

Embedding climate risk in road infrastructure planning and project ESMS



CLAUDIA PALOMA SALAS ESPARZA

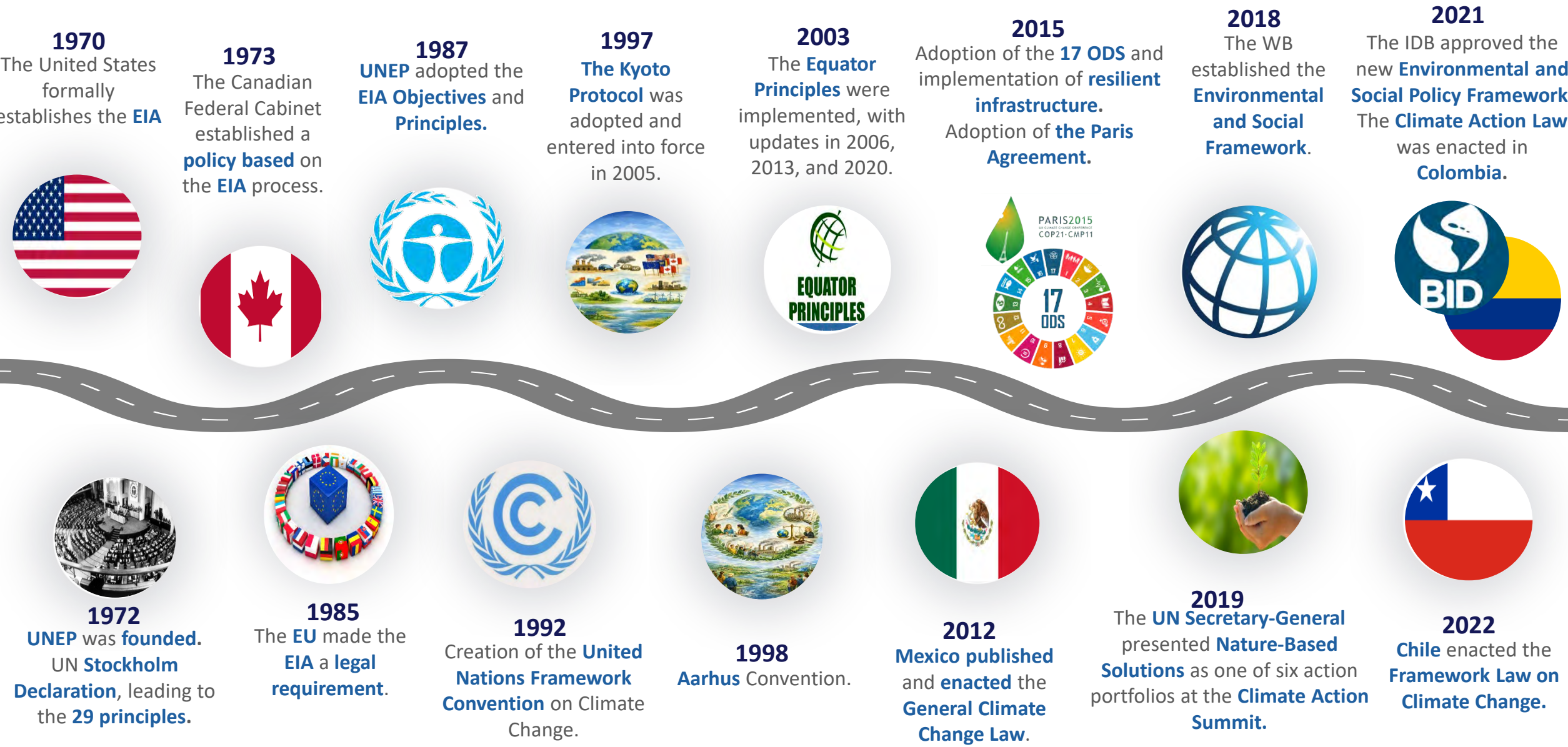
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THE EVOLUTION OF ENVIRONMENTAL AND SOCIAL ASSESSMENTS AROUND THE WORLD



