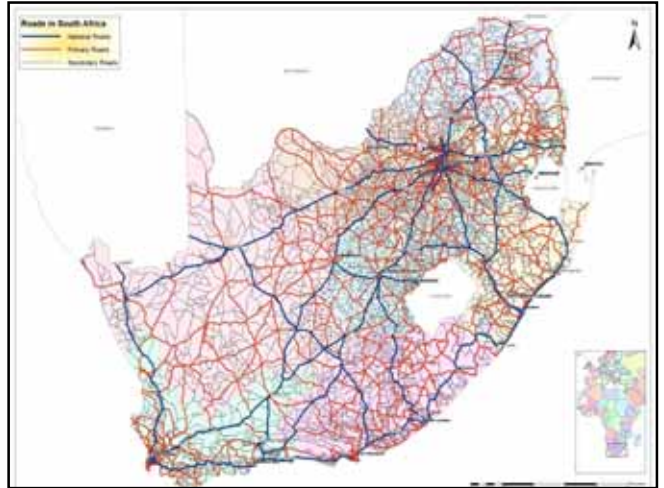




## SANRAL ASSET MANAGEMENT OVERVIEW

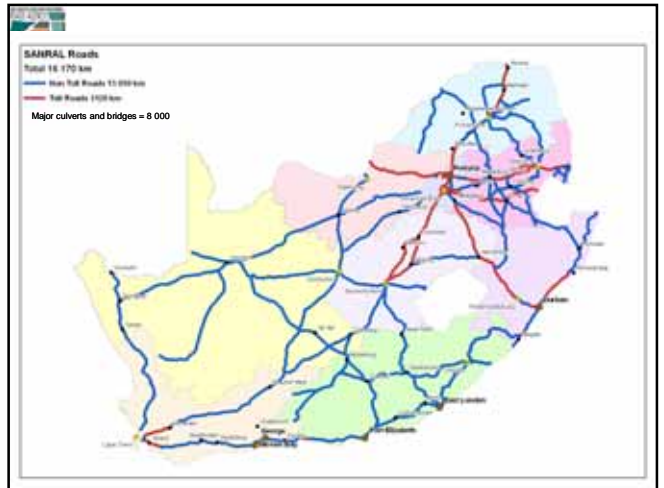
Louw Kannemeyer






### South African Road Network

Authority	Paved	Gravel	Total
SANRAL	16,170	0	16,170
Provinces - 9	48,176	136,640	184,816
Metros - 9	51,682	14,461	66,143
Municipalities	37,691	302,158	339,849
<b>Total</b>	<b>153,719</b>	<b>453,259</b>	<b>606,978</b>
Un-Proclaimed (Estimate)		140,000	140,000
<b>Estimated Total</b>	<b>153,719</b>	<b>593,259</b>	<b>746,978</b>

**Un-Proclaimed Roads** = Public roads not formally maintained by any Authority



### NATIONAL ROAD NETWORK (km)

Description	Non Toll	Agency Toll	BOT	Total
Dual Carriageway 	610	520	443	1 573
4-Lane Undivided 	11	299	240	550
2-Lane Single 	12 429	1013	605	14 047
<b>Total</b>	<b>13 050</b>	<b>1 832</b>	<b>1 288</b>	<b>16 170</b>
% of SANRAL Network	81%	11%	8%	

