






What should be in the core specification?

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17th February 2009



Topics

- Review so far
- Condition data
- Inventory data
- Analysis programs



Wider context of UKPMS

- Radical approach – “zero based” (**Today**)
 - What do we need in a PMS, starting from scratch?
- Evolutionary approach – starting from existing core specification (**next workshop**)
 - Incremental modifications, practicality of each change
 - Why it has to be consistent
- **We will consider BOTH approaches**



Definitions

- Pavement management is:

“A business-like approach to the management of paved highway assets, including roads, kerbs, footways and cycle tracks”
- A Pavement Management System is:

“A set of tools or methods that assist decision makers in finding optimum strategies for providing, evaluating and maintaining pavements in a serviceable condition over a period of time”



What does a PMS do?



- A tool to assist consistent decision making
- Improving the decision making processes:
 - Budgeting (allocating funding)
 - Network maintenance (repair activities)
 - Network operation (meeting traffic needs)
- Improved decision making requires:
 - Knowledge of current inventory
 - Evaluation of present condition
 - Estimation of future condition



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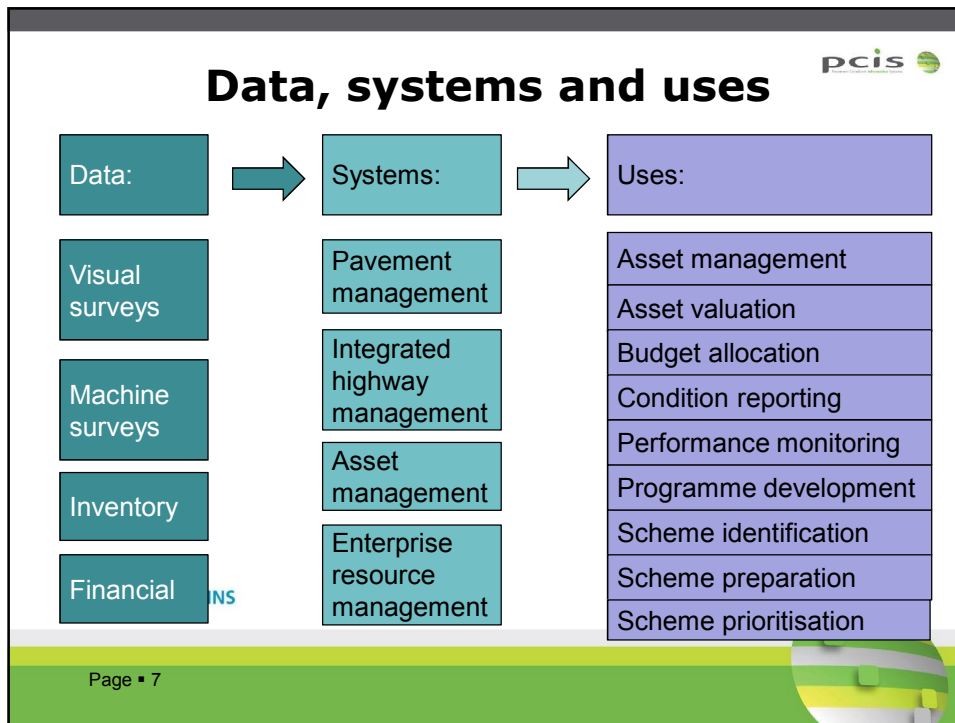
What does a PMS include?



- A PMS consists of three main components:
1. Systems to regularly collect highway condition data
 2. Computer databases to sort and store the collected data
 3. Analysis programs to evaluate repair or reconstruction strategies and suggest cost effective projects to maintain highway condition



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Improved decision making requires
 Evaluation of present condition

A PMS includes
 Systems to regularly collect highway
 condition data



CONDITION DATA


Condition data





- Reports from:
 - Safety inspections
 - Customer feedback
 - Service inspections
- Records of work carried out
 - Planned treatments
 - Reactive treatments
 - Streetworks



Condition data



- Reports from visual condition surveys:
 - UKPMS CVI
 - UKPMS DVI
 - HDM4 visual assessments (outside UK)
 - CHART
 - (and we used to have MARCH)
 - Bespoke local protocols
 - (+ any others?)



