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Pavement Management Strategic Plan Overview

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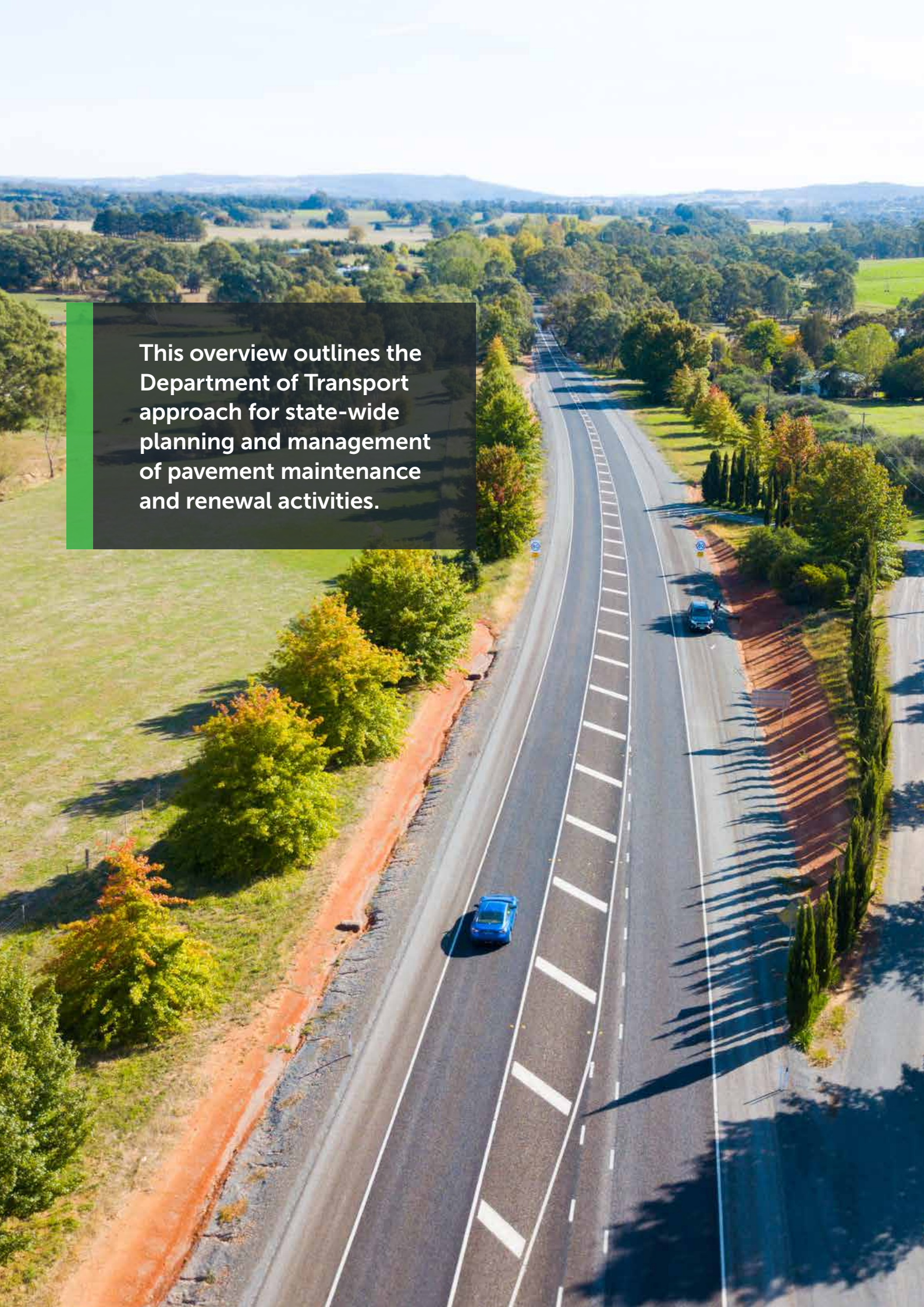


This overview outlines the Department of Transport approach for state-wide planning and management of pavement maintenance and renewal activities.

Context

Victoria's arterial road and freeway network is a critical component of the State's economic infrastructure, generating and supporting significant economic and social benefits to the Victorian community.

Across Victoria there are approximately 26,000 carriageway kilometres of arterial roads and freeways, over 3,180 bridges, 4,800 other structures (major culverts, major sign structures, noise walls and retaining walls), more than 3,400 sets of traffic signals and other electrical systems such as street lighting and freeway management systems.

