Road Asset Management (RAM)
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Session: Asset Management Information Systems and Decision Tools

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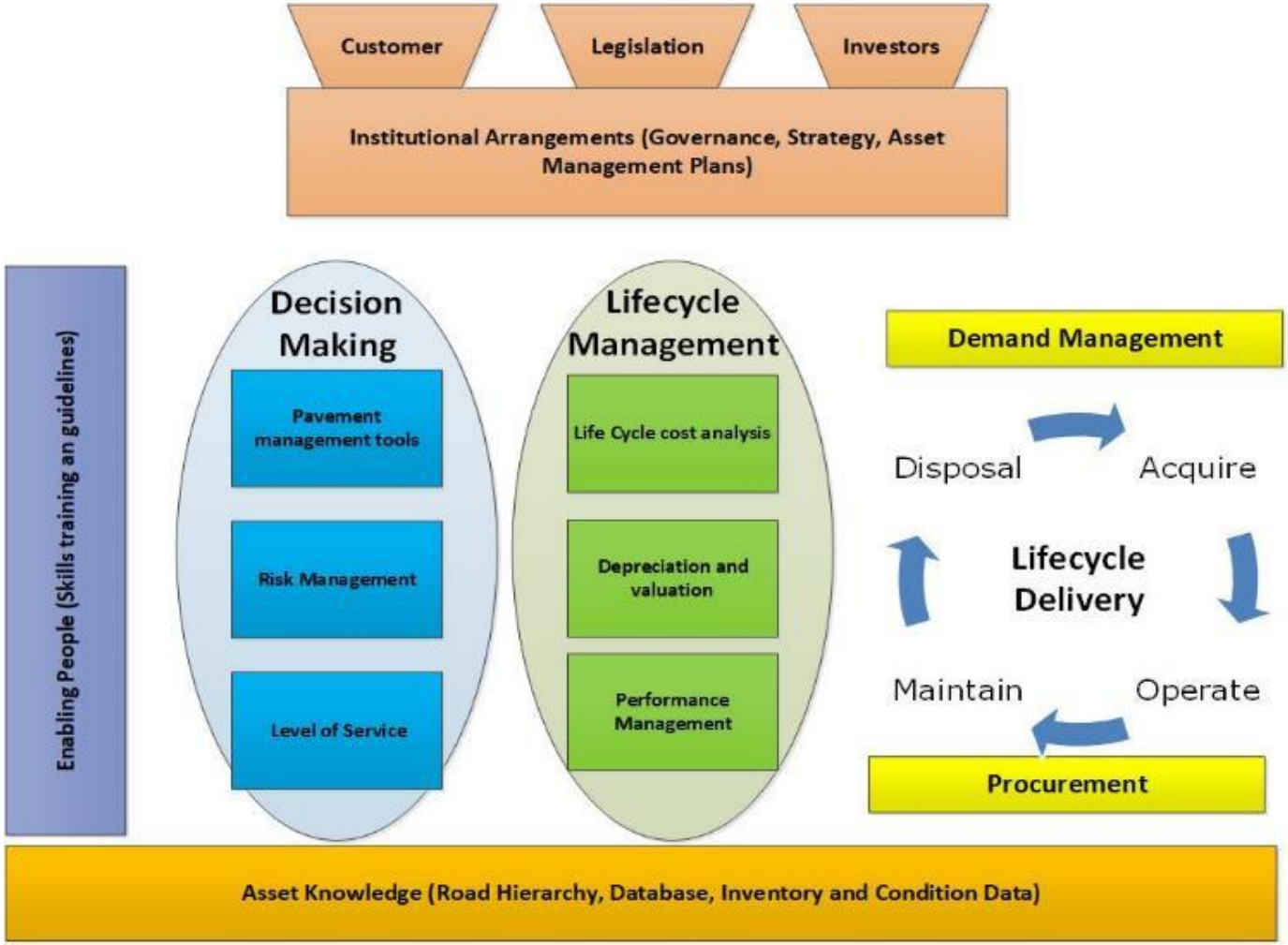
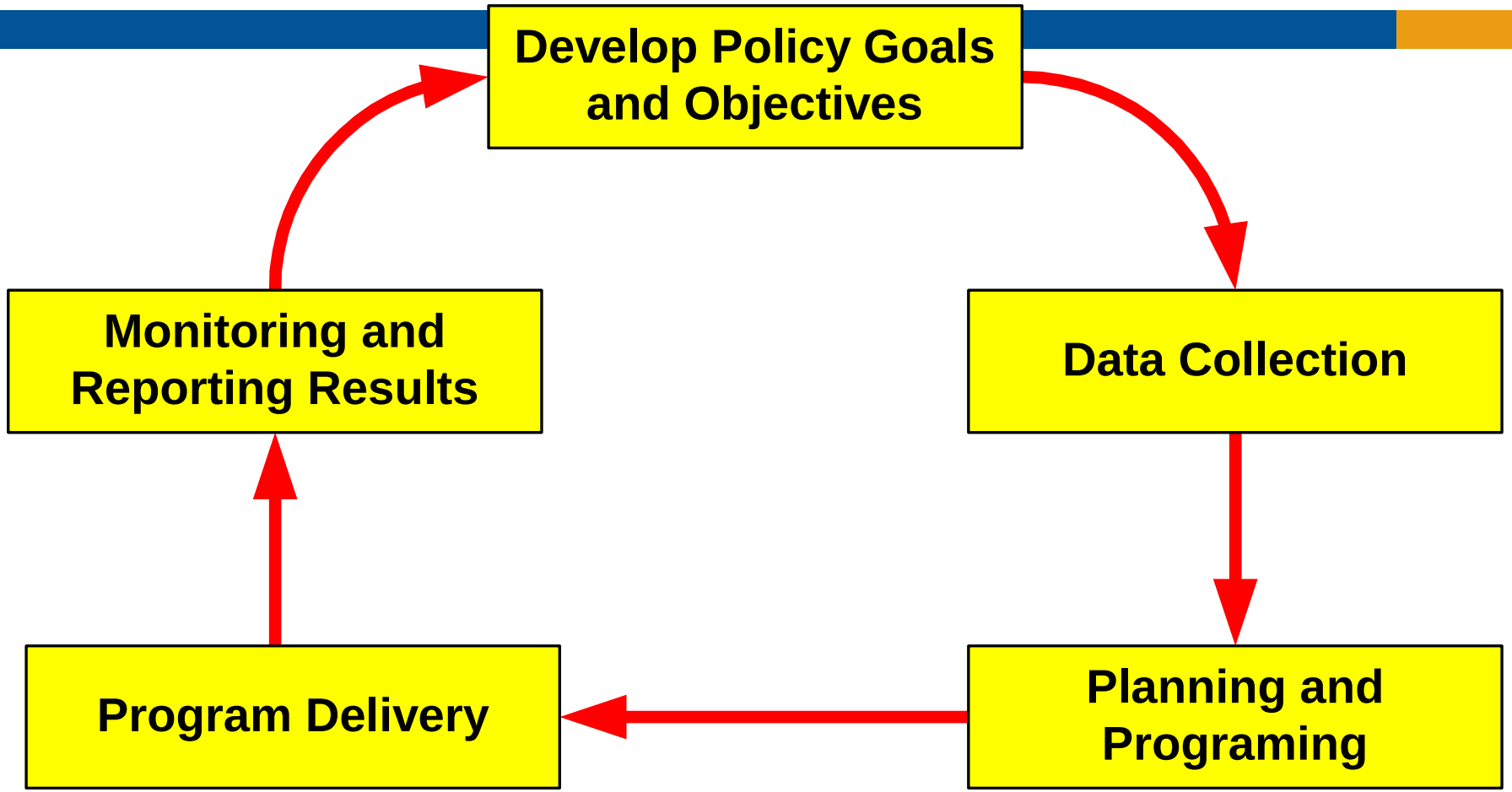
Life-cycle Management : Getting the most from our Investment



