

Road Asset Management (RAM)

May 2023

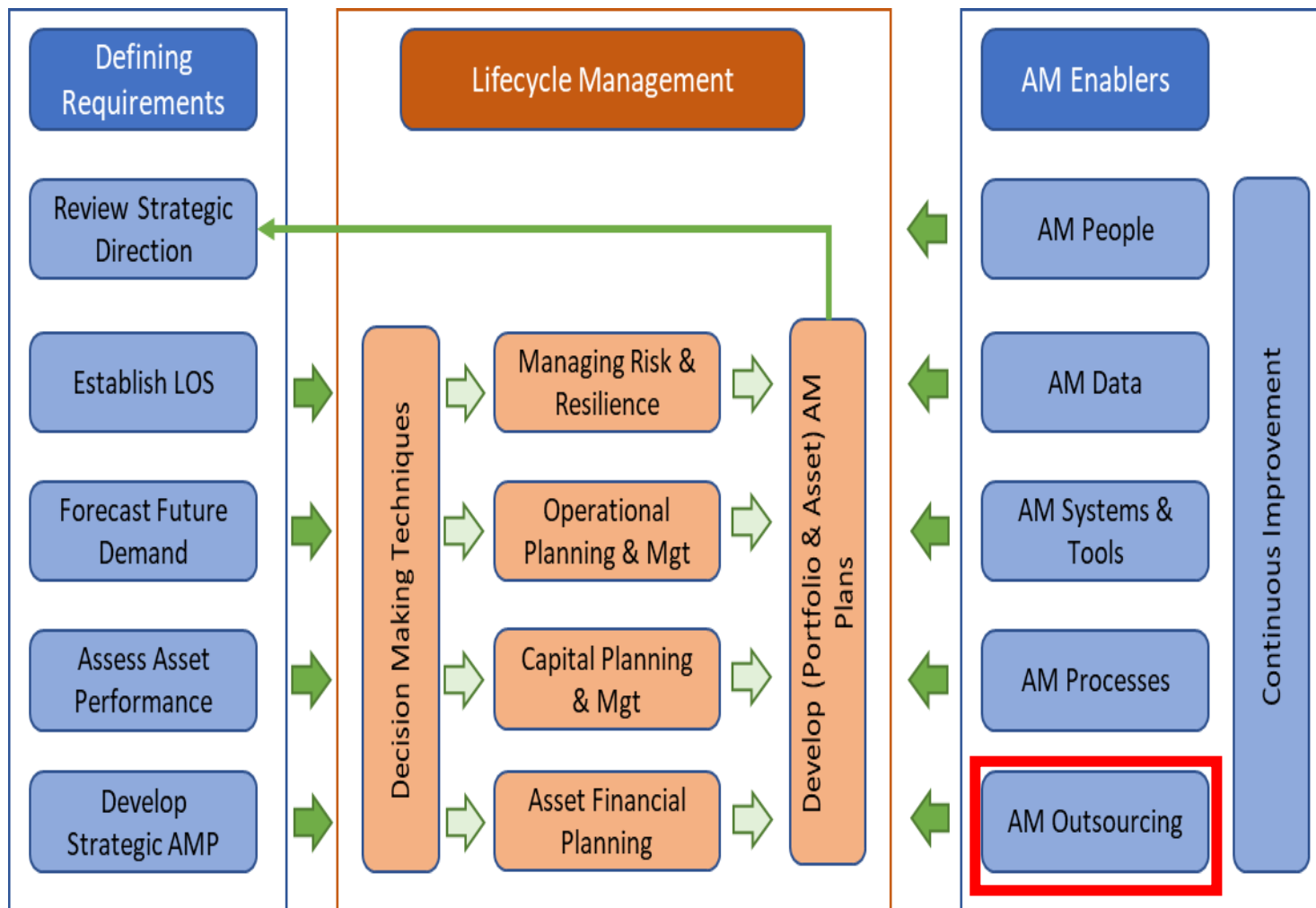
Service Delivery Models

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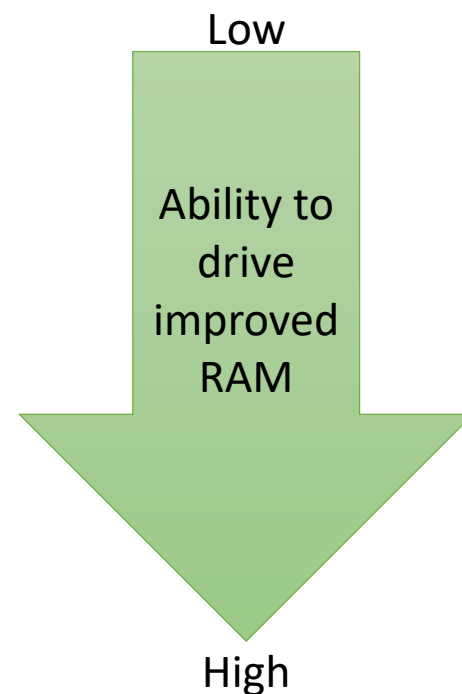
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International Infrastructure Management Manual (IIMM) AM Process



Different Contract Types

- In-House / Force Account
- External
 - Input based
 - \$/hr of labour
 - \$/m³ of materials
 - Output based
 - \$/pothole
 - \$/m² of reseal
 - Outcome (or performance) based
 - \$/km/month that meets standard



Traditional (Input based) Road Contracts

- **“Ok, tell me what to do and how to do it”**
 - Risk on the owner to design, specify, and control the work
 - Price driven approach- Lowest price

- Use Recipe or M&M specifications
 - **Material** to be used (e.g. Polymer modified bitumen)
 - **Method** (required processes)



So what is a Full PBC?

□ “Tell me what you want, but not how to do it”

“the Contract... to perform the services

to be provided by the contractor and

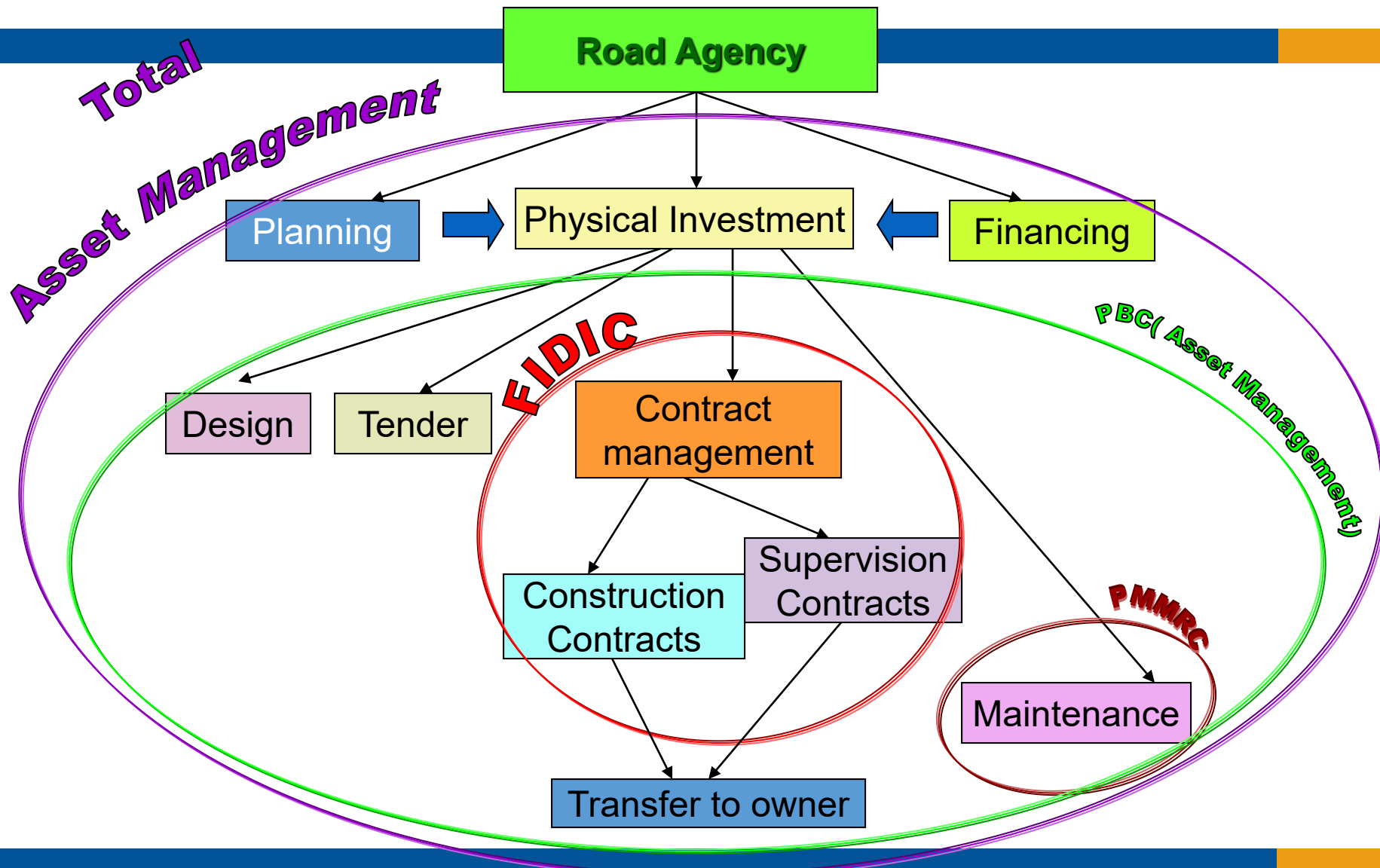
to execute, complete, and maintain the Works” —*WB PBC document*