ROAD SECTOR GUIDELINES FOR CLIMATE RESILIENCE

International guidance

International **guidance** on **climate resilient** infrastructure already **exists**, **but** most references **focus** on specific **parts** of the **problem**: climate proofing, infrastructure governance or road adaptation. The remaining **gap** is **how** to **connect** these inputs into coordinated *decisions* on assets, operation, maintenance, investment and social risk. and how to **communicate** these decisions in a clear, credible and actionable way in contexts where **misinformation** can **weaken** public **trust** and institutional **response**.

Technical guidance on climate proofing infrastructure for the period 2021–2027

Integrates climate mitigation and adaptation into infrastructure investments.

European Commission



2021

OECD Infrastructure for a Climate Resilient Future

Frames resilience across planning, financing, governance and implementation.



2024

2023



PIARC Climate Change Adaptation Framework

Guides climate resilience for road assets, operations and services.

2025



GCA Climate Resilient Infrastructure Handbook

Practical guidance for integrating climate resilience across planning, design, financing, construction and operation.

ROAD NETWORKS AROUND THE WORLD

12.84 million km in the Americas and Europe



Canada

1.04 million km

In 2020, Canada had more than 1 million km of highways and roads.



Latin America

3.60 million km

CAF (2023) reports that Latin America has a road network of 3.60 million km.



United States

6.7 million km

As of 2023, the United States has more than 6.7 million km of urban and rural roads.



European Union

1.5 million km

By 2023, the European Union's main road network had grown to more than 1.5 million kilometers

Climate change threatens the long-term survival of roads by imposing extreme conditions for which they were not originally designed.

According to the NIH, with a warming of approximately 2° by mid-century (RCP 8.5 scenario), 43.6% of global transportation assets are expected to experience at least a 25% decrease in their design return period. This means that a rainfall event statistically expected once every 100 years will now occur every 75 years, representing a 33% increase in probability.

CHALLENGES OF A MATURE HIGHWAY NETWORK

Currently, **highway projects** are defined and evaluated during the **planning stage**, thereby **closing** the **door** to potential **long-term changes** in environmental and social issues.



Traffic volume

Increasing traffic volumes leading to capacity and service level issues.

Urban growth

Urban sprawl as cities expand into new areas along highways, leading to various problems.



Impact of climate change

Analysis by region service disruptions due to drainage failures, landslides caused by extreme rainfall, and/or traffic accidents resulting from external weather conditions.



Obsolescence

Obsolescence of technologies for security and toll control, with a need for modernization.



Service life

The service life of road infrastructure is already nearing its end.