**Total RSA Road Network Estimated to be 750,000 km**

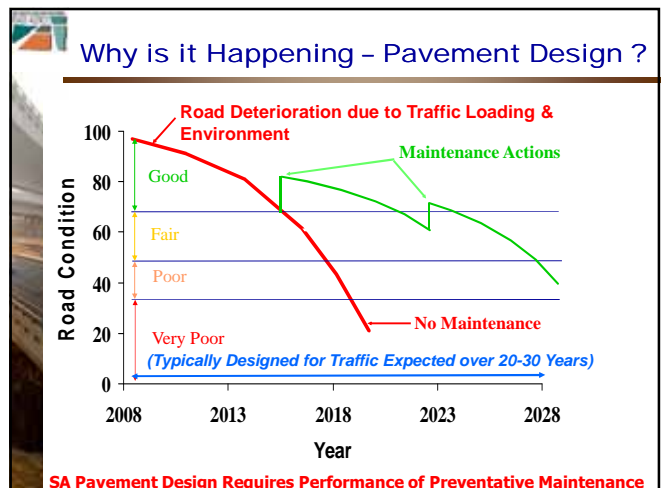
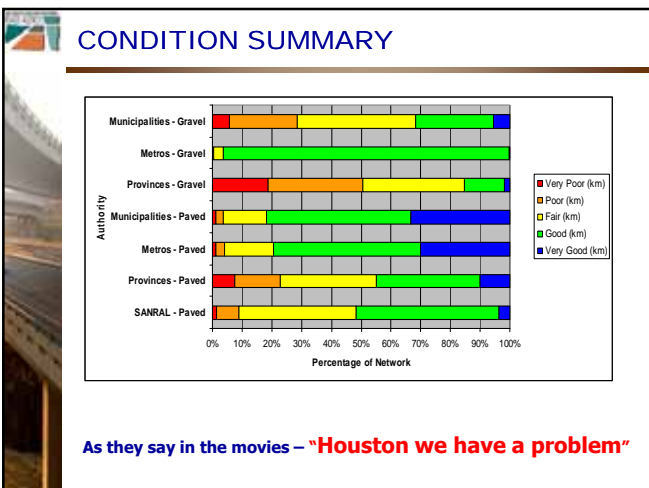
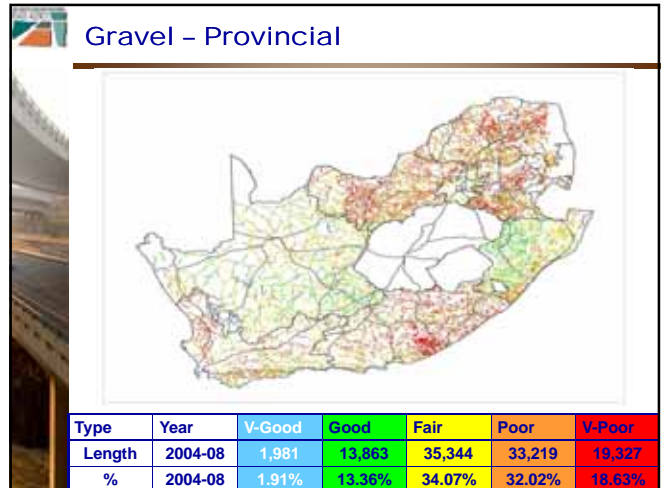
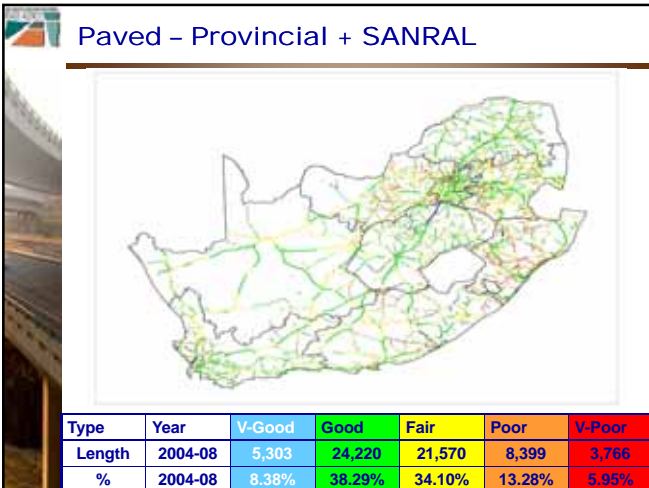