“an approach to contracting that provides disincentives, incentives, or both to the contractor to achieve performance standards or targets for measurable outcomes and sometimes outputs”

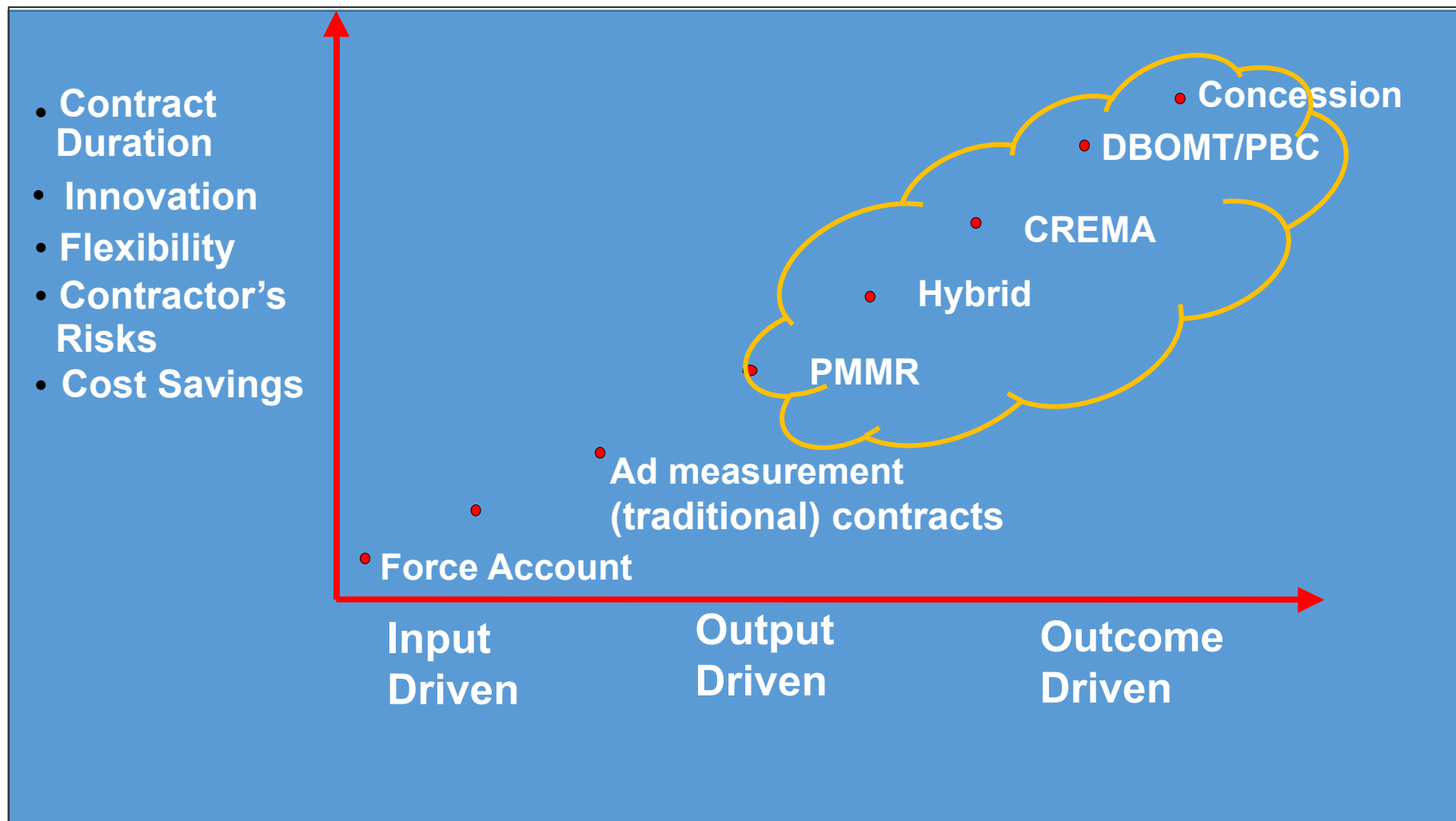
—*NCHRP (US)*



Contractual Models Available



Types of Contracts



Traditional vs. Outcome Based Contracts

Traditional support contract

Command and control

Inputs and processes

Price



Outcome based contract

Collaboration

Outputs and results

Value

Source: J.North and B. Keane; Corrs Chambers Westgarth, Australia, 2014

Many names for PBCs

- Output and Performance Based Road Contract (**OPBRC**- World Bank)
- Performance based Maintenance Management Contract (**PMMR**- World Bank)
- Performance Specified Maintenance Contracts (**PSMC**- NZ, Australia)
- Asset Management Contract (**USA**)
- Contract for Rehabilitation and Maintenance (**CREMA**-Argentina)
- Managing Agent Contract (MAC), Asset Support Contract (ASC) - (UK)
- Area Maintenance Contract (Finland, Ontario, Canada)
- Engineering, Procurement and Construction Contract (**EPC**)
- “Turnkey” Contract

Hybrid Approach is Common

- Input based items
 - Emergency works
 - Day works
- Output based items
 - Improvement works on \$/km of completed road
- Outcome based items
 - Routine maintenance

Performance Based Contracts

What is performance-based contracting?

- It is an outcome or performance –based approach to contracting, where a client pays for results delivered by a service provider (contractor), rather than for defined activities, tasks or assets.
- The contract focuses on the desired outcome of the work to be performed (the “what”), rather than the manner in which it is to be performed (the “how”).
- The service provider decides how it will deliver on the client requirements – and thus a degree of both control and risk shift to the service provider.

