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ASSET MANAGEMENT IN BRITISH WATERWAYS

Implementing a successful strategy in an evolutionary way

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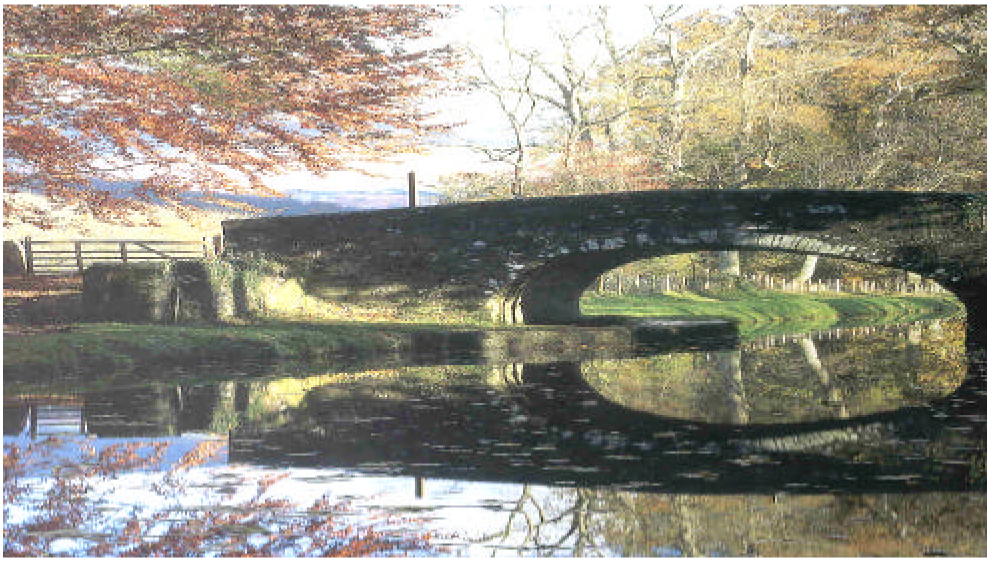
INTRODUCTION

British Waterways (BW) is a public corporation 30% funded by Government through the DETR (£61m in 2000/2001) with a total annual revenue of £190m and a staff of around 1900. Its responsibility is to manage and maintain canals, river navigations and thousands of associated structures. Financial and human resources must be directed to areas of greatest need in terms of operational requirements and public safety. A Government review in 1999 resulted in additional funding to deal with an arrears of maintenance programme of £260m. This includes £90m of urgent safety related backlog work. Asset management techniques have been successfully introduced over a number of years to underpin planning and prioritisation of investment.



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HISTORY

Most of the UK's canals were constructed between 1761 and 1830, the period of so called ' Canal Mania', coinciding with the Industrial Revolution in the UK. Following the advent of the railways in the 1830's and intense competition for trade, freight transport on the canals declined, and many canals fell into disrepair. The decline has been reversed in the last 20 years with an appreciation that canals are an integral part of the UK's transport, leisure and land drainage system. There has been a significant rise in the volume of leisure traffic, and a change in boat types from the traditional horse-drawn narrowboats to modern, powered craft.

British Waterways

3200km canals and river navigations
200 billion litres of water
1500 locks
3300 bridges
450 aqueducts
55 tunnels (up to 5km long)
90 large earth dam reservoirs
Wide range of business/leisure uses
Thousands of heritage, ecological
and environmental

BW manage 3200km of the UK's canals, largely for leisure boat traffic but also for public access, fishing, water transfer and routes for services such as fibre-optic cables. BW has a large and diverse asset portfolio with thousands of individual property and structural assets. Most of these were constructed at the forefront of the technology of the day and long before the principles of engineering were understood. Their current problems are related to their function, history, setting, usage and interaction with other structures. These 200 year old assets are in full time operation, and their demands for care increase with age.

Because of the relative lack of investment over a period of over 100 years, there is a legacy of maintenance problems that BW is striving to overcome. Remedial works are increasingly constrained by the important heritage and environmental considerations of modern society.

BW are also involved in a series of exciting restoration schemes over the whole of the UK and are currently spending over £1m per week on these. At the same time BW is developing rapidly into modern areas such as telecommunications, water transfer and property development. These must all be taken into account within our asset management process.

ASSET MANAGEMENT EVOLUTION - where have we come from?

BW's asset management strategy has developed progressively since the late 1970's, an evolutionary process that has had great benefits. Up to the late 1970's, there was inadequate knowledge of BW's assets and our strategy tended to be reactive and based around the fire-fighting approach of directing limited financial and staff resources simply towards keeping the system running. A number of failures and precautionary closures, notably of the tunnel stock, meant that the canal system was beginning to become truncated at a number of points.

