Highways Workshop

22–23 May 2023 • Tbilisi, Georgia

Семинар по автомобильным дорогам

22–23 мая 2023 года • Тбилиси, Грузия

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CAREC
Central Asia Regional Economic Cooperation Program

Семинар по автомобильным дорогам
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Asset Maturity in CAREC and Lessons from SASEC

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RAM AND MATURITY ASSESSMENTS

What Is Asset Management?

- "The combination of management, financial, engineering, economic and other practices applied to physical assets with the objective of providing the required level of service in the most cost effective manner." (IIMM)

- "A systematic process of operating, maintaining and upgrading transportation assets cost-effectively, by combining engineering practices and analysis with sound business practice and economic theory. Also, the management of the physical infrastructure such as pavements, bridges, and airports, as well as human resources (personnel and knowledge), equipment and materials, and other items of value such as financial capabilities, right-of-way, data, computer systems, methods, technologies, and partners." (AASHTO)

International Infrastructure Management Manual (IIMM) AM Process

Asset Maturity in CAREC, Dr Ian Greenwood, ADB
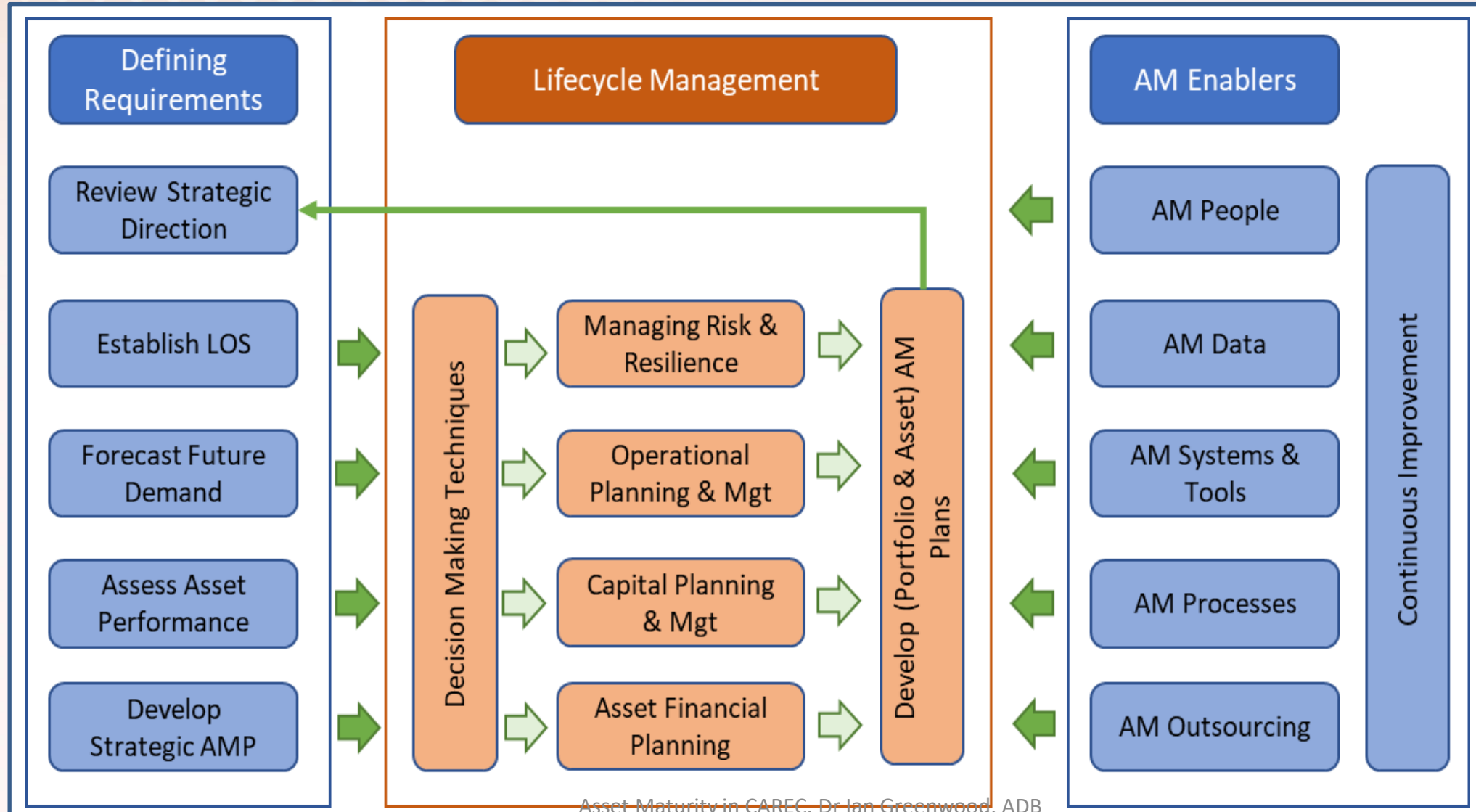
What About RAMS?

- While a common starting point is the implementation of an information management system (RAMS or RAMIS), a decision support tool (often HDM-4) and associated data collection, RAM is a much broader subject.

- Without the overall approach to RAM, RAMS often fails.

Asset Maturity in CAREC, Dr Ian Greenwood, ADB
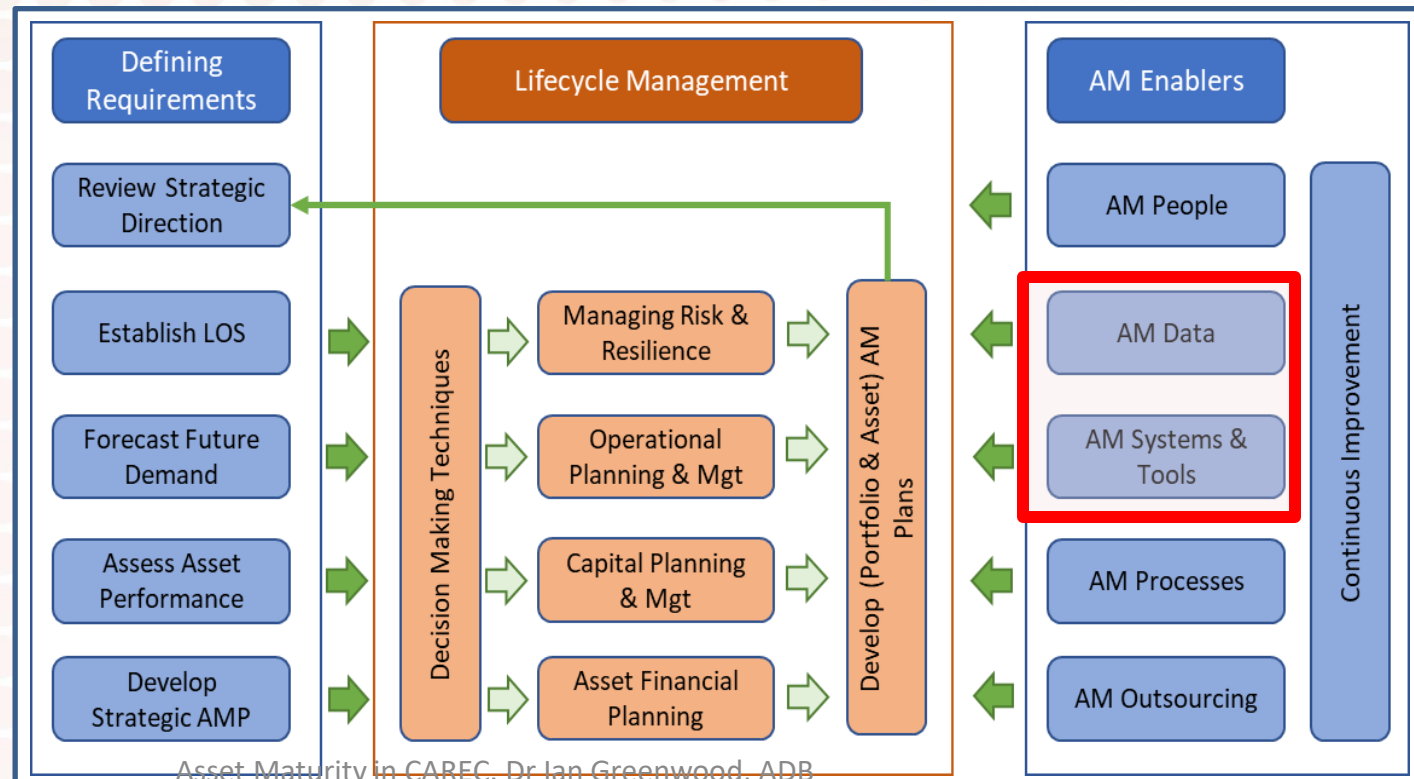
RAM Maturity Assessments

- A formalized and structured method to understand how well each component of asset management is being undertaken

- A high level of maturity typically results in road authorities being able to gain maximum value from their budgets