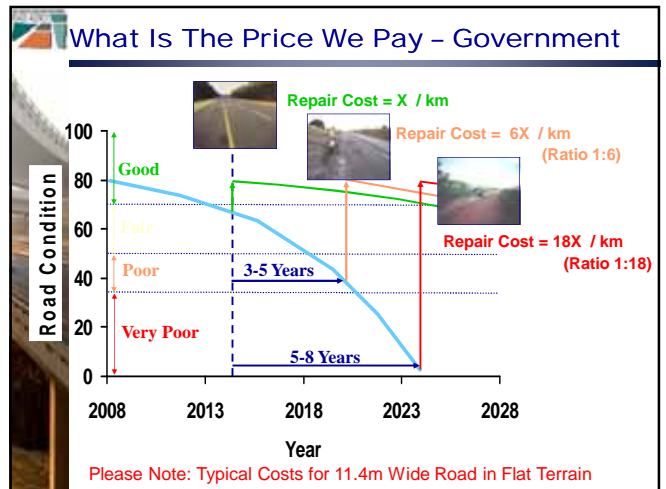
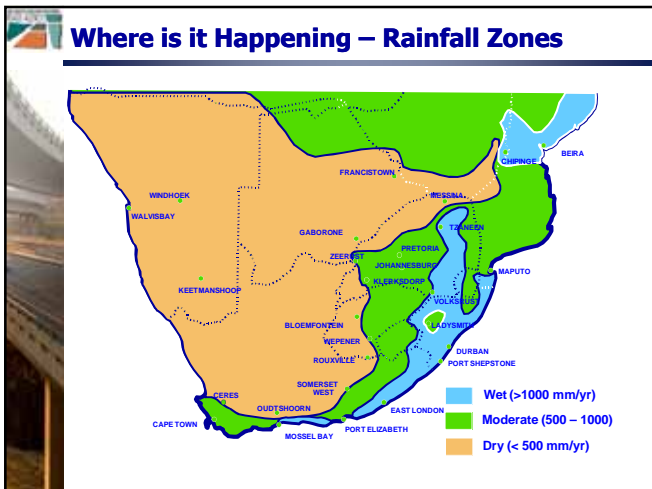
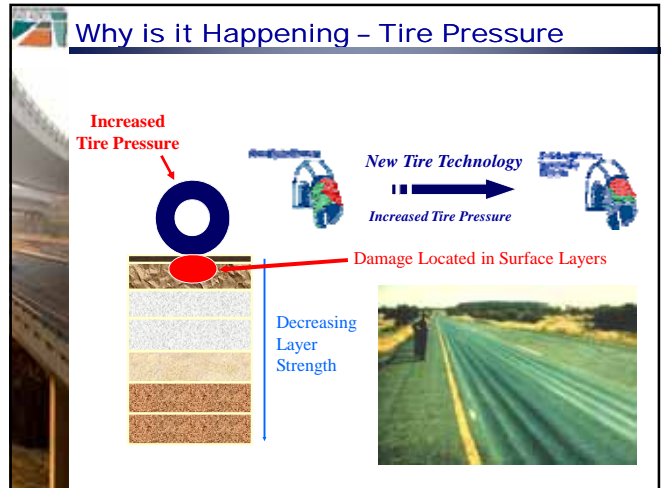
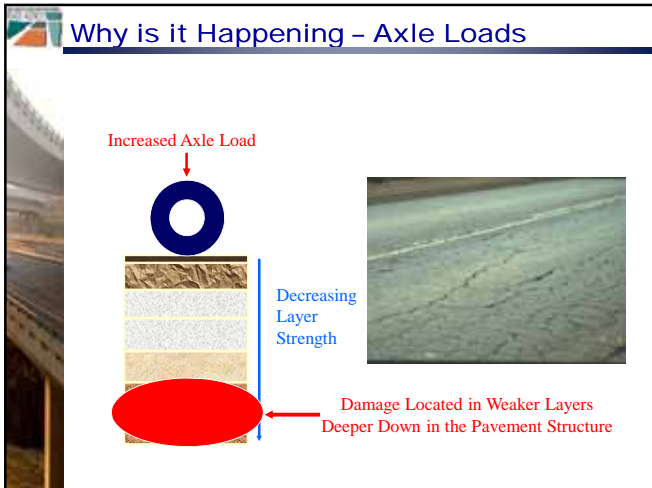
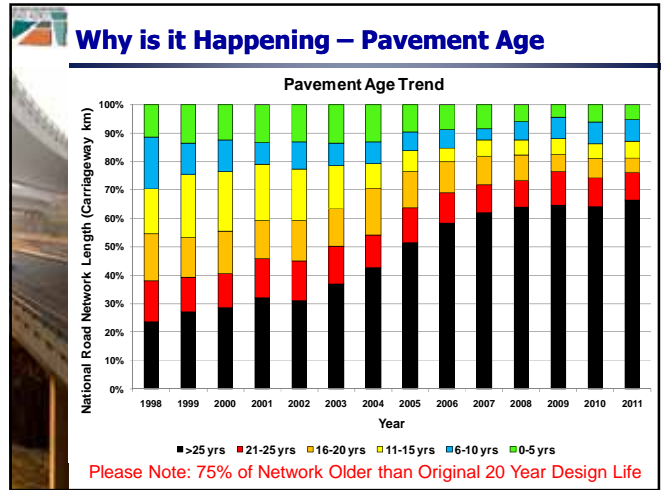
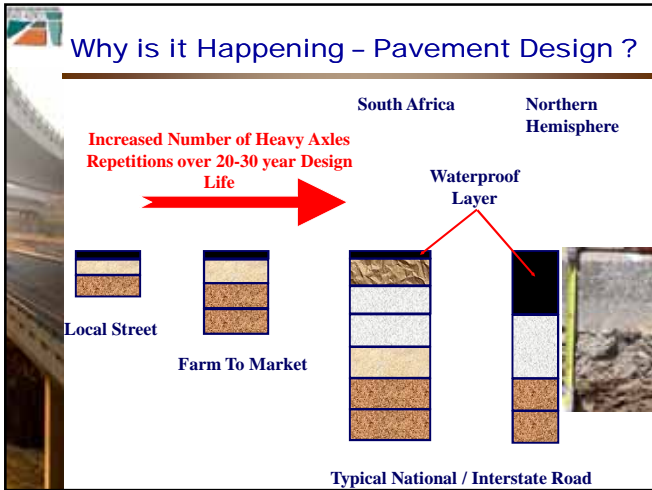