Gradual move to a corporate focus

During the 1980's no corporate asset inventory existed, but there were attempts to devise rudimentary asset management systems, directed at the prioritisation of urgent maintenance and repairs projects, and as a way of planning the annual engineering investment round. These systems were largely driven by engineers and in the main focused on planning for major civil engineering projects. However, the principles were not universally accepted across the organisation and a series of 'unforeseen' engineering problems and emergencies meant that such planning only enjoyed a limited degree of success.

By the 1980's, statutory inspection procedures for some assets, such as bridges and reservoirs, and safety inspections for tunnels, were very comprehensive, but for most assets were not as well defined. The history of failures in BW shows that in nearly every case telltale signs of impending failure were present well before the event. However in the absence of previous inspection records, the significance of these signs may not always have been understood.

Regionalisation

In 1987, BW underwent 'Regionalisation', with power and accountability devolved from the centre to 5 geographical Regions and component Waterway units. With a growing realisation that an asset inventory was urgently needed (a capability provided through the Maintenance Management System), this was developed in 1988 on a Regional basis, by converting to metric and uploading data which already existed from a 1964 survey. It resulted in one engineering (MMS) and one property (PMS) database in each Region, but with wide variations in the type and quality of input data. There was no adequate corporate method of interrogating these individual databases. This lead to a deficiency in strategic management information and an annual 'begging bowl' philosophy in bidding by the Regions for the share of the corporate pot.

Risk Awareness—First Data

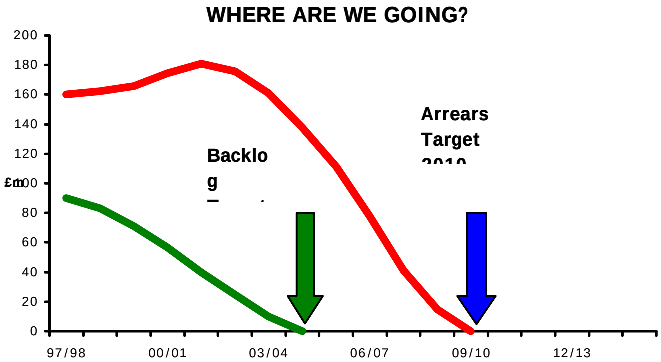
1997 saw a growing awareness by BW management of the degree of risk posed to the organisation due to lack of knowledge of it's assets (by comparison to some well publicised problems in other large organisations). It was clearly impossible to obtain sufficiently detailed data on all of BW's 26000 known assets in a short time and with the resources available. However, some data was required quickly.

An initial rapid assessment exercise by local staff in 1997 (capturing data on hand-held data-recorders against pre-defined questions) generated information on the dimensions, condition and consequence of failure of all principal assets and on the canal 'track' at 100m intervals. This data was downloaded into the MMS database, analysed, and used in the initial investment prioritisation. At the same time it was used to generate a programme of more detailed inspections to validate and improve the data. These are currently underway.

1997 also saw the introduction of mandatory asset inspection procedures (AIP97), and the appointment of BW's first Asset Manager. The Asset Manager's initial task was to merge the 5 engineering asset databases into a single corporate inventory to support submissions to Government for increased funding over a period of 10 years.

The funding announced in 1999 was to

allow the elimination of the urgent safety related backlog of works of around £90m by 2004, and of a further £170m arrears of maintenance by 2010.



Note that for a while, as we reduce the safety backlog, other maintenance arrears will increase. This is a priority judgement. However, once the safety backlog is eliminated, switching annual funding to maintenance arrears will ensure that the overall target is completed ahead of time.

"The asset inventory has enormous value to the organisation and is the result of many years of effort. It is THE definitive corporate inventory to which others will be merged with time (such as operational buildings, financial etc). It provides an analysis tool for management which allows comparison and prioritising on an equal basis between differing asset types"

THE BW ASSET MANAGEMENT PROCESS – where are we now?

Our asset management process defines a framework by which we manage our assets to provide the services required by our customers and the protection expected by our neighbours. It is a vital component in our investment strategy and has been accepted as fundamental to our success.

