Road Asset Management Systems (RAMS)
+
Performance-Based Contracting (PBC)

Session 1.1: RAMS Introduction

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Agenda

Day 1 Road Asset Management System (RAMS)	Day 2 Road Asset Management System (RAMS)	Day 3 Performance Based Contracting (PBC)
Session 1.1 **RAMS** **Introduction**	**Session 2.1** **RAMS Data Management & Data Analysis**	**Session 3.1** **PBC Introduction & Performance Standards**
Break	Break	Break
Session 1.2 **RAMS** **Data Collection**	**Session 2.2** **RAMS** **Integration**	**Session 3.2** **PBC Inspections & Payments**

Road Asset Management System

Any system that is used to collect, manage and analyse road data for road <u>planning and programming purposes</u>

<u>Function of a RAMS</u>: Optimizing the level and the allocation of road funding in relation to medium- and long-term results regarding road conditions and road user costs

- Define the road network maintenance, rehabilitation and upgrading needs
    - Based on condition data
- Determine the required budget to address those needs
- Determine how the <u>available</u> budget is best allocated
    - To different roads and networks (class, traffic, etc.)
    - To different treatment types (routine, periodic, rehabilitation, upgrading)
- Based on agreed prioritization criteria
    - Economic (e.g. road user costs, traffic levels)
    - Social (e.g. population, minimum access)
- Predict the impact of that budget allocation
    - Future road network conditions
    - Future maintenance and rehabilitation costs
- Monitor the road network over time

Road Asset Management System

- Data collection
  - Road data (inventory, condition, traffic, etc.)
  - Treatment data (costs, performance, etc.)
  - Missing / outdated data makes a RAMS useless

- Data management (database)
  - Store data and make it easily accessible
  - Combine different data sets
  - Prepare simple reports - provide statistics for the network

- Data analysis (planning tool)
  - Criteria for prioritization
  - Algorithms for predicting deterioration and costs
  - Recommend allocation of specific budget

- May incorporate other modules
  - Bridge management system
 - Contract management system

Data collection
Data management
Data analysis
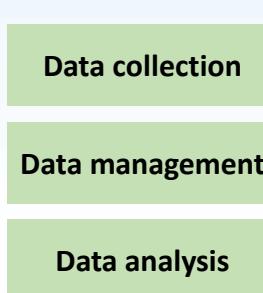
RAMS Integration

The RAMS needs to be integrated into existing systems:

- Institutional framework
  - Resources for RAMS operation
  - Procedures for RAMS operation
  - Especially data collection

- Planning and budgeting procedures
  - RAMS integration into planning systems
  - In time for budget preparation
  - Used as basis for budget preparation

- Financing procedures
  - Influence budget levels by predicting impact of proposed treatments
  - Identify alternative funding options

- Implementation modalities
  - Capacity to implement planned works
  - Shift to (periodic) maintenance
  - Suitable contracting modalities

Institutional Framework

Planning

Financing

Data collection

Data management

Data analysis

Implementation
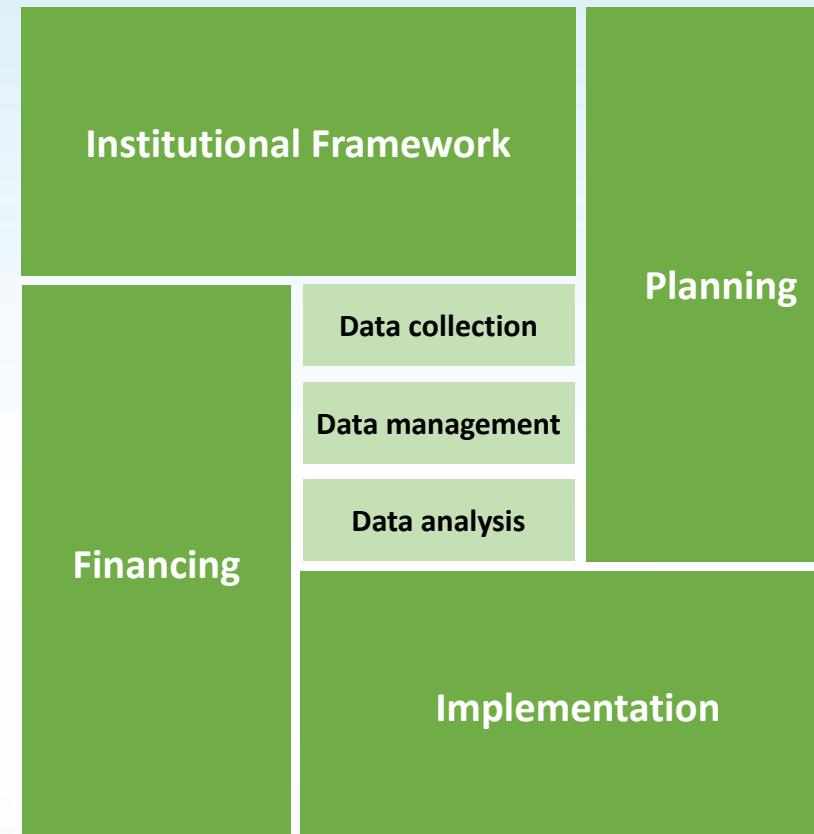
Network vs Project Planning

- RAMS is a network planning tool – <u>Limited data for all roads</u>
  - Planning for an <u>entire</u> (sub-)network
  - Based on data collected for <u>entire</u> (sub-)network
  - Identify best treatment approaches
  - Determine budget needs and propose budget allocations
  - Limited data collection to reduce costs

- Different from project level planning – <u>Detailed data for some roads</u>
  - For specific road (section)
  - Much higher data requirement
  - Identify specific designs
 - Determine volumes of works

Afghanistan

Aspect	Remarks
Trunk roads	22,146 km
Data collection	Network inventory and condition survey ongoing – IRI + PASER
Data management	Different software used by different projects
Data analysis	Basic algorithms developed, HDM4 analysis by consultants
Planning	Planning mainly at project level, network level under development
Financing	Fuel tax, tolls and traffic fines partially allocated to special account
Institutional	Road Asset Management Directorate under National Road Authority
Implementation	Implementation by contractors and in-house unit (piloting of PBCs)

- Security major issue for data collection and maintenance implementation

- Visual assessments and smartphone apps used instead of equipment

Azerbaijan

Aspect	Remarks
Trunk roads	19,016 km
Data collection	Full network inventory in 2012 by WB, replication in subsequent years
Data management	Advanced Road Network Databank developed
Data analysis	Analysis using HDM4
Planning	Planning still done by Azeravtoyol on visual basis
Financing	Road Fund restored in 2007 – earmarked road user charges (mainly fuel tax)
Institutional	Road Data Management Unit under Azeravtoyol
Implementation	Azeravtoyol – force-account units

- Highly advanced database
  - https://www.youtube.com/watch?v=ncJ1lUZywRE

- No longer in use due to costly data collection
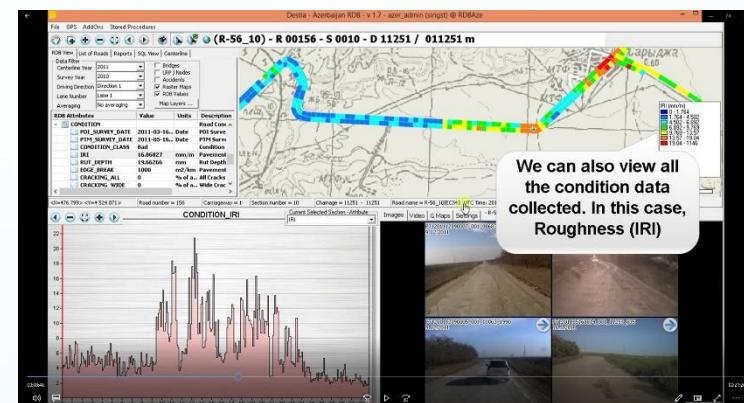
China

Aspect	Remarks
Trunk roads	515,000 km
Data collection	Annual condition survey (equipment, visual)
Data management	China Pavement Management System
Data analysis	China Pavement Management System (analysis module not widely used)
Planning	Largely based on visual assessments
Financing	National fuel tax main source – annual allocations to provinces
Institutional	Special units under Provincial Highway Bureaus
Implementation	Largely force account units

- Large differences between provinces
- Use of RAMS for planning is limited – mainly for monitoring

Georgia

Aspect	Remarks
Trunk roads	7,010 km
Data collection	Annual pavement condition survey (ROMDAS equipment)
Data management	ArcGIS database - upgrade to ESRI Enterprise Web with Roads and Highways
Data analysis	HDM4 used for analysis
Planning	HDM4 results complemented by other socioeconomic criteria
Financing	General Budget (Road Fund abolished in 2004)
Institutional	Planning & Operations Unit (includes former RAMS unit)
Implementation	Private sector contractors – move towards OPRC

Kazakhstan

Aspect	Remarks
Trunk roads	23,485 km
Data collection	Retrofitted vehicle-based equipment in oblast road laboratories + mobile apps
Data management	Remotely accessible custom-made database with Russian/Kazakh interface
Data analysis	Standardized reporting and export to HDM4
Planning	Results-based budgeting introduced
Financing	Republican budget – tolls being introduced
Institutional	National Centre for the Quality of Road Assets, 16 Oblzhollaboratories
Implementation	Kazavtozhol (tolled roads) / Kazakhavtodor / private contractors

- RAMS under development – links well with Results-based Budgeting
- Institutionally complex – various entities involved
- Priority to start collecting data

Kyrgyz

Aspect	Remarks
Trunk roads	18,810 km
Data collection	Data collection 5,835 km by Production Innovation Centre (PIC)
Data management	Excel database, now custom-made web-based RAMS managed by PIC
Data analysis	RONET, now decision matrix incorporated into database
Planning	Formerly visual assessments by DEPs, now RAMS data + decision support tool
Financing	Republican Budget (Road Fund created in 1998)
Institutional	Road Management Department - PLUADs/UADs/SDs - DEUs/DEPs
Implementation	DEPs/DEUs + state-owned contractors