Benefits of Performance Based Contracting

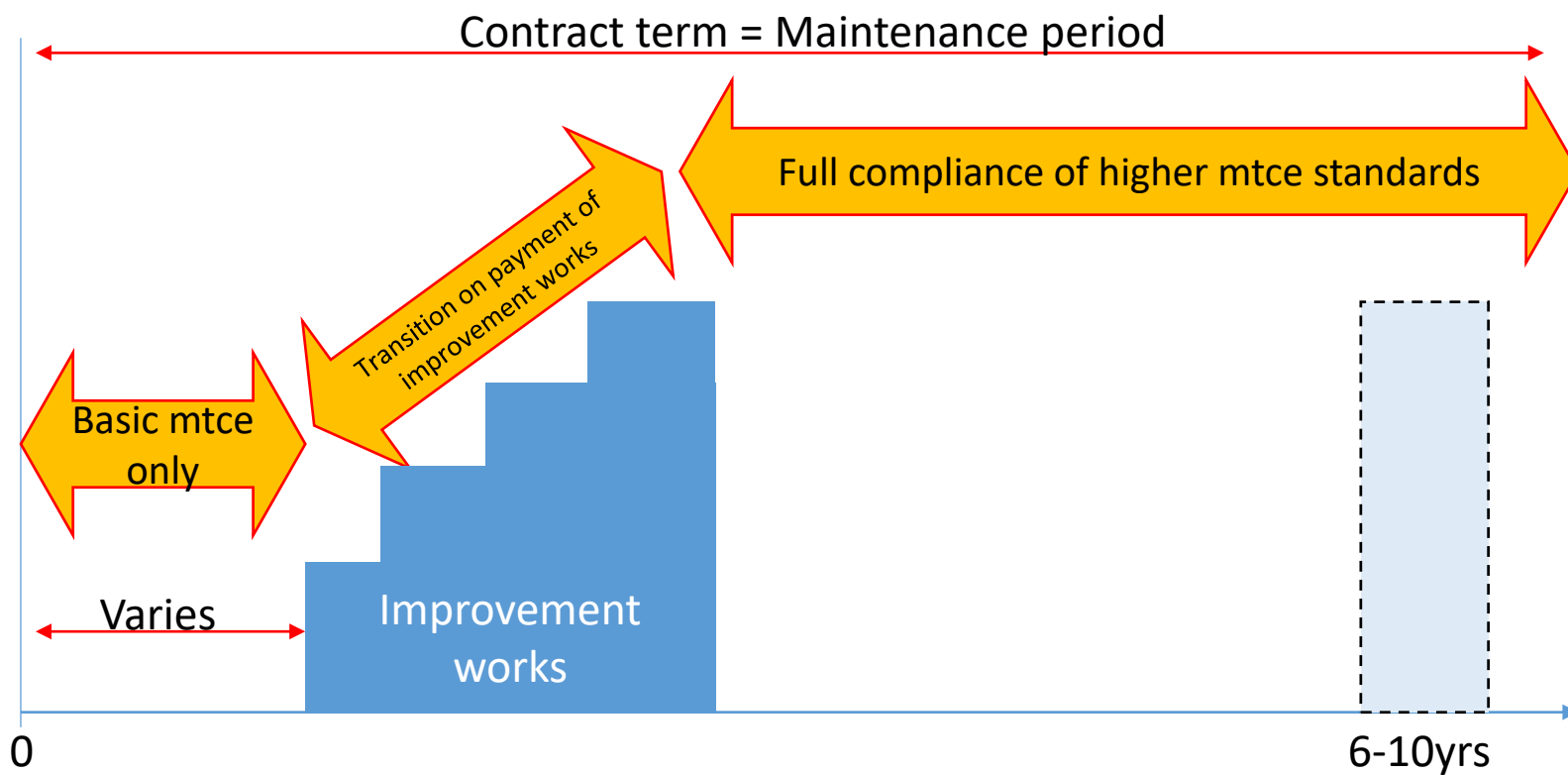
- Greater efficiency in service delivery, by allowing the service provider flexibility in its method of delivery
- Increased motivation for the service provider to achieve the best outcome to maximize financial gain
- Closer alignment of objectives between the customer and the service provider
- Cost savings
- Supporting innovation on the part of the service provider; ability to adapt to technological advancements
- Higher responsiveness to customer requirements
- Better outcomes for customers

Source: J. North and B. Keane; Corrs Chambers Westgarth, Australia, 2014

Contract Duration

- Internationally was common to be 10 years
- Now 5-7years is considered more workable
- If completing improvement works in 1st couple of years, in what condition do you want to receive those back?
 - Could include a second treatment near the end of the contract period.