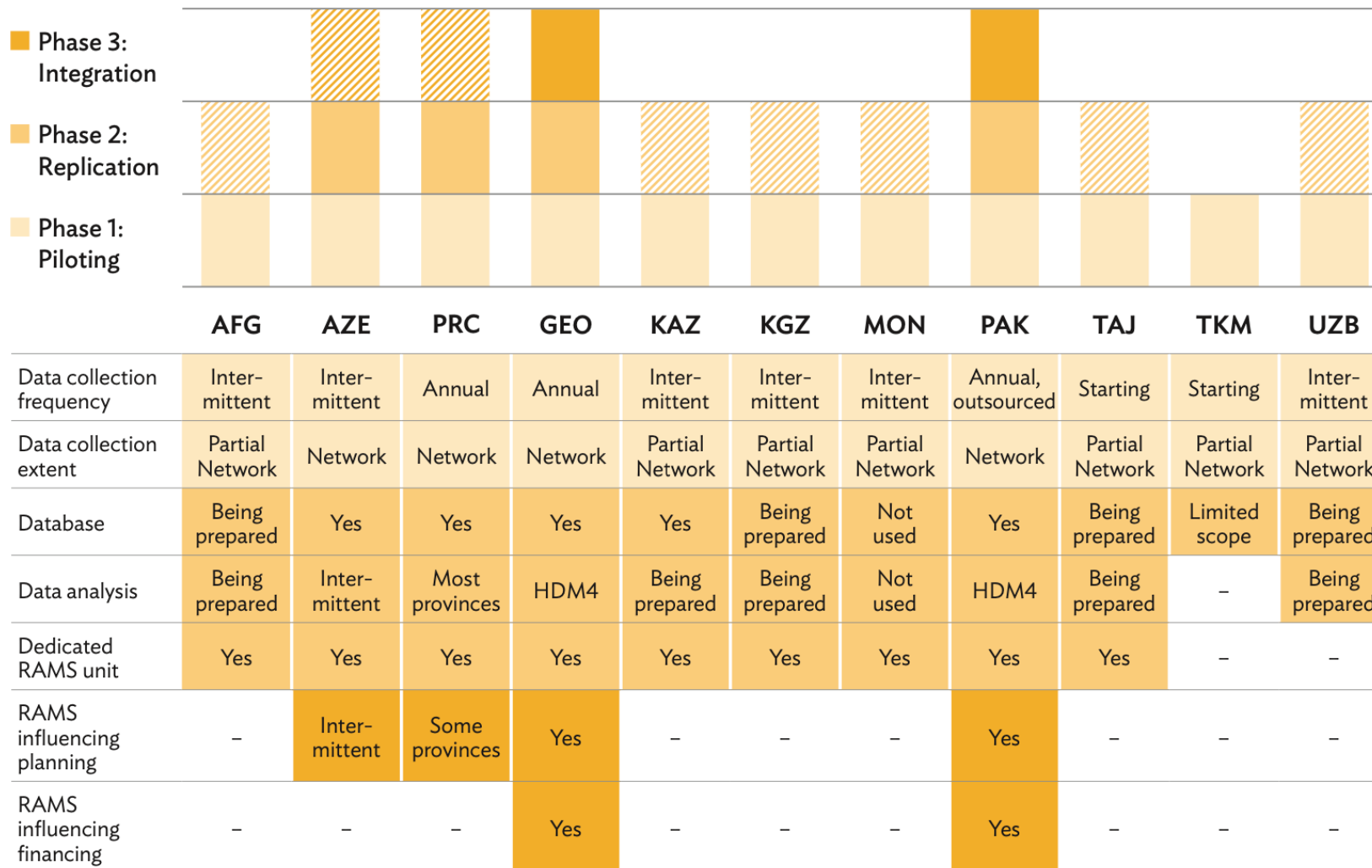- Provides a justifiable basis for an asset management improvement plan.

ROAD ASSET MANAGEMENT IN CAREC

RAMS Assessments

Figure 1: Status of Road Asset Management System Development in CAREC Countries

	AFG	AZE	PRC	GEO	KAZ	KGZ	MON	PAK	TAJ	TKM	UZB
Data collection frequency	Inter-mittent	Inter-mittent	Annual	Annual	Inter-mittent	Inter-mittent	Inter-mittent	Annual, outsourced	Starting	Starting	Inter-mittent
Data collection extent	Partial Network	Network	Network	Network	Partial Network	Partial Network	Partial Network	Network	Partial Network	Partial Network	Partial Network
Database	Being prepared	Yes	Yes	Yes	Yes	Being prepared	Not used	Yes	Being prepared	Limited scope	Being prepared
Data analysis	Being prepared	Inter-mittent	Most provinces	HDM4	Being prepared	Being prepared	Not used	HDM4	Being prepared	–	Being prepared
Dedicated RAMS unit	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	–	–
RAMS influencing planning	–	Inter-mittent	Some provinces	Yes	–	–	–	Yes	–	–	–
RAMS influencing financing	–	–	–	Yes	–	–	–	Yes	–	–	–

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CAREC Institute Assessments

- Online RAM training in 2020

- Maturity assessment in 2021 via a self-assessment methodology
  - 17 specific questions
  - Scale of 0 - 4 (best)
  - Target of at least 2 (proficient)

- Supported remotely with training and workshops

- Follow-up in-country workshops now occurring to validate and develop detailed improvement plans
  - Azerbaijan and Georgia in 2022
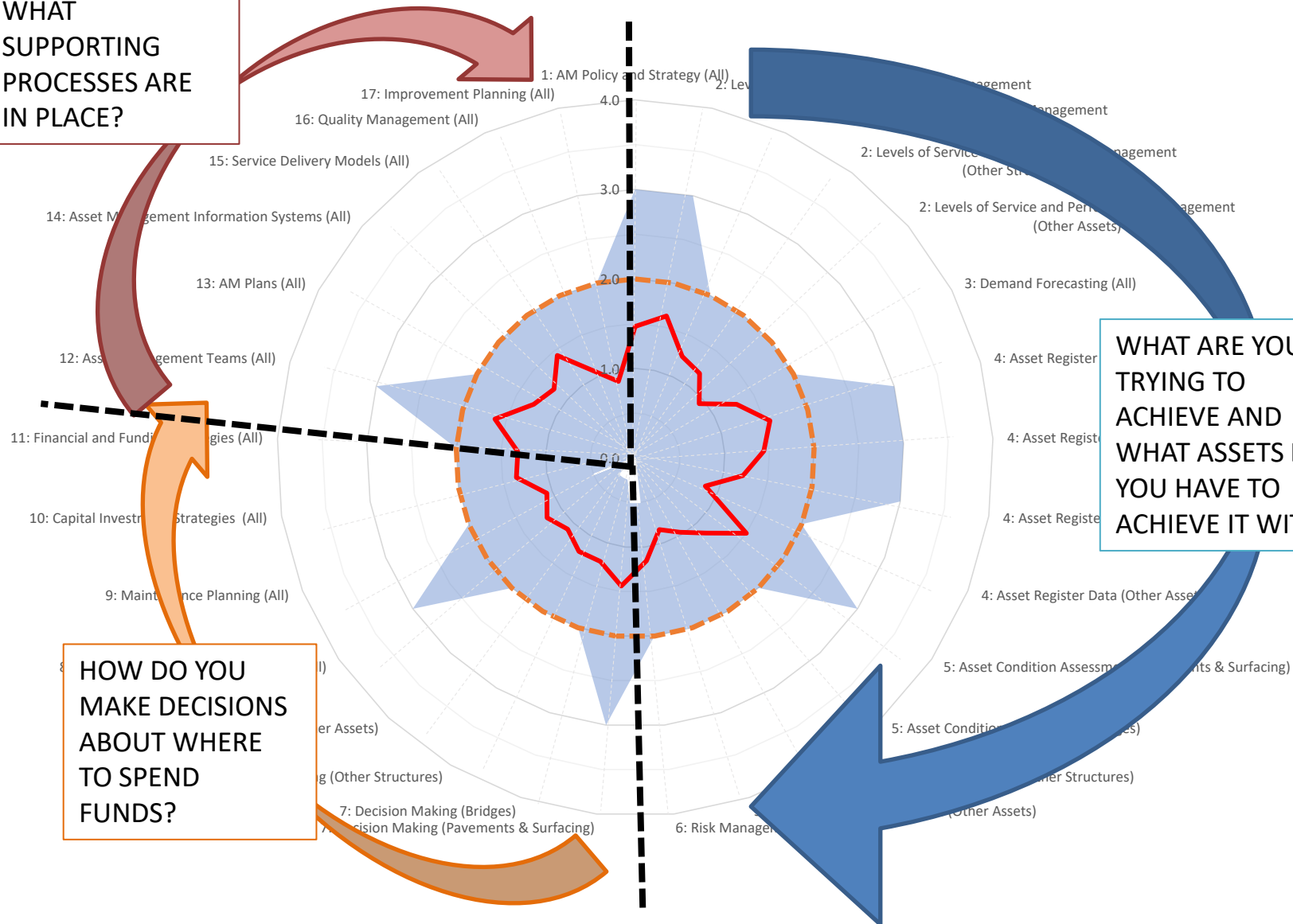 - Kyrgyz and Tajikistan in May 2022

Status

Country	Participated in Workshops	Submitted Template	In Country Workshops
Afghanistan	✓	✓	
Azerbaijan	✓	-	2022
China	✓	✓	
Georgia	✓	✓	2022
Kazakhstan	✓	✓	
Kyrgyz Republic	✓	✓	2023
Mongolia	✓	-	
Pakistan	✓	✓	
Tajikistan	✓	✓	2023
Turkmenistan	✓	✓	
Uzbekistan	-	-	

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All of CAREC

Range   Avg Current Score   Average Target

1: AM Policy and Strategy (All)
2: Levels of Service and Performance Management (Pavements & Surfacing)
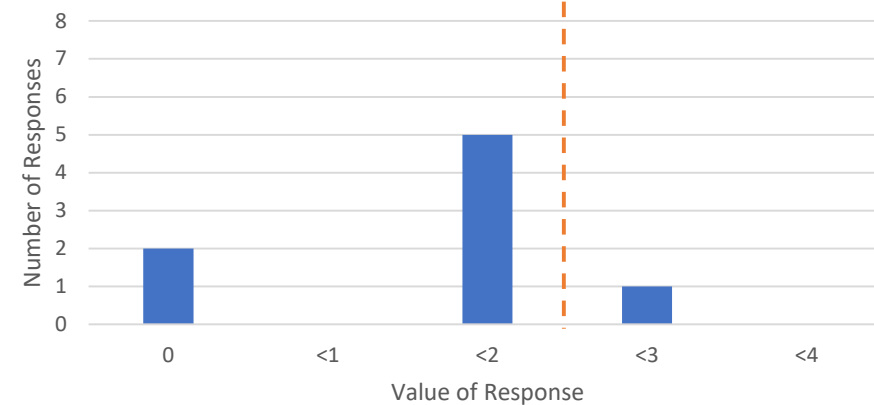2: Levels of Service and Performance Management (Bridges)
2: Levels of Service and Performance Management (Other Structures)
2: Levels of Service and Performance Management (Other Assets)
3: Demand Forecasting (All)
4: Asset Register Data (Pavements & Surfacing)
4: Asset Register Data (Bridges)
4: Asset Register Data (Other Structures)
4: Asset Register Data (Other Assets)
5: Asset Condition Assessment (Pavements & Surfacing)
5: Asset Condition Assessment (Bridges)
5: Asset Condition Assessment (Other Structures)
5: Asset Condition Assessment (Other Assets)
6: Risk Management (All)
7: Decision Making (Pavements & Surfacing)
7: Decision Making (Bridges)
7: Decision Making (Other Structures)
7: Decision Making (Other Assets)
8: Operational Planning and Reporting (All)
9: Maintenance Planning (All)
10: Capital Investment Strategies (All)
11: Financial and Funding Strategies (All)
12: Asset Management Teams (All)
13: AM Plans (All)
14: Asset Management Information Systems (All)
15: Service Delivery Models (All)
16: Quality Management (All)
17: Improvement Planning (All)

AM Policy

AM Policy and Strategy: All [Average =1.5]

