Georgia - RAMS

CAREC Transport Coordinating Committee Meeting

Tashkent, Uzbekistan – 25,26 April 2019

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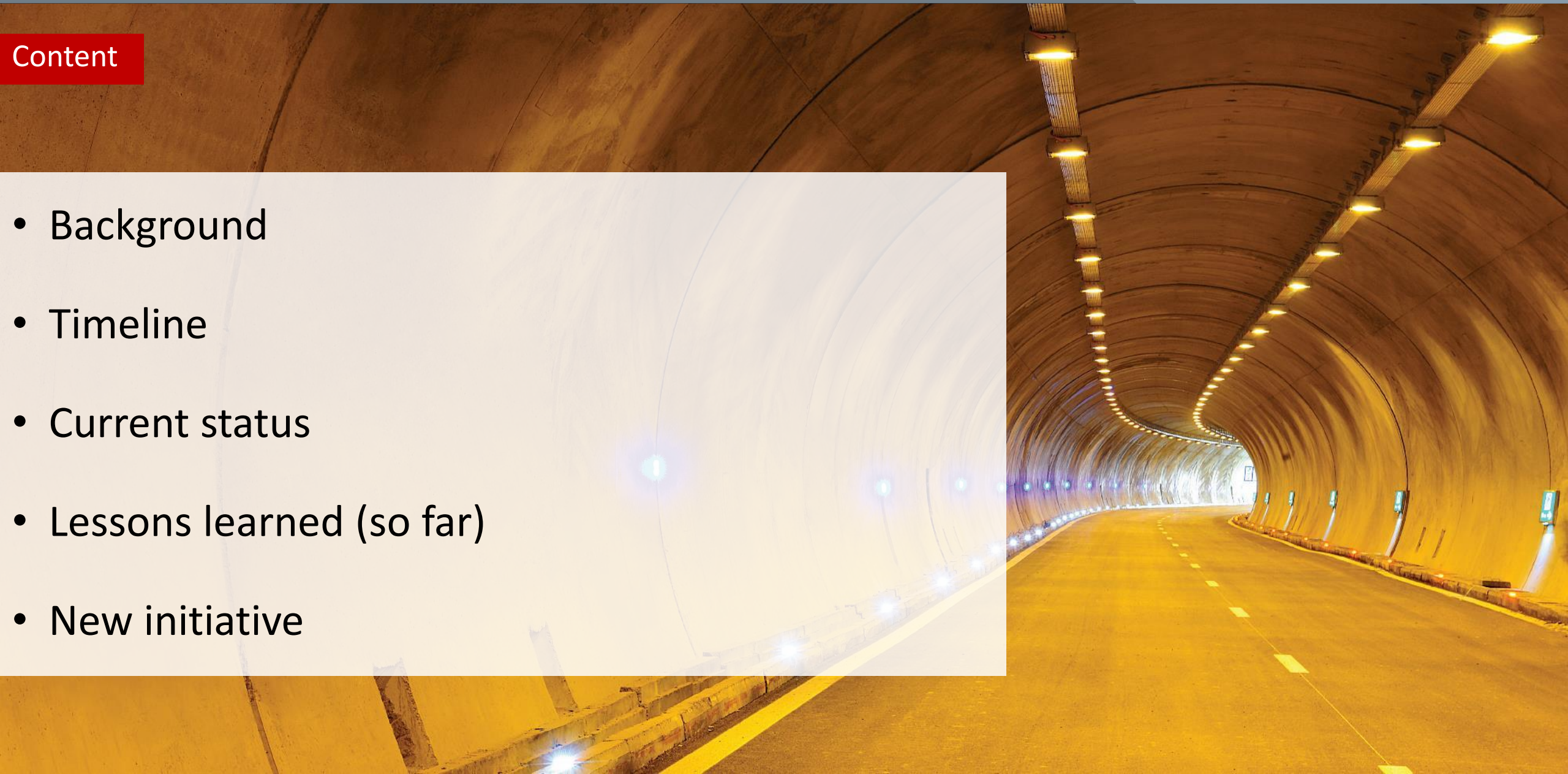
Content

- Background
- Timeline
- Current status
- Lessons learned (so far)
- New initiative



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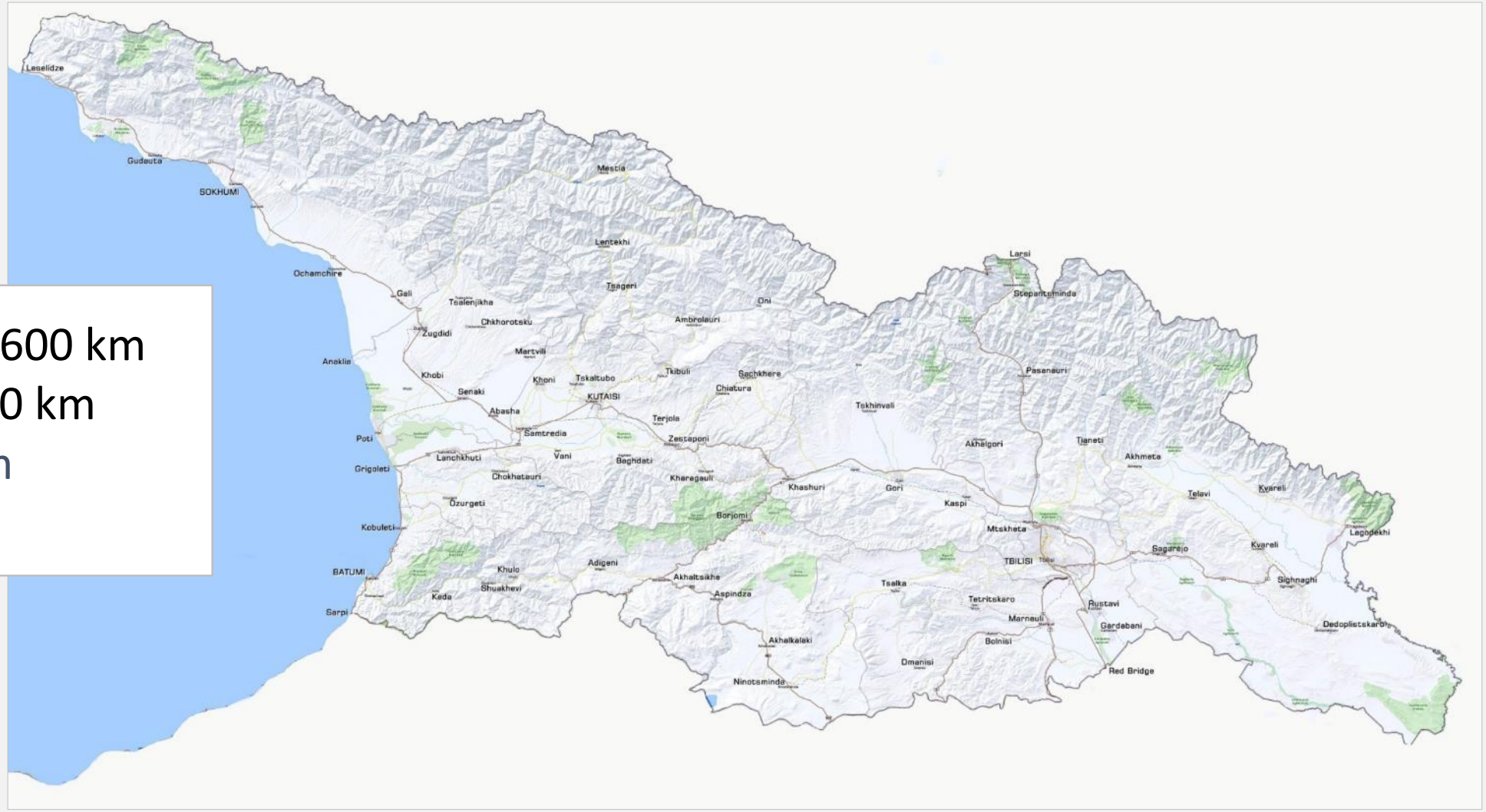
Road Network