### Available Condition Data

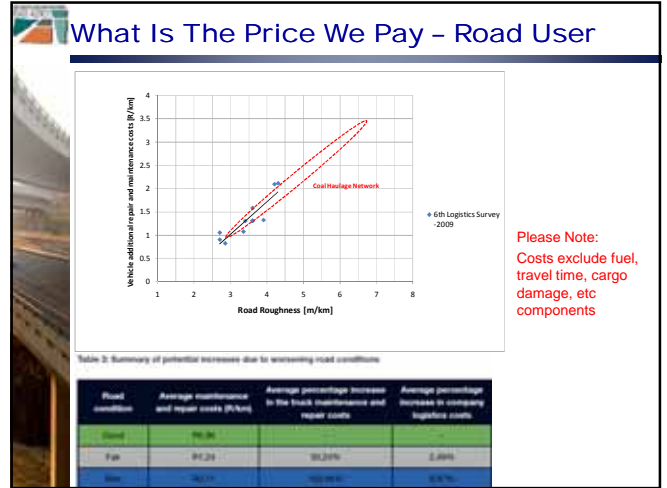
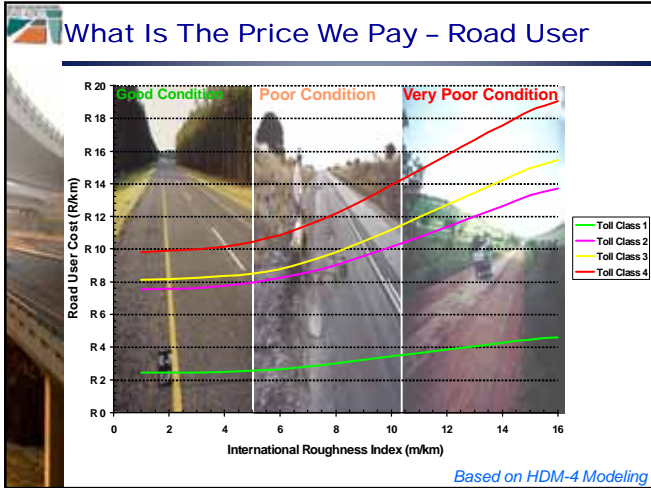
Authority	Paved		Gravel		Total		
	Length	Data	Length	Data	Length	Data	% Data
SANRAL	16,170	16,170	0	0	16,170	16,170	100
Provinces - 9	48,176	47,088	136,640	103,733	184,816	150,820	82
Metros - 9	51,682	40,737	14,461	1,789	66,143	42,527	64
Municipalities	37,691	10,866	302,158	2,124	339,849	12,990	4
<b>Total</b>	<b>153,719</b>	<b>114,861</b>	<b>453,259</b>	<b>107,646</b>	<b>606,978</b>	<b>222,507</b>	
% Data		75		24		37	

If the extent and condition of your network is not known, how do you make sound road investment decisions.









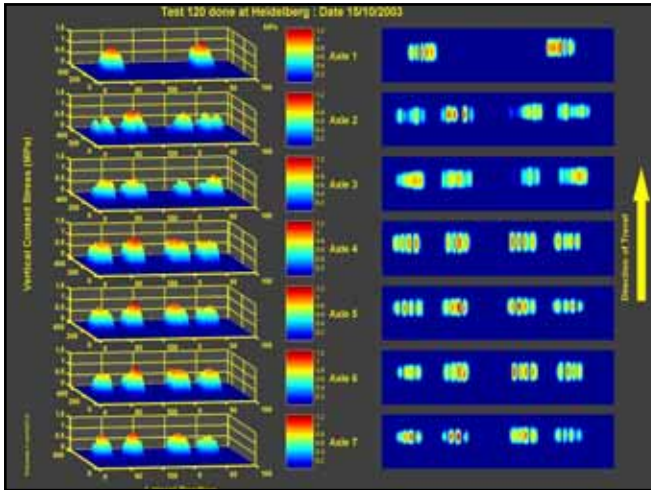
### What Is The Solution: Axle Loads - Control

- Axle Loads
  - Legal Limits
  - Effective Enforcement
    - Network of Traffic Control Centers
    - Operated 24 hours 365 days a year
    - Zero Tolerance to offenders
    - RTMC

7,7 Tons  
 9,0 Tons

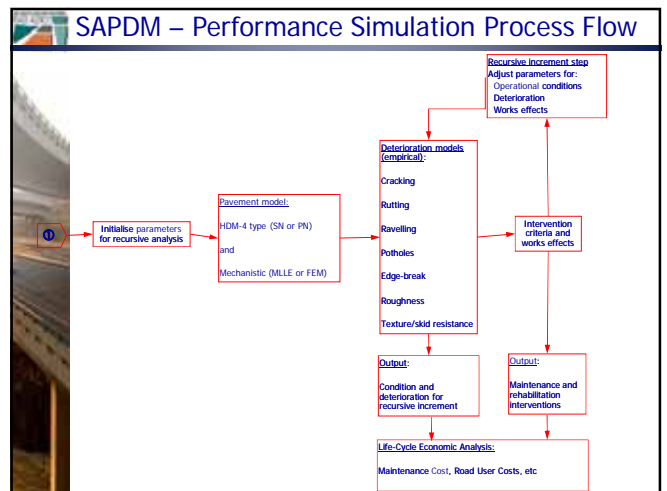
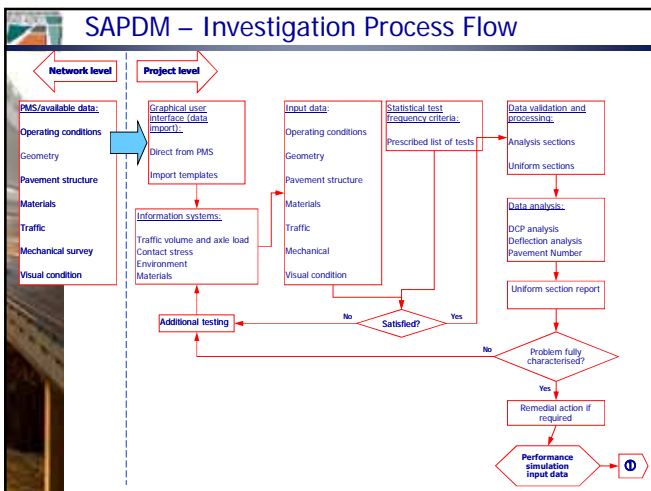
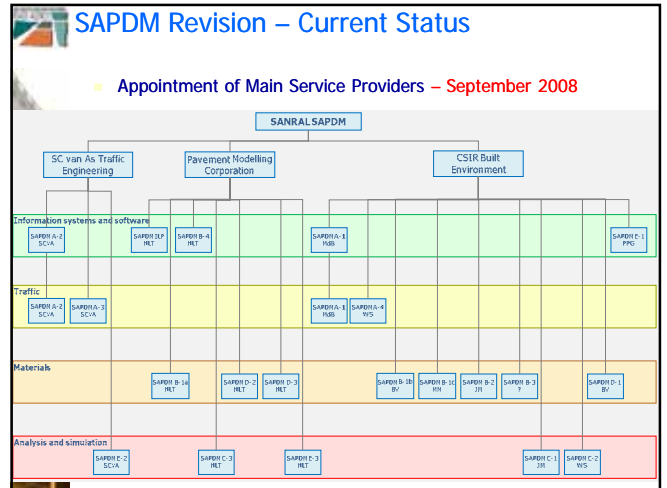
### What Is The Solution: Tire Pressure - Research