Service Levels

Levels of Service and Performance Management:
Pavements & Surfacing [Average =1.6]
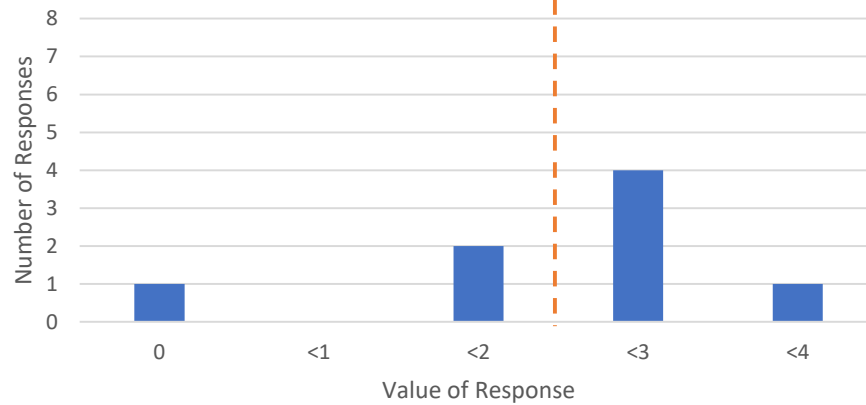
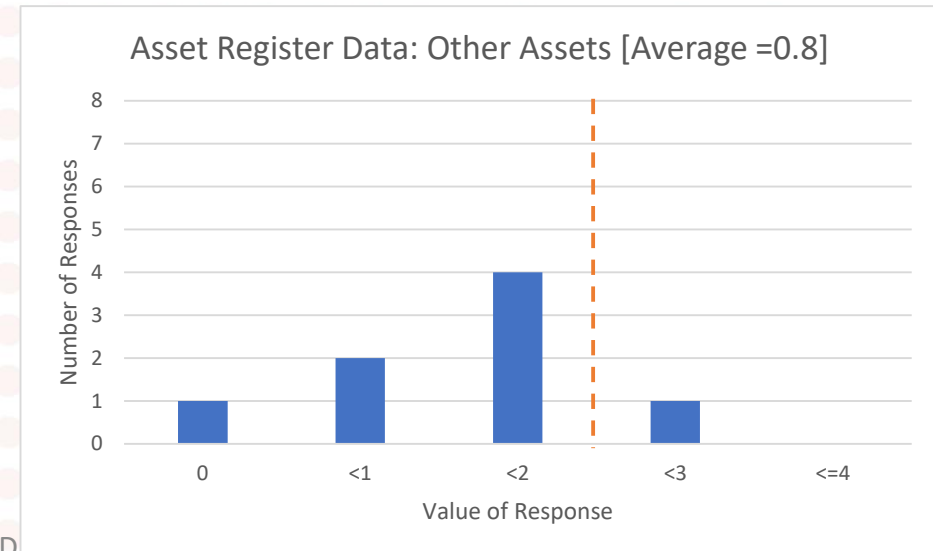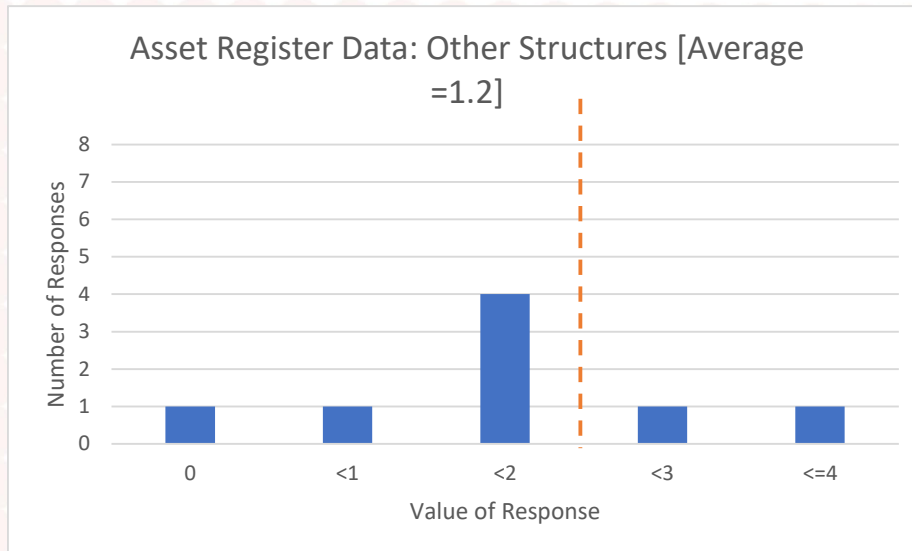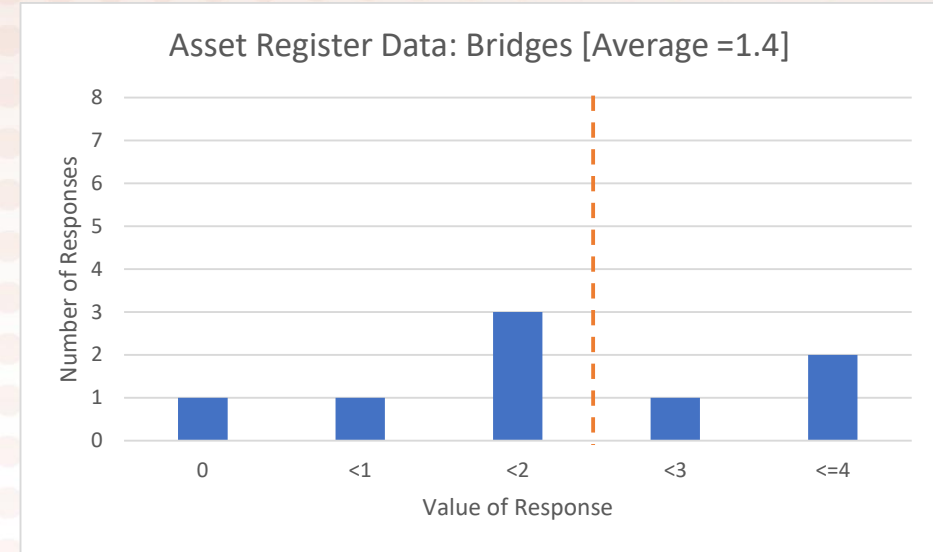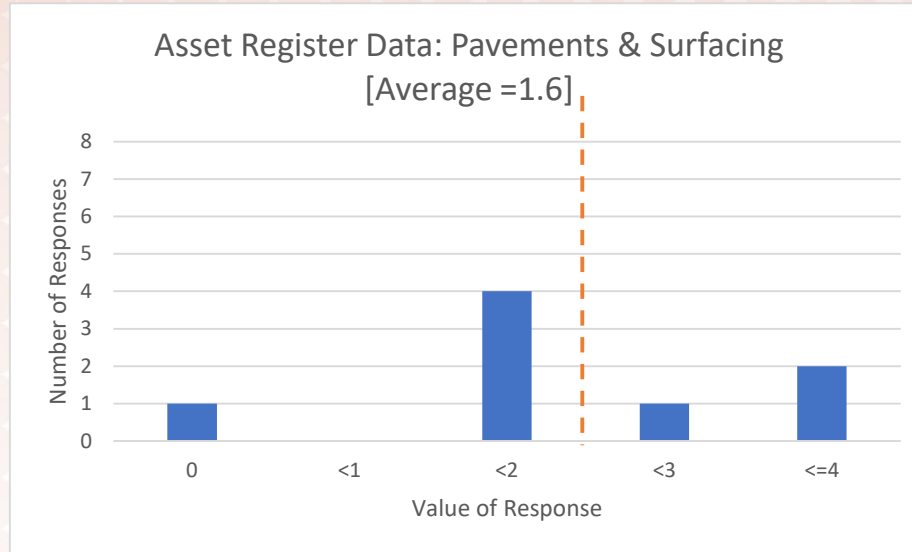Levels of Service and Performance Management:
Bridges [Average =1.3]
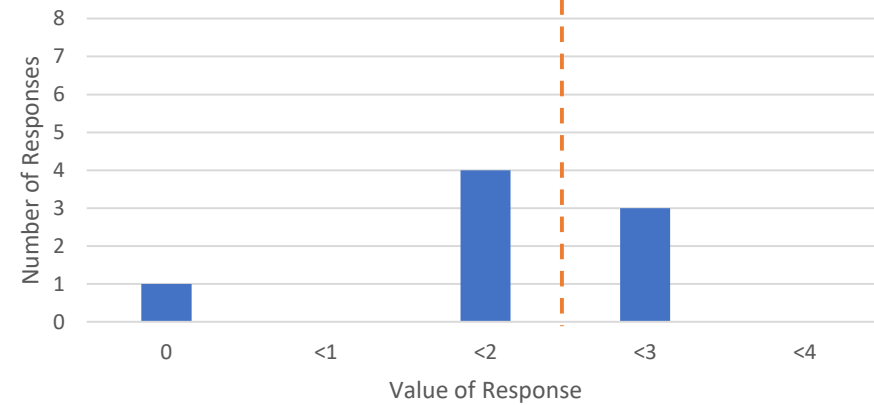
