

Successful asset data collection and management programmes in corporate real estate

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Josh McCullough, MEng, EIT, is the Program Manager of Asset Data Collection & Management (ADCM) at Partner Engineering & Science, Inc. Josh works diligently with clients to understand their needs, determine the key performance indicators and other metrics for collection and ensure that Partner provides the highest quality of data. Prior to and since joining Partner, Josh has directed ADCM services to support facility maintenance operations, provide quantitative data to further evaluate a building and its systems and equipment, calculate Facility and System Condition Index (FCI and SCI) scoring, aid in budgetary and capital planning efforts and more. He has worked with numerous real estate entities and property types, as well as various maintenance management software platforms, to facilitate data integration. Additionally, Josh has developed innovative technology solutions to gather data during field assessments in a more efficient and consistent manner, as well as interactive dashboards to present the findings for dynamic visual analysis.

ABSTRACT

The benefits of implementing an asset data collection and management (ADCM) programme for an

individual site or portfolio are numerous. ADCM can support capital planning exercises, facility condition indexing (FCI) of a portfolio, operation and maintenance (O&M) procedure development, populating a computerised maintenance management system (CMMS) or environmental, social and governance (ESG) initiatives. The relevance and accuracy of such initiatives are dependent upon the quality of the supporting data. In corporate real estate (CRE), too many organisations struggle to capture the necessary data to successfully implement proactive management strategies, leverage economies of scale and improve reporting to investors and government entities. An organisation cannot capitalise on the benefits of data-driven management platform (CMMS/IWMS) without consistent, reliable and accurate data. This paper explores how quality ADCM can streamline maintenance and capital planning, reduce spending and support business objectives.

Keywords: *corporate real estate, asset data collection, asset management, data analytics, capital planning, computerised maintenance management system (CMMS), integrated workplace management system (IWMS)*

ASSET DATA IN CORPORATE REAL ESTATE

There are a multitude of software solutions on the market designed to automate preventative maintenance tasks, track work orders and enhance capital planning efforts for commercial real estate. The effectiveness of these platforms is heavily reliant upon the quality, accuracy and comprehensiveness of asset data entered into the system at the time of implementation. A robust asset data set maximises the value and return on investment when implementing a software solution such as a computerised maintenance management system (CMMS) or an integrated workplace management system (IWMS). For example, preventative maintenance tasks and schedules cannot

be established in a CMMS if an asset is absent from the system. Robust capital forecasts cannot be developed if asset quantities, capacities and equipment ages are inaccurate. Facility condition indexing (FCI) exercises become less meaningful when maintenance budgets and capex budgets are not aligned across a portfolio. By implementing a solid asset data collection and management (ADCM) programme, these issues can be eliminated. ADCM is the process of gathering, compiling and structuring qualitative and quantitative data for the purpose of improving facility operations, maintenance and capital planning.

In the context of ADCM, an ‘asset’ generally refers to an element of a property, which can range from sitework to architectural components to mechanical, electrical and plumbing (MEP) system equipment. Assets can also encompass appliances, other commercial equipment as well as furnishings — really any building system crucial to the functionality and operational needs of a property. Each asset has its own set of data points and key performance indicators (KPIs) that can be collected, analysed and managed to make better, more informed decisions. Ronald D. Marten¹ notes ‘the granular level of data that’s now being aggregated — along with advancements in intelligent, fully researched commercial real estate tools to understand and analyse that data — is the next evolution in commercial real estate’. There is a lot of data when it comes to corporate real estate (CRE) and making sense of what is relevant and important can be overwhelming. The aim of an ADCM programme is to gather and assemble the right data and arrange it in such a way that it can be uploaded into a proprietary software platform or used for data visualisation. Figure 1, as shared by Mónica Rosales Ascencio,² visually conveys the importance of proper data management from the initial raw data to the final stage of having the data explained with a story using Legos.