This complex asset base puts Department of Transport (DoT) as one of Victoria's largest asset managers, with an estimated total pavement asset replacement value of $31.8 billion plus addition $9.2 billion for earthworks (figure current as of 30 June 2020). The movement of goods and people made possible by a road network creates wealth for individuals and corporations, and supports the delivery of services that aid social cohesion and economic development.

DoT is responsible for the planning, management and operation of the arterial road network on behalf of the Victorian Government. Agility and responsiveness are required to enable DoT to respond to dynamic conditions.

This document has been prepared as an overview to the key elements of the DoT's Pavement Management Strategic Plan for the determination of pavement maintenance and renewal requirements, where renewal includes both periodic resurfacing and pavement rehabilitation. Targeted scenario modelling to inform investment needs is a key element of the strategic plan.

This Pavement Management Strategic Plan has been developed based on best practice guidance from ISO 55000, including:

- Taking an integrated systems approach to Asset Management;
- Taking a strategic direction for the management of the pavement assets;
- Taking a Whole of the Life Cycle view; and
- Understanding the interdependency of cost, level of service and risk.

Scope

This overview is to be applied by DoT and parties acting on DoT behalf, when:

- Determining maintenance and renewal requirements for pavement and surfacing assets across the Victorian arterial network;
- Developing forward works programs inclusive of prioritisation considerations; and
- Evaluation of modelling scenarios to inform investment needs.

This overview is a condensed version of the DoT's Pavement Management Strategy that provides greater detail and presents supporting technical parameters.

Objectives

The Pavement Management Strategy seeks to support the key objectives as part of DoT's legislative responsibilities in the *Road Management Act 2004* and the *Transport Integration Act 2010*:

- Manage the asset portfolio to reinforce road safety;
- Optimise funding allocation to meet DoT strategic objectives;
- Enhance Pavement Management regime to meet service delivery needs; and
- Provide accessibility of data and information to make informed decisions.

Strategic Alignment

1. DoT Priorities and Strategic Interventions

Victorian transport objectives are articulated in the Transport Integration Act 2010 (TIA). DoT is working with transport partners, Local Government and others to identify transport priorities and the role of transport system plays in creating movement and place. This DoT has developed Strategic Plan which has the following six strategic directions:

- Support all journeys and users
- Enable new travel patterns
- Maximise the opportunities created by technological advancements
- Service and network reforms that complement the Big Build
- Promote the transition to an environmentally sustainable transport network
- Test, trial and rapidly deploy improvements

DoT has identified seven focus and priorities for 2020-2024 to assist in achieving the above directions, as follows:

- Safe journey for all
- New travel patterns and places
- Advanced technology and assets
- Service and network reforms
- Environment sustainability
- Innovation through engagement
- Empower out people

2. DoT Management Responsibilities

In addition to the TIA objectives, DoT has specific management responsibilities under the Road Management Act 2004 (RMA). The RMA articulates the role of a road authority in performing road management functions. Specifically, the RMA states that a road authority has general functions that include:

- Providing and maintaining a network of roads for use by the community;
- To design, build, inspect, fix and maintain roads and road infrastructure;
- To undertake works and activities that minimise impacts on the safe and efficient operation of the road, including on road public transport.

Asset Management Principles

Asset Management comprises a number of interrelated functions cutting across the whole of the DoT business. To assist with explaining how asset management functions relate to the statutory obligations, priorities and interventions above, DoT is in the process of developing Asset Management Policy that will further articulate asset management principles, as shown in Figure 1.

These asset management principles apply to all assets within the DoT portfolio. These asset management principles have been adopted to guide the Pavement Management Strategy. The Strategy further articulates how these asset management principles apply to management of the pavement and surfacing asset portfolio.

Pavement Management Core Business Activities

The purpose of assets is to enable the provision of services to the community. DoT is tasked with managing infrastructure assets to provide community services. Within the constraints of available budget, DoT manages their portfolio of assets to minimise whole of life costs.

Pavement and surfacing assets are high value and asset failure presents high risk to service provision. As such, DoT adopts sophisticated pavement management practices to achieve best value.

Table 2 demonstrates the alignment between the whole of portfolio asset management principles above and more specific pavement management principles which DoT uses to guide planning, investment decisions and asset management processes.