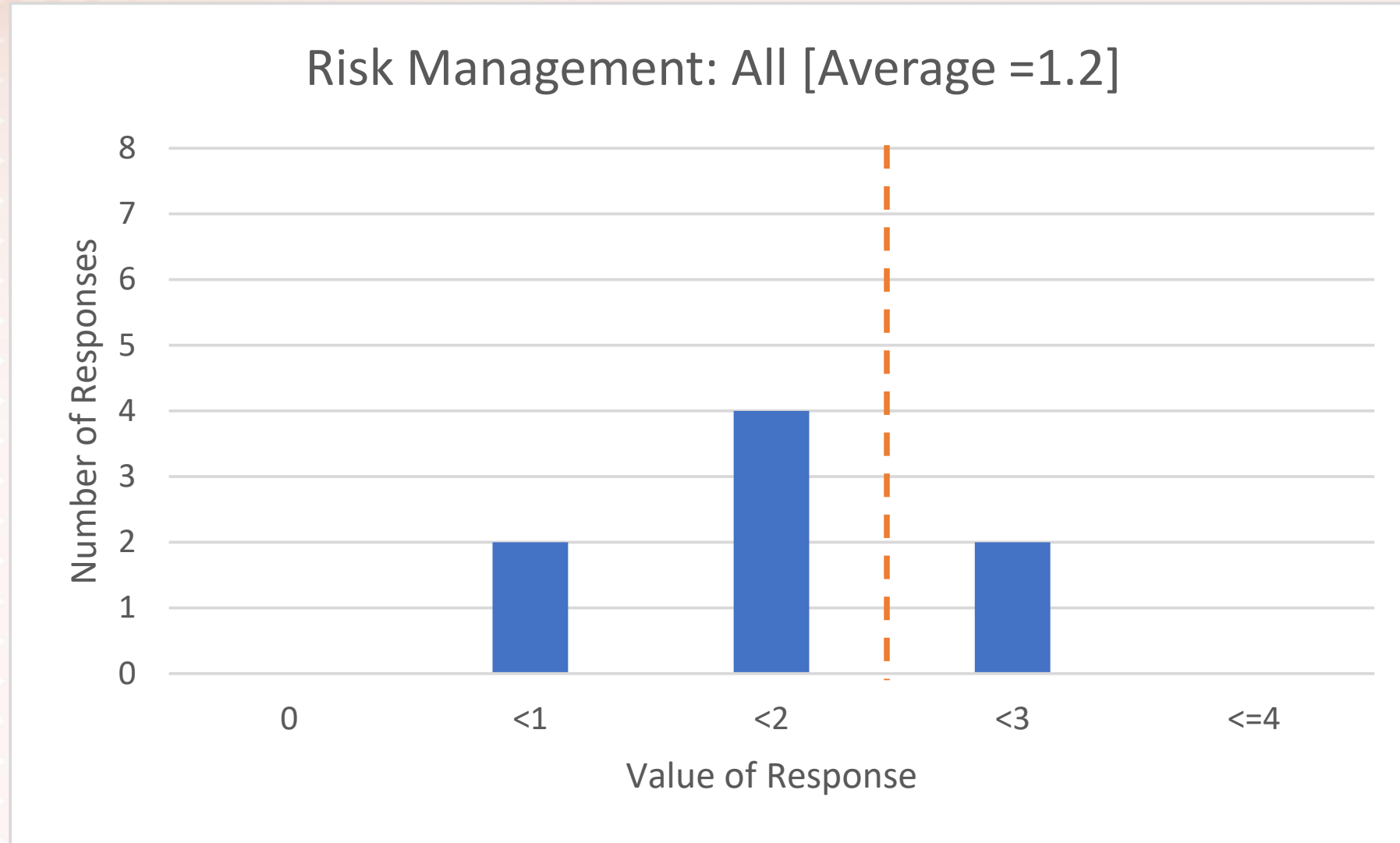Levels of Service and Performance Management:
Other Structures [Average =1.2]
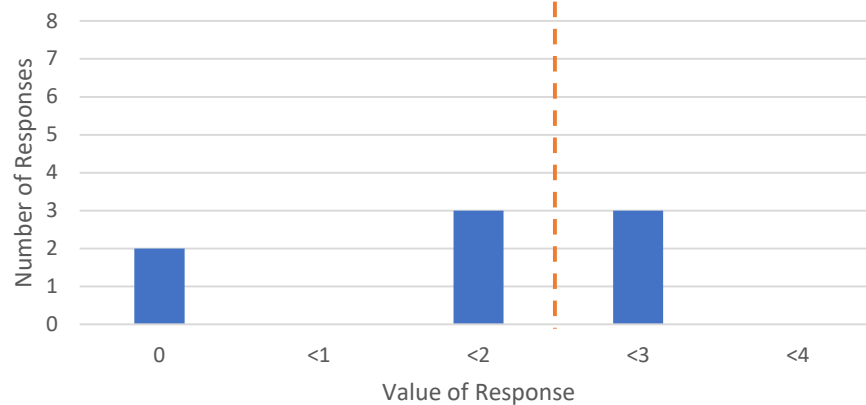
Levels of Service and Performance Management:
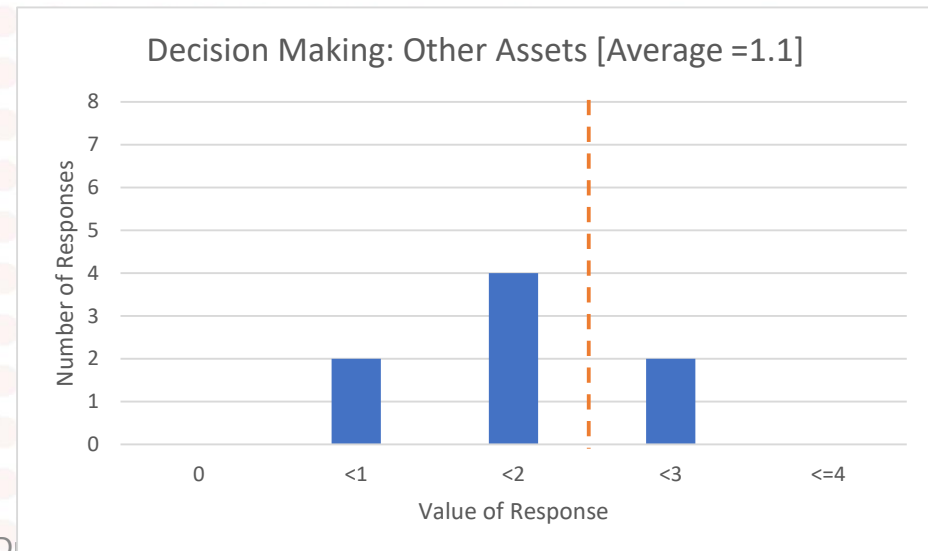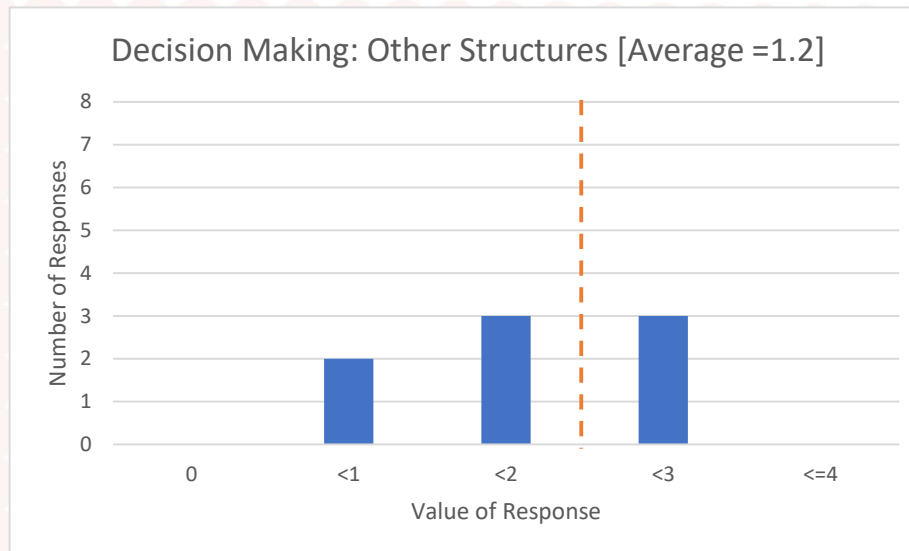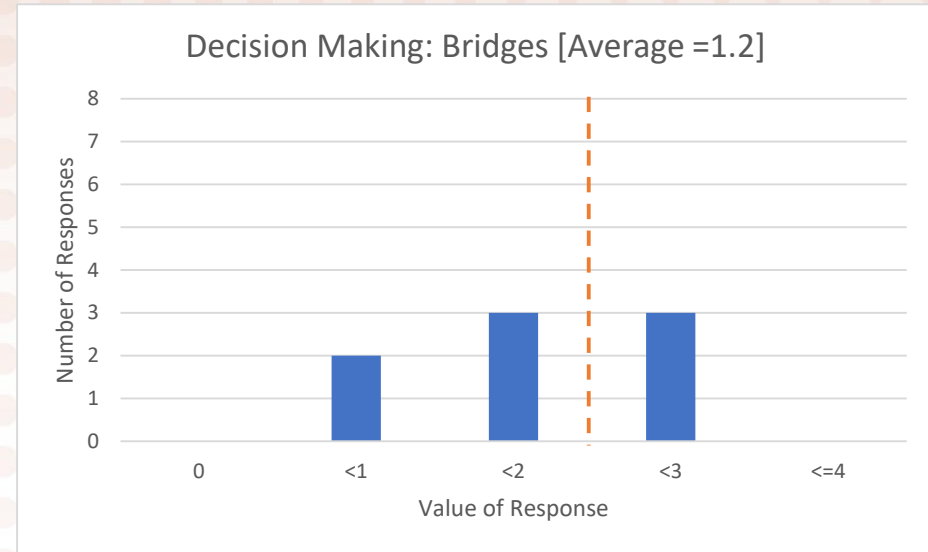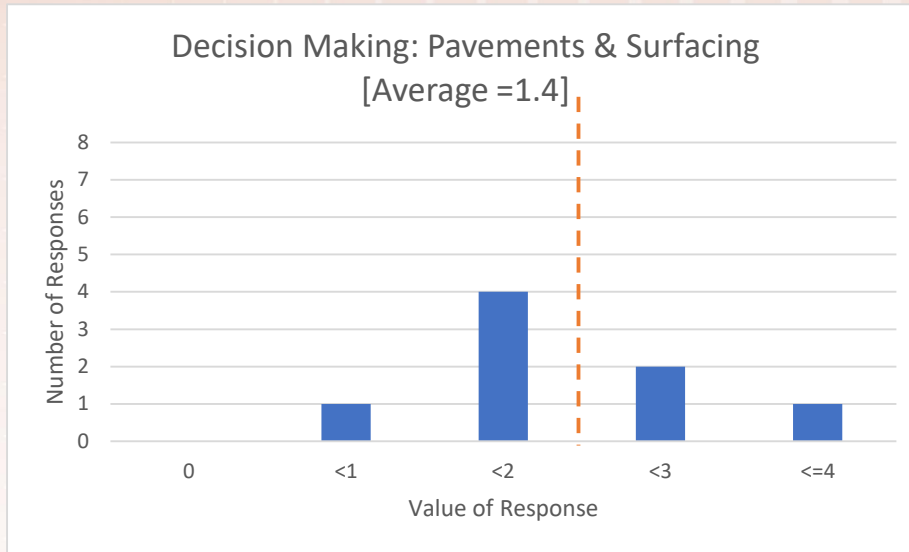Other Assets [Average =0.9]