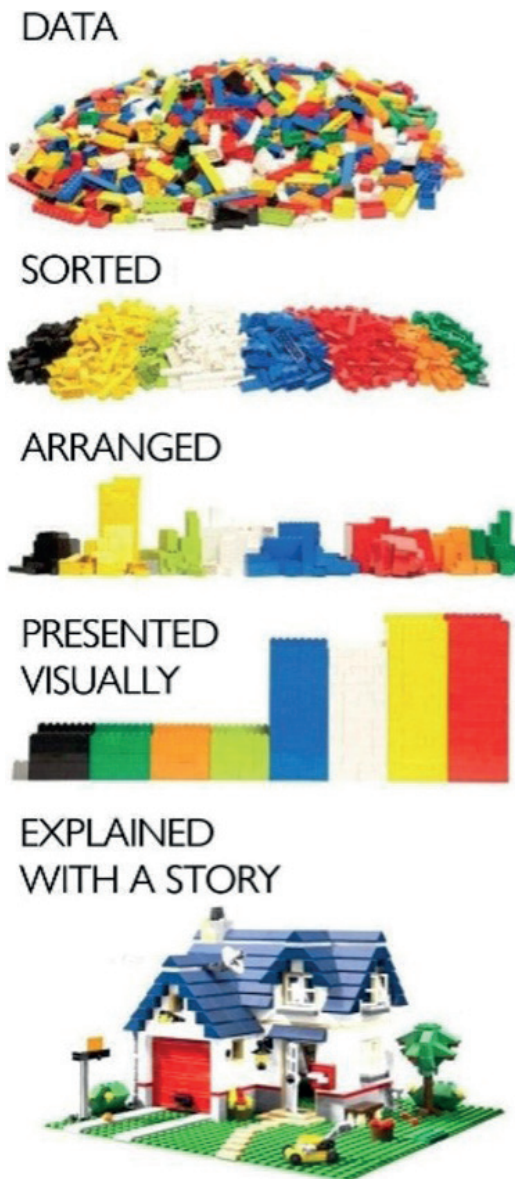


Figure 1 The importance of proper data management from the initial raw data to the final stage

Inconsistent and incomplete asset data sets make aggregation and analysis challenging. Inconsistencies within a portfolio are common given the variety of sources utilised to compile a data set (eg individual facility managers [FMs], different maintenance contractors, a building automation system [BAS], building occupants,

etc.). Inconsistencies in data structure or arrangement, or how an asset is classified can compromise the value of an asset data set. When sorted and arranged in a normalised format and standardised across a portfolio, however, a robust asset data set can be extremely powerful and leveraged to extract key insights through the aid of data visualisation such as charts, graphs and other imagery. Furthermore, the data and associated visuals can be improved and tied to the story of the CRE mission.

FIVE PHASES TO IMPLEMENTING AN ADCM PROGRAMME

Initiating an ADCM programme is a more complicated undertaking than many realise. There are many common obstacles and challenges that, when not taken into proper consideration, can lead to poor data quality and prevent an organisation from capitalising on the benefits of implementing such a programme. Figure 2 shows the preferred phased approach to implementing an ADCM programme.

Purpose

Asset data can be used for many different reasons and at many different levels, and it is important to understand the purpose of



Figure 2 Preferred phased approach to implementing an ADCM programme

asset data collection from an organisational perspective. Detailing the value proposition — whether relieving pain points and/or creating beneficial gains — contributes to defining the problem and drive for the effort, as well the associated scope of work. Some investors and corporate executives might be focused solely on the financial implications and results. Some FMs might be focused solely on certain building systems or components of a property that are giving them a headache. Sean Ross³ states that ‘[the] broad objective of asset management is to maximise property value and investment returns’. It is critical that an asset manager collaborate with an assortment of people when developing a programme to ensure that once complete the data set meets and supports all business objectives. The data set should encompass the holistic needs of the CRE team, and a comprehensive viewpoint will guide the ADCM programme. Defining the purpose of the ADCM programme will assist with drawing the line between helpful data and unnecessary data.

Standardise

The goal of standardising data is to establish consistency across a portfolio so that different property uses, construction types and market locations can be collectively analysed. Inconsistencies at the asset level from one site to the next are an impediment toward developing apples-to-apples comparisons of things such as capex or maintenance budgets. Without a systematic approach applied to the data itself, analysis of the data set can become challenging and less meaningful. A best practice for any data collection effort is to map each asset according to a standardised hierarchy.

