

# SEADRIF Knowledge Series: Financial Protection of Public Assets

## Fact Sheet 4: Public Asset Management and Registry



**Disaster Risk Financing  
& Insurance Program**

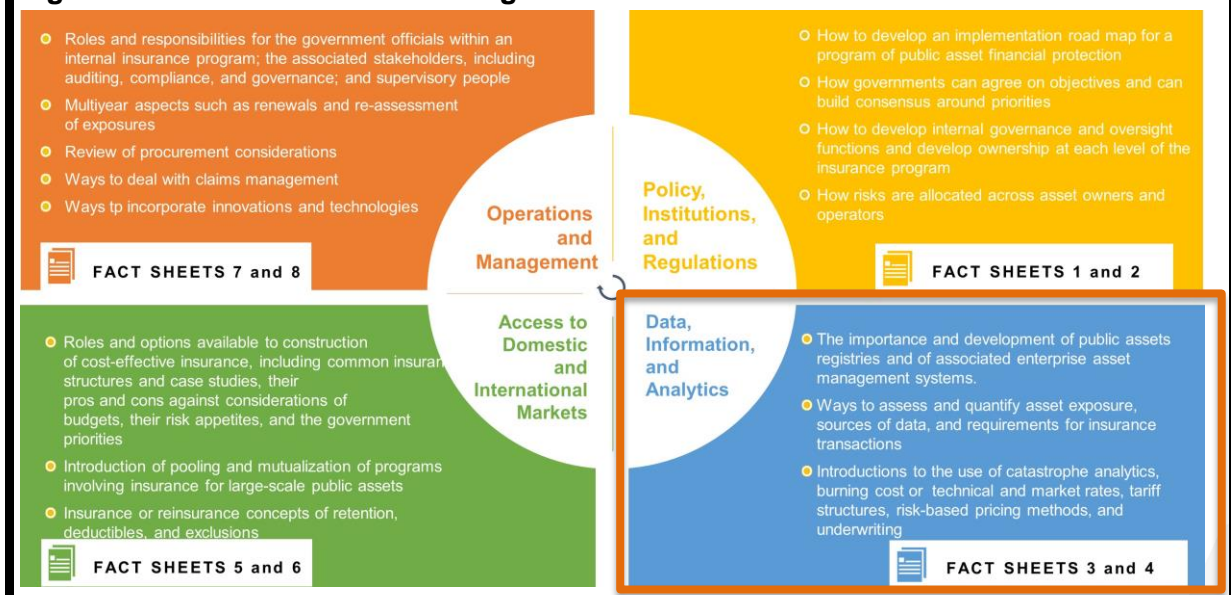


## The SEADRIF Knowledge Series: Financial Protection of Public Assets

This fourth fact sheet<sup>1</sup> is part of a Knowledge Series that supports government officials as they develop their understanding of the steps needed to design, develop, deliver, and operate effective financial protection of public assets, particularly through risk transfer and insurance. The Knowledge Series encompasses an end-to-end development of public asset financial protection and insurance, as shown in figure 1. See previous fact sheets in this series for a more detailed introduction.

Each fact sheet will cover a major element of the process and will highlight considerations to assist government officials and other stakeholders who are tasked with developing solutions. New terminologies are highlighted in itali and defined in the glossary.

**Figure 1. Overview of the Knowledge Series**



<sup>1</sup> Drafted by Lit Ping Low, Steven Eglinton, and Benedikt Signer, Disaster Risk Financing and Insurance Program, the World Bank. It draws on prior World Bank work supporting the Government of the Philippines on Design of a Public Asset Registry. The draft will be refined and finalized after the series of SEADRIF webinars about public asset financial protection, and it will build on feedback from the SEADRIF members and other webinar participants. The findings, interpretations, and conclusions expressed in this fact sheet do not necessarily reflect the views of the World Bank, its board of executive directors, or the governments they represent. The World Bank does not guarantee the accuracy of the data included in this work.

## Introduction

Fact sheet 3 highlighted the importance of data and information to support the process of designing, developing, and delivering a public asset financial protection program. An important, vital, and effective way to hold and use the data and information gathered on assets is through a public asset registry (PAR). More broadly, however, a PAR can also support an improved, whole-of-government approach to asset management. Such support is the focus of this fact sheet, which draws on the experience of several global projects that are being managed by the World Bank and that supported the development of asset management strategies and PARs.

The fact sheet is structured as follows:

- *Key concepts and benefits of asset management.* This section provides a brief overview of the benefits of better asset management and associated concepts in line with international standards.
- *Key components of a PAR.* Each country must consider its local context in designing a PAR system. This section provides an overview of a conceptual PAR, along with brief descriptions of its core components and summaries of the PAR development experience in different countries.
- *Implementing a PAR.* Developing a PAR presents significant design challenges, so a phased approach to implementation can be used to address each country's circumstances. This section provides a guide to potential implementation processes, key challenges, and potential mitigation measures.

## Overview of Public Asset Management and Its Benefits

In many countries, the government is usually the most significant asset owner, particularly when it comes to infrastructure assets vital to the socioeconomic functions of the country. The International Monetary Fund estimates<sup>2</sup> that public assets such as buildings, infrastructure, and land are valued at 120 percent of GDP in a number of countries sampled.<sup>3</sup> A World Bank review of governments in 52 countries<sup>4</sup> found that despite the significant value of existing assets, 98 percent of the governments surveyed focused on new investments rather than on tracking the existing stock of physical assets.

Assets are often managed in government department silos. Data about the assets are often outdated, incomplete, and stored on systems in formats that are incompatible with and inaccessible from other systems.

Amid the challenges of rising population growth, increasing risks from climate and disaster incidents, rapid infrastructure development and replacement, rising expectations of service

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<sup>2</sup> IMF estimates are for a broad sample of 31 countries

<sup>3</sup> IMF, Fiscal Monitor Reports, Managing Public Wealth, October 2018,

<sup>4</sup> See <https://blogs.worldbank.org/governance/where-have-all-public-investments-and-infrastructure-assets-gone>.

levels from assets, and government fiscal constraints, it is vital that governments efficiently and effectively identify, monitor, and manage their assets as important national resources.

