

## R&D Technical Summary W5-070/TS1

# Establishing a Performance-based Asset Management System for Flood Defences (PAMS) – An Introduction

### Introduction

An important element of *flood risk management* is managing flood defence assets such as channels, walls, embankments, gates and pump systems. This activity requires information, tools and techniques to assist decision makers to ensure that assets perform as required under a range of conditions. Current approaches are relatively crude and not fully consistent with a risk-based approach. Improved decision-making will require important technical issues to be addressed, related to assessing risk and managing performance.

A programme of research, Performance-based Asset Management System (PAMS), will take measured steps to develop an approach for identifying and prioritising works to manage existing defences. This will support improved inspection, operation, maintenance and renewal of flood defence systems, helping the Agency and other operating authorities to reduce flood risk.

### The PAMS project

The PAMS R&D project will consider the whole life cycle of systems as well as maintenance, renewal, and replacement options with the goal of optimising the performance of assets to reduce flood risk to people and the developed and natural environment.

The project duration is likely to be two to three years. The current scoping study of six months duration was started in April 2003 to establish the detailed requirements and to develop and demonstrate possible approaches. The project will provide a prototype system that will be trialled at a number of sites before operational implementation

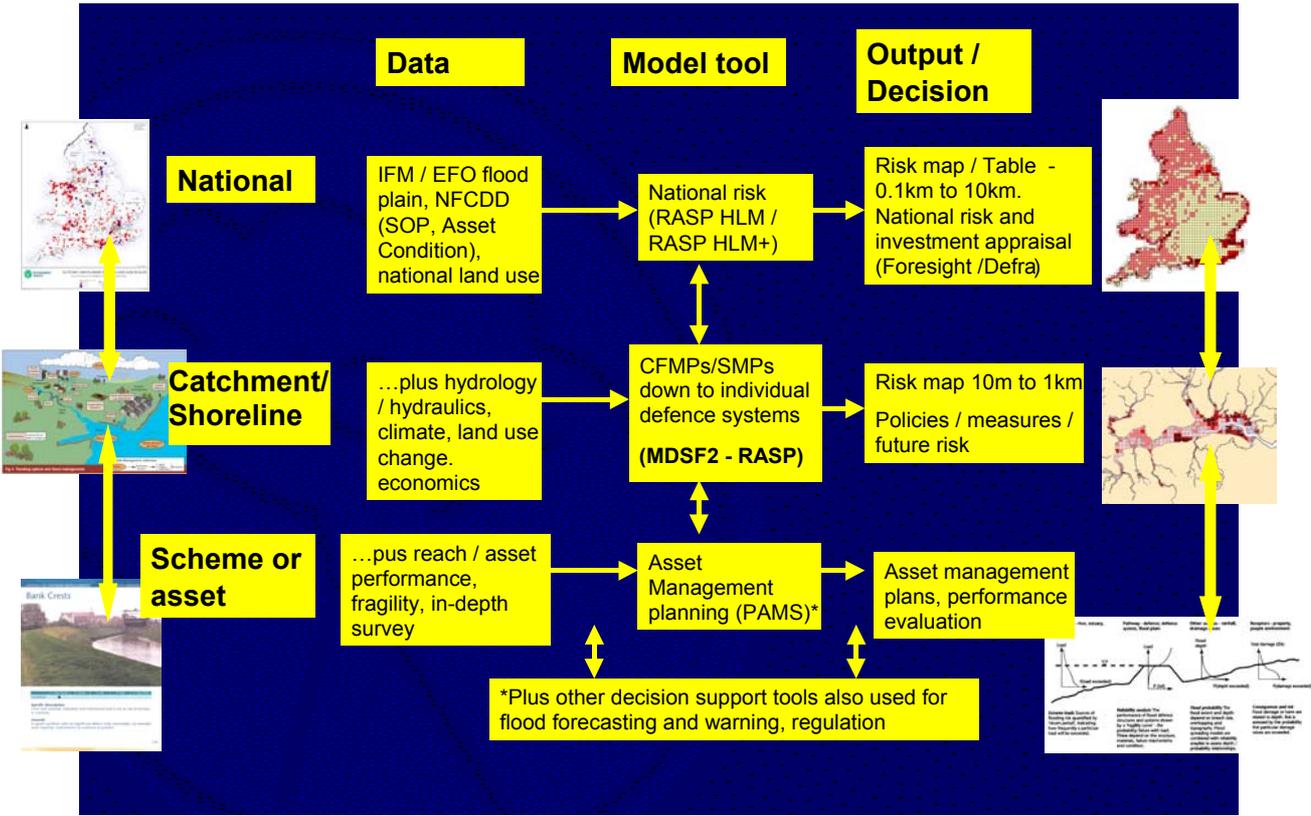
In the long term, a software-supported, performance-based asset management system (to include training, documentation, software interface, etc.) will be developed.