International - 1 600 km
Secondary - 5 300 km
Local - 13 000 km
Total: 20 000 Km



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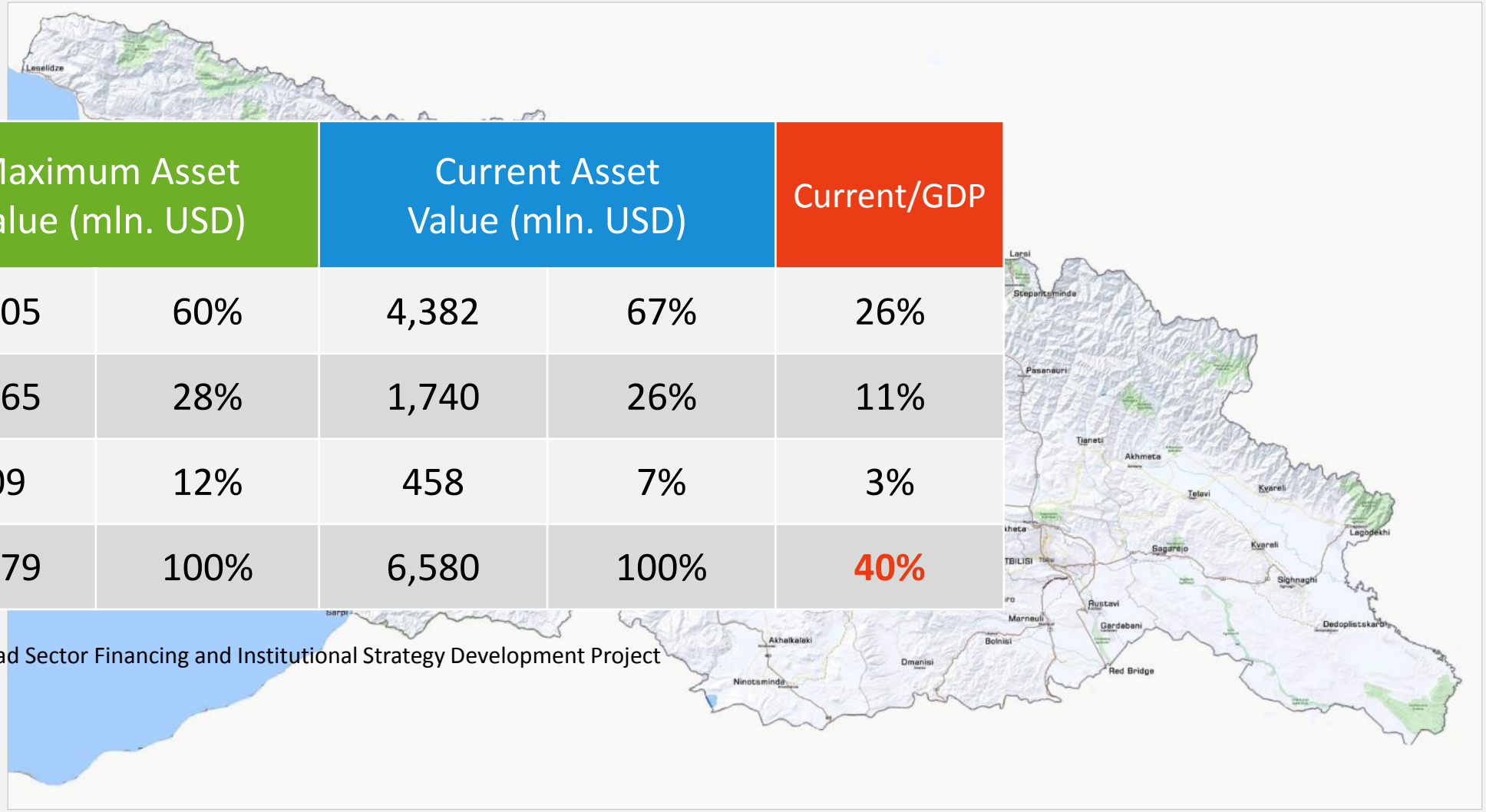
Asset Value

Road Network	Maximum Asset Value (mln. USD)		Current Asset Value (mln. USD)		Current/GDP
International	4,505	60%	4,382	67%	26%
Secondary	2,065	28%	1,740	26%	11%
Local	909	12%	458	7%	3%
Total:	7,479	100%	6,580	100%	**40%**

Source: WB RONET study under Road Sector Financing and Institutional Strategy Development Project



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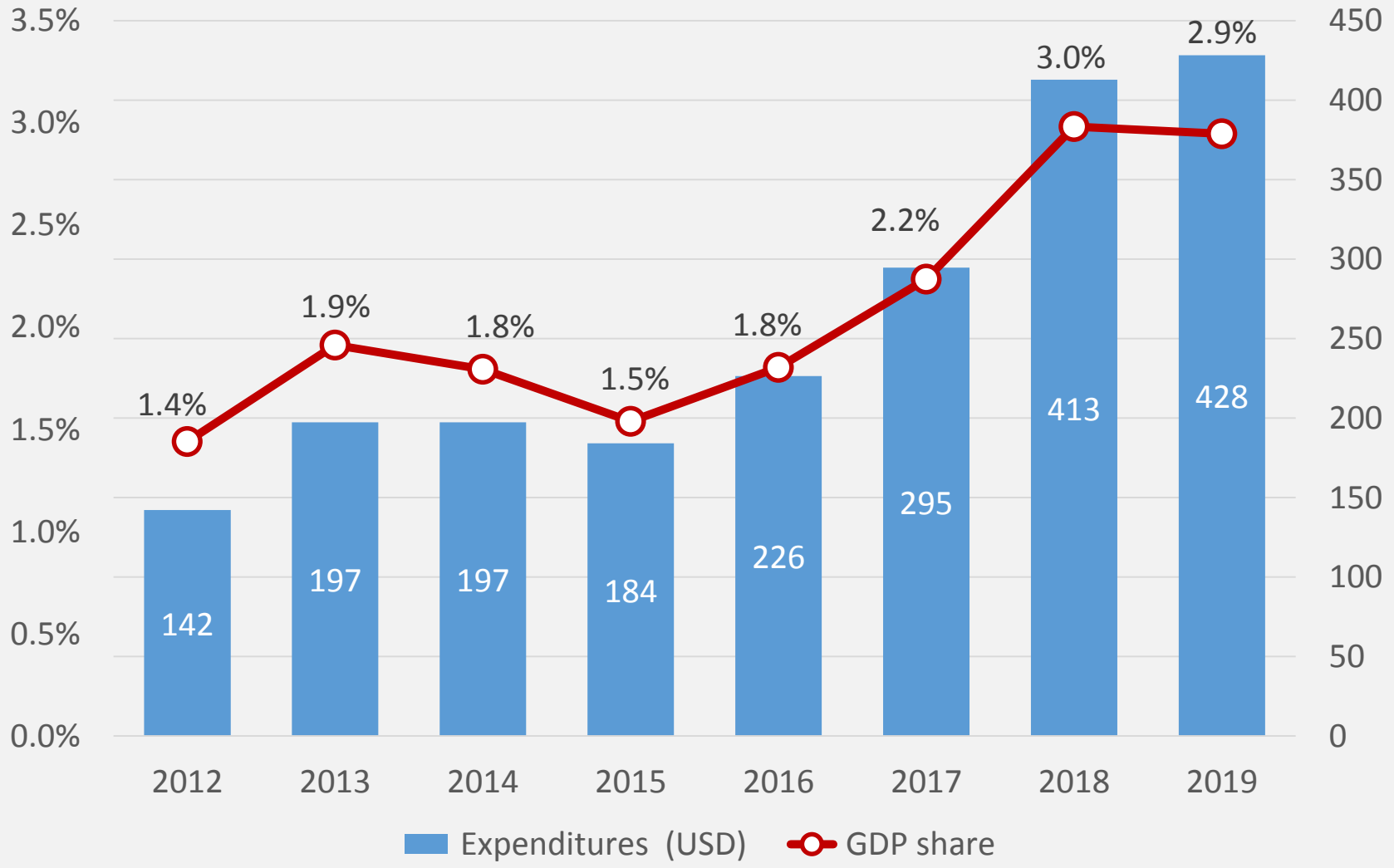
Expenditures

Steady financing resulted in significant decrease in road network backlog. Therefore, now more than ever it's important to improve road asset management trough preventive maintenance and prioritization of works based on economic and social indicators.