- Tire Pressure
  - Not Practical to Specify Legal Limits
    - Technology Improvements Driven by Quest for Economic Efficiency
  - Improved Design Procedures & Materials Through Research
    - Heavy-Vehicle-Simulator (HVS) 20 Years Traffic in 3 Months USA, Finland, Sweden, China, India
    - Stress-In-Motion (SIM)



### Historical Overview – SAPDM Revision

- Process initiated at RPF - **May 2005**
- R&R framework - **November 2005**
- Pavement Performance Information System (LTPP)
  - Material Classification Concept
  - Pavement Number Concept (PN)
  - 50 Projects Completed – **February 2008**
  - 15 Stabilized Projects Added – **February 2008**
- Mechanistic-Empirical Analysis System (MEAS)
  - Phase 1 – Develop Detailed Project Briefs – **November 2006**
  - Phase 2 - Inception Phase (22 Projects) – **July 2007**
  - Peer Review – Phase 2 Reports – **November 2007**
  - Additional SANRAL Requirements – **December 2007**
  - Appointment of Main Service Providers – **September 2008**
    - CSIR Built Environment
    - Pavement Modelling Corporation
    - SC Van As Traffic Engineering
- SAPDM Website ([www.sapdm.co.za](http://www.sapdm.co.za)) – **May 2009**



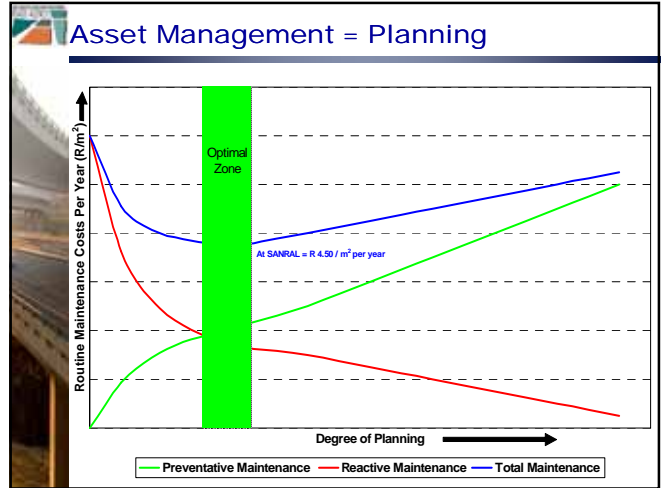
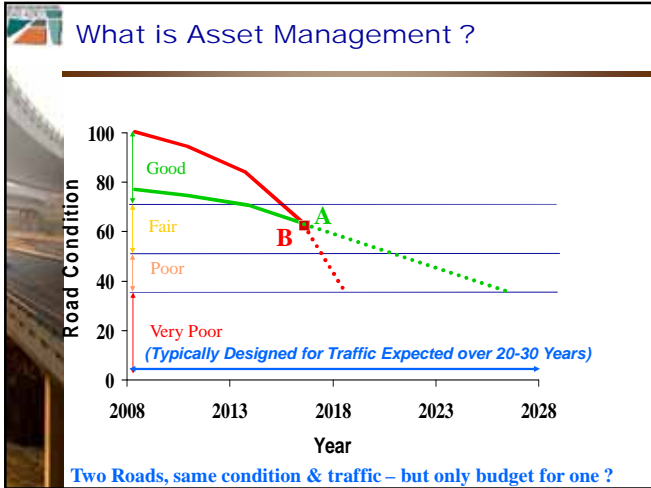
### Progress To Date

- Reports
  - Nov 2009 = 8 Reports
  - May 2010 = 21 Reports
  - Nov 2010 = 30 Reports
  - May 2011 = 44 Reports
- Field Trials – Ongoing
  - Environmental Nov 2010 = 41 Sites
  - Environmental May 2011 = 40 Sites
  - Material Bulk Samples Nov 2010 = 3
  - Material Bulk Samples May 2011 = 3
- Lab Testing – Ongoing
  - Nov 2010 = 6 Asphalt Mixes - Complete
  - May 2011 = 1 of 3 Mixes
- Surface Seals – Work Started at TUDELFT FEM 2D/3D
- Concrete / Block Pavement Integration – Work Started