Organisations looking to model an effective ADCM programme ought to consider a recognised and proven industry standard, such as ASTM International and ISO 55000. ASTM International, formerly known as American Society for Testing and Materials,

is an organisation that publishes technical standards for a wide range of materials, products, systems and services. The scope of ASTM International Designation: E3035-15 ‘Standard Classification for Facility Asset Component Tracking System (FACTS)’⁴ states it ‘establishes a classification of building and sitework elements and components, and their associated functions, attributes, and products’. This standard builds upon another ASTM International standard, Designation: E1557-09 ‘Standard Classification for Building Elements and Related Sitework—UNIFORMAT II’⁵ which establishes three hierarchical levels for the classification of assets. ISO 55000⁶ is a series of international standards from the International Organization for Standardization (ISO) that ‘provides an overview of asset management, its principles and terminology, and the expected benefits from adopting asset management’. In conjunction with ISO 55001 and ISO 55002, the standard ‘enables an organization to achieve its objectives through the effective and efficient management of its assets’ and ‘provides assurance that those objectives can be achieved consistently and sustainably over time’. These two references are just a couple of options for data standardisation guides.

Collection

Once the approach has been standardised, it is time to begin collecting and inventorying the assets. The data points for each asset commonly include documenting the physical location on floorplans or capturing geographic location using geographic information systems (GIS) technology. Other best practices include quick response (QR)/barcoding to establish unique identifiers for each asset, documenting nameplate information when applicable (eg manufacturer, model and serial numbers, capacities, manufacturing and installation dates, etc.), expected useful life and remaining useful life (EUL/RUL) and taking representative photographs. The more thorough and detailed

the asset inventory process the closer one gets to creating a digital twin, or a dynamic digital replica of a property and its physical assets. Digital twins can offer countless advantages in the CRE industry, which will be further touched on below.

Another key best practice is to design and develop a robust data collection tool prior to conducting any asset inventory activities. It is critical to establish a list of parameters that need to be gathered for each asset prior to going on-site. Failure to do so can lead to inconsistencies and inefficiencies in developing an asset database.

In many instances a substantial amount of asset data may already exist between purchasing records, as-built drawings, equipment inventory lists, maintenance schedules, building automation systems (BAS), etc. Such sources can be used to develop a baseline data set; however, take caution as existing data sources can be unreliable, incomplete and/or inaccurate depending on the source. It can often be more time-consuming and painstaking to compile and validate information from numerous, disparate data sources into a uniform and centralised database. Validation projects can actually be more time-consuming and costly than starting from scratch. A best practice is to conduct a desktop review of existing sources prior to developing an ADCM programme. It is essential that the collection and verification of asset data is a complicated but critical phase of the ADCM programme.

Analysis

Once raw data has been collected and compiled into a standardised format, the next step is to arrange and analyse the information. Amy Fowler,⁷ Senior Vice President of PureStorage, discusses how ‘traditional business models are changing as more companies leverage predictive analytics and algorithms to discover trends and make better-informed decisions’. There are a variety of use cases for a robust ADCM programme including

predictive analytics, building performance and management improvements and refined capital planning. A well-implemented and designed ADCM programme can provide value to multiple key stakeholders. A data set can be formatted for upload into a CMMS or IWMS or rolled into a dashboarding platform such as Microsoft Power BI. Ultimately, asset data can be aggregated, leveraged and analysed as needed to make better business decisions.

Action

Once analysis is complete, the final step is to take action in support of the initial purpose of the ADCM programme. There may be a desire to start small and get quick wins to show the value of the process before scaling. There may be specific data points such as criticality rating and/or priority level that determine how capital gets spent initially or which building systems receive preventative maintenance. An ADCM programme helps to ensure that the actions taken are data-driven and that capital is appropriately funded where it is needed most. When asset data is presented visually and explained with a story, it becomes much more actionable and can be easily interpreted by a diverse mix of personnel within an organisation.

Following original action items, asset data should be continuously updated to keep the ADCM programme accurate. During these updates, programme goals can shift or be modernised to reflect current needs. Additionally, the collection phase could be impactful and require a shift in the purpose before the entirety of the asset data can be analysed. This might very well happen at any point and the cycle may be more of a web with each of the steps being interconnected. In the end, initiating a successful ADCM programme is similar to developing any product, and the implementation cycle must be properly managed throughout to ensure it meets the purpose and supports better decision making.

FIVE BEST PRACTICES FOR A SUCCESSFUL ADCM PROGRAMME

Here are five best practices for implementing an ADCM programme.