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Asset Register

Risk

Risk Management: All [Average =1.2]

Lifecycle Decision Making

Decision Making: Pavements & Surfacing [Average =1.4]

Decision Making: Bridges [Average =1.2]

Decision Making: Other Structures [Average =1.2]

Decision Making: Other Assets [Average =1.1]

Capital Investment Strategies & Funding

Capital Investment Strategies : All [Average =1.3]
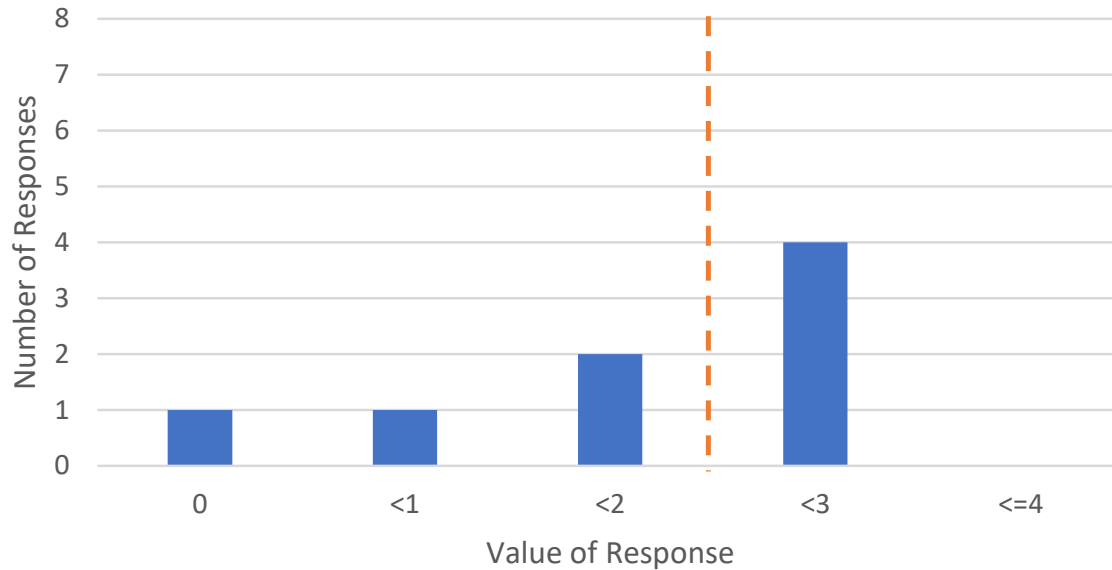
Bar chart — X-axis: Value of Response (0, <1, <2, <3, <=4); Y-axis: Number of Responses (0–8). Bars: 0 = 1, <1 = 1, <2 = 2, <3 = 4. Orange dashed line between <2 and <3.

Financial and Funding Strategies: All [Average =1.3]

Bar chart — X-axis: Value of Response (0, <1, <2, <3, <=4); Y-axis: Number of Responses (0–8). Bars: 0 = 2, <2 = 2, <3 = 4. Orange dashed line between <2 and <3.

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RAM Team & AMIS

Asset Management Teams: All [Average =1.6]

Asset Management Information Systems: All [Average =1.2]

AM Plan

AM Plans: All [Average =1.3]

Service Delivery

Service Delivery Models: All [Average =1.4]