- Very complicated institutional structure with many entities involved
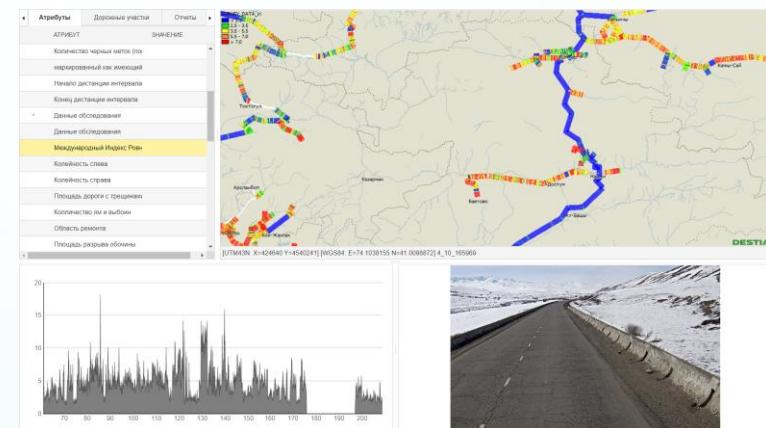
Mongolia

Aspect	Remarks
Trunk roads	15,469 km
Data collection	Road Research Institute: collection equipment + reduced data needs
Data management	Custom-made database
Data analysis	dTIMS with Mongolian language front-end – no longer used
Planning	Visual inspections by RPICD/RTDC/AZZAs
Financing	Road Fund – limited revenue
Institutional	Road Policy Implementation and Coordination Department
Implementation	Road Transport Development Center (AZZAs) + private companies

- RAMS and its results not adopted
- Financing capped by limited revenue of the Road Fund

Pakistan

Aspect	Remarks
Trunk roads	12,131 km
Data collection	Instrumental surveys and visual inspections
Data management	Custom-made database
Data analysis	HDM4 strategy and programme analyses
Planning	Based on HDM4 results
Financing	Road Maintenance Account – road user charges and other allocations
Institutional	National Highway Authority – Road Asset Management Directorate
Implementation	Competitive bidding to private contractors

- RAMS now being developed at state level
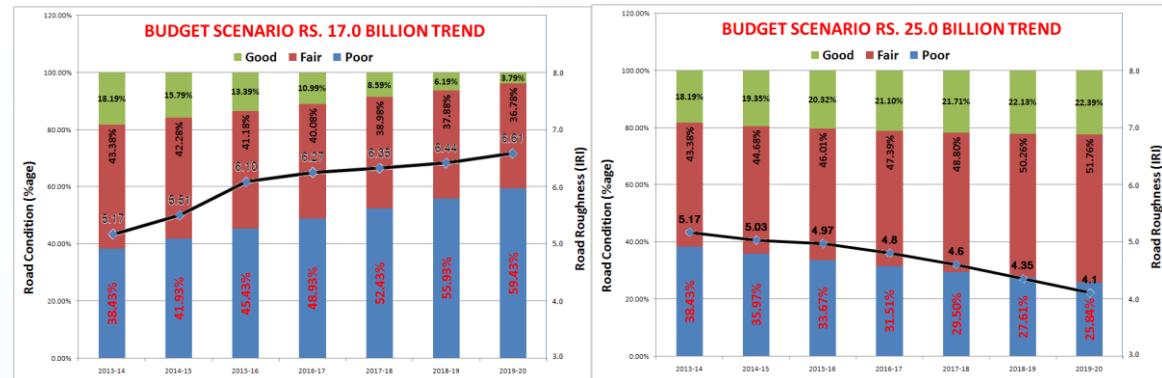
Tajikistan

Aspect	Remarks
Trunk roads	14,067 km
Data collection	Visual surveys by GUSADs – ADB likely to support survey vehicle
Data management	Former MS Access database, custom-made database under development
Data analysis	Custom-made algorithms being developed
Planning	Based on needs assessed by GUSADs
Financing	State budget (Road Fund abolished in 2000)
Institutional	Road and Transport Sector Digitization Unit
Implementation	State-owned GUSADs

- RAMS Action Program issued by Presidential Decree
- RAMS Unit recently established
- Various projects to support implementation of the Action Program
  - Database development
  - Data collection
  - Capacity building

Turkmenistan

Aspect	Remarks
Trunk roads	13,644 km
Data collection	Visual assessments
Data management	Unknown
Data analysis	Unknown
Planning	Based on visual assessments
Financing	State budget
Institutional	Turkmenavtoyollary State Concern
Implementation	Turkmenavtoyollary force-account units

- RAMS not yet developed

Uzbekistan

Aspect	Remarks
Trunk roads	42,530 km
Data collection	ADB and WB support to survey vehicle and simplification of data needs
Data management	WB support to simple off-the-shelf database development at regional level
Data analysis	HDM4, RONET and decision matrix used in past
Planning	Spring and Autumn surveys by district enterprises under Committee for Roads
Financing	Regional Budget allocations to Republican Trust Fund for repair/maintenance
Institutional	Committee for Roads under Ministry of Transport
Implementation	Committee for Roads, state-owned companies (private sector companies)

- Recent reform and abolishment of Republican Road Fund resulted in loss of earmarked road user charges for road repair/maintenance
- Support to RAMS development not yet coordinated

RAMS in the CAREC Region

Phase 3: Integration
Phase 2: Replication
Phase 1: Piloting

	AFG	AZE	GEO	KAZ	KGZ	MON	PAK	PRC	TAJ	TKM	UZB
Data collection frequency	Inter-mittent	Regular	Regular	Inter-mittent	Inter-mittent	Inter-mittent	Regular	Regular	Starting	-	Inter-mittent
Data collection extent	Partial Network	Network	Network	Partial Network	Partial Network	Network	Network	Network	Network	-	Partial Network
Database	Being prepared	Yes	Yes	Being prepared	Being prepared	Not used	Yes	Yes	Being prepared	-	Out of date
Data analysis	Being prepared	Inter-mittent	Yes	Being prepared	Being prepared	Not used	Yes	Some provinces	Being prepared	-	Out of date
RAMS unit	Yes	Yes	Yes	Yes	-	Yes	Yes	Yes	Yes	-	-
RAMS influencing planning	-	Ended	Yes	-	-	-	Yes	-	-	-	-
RAMS influencing financing	-	-	Yes	-	-	-	Yes	-	-	-	-

Compendium of Best Practices

- Set of 11 best practices

    1. Limit the data to be collected
    2. Make the database easy to use
    3. Start with simple software
    4. Institutionalize from the start
    5. Publish annual performance statistics
    6. Integrate into decision-making processes
    7. Provide sufficient and predictable funding
    8. Separate management from implementation
    9. Ensure high-level support
    10. Medium-term development support
    11. Develop the works implementation capacity

https://www.adb.org/publications/compendium-best-practices-road-asset-management
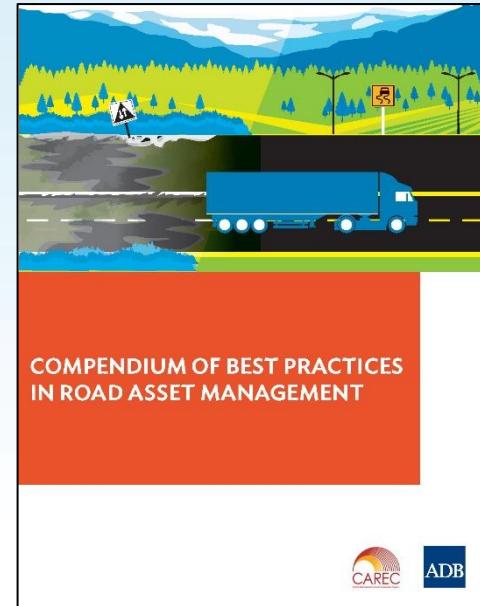
Start simple

- Three of the best practices
    1. Limit the data to be collected
    2. Make the database easy to use
    3. Start with simple software

- Start with the minimum and gradually expand
    - Data types to be collected
    - Complexity of the database and related functions
    - Complexity of the software

Example: Nepal

- Context
  - Rural road network managed at district level – low capacity, strong political influence
  - No network data or database available, no evidence-based planning criteria in use

- Functions
  - Basic inventory, road classification, objective prioritization criteria, visual needs assessment, budget proposal, basic mapping, easy-to-use software

- Simple Excel-based RAMS + Word-based maps (later GIS)
  - Simple inventory (length, surface type, bridges, traffic categories)
  - Prioritization based on multicriteria analysis (population, traffic, connectivity, class)
  - Needs assessment based on visual data
  - Budget allocation module based on prioritization criteria

- Suitability for functions
  - Restructuring in Nepal – many roads managed at Provincial level
  - Larger network of higher level roads
  - Need to move to a more advanced database with more data

Example: Nepal

- Inventory and traffic data

Karnali Pradesh - 2. PROVINCIAL ROAD NETWORK (PRN)

