# BENEFITS OF A ROBUST PROGRAM STRUCTURE

## Outlining a method for enabling portfolio-wide investment trade off decisions

-- This article is based on a modified paper presented at the 2021 AMPeak Conference –

When we think about planning and investment decision making, we often think about projects and the associated programs into which they are rolled up. There are several potential drivers behind the definition of programs such as technical discipline, asset class, expenditure classification and funding source.

In the pursuit of robust technical decision-making capabilities, organisations must keep in mind that the asset management systems used to deliver services are complex and there is often also a need to make investment trade off decisions between different asset groups. To enable quantification of cross asset group investment decisions, there is a need to have common decision-making criteria.

This article describes five core requirements that together enable progression from siloed planning practices into a whole of organisation planning framework. The method described within seeks to build on existing technical discipline-based processes, such that an organisation can leverage existing practices to develop integrated whole-of-portfolio decision making. When implemented, the combination of these five requirements enables optimisation of quantified portfolio-wide investment decisions.

### *Expenditure Types:*

Figure 1 below provides an overview of the different expenditure types employed in managing assets. Broadly speaking, expenditure types can be grouped into:

- ‘preservation’ works which maintain the service effort across an asset portfolio and
- ‘development’ works which enhance service effort.

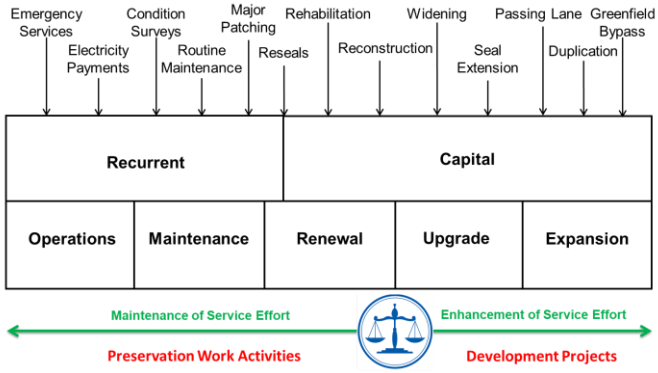


*Figure 1: Expenditure Types, including road network management examples*

This article focusses on portfolio-wide investment decision making. The model was developed to drive integrated investment decisions associated with ‘preservation’ work activities, as shown in Figure 1.

Investment decision making associated with ‘development’ projects is primarily driven by economic criteria. The model described in this article is flexible enough to accommodate both ‘preservation’ and ‘development’ works, provided it is set up as follows:

- ‘Operations’, ‘Maintenance’ and ‘Renewal’ works described as Work Activities
- ‘Upgrade’ and ‘Expansion’ works described as standalone Projects

## Forward Planning:

Planning processes are required to develop forward programs that will support the delivery of services. Forward programs are typically developed to different levels of granularity over different time periods. Broadly speaking, the shorter the time-period the more granular the forward program detail. For example:

- 10 Year Forward program - Asset Lifecycle Modelling Tool outputs
- 3 Year Forward Program - Field verified program, using average treatment unit rates
- Annual Program - Survey, design and project specific cost estimation

All businesses necessarily require an annual program, to provide clarity regarding operational delivery functions. The level of effort expended on multi-year program development is often influenced by how critical the asset portfolio is to the delivery of core services. For asset intensive businesses, which rely on life cycle management of assets to enable effective and efficient service delivery, there is generally an increased focus on multi-year program development.

This article draws a clear distinction between:

- Project level forward programming, using 'technical discipline based' decision making criteria
- Work Activity level forward programming, using 'harmonised risk based' decision making criteria

The two levels of forward programming are intrinsically linked, as outlined above by the cascading level of detail as the forward program timeframe is shortened. The method outlined in this article, for portfolio-wide investment trade off decisions, is focussed primarily on 'preservation' Work Activity level forward programming for operations, maintenance and renewal works.