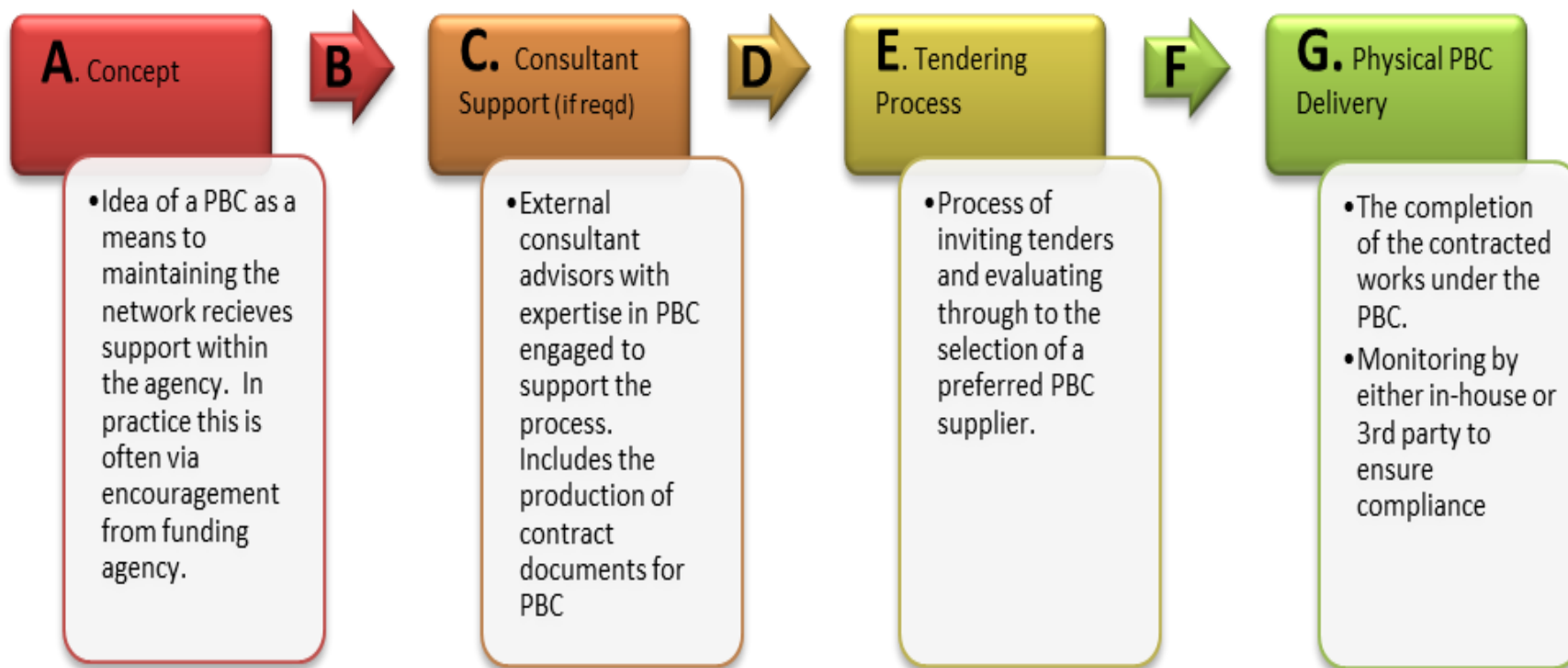
Example of Contract Term



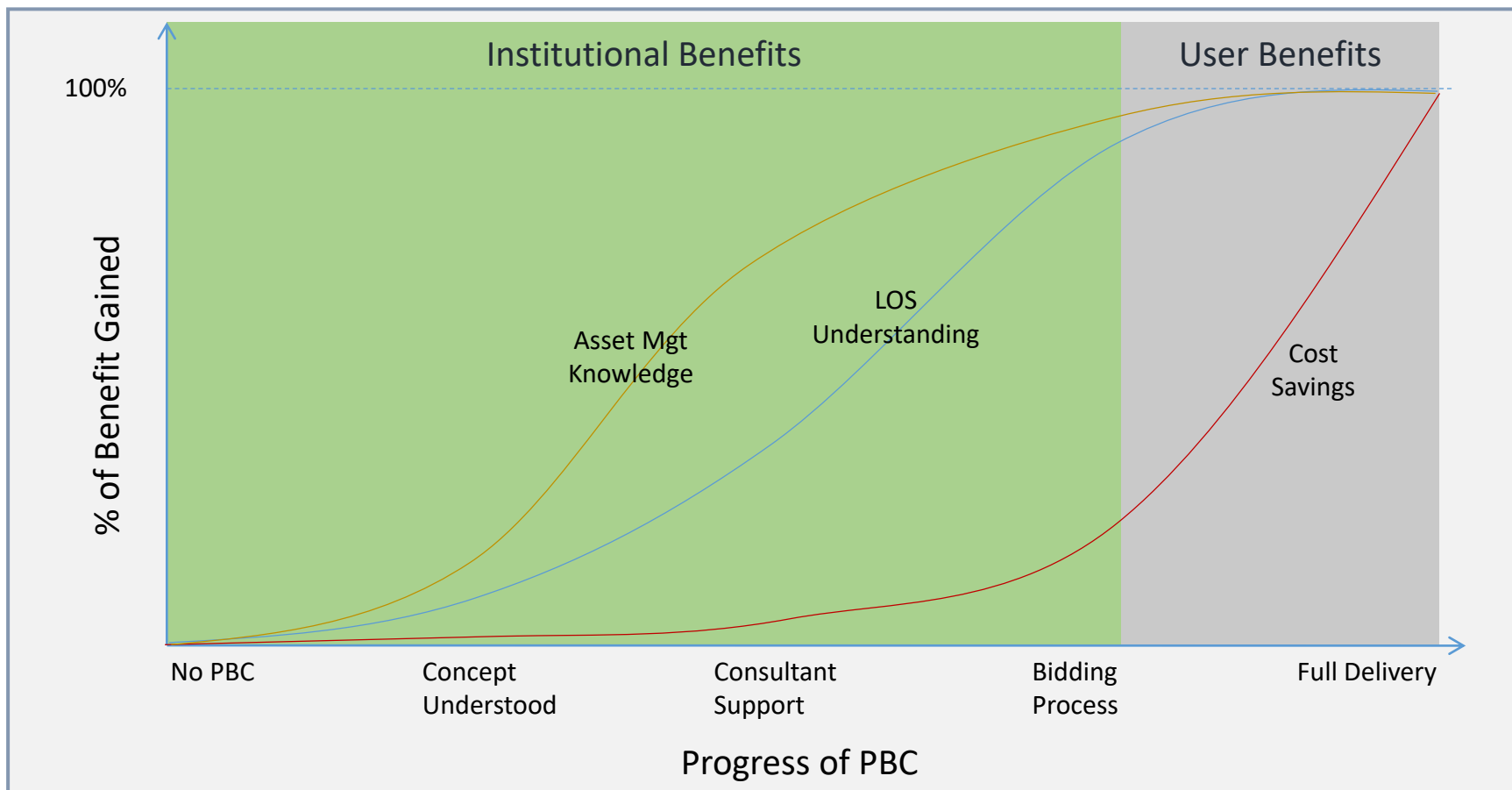
Scope of Works

- Emergency response
- Basic routine maintenance under direction
 - just some defects = outsourced force account approach
- Full routine maintenance
- Periodic resurfacing
- Rehabilitation
- Reconstruction
- Improvement works

PBC Implementation Chain



Many Benefits from the Process

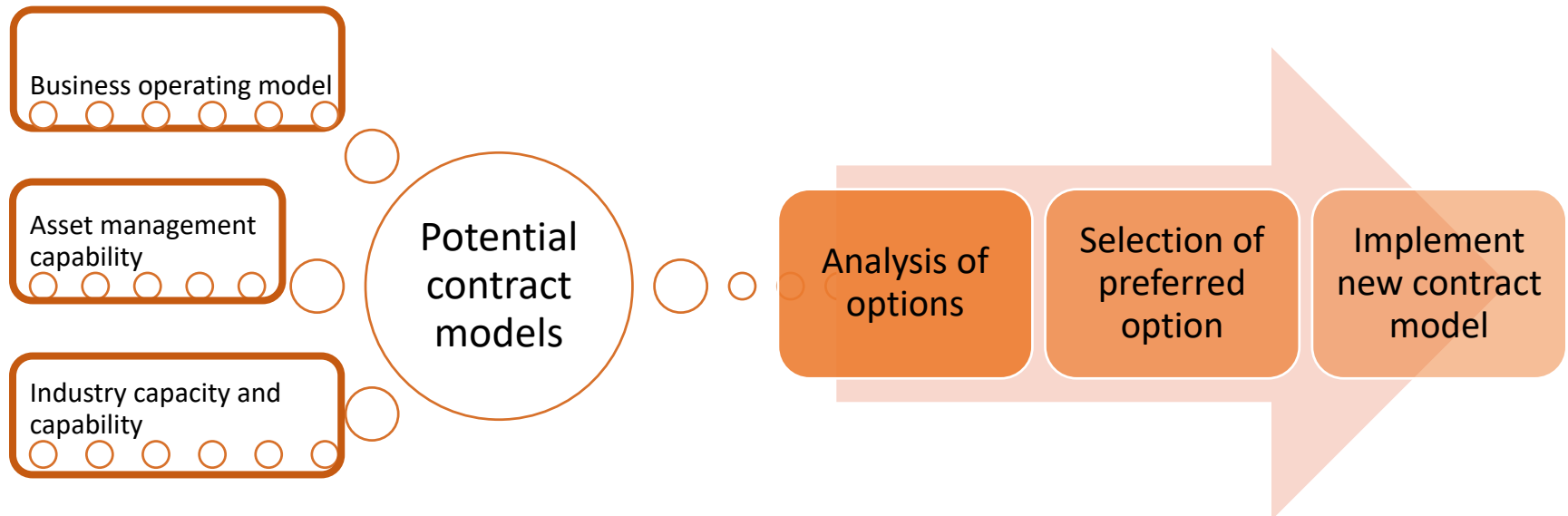


Designing a PBC

Strengths and Weaknesses

- Road authorities perception of the strength and weaknesses of PBC models often depends on their position (implicit or explicit):
 - Appetite for risk
 - Approach to asset management
 - Funding regime
 - Political influence
 - Culture [governance or management]
 - Approach to performance management