#	Road code	Road section	Class	District	Road name	Width m	BT km 82.47	GR km 151.27	ER km 913.84	Existing km 1147.58	UC km	PL km 669.06	Total km 1816.64	Provincial priority	Traffic category
1	P60001	A	PH	Surkhet / सुर्खेत	NH58 (H12,Dhuliyabit)-Kalyan	4.50		16.00		**16.00**			16.00		T2
2	P60001	B	PH	Surkhet / सुर्खेत	Kalyan-Shivanagar P60002A(F183)	4.50		14.21		**14.21**			14.21		T2
3	P60001	C	PH	Surkhet / सुर्खेत	Shivanagar P60002A(F183)-Subhaghat	4.50		3.60		**3.60**			3.60		T2
4	P60001	D	PH	Surkhet / सुर्खेत	Subhaghat-Bheri Bridge-NH57(F047)	5.00		0.51		**0.51**			0.51		T2
5	P60002	A	PH	Surkhet / सुर्खेत	NH57 (F047,Shahare)-Dailekh Border (Simta, F183)	4.50			2.35	**2.35**			2.35		T1
6	P60002	B	PH	Surkhet / सुर्खेत	NH57 (F047,Shahare)-Dailekh Border (Simta, F183)	4.50			26.88	**26.88**			26.88		T1
7	P60002	C	PH	Surkhet / सुर्खेत	NH57 (F047,Shahare)-Dailekh Border (Simta, F183)	4.50			22.31	**22.31**			22.31		T1
8	P60003	A	PH	Surkhet / सुर्खेत	NH57(F047),Tulasipur - Purandhara - Botechaur	5.50		2.04	12.37	**14.41**			14.41		T2
9	P60003	B	PH	Salyan / सल्यान	NH57(F047),Tulasipur - Purandhara - Botechaur	5.50			18.94	**18.94**			18.94		T2
10	P60003	C	PH	Salyan / सल्यान	NH57(F047),Tulasipur - Purandhara - Botechaur	5.50			1.76	**1.76**			1.76		T2
11	P60003	D	PH	Salyan / सल्यान	NH57(F047),Tulasipur - Purandhara - Botechaur	5.50			1.54	**1.54**			1.54		T2
12	P60003	E	PH	Salyan / सल्यान	NH57(F047),Tulasipur - Purandhara - Botechaur	5.50			3.55	**3.55**			3.55		T2
13	P60004	A	PH	Surkhet / सुर्खेत	NH58(H12) Ratna Rajmarg-Phalate-Bhurigaun	4.00	8.73			**8.73**			8.73		T1
14	P60005	A	PH	Surkhet / सुर्खेत	NH59(F048) Chheda-Ghodaankhe NH58(H13)	4.00			16.33	**16.33**			16.33		T1
15	P60006	A	PH	Surkhet / सुर्खेत	NH58(H13) Badichaur-Babiyachaur (Part of F170)	6.00	22								
16	P60006	B	PH	Surkhet / सुर्खेत	Babiyachaur- Gutu (Part of F170)	6.00									
17	P60006	C	PH	Surkhet / सुर्खेत	Gutu-Baijura-Benighat Doti District Border	6.00									
18	P60007	A	PH	Surkhet / सुर्खेत	NH59(F048) Ratanangla-Awalching	4.50	12								
19	P60007	B	PH	Surkhet / सुर्खेत	NH59(F048) Ratanangla-Awalching	4.50	6								
20	P60007	C	PH	Surkhet / सुर्खेत	NH59(F048) Ratanangla-Awalching	4.50									

Karnali Pradesh - 3. TRAFFIC

#	Road code	Road section	Class	District	Road name	Bicycle, motorcycle VPD	Car, SUV, light van, pick-up VPD	Light (mini) truck, tractor VPD	Truck, minibus, bus, tractor+trailer VPD	Total traffic count VPD	Total traffic estimation VPD	Total traffic PCU	Traffic category
1	P60001	A	PH	Surkhet	NH58 (H12,Dhuliyabit)-Kalyan	88	143	25	39	**295**		**342**	T2
2	P60001	B	PH	Surkhet	Kalyan-Shivanagar P60002A(F183)	105	145	23	35	**308**		**337**	T2
3	P60001	C	PH	Surkhet	Shivanagar P60002A(F183)-	145	25	55	22	**247**		**246**	T2
4	P60001	D	PH	Surkhet	Subhaghat-Bheri Bridge-NH57(F047)	157	31	40	17	**245**		**221**	T2
5	P60002	A	PH	Surkhet	NH57 (F047,Shahare)-Dailekh	85	24	18	8	**135**		**118**	T1
6	P60002	B	PH	Surkhet	NH57 (F047,Shahare)-Dailekh	80	21	16	6	**123**		**103**	T1
7	P60002	C	PH	Surkhet	NH57 (F047,Shahare)-Dailekh	70	16	12	4	**102**		**81**	T1
8	P60003	A	PH	Surkhet	NH57(F047),Tulasipur - Purandhara	92	147	29	41	**309**		**360**	T2
9	P60003	B	PH	Salyan	NH57(F047),Tulasipur - Purandhara	95	149	31	42	**317**		**369**	T2
10	P60003	C	PH	Salyan	NH57(F047),Tulasipur - Purandhara	95	149	31	42	**317**		**369**	T2
11	P60003	D	PH	Salyan	NH57(F047),Tulasipur - Purandhara	101	151	32	44	**328**		**382**	T2
12	P60003	E	PH	Salyan	NH57(F047),Tulasipur - Purandhara	101	151	32	44	**328**		**382**	T2
13	P60004	A	PH	Surkhet	NH58(H12) Ratna Rajmarg-Phalate-	65	22	18	12	**117**		**118**	T1
14	P60005	A	PH	Surkhet	NH59(F048) Chheda-Ghodaankhe	15	4	5	2	**26**		**25**	T1
15	P60006	A	PH	Surkhet	NH58(H13) Badichaur-Babiyachaur	125	51	39	36	**251**		**280**	T2
16	P60006	B	PH	Surkhet	Babiyachaur- Gutu (Part of F170)	130	50	42	30	**252**		**268**	T2
17	P60006	C	PH	Surkhet	Gutu-Baijura-Benighat Doti District	85	25	18	8	**136**		**119**	T1
18	P60007	A	PH	Surkhet	NH59(F048) Ratanangla-Awalching	128	61	15	15	**219**		**193**	T2
19	P60007	B	PH	Surkhet	NH59(F048) Ratanangla-Awalching	130	55	12	12	**209**		**174**	T2
20	P60007	C	PH	Surkhet	NH59(F048) Ratanangla-Awalching	117	52	11	10	**190**		**157**	T2

Example: Nepal

- Prioritization and ranking

Karnali Pradesh - 5. RANKING																		
#	Section code	District	Road name	Palika centres connected		Population served		Population unconnected		Traffic category		Road class		Provincial priority		Total	Rank
				15		30		20		20		5		10		100	
				#	Score	#	Score	#	Score	#	Score	#	Score	#	Score	Score	
14	P60005A	Surkhet	NH59(F048) Chheda-Ghodaankhe NH	2	15.0	57,471	30.0	-	-	T1	-	PH	5.0	-	-	50.0	1
79	P60503A	Kalikot	NH58(H13)-Kumalgaun	1	7.5	21,366	11.2	21,366	20.0	T1	-	PR	-	-	-	38.7	2
15	P60006A	Surkhet	NH58(H13) Badichaur-Babiyachaur (	1	7.5	30,295	15.8	-	-	T2	6.7	PH	5.0	-	-	35.0	3
80	P60504A	Kalikot	NH58(F172) Sannighat-Phukot-Syuna	2	15.0	29,118	15.2	-	-	T1	-	PR	-	-	-	30.2	4
25	P60011A	Dailekh	NH58(H13) Sangetada-Chamunda NH	1	7.5	33,730	17.6	-	-	T1	-	PH	5.0	-	-	30.1	5
83	P60505B	Kalikot	Ramnakot-Thirpu	1	7.5	15,303	8.0	15,303	14.3	T1	-	PR	-	-	-	29.8	6
82	P60505A	Kalikot	F172-Jarkot-Ramnakot	2	15.0	27,646	14.4	-	-	T1	-	PR	-	-	-	29.4	7
18	P60007A	Surkhet	NH59(F048) Ratanangla-Awalching	1	7.5	17,275	9.0	-	-	T2	6.7	PH	5.0	-	-	28.2	8
77	P60501A	Kalikot	NH61(H13)-Sukatiya	1	7.5	14,080	7.3	14,080	13.2	T1	-	PR	-	-	-	28.0	9
38	P60017A	Rukum West	H18-Chaurjhari (Bijeshwori)	1	7.5	27,438	14.3	-	-	T1	-	PH	5.0	-	-	26.8	10
93	P60704A	Jajarkot	NH03(H18) Thala- Managhat	1	7.5	35,295	18.4	-	-	T1	-	PR	-	-	-	25.9	11
42	P60020A	Jajarkot	NH57(F047) - Dalli (Nalgad M)	1	7.5	25,597	13.4	-	-	T1	-	PH	5.0	-	-	25.9	12
24	P60010A	Dailekh	NH58(H13,Tallo Dungeshwor)- Dullu	1	7.5	24,972	13.0	-	-	T1	-	PH	5.0	-	-	25.5	13
67	P60202A	Mugu	Tarapani-Jima/Sorukot	1	7.5	12,238	6.4	12,238	11.5	T1	-	PR	-	-	-	25.3	14
48	P60021E	Dolpa	Triveni-Narku NH57(F047)	2	15.0	7,402	3.9	-	-	T1	-	PH	5.0	-	-	23.9	15
29	P60014A	Dailekh	NH60 Dailekh (Khursanibari)-Naumu	1	7.5	20,802	10.9	-	-	T1	-	PH	5.0	-	-	23.4	16
27	P60013A	Dailekh	NH03 (H18,Bhirkhet) -Kharigaira-Gai	1	7.5	19,277	10.1	-	-	T1	-	PH	5.0	-	-	22.6	17
70	P60303A	Humla	NH58(F172) - Sarkegad	1	7.5	9,868	5.2	9,868	9.2	T1	-	PR	-	-	-	21.9	18
55	P60025A	Humla	NH58(F172) Kawadi-Maila	1	7.5	5,964	3.1	5,964	5.6	T1	-	PH	5.0	-	-	21.2	19
101	P60902A	Salyan	NH55(H11)-Dhorchaur	1	7.5	24,972	13.0	-	-	T1	-	PR	-	-	-	20.5	20