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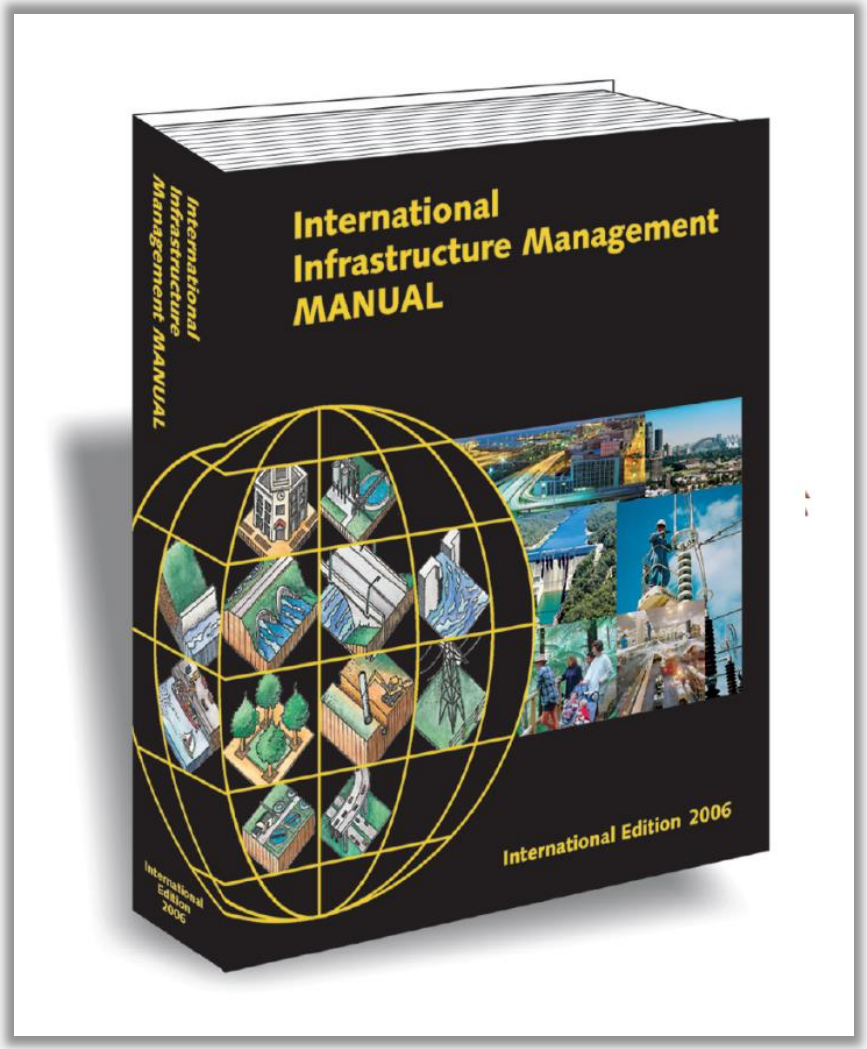
Definition

"The goal of infrastructure asset management is to meet a required level of service, in the most cost effective manner, through the management of assets for present and future customers.

Key elements include:

- Taking **a life cycle** approach
- Developing **cost-effective** strategies for the long-term
- Providing a defined **level of service** quality and then monitoring performance
- Meeting the **needs of growth**
- Managing **risks** associated with failures
- **Sustainable** use of physical resources

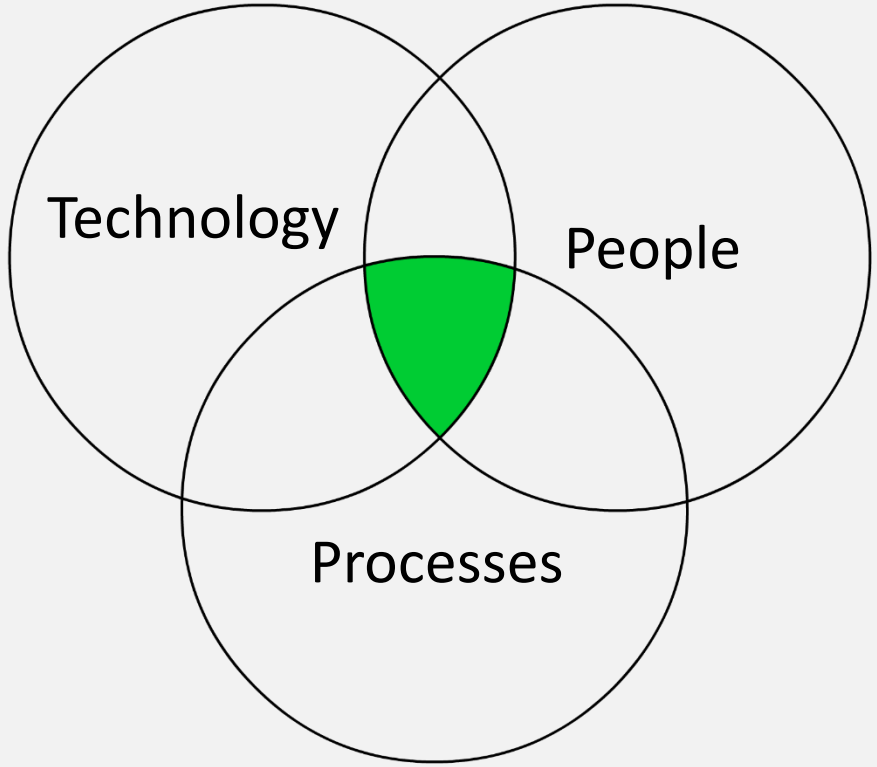


Components

Road asset management systems (RAMS) have two components

- Software to store and process data
- Business processes to use RMS to make decisions

RAMS is only a tool. Without adequate human resources any advanced system will fail.



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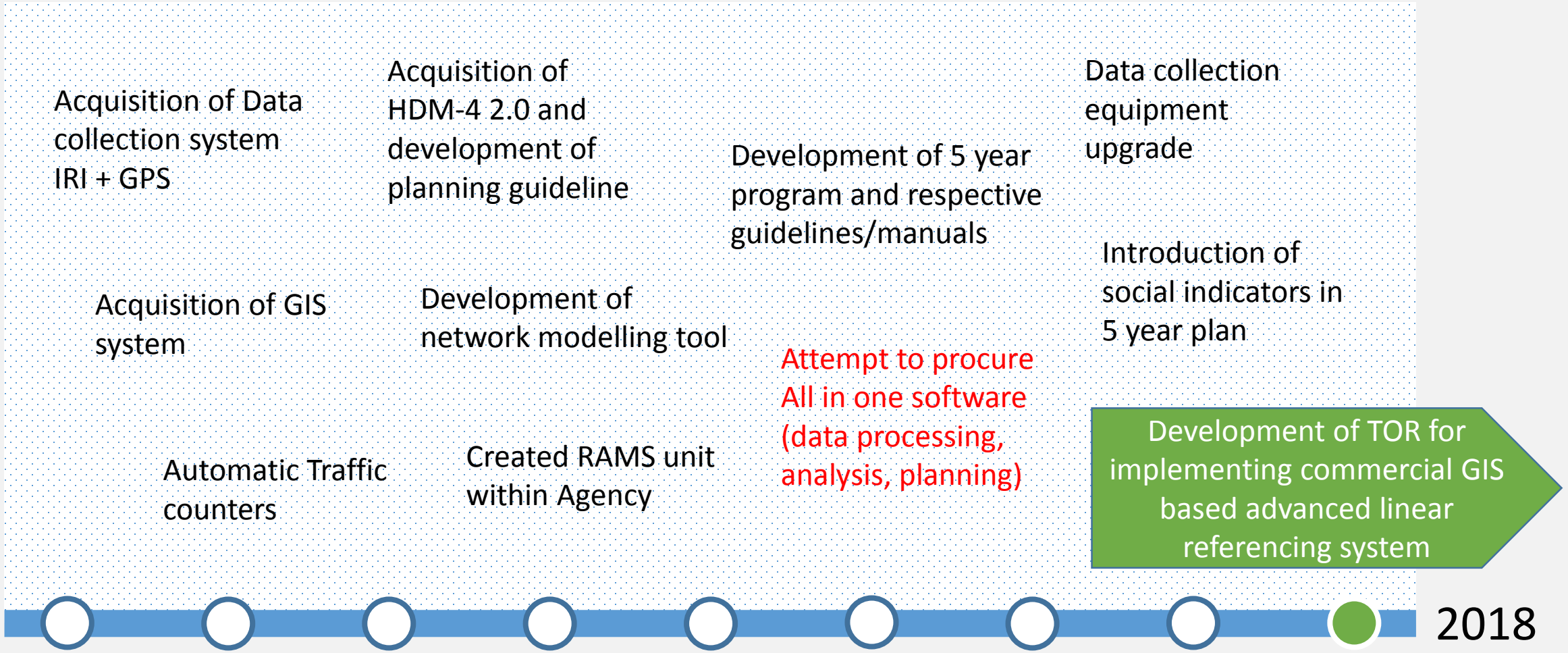
Timeline