Improvement Plans

Improvement Planning: All [Average =0.9]
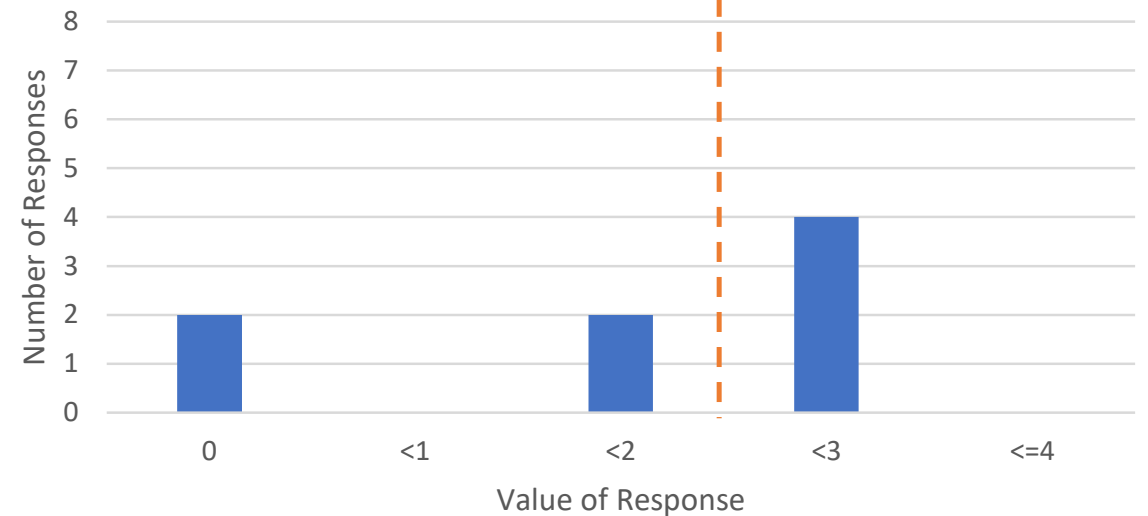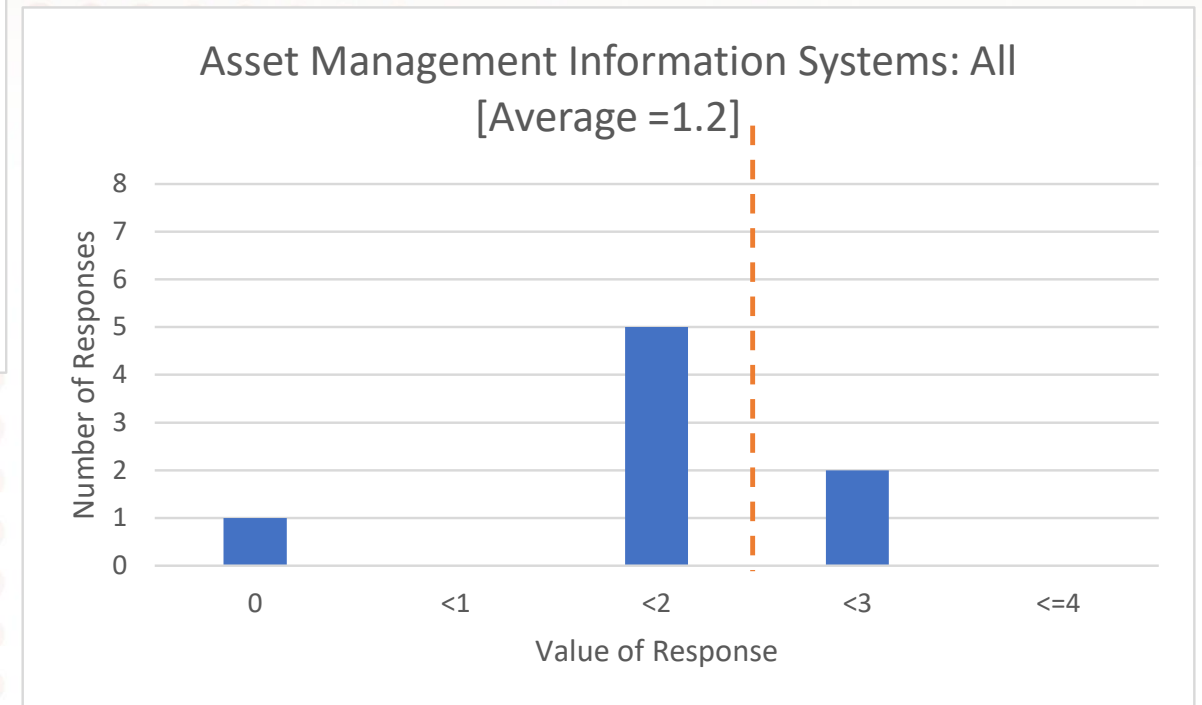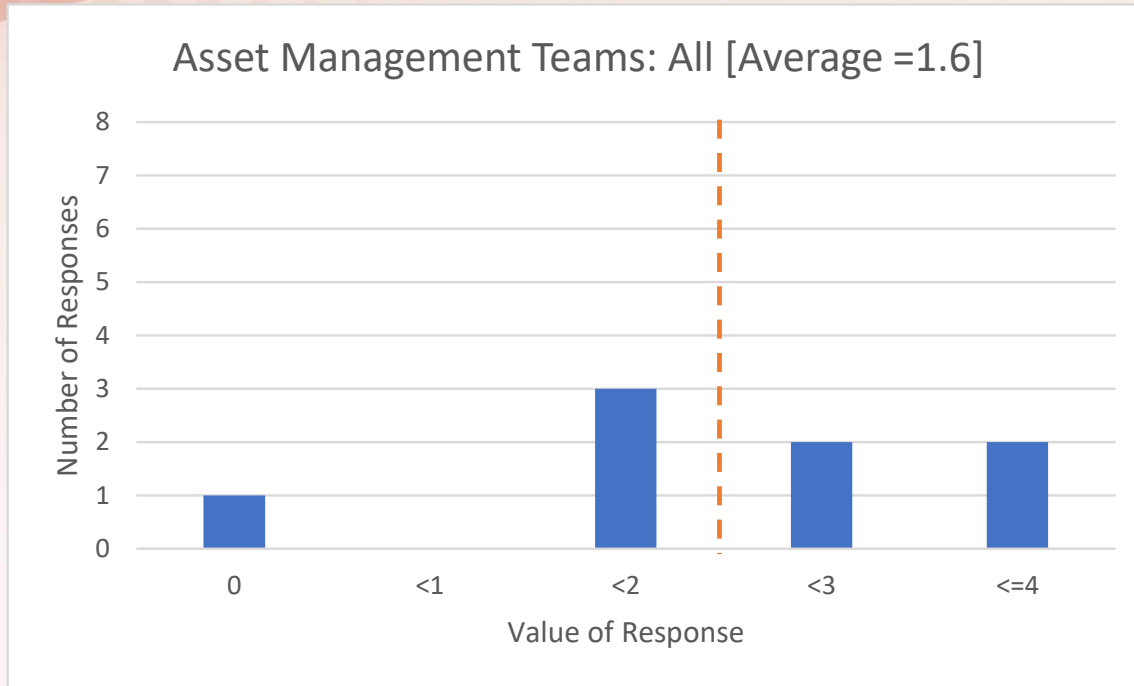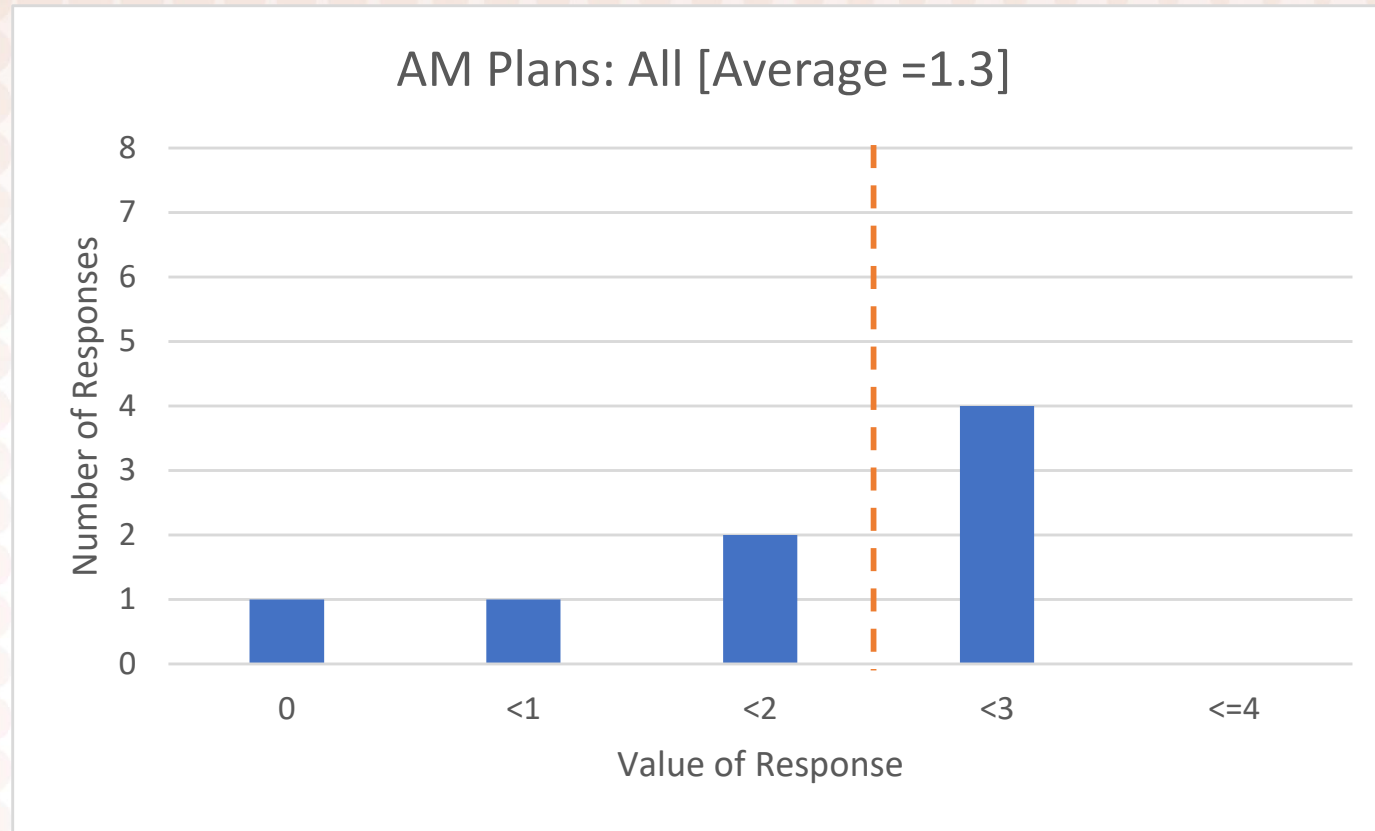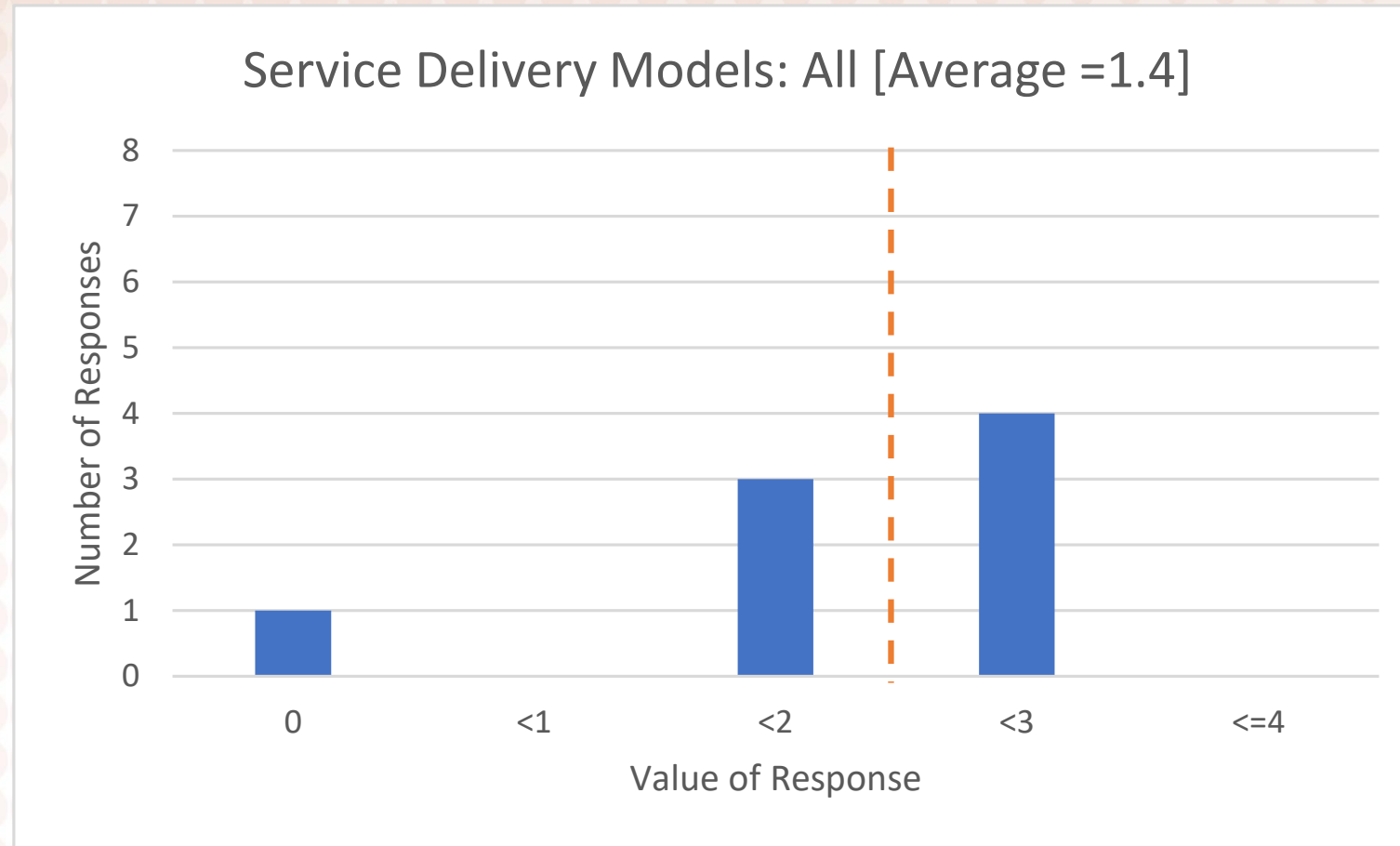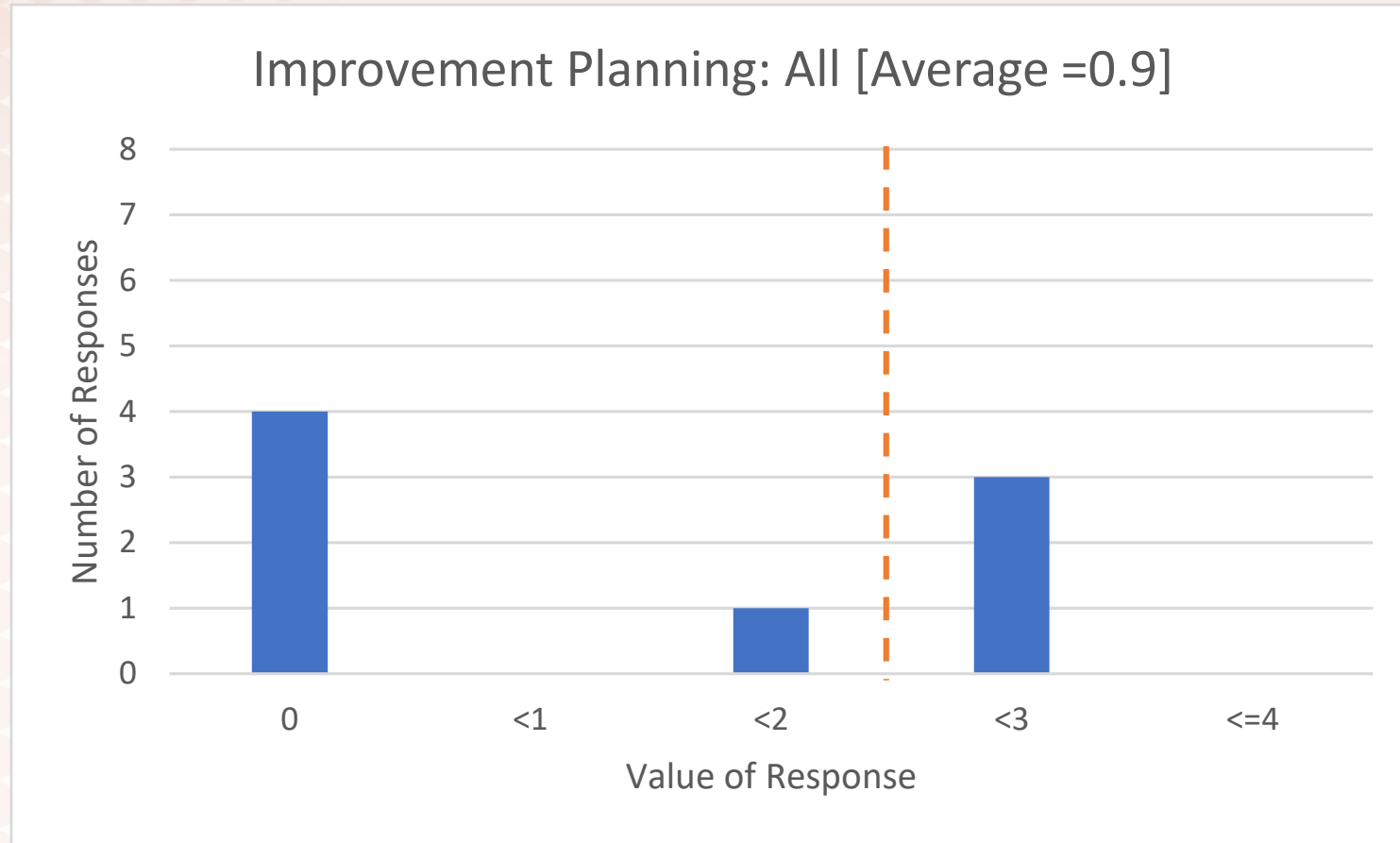
CAREC Wide Improvement Plan

- What are the improvements that apply across many CAREC countries?