Karnali Pradesh - 4. CONNECTIVITY										
District	Palika code	Palika name	Palika type	Palika centre	Population (2011)	District Centre	1st connecting road	2nd connecting road	3rd connecting road	4th connecting road
Dolpa	60101	Dolpo Buddha	Gaunpalika	Dho	2,126		CRN			
Dolpa	60102	She Phoksundo	Gaunpalika	Saldang	3,099		P60101B	P60101A		
Dolpa	60103	Jagadulla	Gaunpalika	Majhgaun	2,273		P60105B	P60105A	P60021E	
Dolpa	60104	Mudkechula	Gaunpalika	Narku	5,129		P60021D	P60021E		
Dolpa	60105	Tripura Sundari	Nagapalika	Tripurakot	10,104		CRN			
Dolpa	60106	Thuli Bheri	Nagapalika	Juphal	8,370		P60104A			
Dolpa	60107	Kaike	Gaunpalika	Sahartara Bagar	3,576		CRN			
Dolpa	60108	Chharka Tangsong	Gaunpalika	Chharka-3	1,451		P60103A			
Mugu	60201	Mugum karmarong	Gaunpalika	Pulu	5,396		CRN			
Mugu	60202	Chhayanath Rara	Nagapalika	Gamgadhi Bazar	20,078	x	CRN			
Mugu	60203	Soru	Gaunpalika	Jima/Sorukot	12,238		P60202A	P60023A		
Mugu	60204	Khatyad	Gaunpalika	Majhachaur/Rataudi	17,116		P60201A	P60404A		
Humla	60301	Chankheli	Gaunpalika	Piplang	5,517		P60024C			
Humla	60302	Kharpunath	Gaunpalika	Yanchubagar	6,011		P60302A			
Humla	60303	Simkot	Gaunpalika	Simikot	11,557	x	CRN			
Humla	60304	Namkha	Gaunpalika	Yalwang	3,900		CRN			
Humla	60305	Sarkegad	Gaunpalika	Sarkegad	9,868		P60303A			
Humla	60306	Adanchuli	Gaunpalika	Shreengar	7,116		P60305A			
Humla	60307	Tanjakot	Gaunpalika	Maila	5,964		P60025A			
Jumla	60401	Patarasi	Gaunpalika	Dilichaur	14,571		P60402A			
Jumla	60402	Kanaka Sundari	Gaunpalika	Birat	12,977		CRN			

Example: Nepal

- Needs assessment and budgeting

Karnali Pradesh - 6. INVESTMENT NEEDS

#	Rank	Section code	District	Road name	BT km	GR km	ER km	UC/PL km	Width m	Traffic	Construction km 617.88	Rehabilitation km -	Gravelling km 835.27	Black-topping km 109.51	Widening km -	Bridge m 1,881	Causeway m 30	Box culvert # 36	Pipe culvert # 436	Retaining wall m3 -
14	1	P60005A	Surkhet	NH59(F048) Chheda-Ghodaank	-	-	16.33	-	4.00	T1			27.67							
79	2	P60503A	Kalikot	NH58(H13)-Kumalgaun	-	-	8.64	15.59	4.00	T1	5.38		5.83			80			19	
15	3	P60006A	Surkhet	NH58(H13) Badichaur-Babiyach	22.11	-			6.00	T2			1.01							
80	4	P60504A	Kalikot	NH58(F172) Sannighat-Phukot-	-	-	11.22		4.50	T1			8.97					6	6	
25	5	P60011A	Dailekh	NH58(H13) Sangetada-Chamun	-	-	9.50		7.00	T1	29.19									
83	6	P60505B	Kalikot	Ramnakot-Thirpu	-	-	5.10	8.35	4.50	T1	10.79		25.27							
82	7	P60505A	Kalikot	F172-Jarkot-Ramnakot	-	-	1.02		4.50	T1			0.51							
18	8	P60007A	Surkhet	NH59(F048) Ratanangla-Awalch	12.90	-			4.50	T2				35.53						
77	9	P60501A	Kalikot	NH61(H13)-Sukatiya	-	-	3.56	7.75	3.50	T1			6.06			50			18	
38	10	P60017A	Rukum West	H18-Chaurjhari (Bijeshwori)	-	-	1.01		4.00	T1	84.12									
93	11	P60704A	Jajarkot	NH03(H18) Thala- Managhat	-	-	1.62		3.50	T1										
42	12	P60020A	Jajarkot	NH57(F047) - Dalli (Nalgad M)	-	-	2.78		4.50	T1	10.01									
24	13	P60010A	Dailekh	NH58(H13,Tallo Dungeshwor)-	16.76	-			5.50	T1			35.76			61			16	
67	14	P60202A	Mugu	Tarapani-Jima/Sorukot	-	-	-	10.01	3.75	T1			15.49							
48	15	P60021E	Dolpa	Triveni-Narku NH57(F047)	-	-	9.05		3.50	T1			30.80							
29	16	P60014A	Dailekh	NH60 Dailekh (Khursanibari)-N	-	-	16.36		4.50	T1	19.19		28.67							
27	17	P60013A	Dailekh	NH03 (H18,Bhirkhet) -Kharigain	-	-	13.18		4.00	T1	13.18		15.43			75			26	
70	18	P60303A	Humla	NH58(F172) - Sarkegad	-	-	-	2.58	3.75	T1	-	-	-	-						
55	19	P60025A	Humla	NH58(F172) Kawadi-Maila	-	-	-	4.67	3.75	T1										
101	20	P60902A	Salyan	NH55(H11)-Dhorchaur	-	-	0.51		4.00	T1										

Karnali Pradesh - 10. BUDGET ALLOCATION

Financial year	2076/77	2077/78	2078/79	2079/80	2080/81	Estimated annual maintenance cost
Expected PTMP budget	2,828,970,000	2,828,970,000	2,828,970,000	2,828,970,000	2,828,970,000	
Maintenance allocation	226,516,850	226,516,850	226,516,850	226,516,850	226,516,850	226,516,850
Investment allocation	2,602,453,150	2,602,453,150	2,602,453,150	2,602,453,150	2,602,453,150	

Rank	Section code	Cost NPR 16,871,624,293	Investment allocation NPR 2,602,453,150	NPR 2,602,453,150	NPR 2,602,453,150	NPR 2,602,453,150	NPR 2,602,453,150	Main funding source
1	P60005A	44,272,000	44,272,000	-	-	-	-	
2	P60503A	233,139,600	233,139,600	-	-	-	-	
3	P60006A	2,424,000	2,424,000	-	-	-	-	
4	P60504A	22,015,200	22,015,200	-	-	-	-	
5	P60011A	926,296,000	926,296,000	-	-	-	-	
6	P60505B	287,647,200	287,647,200	-	-	-	-	
7	P60505A	1,101,600	1,101,600	-	-	-	-	
8	P60007A	179,071,200	179,071,200	-	-	-	-	
9	P60501A	86,480,800	86,480,800	-	-	-	-	
10	P60017A	1,525,376,000	820,005,550	705,370,450	-	-	-	
11	P60704A				-	-	-	
12	P60020A	204,204,000		204,204,000	-	-	-	
13	P60010A	167,481,600		167,481,600	-	-	-	
14	P60202A	30,980,000		30,980,000	-	-	-	
15	P60021E	57,493,333		57,493,333	-	-	-	
16	P60014A	449,962,800		449,962,800	-	-	-	
17	P60013A	365,297,067		365,297,067	-	-	-	
18	P60303A	-		-				
19	P60025A	22,000,000		22,000,000	-	-	-	
20	P60902A							

Karnali Pradesh - 11. OUTPUT

Investment needs

ER km	GR km	BT km	Widen km	Bridge m
617.88	835.27	109.51	-	1,881

Investment output

ER 456.58	GR 650.05	BT 109.51	Widen -	Bridge 1,725
-	27.67	-	-	-
5.38	5.83	-	-	80
-	1.01	-	-	-
-	8.97	-	-	-
29.19	-	-	-	-
10.79	25.27	-	-	-
-	0.51	-	-	-
-	-	35.53	-	-
-	6.06	-	-	50
84.12	-	-	-	-
10.01	-	-	-	-
-	35.76	-	-	61
-	15.49	-	-	-
-	30.80	-	-	-
19.19	28.67	-	-	-
13.18	15.43	-	-	75
-	-	-	-	-
-	11.00	-	-	-

Example: Kyrgyz

- Context
    - Network managed at central level through local units (PLUADS/UADs)
    - Little network data available (currently inventory data being collected)
    - No evidence-based planning criteria in use (currently being introduced)

- Functions
    - Network inventory, prioritization criteria, introduce RAMS, visual + equipment condition assessment, budgeting, linked to mapping, easy-to-use software

- Detailed Excel-based RAMS
    - Detailed road and structure inventory, traffic data
    - Condition categories based on measured data or visual assessments
    - Prioritization and needs assessment based on decision matrix
    - Budget allocation based on ranking
    - Export of data to Google Earth for mapping or RONET for analysis

- Suitability for functions
    - Simple database, but extensive data needs – complicated to use
    - Currently being integrated into web-based RAMS