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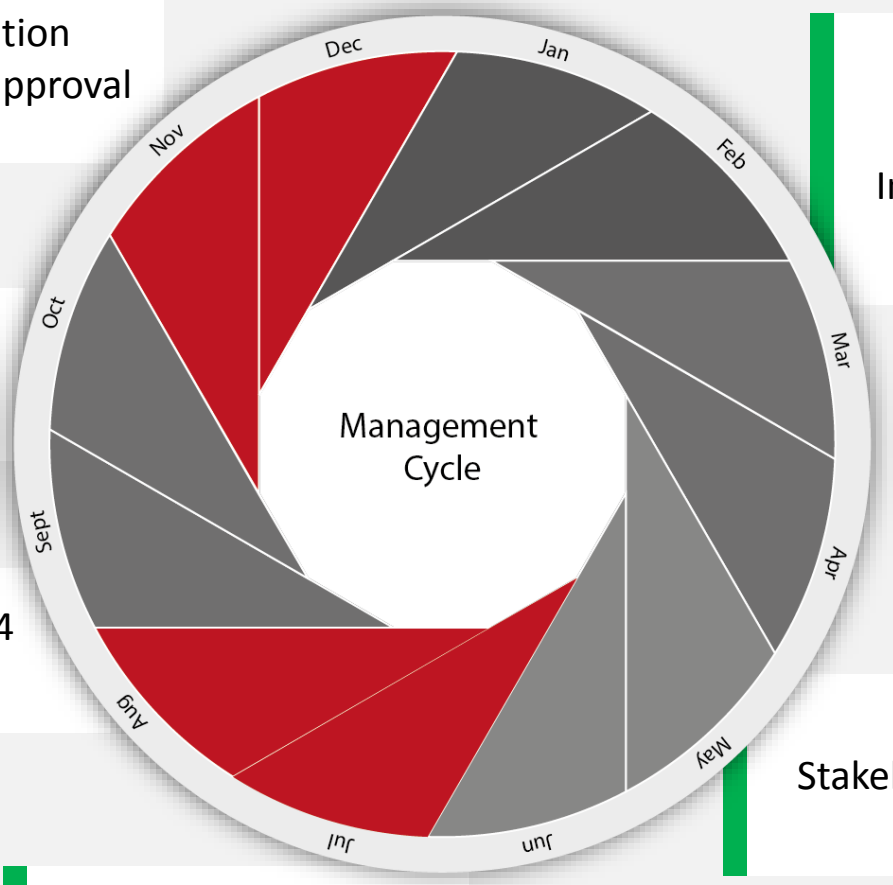
RAMS – Annual Planning Cycle

Follow up and Evaluation
Budget negotiation and approval

Annual data collection
Inventory, Road condition, traffic etc.



Preparation and approval of next year plan

Preparation of HDM-4 multi year program

Stakeholders inputs

Data Processing

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RAMS – Annual Planning Cycle

1. Annual data collection
2. Structuring the available data, using GIS data base and Network modelling tool
3. Defining Maintenance Strategies and unit costs
4. Conducting HDM4, program analysis (life cycle)
5. Using the HDM-4 unconstrained solution
6. Obtaining the expected RD budget for periodic maintenance and rehabilitation, Using the HDM4 unconstrained budge.
7. Assigning non-monetary Indicators using GIS spatial analysis
8. Preparation of a 5 year list over the prioritized road project candidates, based on benefit- cost ratio (NPV/C) sorted by year, and population density,
9. Preparation of project fact sheets for the selected projects in the first year

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Current Status - Data Collection

360 Degree camera, GPS, Geometry unit

IRI (Laser Profilometers)

Odometer

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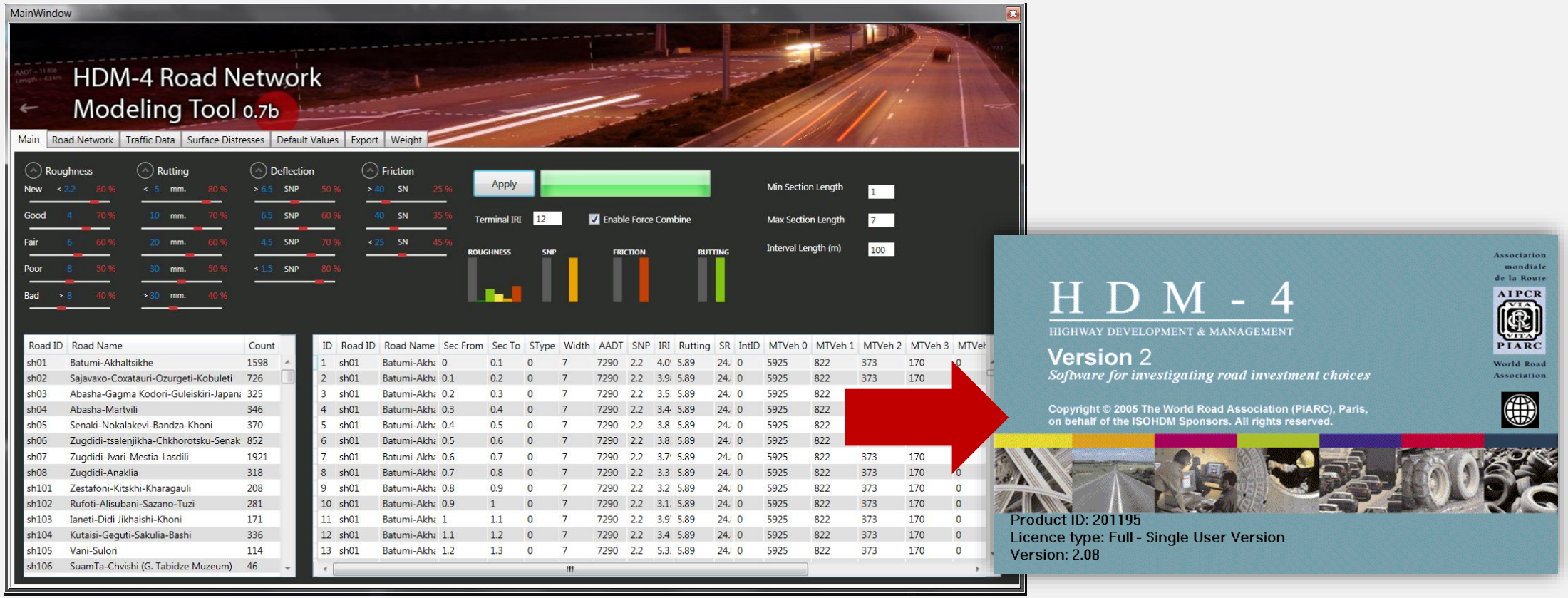
Current Status - Data Processing