Condition data



- Reports from machine condition surveys:
 - SCRIM
 - GripTester
 - Deflectograph
 - FWD
 - SCANNER (+ other instrumented vehicles)
 - (and we used to have HRM)
 - Video surveys
 - GPR (+ any others?)



Condition data



- Condition data need to be located on the network (the pavement asset) to a sufficient level of accuracy.
- They could be expressed as:
 - Point values
 - Lengths (on the pavement)
 - Areas (of the pavement)
- And positioned:
 - By length (along the carriageway)
 - By length and offset (carriageway lane, footway, etc.)
 - By length, offset and depth (within the pavement)



Data requirements



- Level of detail
 - The amount of detail required in the data structure within the repository will depend on the granularity of the analysis to be carried out
- Location detail
 - The definition of the location of condition data in relation to the inventory will also depend on the complexity of the methods of analysis
- Anything else?




Condition data






- Have we identified what condition data we need?
- **Which** condition data should be in the **core** functional specification ?
- **WHY** should they be in the **core** (nationally defined) specification?







Improved decision making requires
Knowledge of current inventory
A PMS includes
Computer databases to sort and store the
collected data

INVENTORY



Inventory

- Length of roads
 - By class, by category within hierarchy, by function
- Width of roads
 - Location and area of paved surfaces
- Materials and depth of construction of paved areas
 - Vary from place to place
- How much detail is needed?



Inventory detail



How much other information do we need in the inventory?

- Types of surface?
- Types of construction?
- History of maintenance?
- Features?



Inventory requirements



- Amount of information gathered
 - will depend on the purposes for which it is needed, compared with the costs of gathering, storing and maintaining it.
- Information actually available
 - will depend on costs of acquisition, storage, maintaining accuracy, through a history of change and the policies of the local highway authority
- Amount required for a PMS will depend on
 - the complexity of the analyses to be carried out and
 - the granularity of the analysis (whether broad brush or fine detail)



Data management



- Inventory data will need to be stored and the record maintained through an ongoing process of change
 - Network length only changes gradually, historically it has grown by about 1% per year
 - Structural change (alteration and reconstruction) probably affects a similar length (1% per year)
 - Over 5 years, up to 10% of network inventory could be physically altered.



Inventory data



- Have we identified what inventory data we need?
- **Which** inventory data should be in the **core** functional specification ?
- **WHY** should they be in the **core** (nationally defined) specification?



Improved decision making requires

Estimation of future condition

A PMS includes

Analysis programs to evaluate repair or reconstruction strategies and suggest cost effective projects to maintain highway condition

ANALYSIS PROGRAMS



Condition assessment

- To understand pavement condition, each method of collecting data about pavement condition has to be interpreted e.g.
 - a measured rut depth can be rated for importance in relation to the level of service of the road
 - ***And hence turned into an assessment of the need for treatment and the priority for that treatment***
 - A measurement of transient deflection (under the Deflectograph), which is a measure of stiffness,
 - ***Can be interpreted as an indication of strength and hence longevity of the pavement structure***



Condition assessment



- In practice, each of the different condition measurement tools has been developed independently
 - **So the results from each method are independent and may not be comparable**
- Different visual survey methodologies describe pavement condition in different ways and are not readily convertible
 - **Therefore a PMS that has been designed to use one methodology may not be able to use a different set of condition (or defect) definitions**



Condition assessment



- To provide a comprehensive assessment of the condition of each element of the pavement there has to be:
 - A consistent method of combining results from different systems
 - A defined standard of what is an acceptable condition, and what is not acceptable, possibly including some sort of acceptability scale
 - A way of comparing sections with differing types, quantities and qualities of data
 - + anything else?



Need for treatment



- Each method of collecting data and assessing condition has an associated method for identifying or assessing the need for treatment
- The need for treatment at the network level may be a “broad brush” assessment, leaving detailed scheme design to be carried out at project level
 - *This can cause misunderstanding, especially where the network level assessment (and associated prioritisation) indicates one option but detailed scheme design indicates a different approach, and possibly a different priority for schemes*



Need for treatment



- To provide a comprehensive assessment of the need for treatment, and the appropriate treatment option, there has to be:
 - A consistent method of combining results from different systems
 - A defined range of treatment options, criteria for selecting each of them and for choosing between them
 - A way of comparing treatment options on sections with differing types, quantities and qualities of data
 - + anything else?