Pilot study

Deploying an ADCM programme at a pilot site can be beneficial for verifying the data set meets programme objectives before expanding and scaling to other sites. The scope of work can be refined and finalised, KPIs and other metrics can be confirmed for collection and standardisation, and the asset data can be analysed to ensure it ties back to original goals. All five phases of an ADCM programme should be completed for the pilot site. Any lessons learned and adjustments to the process should then be implemented prior to executing across a larger portfolio.

Condition assessments

Performing a property or facility condition assessment (PCA/FCA) in conjunction with an asset data collection effort can provide beneficial information when analysing the state of a property. A PCA/FCA can be used to identify deferred maintenance and deficiencies and inform assumptions based on physical condition. A FCI rating is another KPI to compare the relative condition of a given facility relative to an owner's portfolio. A FCI rating is the ratio of deferred maintenance deficiencies to the current replacement value, which provides a data-driven analysis of the true condition for an asset manager as opposed to just a subjective 'good', 'fair' or 'poor' assessment. Furthermore, FCI ratings allow for a diverse portfolio to be analysed to a standardised score.

Digital twins

A digital twin is often referred to as a dynamic digital replica of a property and its physical assets. In the context of commercial real estate, it is typically in reference to 360 imagery and/or a geospatial point cloud

for the interior of a building. Often this imagery is 'intelligent' or geospatial allowing extraction of the precise 3D position of any object in the imagery. This imagery can then be tied into an asset database and CMMS or IWMS platform via application programming interface (API) technology. Ian Siegel, Digital Project Director with Willow, notes that 'digital twins are the most intuitive way to store, organize and access the incredible amount of data generated by the various, complex technology systems that make buildings "smart" for owners, FMs, occupiers, and other built environment professionals'.⁸ A digital twin provides real-time insight and analysis across a multitude of sources, but of course it is vital that the data behind the digital twin is consistent and reliable too.

Management software

In the CRE industry, management practices are too often reactive and not proactive. The 'out of sight, out of mind' viewpoint to maintaining assets can be detrimental in the long run, with failed equipment that has an impact on the daily operation of properties, unforeseen spikes in capital plan budgets and potential life safety hazards. Software management systems can further contribute to an ADCM programme with data validation and governance assistance, as well as operational readiness. A key benefit to using a software platform is to establish proactive and preventative management. There are numerous vendors available to assist with providing a long-term maintenance management solution. Additionally, management software has a variety of labels in addition to CMMS and IWMS, such as enterprise asset management (EAM) or computer-aided facility management (CAFM).⁹ Each software provider and package has different features and capabilities, some specialised by property type, and software vendors can be connected to other platforms, as well as BAS, Internet

of Things (IoT) sensors and digital twin models. A qualified third-party consultant can provide unbiased expertise regarding software selection.

Experienced third-party consultants

Without recognising the time and skill required for qualitative and quantitative asset data collection, many asset managers assign the information-gathering task to on-site maintenance staff. FMs and maintenance technicians are undoubtedly the most familiar with the various assets and history of a given site, but due to systemic staffing shortages and the great exodus of retiring building engineers industry-wide, these resources are often over-utilised and do not have time to devote to implementing an ADCM programme. An experienced assessor equipped with a robust mobile phone-based data collection tool is going to be more efficient than onsite staff attempting to gather data using pen and paper. Another pitfall when using in-house staff, especially when implementing an ADCM programme for multiple sites, is inconsistencies in approach, resulting in a disparity of key asset types and KPIs in the database. Beyond providing resources for a large-scale asset data collection effort, a consultant can offer insight to industry standards on key asset types and data fields to gather; provide an outlook on the best delivery methods; offer guidance on available management software; and contribute to ensuring that business objectives are met across the portfolio and organisation.

REAL-WORLD ADCM PROGRAMME CASE STUDIES

Our team has worked with a wide range of clients and assisted with creating ADCM programmes to fit their individual needs. A handful of real-world case studies are detailed below to demonstrate how a programme can be uniquely customised.