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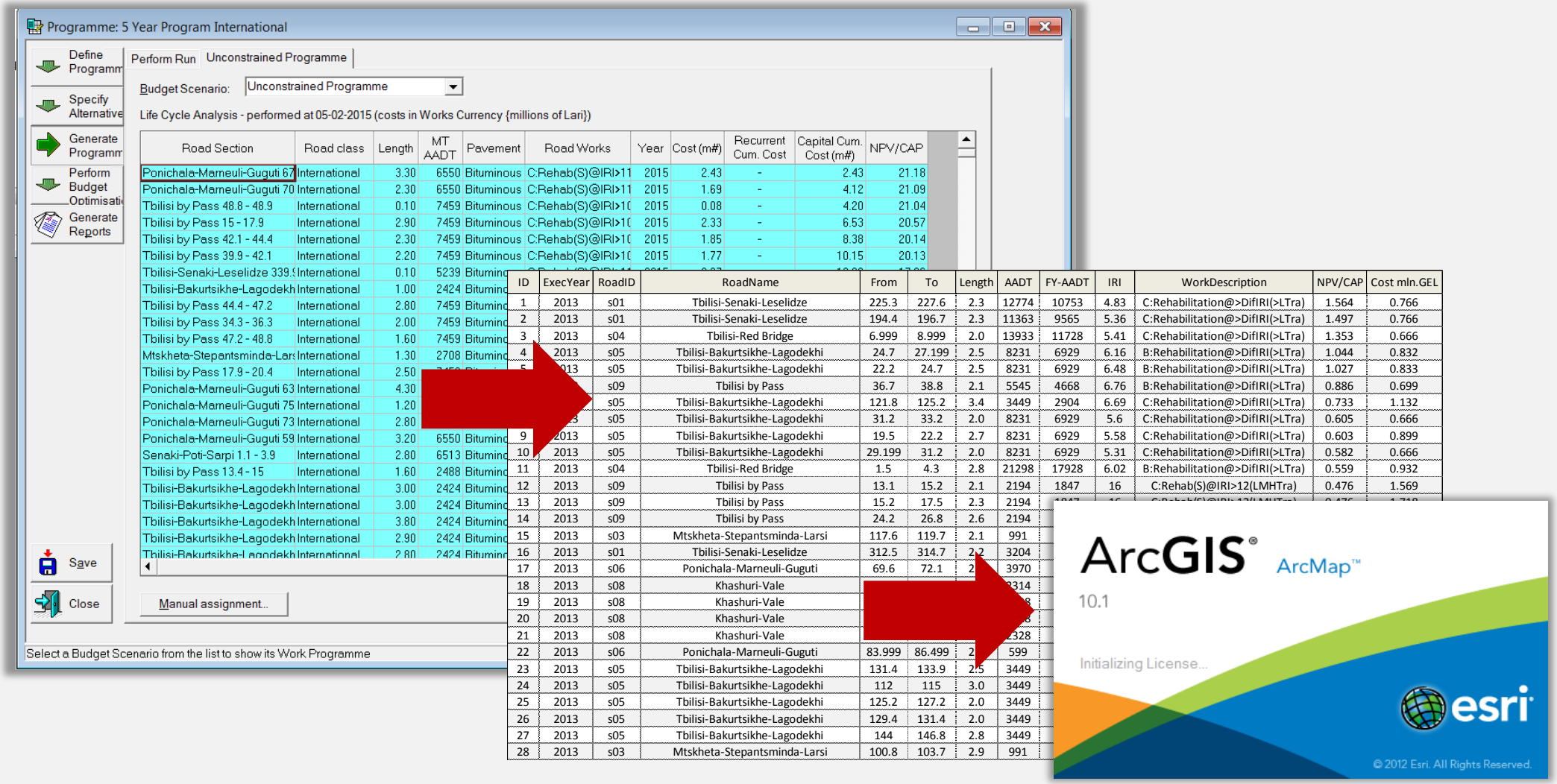
Current Status - Life-Cycle Analysis



ID	ExecYear	RoadID	RoadName	From	To	Length	AADT	FY-AADT	IRI	WorkDescription	NPV/CAP	Cost mln.GEL
1	2013	s01	Tbilisi-Senaki-Leselidze	225.3	227.6	2.3	12774	10753	4.83	C:Rehabilitation@>DifIRI(>LTra)	1.564	0.766
2	2013	s01	Tbilisi-Senaki-Leselidze	194.4	196.7	2.3	11363	9565	5.36	C:Rehabilitation@>DifIRI(>LTra)	1.497	0.766
3	2013	s04	Tbilisi-Red Bridge	6.999	8.999	2.0	13933	11728	5.41	C:Rehabilitation@>DifIRI(>LTra)	1.353	0.666
4	2013	s05	Tbilisi-Bakurtsikhe-Lagodekhi	24.7	27.199	2.5	8231	6929	6.16	B:Rehabilitation@>DifIRI(>LTra)	1.044	0.832
5	2013	s05	Tbilisi-Bakurtsikhe-Lagodekhi	22.2	24.7	2.5	8231	6929	6.48	B:Rehabilitation@>DifIRI(>LTra)	1.027	0.833
6	2013	s09	Tbilisi by Pass	36.7	38.8	2.1	5545	4668	6.76	B:Rehabilitation@>DifIRI(>LTra)	0.886	0.699
7	2013	s05	Tbilisi-Bakurtsikhe-Lagodekhi	121.8	125.2	3.4	3449	2904	6.69	C:Rehabilitation@>DifIRI(>LTra)	0.733	1.132
8	2013	s05	Tbilisi-Bakurtsikhe-Lagodekhi	31.2	33.2	2.0	8231	6929	5.6	C:Rehabilitation@>DifIRI(>LTra)	0.605	0.666
9	2013	s05	Tbilisi-Bakurtsikhe-Lagodekhi	19.5	22.2	2.7	8231	6929	5.58	C:Rehabilitation@>DifIRI(>LTra)	0.603	0.899
10	2013	s05	Tbilisi-Bakurtsikhe-Lagodekhi	29.199	31.2	2.0	8231	6929	5.31	C:Rehabilitation@>DifIRI(>LTra)	0.582	0.666
11	2013	s04	Tbilisi-Red Bridge	1.5	4.3	2.8	21298	17928	6.02	B:Rehabilitation@>DifIRI(>LTra)	0.559	0.932
12	2013	s09	Tbilisi by Pass	13.1	15.2	2.1	2194	1847	16	C:Rehab(S)@IRI>12(LMHTra)	0.476	1.569
13	2013	s09	Tbilisi by Pass	15.2	17.5	2.3	2194					
14	2013	s09	Tbilisi by Pass	24.2	26.8	2.6	2194					
15	2013	s03	Mtskheta-Stepantsminda-Larsi	117.6	119.7	2.1	991					
16	2013	s01	Tbilisi-Senaki-Leselidze	312.5	314.7	2.2	3204					
17	2013	s06	Ponichala-Marneuli-Guguti	69.6	72.1	2	3970					
18	2013	s08	Khashuri-Vale				2314					
19	2013	s08	Khashuri-Vale									
20	2013	s08	Khashuri-Vale									
21	2013	s08	Khashuri-Vale				2328					
22	2013	s06	Ponichala-Marneuli-Guguti	83.999	86.499	2	599					
23	2013	s05	Tbilisi-Bakurtsikhe-Lagodekhi	131.4	133.9	2.5	3449					
24	2013	s05	Tbilisi-Bakurtsikhe-Lagodekhi	112	115	3.0	3449					
25	2013	s05	Tbilisi-Bakurtsikhe-Lagodekhi	125.2	127.2	2.0	3449					
26	2013	s05	Tbilisi-Bakurtsikhe-Lagodekhi	129.4	131.4	2.0	3449					
27	2013	s05	Tbilisi-Bakurtsikhe-Lagodekhi	144	146.8	2.8	3449					
28	2013	s03	Mtskheta-Stepantsminda-Larsi	100.8	103.7	2.9	991					

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Current Status - Automated, Data driven, simple indicators

Main Indicators	1	NPV/CAP	Benefits/Capital cost ratio
	2	Population Density	Total population within 2km buffer / section length
Secondary Indicators	1	Enhanced National Connectivity	Part of Secondary Road between, connecting two international roads
	2	Enhanced Regional Connectivity	Distance from the centre of section to closest city centre
	3	Enhanced economic activities	Number of registered businesses in the district where the section is located
	4	Education	Number of schools within a 2 km buffer along the road section
	5	Tourism	Number of attraction within a 2 km buffer along the road section
	6	Life Line Road	The road is the only possibility of connecting the village to the outside world
	7	Rate of poverty	Number of people receiving government support in the district in relation to the district population, where the road section is located
Custom Indicators	1	Emergency Access	Time required from closest city/municipal center to reach populated place
	2	Mobility	Total number of villages section provides shortest access to municipal center/city