Limited implementation

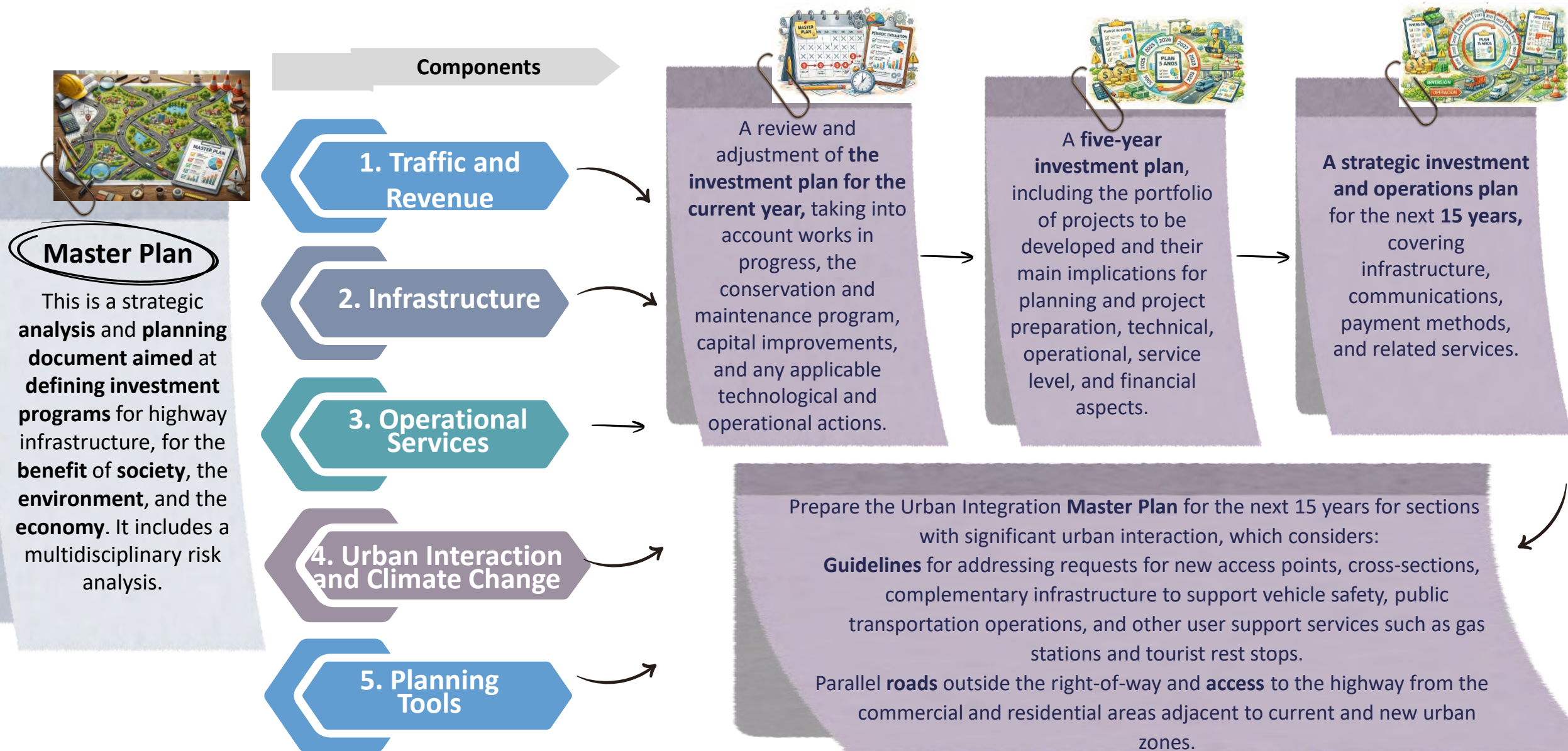
Road infrastructure still has limited implementation of nature-based solutions in the face of growing risks from climate change.



