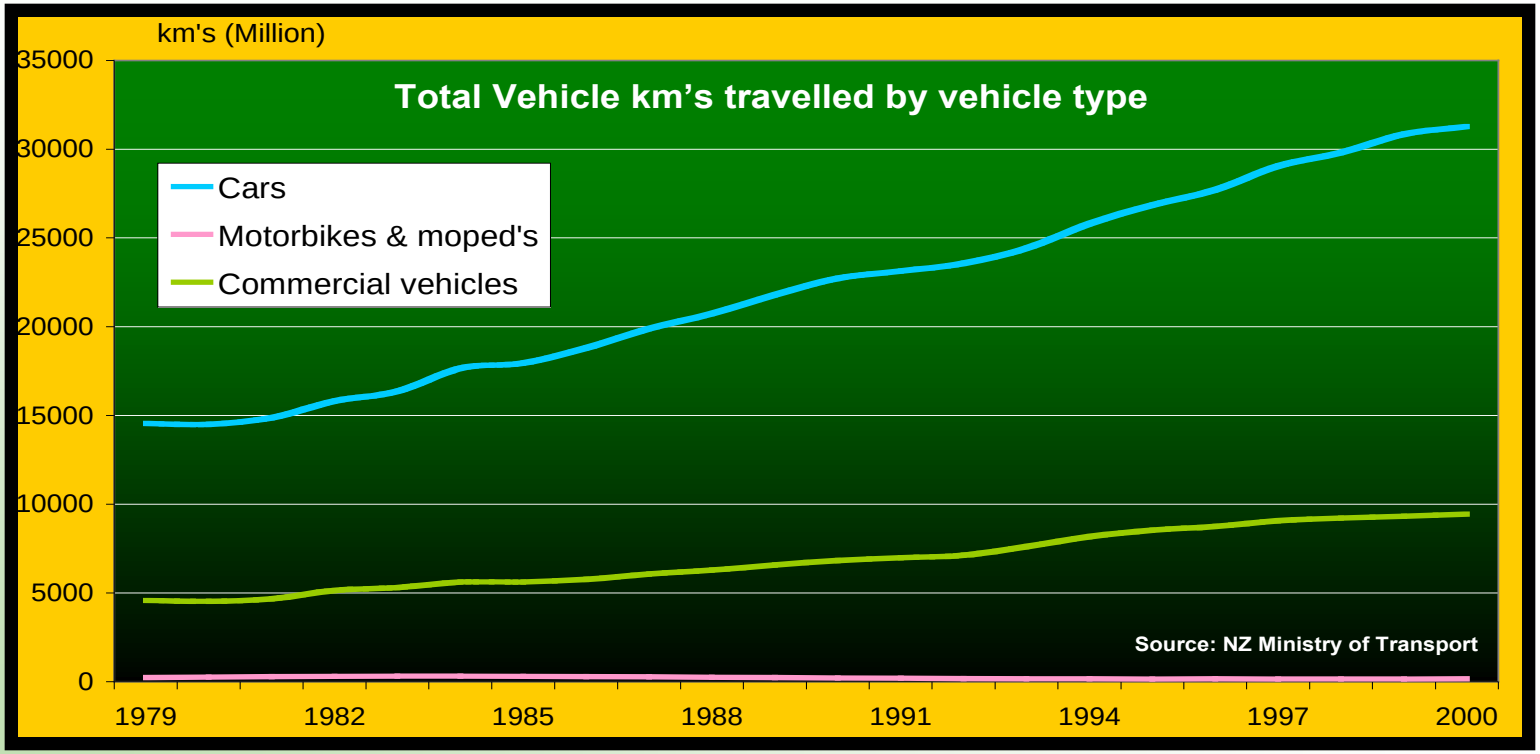


The Problem (same as everywhere)

New Zealanders “love their cars”

Empty wallet

Fuel tax income on decline — 24% decline by 2016



Private Diesel Cars – "Light RUC"

RUC's role and approach

- Diesel Cars – approximately 180,000
  - Few before 2001
  - Influx of Japanese refurbished cars
  - New growth of European diesel hybrids
- Required to report mileage by odometer
- Pre-purchase mileage in 1,000 mile blocks
- May purchase any number of blocks
- May transfer blocks on sale/transfer
- Parallels truck eRUC without weight/mass
- Refunds for off-road and private land
- Enforcement by Police and ECU
- Fines are 3x's cost factor
- Opt-in for GPS solution from TTSPs
- TTSPs offer post-payment

Summary — What was accomplished

- National eRUC Administration
- Interoperability and free roaming
- Choice of billing & payment
- National enforcement across all projects
- Achieved economies of scale
- Integration between existing Government services & Private Industry
- Ability to evolve with emerging and future technologies – Transition risk with TTSP!
- No borders means no “clearing”
- Consolidation with TRC functions
  - Drivers’ Licensing
  - Vehicle Registration
  - WOF/COF & Safety Inspections
  - Overweight & Oversized Permitting
  - Tolling
  - RUC

Summary: Keys to Public Acceptance

- **Fit user needs or requirements**
- **Provide tangible value proposition to user**
- **Provide user choice through open system model**
- **Provide service plans that fit user's life style**
- **Provide familiar business model to user**
  - **Perceived as simple and easy to use**
  - **Prices for services are perceived as fair & equitable**
  - **Post-pay for services received or guaranteed with pre-pay**
  - **Multiple payment method options & service plans**
  - **Choice of periodic payment & invoicing plans**
  - **Customer satisfaction with responsive means of remedy**

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Thank You!

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