### Background and related developments

Relative to existing methods of appraisal for new flood defence schemes, current approaches to justifying maintenance needs are more crude, as identified by the recently completed report on Operations and Maintenance Concerted Action. The PAMS project will provide an asset management system that enables flood and coastal defence managers to assess the performance of and maintenance requirements for flood defence assets. Furthermore, the project will provide a means of identifying the optimum management intervention to achieve a particular outcome.

PAMS is a part of the overall framework being developed for flood risk management in England and Wales. The Figure shows the ‘tiered’ approach, with National, Catchment and Shoreline, and Scheme or Asset scales. PAMS supports decision-makers to manage specific schemes, reaches or assets, with performance requirements coming from catchment and shoreline management plans. Development of PAMS within this integrated framework will ensure that assets are managed to meet overall plans, and that the contribution of asset management to overall risk reduction is properly understood.

The risk-based approach will follow the framework set out in the Review of Risk, Uncertainty and Performance (Report FD2302/TR1, available on the Agency web site). PAMS will also draw on many other R&D projects for knowledge on behaviour, performance and reliability of a wide range of asset types.



**Figure 1 Planning tools for flood risk management**

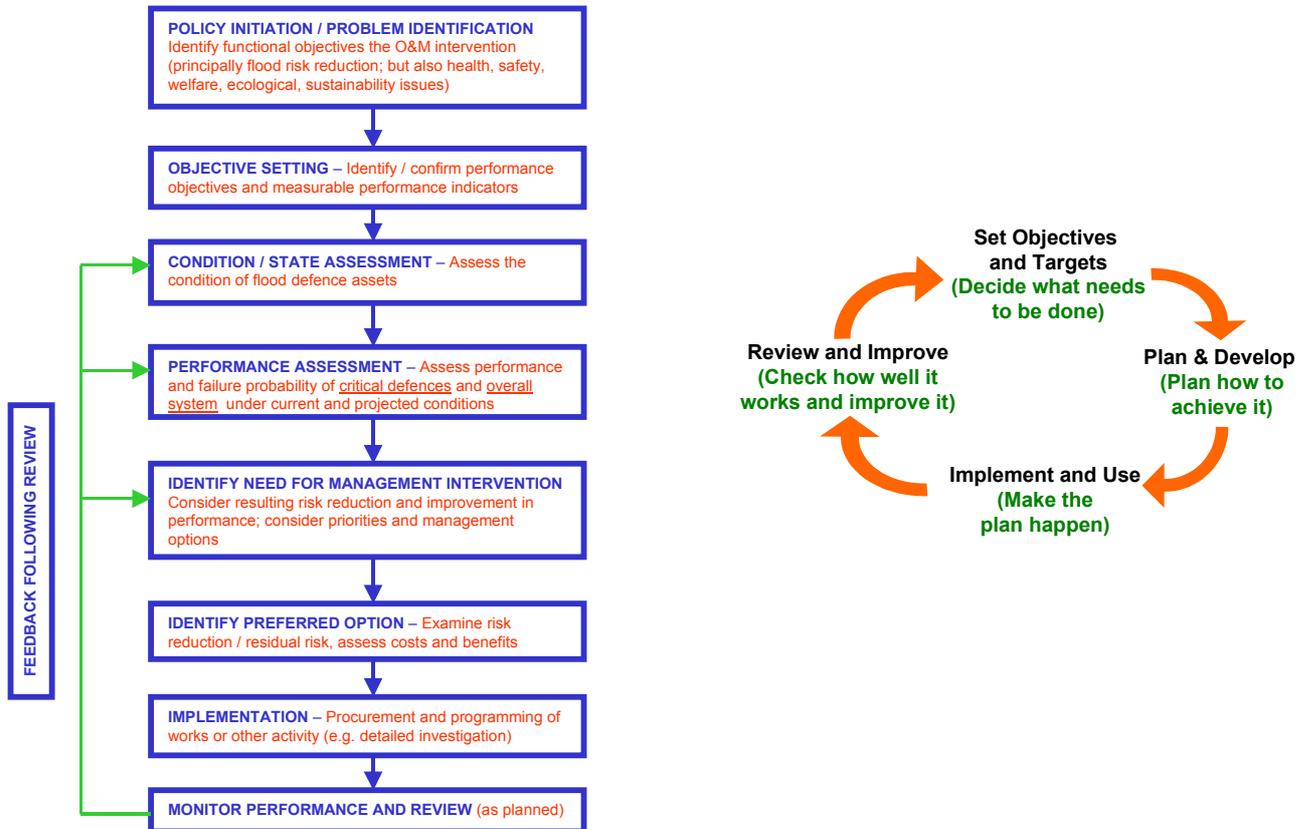
Figure 2 charts the stages of the management cycle identified in the ‘Logical Framework for O&M (Operations and Maintenance) Activity,’. This is a development of the generic four stage management process forming the basis for EA process management and will form a starting point for development of PAMS.

**Issues**

The following key problems will need to be addressed by the PAMS project:

- the flood defence system is complex, with multiple components contributing to performance (or reliability) during a flood event
- it is difficult to obtain meaningful indicators of asset performance by visual inspection alone.