Research laboratory facilities and improving maintenance plans

In the CRE industry, responsibility for maintenance and repair of building systems can be shared between an owner and a tenant depending on the system. Sometimes the boundary of responsibility can be blurry, and assets can be overlooked or missed. This was the case at a research laboratory facility where preventative maintenance activities were not being performed for equipment serving a critical cold storage environment ultimately resulting in equipment failure. A refrigerator failed, ruining US\$250,000 worth of product and it turned out that the facility maintenance vendor was responsible. This specific case appeared to be a result of transitioning to a new building maintenance team, but it could occur with individual staff turnover. The goal of this ADCM programme was to improve maintenance planning and scheduling through an asset data verification and collection project. The existing database was updated and confirmed, location descriptions were provided and barcodes were placed on the key operational equipment to uniquely identify and track maintenance for each asset. Collected data was then integrated into an enterprise asset management (EAM) system to assist with managing the asset information and preventative maintenance schedules. The total cost for the campus-wide asset data collection effort paid for itself should it have helped to avoid any further critical equipment failures.

Net-leased retail properties and tracking tenant equipment

Retail property owners with triple-net (or NNN) lease agreements wanted to verify that tenant mechanical equipment was being maintained as specified in the leases. The owners purchased a management software application who then engaged an independent third-party to inventory key equipment and data points (ie manufacturer,

model and serial number, manufacturing/install dates, refrigerant type and charge, heating sources, etc.), as well as map each piece of heating, ventilation and air conditioning (HVAC) equipment to the respective tenant suite it serves, place QR codes, geotag latitude and longitude coordinates and capture photographs of each asset. The database was then uploaded into an IWMS platform to track maintenance compliance, provide more accurate capital planning and lower replacement costs through economy of scale purchasing. The building ownership team also offered use of this management software to tenants who leveraged it to stay on top of their own third-party HVAC service providers.

County municipality portfolio and forecasting capital plans

A municipality needed assistance with evaluating the physical condition of their real estate portfolio and develop a comprehensive capital plan for all sites across a 20-year evaluation period. The primary motivation behind the programme was to evaluate whether it would be more economical to maintain each facility (based upon a solid understanding of future capex) or dispose of an asset and combine a city department with others in a newly built facility. Asset data was delivered in a structured report complete with assets linked to the UNIFORMAT II classification hierarchy, current deficiencies detailed with action items and opinions of cost to remediate, predicted future expenditures using RUL studies, summarisation of the FCI ratings, analysis of criticality and prioritisation categories and the findings of space utilisation studies. Key personnel in the county government board used the report and data deliverables to review and approve budgets and strategic plans for renovations, consolidating or repurposing buildings and constructing new buildings. The ADCM programme fundamentally enabled the municipality to make informed

decisions and develop a strategic plan with less uncertainty.

HUD funding for tribal communities

The US Department of Housing and Urban Development (HUD) awarded US\$221m in fiscal year 2022 to affordable housing and other development projects for American Indian and Alaska Native communities. A tribally designated housing entity (TDHE) initially struggled to govern and best implement these funds, so an ADCM programme was initiating to provide simplified digital twins of each facility with detailed asset inventory and floor plans of each of the tribe's residential and neighbourhood sites. Using data aggregated across a multi-state region, HUD developed strategic plans to improve the entirety of the tribal nation portfolio. The TDHE successfully used the ADCM programme to prioritise and leverage economies of scale and execute capital improvement projects.

Medical facility and analysing renovation budgets

A hospital facility management team had a challenging time prioritising the renovation budgets of their various medical departments. Every department head correctly noted that their mission was critical, but prioritising the loudest voice in the room was not an appropriate solution. They required an ADCM programme to inventory and assess interior finishes and furnishings room-by-room throughout the hospital. A team of field assessors utilised phones and tablets with a customised mobile application for rapid data collection, programmed with a pre-populated list of each room and a standard checklist for all required data points. The asset data was combined with RUL estimates to aggregate the true condition for each wing and floor of the building. Deliverables included a full summary report, a spreadsheet database with the information from each room and an interactive

dashboard with heatmaps identifying specific spaces most in need of renovation. After initial review, the ADCM programme was expanded to include criticality and priority scores for each space to aid with funding prioritisation. Traffic flows were also incorporated into the data set for each waiting room, nurse station, operating room, etc. in the various departments. The ADCM programme efficaciously allowed the key team members to review all assessment findings, govern the different department heads and direct a strategic plan for the future use of the hospital facility.