Process to Pick the Model



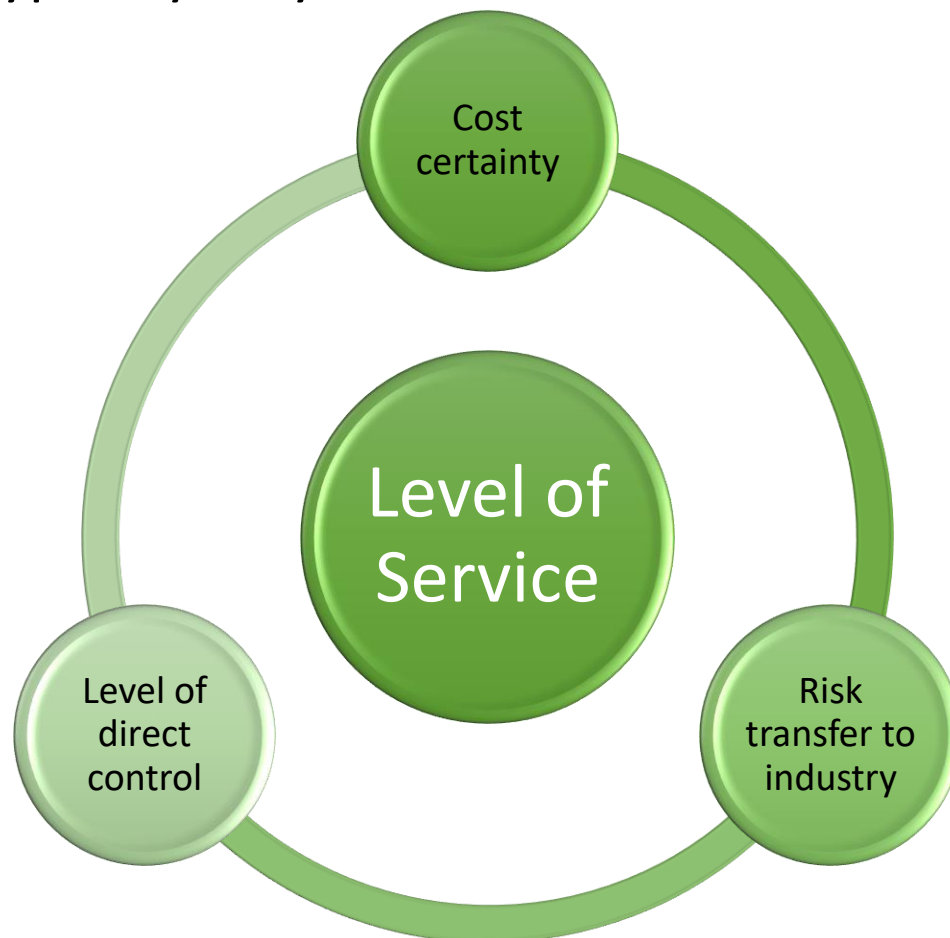
What is the Problem You Are Seeking to Fix with a PBC?

- Cost savings?
- Certainty/securing of funding needs?
- Risk transfer?
- Improved construction quality?
- More consistent delivery of service levels?
- Reducing public sector / increasing private sector participation?
- Skill shortage in the public sector?
- Improving a road network in poor condition / protecting a network in good condition?
- Addressing climate change?
- Accessing development partner funds (ADB, World Bank etc.)?

...and as a result every PBC is subtly different.

What Sort of an Organisation Are You?

- For a given LoS, can typically only control two of the three variables



Issues to be considered

- Expenditure predictability vs Budget flexibility
- Length of Contract term
 - Shorter vs Longer
- Establishment of LOS
 - Costing
 - Overall linkage to Network LOS
- Incentives and Disincentives
 - Usually focus is only on disincentives (penalties)
- Contractor Selection Criteria
 - Low Bid vs Best Value

Issues to be considered

- Internal road authority support
 - Inertia if a long history of input based contracting
 - Threat to jobs, wages or benefits
- Training
 - Change in culture
 - Agency staff and contractor
- Multi Year Funding Commitment

For Improvement Works

- Prefer to avoid payment on inputs (or sub-components subgrade, pavement, surfacing etc)
 - Pay on \$/km of completed road if at all possible
 - If there is uncertainty in the subgrade works, pay that on inputs for the 'risky' items and then move to \$/km for the remainder of the works; or
 - If all on inputs, then put a criteria that no payment is due until a section of road is complete.
- History of contractor having 90% of the payment, but the road user has 0% of the benefits
 - Especially if they have freedom to bid high rates for establishment and site clearance, and low rates for signs, line marking etc.
- Paying on completed sections of road encourages the contractor to finish a section, rather than encouraging to start many sections.
- The claiming and payment for the completion of a section of the works, is also the triggering for the application of the full maintenance specifications to that section of road.

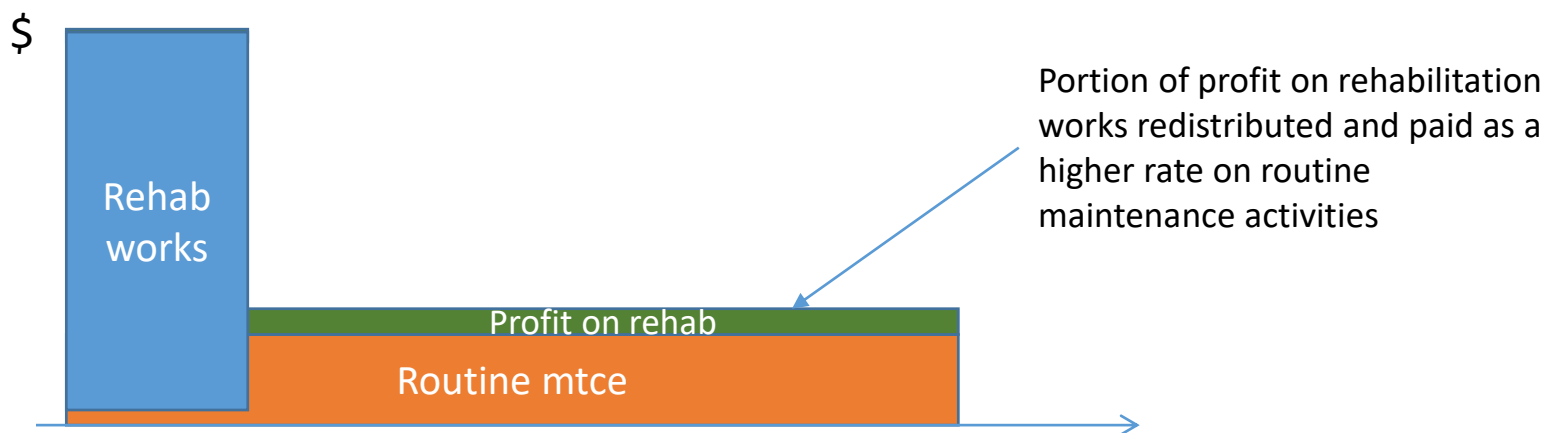
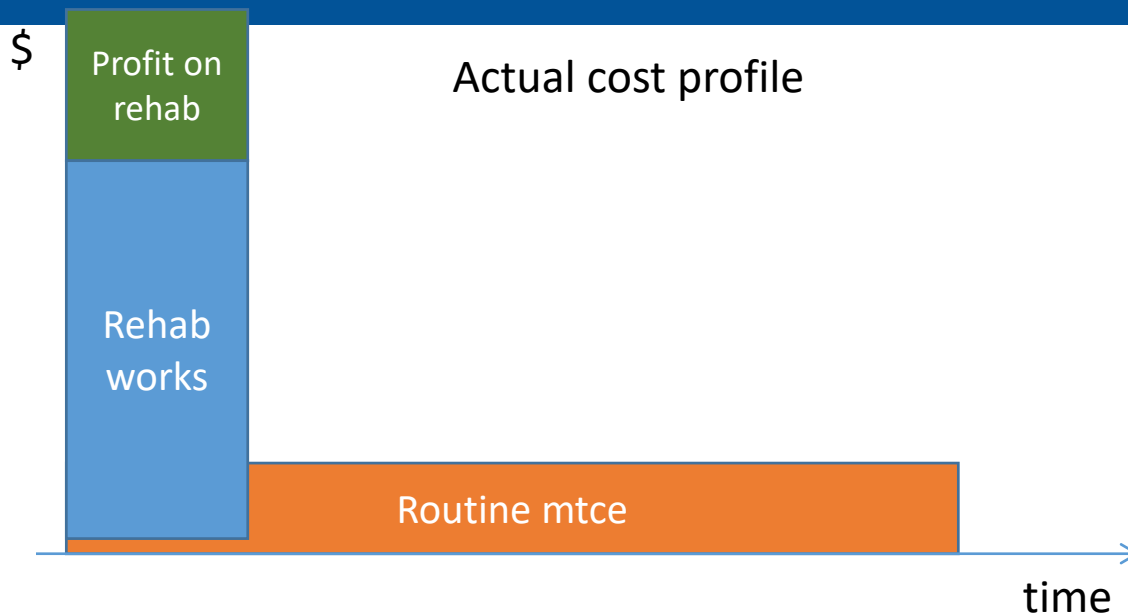
For Maintenance Works

