Asset Planning Performance Measurement Framework

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Abstract

The international asset management standard ISO 55001, introduced in early 2014, outlines the requirement for an effective Asset Management System. Asset Management practitioners are seeking guidance on implementing one of the key requirements of the standard: the "line of sight" between the Corporate, Asset Management objectives and its relevant performance measures. This alignment ensures regulatory compliance, improved communication, informed asset investment decisions, managed risks and increased operational effectiveness. This paper demonstrates that a 'line of sight' is achievable through the application of the Balanced Scorecard approach using the Asset Management function at the Water Corporation as an example. The approach is deployed across two phases: the development of Asset Management Objectives through a consultative Asset Strategy Mapping exercise; and the selection of a balanced set of performance measures that link to the Strategy Map. The result of this approach is the creation of the 'Asset Planning Performance Measurement Framework'. This framework is tested using water utility data resulting in the realisation of a 'line of sight' between asset performance measures and corporate objectives.

1. Introduction

In the absence of Regulations or Standards, companies have had autonomy in determining the level of maturity needed in their Asset Management (AM) System. This has changed with the release of the ISO 55001, the first international standard for the management of physical assets. The ISO 55001 details the requirements for the establishment, implementation, maintenance and improvement of an AM System (ISO 55001: 2014). It is anticipated that regulators in industries such as water, gas, electricity and offshore oil and gas will adopt this standard as part of their regulatory regime.

The focus of this project is on achieving one of the major components of the ISO 55001; developing a 'line of sight' between the Corporate objectives, the AM objectives and the performance measures of an organisation. It is envisaged that developing a 'line of sight' through the creation of the Asset Management System known as the 'Asset Planning Performance Measurement Framework' will provide the benefits of ensuring regulatory compliance and increased operational effectiveness, as well as managed risk, improved communication and informed asset management decisions (ISO 55000: 2014).

It is proposed to use the Balanced Scorecard approach that has been adapted for use by Public Companies to develop the 'line of sight'. The Balanced Scorecard approach ensures that an Asset Management System displays the attributes of: measures derived from strategy; balance of measures and objectives; causal linkages between objectives and measures; and double loop learning (Soderberg et al. 2010). These are all attributes that lead to developing a 'line of sight'.

2. Approach

The Balanced Scorecard approach involves developing AM objectives through a consultative Strategy Mapping exercise in two steps: The Classical Descriptors, also known as a Destination Statement, define who you are and what you do; and the objectives guide how you will achieve this (Perkins et al. 2014). Performance measures are selected on the basis that they relate to the Strategy Map and adhere to a strict set of recommendations on what constitutes a 'good measure' (Neely et al. 1997). The chosen performance measures are tested using a Performance Measure Record Sheet that addresses these recommendations in a structured format; and sourcing available data to plot the information for further validation (Figure 2). The record sheet details the purpose, target, source of data and accountability processes. The consultative approach involves a series of workshops with senior Asset Managers and feedback from AM practitioners across the business. This approach is tested using the AM function at the Water Corporation as an example.

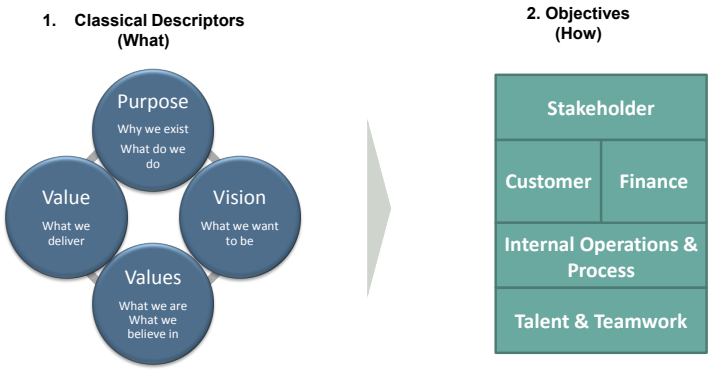

Figure 1 Classical Descriptors and Objectives (Internal Water Corporation)

3. Results and Discussion

The result of the series of workshops is an AM Strategy Map (Figure 2) that is tailored for use in assessing asset performance and aligns with the corporate objectives. For the case study, a Corporate Strategy Map had previously been completed using the Balanced Scorecard approach shown in Figure 1. The objectives from the Corporate and AM Strategy Map are confidential; however alignment is ensured with the continued use of the Strategy Map elements of Stakeholder, Customer, Financial, Internal Process and Talent and Teamwork. These objectives are used to convey the AM priorities over the short, medium and long term and highlight opportunities for improvement. Feedback from the wider business is essential to deriving a set of objectives that reflect each part of AM function. This is achieved by circulating the Strategy Map to the wider business and encouraging anonymous post-it-note comments validating and or questioning the outcomes. These comments are collated and used to revise the Strategy Map. Validation is essential to embed the outcomes of the project into the organisational culture.