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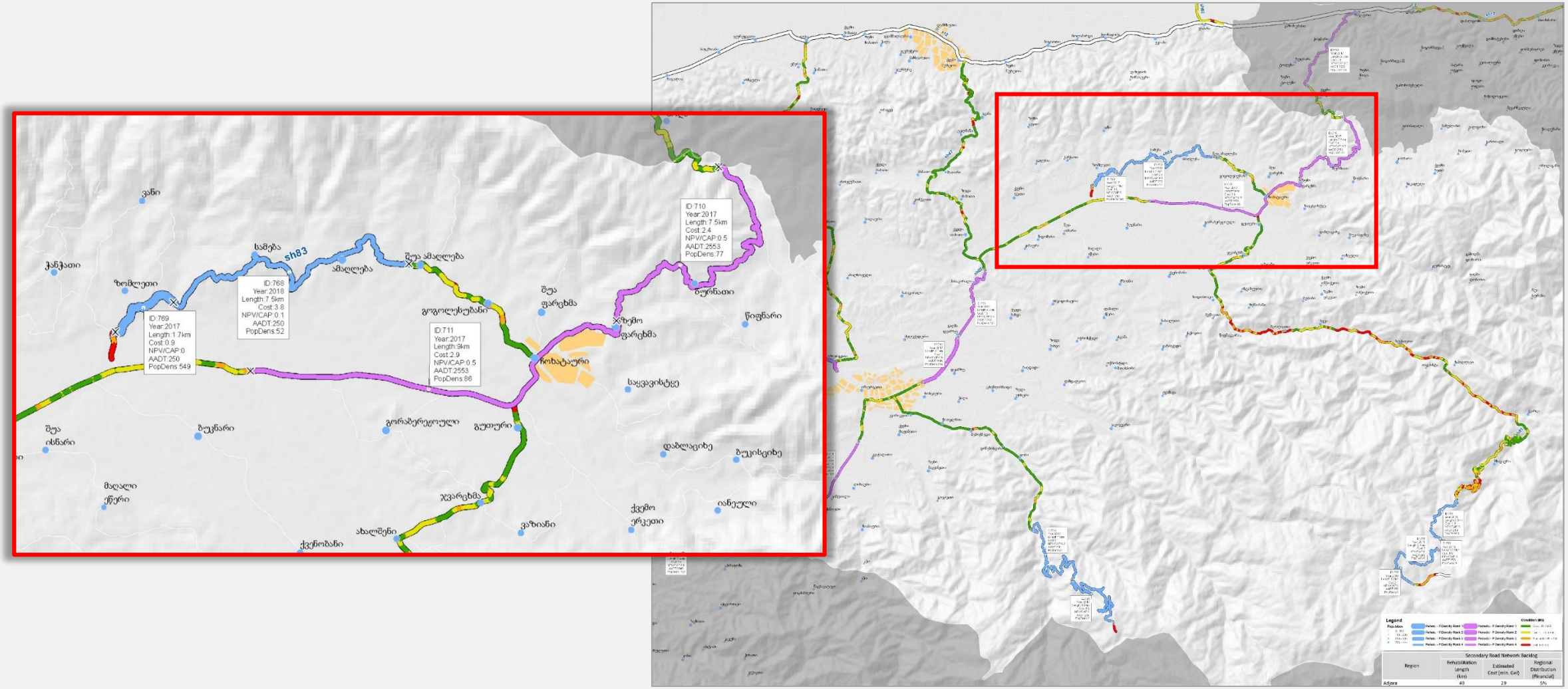
Multi – Year program visualization



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Project Fact-Sheet

Project name, description and rationale for prioritization

Main indicators NPV/CAP, Population Density

Secondary Indicators assessing mobility and social impact

Project area map, road condition

Rehabilitation of: Sh37 Sadakhlo-Tsopi-Askhepi secondary road km3-km8 Section

Project Description

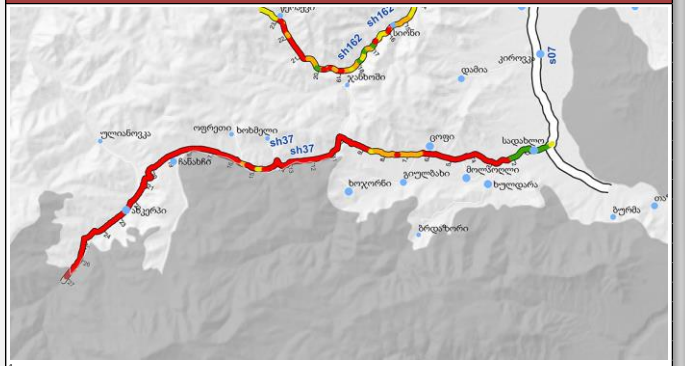
Following road section is part of rolling program for year 2018, section connects international road S07 Marneuli-Sadakhlo to Armenia border and provides access to social services to more than 1500 people. Road is considered importan in terms of Agriculture as well as providing minimum standard of mobility and integration.

Utilization		Class	Economic Indicators (mln. Gel) / Road Works			
Traffic (AADT)	250	1	Total Capital Cost	3.0	Pavement str	
Heavy Vehicles (%)	2.5		NPV	0.14	Bridge/Culver	
[1]Condition	10.91	4	NPV/Cost Ratio	0.03	Traffic Safety	n/a
[2]Population Density	227	4	Cost/Pop. Ratio	0.002	Environment	n/a

Socio Economic Impact Assesment

Objective	Indicator	Unit
Enhanced National Connectivity	Part of Secondary Road connecting two international roads.	N
Enhanced Regional Connectivity	Distance from the centre of section to closest city centre.	34km
Enhanced economic activities	Number of registered businesses in the district where the section is	
Population	Number of people living within 2km buffer along the road section.	
Education	Number of schools within 2 km buffer along the road section.	7
Tourism	Number of attraction within 2 km buffer along the road section.	2
Poverty	Percentage of people receiving government support within district where road section is located.	n/a
Life Line Road	The road is the only possibility for connecting the village to outside world.	y

Project Area Map



[1]Description of Condition Classes (Good, Fair; poor and Bad) is found in Chapter 4, section 1.1
[2]Number of persons/2km buffer from the homogenous section divided by section length

Economic Indicators	
Total Capital Cost	3.0
NPV	0.14
NPV/Cost Ratio	0.03
Cost/Pop. Ratio	0.002

Part of Secondary Road connecting two international roads.	N
Distance from the centre of section to closest city centre.	34km
Number of registered businesses in the district where the section is located.	347
Number of people living within 2km buffer along the road section.	1520
Number of schools within 2 km buffer along the road section.	7
Number of attraction within 2 km buffer along the road section.	2
Percentage of people receiving government support within district where road section is located.	n/a
The road is the only possibility for connecting the village to outside world.	y

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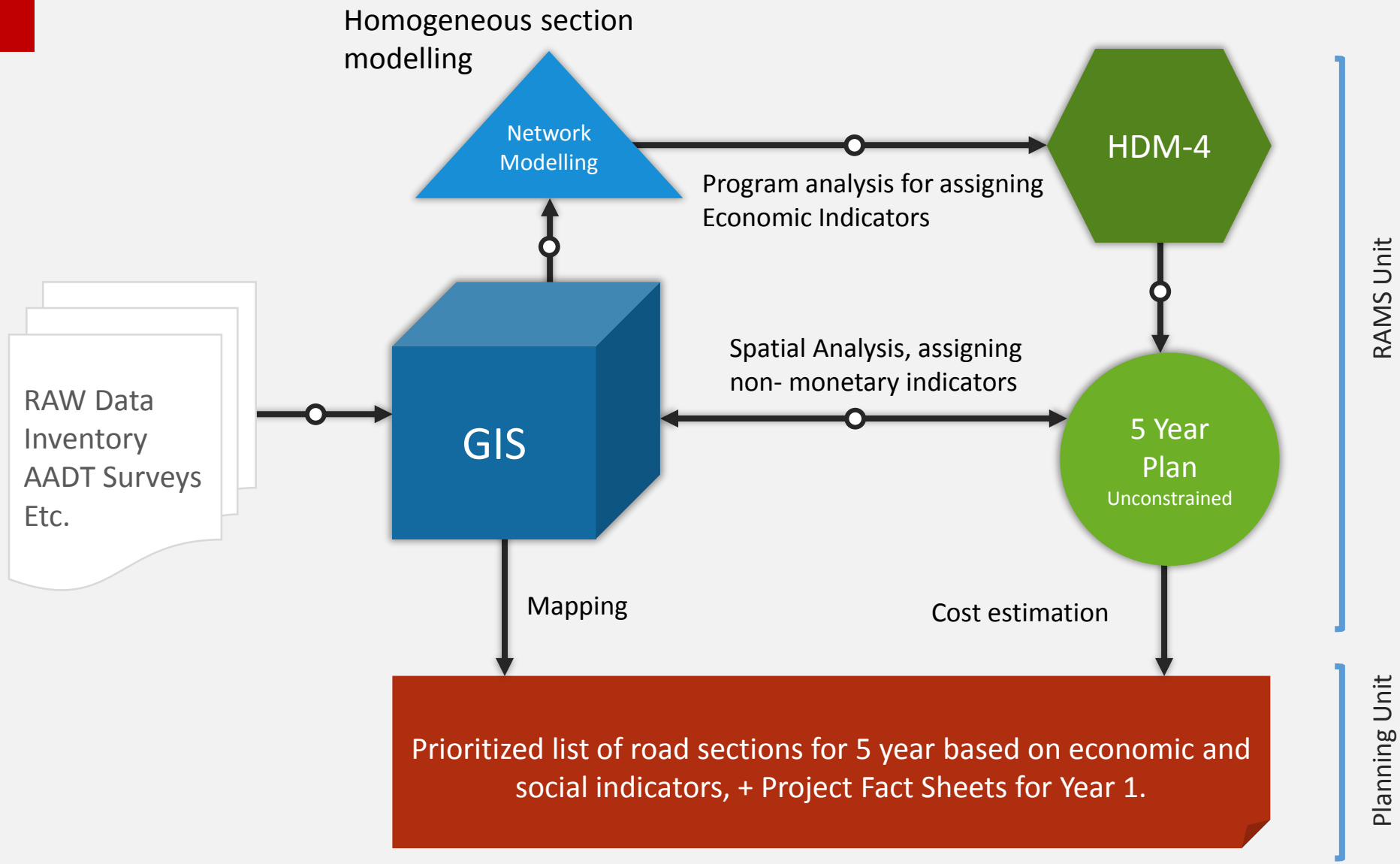
RAMS interfacing



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RAMS as a vital tool for OPRC contract monitoring

Road Agency must have established RAMS to enable monitoring of performance standards and service Quality Levels.