- Base maintenance (ahead of improvement works)
 - Often not paid at all, unless there is several years before improvement works occur
 - Can still make deductions from monthly claim if not compliant though
- Full performance based maintenance
 - Paid on a \$/km/month basis at tendered rate
 - Deductions for non-compliance
 - Penalties are to drive full compliance
 - Termination is to avoid bad performance
 - Typically cap at 30% for really bad performance
 - If worse than say 20% for 3 months out of a 6 month period, then contractor in default and can be terminated
 - Contractor is rewarded for completing improvement works early through either
 - Additional months of payment of the tendered \$/km/month rate or
 - Total routine maintenance payment is spread out over more months or
 - Routine maintenance is specified to only start being paid at a fixed time at the earliest

Avoiding Underbidding of Maintenance

- Place a limit on the minimum percentage of the total tender value that the contractor can assign to routine maintenance
- Idea is to make routine maintenance highly profitable and improvement works marginally profitable
 - This way the contractor retains focus on maintenance

Payment Model Concept

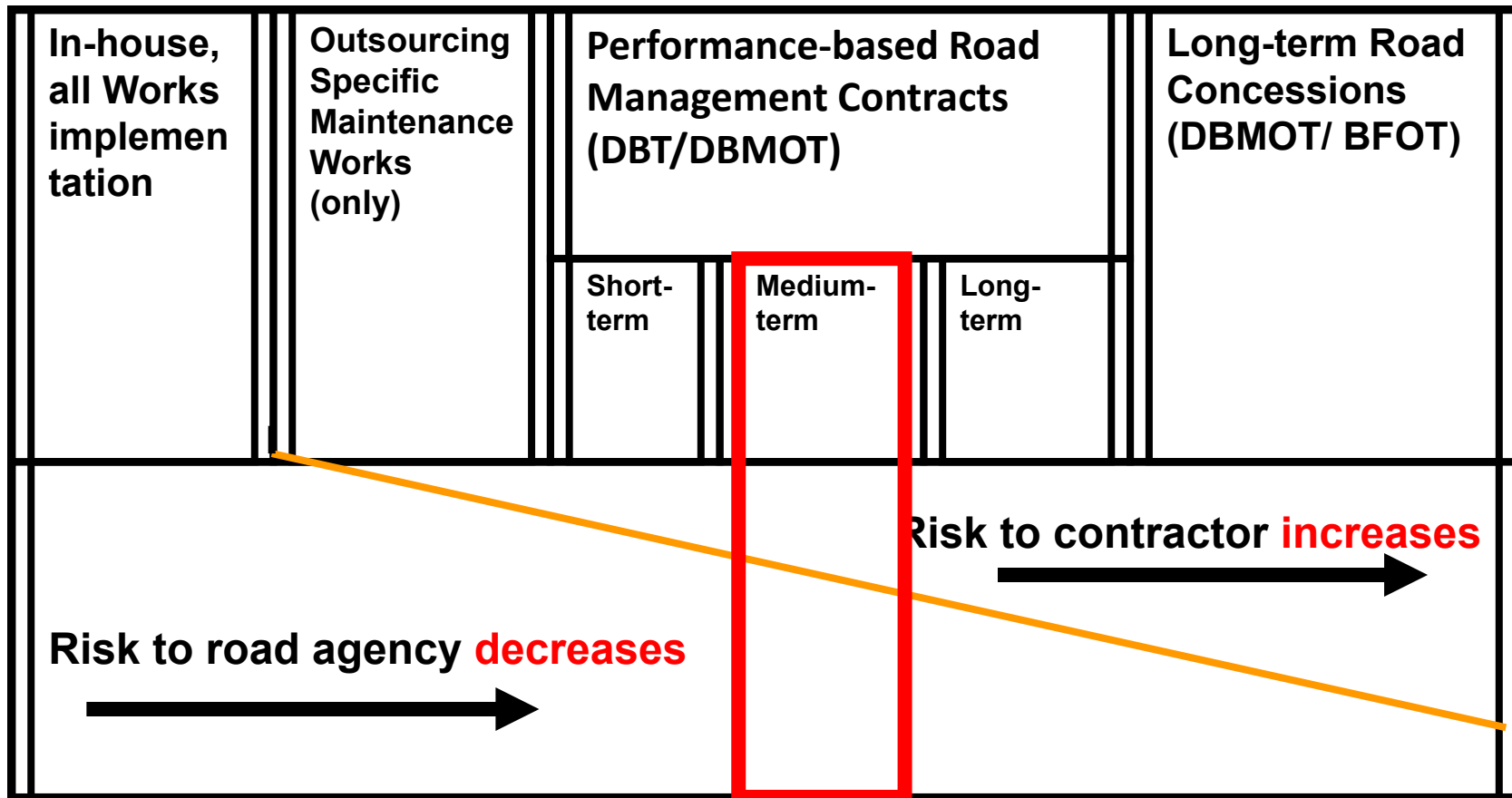


Key principles for successful PBC implementation

- Selection of a network of roads, rather than isolated road links
- A contract period of at least 5 years and ideally 7-10 years to ensure that the contractor is incentivized to think long term
- Client specifies the minimum designs to be built, but the contracting entity (contractor plus their sub-contracted consulting firm) must take ultimate responsibility for what is built
- A single contract covers all works within the contract period.

Risk Management in a PBC

Distribution of Risks- Civil Works Projects



Risk Allocation Table

- Important to ensure risks are appropriately allocated or shared
- For example with land slips it could be
 - If the volume is $< 50\text{m}^3$ then the contractor is responsible
 - If the volume is $> 50\text{m}^3$ then the client pays
 - This is assuming that the contractor can show they were in full compliance with all relevant performance measures (e.g. drainage) ahead of the event
- Trying to avoid the need for lots of variations

