

The Common Framework for Capital Maintenance Planning in the UK Water Industry – from concept to current reality

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Abstract

Tynemarch was commissioned by the UK Water Industry Research Ltd (UKWIR) to develop an improved Common Framework for capital maintenance planning (CMP) by the UK water industry. The final report was presented to the industry on the 8th May.¹

The project was undertaken with the support and collaboration of Ofwat, the Drinking Water Inspectorate (DWI), the Environment Agency (EA), the Water Industry Commissioner for Scotland and the Department for Environment, Food and Rural Affairs (DEFRA) together with the UK water industry, all of whom were represented on the Steering Group. The water industry representatives were Severn Trent Water, Southern Water, Thames Water, Three Valleys Water (as client manager) and Anglian Water (as project manager). Sub-consultants were SMC Ltd acting as Reporters to the trials and Stone & Webster Consultants as economics specialists.

The Common Framework is based on the analysis of risk (specifically the probability and consequences of asset failure) and encompasses an economic approach which allows the trade-off between capital and operational cost options to be considered. The Common Framework builds on the Ofwat requirements for economic levels of capital maintenance to be demonstrated as outlined in MD161.² This enables an economic level of capital maintenance to be identified with due regard to the costs associated with asset failure and (where appropriate) the value placed by customers on service improvements.

Key concepts

The following key concepts form the basis of the framework:

- capital maintenance should normally be justified on the basis of current and forecast probability and consequence of asset failure with or without investment
- “consequences” are expressed as direct or indirect impact on service and company costs
- “service” is defined as service to customers and the environment (including all relevant third parties and regulatory requirements)
- service is assessed using suitable indicators, building on the approach applied by Ofwat at the 1999 Periodic Review
- there is a need to demonstrate a least cost approach to Opex versus Capex and proactive versus reactive maintenance
- an integrated system approach is required for some systems to assess the direct and indirect impacts on customers and the environment.

¹ *The Final Report can be purchased from UKWIR*

² *Ofwat, Maintaining Serviceability to Customers, MD161 (2000)*

The Common Framework moves away from previous general Water Service Providers (WSP) practices based on a simple conversion of Condition and Performance grades into remaining asset lives and hence capital maintenance needs and is illustrated in the following diagram:

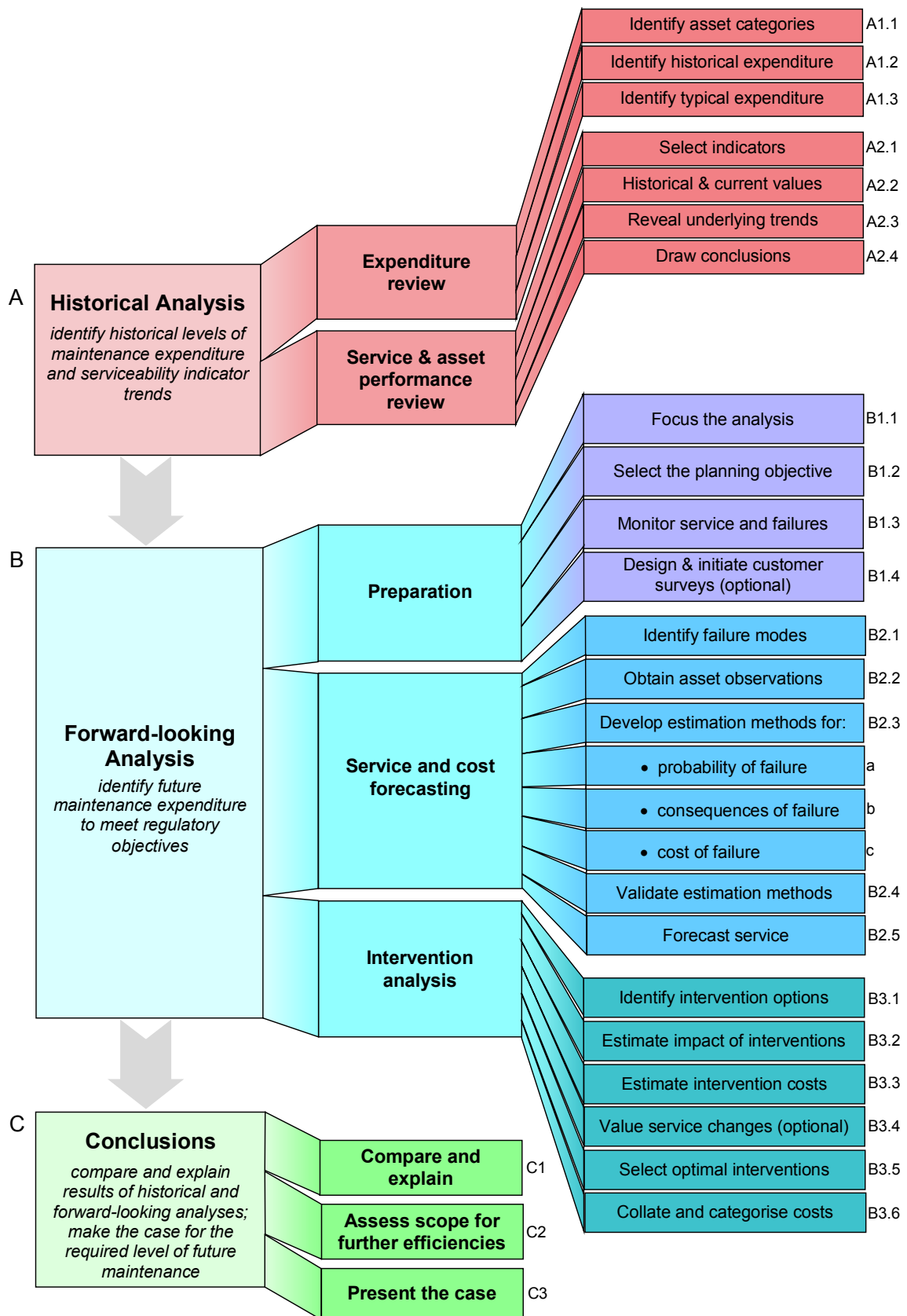


Fig 1: The Common Framework Process

Planning objectives

There are two possible objectives that can be applied generally or vary with service areas.

- **Cost-effective objective:** to provide steady or improving service to customers and the environment at minimum cost to the WSP.
- **Cost-benefit objective:** to provide the level of service to customers and the environment which represents an economic balance between the value of the service provided and the associated costs to the WSP.

Serviceability indicators

The use of serviceability indicators is a central element of the Common Framework.

The current serviceability indicators are of two types:

- **Service indicators** which measure directly or indirectly the service being provided to customers and the environment.

The set of service indicators should ideally cover all areas of service, understood in this context to encompass all regulatory requirements and to include service to customers, the environment, third parties in the community and health and safety obligations to the public and company employees.

- **Asset performance indicators** which reflect the performance of an asset or group of assets in fulfilling its intended function.

It is proposed that WSPs are not required to maintain a stable or improving trend in asset performance indicators, provided that any deterioration can be shown to be consistent with the economic provision of service in the long term.

The development of improved indicators must be seen as an ongoing task extending beyond the current Review cycle and have been the subject of a Ofwat consultation with the industry and the production of guidelines for PR04. Proposed modifications and additions to the set of serviceability indicators are included in the final report.

It is recognised that no set of indicators can fully reflect all aspects of water services, and that WSPs may at times need to present a case for CM expenditure based on their own indicators or on broader arguments regarding the avoidance of a future deterioration in service to customers and the environment, including compliance with regulatory requirements. The Ofwat guidance for PR04 allows the introduction of WSP specific indicators.

Forecasting of service to customers and the environment

The Common Framework extends the approach used at PR99 in that the assessment of historical service is to be complemented by the forecasting of future service, taking account of the impact of proposed CM and operational changes.

It is generally accepted that inadequate CM will eventually lead eventually to some form of asset failure. Within the Common Framework, CM is to be justified on the basis of the expected future impact of such failures on both service and on WSP costs, i.e. the current and future probability and consequences of asset failure with and without the intervention (Capex and/or Opex).

Asset observations

The probability and consequences of the failure of a given asset will depend on various attributes of the asset, termed here the 'asset observations'. These observations may include anything that is known or can be measured, judged or estimated regarding the asset and its operation, environment and performance, and which is useful for estimating the probability and/or consequences of failure.

Whilst many of their component observations will continue to be important, the current grading systems for Condition and Performance assessment as a whole are not considered adequate as asset observations within the Common Framework.

The Framework does not prescribe specific asset observations since WSPs have differing views and experience regarding the relationship between various asset observations and the probability and consequences of failure.