Example: Kyrgyz

- Inventory, traffic and condition data

N°	Наименование Участка	значение	Номер дорог	Номер Участка	ПЛУАД	ДЭП	Область	Протяж. км	Ширина (м)	Полосы (кол	а/бетон	ц/бетон	ч/гравий	гравий	грунт
1	2	3	4	5	6	7	8	10	14	15	16	17	18	19	20
1	Мырзаке-Карашоро 0-69 км	М	М-066	М-066-01	ГДАД БО	ДЭП-05	Ошская	69			33			36	
2	Жыланды-Ийри-Суу-Чангет 17-52 км	М	М-067	М-067-02	ГДАД БО	ДЭП-05	Ошская	35			17			18	
3	Бишкек-Ош 594-613 км	ЭМ	ЭМ-02	ЭМ-02-06	ГДАД БО	ДЭП-05	Ошская	19			19				
4	Мырзаке-Кара-Кулжа-Алайку 0-8 км	ЭМ	ЭМ-17	ЭМ-17-04	ГДАД БО	ДЭП-05	Ошская	8			8				
5	Суусамыр-Западный-Каракол	М	М-058	М-058-01	ГДАД БО	ДЭП-09	Чуйская	85						85	
6	Толук-Сарыкамыш-Кызыл-Ой	М	М-059	М-059-01	ГДАД БО	ДЭП-09	Чуйская	45						45	
7	Бишкек-Ош 9-209 км	ЭМ	ЭМ-02	ЭМ-02-01	ГДАД БО	ДЭП-09	Чуйская	200	7	2	199.7	0.3			
8	Кочкор-Арал-Тоо-Ашуу 140-224 км	ЭМ	ЭМ-16	ЭМ-16-02	ГДАД БО	ДЭП-09	Чуйская	84			15.6			68.4	
9	Барпы-Ийри-Суу-Узген 0-17 км	М	М-067	М-067-01	ГДАД БО	ДЭП-22	Жалал-Абадская	17			4			13	
10	Сузак-Кара-Даря 0-19 км	М	М-083	М-083-02	ГДАД БО	ДЭП-22	Жалал-Абадская	19			19				
11	Маданият-Майлуу-Суу 0-19 км	М	М-085	М-085-01	ГДАД БО	ДЭП-22	Жалал-Абадская	19			3		16		
12	Подьезд Жалал-Абад-Бекабад-Таможня 0-11 км	М	М-098	М-098-01	ГДАД БО	ДЭП-22	Жалал-Абадская	11			11				
13	Обход Сузак 0-9км	М	М-099	М-099-01	ГДАД БО	ДЭП-22	Жалал-Абадская	9			9				
14	Бишкек-Ош 488-596 км	ЭМ	ЭМ-02	ЭМ-02-05	ГДАД БО	ДЭП-22	Жалал-Абадская	110			110				
15	Токтогул-Бешташ 0-90 км	М	М-031	М-031-01	ГДАД БО	ДЭП-23	Жалал-Абадская	90			7			83	
16	Торкент-Толук-Сарыкамыш	М	М-059	М-059-02	ГДАД БО	ДЭП-23	Жалал-Абадская	155						155	
17	Бишкек-Ош 209-318 км	ЭМ	ЭМ-02	ЭМ-02-02	ГДАД БО	ДЭП-23	Жалал-Абадская	109			109				
18	Ылайталаа-Гульчо	М	М-074	М-074-01	ГДАД БО	ДЭП-26	Ошская	23						23	

N°	участок	значение	ПЛУАД	ДЭП	Дата ВОС	От Км	До Км	Тип покрытия (АБ/ ЦБ/ ШПО/ЧГ/ ГР)	Шрина покрытия (м)	Растрескивание	Тип трещины	Ямы	Колейность	Ямочный ремонт	Разрушение кромки покрытия	Тип покрытия обочины	Общая ширина обочины (м)	Расстояние от покрытия до обочины (м)	Состояние обочины (Х/У/ П/ ОП)	ИРИ Направление 1	ИРИ Направление 2	ИРИ Среднее	класс ИРИ
ЭМ-07	Бишкек - Торугарт 0-32 км	ЭМ	ПЛУАД-1	ДЭП-958	05/12/2014	6.0	7.0	АБ	24	1	ПП	0	0	1	0.0	ГР	2	1	Х		3.3	3.3	1
ЭМ-07	Бишкек - Торугарт 0-32 км	ЭМ	ПЛУАД-1	ДЭП-958	05/12/2014	7.0	8.0	АБ	24	1	ПП	0	0	1	0.0	ГР	2	1	Х		3.8	3.8	1
ЭМ-07	Бишкек - Торугарт 0-32 км	ЭМ	ПЛУАД-1	ДЭП-958	05/12/2014	8.0	9.0	АБ	24	1	ПП	0	0	1	0.0	ГР	2	1	Х		4.2	4.2	1
ЭМ-02	Бишкек-Ош 318-427 км	ЭМ	ГДАД БО	ДЭП-30	29/09/2014	323.0	324.0	АБ	18	0		0	0	0	0.0	ГР	6	1	Х				
ЭМ-02	Бишкек-Ош 318-427 км	ЭМ	ГДАД БО	ДЭП-30	29/09/2014	324.0	325.0	АБ	18	0		0	0	0	0.0	ГР	6	1	Х				
ЭМ-02	Бишкек-Ош 318-427 км	ЭМ	ГДАД БО	ДЭП-30	29/09/2014	352.0	353.0	АБ	16	1	ПР	1	1	1	0.0	ГР	3	1	Х				
ЭМ-02	Бишкек-Ош 318-427 км	ЭМ	ГДАД БО	ДЭП-30	29/09/2014	353.0	354.0	АБ	16	1	ПР	1	1	1	0.0	ГР	3	1	Х				
ЭМ-02	Бишкек-Ош 318-427 км	ЭМ	ГДАД БО	ДЭП-30	29/09/2014	354.0	355.0	АБ	16	1	ПР	1	1	1	0.0	ГР	3	1	Х				
ЭМ-02	Бишкек-Ош 318-427 км	ЭМ	ГДАД БО	ДЭП-30	29/09/2014	355.0	356.0	АБ	16	1	ПР	1	1	1	0.0	ГР	3	1	Х				
ЭМ-02	Бишкек-Ош 318-427 км	ЭМ	ГДАД БО	ДЭП-30	29/09/2014	356.0	357.0	АБ	16	1	ПР	1	1	1	0.0	ГР	3	1	Х				
ЭМ-02	Бишкек-Ош 318-427 км	ЭМ	ГДАД БО	ДЭП-30	29/09/2014	357.0	358.0	АБ	16	1	ПР	1	1	1	0.0	ГР	3	1	Х				
ЭМ-02	Бишкек-Ош 318-427 км	ЭМ	ГДАД БО	ДЭП-30	29/09/2014	358.0	359.0	АБ	16	1	ПР	1	1	1	0.0	ГР	3	1	Х				
ЭМ-02	Бишкек-Ош 318-427 км	ЭМ	ГДАД БО	ДЭП-30	29/09/2014	359.0	360.0	АБ	16	1	ПР	1	1	1	0.0	ГР	3	1	Х				
ЭМ-06	Балыкчы - Ананьево - Каракол 40-156 км	ЭМ	ПЛУАД-4	ДЭП-07	08/10/2014	97.0	98.0	ШПО	15	1	С	0	0	0	0.0	ГР	3	0	Х				
ЭМ-06	Балыкчы - Ананьево - Каракол 40-156 км	ЭМ	ПЛУАД-4	ДЭП-07	08/10/2014	98.0	98.5	ШПО	15	1	С	1	0	0	0.0	ГР	3	0	Х				
ЭМ-06	Балыкчы - Ананьево - Каракол 0-40 км	ЭМ	ПЛУАД-4	ДЭП-10	30/10/2014	20.0	21.0	АБ	15	1	ПР	1	1	1	5.5	ГР	3	1	х	6.3		6.3	3
ЭМ-06	Балыкчы - Ананьево - Каракол 0-40 км	ЭМ	ПЛУАД-4	ДЭП-10	30/10/2014	21.0	22.0	ШПО	15	1	ПР	2	2	2	3.5	ГР	3	1	х	5.7		5.7	3
ЭМ-07	Бишкек - Торугарт 32-82 км	ЭМ	ПЛУАД-1	ДЭП-954	05/12/2014	54.5	55.0	АБ	15	1	ПП	0	0	2	2.0	ГР	3	2	У	4.2		4.2	2
ЭМ-07	Бишкек - Торугарт 32-82 км	ЭМ	ПЛУАД-1	ДЭП-954	05/12/2014	55.0	56.0	АБ	15	1	ПП	0	0	2	2.0	ГР	3	2	У	3.5		3.5	1
ЭМ-07	Бишкек - Торугарт 32-82 км	ЭМ	ПЛУАД-1	ДЭП-954	05/12/2014	56.0	57.0	АБ	15	1	ПП	0	0	2	2.0	ГР	3	2	У	3.1		3.1	1
ЭМ-07	Бишкек - Торугарт 32-82 км	ЭМ	ПЛУАД-1	ДЭП-954	05/12/2014	57.0	58.0	АБ	15	1	ПП	0	0	2	2.0	ГР	3	2	У	2.9		2.9	1
ЭМ-07	Бишкек - Торугарт 32-82 км	ЭМ	ПЛУАД-1	ДЭП-954	05/12/2014	58.0	59.0	АБ	15	1	ПП	0	0	2	2.0	ГР	3	2	У	4.1		4.1	2
ЭМ-07	Бишкек - Торугарт 32-82 км	ЭМ	ПЛУАД-1	ДЭП-954	05/12/2014	59.0	59.7	АБ	15	1	ПП	0	0	2	2.0	ГР	3	2	У	3.9		3.9	1
ЭМ-07	Бишкек - Торугарт 32-82 км	ЭМ	ПЛУАД-1	ДЭП-954	05/12/2014	65.5	66.0	АБ	15	2	ПП	0	0	1	0.0	ГР	4	2	Х	2.7	3.6	3.1	1
ЭМ-07	Бишкек - Торугарт 32-82 км	ЭМ	ПЛУАД-1	ДЭП-954	05/12/2014	66.0	67.0	АБ	15	2	ПП	0	0	1	0.0	ГР	4	2	Х	3.1	3.5	3.3	1
ЭМ-07	Бишкек - Торугарт 32-82 км	ЭМ	ПЛУАД-1	ДЭП-954	05/12/2014	67.0	68.0	АБ	15	2	ПП	0	0	1	0.0	ГР	4	2	Х	3.3	3.9	3.6	1
ЭМ-07	Бишкек - Торугарт 32-82 км	ЭМ	ПЛУАД-1	ДЭП-954	05/12/2014	68.0	69.0	АБ	15	1	ПП	0	0	2	0.0	ГР	4	2	Х	2.7	3.1	2.9	1