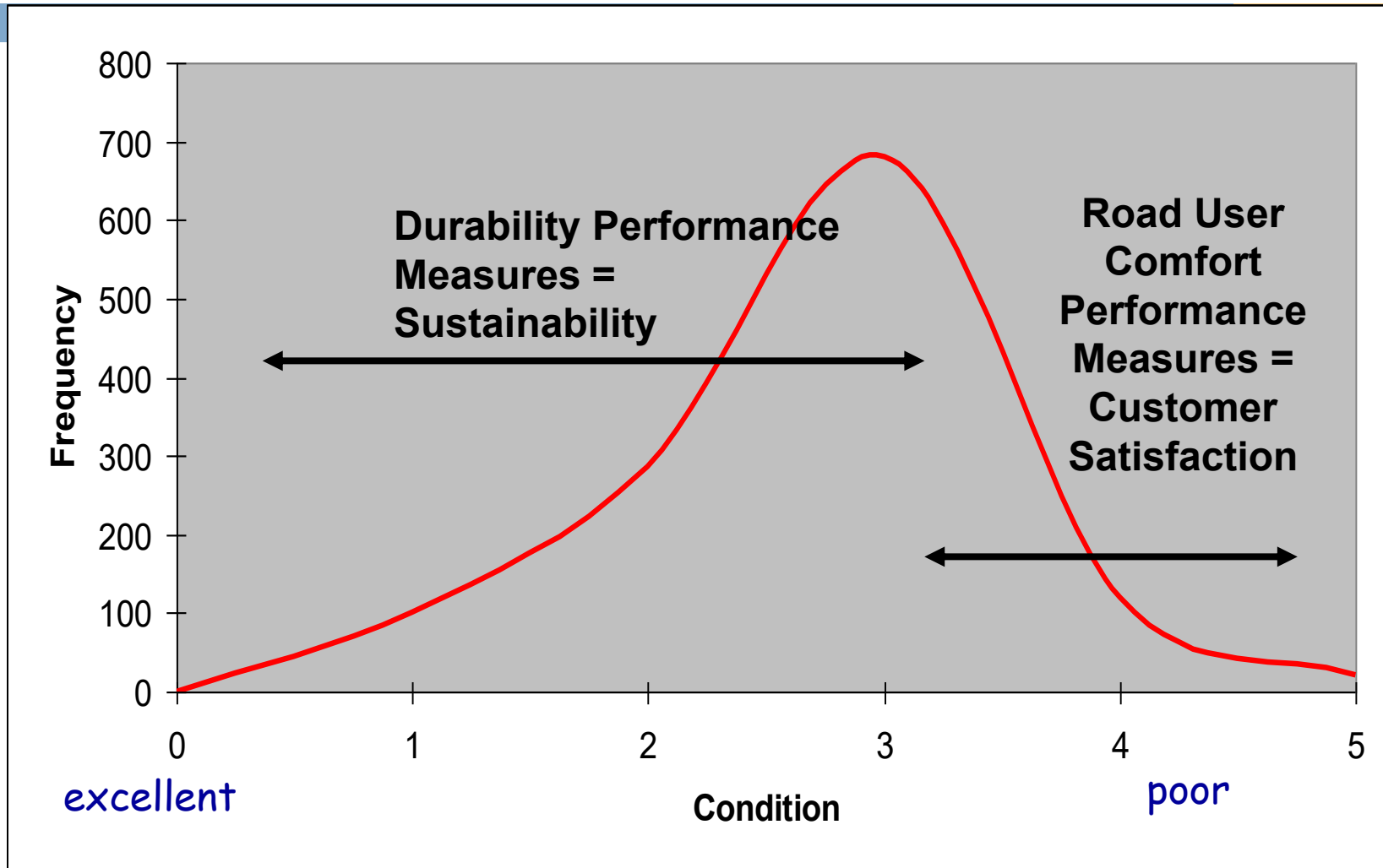
Overloading Risk

- Controlling (or eliminating) overloading is the clients problems and risk
- The Contractor just needs to be protected from an increase in overloading
- Therefore:
 - Do not need to transfer control of overloading to the Contractor (e.g. weigh stations)
 - But do need to be able to determine if an increase in overloading has occurred (e.g. weigh in motion)
- If there is a current level of overloading present, then that is not a risk – that is a known.
 - Risk is that it gets worse
 - If currently overloading is at 10%, then can set risk threshold at 15% - beyond that a variation event is triggered.
- Question: Is overloading an issue for you?

- If risk profile is exceeded then Contractor can claim a variation
- Contractor has to prove additional costs
- Client may
 - Make payment(s) to cover the additional routine maintenance costs to meet the performance specifications
 - Pay for specific corrective works to be undertaken
 - Lower the service levels required to cover the higher deterioration of the network
 - Exclude a certain road section from penalties for some defects
- Some risks that occur will have negligible (if any) impact on the contractor within the contract period

Service Levels, Performance Measures and Penalties

Definition of Terms



Routine Maintenance Performance Measures

- Requirement to conduct daily patrols
 - Contractor will require system to store location of defects to manage the network
- Primarily focus on density based measures
 - E.g. Number of Potholes / 5 km
- Time based measures used only as a backstop for safety items or those that cannot be predicted
 - E.g. 4 hours to remove debris from carriageway surface
- If you can predict failure (such as a small pothole becoming larger), then why should there then be a tolerance to fix it.

Two Types of Measures

- Response time measures
 - E.g. Fix all potholes within 7 days
- Density measures
 - E.g. No more than 1 pothole in any 5kms of road
- Although it seems minor, the above difference can fundamentally change the performance of the contractor and the associated effort to manage a PBC

Response Time Measures

- Common in road authorities
- Contractors like them as they don't have to take responsibility
 - Just wait till the consultant finds a fault and then they go and repair it
- But with many different response times for different defects, you end up with the consultant constantly on site
- Contractor becomes reactive and does not take control of the network as they are meant to
 - They don't go looking for the faults, as they know they will have time to repair them once the consultant finds them

Density Based Measures

- Less common in road authorities
- Is actually how road users experience defects
- Contractors have to be in compliance whenever the consultant does an inspection
 - Consultant only needs to go on site once per month for maintenance inspections
- Contractor becomes proactive and takes control of the network
 - They go looking for faults and repair them before the consultant finds them
- Reduces contractors costs as don't have to respond immediately to a single small defect
- Far easier to enforce
 - Only a single inspection required to determine compliance

Example for Measures

If current response time measure is:

All potholes > 300mm in diameter or > 100mm in depth to be repaired in 7 days

Converts in to...

Asset Class – Defect	Measure Definition	Target
Pavement - Potholes	<p>A Small Pothole is one that:</p> <ul style="list-style-type: none"> Is less than 300mm in diameter, and which does not extend in depth to the wearing course <p>A Medium Pothole is one that:</p> <ul style="list-style-type: none"> is greater than 300mm in diameter, and with a depth of at least 50mm <p>A Large Pothole is one that:</p> <ul style="list-style-type: none"> is greater than 600mm in diameter, and with a depth of at least 100mm. or is of any size and is in such a location so as to pose a significant safety hazard to road users (e.g. on a curve in the wheel path). 	<p>No Large Potholes.</p> <p>No more than 1 Medium Pothole within any 10km of travel (for roads less than 5km in length, the target shall apply to the whole road length)</p> <p>No Medium pothole to remain for more than 1 month.</p>

Penalties

- Best financial outcome for contractor must be to have the network in full compliance and be able to prove that compliance
- Next best outcome is to fail but tell the truth that they have failed
- Worst outcome is to fail performance standards and try to cover it up

- Focus the penalties on the key aspects of the network
 - Can include non-key aspects in a measurement assessment but not link to \$\$\$
- Penalty for having too many defects must be greater than the cost of fixing the defect
- If repeated failure of a measure, then increase penalty for that measure
- Really poor performance results in termination with associated loss of bonds.

- Question: Are penalties for non-performance used here?