Road Management System Functions

- Major activities include:
  - Needs Assessment;
  - Strategic Planning, including budgeting for new development and asset preservation
  - Development, under budget constraints, of multi-year works expenditure programs
  - Data collection

Asset Management Cycle

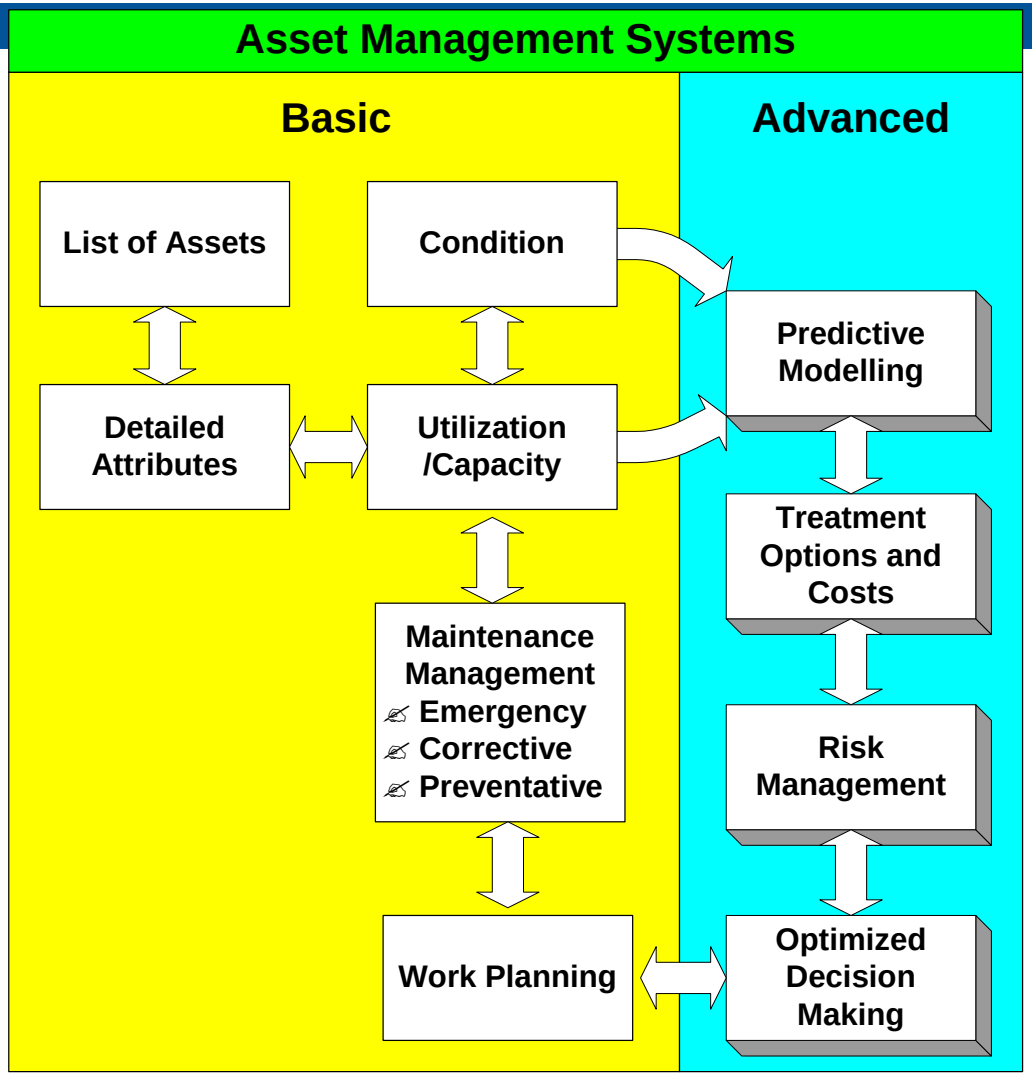


Asset management is a process to strategically manage a transportation system in a cost-effective and efficient manner

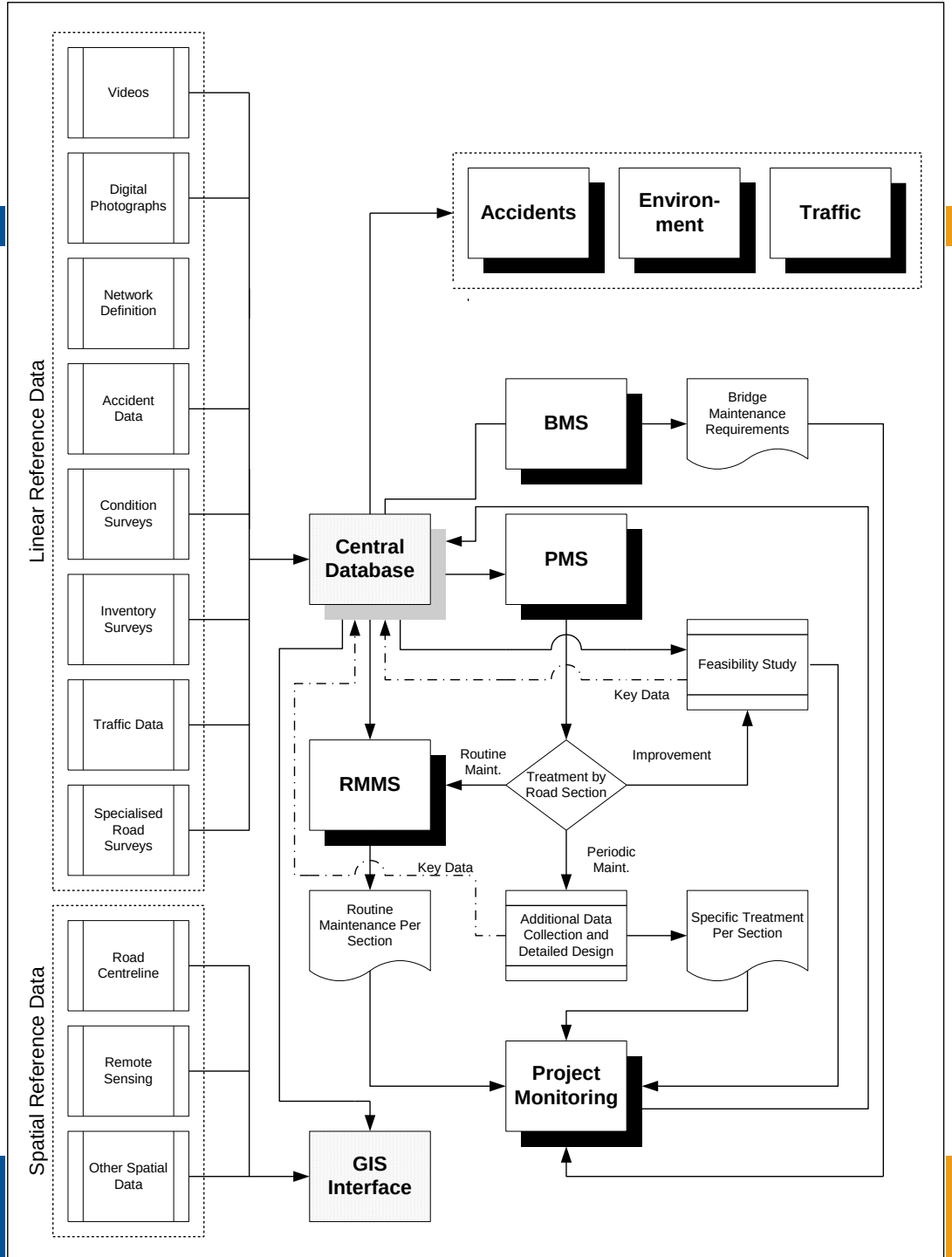
Information Management

- Series of distributed databases
  - Managed and operated by the organizational units most interested in the use of the data,
- Connected through the communication system to be accessible throughout the organization