### What Is The Solution – Preventative Maintenance ?!

**ASSET MANAGEMENT !!!**

- Routine Maintenance
- Crack Sealing, Cleaning Drainage Structures, Cutting of Grass - R 4.50 m<sup>2</sup> / per km / year
- SANRAL Reseal Cost - R70 – R130 m<sup>2</sup> / 10 year
- SANRAL Pothole Repair Cost - R 700 – R1500 / m<sup>2</sup>
- SANRAL In-situ Recycle - R 250 – R500 / m<sup>2</sup>



### Option 1 - Employee Mr Bones

... but eish! – he was not big on roads

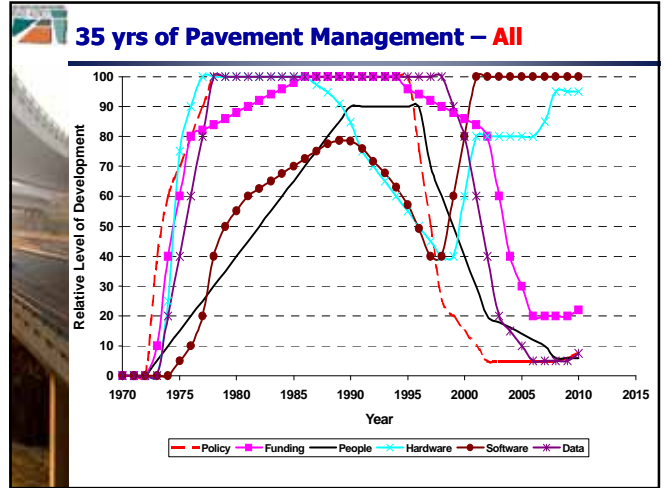
### Option 2 - Asset Management System Building Blocks/Puzzle Pieces of AMS

- **Policy/Procedures** – Principles/Rules to Guide Decisions and achieve rational outcomes – what, where, when, how.
- **Funding** – Financial resources for operation and results implementation.
- **People** - People make decisions, the rest are just to support the process.
- **Hardware** – Road Survey Equipment + IT Infrastructure.
- **Software** – Computer based data Analysis and Storage Tools.
- **Data** – Knowing what you have, its condition and performance Trend.



### Option 2: Asset Management System - Success

- For asset management to be successful **all** the “pieces of the puzzle” need to be in place in a “**balanced equilibrium**”
- It does not help you have the most advance survey vehicle but no means to effectively store and analyse the data, or
- Have the most sophisticate software, but the quality of your data is suspect !
- Without Funding and People – Nothing will happen !!!



### AMS Hardware - Pavement Data

Various condition parameters collected using SANRAL

Road Survey Vehicle:

- Roughness** – how bumpy is the road – speed, wear, etc
- Rut Depth** – how much water pond on surface - safety
- Macro Texture** – assist vehicle tire to drain water – safety, noise
- Cracking** – how much water will get in - deterioration
- Alignment (DGPS)** – Speed, Fuel Consumption, etc
- ROW Video** – Road Signs, Section Measurements, etc
- Annual Surveys at 100 km/h

### AMS Software - Road Inventory

#### Semi-Automated Data Analysis for data extraction

### AMS Software - Real-Time Crack Analysis

Real-time analysis during recording !!!

### AMS Hardware - Pavement Data

#### Micro-Texture (mm)

- Micro-texture is associated with the gritty sandpaper feeling or lack thereof when touching the pavement surface. It affects the level of surface friction at all speeds for dry and wet conditions.
- Measured using SCRIM or Griptestter
- 3-8 Year Surveys, Low Macro Texture Areas

### AMS Hardware - Pavement Data

**Structural Strength (Surface Deflection (mm))**

Traffic Speed Deflectometer (TSD)

Coming 1<sup>st</sup> Quarter 2012

3D Laser Point Cloud      3D Pavement Imaging

### AMS Data - Bridges

**Visual Assessments (DER)**

- Bridge condition is assessed through a standardized procedure to determine the **Degree, Extent and Relevancy**.
- Bridge repairs are prioritised according to severity and Relevancy of defects
- 3 to 5 year cycle
- 8000 Bridges & Major Culverts

### AMS Data - Traffic

**Traffic Event Logger (TEL)**

- Inductive Loop Based Technology (1000)
  - > + Piezo (200)
  - > + WIM (45)
- Cluster Monitoring
- 1 to 3 year for Secondary Stations

LB Threshold  
WB Threshold

ABX-Loop Failure Time      ACH-Forking Time

### AMS Data - Vehicles Operating Costs

- Up to 90 % of Total Transportation Costs
- Vehicle Operating Costs (Fuel, Tires, etc)
  - Standard Vehicles (i.e. HDM-4  $\sqrt{\quad}$ )
  - Congestion (i.e. HDM-4  $\sqrt{\quad}$ )
- Accident Costs
- Value of Time (Congestion)

■ And Then !!!