The benefits of implementing better asset management practices include the following:

- *More effective and forward-looking decisions.* Decision-making can be more effectively supported through these:
  - More robust information and evidence
  - More comprehensive consideration of viable options
  - Integration of all life cycle costs of the assets in decision-making processes
- *Improved financial efficiency.* Spending effectiveness can be improved through these:
  - Better decision-making that is based on the costs and benefits of alternatives
  - More informed prioritization of investments, interventions, and asset protection activities
  - Greater recognition of all costs of owning and operating assets over the life cycle of an asset
  - More effective procurement
  - Greater risk-transfer market attraction, which results in better pricing
  - The ability to benchmark the conditions and performance of asset use
- *Improved governance and accountability.* Effective asset management can accomplish these:
  - Allow the government to demonstrate to owners, customers, and stakeholders that services are being delivered effectively and efficiently.
  - Develop a transparent and auditable basis for making trade-off decisions between service, risk, and price.
  - Improve accountability for the use of scarce resources through performance and financial indicators.
  - Provide the ability to benchmark results against similar organizations.
- *More effective risk management.* A broader, whole-of-government approach to asset management can accomplish these:
  - Improve legal and regulatory compliance.
  - Provide a better understanding of the risks to assets.
  - Improve cross-government relationships and interrelationships between different assets and networks.
  - Improve the priority setting in relation to ensuring the resilience of critical assets.
  - Improve business continuity practices.
  - Support investments in risk reduction, prevention of loss, and preparedness for rapid restoration of service.
  - Inform efficient financial protection to ensure access to funds for rapid rehabilitation of assets and restoration of service.
- *Improved customer service.* Enhanced monitoring of asset performance and services and the development of multidisciplinary management teams can accomplish these:
  - Improve the overall understanding of service requirements, options, and delivery.
  - Monitor the performance and control of service delivery to the required standards.
  - Improve service delivery to the population.

Since the 1980s, many organizations and practitioners have published guidance about asset management standards and practice. The International Organization for Standardization's (ISO) ISO 55000 has now become an international consensus-based standard for implementing, maintaining, and improving an asset management framework. A summary of the key elements of asset management as presented by ISO 55000 is provided in box 1.

### **Box 1. ISO 55000:2014 Asset Management**

ISO 55000:2014 is the internationally recognized standard that provides an overview of asset management, its principles and terminology, and the expected benefits from adopting asset management. ISO 55000:2014 can be applied to all types of assets and by all types and sizes of organizations.

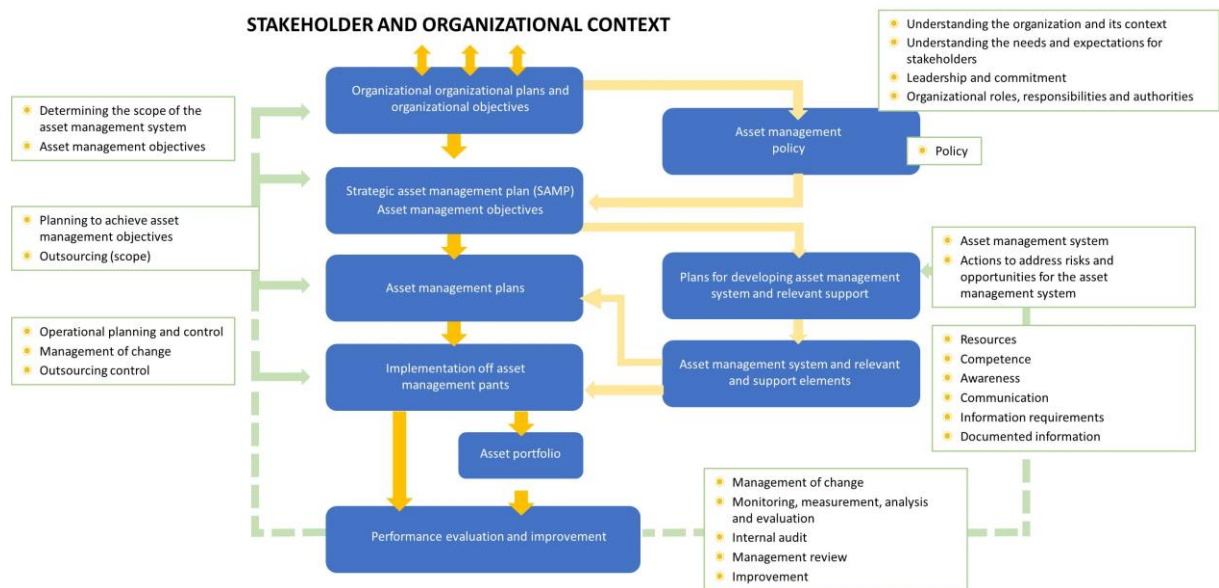
There are many definitions of asset management, and the ISO 55000 defines an asset as something that “has potential or actual value to an organization” and asset management as something that “enables an organization to realize value from assets in the achievement of its organizational objectives.” An asset management system is used by the “organization to direct, coordinate, and control asset management activities.”

The asset management system for an organization includes (a) an asset management policy; (b) a set of asset management objectives; (c) a strategic asset management plan; (d) an asset management plan(s); (e) a number of supporting activities; (f) an operational planning and control system, including the processes and procedures used to manage assets in the asset portfolio throughout their life cycle; (g) a performance evaluation system; (h) a set of designated improvement activities; and (i) a guidance plan describing how it relates to or interfaces with other relevant policies, processes, and management systems.

The asset management system, the activity of asset management, and the asset portfolio should be aligned with and support the achievement of organizational objectives and the organizational plan. Box figure 1 shows the relationship between the key elements of an asset management system.