Example: Kyrgyz

- Decision matrix and work programming

Решения о работах в зависимости от состояния

Инт-ть дв. (СГС	Трещины	Колея / Ямы	0-1 IRI: 0-1	IRI: 2	IRI: 3-4	2 IRI: 0-1	IRI: 2	IRI: 3-4	3 IRI: 0-1	IRI: 2	IRI: 3-4
	0-1	0 - 1	СОД	СОД	МР	СОД	СОД	МР	МР	РЕК1	РЕК1
		2	ЯР	ЯР	МР	ЯР	ЯР	МР	ПИ	РЕК1	РЕК1
		3	ЯР	ЯР	МР	ЯР	МР	МР	ПИ	РЕК1	РЕК1
	2 - 3	0 - 1	3Т	ШПО	Ф308	ШПО	ШПО	Ф308	РЕК1	РЕК1	РЕК1
		2	ШПО	ШПО	Ф308	ШПО	Ф304	Ф308	РЕК1	РЕК1	РЕК1
		3	ШПО	ШПО	Ф308	Ф304	Ф306	Ф308	РЕК1	РЕК1	РЕК1
	4	0 - 1	ШПО	ШПО	ПИ	ШПО	Ф304	ПИ	РЕК1	РЕК1	РЕК1
		2	ШПО	Ф304	ПИ	Ф304	Ф306	ПИ	РЕК1	РЕК1	РЕК1
< 1000		3	РЕК1	РЕК1	РЕК1	РЕК1	РЕК1	РЕК1	РЕК1	РЕК1	РЕК1
	0-1	0 - 1	СОД	СОД	МР	СОД	ШПО	АБ08	МР	РЕК2	РЕК2
		2	ЯР	ЯР	АБ08	МР	МР	АБ08	ПИ	РЕК2	РЕК2
		3	ЯР	ЯР	АБ08	МР	АБ08	АБ08	ПИ	РЕК2	РЕК2
	2 - 3	0 - 1	3Т	ДШПО	АБ08	ШПО	АБ04	АБ08	РЕК2	РЕК2	РЕК2
		2	ШПО	Ф304	АБ11	Ф304	АБ08	АБ11	РЕК2	РЕК2	РЕК2
		3	Ф304	АБ08	АБ11	АБ08	АБ11	АБ11	РЕК2	РЕК2	РЕК2
	4	0 - 1	ШПО	Ф304	АБ11	Ф304	АБ08	АБ11	РЕК2	РЕК2	РЕК2
		2	Ф304	АБ08	РЕК2	АБ08	АБ11	РЕК2	РЕК2	РЕК2	РЕК2
1000-3000		3	РЕК2	РЕК2	РЕК2	РЕК2	РЕК2	РЕК2	РЕК2	РЕК2	РЕК2
	0-1	0 - 1	СОД	СОД	МР	СОД	ШПО	АБ11	МР	РЕК3	РЕК3
		2	ЯР	ЯР	АБ11	МР	МР	АБ11	ПИ	РЕК3	РЕК3
		3	ЯР	ЯР	АБ11	МР	АБ11	АБ11	ПИ	РЕК3	РЕК3
	2 - 3	0 - 1	3Т	АБ04	АБ13	ШПО	АБ04				
		2	ШПО	Ф304	АБ13	Ф304	АБ11				
		3	Ф304	АБ11	АБ13	АБ11	АБ13				
	4	0 - 1	ШПО	Ф304	АБ13	Ф304	АБ11				
		2	Ф304	АБ11	РЕК3	АБ11	АБ13				
>3000		3	РЕК3	РЕК3	РЕК3	РЕК3	РЕК3				

Программа работ

№	участок	значе-ни	ПЛУАД	ДЕП	От Км	До Км	Протяж. км	Индекс серьез-ности	Функцио-нальный индек	Индекс приоритет-ности	Предла-гаемые работ	Зат-рат
ЭМ-02	Ош-Исфана 179-280 км	ЭМ	УАД ОБИ	ДЭП-02	218	219	1	18	15	270	РЕК2	560
ЭМ-02	Ош-Исфана 75-179 км	ЭМ	УАД ОБИ	ДЭП-46	101	102	1	17	15	255	РЕК2	640
ЭМ-02	Ош-Исфана 75-179 км	ЭМ	УАД ОБИ	ДЭП-46	100	101	1	16	15	240	РЕК2	640
ЭМ-02	Ош-Исфана 75-179 км	ЭМ	УАД ОБИ	ДЭП-46	102	103	1	16	15	240	РЕК2	640
ЭМ-02	Ош-Исфана 30-75 км	ЭМ	УАД ОСИ	ДЭП-37	48	49	1	15	16	240	РЕК3	612
ЭМ-02	Ош-Исфана 30-75 км	ЭМ	УАД ОСИ	ДЭП-37	49	50	1	15	16	240	РЕК3	612
ЭМ-02	Ош-Исфана 30-75 км	ЭМ	УАД ОСИ	ДЭП-37	50	51	1	15	16	240	РЕК3	612
ЭМ-02	Ош-Исфана 179-280 км	ЭМ	УАД ОБИ	ДЭП-02	229	230	1	16	15	240	РЕК2	440
ЭМ-02	Ош-Исфана 75-179 км	ЭМ	УАД ОБИ	ДЭП-46	97	98	1	16	15	240	АБ11	196
ЭМ-02	Ош-Исфана 280-403 км	ЭМ	УАД ОБИ	ДЭП-13	356	357	1	15	15	225	РЕК3	714
ЭМ-02	Ош-Исфана 75-179 км	ЭМ	УАД ОБИ	ДЭП-46	96	97	1	15	15	225	АБ11	196
ЭМ-02	Ош-Исфана 75-179 км	ЭМ	УАД ОБИ	ДЭП-46	98	99	1	15	15	225	АБ11	196
ЭМ-02	Ош-Исфана 179-280 км	ЭМ	УАД ОБИ	ДЭП-02	228	229	1	15	15	225	АБ11	147
ЭМ-02	Ош-Исфана 179-280 км	ЭМ	УАД ОБИ	ДЭП-02	230	231	1	15	15	225	АБ11	147
ЭМ-02	Ош-Исфана 30-75 км	ЭМ	УАД ОСИ	ДЭП-37	51	52	1	14	16	224	РЕК3	816
ЭМ-02	Ош-Исфана 30-75 км	ЭМ	УАД ОСИ	ДЭП-37	46	47	1	14	16	224	РЕК3	612
ЭМ-02	Ош-Исфана 30-75 км	ЭМ	УАД ОСИ	ДЭП-37	47	48	1	14	16	224	РЕК3	612
ЭМ-02	Ош-Исфана 30-75 км	ЭМ	УАД ОСИ	ДЭП-37	62	63	1	14	15	210	РЕК3	816
ЭМ-02	Ош-Исфана 30-75 км	ЭМ	УАД ОСИ	ДЭП-37	63	64	1	14	15	210	РЕК3	816
ЭМ-02	Ош-Исфана 30-75 км	ЭМ	УАД ОСИ	ДЭП-37	64	65	1	14	15	210	РЕК3	816
ЭМ-02	Ош-Исфана 30-75 км	ЭМ	УАД ОСИ	ДЭП-37	66	67	1	14	15	210	РЕК3	816
ЭМ-02	Ош-Исфана 30-75 км	ЭМ	УАД ОСИ	ДЭП-37	72	73	1	14	15	210	РЕК3	816
ЭМ-02	Балыкчы - Боконбаево - Каракол 0-60 км	ЭМ	ПЛУАД-4	ДЭП-10	41	42	1	15	14	210	РЕК3	714
ЭМ-02	Балыкчы - Боконбаево - Каракол 0-60 км	ЭМ	ПЛУАД-4	ДЭП-10	42	43	1	15	14	210	РЕК3	714
ЭМ-02	Ош-Исфана 75-179 км	ЭМ	УАД ОБИ	ДЭП-46	103	104	1	14	15	210	РЕК2	640
ЭМ-02	Ош-Исфана 30-75 км	ЭМ	УАД ОСИ	ДЭП-37	73	74	1	14	15	210	АБ11	196
ЭМ-02	Ош-Исфана 30-75 км	ЭМ	УАД ОСИ	ДЭП-37	44	45	1	13	16	208	РЕК3	816
ЭМ-02	Ош-Исфана 30-75 км	ЭМ	УАД ОСИ	ДЭП-37	54	55	1	13	16	208	РЕК3	612

Example: Kyrgyz

- Standard reports for monitoring

**Результаты состояния сети с твердым покрытием в плане визуально заметного разрушения**

СУДА
Кыргызстан

По Плуадам
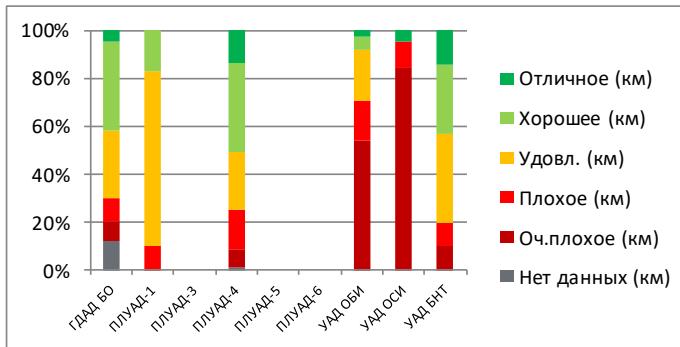
	Отличное (км)	Хорошее (км)	Удовл. (км)	Плохое (км)	Оч.плохое (км)	Нет данных (км)
ГДАД БО	20.0	153.0	119.0	39.0	34.0	52.0
ПЛУАД-1	0.0	13.0	55.2	7.8	0.0	0.0
ПЛУАД-3	0.0	0.0	0.0	0.0	0.0	0.0
ПЛУАД-4	60.5	159.0	105.2	71.4	34.4	4.0
ПЛУАД-5	0.0	0.0	0.0	0.0	0.0	0.0
ПЛУАД-6	0.0	0.0	0.0	0.0	0.0	0.0
УАД ОБИ	5.0	9.0	36.0	29.0	92.0	0.0
УАД ОСИ	2.0	0.0	0.0	5.0	38.0	0.0
УАД БНТ	17.0	34.5	44.0	12.0	12.0	0.0