## Decision Making:

Forward planning decision making, at the project level, is often enabled by:

- Asset Lifecycle Management tools
- 'Technical discipline based' decision-making criteria

Because different asset groups have different failure mechanisms, which trigger the need for maintenance or renewal intervention, tailoring of decision-making criteria and associated modelling tools is to be encouraged. Therefore, the 'technical discipline based' decision criteria used for one asset group will not be suitable for application to alternate asset groups. For example, condition-based criteria such as roughness and rutting are central to making informed decisions regarding pavement renewal interventions, however these criteria will not be applicable to making decisions associated with bridges, buildings, water or rail assets.

Similarly, the level of complexity within adopted modelling tools may be different depending on the 'technical discipline based' decision criteria that are selected for analyses. As such, the asset lifecycle management tools adopted for project level decision making will typically vary within an organisation, depending on the asset group and/or technical discipline.

In the pursuit of robust technical decision-making capabilities, organisations must keep in mind that the asset management systems used to deliver services are complex and there is often also a need to make investment trade off decisions between different asset groups. To enable quantification of cross asset group investment decisions, there is a need to have common decision-making criteria.

However, as described above, project level decision making typically employs 'technical discipline based' criteria, which is necessarily not harmonised across asset groups. Therefore, there is a need to identify an alternative set of common decision-making criteria that can be used for portfolio level decision making.

Importantly, the model described in this article is intended to demonstrate vertical alignment across all levels of forward program decision making. This is achieved by rolling the project level forward program outputs, from the discipline-based Asset Lifecycle Management tools, up to the 'preservation' Work Activity level. These rolled up project level outputs then become inputs to the Portfolio Optimisation Tool, to inform investment trade off decisions at the 'preservation' Work Activity level.

If there is a desire for investment trade-off decisions to cover both 'preservation' and 'development' works, the individual 'development' projects can be combined with the 'preservation' Work Activities in the Portfolio Optimisation Tool.

## *Requirements:*

The method outlined in this article outlines five core requirements, each categorised as either process, people or technology, as follows:

1. A Stable Program Structure (Process), defining 'preservation' Work Activities across all asset groups / disciplines.
2. Adoption of Common Investment Scenarios (Process), applied to all 'preservation' Work Activities.
3. Collaborative People (People), willing to embrace the other core requirements.
4. Discipline-based Asset Lifecycle Modelling (Technology), for project level planning.
5. Portfolio Optimisation Tool (Technology), using 'harmonised risk based' decision-making criteria.

Implementation of these five core requirements will enable optimisation of portfolio-wide investment decisions. The requirements are further outlined as follows:

**Requirement #1 - Stable Program Structure (Process)**

The Program Structure defines 'preservation' Work Activities, and groups them under technical disciplines.

The Program Structure is not intended to cover project level detail. Rather, it provides a framework that shows how operations, maintenance and renewal works roll up into standardised 'preservation' Work Activities.

The Work Activities within the Program Structure provide a framework to drive consistency of:

- forward program forecasts
- budget allocation

Importantly, the Program Structure should remain relatively stable over time. More specifically, the source of funding should have no impact on the Program Structure. Rather, the source of funding should be managed via separate fund codes. Therefore, any given Work Activity may receive funding from multiple sources.

Work Activities need to be categorised as either recurrent (Opex) or capital (Capex), to enable alignment with financial management requirements. In principle, all operations and maintenance Work Activities should be recurrent and all renewal Work Activities should be capital. In practice, this is dependent on the organisation's capitalisation policy.

**Requirement #2 – Common Investment Scenarios (Process)**

Investment scenarios describe the 'what if' criteria associated with forward planning. Investment scenarios are typically modelled in Asset Lifecycle Management tools, using 'technical discipline based' decision making criteria.

Broadly speaking, investment scenarios will incorporate either:

- The budget required to achieve defined levels of service, or
- The levels of service that can be delivered with a defined budget.