### AMS Software - Data Management

**Traffic**

**DGPS**

**Bridge**

**Unit Costs**

**Centralised Database**

Roughness  
Rut Depth  
Macro Texture  
Cracking  
Ravelling  
Video

Surface Friction

Structural Strength

### AMS Software - Life Cycle Modelling

**Condition Surveys**

**Centralised Database**

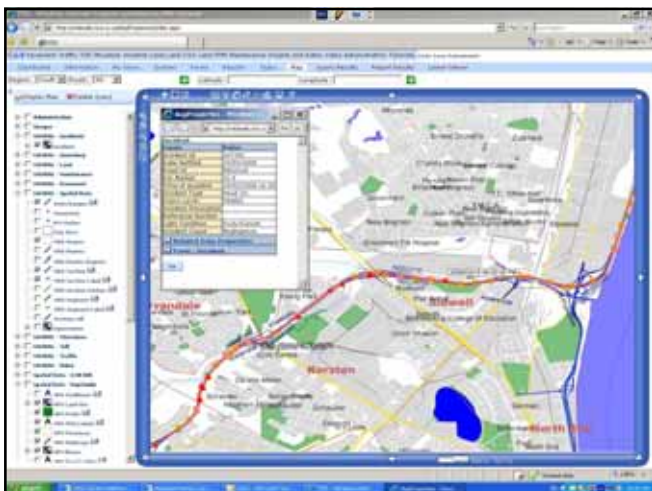
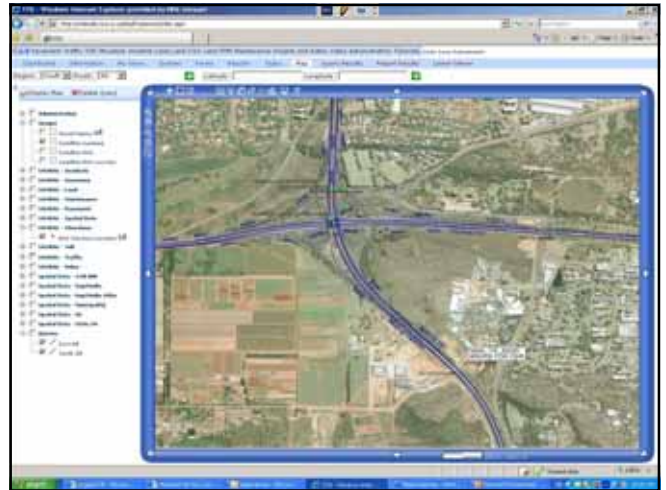
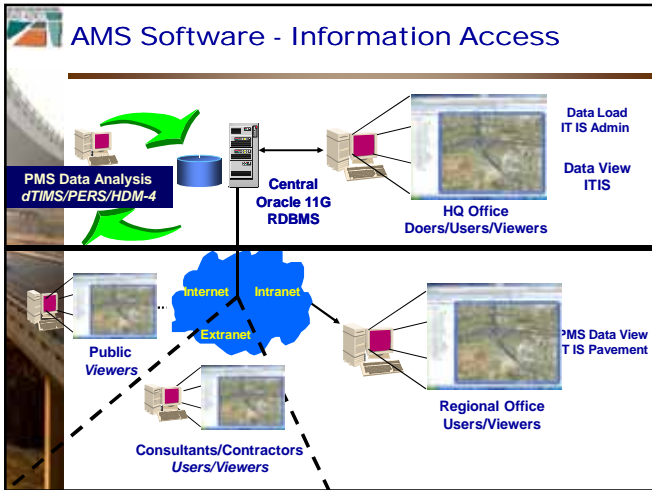
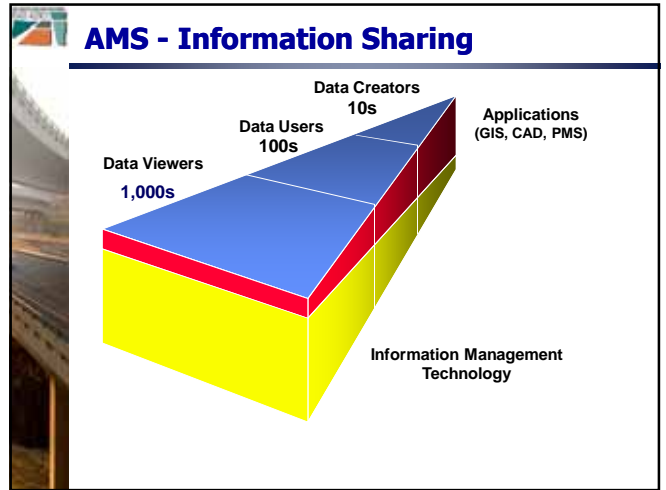
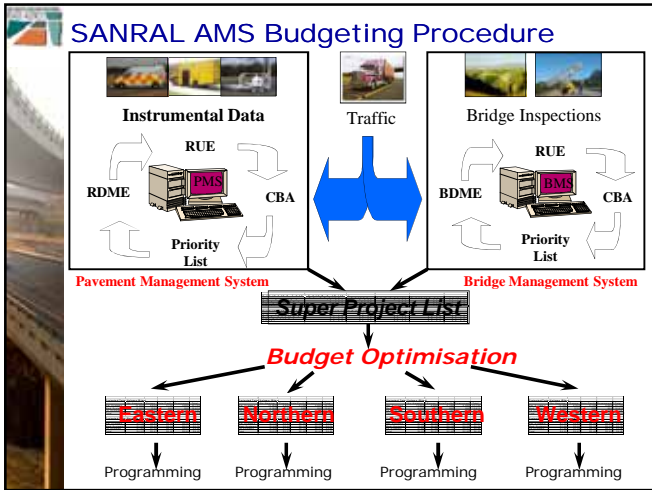
**Dynamic Segmentation Uniform Sections**