Multi-family and evaluating EVCS initiatives

Some US states, such as New Jersey,¹⁰ are beginning to pass laws requiring a percentage of parking stalls to be equipped with electric vehicle charging stations (EVCS) for new developments. Many real estate investors are also motivated to install EVCSs at their properties to attract tenants/residents and/or take advantage of tax breaks and other incentives. Determining whether EVCSs can be installed at a property requires numerous data inputs readily obtained through onsite reconnaissance. One multifamily ownership group recognised the need to standardise the site reconnaissance process and developed an ADCM programme focused solely on KPIs needed to make well-informed decisions about installing (or not) EVCSs at a given property. The programme was designed to capture data in order to design the approximate number of EVCSs that could feasibly be installed and at what approximate cost. Sites were then selected and prioritised based upon findings of the entire ADCM programme across all of the properties.

California state mandated balcony inspections and other EEE Inspection laws

An ADCM programme was developed for a multi-family real estate firm to specifically

address California's Exterior Elevated Elements (EEE) inspection law (SB721 and SB326), which requires that all balconies be inspected by a licensed architect or engineer by 1st January, 2025 and that they be reinspected once every six years.¹¹ An outside consultant was used to comply with licensed inspector requirements, who also used a mobile data collection app to standardise the inspection process and ensure all critical inputs were gathered for each property and individual exterior element. All the assessment findings were then compiled and summarised in an automated report, ensuring stakeholders were informed of any immediate safety hazards or other items of concern within appropriate timeframes. The data collection component with the integration of a mobile app and automated reporting allowed the client to review findings as soon as the field inspection was completed, which would have otherwise been delayed several days. In conclusion, the ADCM programme met the requirements of the EEE inspection laws and continues to provide confidence that reinspections will be tracked and scheduled as needed.

Roof asset management planning

An ADCM programme was developed for an ownership group with a portfolio of manufacturing buildings constructed in the late 1990s with millions of square feet of anticipated roofing replacements. The ADCM programme focused upon gathering key parameters for each roofing system including material type, installation details, current condition and level of maintenance, industry standard EUL, estimate of RUL and geographical property location factors. Without an accurate, current and uniform data set it would have been challenging to prioritise and stage roofing replacement projects. The data from ADCM programme was then used by an asset manager to run scenario analysis and develop a strategic plan for the entire portfolio.

Environmental, social and governance (ESG)

With the ever-increasing importance of environmental, social and governance (ESG) metrics in investment real estate, quality data collection at property acquisition is crucial. Beyond the obvious demands of deploying capital on behalf of impact funds or corporate investors with sustainability criteria, collecting data regarding the efficiency, sustainability or resiliency of a property provides numerous benefits. With that in mind, an ESG-specific ADCM programme is utilised by an ownership group to identify low-cost 'green' improvement opportunities during the acquisition of prospective properties. This allows for return on investment (ROI) and other financial analysis, as well as funding for ESG projects to be incorporated into the capital and strategic plan and systems nearing end of their EUL to be slated for efficiency upgrades upon replacement. Furthermore, asset inventories are mined for energy efficiency opportunities in the future, especially when replacing components and/or entire systems near the end of their EUL and assist with establishing an early baseline from which potential future improvements can be measured. By setting the baseline early on it allows the fund manager, who must deliver on ESG commitments, to demonstrate the most improvement over an anticipated hold period. The ADCM programme outlined the baseline goals, improvement opportunities, analysed the EUL/RUL studies and other key ESG-focused metrics in order to ensure a standard and comprehensive plan could be applied across the portfolio.

CONCLUSION

Developing a reliable, orderly and comprehensive asset data set can be challenging — particularly for large or complex portfolios that are commonly 'asset rich', such as healthcare, data centres, research facilities or manufacturing facilities. Investing in an

ADCM programme can pay dividends and provide a return on investment by enhancing preventative maintenance, avoiding premature equipment failure and leveraging economy of scale for an enterprise-wide master management plan. Successful asset management reduces operational costs and risks, provides a comprehensive perspective on the health of each individual asset and the entire portfolio, and allows property staff to plan for capital expenditures strategically and accurately. Individual or specialised asset managers within a company can focus on their specific management plan while allowing for the data to be shared across the organisation. A centralised management plan can allow for quick adaptations and modifications across the platform with minimal logistical headaches or other negative implications.

Lastly, an ADCM programme can be beneficial during all phases of a property life cycle. During the initial acquisition and pre-screening phase, ADCM supports data-based assessment of property potential. It benefits in-service occupiers with an accurate and comprehensive understanding of the condition and status of their property or portfolio of properties. During the disposition phase, the data can be examined to determine if selling, repurposing or decommissioning an asset or property is the best course of action.

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