The method outlined in this article relies on the outputs from Asset Lifecycle Management tools. The outputs are rolled up to the 'preservation' Work Activity level, for each pre-defined Investment Scenario, and become key inputs to the Portfolio Optimisation Tool.

Common Investment Scenarios are required, for adoption by all technical discipline planning personnel, to enable the Portfolio Optimisation Tool to inform trade off decisions between Work Activities in different disciplines.

This article does not seek to define required common Investment Scenarios. Rather, businesses must choose the scenarios that will inform their targeted strategic investment decision making requirements. As an example, traditional Investment Scenarios adopted are:

- Current Budget
- Minimum Service Standard (safety focussed)
- Optimal (minimise whole-of-life-cycle costs)

Technical discipline planning personnel are free to model additional investment scenarios, provided the pre-defined common Investment Scenarios are produced, to inform inputs to the Portfolio Optimisation Tool.

**Requirement #3 – Collaborative People (People)**

In the context of this article, the need for collaborative people relates primarily to Planning Managers agreeing to develop forward program forecasts:

- in accordance with Work Activities in the Program Structure (i.e. Requirement #1)
- for each common Investment Scenario (i.e. Requirement #2)

The change management effort involved in driving the adoption of Requirement #1 and #2 should not be underestimated. It will be necessary to demonstrate to the discipline specific Planning Managers and their respective teams that the alignment in approach across disciplines is necessary, to enable quantified portfolio-wide investment trade off decisions.

**Requirement #4 – Discipline-based Asset Lifecycle Modelling (Technology)**

Planning Managers will generally adopt Asset Lifecycle Management tools to support forecasting of future needs. The level of complexity required in the modelling tool will be dependent on the 'technical discipline-based' decision making criteria.

The choice of modelling tool does not influence the portfolio optimisation method described in this article. Planning Managers should choose modelling tools that meet their technical needs and are fit-for-purpose.

The outputs produced from the modelling tool need to meet the requirements specified for Requirement #1 (i.e. Stable Program Structure) and #2 (Common Investment Scenarios).

**Requirement #5 – Portfolio Optimisation Tool (Technology)**

This article is not promoting a specific tool or product. Rather, it describes a set of requirements that enable implementation of a structured method for enabling portfolio-wide investment trade off decisions. The Portfolio Optimisation Tool referred to in this article relies on risk assessment of each 'preservation' Work Activity in the Program Structure, using 'harmonised risk based' decision making criteria. Similarly, if 'development' projects are to be included in the Portfolio Optimisation Tool, then these projects also need to be assessed in accordance with the 'harmonised risk based' decision making criteria.

The outputs from discipline-based Asset Lifecycle Management tools need to be rolled up to the Work Activity level in the Program Structure (i.e. Requirement #1) for each Investment Scenario (i.e. Requirement #2); this forms a key input into the Portfolio Optimisation Tool.

The Portfolio Optimisation Tool needs to include an objective function which is a combination of the risk assessments and the relative forward program forecasts across the common Investment Scenarios. By adopting this risk-based approach, all 'preservation' Work Activities and 'development' projects can be assessed using common decision-making criteria. The adoption of this structured method will enable trade off decisions to be made regarding the relative merit of investments across the portfolio.

## *Benefits:*

The primary benefit of implementing the core requirements described above, is to enable portfolio-wide optimisation, in the form of quantified trade off investment decisions.

Furthermore, the implementation of a stable Program Structure (Requirement #1) and common Investment Scenarios (Requirement #2) can also provide a foundation for leveraging other benefits, such as:

- Providing a structure to inform core Planning Documents, such as Asset Management Plans
- Clarity around decision making responsibilities, at the following levels:
  - Portfolio – 'Risk based' decision making criteria, including:
    - Work Activity level for 'preservation' works
    - Project level for 'development' works
  - Discipline – 'Technical' decision making criteria, at Project level
- Improved alignment of Cost, Risk and Service
- Quantification of risk associated with:
  - Planning – Assess planning approach maturity, by Work Activity
  - Allocation – assess Risk associated with Budget shortfall, by Work Activity

## Schematic Summary:

Figure 2 provides a basic schematic of the key inputs to discipline based forward planning. This approach can result in quality discipline-based forward programs, but does not enable quantified portfolio-wide optimisation, in the form of trade off investment decisions across discipline-based programs.