Impacts on Road Authority and Industry

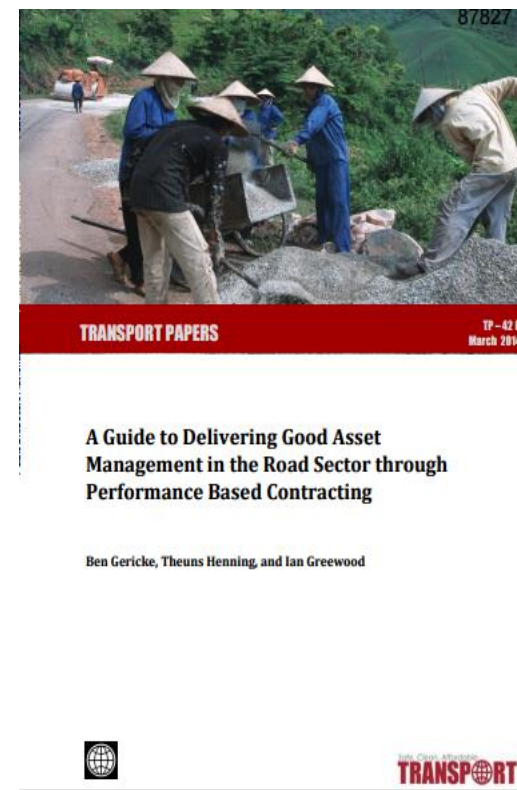
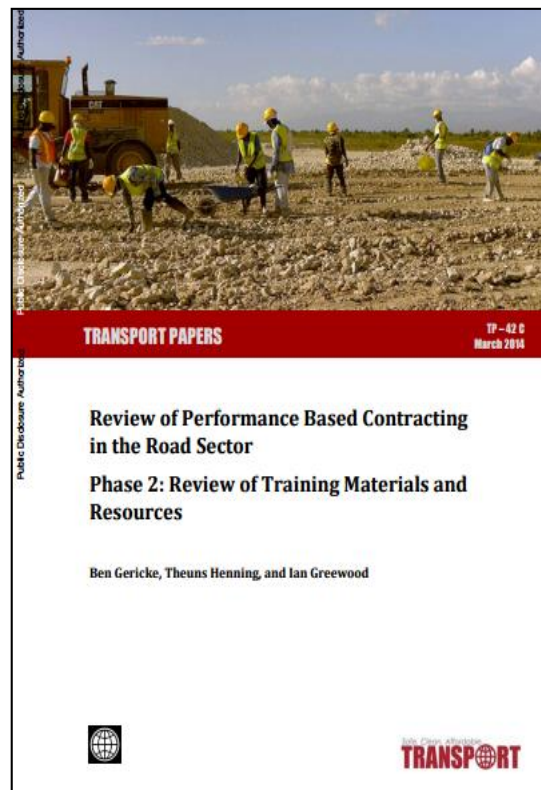
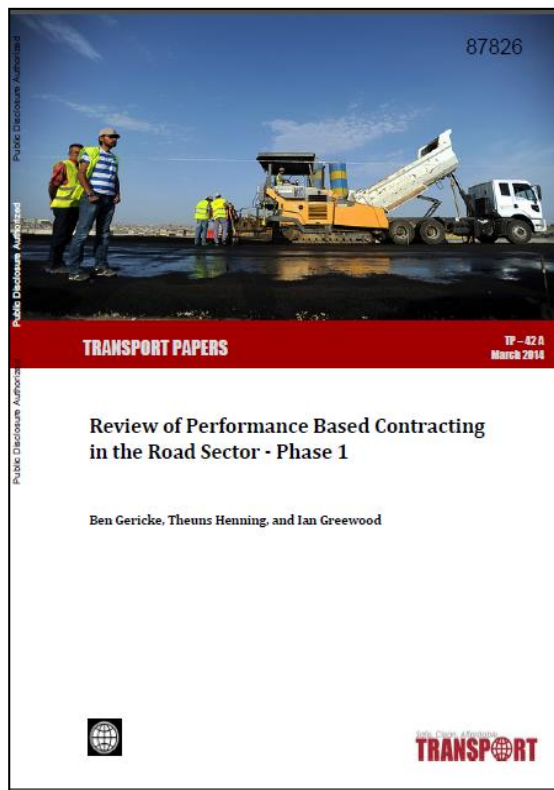
- The move to performance based contracts requires a shift in the culture of all parties
 - Reversal of roles as contractor makes most money by doing as little as possible
- Industry is often more prepared for the cultural change than the road authority.

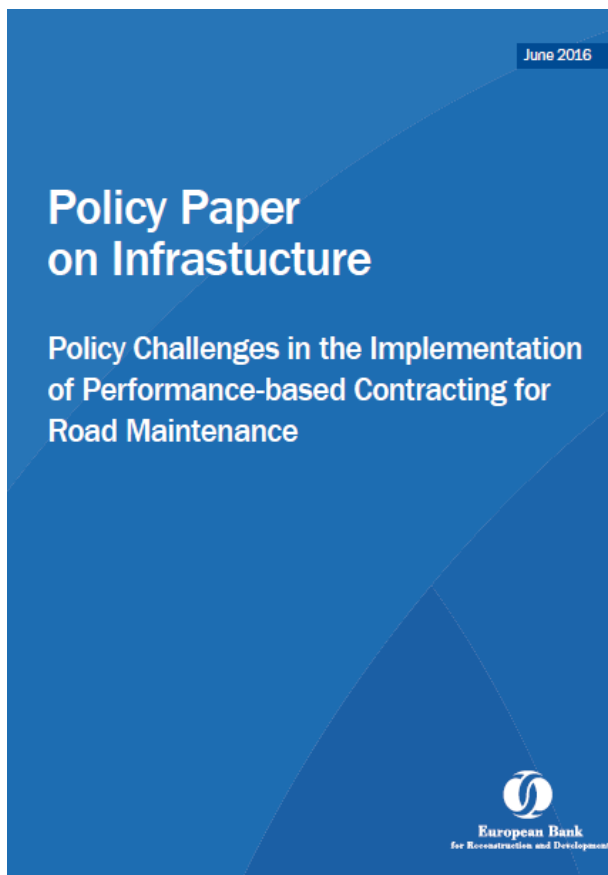
- Balance of work to ensure network does not deteriorate
 - Type
 - Location
- Residual life
- Loss of skills
- Funding
 - Under pricing
 - Lack of flexibility to respond to changes in available funds

- Lack of control
- Service level manipulation
- Social impact
- Maintaining a competitive market
 - Information needs
 - Viable market

Contractor Concerns

- Need for broader skill sets (or engaging consultants)
- Complexity of measures
- Scope creep
- Risk Transfer
 - Traffic
 - Historic work quality
- Insufficient funds
- Relationships
- Lack of commitment to success by RCA
 - Piecemeal outsourcing





<http://dev.irf.global/extending-the-functional-life-of-road-assets-with-performance-based-contracts/>

Summary

- **Good Asset Management should be the primary goal of any contract model**
- Lots of contract model types available to deliver works
- Performance based contracts that focus on outcomes tend to better align with RAM delivery
- But you can deliver good RAM with any contract model.

Advantages of PBCs

- Potential reduction in costs
- Improved or more consistent level of service (could cost more)
- The transfer of risk to the contractor thereby providing surety of costs to the agency
- Securing of an appropriate level of multi-year financing
- More innovation as a result of the PBC contractor having a financial incentive
- Enhanced asset management on the part of both the PBC contractor and for the road agency
- Consciously focusing resource on the long term needs of the asset.

Disadvantages of PBCs

- A more costly procurement process for the bidders
- The complexity of the bids also increases the evaluation time and skills required by the road agency
- Potentially a longer procurement process
- The increased cost of having good data
- A potential reduction in competition
- A potential loss of agency control and flexibility.

To Implement a PBC Well Requires

- Knowledge of assets
- Defined LOS and Performance Measures
- Knowledge and allocation of risks
- Clear auditing guidelines
- Consequence of non-conformance related to the impact on the owner (not just the cost on the contractor)
- Cost of delivering the service

....Which has a lot of an AM sound to it!

Key Points on PBC

- PBCs can drive the paradigm shift in all parties necessary to deliver good Asset Management outcomes
- Careful management of the full PBC implementation chain is necessary
- PBCs are not a panacea, but are a valuable instrument in a road agency's contracting toolkit
- There are advantages and disadvantages and PBC is not the solution for every scenario.
- Partnership and Trust are key to success!





Questions

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