По участкам

ПЛУАД	ДЭП	Участок	Отличное (км)	Хорошее (км)	Удовл. (км)	Плохое (км)	Оч.плохое (км)	Нет данных (км)	Среднее разрушение	Среднее IRI	Максимальное IRI
ГДАД БО	ДЭП-09	Бишкек-Ош 9-209 км	8.0	53.0	33.0	19.0	34.0	52.0	31.80	2.74	5.60
ГДАД БО	ДЭП-23	Бишкек-Ош 209-318 км	6.0	87.0	12.0	1.0	0.0	0.0	6.75		
ГДАД БО	ДЭП-30	Бишкек-Ош 318-427 км	6.0	13.0	74.0	19.0	0.0	0.0	20.58		
ПЛУАД-1	ДЭП-954	Бишкек - Торугарт 32-82 км	0.0	0.0	43.8	5.8	0.0	0.0	26.75	3.48	4.91
ПЛУАД-1	ДЭП-958	Бишкек - Торугарт 0-32 км	0.0	13.0	11.4	2.0	0.0	0.0	18.75	4.10	7.13
ПЛУАД-4	ДЭП-03	Балыкчы - Боконбаево - Каракол 124-150 км	8.0	15.0	3.0	1.0	0.0	0.0	7.96	3.88	5.56
ПЛУАД-4	ДЭП-04	Балыкчы - Ананьево - Каракол 156-207 км	13.7	11.0	8.9	17.4	0.0	0.0	20.19	4.15	5.61
ПЛУАД-4	ДЭП-07	Балыкчы - Ананьево - Каракол 40-156 км	16.8	99.1	0.6	0.0	0.0	0.0	5.15	4.24	6.50
ПЛУАД-4	ДЭП-10	Балыкчы - Ананьево - Каракол 0-40 км	0.0	0.0	28.0	2.0	5.0	0.0	33.14	4.88	6.32
ПЛУАД-4	ДЭП-10	Балыкчы - Боконбаево - Каракол 0-60 км	8.0	1.0	28.0	7.0	16.0	0.0	32.33	4.56	7.20
ПЛУАД-4	ДЭП-33	Балыкчы - Боконбаево - Каракол 60-124 км	14.0	2.0	17.0	21.0	6.0	4.0	28.00	3.99	9.28
ПЛУАД-4	ДЭП-35	Балыкчы - Ананьево - Каракол 207-218 км	0.0	5.9	1.7	1.0	2.4	0.0	25.50	4.65	6.28
ПЛУАД-4	ДЭП-35	Балыкчы - Боконбаева - Каракол 150-220 км	0.0	25.0	18.0	22.0	5.0	0.0	28.00	4.16	7.18

Example: Kyrgyz

- Export to RONET

Данные для RONET

Протяженность дорожной сети в пересчете на двухполосный эквивалент (км)

Международные
Цементобетон

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 2	Хорошее 4	Удовл. 5.5	Плохое 7	Оч.Плохое 13	Всего
Инт-ть дв- <300	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 300-1000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 1000-3000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 3000-10000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- >10000	0.0	0.0	0.0	0.0	0.0	0.0
Всего	0.0	0.0	0.0	0.0	0.0	0.0

Международные
Асфальтовая смесь

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 2	Хорошее 4	Удовл. 5.5	Плохое 7	Оч.Плохое 13	Всего
Инт-ть дв- <300	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 300-1000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 1000-3000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 3000-10000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- >10000	0.0	749.0	0.0	0.0	0.0	749.0
Всего	0.0	749.0	0.0	0.0	0.0	749.0

Международные
ШПО

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 2	Хорошее 4	Удовл. 5.5	Плохое 7	Оч.Плохое 13	Всего
Инт-ть дв- <300	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 300-1000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 1000-3000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 3000-10000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- >10000	0.0	0.0	0.0	0.0	0.0	0.0
Всего	0.0	0.0	0.0	0.0	0.0	0.0

Государственные
Цементобетон

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 2	Хорошее 4	Удовл. 5.5	Плохое 7	Оч.Плохое 13	Всего
Инт-ть дв- <300	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 300-1000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 1000-3000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 3000-10000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- >10000	0.0	0.0	0.0	0.0	0.0	0.0
Всего	0.0	0.0	0.0	0.0	0.0	0.0

Государственные
Асфальтовая смесь

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 2	Хорошее 4	Удовл. 5.5	Плохое 7	Оч.Плохое 13	Всего
Инт-ть дв- <300	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 300-1000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 1000-3000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 3000-10000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- >10000	0.0	0.0	0.0	0.0	0.0	0.0
Всего	0.0	0.0	0.0	0.0	0.0	0.0

Государственные
ШПО

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 2	Хорошее 4	Удовл. 5.5	Плохое 7	Оч.Плохое 13	Всего
Инт-ть дв- <300	0.0	0.0	0.0	0.0	0.0	
Инт-ть дв- 300-1000	0.0	0.0	0.0	0.0	0.0	
Инт-ть дв- 1000-3000	0.0	0.0	0.0	0.0	0.0	
Инт-ть дв- 3000-10000	0.0	0.0	0.0	0.0	0.0	
Инт-ть дв- >10000	0.0	0.0	0.0	0.0	0.0	
Всего	0.0	0.0	0.0	0.0	0.0	0.0

Местные
Цементобетон

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 3	Хорошее 5	Удовл. 7	Плохое 9	Оч.Плохое 13	Всего
Инт-ть дв- <300						0.0
Инт-ть дв- 300-1000						0.0
Инт-ть дв- 1000-3000						0.0
Инт-ть дв- 3000-10000						0.0
Инт-ть дв- >10000						0.0
Всего	0.0	0.0	0.0	0.0	0.0	0.0

Местные
Асфальтовая смесь

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 3	Хорошее 5	Удовл. 7	Плохое 9	Оч.Плохое 13	Всего
Инт-ть дв- <300						0.0
Инт-ть дв- 300-1000						0.0
Инт-ть дв- 1000-3000						0.0
Инт-ть дв- 3000-10000						0.0
Инт-ть дв- >10000						0.0
Всего	0.0	0.0	0.0	0.0	0.0	0.0

Местные
ШПО

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 3	Хорошее 5	Удовл. 7	Плохое 9	Оч.Плохое 13	Всего
Инт-ть дв- <300						0.0
Инт-ть дв- 300-1000						0.0
Инт-ть дв- 1000-3000						0.0
Инт-ть дв- 3000-10000						0.0
Инт-ть дв- >10000						0.0
Всего	0.0	0.0	0.0	0.0	0.0	0.0

Областные
Цементобетон

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 3	Хорошее 5	Удовл. 7	Плохое 9	Оч.Плохое 13	Всего
Инт-ть дв- <300						0.0
Инт-ть дв- 300-1000						0.0
Инт-ть дв- 1000-3000						0.0
Инт-ть дв- 3000-10000						0.0
Инт-ть дв- >10000						0.0
Всего	0.0	0.0	0.0	0.0	0.0	0.0

Областные
Асфальтовая смесь

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 3	Хорошее 5	Удовл. 7	Плохое 9	Оч.Плохое 13	Всего
Инт-ть дв- <300						0.0
Инт-ть дв- 300-1000						0.0
Инт-ть дв- 1000-3000						0.0
Инт-ть дв- 3000-10000						0.0
Инт-ть дв- >10000						0.0
Всего	0.0	0.0	0.0	0.0	0.0	0.0

Областные
ШПО

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 3	Хорошее 5	Удовл. 7	Плохое 9	Оч.Плохое 13	Всего
Инт-ть дв- <300						0.0
Инт-ть дв- 300-1000						0.0
Инт-ть дв- 1000-3000						0.0
Инт-ть дв- 3000-10000						0.0
Инт-ть дв- >10000						0.0
Всего	0.0	0.0	0.0	0.0	0.0	0.0

Городские
Цементобетон

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 3	Хорошее 5	Удовл. 7	Плохое 9	Оч.Плохое 13	Всего
Инт-ть дв- <300						0.0
Инт-ть дв- 300-1000						0.0
Инт-ть дв- 1000-3000						0.0
Инт-ть дв- 3000-10000						0.0
Инт-ть дв- >10000						0.0
Всего	0.0	0.0	0.0	0.0	0.0	0.0

Городские
Асфальтовая смесь

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 3	Хорошее 5	Удовл. 7	Плохое 9	Оч.Плохое 13	Всего
Инт-ть дв- <300						0.0
Инт-ть дв- 300-1000						0.0
Инт-ть дв- 1000-3000						0.0
Инт-ть дв- 3000-10000						0.0
Инт-ть дв- >10000						0.0
Всего	0.0	0.0	0.0	0.0	0.0	0.0

Городские
ШПО

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 3	Хорошее 5	Удовл. 7	Плохое 9	Оч.Плохое 13	Всего
Инт-ть дв- <300						0.0
Инт-ть дв- 300-1000						0.0
Инт-ть дв- 1000-3000						0.0
Инт-ть дв- 3000-10000						0.0
Инт-ть дв- >10000						0.0
Всего	0.0	0.0	0.0	0.0	0.0	0.0