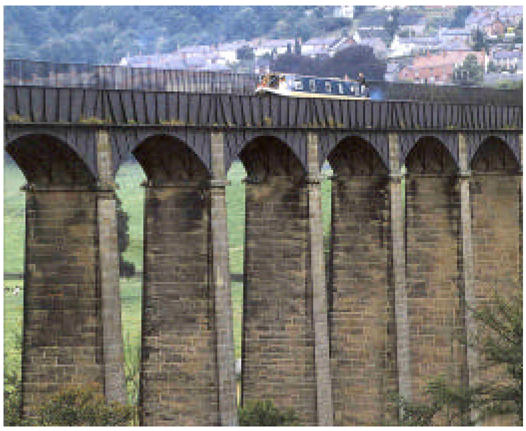
The strategic objectives of the process are to:

- help convert policy decisions into appropriate actions
- provide an accepted mechanism for decision making at all levels of the organisation
- allow the deployment of finite resources in a fair, analytical and transparent way
- manage the risks associated with the maintenance and operation of our assets
- enable satisfactory monitoring of progress against key performance indicators (KPI's)
- support submissions to Government and others for funding

BW has adopted a staged process with asset management involved at all 4 stages. These are:

1. Strategic Planning – inspections, forward planning and programming
2. Individual Project Planning – feasibility, design, appraisal and procurement
3. Project Control – progress, forecasts, expenditure and quality control
4. Performance Monitoring – post project appraisal, delivery against objectives

"We have also provided targeted training in use of the MMS system and in inspection procedures required under AIP2001. This of course is an ongoing commitment"



To input into the above, we must be able to:

- quantify the number, type and condition of our assets (via the corporate asset inventory) and provide information on their serviceability and rates of deterioration.
- identify the precise location of each asset (by

"We have introduced the concept of data owners at each Waterway unit whose responsibility it is to check and input data. This concept of ownership of data is vital to the continuing success of the inventory"

use of a unique chainage code identifier)

- quantify risk and therefore prioritise expenditure and resources on the basis of need and consistent standards, at both Regional (via the 3 year rolling Priority Project Programme or PPP) and Waterway (via the General Works Programme or GWP) levels
- provide comparative analysis across the organisation
- report progress against the KPI's (including Waterway Standards)
- help identify the long term investment needs (via an estimating cost database)

With the basic systems in place since 1997, the current focus is on the following key areas:

- Consistency of approach – training is being given to all key staff and is a significant part of induction training
- Asset Inventory – engineering data density and quality are increasing with time.
- Inspections - The mandatory asset inspection procedures have been refined, updated (as AIP2001) and implemented across the organisation. Staff resource needs are being addressed.
- PPP (projects > £20k) – the asset management process is being used to plan and monitor the progress of BW's rolling 3 year programme in an auditable way. Essentially if inspection and monitoring are deemed insufficient to manage the perceived risk, then major works can be initiated to mitigate or remove the risk. These projects are balanced across BW's various business sectors.
- GWP (projects <£20k) – increasingly the results of the asset management process are being used to assist the Waterway units in budgeting for their routine maintenance programmes and in the undertaking of urgent safety related works.
- Procurement – innovative approach to partnerships, omnibus contracts, and bulk purchasing, to ensure delivery of the projects in the most effective way

Mandatory Asset Inspection Procedures (AIP2001)

The inspection of assets is crucial to the success of any asset management process. Whilst local length and vulnerable points inspections have always been carried out, these tended to be ad-hoc. Since 1992 there has been a hierarchical system of inspections in accordance with a formal timetable, producing reports on condition and identifying specific defects with recommendations for remedial works. A group of 20 Principal assets have been identified (those fundamental to the safe management *of the canal* system and whose failure would lead to major operational disruption). Other assets are termed Non-Principal and are not normally subject to the same rigorous inspection regime.

The hierarchy of inspections is:

- Length Inspection – normally monthly by experienced local Waterway staff to focus on change of condition
- Intermediate Inspection – normally annually by a Regional engineer or building surveyor to focus on rates of change

- Principal Inspection – normally 10 yearly by a specialist (chartered civil, geotechnical, structural or M&E engineer, etc) to focus on the significance of changes

These are all additional to any statutory inspections necessary for reservoirs and public road bridges

- Customer Service Inspection – this is an annual inspection by the Waterway Manager to provide a review of the condition and operation of the assets and to ensure adherence to the Waterway Standards applying to that Waterway.

Under AIP2001, roles are now clearly defined and responsibilities specifically placed on post-holders, from routine maintenance staff up to Director level. This includes for the formal training and certification of inspectors

Consistent Application of Grades

In the overall assessment of risk, BW utilise a methodology which recognises both an assets current condition (Condition Grade A to E) and the effects on others should it fail (Consequence of Failure Grade 1 to 5). There has been a very deliberate decision not to use purely numerical grades as there would be a temptation to set up a matrix, and by simple multiplication of numbers, assign a single number as an overall risk score. BW have taken the view that this would be an oversimplification and prefer to have both grades reported to allow informed management decisions to be made on investment priorities at Waterway level. However, it is fair to say that BW are concentrating their efforts initially on the worst condition grades where these are accompanied by a high consequence of failure grade.

A further refinement is the application of a Serviceability Score (1 to 3) to assets whose assessed condition may be good, but whose functionality may be inadequate (such as an under-sized culvert, or a bridge which may be under-strength for modern traffic loadings).