Improved asset management can help make an organization's infrastructure and building stock more resilient, reducing the risk of damage and destruction from disasters. Improved asset resilience overall is critical for a sustainable financial protection program, which helps reduce the risk of loss over time.

**Figure 1. Key Elements of an Asset Management System**



Sources:

ISO 55000:2014(en), "Asset Management—Overview, Principles, and Terminology" at <https://www.iso.org/obp/ui/#iso:std:55088:en>.

ISO 55002:2018 (en), "Asset Management—Management Systems—Guidelines for the Application of ISO 55001" at <https://www.iso.org/obp/ui/#iso:std:iso:55002:en>.

## Public Asset Registries and Their Core Components

A public asset registry is a digital database that assists effective whole-of-government business planning by providing a single source of information about all nonfinancial government assets, along with their geolocations, physical characteristics, asset value, and asset life.

A PAR can be used to achieve the following:

- Maximize the value of public assets by optimizing the way the assets are allocated, used, leased, and sold.
- Prioritize assets for operational maintenance, risk mitigation measures or replacement.
- Prioritize assets for financial protection, including for the purposes of risk transfer and insurance.

Prioritization can be made on the basis of varied parameters such as asset value, location, condition, strategic importance, and risk. To achieve this, a PAR will require:

- Maintaining a central repository of information on government assets across the asset life cycle (information can include data about asset creation, capitalization, valuation, depreciation, repair and maintenance, transfer, split, decommissioning, and retirement).
- Conducting an annual physical inventory of all assets.

- Conducting risk assessments of assets while recording historical data about disaster events and post-disaster assessment or by using advanced tools to assess the asset's exposure to different types of risks.

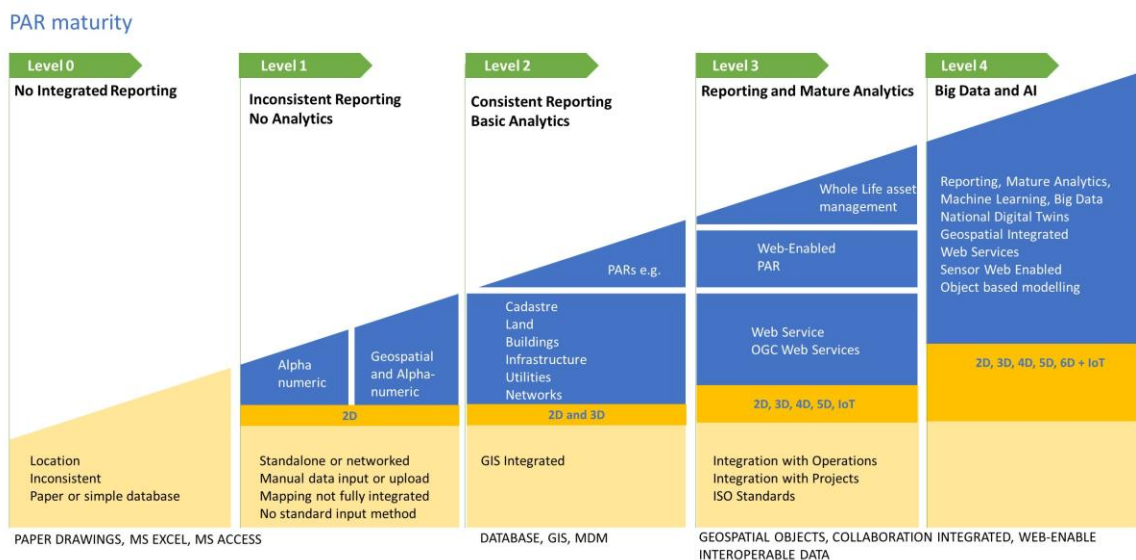
Within the context of this fact sheet series, a PAR can support the development of a public asset financial protection program as a source of asset information; it can also inform the risk assessment and risk-transfer strategy, as well as a wider disaster risk management strategy. In addition, evidence of a mature approach to asset management earns the favor of insurers, who often reward the asset holders with competitive pricing.

International experience suggests implementing a PAR can take time and must evolve over time by using experience and tailoring each system to reflect local conditions. This approach is illustrated conceptually in figure 2, which shows the evolution of PAR maturity over time from the perspective of both usage and technological capability. The purpose of this diagram is to show a maturity progression, it is not intended to be a *prescriptive* definition, nor definitive. It is based on practical experience and lessons on best practice.

It should be noted that equal focus should be given to reporting and analytics from the PAR, as much as the PAR data itself. Robust reporting and data analytics create Business Intelligence (BI) or 'insights' with which to make decisions.

Selected country experiences are also shared in Annex A.

Figure 2. Conceptual Evolution of a PAR



Source: Eglinton, 2020.

Broadly speaking, as a government's PAR becomes more mature, they comprise the following characteristics:

- **Level 0 – Mainly paper-based asset records**

This is the situation where there is either no digital system, so asset records are only on paper, or where there is a simplistic data storage (e.g. Excel) with paper and manual data inputting from paper still a key part of the process. For financial protection of assets, this data is far better than none, but there are many challenges. Not only is this approach inefficient (e.g. double-data-handling), it has inherent risks of transcription errors and resilience of the information – e.g. if there was a fire damaging the paper records or the computer / database. It is generally characterised by: no integrated reporting; inconsistent data capture; paper or Simple Database as the main source and record; and paper drawings, with some inconstant use of technology is likely e.g. MS Excel, MS Access

- **Level 1 – paper and computer-based, with no clear system or standards**

This level is where a digital system is in place as the main system, either as a standalone system or networked in some way to other government systems. There may be paper use at some stage, for example data collection, but this is not the main data storage for the system of records. In practice, some challenges are generally experienced at this level. For example, there may be inconsistent reporting capabilities, and while basic analytics may be undertaken in Excel, there is no analytics tools linked to the PAR. The datasets and database structure may remain mainly alpha-numeric, with potentially some inconsistent use of GIS, mapping or 'geospatial' capabilities. Data input is often manually inputted or uploaded, making it time consuming to update. Not having a consistent map-based interface can mean that datasets are inconstant in their structure and not 'Location-Enabled' natively, making it difficult to automate GIS analysis.