Need for treatment



- The treatment selection process may need other sorts of information:
 - About the pavement construction and materials
 - About the maintenance history (including streetworks)
 - About the change in condition over time (trends)
 - + anything else?
- This is likely to be needed at the project level, but may also be useful at the network level



Scheme lengths



- Having assessed condition, and identified the need for treatment, there is a question about the best treatment option and the best time to apply it.
- If schemes are prioritised on condition (worst first) the PMS needs some way of assembling lengths of pavement into treatment, scheme or project lengths
- This could be some sort of "interactive" process, to allow for the variation of condition along the road.



Scheme costs



- Having identified the need for treatment, and the viable projects or schemes, the PMS will need to ascribe a cost to each scheme
 - The scheme cost may not simply be the cost of the indicative treatment, but also the cost of traffic management, etc.
 - Prices may be related to the method of procurement (Either different rates within a term contract or different rates from different contractors)
- Either “worst first” or “economic” prioritisation of projects and schemes will lead to a future programme of work



Project prioritisation



- If schemes are prioritised on economic principles, assuming that there is an “optimum” time for each level of intervention, and that some treatments can be brought forward or delayed, in order to get better value for money
 - **Then the PMS needs to be able to predict the change in condition of the pavement over time.**
- This implies the importance of being able to track the condition of the pavement over time
 - **To be able to model the future condition trajectory from knowledge of the past trajectory (of either the individual length, or the pavement type)**



Programming schemes



- The future programme of work will have to be profiled over a number of years taking account of:
 - Available funding
 - Impact on network traffic management
 - Other resource constraints
 - Other network management factors
 - + anything else?



Impact of funding decisions



- Once a future programme of work has been assembled, with indicative costs for each project or scheme:
 - The overall level of funding can be estimated and
 - Profiled over a number of years
- If a different level of funding is applied
 - Projects or schemes may have to be re-profiled over a different period or
 - Alternative treatment options may have to be considered



Impact of funding decisions

- If schemes are delayed:
 - There is a risk that future repair work will be more extensive or intensive and will cost more
- If maintenance activity is reduced,
 - There is a risk that the overall condition of the network will deteriorate
- Both of these calculations require a model of the deterioration of the pavement (or the network)
 - so that the condition of the network can be projected forward



A feedback process

- PMS have been developed with
 - **Treatment selection processes**
 - **Condition projection techniques and**
 - **Costs**
 Based on relatively little information
- A PMS regularly gathers detailed information about pavement condition
- A feedback process would enable observed values to be compared with predicted values to improve future calculations
 - **In principle, a PMS could be designed to incorporate a self-learning feedback process**



Integration with other systems

- Information from a PMS is often integrated with other, wider asset management or enterprise resource management systems
- The PMS should be able to share data with a number of other systems
 - Safety inspection management systems
 - Reactive maintenance work ordering systems
 - Customer feedback management systems (including 3rd party claims)
 - Works ordering and management systems
 - Streetworks management systems



Integration with other systems

- Integrated highway management systems
- Transport and highway asset management systems
- Corporate Geographic Information Systems
- Corporate financial management information systems
- One major issue about linking to some of these other systems, and sharing data, will be the level of detail, and the granularity of the data.
- For a PMS the key requirement is to be able to locate the information on the road network



Reporting



- Information from a PMS is potentially useful in a number of ways.
- Each local highway authority has its own way of managing its business,
- The PMS may need to be integrated into those business process, procedures and systems
- Reporting from the PMS may need to be tailored to the individual authority's requirements.




Analysis programs




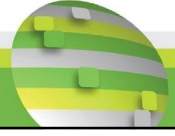
- Condition assessment
- Need for treatment
- Scheme lengths
- Scheme costs
- Project prioritisation
- Programming schemes
- Impact of funding decisions
- A feedback (self learning) process
- Integration with other systems
- Reporting




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Analysis programs

- Have we identified what analysis programs we need?
- **Which** analysis programs should be in the **core** functional specification ?
- **WHY** should they be in the **core** (nationally defined) specification?



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Discussion




The core specification

What has to be the same in all systems and **WHY**?

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Presented by Andrew Gallagher
Review of UKPMS core functionality
Workshop 1
17th February 2009
THANK YOU



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