- What centralised support initiatives would be of use?

- Priority assigned based on:
  - High = deliver within next 12 months
  - Medium = within 2 years
  - Low = within 5 years

Aspect of RAM	Improvement Action – Support Initiatives Required	Priority
Policy	Develop a RAM policy template	High
Levels of Service	Developing a range of service level indicators and performance measures for all asset types that countries can adopt if desired	Medium
Future Demand	Develop a TOR for the development of a network level traffic monitoring program.	Low
Asset Register	Develop guidance on minimum data to be collected for major asset types.	High
Asset Condition	Develop guidance on recommended data collection for major asset types (what to collect and how often)	High
Risks	Develop guidance on defining route criticality, and a risk management framework	Low
Lifecycle Decision Making	Ensure that investment decisions are aligned with RAM Policy, and appropriately utilize maintenance cost data to generate lifecycle cost forecasts.	Medium
Operations	Assistance in developing emergency response plans.	Low
Maintenance	Business case for increasing maintenance funding.	Medium

Aspect of RAM	Improvement Action	Priority
Capital Works	Support to produce an evidence based 5 year capital investment plan (including renewals, capacity expansion, asset condition and asset valuation).	Medium
Funding Strategies	Align with development of 5 year capital investment plan, to identify funding needs for all aspects of the asset (including RAM, operations, maintenance and capital).	Medium
AM Team	Provide some benchmark indicators for the human resources needed to appropriately manage a road network under various delivery models.	High
AM Plans	Produce an AMP template.	High
AMIS & Tools	Produce ToR for consultant to work with road authority to determine needs and support procurement of an AMIS.	Medium
Service Delivery	Workshops on various contractual models (from force account to PBC).	Medium
Quality Management	Encourage ongoing documenting of processes	Low
Improvement Plan	Country specific support to take findings from the Maturity Assessment and turn into a country level Improvement Plan.	High

SASEC REGIONAL PROJECT

Road Asset Management in SASEC

- SASEC wide project with two parts, completed over 2021-22

- Part 1: Road Asset Management
  - What is the level of Road Asset Management (RAM) capability within each country?, and
  - What needs to be undertaken to ensure each country is delivering a proficient level of RAM?

- Part 2: Infrastructure Investments
  - What level of investment is needed to deliver various outcomes for the paved road network (just the pavement and surfacing, excludes bridges etc.) of:
    - Stopping the network from deteriorating?
    - Eliminating any backlog of roads in poor condition?
    - Eliminating any backlog of roads in poor condition plus bringing the network up to a safety standard of 3-stars or better?
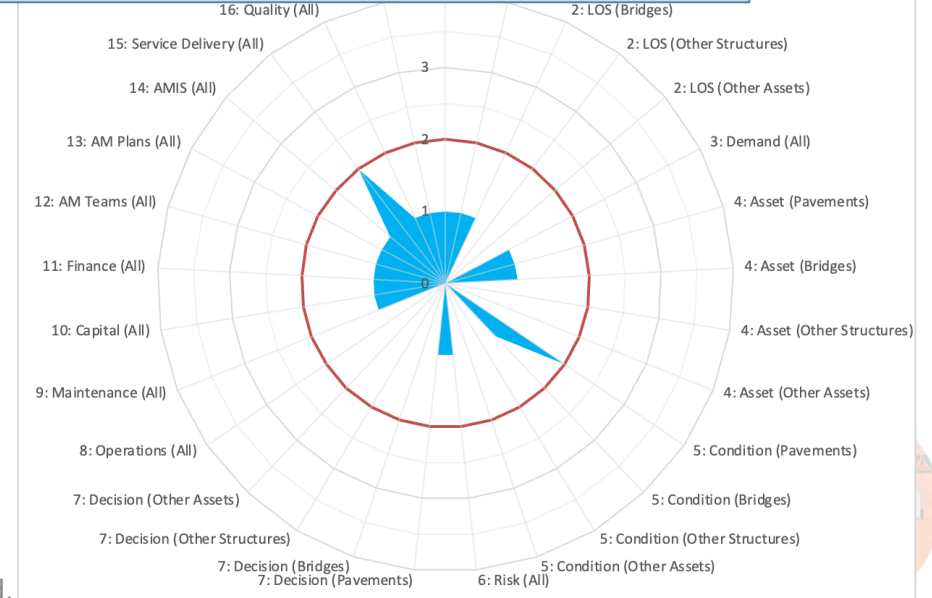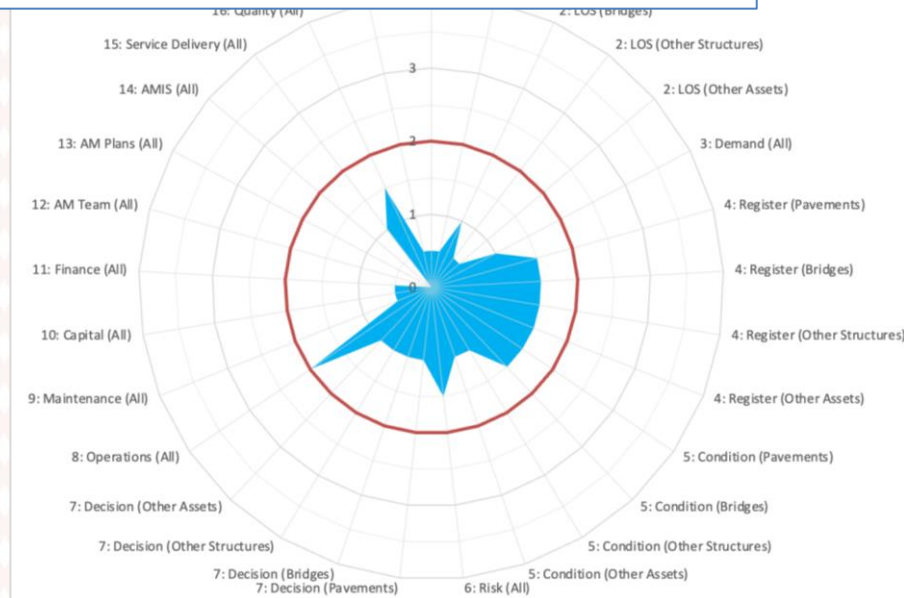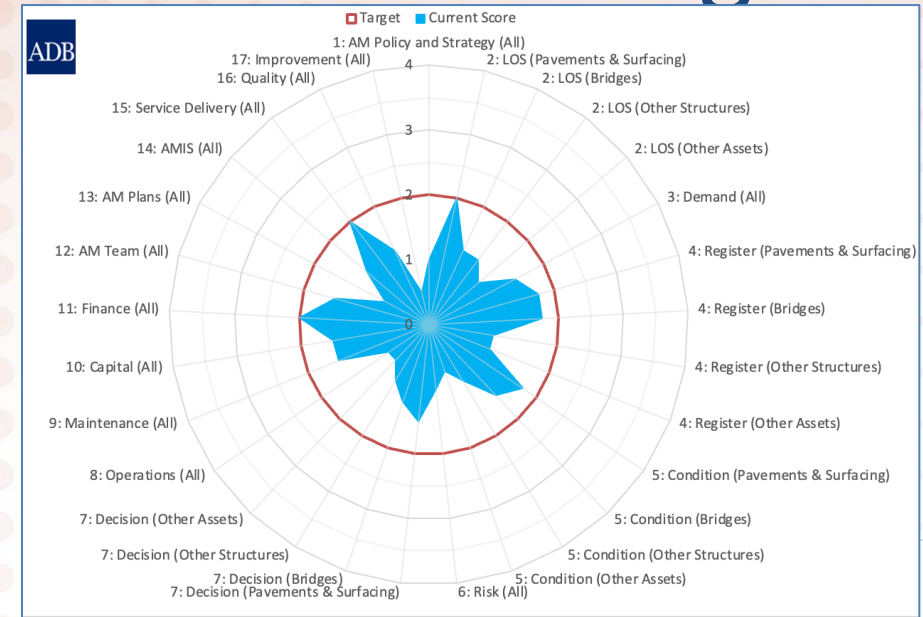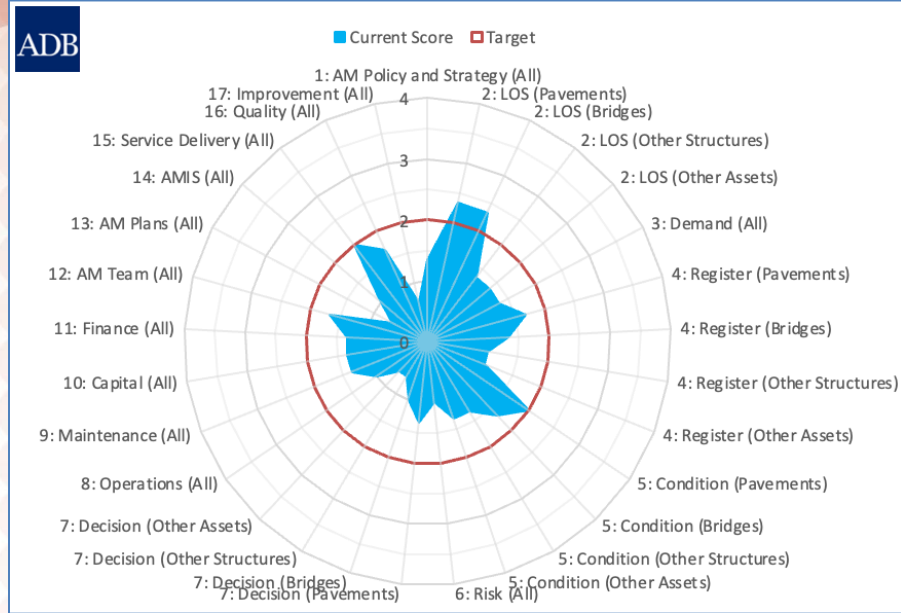
Maturity Assessment

- Self assessment, followed up with in country workshops

Country	Participated in Workshops	Submitted Template	In Country Workshops
Bangladesh	✔	✔	✔
Bhutan	✔	✔	-
India	✔	✔	✔
Maldives	✔	✔	✔
Nepal	✔	✔	✔
Sri Lanka	✔	✔	-

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SASEC Maturity Assessment Findings

Country Specific Improvement Plans

Question	Section	Asset Class	Questions	Current Score	Improvement Action	Priority
1	AM Policy and Strategy	All	Does your organization have a clearly articulated and widely understood commitment to AM that forms its AM Policy and Strategy?	0.5	Determine who is the technical owner of the assets.