- **Level 2 – computer-based, systemised with a mapping element integrated.**

As a system matures further, the PAR is 'location-enabled', where a GIS, or location-based solution, is a core element of the PAR. Datasets are captured in formats and maintained in ways that enable map-presentation, including location, proximity and other forms of spatial analyses. This enables many types of spatial analyses on the relationships of assets, asset systems and networks of 'systems-of-systems' for resilience and risk planning. Master Data Management (MDM) principals are typically used and widely understood - a comprehensive method to consistently define and manage the critical data of an organization to provide a single point of reference. Additionally, more than one source of data managed by the most relevant data owner / custodian are linked or 'federated' together, for example cadastre, land, buildings, infrastructure, utilities and other networks.

- **Level 3 – computer-based with system, GIS and web services**

At this stage, a Whole Life Asset Management approach is undertaken, following the principles and guidance of ISO 55000. There is good integration of the PAR with operations and with projects, the use of sophisticated reporting and mature analytics. The PAR is also likely web-enabled – where a web service (such as OGC Web Services) is capable of being consume and publish information from the system. International,



national and industry best practice standards will be used and established where needed, such as property data standards. Extra ‘dimensions’ of asset modelling are likely to be captured including 2D, 3D, 4D (time), 5D (costs), and the use of remote sensors and monitoring technologies is supported.

- **Level 4 – 3D asset objects as standard, web services, federated management**

The next level of maturity level will see the ability to handle data models, geospatial objects, web-enable interoperable data at more sophisticated levels. As well as having all the capabilities of the previous levels, this level will see the focus on asset as objects (in a data sense and 3D etc sense). The main difference here is that data collection, management and use is so mature that Big Data and Artificial Intelligence (AI) and Machine Learning become the norm for assisting with decision-making and tending.

An effective PAR addresses the specific requirements of its end users and typically develops in line with a country’s priorities. This approach means that the functionality of a PAR can differ and evolve depending on its context.

In New Zealand, for example, the policy evolution led to separate systems for roads, buildings, bridges, tunnels, and transportation systems, which can create challenges, and there are now considerations on how to integrate those different systems.

In the United Kingdom, the “e-PIMS” system was developed as a central repository for all property and land assets and is now being replaced with a new custom-built digital national asset registry system (Annex 2).

The right approach to a developing a PAR will depends on its use (Box 2)

**Box 2. Implementation Options**

A key consideration for countries developing a PAR is whether to adopt a commercial off-the-shelf solution, develop a custom-made model, or collaborate with another government system. The relative benefits and challenges of each option are outlined below.

Implementation options	Benefits	Challenges
<b>Commercial off-the-shelf solution</b>	<ul style="list-style-type: none"> <li>• Quicker implementation time frame with a ready product</li> <li>• Low risk of system failure with a tried-and-tested solution and adequate support for future enhancements, operations, and maintenance</li> </ul>	<ul style="list-style-type: none"> <li>• Limited ability to customize because it is based on an existing solution</li> <li>• Limited ability to create an interface with existing systems</li> </ul>
<b>Custom-made solution</b>	<ul style="list-style-type: none"> <li>• Retention of full rights over the application and future enhancements by the government</li> <li>• Tailored to country’s specific needs</li> </ul>	<ul style="list-style-type: none"> <li>• Requirement of substantial time for development of a fresh solution, including extensive testing and pilot phases</li> </ul>

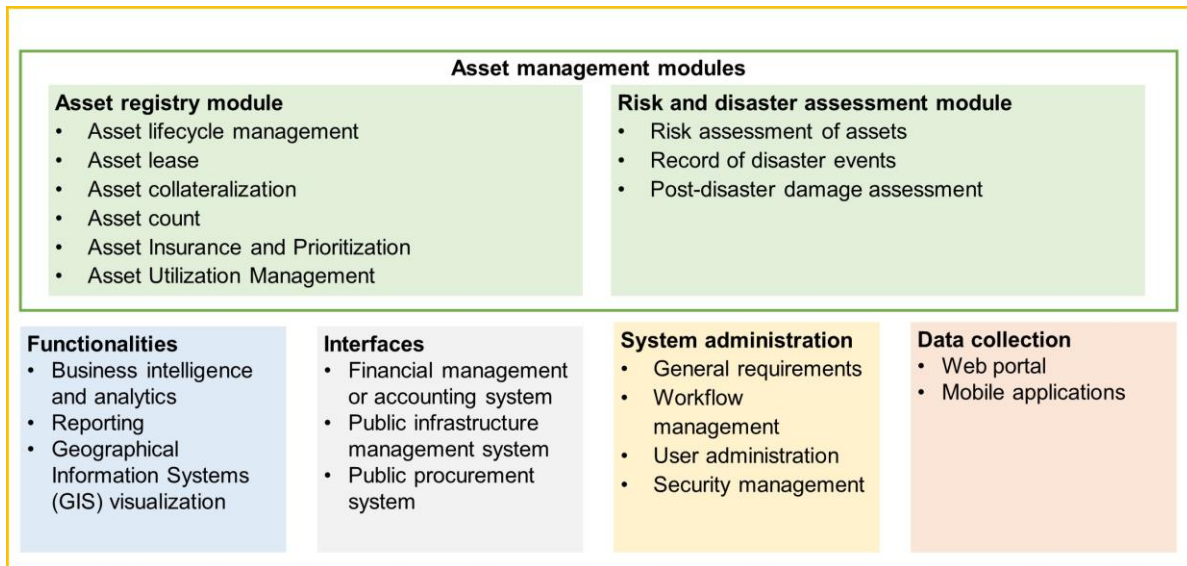
<b>Hybrid solution</b>	<ul style="list-style-type: none"> <li>• A mixed solution whereby the both the Commercial off the shelf solution is the focus with some customization brings benefit from both options.</li> </ul>	<ul style="list-style-type: none"> <li>• Clarity as to the ownership of some the solution elements needs to be clearly defined</li> <li>• Intellectual Property of work needs to be established</li> </ul>
<b>Government-to-government transfer of a suitable solution from other countries</b>	<ul style="list-style-type: none"> <li>• Quicker implementation time frame if solutions are likely to be comparable, also subject to the extent that customization is needed</li> </ul>	<ul style="list-style-type: none"> <li>• Operational risk, because the government that developed a system is likely unable to provide full operational support or does not have full IPR or ownership of the system</li> </ul>