Heterogeneity

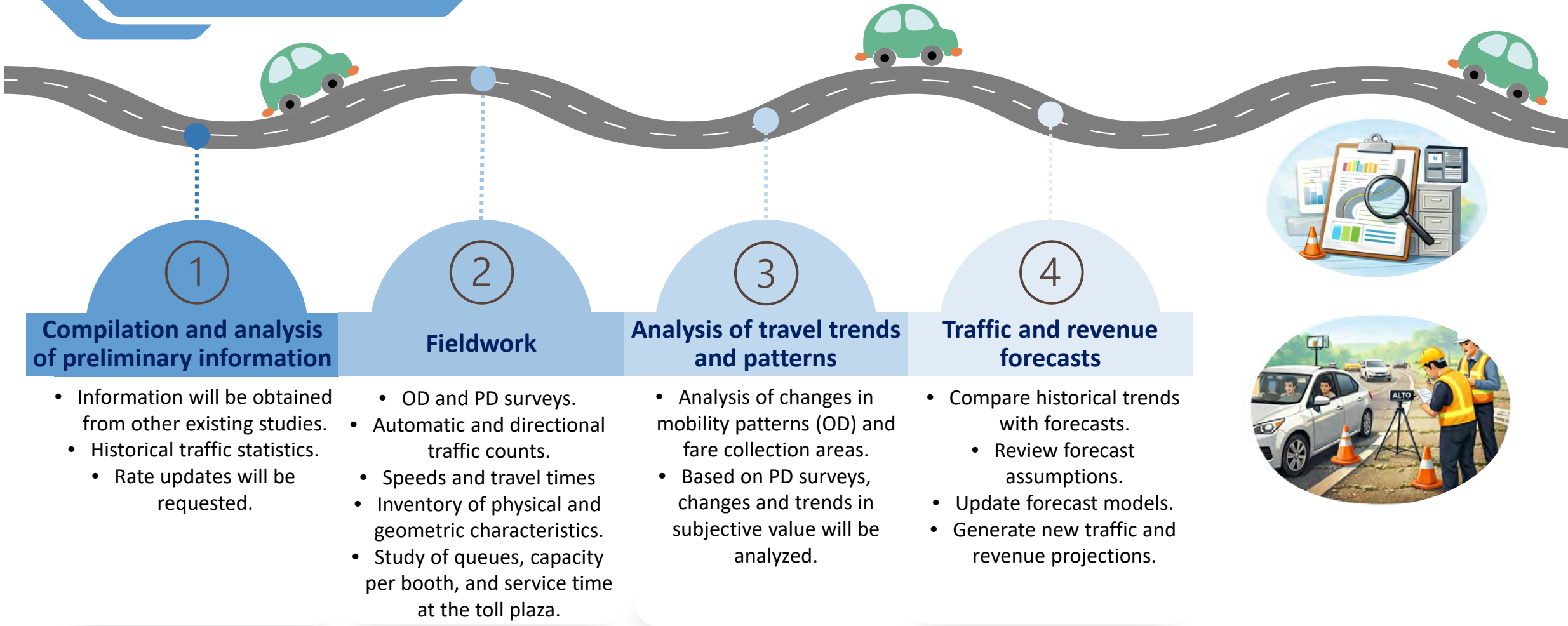
Heterogeneity of road network conditions, as well as significant gaps in comprehensive road safety planning and management