Prepare a RAM policy & strategy and have it approved by the Minister. | H |
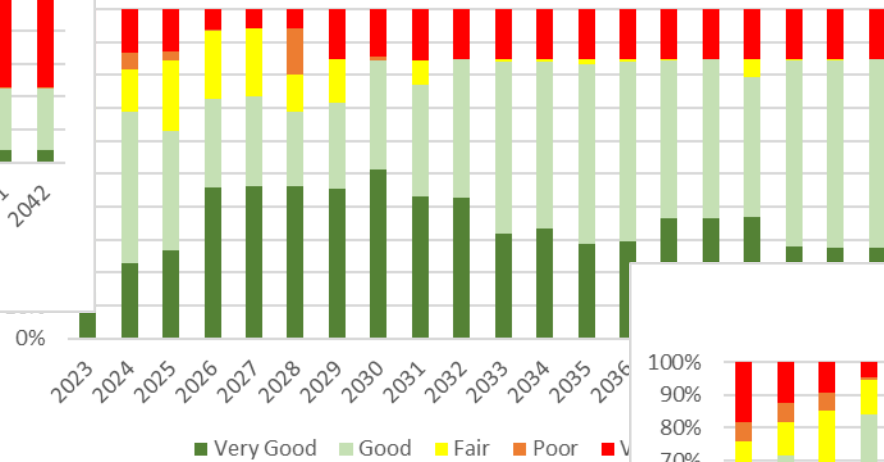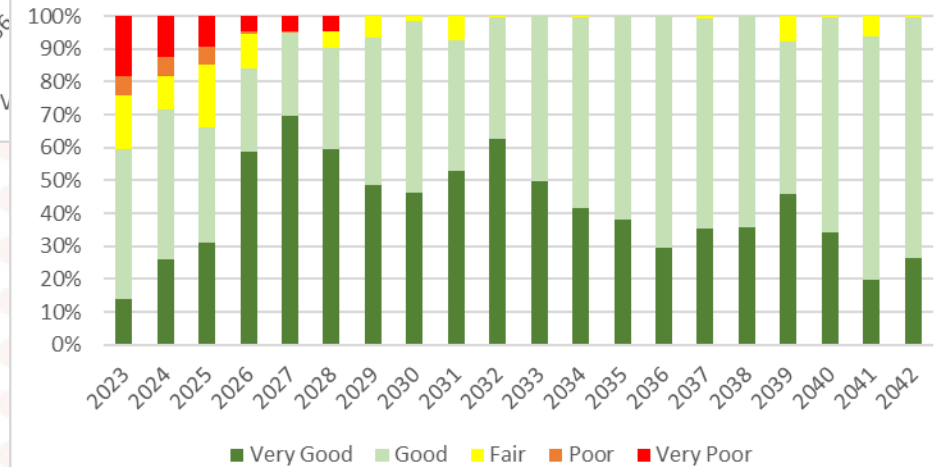| 2 | Levels of Service and Performance Management | Pavements & Surfacing | What type of service levels are in place, and how are targets set and achievements reported? | 0.5 | Develop technical measures based on a combination of visual defects and roughness (likely low cost devices such as those available on smart phones). Report performance against LoS each year by island. | H |
| | | Bridges | What type of service levels are in place, and how are targets set and achievements reported? | 1 | Base measures off the requirements in the current maintenance contract. | L |
| | | Other Structures | What type of service levels are in place, and how are targets set and achievements reported? | 0.5 | Develop for coastal protection (sea walls). | M |

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SASEC: Part 2 of Project

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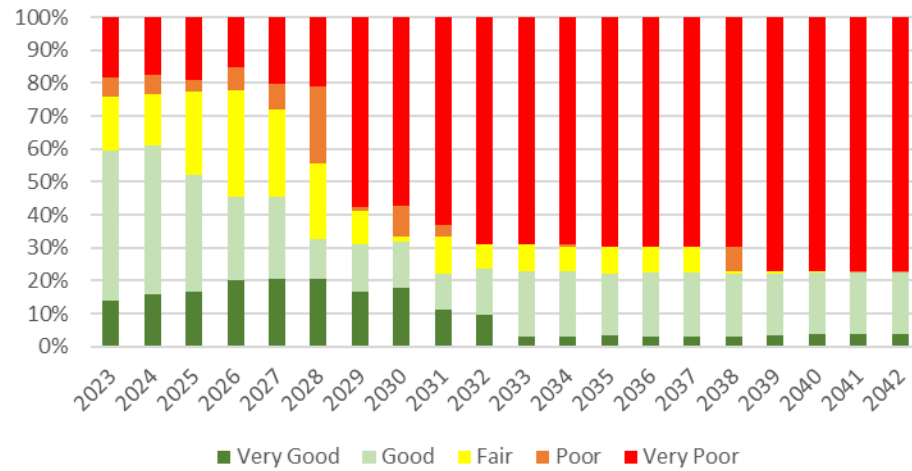
Workplan and Economic Indicators

Work Type	Annual (m2/Year)		Total 5 Year Quantity (m2)	
	Year 1 - 5	Year 6 - 10	Year 1 - 5	Year 6 - 10
Slurry Seal	1,316,091	1,364,838	6,580,457	6,824,190
Reseal (DBST)	68	547,184	340	2,735,920
Mill & Replace (30mm)	339,980	72,545	1,699,901	
Overlay (50mm)	115,782	80,622	578,910	
Overlay (80mm)	90,771	19,271	453,853	
Pavement Reconstruction (Asphalt)	0	0	0	
Total	1,862,692	2,084,460	9,313,461	

Table 75: Work Value (US$) by Treatment Type -Steady State

Work Type	Annual (US$/Year)		Total 5 Year Quar	
	Year 1 - 5	Year 6 - 10	Year 1 - 5	
Slurry Seal	3,445,796	2,750,812	17,228,980	
Reseal (DBST)	98,633	2,813,953	493,166	
Mill & Replace (30mm)	21,344,462	26,309,076	106,722,309	
Overlay (50mm)	2,150,936	10,920,134	10,754,680	54,600,672
Overlay (80mm)	8,409,204	4,509,424	42,046,022	22,547,119
Pavement Reconstruction (Asphalt)	17,231,374	0	86,156,868	0
Total	52,680,405	47,303,399	263,402,025	236,516,994

Scenario	Average IRI[1] (m/km)	Asset Value[2]	CO2 Emissions[3]	Total RAC[4]	Total RUC[5]	Total Transport Costs	NPV[6]	Incr. BCR[7]
	Paved	US$ Million	Million tonnes	US$ Million	US$ Million	US$ Million	US$ Million	
BAU	7.6	2,221.3	111.71	250.5	27,230.4	27,481.0	0	Base case
Steady State	4.4	4,644.2	110.95	1,000.2	24,396.9	25,397.1	2,083.8	3.1
Eliminate Backlog	3.4	4,962.5	109.52	1,394.8	22,825.0	24,219.8	3,261.1	3.3
Eliminate Backlog + Safety	3.4	4,962.5	109.52	1,664.8	14,899.7	16,564.5	10,916.5	7.6

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SASEC Conclusions

i.   A lack of a RAM Policy and Strategy documents to provide the overarching framework for RAM and to provide strong leadership for all RAM actions.

ii. A need to move RAM beyond the pavement, and into the full range of assets – in particular bridges, and major structures (retaining walls etc.) that play key roles in basic accessibility should be included in RAM coverage immediately.

iii. A lack of customer-based service levels, with the focus currently being on the average roughness of the network.

iv. A lack of a long term (10 year or longer) funding needs assessment and associated linkage with funding sources.

v.   A lack of asset valuation practices and associated with this absence, the roads are not recognized as financial assets.

vi. RAM is not seen as a whole-of-agency business process, but rather is the responsibility of a small team.

vii. A lack of an asset management plan (AMP) that brings all of the RAM practices together, sets out the improvement plan, and provides a comprehensive overview of the assets.

viii. A lack of a formal RAM improvement plan, with many improvements being driven by multilateral development banks (MDBs) (such as the ADB) rather than led by the road agency.

SASEC Recommendations

Recommendation 1: Asset Management Policy and Strategy

An asset management policy and strategy should be developed, endorsed by senior official(s) and published. This should align with National transport policies and promote safe, resilient, green, and inclusive road infrastructure and mobility for all road users.

**Recommendation 2: Level of Service and Performance Management**

a. Develop level of service for the management of National Road networks. They should relate to outcomes and include key aspect of road asset performance and operations such as safety, resilience, serviceability, climate mitigation, inclusivity, and decarbonization of road transport.

b. Develop a full performance management framework related to the level of service framework, and report on this also.

Recommendation 3: Funding Needs Assessment

a. Lifecycle planning principles should be used to assess long term funding needs for the road network and make the case for appropriate and sustainable long-term (at least 5 years) investment.

b. Aligned with the development of the funding need assessment, the source of those funds should be identified and clearly tagged to the maintenance and renewal of the existing road network.

Recommendation 4: Asset Valuation

a. Undertake an asset valuation (replacement cost basis) of the full road assets. Update annually and ensure that funding is at least equal to the annual depreciation estimate

b. Ideally include the value of the asset onto the balance sheet of the road authority (alongside existing assets such as cars, office buildings, office furniture etc.) to further demonstrate the need to invest in the maintenance and renewal of the existing assets.
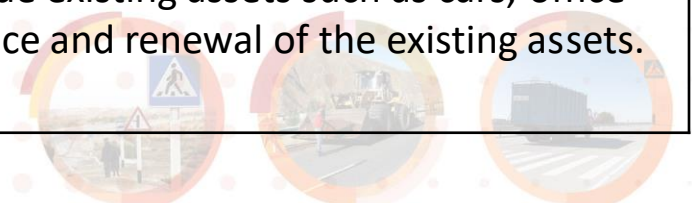
SUMMARY

Summary

- ADB/CAREC Institute has now undertaken consistent maturity assessments across the CAREC and SASEC regions.

- Many examples of good practice going on, but equally a long way to go until a fully proficient implementation of RAM is occurring across the region.

- Important to take the findings from self-assessments and validate these to get consistent results.

- Improvement plans flow from the maturity assessment, but then need to be actioned.

Thank You

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