For a PAR to support whole-of-government asset management, the planning and design of a PAR will need to consider the following:

- *Asset management modules.* The ability to support the management of all public asset categories and subcategories across the entire government (including its agencies and sectors) for a variety of different purposes
- *Tools and user interfaces.* The use of features that support asset management across its life cycle and the ability to link to existing systems that manage finance and procurement and that accomplish these:
  - Allow any agencies without information and communication technology (ICT) systems for asset management to leverage PAR for all asset management functions.
  - Support the efforts of agencies with mature systems of public asset management to collect public asset data from their systems for centralized planning and monitoring purposes at a whole-of-government level, while day-to-day asset management functions are carried out in such independent systems at respective agencies.
- *Functionalities and data collection.* The ability to support various tools for asset data collection and maintenance including web portals and short-term mobile applications and to leverage remote sensing technologies, drones, satellites, and other emerging technologies in the long term (including other PAR functionalities such as analytics, visualization, and reporting).
- *Security and system administration.* The governance of the use of PAR, including security systems and user rights and administrations.

Those design components are presented in figure 3, which shows how they fit together to form the elements of a PAR. A brief description of each component is provided in table 1.

**Figure 3. Conceptual Design of a Public Asset Registry System**



**Table 1. Core Components within a Public Asset Registry System**

**Asset Management Modules: Asset Registry**

This module supports the oversight and executing agencies in life cycle management of public assets from the planning of new asset to the asset retirement or disposal. Submodules include these:

- *Asset life cycle management* stores, manages, and updates asset-related information throughout its lifecycle, including general, technical, financial, legal information, costs of construction, capitalization, repair and maintenance, depreciation, computation of book value and replacement value, fair value of the assets, and records of third-party valuation.
- *Asset lease* manages and tracks different type of asset leases in accordance with the requirements of financial management or accounting manual.
- *Asset collateralization* maintains essential data for assets collateralized with financial and other institutions and helps identify the assets available for collateralization.
- *Asset count* supports periodical physical inventory checks of assets while using bar code technology for asset count and generating inventory reports.
- *Asset insurance and prioritization* supports the prioritization of assets for insurance and valuation on the basis of parameters such as strategic importance, value, location, condition; it also records details of insurance policy and claims.
- *Asset utilization management* records and analyzes data about occupancy and vacancy of properties and about asset use that support space management.

**Asset Management Modules: Risk and Disaster Assessment**

This module supports the assessment of the risk rating of assets on the basis of asset condition and risks attributable to the geographical location of the asset. It also maintains information about the risk profile and historical information about disaster events, damages, and negative impacts on the public assets or on their services.

### Other Components of a PAR

*Functionalities.* Specific functionalities should be built into the PAR. Basic functions include business intelligence analytics, reporting, and geographical information systems (GIS). In addition, other advanced functions such as the use of artificial intelligence or other visualization functionalities can be explored.

*Interfaces.* The proposed system should support appropriate interfaces with existing systems including financial management, accounting, and public procurement systems. Where there is varying existing data infrastructure on public assets, the PAR will need interfaces with agencies with pre-established ICT systems. Over time, there may be a potential to scale or integrate toward a national PAR for whole-of-government needs.

*System Administration.* This module captures the general requirements to support all the modules of PAR including user administration, user access and user rights, workflow management, and information security management.

*Data collection tools.* Secure and easy-to-use data collection and maintenance tools such as web portals and mobile applications need to be deployed at a minimum. Newer and emerging technologies such as satellite and drone imagery can also be integrated.

## Implementation Approach to Develop a PAR

The challenges of establishing a PAR include the need to tailor it to specific country conditions. Although some governments may already have a robust, pre-existing asset management or records system, which obviates the need for developing a PAR from scratch, many will be considering a whole-of-government approach for the first time. Although the benefits are clear, government establishment of PAR can bring challenges such as the following:

- *Development of new legal frameworks and harmonizing policies on asset management and data provision.* This development may include new policies related to open data laws and information transparency, development of government regulations for asset management, and risk management and procurement processes (in other words, value for money and approaches to market).
- *The change management within public asset management.* The challenges include developing the appropriate PAR framework that is best suited to the country's context and asset ownership structure.. In some countries, data collection can be labor-intensive, paper-based, and localized, so the transition toward a digital database is likely to be a significant change to the management process.
- *Implementation challenges including appropriate timelines for design, procurement, data collection, operationalization.* Undertaking extensive data collection and procuring or building the appropriate and secure digital solution architecture
- *Implementation of a PAR also requires institutionalizing its functionalities to support its use.* Such implementation will allow relevant government agencies to adopt consistent procedures for data provision and to feed into asset management policies, strategies, and planning. Training and capacity-building are also needed to design and operate a PAR, thereby ensuring adequate staffing readiness for future changes and modernizations. A change management and communication strategy will be required to ensure sustainability as the whole of government moves toward more effective management of public assets.