Бетон Всего	Asphalt Всего	ШПО Всего
0.0	749.0	0.0

Example: Kyrgyz

- Currently web-based RAMS being developed
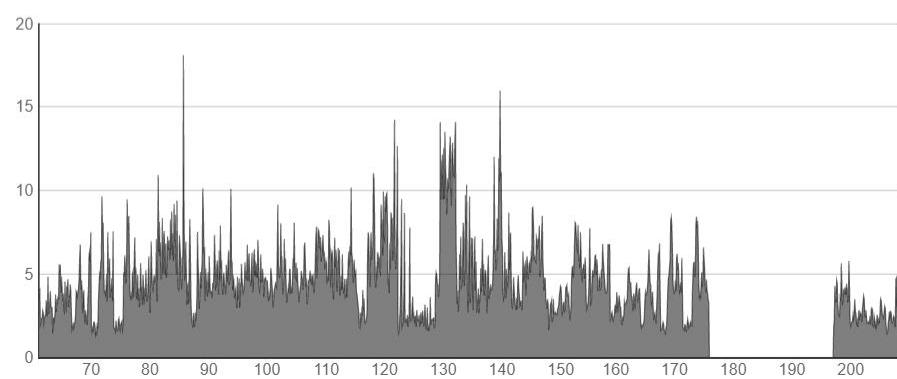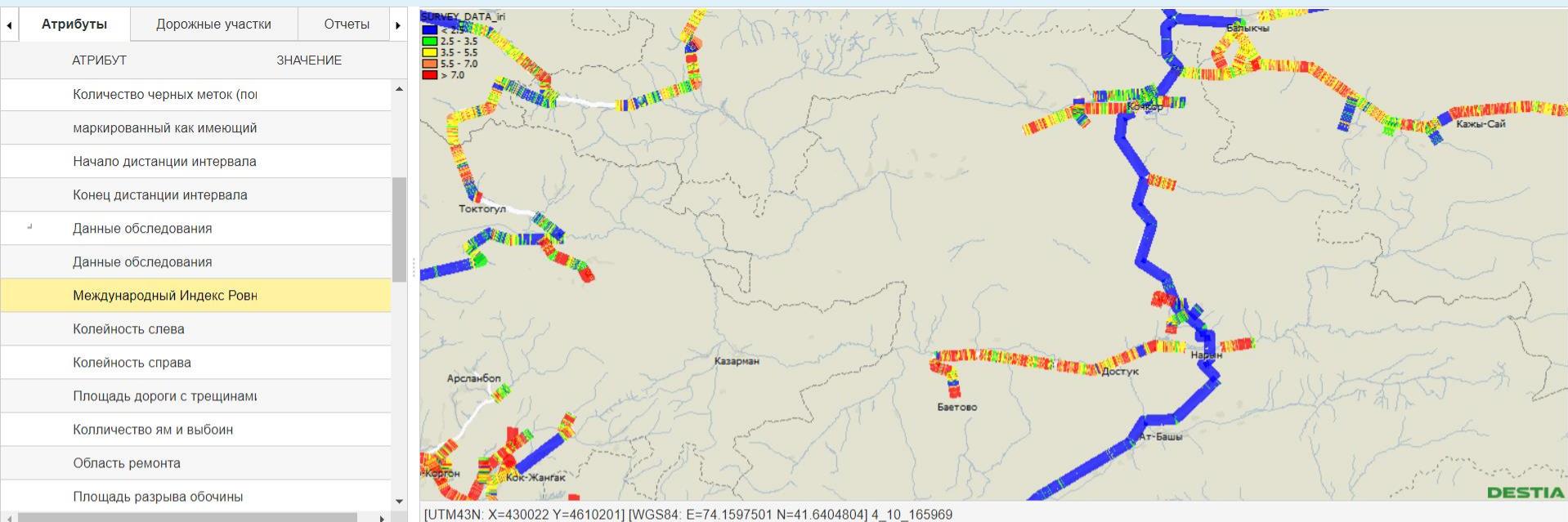
Example: Georgia

- Context
  - Network managed at central level through Roads Department
  - Move towards evidence-based planning
- Functions
  - Basic inventory, equipment-based pavement condition assessment, prioritization criteria, budgeting, linked to GIS mapping, off-the-shelf software (support)
- ArcGIS-based RAMS
  - Basic road and structure inventory, traffic data
  - Condition categories based on measured pavement condition data
  - Prioritization of treatments using HDM4
  - Budget allocation based on HDM4 results and other criteria
  - Status and plans presented on maps
- Suitability for functions
  - Five-year maintenance and rehabilitation plans updated annually
  - Basic data collection using ROMDAS – plans to expand (safety, full inventory)
  - Data only accessible to trained users, not remotely accessible – plans to upgrade to ESRI Enterprise Web

Example: Georgia

Acquisition of Data collection system IRI + GPS

Acquisition of HDM-4 2.0 and development of planning guideline

Development of 5 year program and respective guidelines/manuals

Data collection equipment upgrade

Acquisition of GIS system

Development of network modelling tool

Introduction of social indicators in 5 year plan

Automatic Traffic counters

Created RAMS unit within Agency

Attempt to procure All in one software (data processing, analysis, planning)

Development of TOR for implementing commercial GIS based advanced linear referencing system

2008

2018

Example: Georgia

360 Degree camera, GPS, Geometry unit

IRI (Laser Profilometers)

Odometer

Example: Georgia

Example: Georgia

- HDM4 results for basis for planning

- Other criteria also applied
  - Difficulties getting objective data

- Final plan 80% in line with HDM4 results

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 structure	n/a
Heavy Vehicles (%)	2.5		NPV	0.14	Bridge/Culvert/structure	n/a
[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 located.	347
Population	Number of people living within 2km buffer along the road section.	1520
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

Example: Azerbaijan

- Context
  - 17,473 km roads managed by Azeryolservis
  - RAMS and data collection with WB support since 2010 - $12 million
  - 2003 attempt was not successful – system not used

- Functions
 - Update and further develop existing database, collect data for 13,000 km and develop planning systems

- Integrated RAMS
  - Extensive data collection for 13,500 km as part of development
  - Custom-made database (inventory, traffic, condition, video, photo, GIS, etc.)
  - Export to HDM4 for further analysis

- Suitability for functions
  - Very comprehensive system
  - Very high data needs - $12 million for data collection
  - System reportedly no longer being used

Example: Azerbaijan
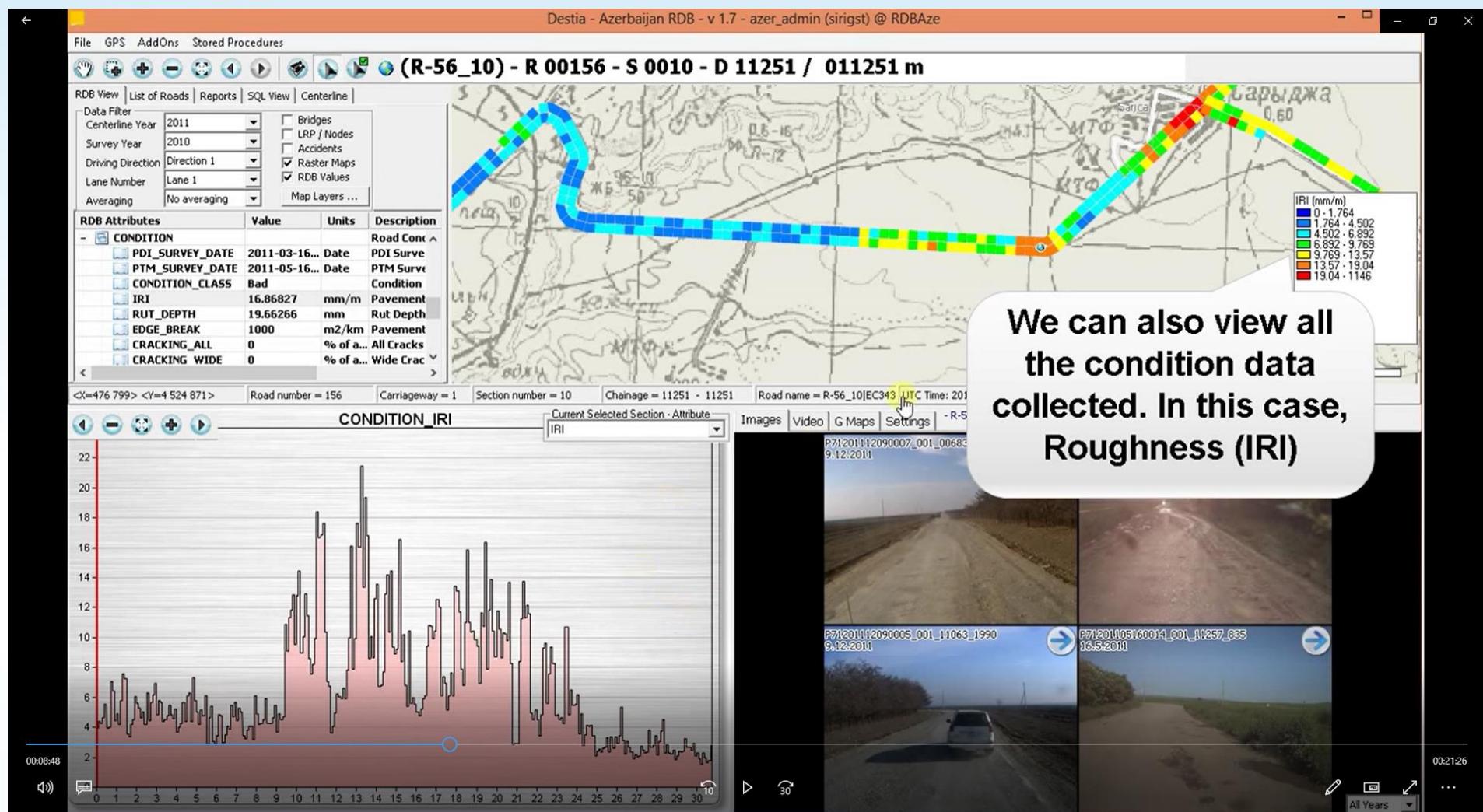
Functions of a RAMS

- The RAMS needs to be fit-for-purpose
    - What data needs to be collected and managed?
    - How will we collect that data?
    - How will we use that data?
    - Who will use and operate the RAMS (trained staff)?
    - Will we use off-the-shelf or custom-made software?

- Road management skills and needs will evolve over time
    - Start simple
    - Gradually increase functionality as skills/needs develop

Plenary

- Which entity is responsible for planning road investments?

- How is road management and planning currently done?

- What role could a RAMS play in this?

- Why do we want a RAMS? What will be the purpose?