- assessing the improvement in performance resulting from management interventions (ranging from routine maintenance to major renovations) is difficult.
- whole life asset management will need closer integration of maintenance and capital decision-making with good representation of performance over the asset's life

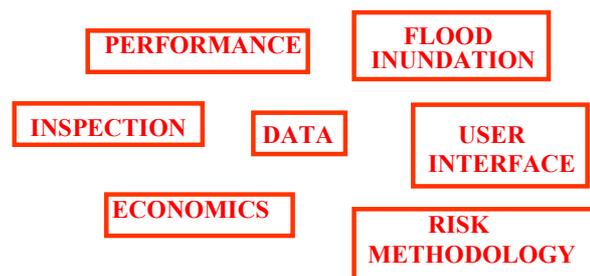


**Figure 2 Logical Framework for O&M Activity and EA 4-stage management process**

### A modular approach

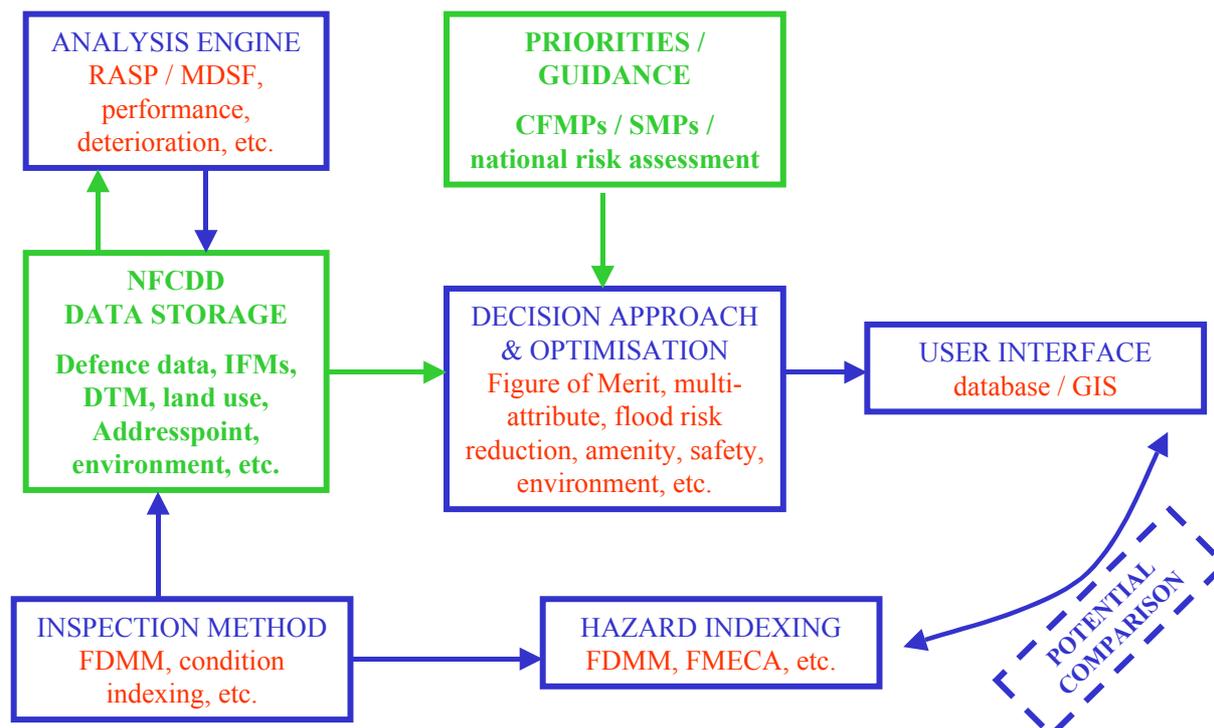
The following diagrams represent the current vision for the development of the PAMS project. These will be revised as they are developed during the initial scoping phase. It is likely that a modular approach to flood defence asset management will be developed (Figure 3). This will allow both a phased introduction of new practices and further updating of practice in light of future research. For example, in some circumstances, a practitioner could conduct calculations in accordance with the FDMM, but using RASP and MDSF to inform flood inundation calculations.

**Figure 3 PAMS modular structure**



A potential framework for the final PAMS system is outlined in Figure 4. This figure illustrates progression from a revised inspection method (updating data in the NFCDD) through analysis (e.g. flood inundation and economics) and decision making to the eventual user interface. In addition, potential for a parallel, more simplified system (similar to the current FDMM approach) is provided to allow for comparison calculations and, where necessary, rapid calculations to support emergency remedial measures.

The final PAMS systems must address not only the quantifiable aspects of flood defence asset management (e.g. flood inundation and economics) but also legal or quasi-legal issues (i.e. environment, safety, and amenity).



**Figure 4 PAMS analysis framework (Draft)**

This R&D Technical Summary is an introduction to R&D Project W5-070

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