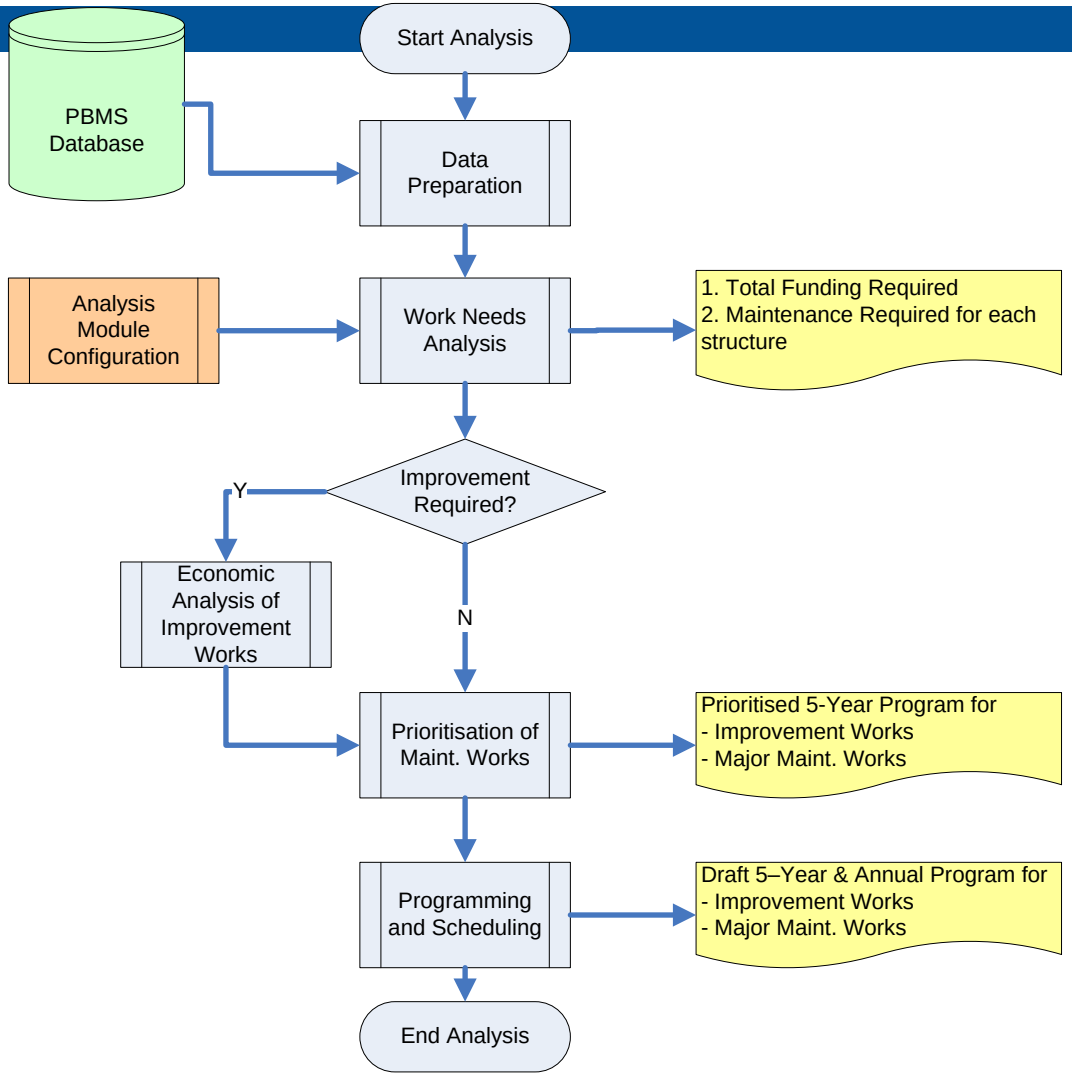
Basic and Advanced Systems



Road Management System Framework



Analysis and Business Process



Grouping of management systems by generation[1]

Table 7.1 *Grouping of management systems by generation*

	First generation	*Second generation*	*Third generation*
Sectioning	Constant length sections, or fixed length sections based on data collection intervals	Pre-defined, variable treatment lengths based on physical pavement characteristics and traffic	Variable treatment lengths obtained by combining defect lengths after the analysis for efficiency of undertaking works ('dynamic sectioning')
Intervention levels	Intervention levels based on present pavement condition plus traffic	Intervention levels consider prediction of pavement condition	Intervention levels based on life cycle prediction of both deterioration and impact on road users
Treatment options	One standard treatment prescription per section	Comparison of do something and do minimum treatment options for each section	Consideration of multiple treatment options per section
Basis of economic analysis	Present cost of treatments	Present and future costs of treatments and benefits to road administration ('commercial' models)	Life cycle approach to costing and inclusion of benefits to road users ('user' models)
Method of prioritisation	Ranking based on function of present costs, condition and road hierarchy	Ranking based on cost-effectiveness, with consideration of treatment life, and analysis of deferment options	Formal optimisation of multiple treatment options per section over a multi-year period

1. Robinson et al., 1998

First Generation Prioritization Methods

- Considers current condition only
- Relies on engineering practice
- No forward vision
- Still used in many countries, however, current trends are moving towards predictive modelling

- Examples include defectiveness indices, degree of defectiveness and treatment based methods.