It has been found that with appropriate guidance to inspectors it is possible to apply these grades consistently to a wide variety of assets, allowing cross-functional comparisons to be made.

THE FUTURE – where are we going?

It is difficult to predict the future in a world where there are only limited long term investment guarantees from Government, and when societal expectations regarding risk management are becoming more onerous for organisations like BW. Because of this BW has been tasked with increasing access to self-generated funding.

However, it is reasonable to assume that there will be progress in the following areas in the next few years:

- Asset management will continue to be the prime tool with which to monitor expenditure and income against targets set by both Government and the Board. BW is demonstrably on-target to reduce the safety related backlog works to zero by 2004 and arrears of maintenance by 2010
- There will be an increasing concentration on the quality of data in the asset inventory and in particular on the rates of deterioration of Principal assets from one inspection to the next (the asset condition profile).
- The developing estimating cost database will be further refined as the results of the PPP and the GWP become clearer. Analysis has already started to provide information on annual 'Steady State Expenditure' to maintain the canal system in a serviceable condition. Current calculations indicate an annual investment of between £25m and £35m is required *(depending on the ratio of* best case and worst case renovation frequencies)
- It is recognised that adequate staff resourcing is essential. One aspect that is already clear, is the decision whether or not to outsource inspections. BW's experience is that the necessary quality and consistency cannot be fully achieved using external staff resources. Although this has necessitated a change in paradigm in BW, it has been found that the development of a small number of experienced and dedicated core BW inspection teams has benefited the organisation

in many other ways. Training programmes are being developed for all relevant staff to ensure consistency of approach to inspections and the formal certification of inspectors.

- There is an ongoing review of BW's future IT strategy, which happily has seen asset management placed at the very centre. The options will undoubtedly include on-site data capture and download into the asset database. Through a GIS front-end, data and reports will increasingly be available on-line to inspectors and managers. The review is likely to recommend a phased procurement and adoption of new systems over a period of 3 or 4 years (in other words no Big Bang), which can solve the existing problems of integration and co-ordination across all areas of the business
- Joint venture initiatives such as Water Grid, Telecommunications, and Property will become increasingly important to BW's business and have the potential to generate a steady and secure income stream thus reducing the reliance upon Government grant. In all of these, asset management has a fundamental and increasing role to play, and there will be development of risk management techniques to consider business risks as well as safety aspects.
- The gradual inclusion of property, apparatus and environmental assets will ensure a consistent and fair approach to investment needs across the business, and will form a key part of the Waterway business plans.
- There will be a review of KPI's, ensuring that the most appropriate indicators are used

CONCLUSIONS

BW's experience is that asset management can be introduced to a geographically and historically disparate organisation in an evolutionary and phased way. The successful use of asset management techniques can bring clarity to an organisation which is struggling to understand and manage its investment needs.

It is unrealistic to assume that all deficiencies can be remedied at once but two first steps are the most important; these are the generation of a good corporate asset inventory, and the adoption of formal inspection and reporting procedures.

It is absolutely essential to have support for the process at all levels in the organisation. Organisational discipline is needed and time is well spent in engineering out any ability for staff to "get round the system"

And the ultimate success of asset management?
(Editor)

Being on the Board of a company managing 200 year old assets that have serious consequences for life, property and the environment if they fail is not the most envious of positions. That is perhaps why the Board of British Waterways thoroughly endorses and is the most enthusiastic supporter of asset management in the company—it enables them to manage their risks, and to demonstrate this management so that the charge of negligence cannot be laid at their door in the event of an accident!

ASSET MANAGEMENT PROVIDES THE FRAMEWORK TO

- help convert policy decisions into appropriate actions
- provide a mechanism for decision making
- allow the fair deployment of resources
- manage risks associated with the use of assets
- monitor progress against KPI's
- support submissions to Government and others

The Personal Asset Management Evolution of Graham John Holland, the author, of this case study:

Following his graduation in 1976, and after 4 years spent with a Local Authority, Graham Holland joined British Waterways in 1980 as an engineering geologist in the Mining Section. He spent 12 years in that section in various roles but concentrating on the inspection, investigation and repairs to British Waterways 48 km of tunnel stock, and in confined spaces operations.

He was appointed Principal Geotechnical Engineer in the Technical Services Department in 1992 managing a team a team providing all geotechnical, land and hydrographic survey support to BW. He was responsible for developing asset inspection procedures for earth structures now in use nationally by BW and others.

In 2000 he was promoted to the position of Investigations Service Manager with an increased team including mining and tunnel engineers.

In 2001, he became British Waterways Asset Manager within the Operations Department, Watford. In this role he has responsibility for driving forward the corporate asset management process to ensure the attainment of agreed targets for asset maintenance and investment.