An assessment of the current situation is needed as the first step in developing a new PAR, which should include these:

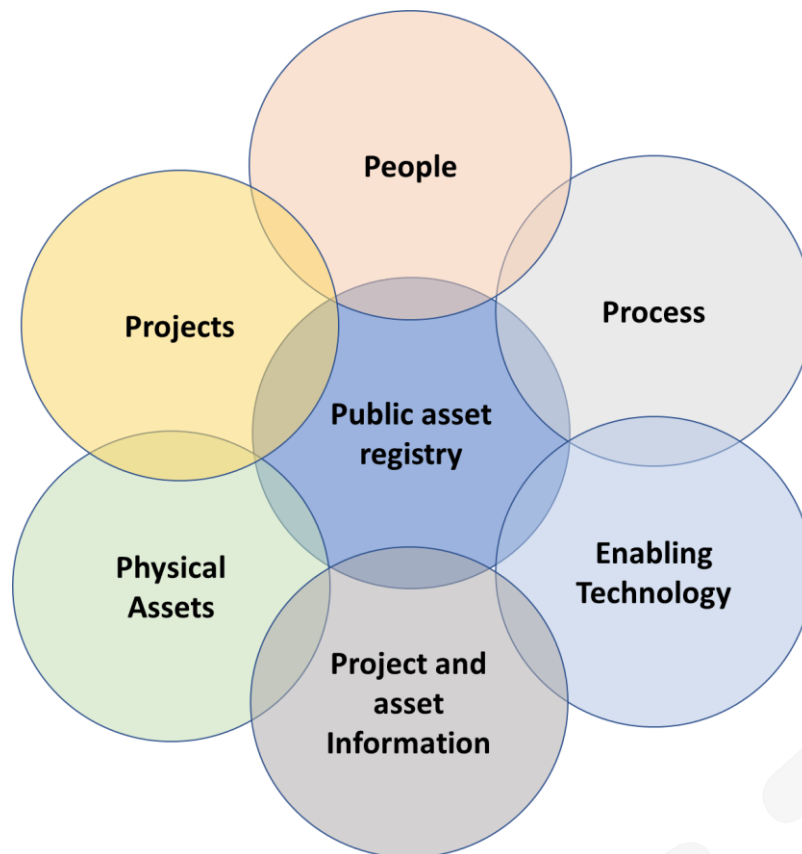
- The legislative environment
- The institutional environment
- The ICT environment in relation to public asset management
- Potential implementation options, with their costings and pros and cons, which would include a comparison of commercial off-the-shelf solutions, custom-made solutions, or transfers of a suitable solution from other country governments
- Behavioral changes that will likely be required by all potential users and data contributors within government, which will include activities such as communication, stakeholder engagement, and transition and change management

The implementation of a PAR is likely to be phased in gradually, first of all covering the assets that are most critical, that have the best data availability, and that are owned or managed by stakeholders who support the initiative.

This approach (laid out in table 2) is necessarily generic and simplified; nevertheless, it captures the key required elements of an implementation plan. Often a three- to five-year time frame can be expected to move through the following stages, depending on the solutions chosen and the existing barriers to implementation.

A successful PAR relies on more than technology and data. There are wider challenges to establish the correct policies, governance, skills and basic asset management and asset information management concepts and principals that must be addressed to sustained value for the PAR. ISO 9001, ISO 55000 and ISO 19650 address many of these wider challenges and inform this wider, 'holistic' approach. Public asset management needs to more than just a technology-based register, and incorporate other factors, as illustrated in Figure 4.

Figure 4: The supporting framework around public asset management



**Table 2. Key Elements of a Generic Implementation Plan**

Stage 0. Pre-implementation Current State and Feasibility Assessments	Stage 1. Preparatory Activities for a Comprehensive PAR	Stage 2. Customization, Development, and Implementation of Procured IT System	Stage 3. Implementation of Advanced Functions of PAR
<ul style="list-style-type: none"> <li>• Assessment of legislative set-up, including identification of the acts, rules, and regulations about asset management and accounting</li> <li>• Assessment of institutional set-up, including the identification of the roles and responsibilities of all public asset oversight organizations, executing agencies, and implementation team</li> <li>• Assessment of the ICT environment, including the identification of existing systems, their functional coverage and technical architecture, and the development of feasibility assessment of existing ICT systems for enhancement into the PAR</li> </ul>	<ul style="list-style-type: none"> <li>• Establishment and strengthening of the current policy and institutional framework</li> <li>• Formulation of a technical working group and a project implementation team</li> <li>• Capacity building and change management initiatives</li> <li>• Implementation planning, including proposed phasing-in of assets or agencies</li> <li>• Procurement of a comprehensive IT system for PAR, including assessment of the following options: commercial off-the-shelf solutions, custom-made solutions, and the purchase of suitable similar solution from another country government.</li> <li>• Initiation of data collection and digitization for pilot assets or government agencies</li> </ul>	<ul style="list-style-type: none"> <li>• Development of customization of IT systems to reflect core modules including asset life cycle management, asset insurance and valuation, asset utilization management, basic risk assessment features and risk categorization for public assets, interface with external systems, and integration with GIS</li> <li>• Continued capacity building and change management initiatives</li> <li>• Migration of data from existing sources</li> </ul>	<ul style="list-style-type: none"> <li>• Following successful initial rollout of the PAR, the implementation can proceed toward integration of advanced functions of the PAR such as advanced features of risk assessment for assets, disaster event recording, post-disaster damage assessment for public assets, and planning improvements and repairs for damaged assets</li> <li>• Rollout to other assets or agencies</li> </ul>

## Conclusion

As part of the broader strategy of public asset management, a PAR is an important tool for governments to use in collating and analyzing public asset data for informed decision-making. This fact sheet provides an overview of a generic PAR with a broad range of functionalities and interfaces, as well as a high-level implementation plan. To develop an effective PAR, a broad range of stakeholders need to be involved. The range includes involvement of relevant end users from the design stage onward, dedicated program developers, a delivery team, governance personnel to manage this registry (to coordinate and lead the implementation process and data collection), and finally change management personnel to support the rollout of the PAR.