Georgia OPRC pilot - Laser IRI measurements are carried out for each rehabilitated road section. Requirement is set to Max 2.0 km per any 1km section and max 2.5 per any 100m subsection.

IRI requirements is also set for all road network and linked to the monthly payment adjustments.

Lessons learned - Data Collection

Data collection must be appropriate and sustainable

Only collect:

- The essential data
- At the minimum level of detail
- With the most appropriate technology given the agency's constraints and capabilities
- Agency must have explicit data collection policies and procedures
- There must be strict data QA procedures

Lessons learned - Technology

Focus on combination of commercial off-the-shelf (COTS) software instead of all in one custom solution.

- Lower cost
- Independence – many consultants
- Timeframe – implemented much faster
- Experience – reflects inputs and testing from a larger number of users
- Functionality – more functions
- Ongoing development – continual upgrades and improvements
- Exchange of ideas – conferences and other users

Lessons learned - People

The RMS must be fully institutionalized and supported

To Achieve This:

- There must be an organizational unit to manage, monitor and continually improve the RMS
- Unit must have appropriate staff, clear job responsibilities, sufficient budget, clear reporting lines to upper management
- Continual training and development
- Commitment to continual improvement

Lessons learned - Processes

RAMS must have an active role in the agency

To Achieve This:

- The RMS must be an integral part of the agency's monitoring and planning process
- Have written guidelines for annual cycle of activities
- Outputs should be used to prepare annual reports to ensure data are regularly collected and the system applied

Provide a structured framework for reporting the performance of the agency and plans

Elements typically include

- Key performance indicators
- Five-year goals
- Annual asset management plan

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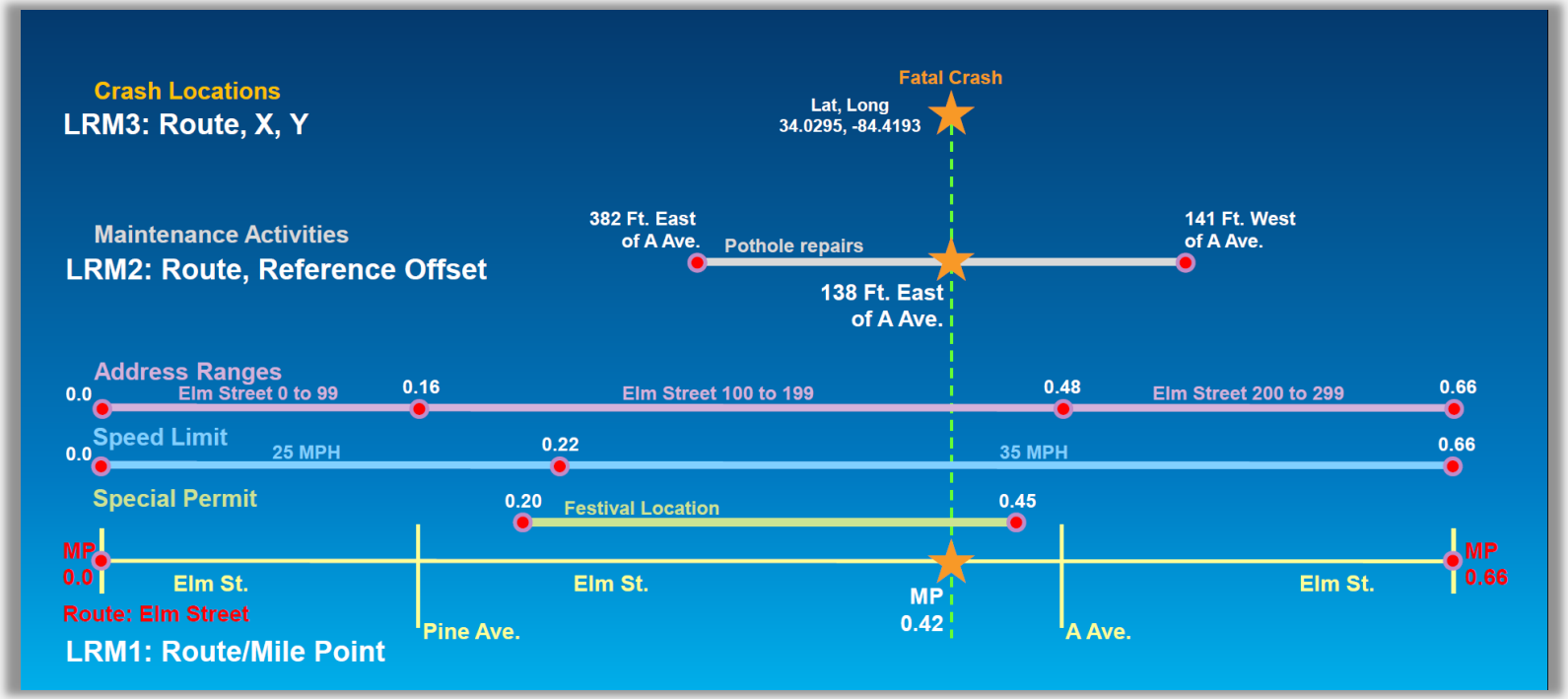
Major functions to be introduced in Georgia RAMS

- Support for Advanced Linear Referencing
- Dynamic Sectioning
- Security, User levels, etc
- Temporal model



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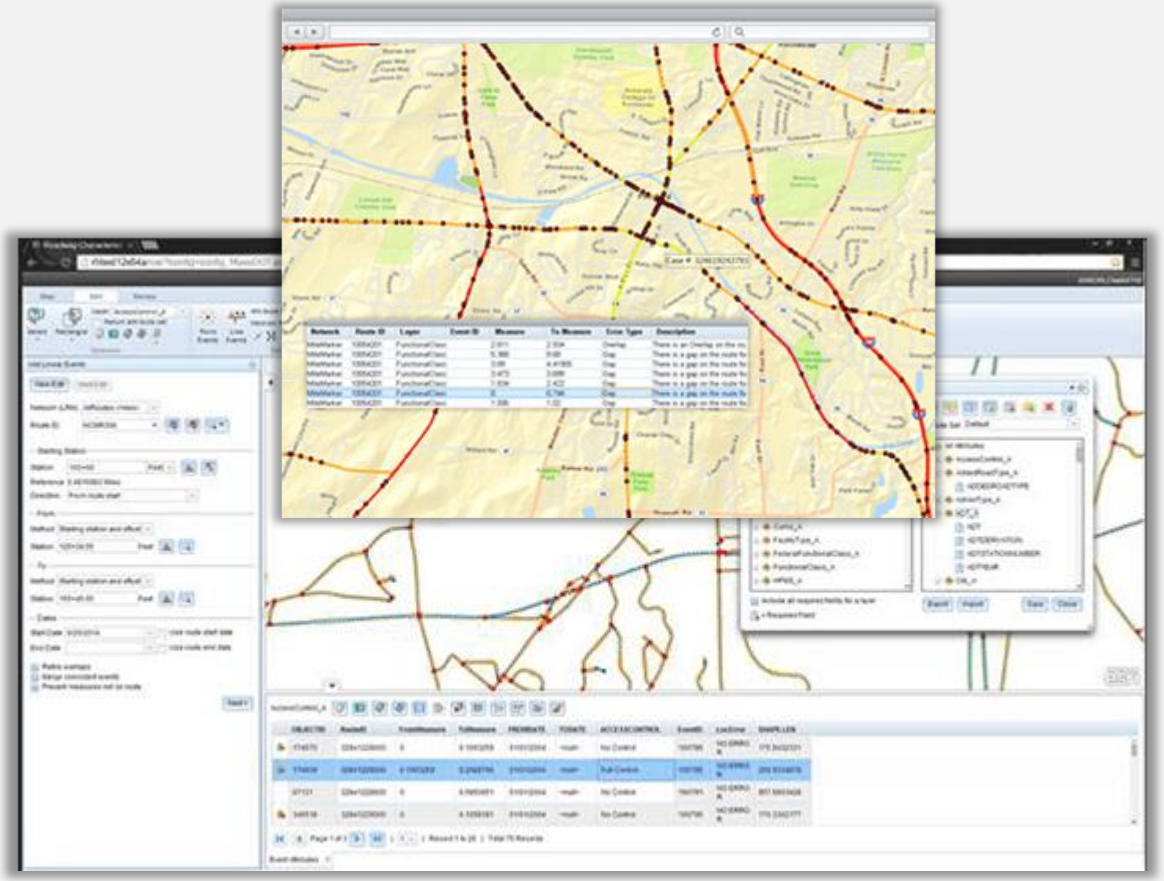
ESRI ArcGIS Roads and Highways