Identifying the intervention options

Having estimated future service, it is necessary to identify a range of intervention options to be considered for use in meeting the chosen planning objective. These should include both CM schemes and operational changes, with appropriate phasing and timing variations.

Costs and value

All intervention options considered should be costed taking full account of capital costs, changes in operational cost, and any expected savings in the costs which result from asset failure (e.g. clean-up costs, compensation payments and the additional costs of reactive maintenance).

Where the cost-benefit planning objective is being applied, there is a further requirement to take account of the value of any resulting improvement in service to customers and the environment, which will usually be quantified on the basis of customer surveys.

To allow comparison of capital and operational interventions, all costs and benefits are to be evaluated as present values using an appropriate discount rate and planning horizon.

Selection of optimal interventions

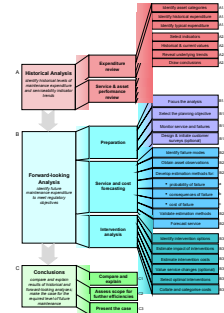
The interventions which are required to meet the chosen planning objective are identified using an appropriate decision-support algorithm, based on an assessment of the comparative costs and benefits of each option.

Interventions may be included within the optimal selection on the basis of the expected cost savings which would result, in the absence of any service benefits.

Where the least cost interventions involve increases in operating costs, these will need to be taken into account in Ofwat comparative efficiency assessments.

Working within the Common Framework Process

The intention of the Common Framework is not be prescriptive regarding particular methodologies and WSPs should adopt an appropriate level of detail and make adaptations where required to reflect individual circumstances, whilst adhering to the broad principles of the Framework.



The Common Framework provides sufficient flexibility to allow considerable variation in the analysis undertaken, according to the importance of the asset area, the size of the WSP and the availability of suitable data.

It was recognised that the Framework should neither limit the opportunities for companies to gain competitive advantage through innovative methods, nor fetter the Regulator in his price determination.

Pilot implementation

Early in 2002, three water and sewerage companies and one water only company completed a pilot trial of the framework each focussing on different asset types. Included in the project was the assessment of the trials using a Reporter in the same manner as is undertaken on behalf of Ofwat for a Periodic Review. The feedback from the companies was positive as indicated by the following:

“The Common Framework for CMP provides a logical and well-structured methodology...which complies with the needs of MD161”

[The Company] “was able to fulfill all of the steps and produce an asset plan for the asset set studied”

[The Company] “believed that the framework in essence is what all good companies should be undertaking...”

“the general principles of the model are aligned with the Asset Management approach that is being implemented within the company”

The Framework also received solid support from the Regulators, with Ofwat for example referring to it as *“a large step in the right direction”*.

Support contract

In order to provide support for the water/water and sewerage companies in England and Wales in working within the Common Framework UKWIR contracted Tynemarch to provide a telephone and email support service covering a period of 6 months from circa August 2002. In addition to providing support to the companies the contract included the development of a structure for a manual including a summary of the questions and answers provided during the support period. In addition the manual includes a collection of case study contributions of current methods employed by the companies for PR04, plus some general guidance documents drafted by both the companies and the Regulators. The Manual is now available to subscribers on the UKWIR web-site and includes contributions from Ofwat, Severn Trent, South East Water, Southern Water, South West Water, Thames Water, Three Valleys Water and Yorkshire Water.

PR04 and the Common Framework

Ofwat have widely referenced the Common Framework in their guidance notes for AMP4³. The general concept of linking capital maintenance to forecast risk has been incorporated by the introduction of reporting criteria related to service risk which replaces the previous performance grades. Table 6 (grade 3) of the Ofwat guidance notes recognises that capital maintenance can be justified where the costs of asset failure are increasing (for the company) or on H&S grounds even where there has been no decline in recorded serviceability. Grades 4 and 5 reflect both high risks of failure and also issues of scale (e.g. one or more zones at risk).

Concluding remarks

The Common Framework has helped the industry move to a more soundly-based identification of the need for capital maintenance for both PR04 and the longer-term, within a process agreed with Ofwat. The forward-looking risk-based aspect of the framework encourages consideration of the optimal balance between proactive and reactive maintenance as well as Opex and/or Capex solutions, and assists in identifying the economic level of capital maintenance.

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³ PR04 Information Requirements Part C3, Issue 1, Ofwat, 29th October 2002.

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Note that this paper represents the views of the authors only.

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