As emerging technologies make sophisticated approaches to monitoring public assets increasingly possible, those technologies can be integrated into the PAR either from the start or along the way. For example, *Building Information Modeling* (BIM), which involves digital visualization and models of the physical assets, is increasingly recognized as an effective tool to support the ability of PARs to define, procure, obtain, and manage information for the whole life of a physical asset. Other emerging technologies include the use of satellite and drone imagery in capturing real-time spatial data, artificial intelligence (AI) in collating relevant information from large databases, and the internet of things (IoT) in capturing or managing asset performance and use. Some of those innovations will be discussed in fact sheet 8.



## Annex A: Selected International Experiences with PARs

Country	Approaches to Asset Management and Development of PARs
<b>United Kingdom</b>	<ul style="list-style-type: none"> <li>• The UK started recognizing the importance of “good” asset data, data systems, and data management more than 30 years ago. The UK government has undertaken considerable research and publication to track its own path in developing leading asset management practices, including the development of a national asset registry and an electronic property information mapping service (e-PIMS), which is a government-wide property database. The in-house National Asset Registry was developed in association with the private sector, and it covers all central government departments together with their executive agencies.</li> <li>• The e-PIMS system, which has been in existence for more than 20 years, is currently being replaced with a modernized system called the Digital National Asset Register (d-NAR). A review on e-PIMS in 2014 concluded that the system was considered more as a static record rather than a dynamic system because it produces reports (backward-looking) rather than analytics (current or future-looking). Government departments continued to operate their own separate property management information systems.</li> <li>• The d-NAR project currently being implemented will initially include land and buildings (defined as property) owned by the central government and later phased out to include local government assets. The modernization project will look at more than technology and will incorporate data analysis capacities and capabilities.</li> <li>• A more ambitious program, the National Digital Twin, is currently under development as the next evolutionary step up from the Public Asset Register in the sense that it can consume real-time data. A digital twin is a digital representation of physical assets and infrastructure that unlocks value principally by enabling better decisions about how the physical asset is built, operated, maintained, or used. The UK government aims to use the National Digital Twin program to increase infrastructure resilience, reduce disruption and delays, optimize use of resources, and boost quality of life for citizens.</li> </ul>
<b>New Zealand</b>	<ul style="list-style-type: none"> <li>• Asset management practice in New Zealand has been evolving since the first asset management plans were developed in the late 1990s. Asset management is decentralized and gives autonomy to local government entities in their policy and planning. The new innovative approaches have stimulated a high degree of private sector participation and private sector principles usage in asset management.</li> <li>• New Zealand Asset Management Support (NAMS) was formed in 1995 as a response to the increasing desire within industry to embrace a more professional, long-term approach by adopting more efficient and sustainable practices for the management of public infrastructure. The group was established as a nonprofit industry organization with</li> </ul>



Country	Approaches to Asset Management and Development of PARs
	<p>representation from INGENIUM (Association of Local Government Engineers, New Zealand), the Society of Local Government Managers, Local Government New Zealand, the Office of the Auditor General, the New Zealand Water and Wastes Association, and the New Zealand Recreation Association. It was set up to promote infrastructure asset management practices, policies, and systems. In 2004, the NAMS Group was restructured as a company to better carry out its strategic focus. In 2008, it was organizationally realigned to be managed by a team of four board members, with support of its parent company, IPWEA New Zealand, which provides the ongoing tools to help NAMS grow. NAMS has developed guidelines for best-practice asset management in the form of five manuals, with New Zealand’s local government sector being their primary purchaser.</p> <ul style="list-style-type: none"> <li>• The different government entities in New Zealand use a range of IT systems for asset management, ranging from simple spreadsheets to advanced data management systems with functionalities for life cycle modeling that is based on staff capacities and asset criticality. In general, land transportation demonstrates the most advanced asset management systems in New Zealand, followed by water sector assets.</li> </ul>
Japan	<ul style="list-style-type: none"> <li>• Japan’s government assets are defined according to the National Government Asset Act and include land and properties, as well as movable assets such as transport, equipment, stocks, and other securities. In January 2010, the government asset register was digitalized through the implementation of the Government Asset Comprehensive Information Management System.</li> <li>• Japan has a three-tier governmental system that consists of the national government, 47 prefectures, and 3,230 municipalities. The Ministry of Finance (MoF) maintains the consolidated asset register, and each ministry and agency is responsible for updating its respective assets. Each agency and its subordinate offices must maintain a government asset register that records asset category (land, trees and bamboo, buildings, structures), application (land for buildings, land for housing, unused fields), quantity, value and price, and date of acquisition or transfer or loss (with explanatory notes). The head of each ministry and agency then prepares reports about the changes in asset value every fiscal year for submission to the MoF.</li> <li>• In addition, the MoF annually audits each ministry and agency to examine its management and use of government assets, after which the MoF recommends improvements to correct any identified inefficiencies.</li> <li>• The cross-ministerial Strategic Innovation Promotion Program has been established to realize scientific technology innovations in Japan, specifically to achieve Society 5.0 (first super-smart society) in infrastructure management. Its areas of innovation include appropriate infrastructure asset management covering inspections and monitoring, asset life modeling, and maintenance plans using modern technology such as satellite synthetic aperture radar and as robotics technology.</li> </ul>



Country	Approaches to Asset Management and Development of PARs
<b>Australia</b>	<ul style="list-style-type: none"><li>• The Australian approach to asset management has been driven more by the introduction of regulatory requirements and accounting standards. Asset management was included within public works in 1993, when the Australian Accounting Standard Board issued Australian Accounting Standard 27, which required government agencies to capitalize and depreciate assets rather than expense them against earnings.</li><li>• There is no integrated governance of assets at the federal level. Devolution of power to state and territorial governments means that each government has developed its own property asset management policies and methodologies. Although this approach did not result in nationally consistent frameworks, Australia's states and territories have enacted legislation and regulation to varying degrees that require councils to adopt strategic, corporate, workforce, financial, and asset management plans. Within those frameworks, councils must create and maintain their own asset data, information, and asset management systems.</li><li>• The Australian National Audit Office published its <i>Asset Management Handbook</i>, which lays out strategic asset management principles and approaches, and the <i>Better Practice Guide on the Strategic and Operational Management of Assets by Public Sector Entities</i>. The latter guide provides a framework for an asset register that (a) captures asset information, maintains historical records of financial and nonfinancial information during each asset's life cycle to help with asset planning, (b) assists with meeting accounting standards and legislative compliance, (c) monitors performance, and (d) provides accountability.</li><li>• At the federal level, the Department of Finance maintains the Australian Government Property Register for leased and owned commonwealth property. It contains a list of landholdings owned by noncorporate Commonwealth entities, including title and address information, along with a geospatial link to each site. Each department or agency is required to keep its data up to date in the system.</li></ul>