Optimisation

- Leonid Kantorovich
  - At 22 became a professor
  - 1939, developed linear programming
  - 1975 Nobel Prize

- “an act, process, or methodology of making something (as a design, system, or decision) as fully perfect, functional, or effective as possible; specifically that maximize productivity or minimize waste” (Merriam-Webster)

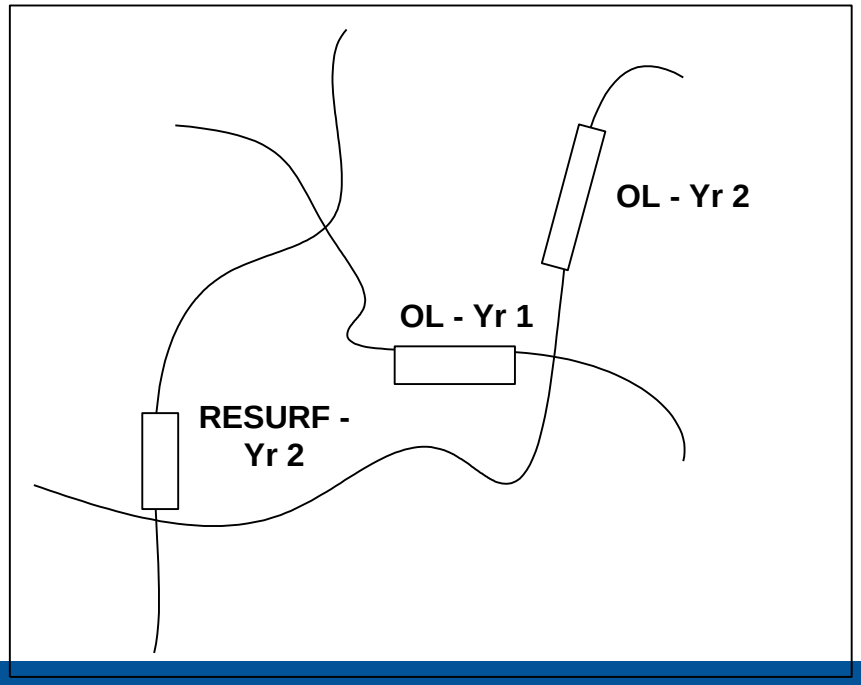
What is Optimisation?

- Optimisation consists of three elements:
  - Objective function – the desired outcome of the analyses; and,
  - Feasible Options (Treatment Scenarios)
  - Constraints – that need to be satisfied eg. available budget, Level of Service, risk, etc.

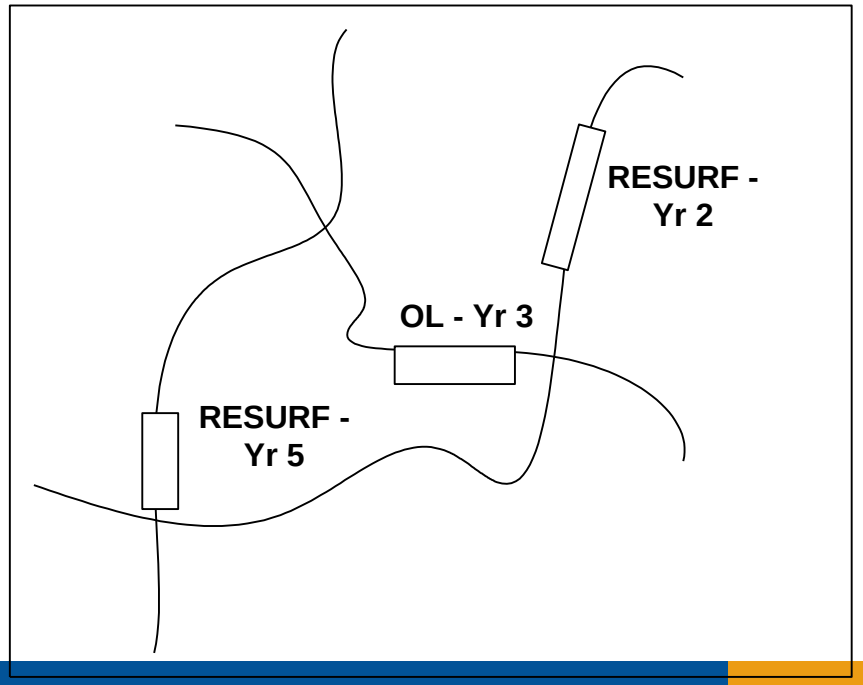
Optimisation Tells Us

- What treatments will be applied, when and where, if funds are less than ideal?