PROPOSAL FOR THE IMPLEMENTATION OF A HIGHWAY MASTER PLAN



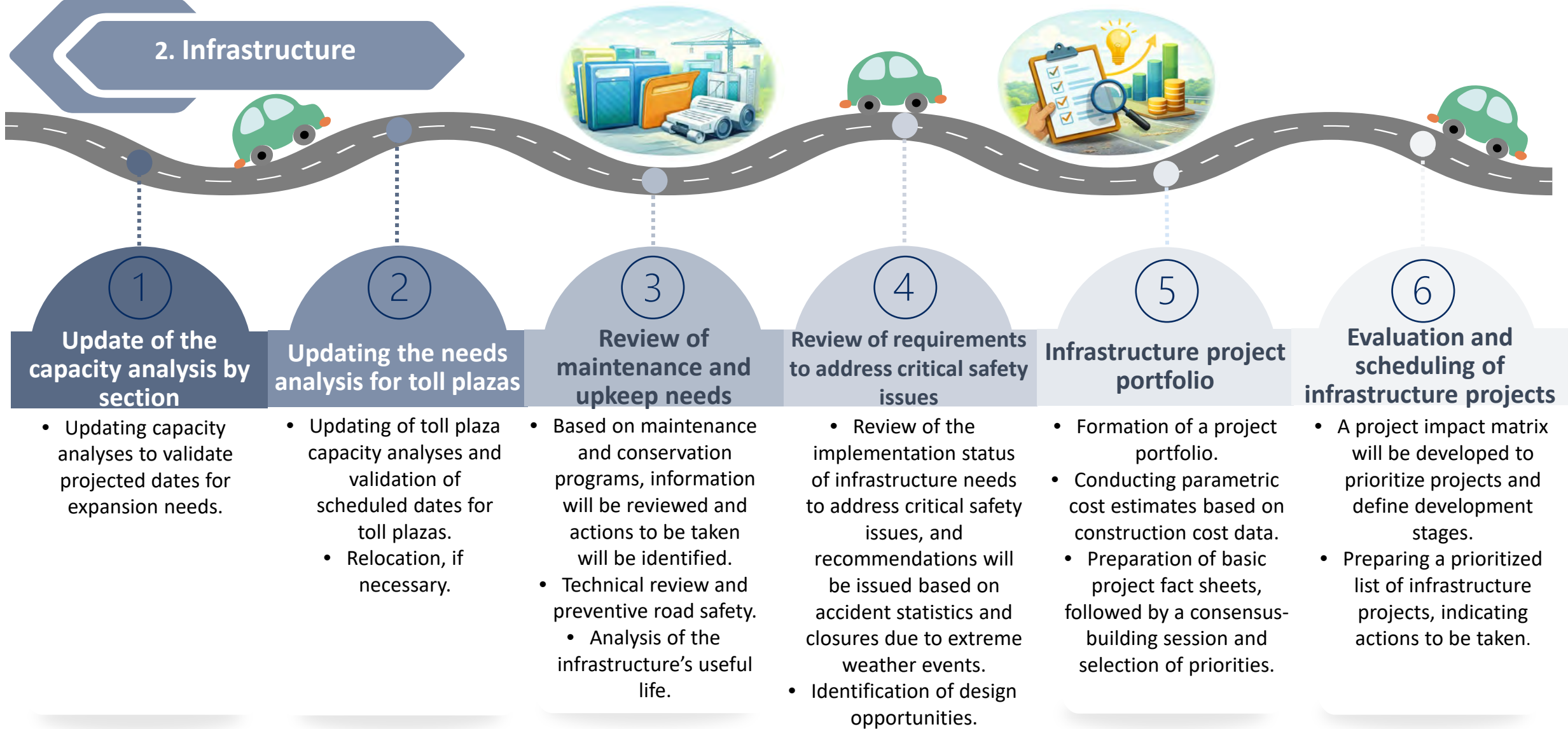
PROPOSAL FOR THE IMPLEMENTATION OF A HIGHWAY MASTER PLAN

1. Traffic and Revenue

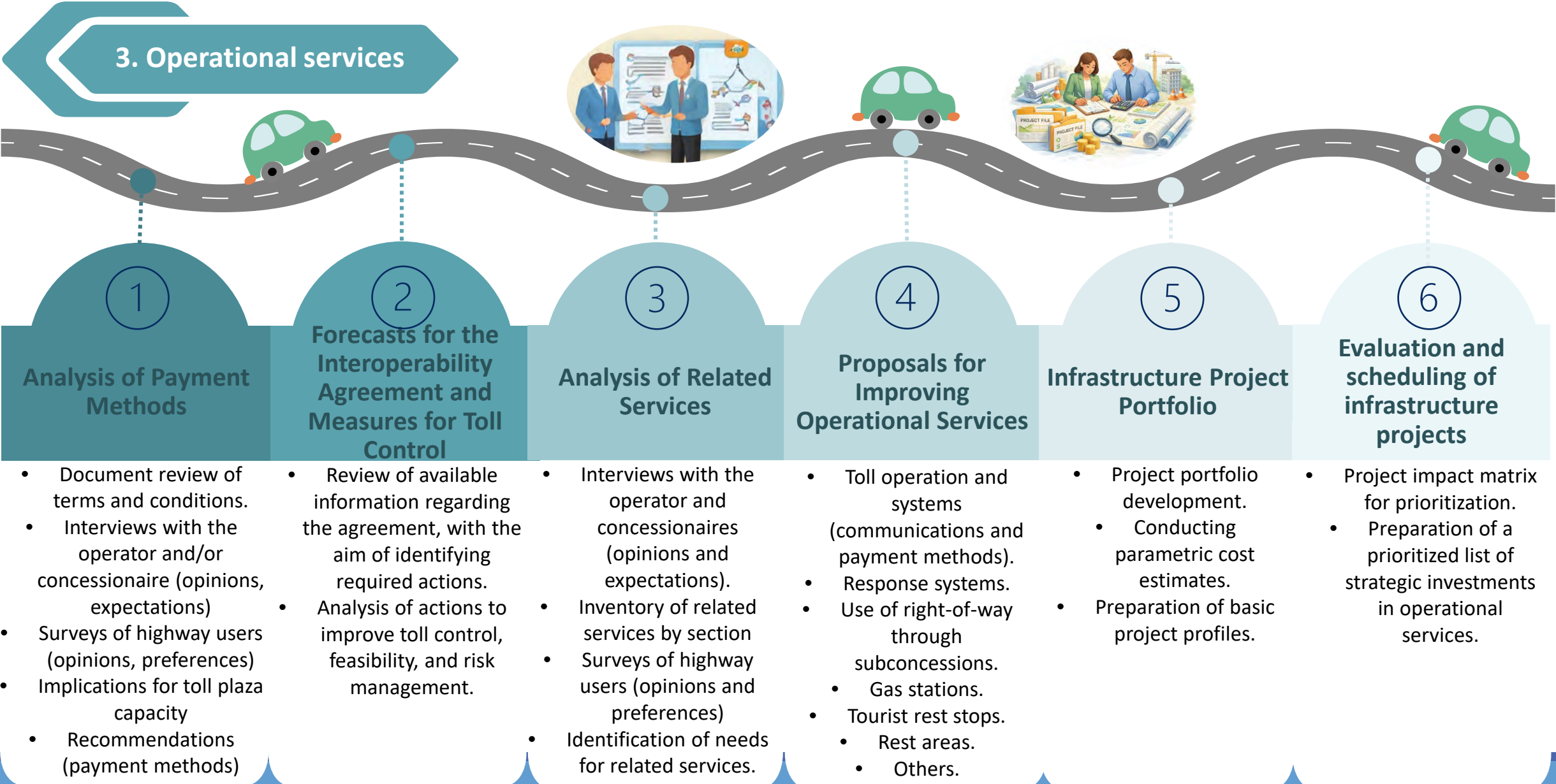


PROPOSAL FOR THE IMPLEMENTATION OF A HIGHWAY MASTER PLAN

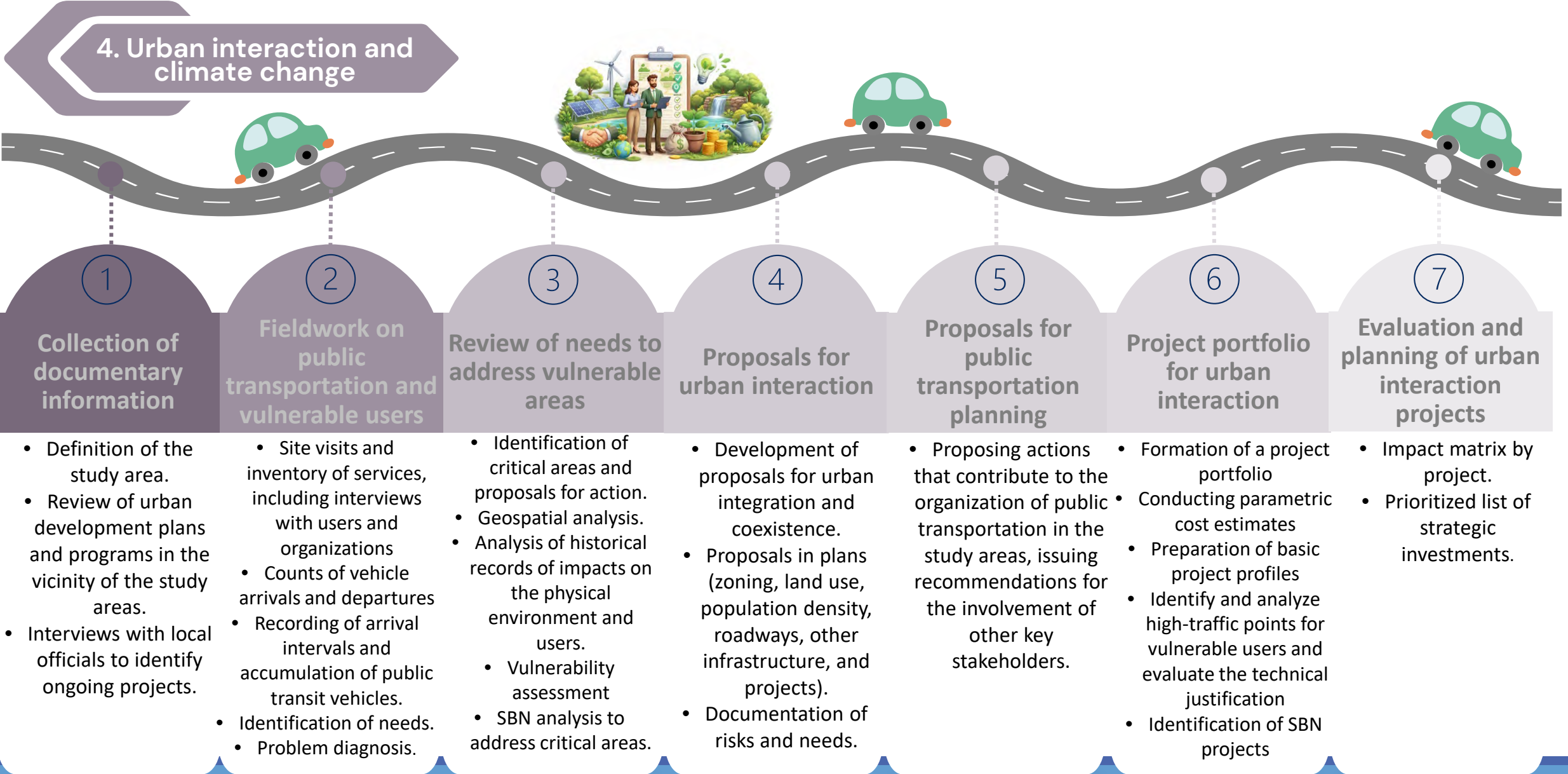
2. Infrastructure



PROPOSAL FOR THE IMPLEMENTATION OF A HIGHWAY MASTER PLAN



PROPOSAL FOR THE IMPLEMENTATION OF A HIGHWAY MASTER PLAN



CONCLUSION

Mature road networks face cumulative pressures that amplify their vulnerability to **climate change**. **Integrating climate risk** into **planning, operations, and the management system enables a shift** from scattered technical data **to prioritized, communicable, and adaptive decisions**, thereby strengthening the resilience of assets, ensuring service continuity (revenue), and promoting transparency in decision-making (while avoiding social conflicts).

While **road networks** currently face a combination of **critical factors**, the increase in traffic volume and urban growth have led to a failure to keep pace with current demands. This **gap** is **exacerbated** by **inconsistencies in management**, preventing a uniform response to climate change and **leaving the road network vulnerable** and its **service life compromised**.

CONCLUSION

Over the **past few decades**, a clear **transition** has been observed in **actions** to **combat climate change**: from the implementation of **Environmental Impact Assessments** in the 1970s to the current adoption of **Nature-Based Solutions (NbS)**.

This **evolution** demonstrates that the success of **any project** today **depends** on its **alignment** with **international frameworks** (such as the **ODS** and **the IFC's ND**). Current regulations no longer seek merely to “mitigate” damage, but to integrate infrastructure that harmonizes with the ecosystem, ensuring that roads are not just transportation routes, but assets capable of withstanding and adapting to environmental and social challenges.

To address this issue, it is essential to transition toward a **Master Plan** model. This involves developing **5- and 15-year strategies** that **address investment** and **operations, integrating Nature-Based Solutions** to tackle the **new environmental** and **social challenges** affecting society.



Let's continue the conversation!

Message me your questions or comments in the IAIA26 app.

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