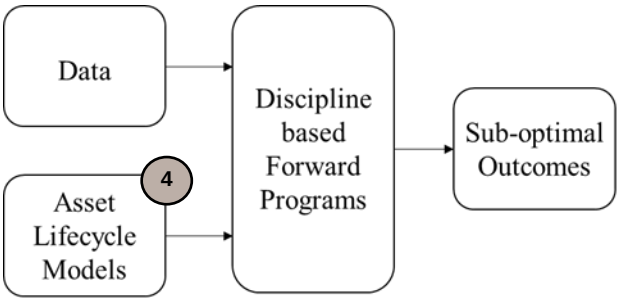


*Figure 1: Schematic of discipline-based planning*

Figure 3 provides a basic schematic showing how the requirements described in this article enable the existing discipline-based planning processes to be refined and built upon, to enable portfolio-wide optimisation in the form of trade off investment decisions.

## Author

Gary Rykers
Principal Consultant – Strategic Asset Management
WSP in Australia

Gary.Rykers@wsp.com

## About WSP

WSP is one of the world's leading professional services consulting firms. We are dedicated to our local communities and propelled by international brainpower. We are technical experts and strategic advisors including engineers, technicians, scientists, architects, planners, surveyors and environmental specialists, as well as other design, program and construction management professionals. We design lasting solutions in the Transportation & Infrastructure, Property & Buildings, Environment, Power & Energy, Resources and Industry sectors, as well as offering strategic advisory services. Our talented people around the globe engineer projects that will help societies grow for lifetimes to come. wsp.com

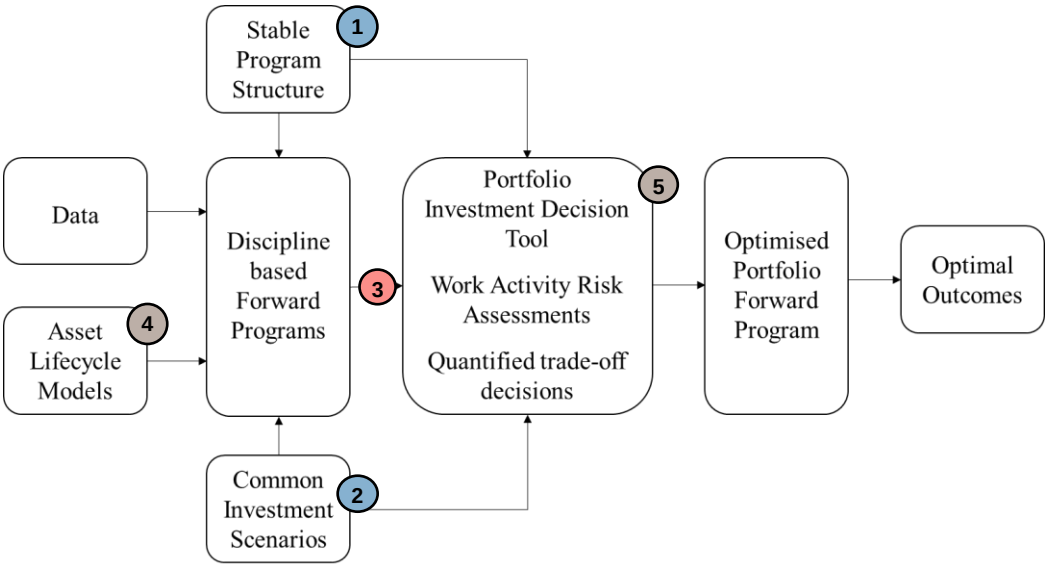


*Figure 3: Schematic of discipline-based planning plus portfolio optimisation*