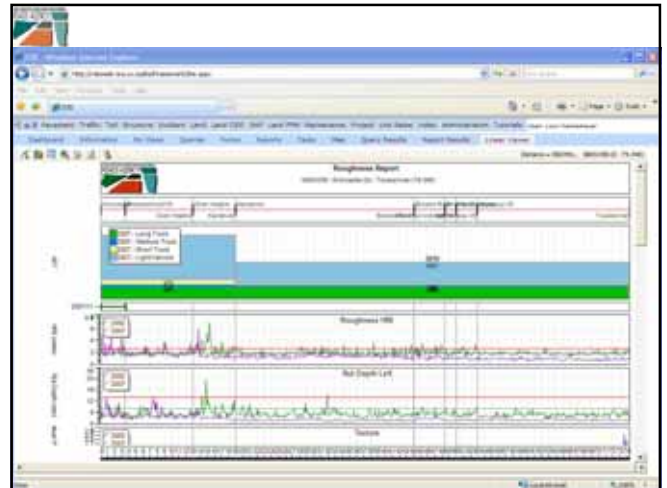
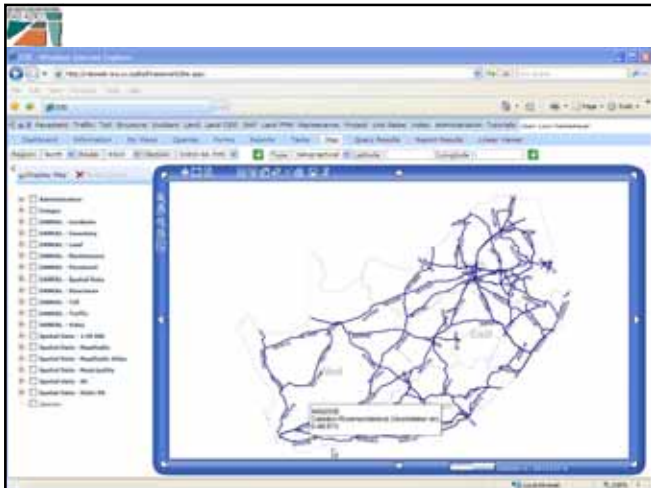
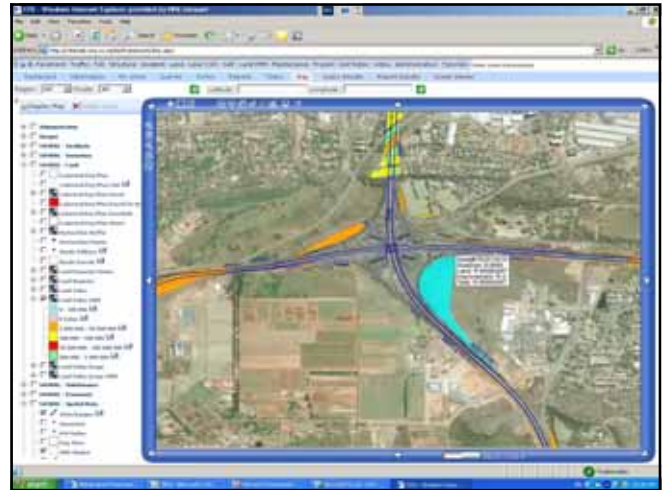
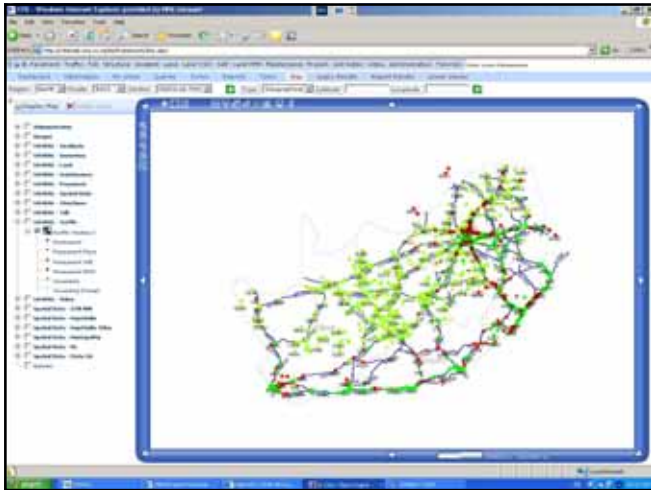
**Road Deterioration & Maintenance Effects**

**Road User Effects**

**Economic Analysis & Optimisation**







 SANRAL: Touching Peoples Lives

**THANK YOU!**

*"Where a road passes, development follows right on its heels"*



24 7 2008