Ideal Funds



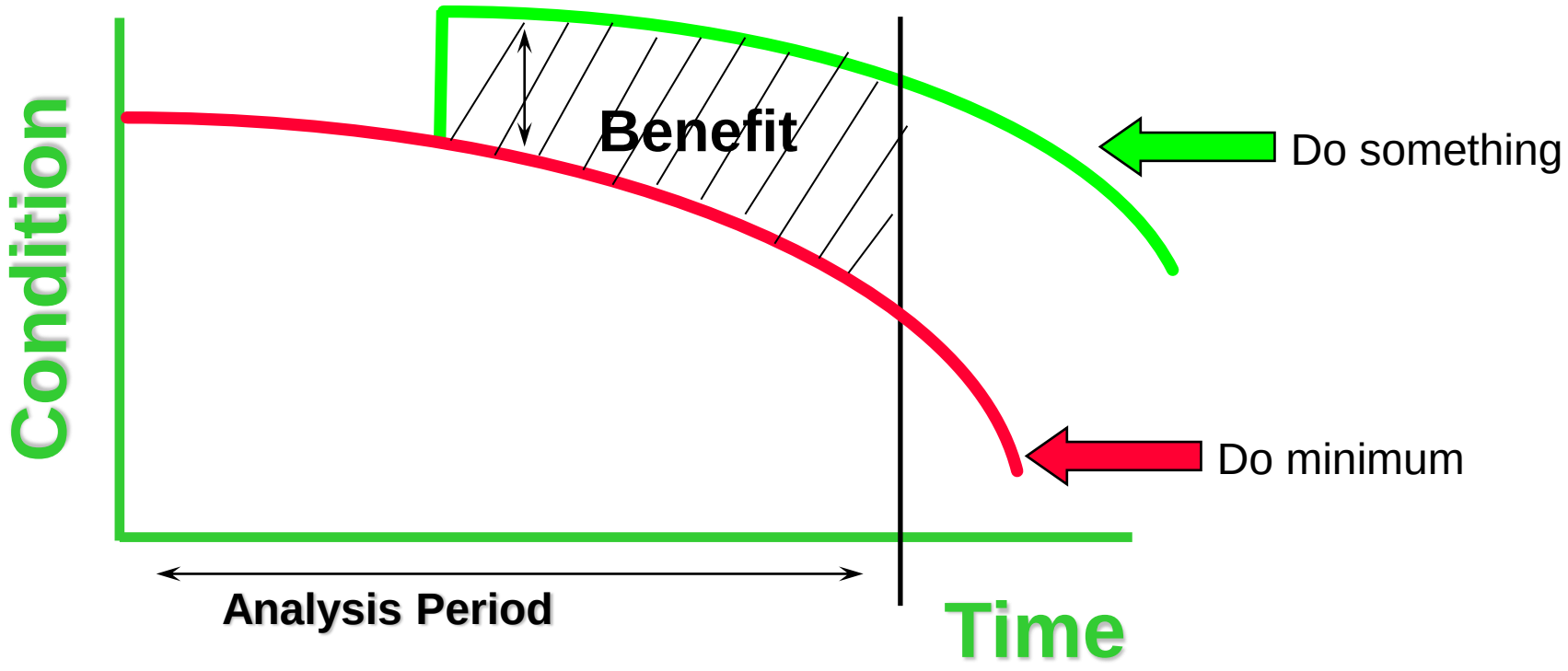
Less Than Ideal Funds



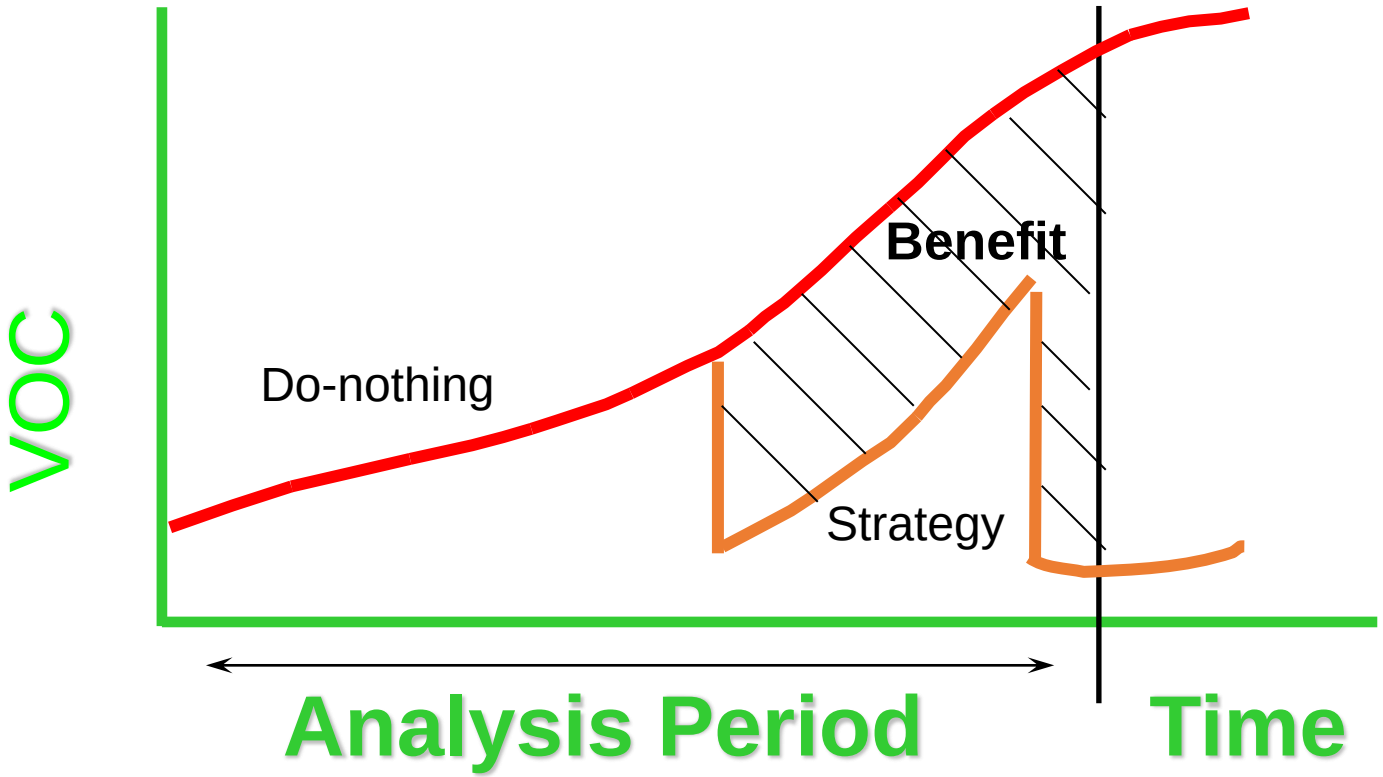
Objective Function

- The Objective Function is exactly what it says it is: *"What do I want to achieve on my network"*
- Examples:
  - Maximise Condition (Area under the curve)
  - Minimise Vehicle operation costs over time
  - Maximise the road user benefits
  - Minimise the agency cost
  - Minimise Total Transport Costs/maximise NPV
- Maximisation of NPV under budget constraint is the most widely used and will be used here for further discussion.