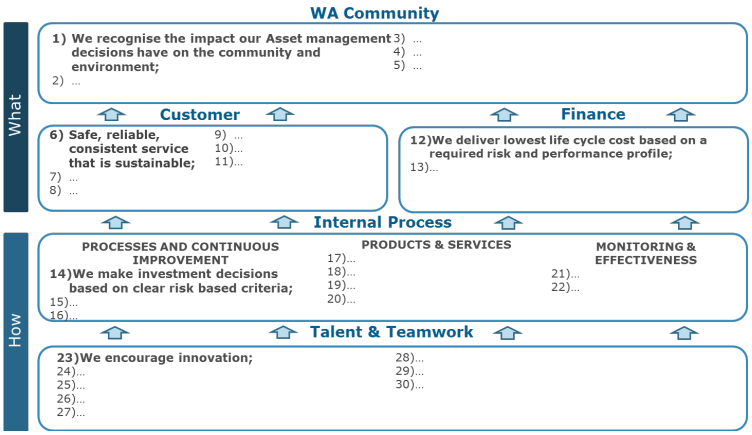

Figure 2 Asset Management Strategy Map

The Strategy Map approach can be adapted for different purposes by rearranging its elements. The key differences between the Corporate and AM Strategy Map are the renaming to WA Community as the major stakeholder of the Water Corporation and removal of capital delivery objectives whose responsibility is outside the AM function. As a State-owned utility, the WA Community objectives are prioritised above meeting financial gains as opposed to private companies where the highest returns on investment are paramount (Kaplan & Norton 2008). For the purposes of the AM function at the case study, it is considered appropriate to include some of the financial objectives in the internal process element. This is reflected in the financial aspect of the objective "We make investment decisions based on clear risk-based criteria"; as such, the financial element is the least represented in Figure 2.

An example of the selected measures that align to the AM Strategy Map is displayed in Figure 4. This is a deviation from the intended approach where it was envisaged that just one measure could be used to describe the performance of an AM objective. Due to the complex nature of quantifying the objective of "We recognise the impact our AM decisions have on the community and the environment"; the members of the workshop proposed five measures to capture its behaviour. The downside to this approach is the extra work it creates in collating the data. The approach for each AM objective forms a balanced set of performance measures with the distribution displayed in Table 1. The measures are balanced between lead indicators, which are used to predict future performance, and lag indicators, which measure past performance. An excess of lag indicators leads to reactive behaviour which is less efficient. The balance is further demonstrated through the mix between the Strategy Map elements. This is important as the 'Internal Process' and 'Talent & Teamwork' are enablers for achieving the 'WA Community', 'Customer' and 'Financial' objectives.

	WA Community	Customer	Financial	Internal Process	Talent & Teamwork	Total
Lead	4	4	2	11	7	**28**
Lag	6	6	2	5	6	**25**
Total	**10**	**10**	**4**	**16**	**13**	**53**

Table 1 Balance of Measures - Lead and Lag; Strategy Map Elements

The process of completing a Performance Measure Record Sheet for each measure results in either validation of its selection or in discarding the measure. The 'Number of Wastewater Overflow Events' is easily validated as the information is already captured within the existing reporting processes at the case study. Comparatively, the 'Percentage of non-operational hydrants' led to a redesign as it did not adhere to the recommendations of a 'good' measure due to the overlap in accountability between other State organisations.

Another function of the record sheet is to detail the processes required in data retrieval. This highlights the key constraint of siloed information, where information is stored between multiple data systems and departments within an organisation. This is a common problem encountered within large organisations and IT support for using the data systems and the experience of senior is crucial to overcoming these barriers. The use of the record sheet makes explicit the accountability process to ensure that poor performance is addressed. The other key constraints are identified as managing the resistance to change and ensuring senior management commitment despite other priorities. These manifested during the selection of performance measures; these had been addressed previously and it was preferred to use existing measures for the project. However the existing measures were not selected to align with the objectives of the Strategy Map and thus a number of gaps existed. An authoritative management style enabled progress to continue. The data captured in the record sheet is further tested by plotting over a time period (Figure 5). The first test is to ensure the data changes over time. Failure to do this indicates poor data quality and a measure that is not sensitive to a change in strategy. A measure must also have a target as it provides context to the performance and can trigger a change in strategy.