Esri ArcGIS Roads and Highways extension is a linear referencing system solution that makes it possible for departments of transportation to integrate data from multiple linear referencing system (LRS) network

Every Public Agency in Georgia with GIS needs is using ESRI ArcGIS system, including Roads Department

ESRI GIS is an off-shelf commercial software and worldwide standard for GIS solutions



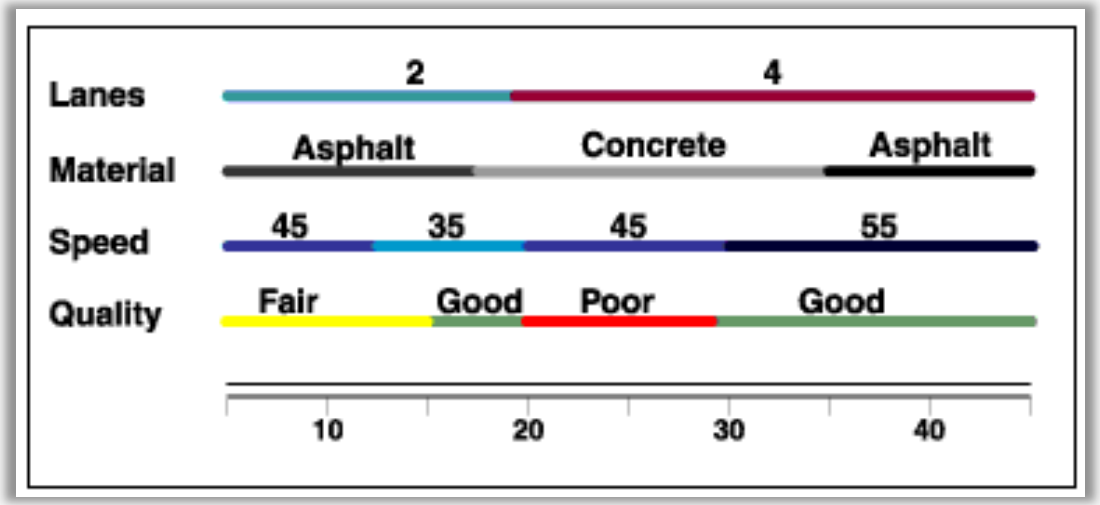
Roads and Highways – Linear Referencing

Esri Roads and Highways is an example of the new breed of single-source linear referencing system (LRS) maintenance tools. That is, it is designed to update not only the road network but also the linear location of all assets and events associated with that network. The Roads and Highways system works by using the editor to make changes to the roadway network and the system automates the update of linear locations for assets and events. This is a powerful way to maintain locations because one single LRS edit can easily necessitate hundreds of asset location edits.

Roads and Highways – Linear Referencing

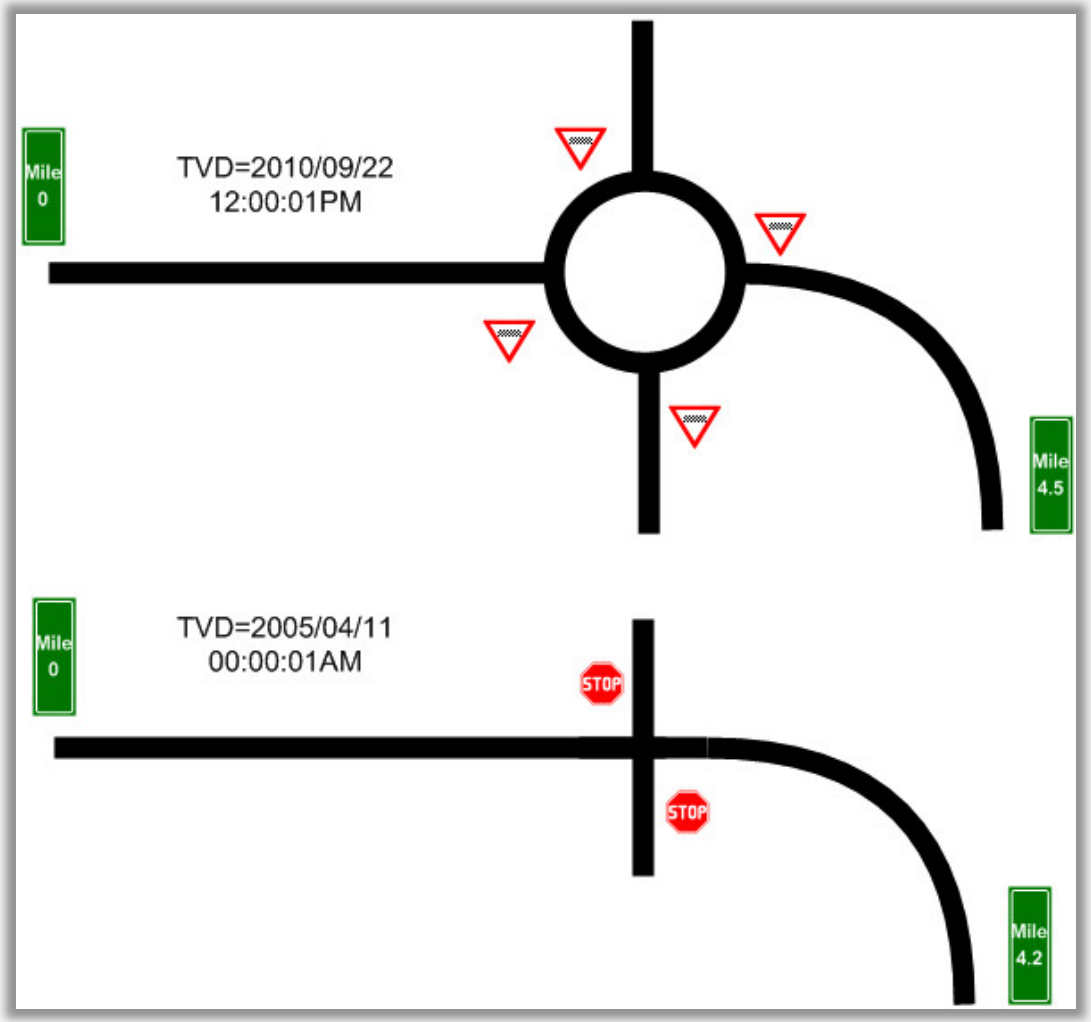
Linear referencing is also used to associate multiple sets of attributes to portions of linear features without requiring that underlying lines be segmented (split) each time that attribute values change.

LRS enables production of linear schematic reports.



Roads and Highways – Temporal model

Temporal model. By entering begin and end dates for each record in your database you can move backward and forward through time to see the state of your LRS at some point in the past and, if you've populated the data for it, see the expected state of the data at some point in the future. This is true for routes as well as events.



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Scope of TOR – Action Plan

Software Phase I

The provision of ESRI GIS modules and extensions. Roads and Highways, Network analyst, Spatial analyst, 3D analyst extensions.

Hardware Phase I

Provision of central server equipment and workstations, including equipment for field data collection

Consultancy services Phase I

Designing Road asset data model, capacity building trough trainings in ESRI GIS server installation, administration, Roads and Highways, Network analyst, Spatial analyst, 3D analyst extensions, Data collection and data quality assurance.

Road asset data collection Phase II

Data collection will be carried out on International and Secondary road network.

Thank you