## Annex B: Focus on UK experiences with PARs

In the United Kingdom the Central Government, the Government Property Unit (GPU), now called the Office of Government Property (OGP) Office, which is part of the Cabinet Office<sup>5</sup>, published its second version of the “Government Estate Strategy”<sup>6</sup> in 2018. The previous version being the ‘Government’s Estate Strategy’ in October 2014.



Two notable changes in the UK’s Government Estate Strategy in 2018, compared with the 2014 version are;

- 1) the increased of importance in data and information and the needs to invest in information management capabilities and capacity as a whole.
- 2) The introduction of Strategic Asset Management Plans (SAMPs)

### Information and Data Management

As described in the UK’s 2014 ‘Government’s Estate Strategy’ information management and data management were for property via the existing e-PIMS (electronic Property Information Mapping Service) system. This system was seen more as a **record** rather than a

<sup>5</sup> The Cabinet Office supports the Prime Minister and ensures the effective running of UK Government as a whole. The Cabinet Office is also the corporate headquarters for government, in partnership with HM Treasury, and takes the lead in certain critical policy areas.

<sup>6</sup>

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/738217/Government\\_Strategy\\_Final\\_AW\\_v2.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/738217/Government_Strategy_Final_AW_v2.pdf)

dynamic system, producing backwards-looking **reports** rather than **analytics** (current or future-looking). There were efforts to populate the system, but with limited analysis and bespoke reporting capabilities there was need for a change. Over 2015, the Cabinet Office intended to leverage the new 100,000 entry dataset by developing the management information capability of e-PIMS, including:

- A forecasting facility for property teams to record forward profiles in terms of workstations, FTEs, investment, vacancy, and when we expect to vacate each property
- Integration of the NPC system so exemptions and exits can be managed, and savings calculated, on e-PIMS, and
- A performance measurement tool that enables immediate
- comparisons of KPIs against the Civil Estate and private sector benchmarks

Rather than via discrete clerical data collection, validation, number crunching and reporting activities, all of these new features are to be ultimately processed digitally and be accessible online. This centralized management information will promote the understanding, joining-up and optimization of estate strategies. The vision at that time was to extend performance management beyond the office estate and into other types of public sector property, thanks to increased automation. The Government was implementing the use of e-PIMS by local authorities as a precursor to extending estate planning and performance management to the wider public sector.

**Modernization for Property Information** - Following work by the OGP in the Cabinet Office, the Digital National Asset Register (d-NAR) project was developed as an eventual replacement to e-PIMS. The scope being land and buildings (defined as property) initially in the Central Government and later Local Government on a phased approach.

The strategic approach looking at more than technology alone was needed to modernize the information and data analytical capacities and capabilities. This was undertaken and it was therefore decided that a review of current systems and ways of working was need. e-PIMS is now over 20 years old and was not able to provide the technical capabilities, integration flexibilities or reporting and analytics capacities that were needed to modernize the property data and property reporting needs of the Central Government.

Asset types other than land and buildings / estates are out of scope to be in the d-NAR, such as Rail infrastructure assets or flood defenses, as there are other mature information systems already in place. It is expected that a federated approach will be taken, whereby trusted datasets from these sources are brought together via web services. Working towards the larger vision for the UK Government, which is building a National Digital Twin. The d-NAR would be **part** of this.

### Useful References

ISO 55000:2014(en), *Asset Management — Overview, Principles and Terminology*, <https://www.iso.org/obp/ui/#iso:std:55088:en>.

ISO 55002:2018 (en), *Asset Management — Management Systems — Guidelines for the Application of ISO 55001*, <https://www.iso.org/obp/ui/#iso:std:iso:55002:en>.

### Glossary of Selected Terms

Artificial intelligence	Artificial intelligence (AI) or machine learning is the simulation of human intelligence processes by machines, especially computer systems. In asset management, AI can be used, for example, to support portfolio management that involves monitoring or building a portfolio with specific risk and revenue characteristics.
Asset	It is something that has potential or actual value to an organization.
Asset management	Asset management enables an organization to realize value from assets in the achievement of its organizational objectives.
Asset management system	An asset management system is used by the “organization to direct, coordinate and control asset management activities.”
Building information modeling (BIM)	BIM is the process of generating and managing building data during an asset’s design, construction, and life cycle. Typically, the process uses three-dimensional software for building modeling that will increase productivity of consultants and contractors during the whole asset life cycle. The process produces the BIM database, which encompasses building geometry, spatial relationships, geographic information, quantities, and properties of building elements.
International Organization for Standardization (ISO)	ISO is an international standard-setting body composed of representatives from various national standards organizations.
Internet of Things (IoT)	IoT refers to the interconnection through the internet of computing devices embedded in everyday objects, thereby enabling them to send and receive data. IoT and

	its industrial version, called Industrial IoT, can support asset management by making the system smarter such as by sending alert automatically, tracking and monitoring the condition of an asset with fewer human interventions, and creating optimized and dynamic maintenance scheduling.
Procurement	Procurement is the process of finding and agreeing to terms and of acquiring goods, services, or works from an external source, often through a tendering or competitive bidding process.
Public Asset Registry (PAR)	PAR is a database containing specific information about the public assets owned or controlled by an organization.