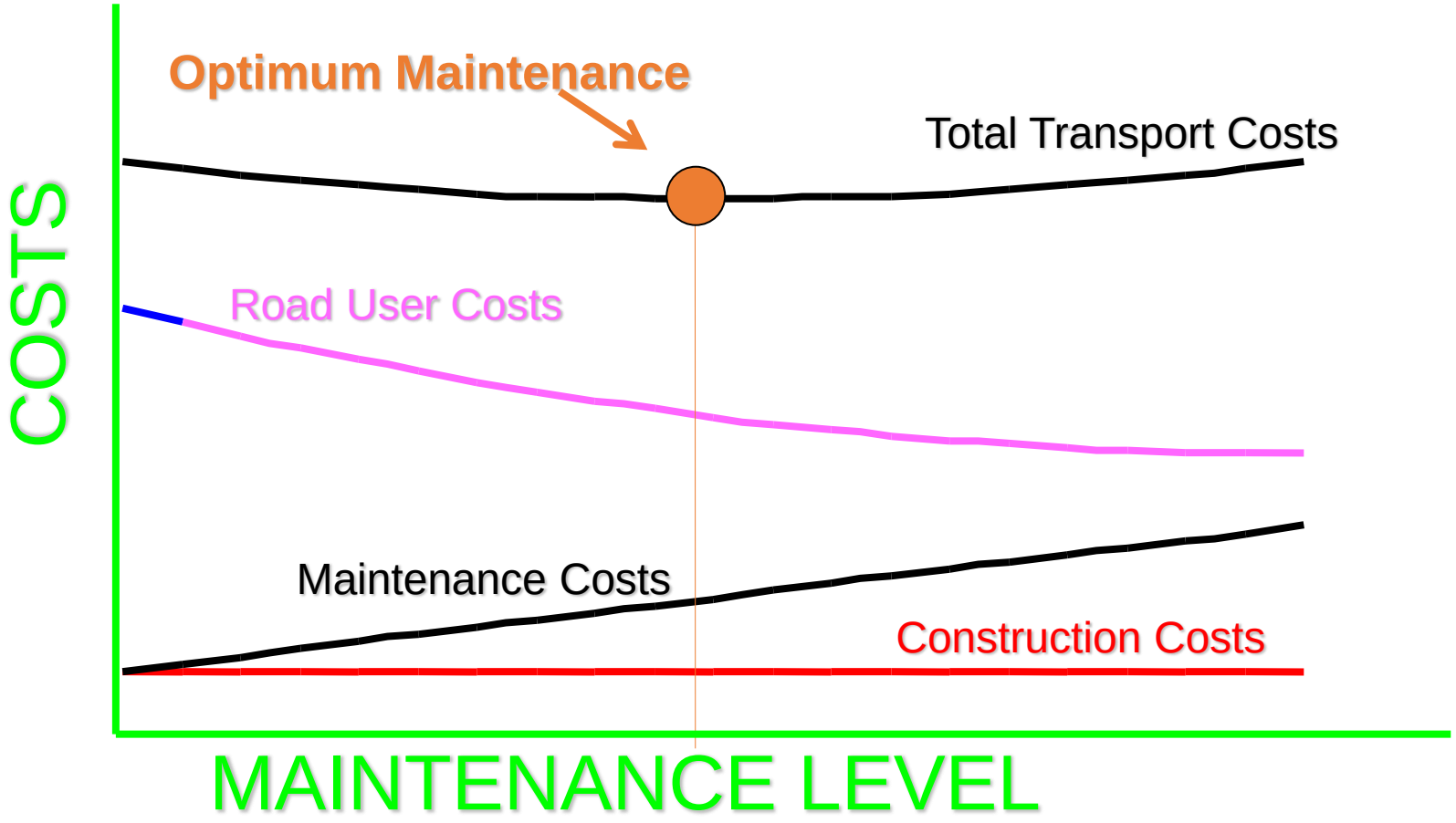
Maximise Condition



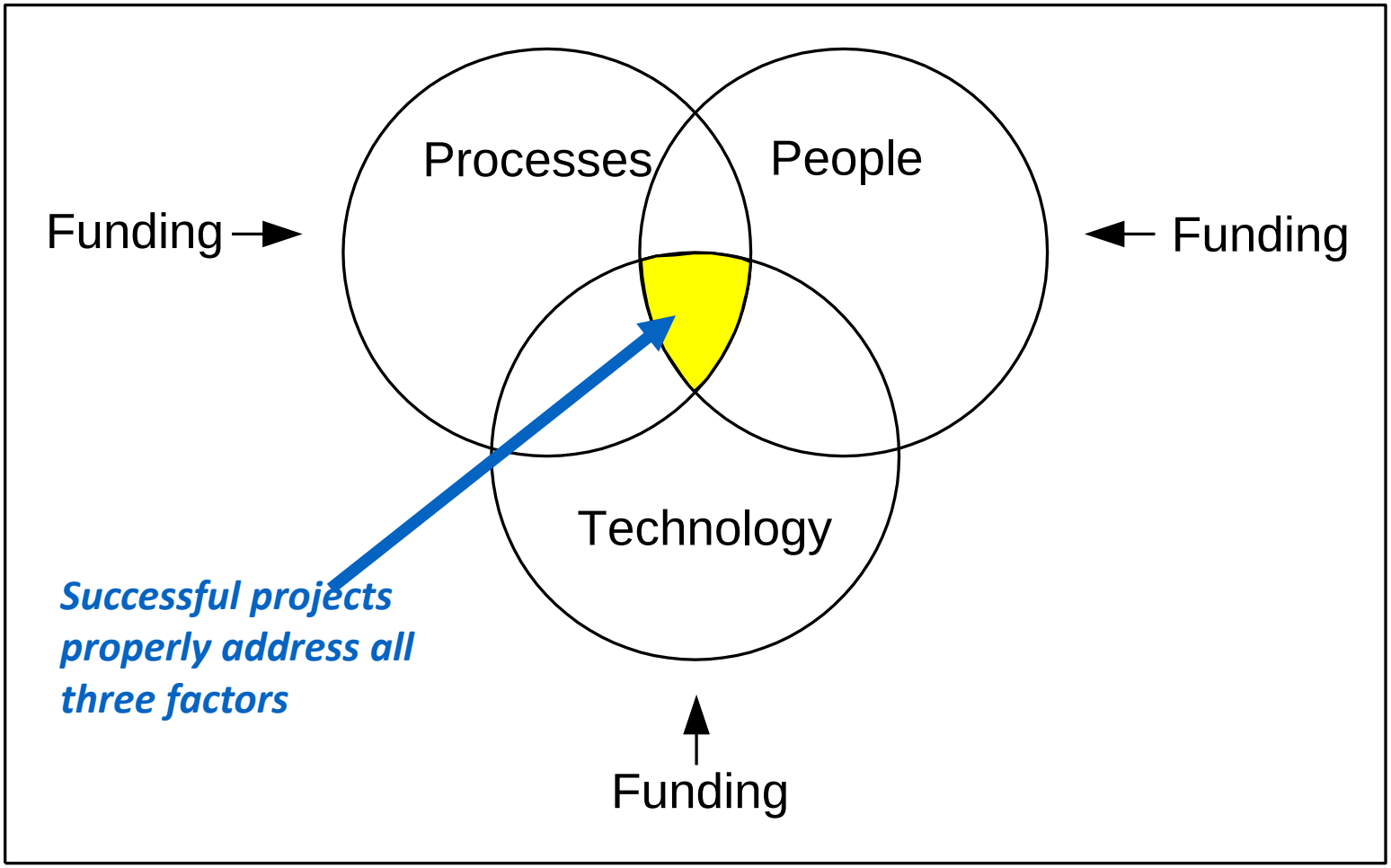
Maximise Savings in VOC



Minimise Total Transport Costs



System Implementation - The Key to Success



Selecting the Right Tool

Correct Approach

- Business Process Analysis
  - Determine the function and role of the PMS in the agency, required features
- System Design
  - Design the system around the institution's capabilities
- Select and Adapt/Customize Existing Software
- Simple analyses
- Implement and provide ongoing support

Wrong (but typical) Approach

- Select software before project starts or write new software
- Fit the agency's activities into the software
- Adopt too intensive data collection
- Complex system and analyses

Technology

- Key Success Factor:
  - **The IT components should be appropriate**
- To Achieve This:
  - System predictions relevant
  - Need a strong IT division – or outsource
  - Need an IT strategy
  - RMS must fit into IT strategy
  - RMS must be properly supported from an IT perspective

Commercial Off-the-Shelf (COTS) Software

- Most large commercial organizations have policy of using COTS instead of custom software because:
  - 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

COTS - Disadvantages

- Requirements – Functionality may not be *exactly* what is required
- Customization – time to develop new ideas may take longer since other clients also need to be taken care of
- Cost – agency may have problems meeting ongoing support and maintenance agreements

COTS - Recommendations

- COTS from a good supplier is almost *always* preferable to custom development
- Several packages available
- Careful review and assessment required prior to procurement
- Biggest issue is that client's business processes do not exactly match the software
  - Software can usually be modified
  - Often, business processes should be improved

People

- Key Success Factor:
  - **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

Training

- Need to ensure that staff are trained in all elements of the RMS, from data collection procurement through management
- Most agencies claimed 5-10 days a year of training
- Bangladesh supports higher education (eg master's degrees)
- Several countries reported training was carried out only at the end of the project just before consultant demobilized
- Few, if any, projects had produced complete (or any) training materials

Recognition

- Slide Based on:
- *McPherson, Kevin; Bennett, Christopher R.. 2006. Success Factors for Road Management Systems. Transport Notes Series; No. TRN 29. World Bank, Washington, DC. © World Bank. https://openknowledge.worldbank.org/handle/10986/11777 License: CC BY 3.0 IGO."*

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