Figure 1: DoT Asset Management Principles

Table 1: Alignment of Core Business Activities to Asset Management Principles

	Pavement Management Core Business Activities	DoT Asset Management Principles						
		Manage the asset to reinforce road safety	Manage the risks to ensure roads support customer needs	Increase Community resilience to natural disasters and other system disruptions	Manage the road assets to support future land use change in transport needs	Meet statutory obligations	Sustainably manage assets to minimise whole of life costs	Deliver level of service, at the lowest long-term cost to the community
1	Adopt service focussed outcomes that support road safety, value creation, political and environmental objectives	✓	✓		✓	✓	✓	✓
2	Collect data to inform evidence-based decisions regarding investment options	✓	✓		✓		✓	✓
3	Adopt predictive modelling techniques to assess network wide costs and benefits for different investment scenarios			✓			✓	
4	Prepare business cases for funding consideration that reflect the risk and LoS outcomes for pre-defined investment scenarios	✓	✓	✓		✓	✓	✓
5	Apply risk management and balance with levels of service, for optimal outcomes, within the constraints of the available budget	✓	✓			✓	✓	✓
6	Allocate activity-based funding to regions at a program level			✓	✓		✓	
7	Leverage local expertise within regions for project level decision making, to empower accountable decision making and increase program efficiency	✓	✓					✓
8	Monitor performance to measure effectiveness of investment decisions, including output, service, access and financial performance metrics	✓	✓	✓		✓	✓	✓
9	Deliver an annual works program that supports the pavement's program objectives and expected outcomes	✓	✓	✓			✓	✓
10	Manage delivery of works programs to achieve state-wide performance targets			✓	✓	✓		✓
11	Adopt a learning culture to continually improve and evolve our planning processes				✓			✓

Investment Decision Making Principles for Pavement Management

1. Investment Drivers

The DoT Pavement Management Strategy focusses on maintenance and renewal programs for surfacing and pavement assets, for which core drivers of investment include:

- Safety
- Economic Benefits
- Functionality
- Network Preservation
- Whole of Life Costing
- Capacity
- Quality
- Responsiveness

Table 2: Road Maintenance Categories and definitions

RMC Score	RMC Definition
1	Those roads, which form the principal avenues for communications between major regions, including direction connections between capital cities
2	Those roads, not being Class 1, whose main function is to form the principal avenue of communication for movements between: • a capital city and adjoining states and their capital cities; or • a capital city and key towns; or • key towns.
3	Those roads, not being Class 1 or 2, whose main function is to form an avenue of communication for movements: • between important centres and the Class 1 and Class 2 roads and/or key towns; or • between important centres; or • of an arterial nature within a town in a rural area.
4	Those roads, not being Class 1, 2 or 3, those main function is to provide access to abutting property (including property within a town in a rural area).
5	Those roads, which provide almost exclusively for one activity or function, which cannot be assigned to Classes 1 to 4

2. Road Maintenance Categories

DoT uses Road Maintenance Categories to assist with prioritisation of maintenance and renewal investment on the road network. Road Maintenance Categories use key factors such as route connectivity and access, traffic volumes, number of commercial vehicles/principal freight network, tourist priority route and public transport to establish relative functional classification levels.

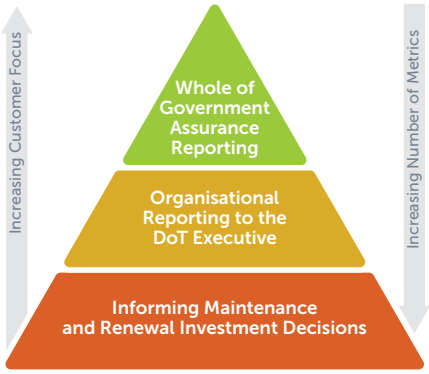
3. Levels of Service

Assets exist primarily to support the delivery of services to customers. Road users have expectations that the network supports safe and comfortable journeys for people and goods. Our customers intuitively understand the need for different levels of service that reflect the different road categories and how the roads are used.

Our commitment to customer levels of service will be supported by measurable technical service standards and intervention criteria across the Road Maintenance Categories. The technical service standards documented within the Pavement Management Strategic Plan will cover output, service, access and financial performance metrics. The vertical transparency between the customer levels of service and the technical service standards will drive our program development tasks and will support our annual monitoring, evaluation and reporting tasks.

The range of performance metrics available can be used to monitor, evaluate and report performance of the pavement portfolio. The number of performance metrics used will vary, depending on the business purpose, as is outlined in Figure 2.

Figure 2: Business Uses of Technical Service Levels



The primary technical intervention criteria used to manage pavement and surfacing assets are roughness, rutting and cracking. In recognition of different customer needs and associated differences in road use and function across the Victorian arterial network, DoT have adopted scalable intervention levels based on the Road Maintenance Category definitions. Each combination of treatment option, Road Maintenance Category and Intervention Criteria has an intervention level set.

DoT has used a pavement management system to assist with modelling various investment

Figure 3: Indicative Network Wide Intervention Criteria

RMC Category	Periodic Intervention Resurfacing criteria	Renewal Intervention Rehabilitation criteria
Service Level 1	2.9 IRI roughness 10-12mm rutting >10% cracking	3.4 IRI roughness >12mm rutting No limit
Service Level 2	3.0 IRI roughness 10-12mm rutting >10% cracking	3.8 IRI roughness >12mm rutting No limit
Service Level 3	3.0 IRI roughness 12-15mm rutting >20% cracking	3.8 IRI roughness >15mm rutting No limit
Service Level 4	3.4 IRI roughness 12-15mm rutting >20% cracking	4.2 IRI roughness >15mm rutting No limit
Service Level 5	3.8 IRI roughness 12-15mm rutting >20% cracking	4.6 IRI roughness >15mm rutting No limit

scenarios (refer section 5). Figure 3 lists the interim intervention levels used to trigger treatments within the modelling tool.

4. Planning Horizons

DoT adopts a ten year planning horizon to inform strategic decision making. For pavement and surfacing assets, DoT models ten year forward programs to inform investment decision making.

These strategic modelling outputs are used to develop a more detailed four year forward program. This four year forward program is then developed into an annual delivery plan.

Figure 4: 10 Year Investment Horizon

5. Scenarios

Investment decision making requires a balancing of cost, risk and level of service. That is, different levels of investment will produce different risk profiles and service outcomes. For pavement and surfacing assets, DoT uses predictive tools and techniques to model different investment scenarios, as follows:

1. Zero Renewal Funding (routine maintenance funding only): This scenario acts as the lowest boundary constraint. This scenario is used to calibrate the model to test the model configuration. Minimum routine maintenance activities are required in order to prevent premature asset failure/ allow asset service lives to be achieved.
2. Holding Current/Existing Renewal Funding: Assumes the recent (I.e. past three years) level of renewal and routine maintenance funding is maintained over the 10-year planning horizon, with a nominal CPI increase each year. This investment considers any efficiency targets that may be in place from central government. This investment level is unlikely to realise additional benefits related to road safety and predictable journeys for our customers.
3. Unlimited Renewal Funding: This scenario acts as the highest boundary constraint. This scenario is used to calibrate the model to test the model configuration.
4. Holding Current Service: Assesses the level of renewal funding required to hold the network condition at the current LoS. This option will typically hold the residual renewal liability in year 0 at a similar level in year 10. Liability is expressed in terms of financial commitment required to address service breaches (as opposed to length of network outside of service standard). As the network is in a state of decline, this investment level is likely to realise minimal additional benefits related to road safety and predictable journeys for our customers.
5. Moving to Desired Service Target: Assesses the level of renewal funding required to progressively move towards and sustain the network condition at the desired service level. The desired service can be higher or lower when compared to the current service delivered through current funding. The service target can be either a single target or a range of targets from minimum to desired. Pavement condition parameters and index are used as the service target measure, where the current desired service target is modelled as zero maintenance and renewal liability in year 10. This investment level provides the opportunity for Victorian Government objectives such as efficiency, road safety and journey benefits to be maximised

The investment level required for each of these scenarios, along with the associated risk and level of service outcomes, are used to inform business cases and annual planning processes. Central government uses this information to make an informed decision regarding the annual budget allocation for pavement and surfacing programs.

DoT then allocates funding to program delivery, in a manner that maximises efficiency and limits risk.

Each of the investment scenarios above assesses benefits and costs associated with treatment options, across the whole of the DoT arterial road network. The treatment options modelled are triggered when condition deteriorates beyond a specified intervention level. To ensure investment is targeted at areas of greatest need, intervention levels are set on a sliding scale depending on the relative strategic importance of the road. Road Maintenance Categories are adopted to assist with assigning a level of importance to a road and by extension assist with modelling the most efficient use of available funding and management of risk.

Current Improvements

DoT is currently undertaking and planning various improvement initiatives to further enhance pavement management processes and associated road user outcomes. Any changes, additions or reprioritisation of improvement initiatives within the pavement management improvement plan will be under the oversight of the DoT Asset Management Capability Improvement.

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