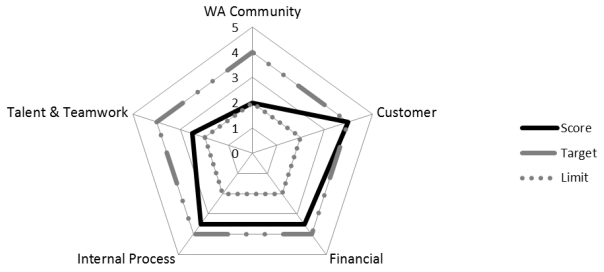

Figure 3 Executive Level Summary of KPI Dashboard.

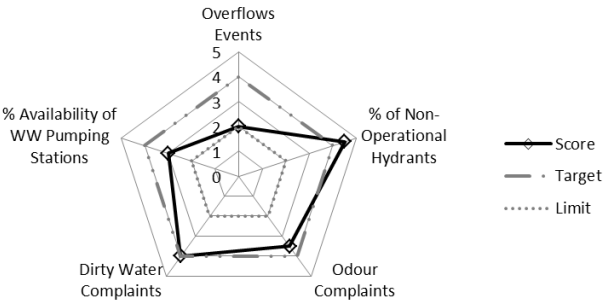

Figure 4 AM Objective Score for WA Community: We recognise the impact our AM decisions have on the community and the environment.

Each of the measures detailed within the record sheets are captured in a dashboard reporting tool. Figures 3, 4 and 5 are extracts from the dashboard, which provide a snapshot of the progress towards achieving the AM objectives. Figure 3 details an executive level summary of the overall effectiveness of the strategy employed at the organisation towards achieving the AM Strategy Map elements. From this position resources can be directed down the corporate structure to where performance can be improved. The score for each of the Strategy Map elements in Figure 3 are an average of the score for each of the objectives within the AM Strategy Map; and each objective is a composite of the performance measures (Figure 4). The score for each of the measures and objectives are normalised to a rating out of five. An example of the range of performance that correlates to a normalised score is given in Figure 5. This provides a methodology to compare measures that do not use the same units such as percentage against number per month. A normalised score of four and above indicates the target threshold is reached; whereas a score of two or below is the limit for poor performance.

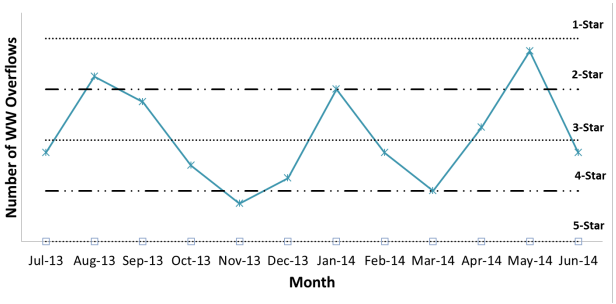

Figure 5 Performance Measure: Number of Wastewater Overflows

The dashboard contains drill down functionality to target multiple users. The Executive team and Asset Managers can form a 'line of sight' to drill down into the root cause for poor performance. A score of two for the element of 'WA Community' (Figure 3) can be investigated further; analysis of Figure 4 indicates that the 'Number of Wastewater Overflows' is performing poorly. Figure 5 shows that the limit for poor performance is exceeded for the month of May. Subsequently the Environment Branch, who act on the data for this measure as per the record sheet, use filters such as location or asset class to determine if there is a pattern to the overflows. This information is communicated to senior management to request resources to address the problem, which may result in a change of strategy such as an increase in asset renewals that cause a drop in the number of overflows for the following month. Performance cannot be viewed in isolation as analysis over a longer period and the use of supplementary data could highlight that the spike seen in May is due to a seasonal factor such as a significant storm event and not due to an asset fault. Due to the causality between objectives and measures (Kaplan & Norton 2008), senior managers must take a balanced view of the situation using the dashboard to ensure that improvements made in one measure are not at the expense of poor performance elsewhere. Furthermore it may show that gains made in one objective have benefits for others.

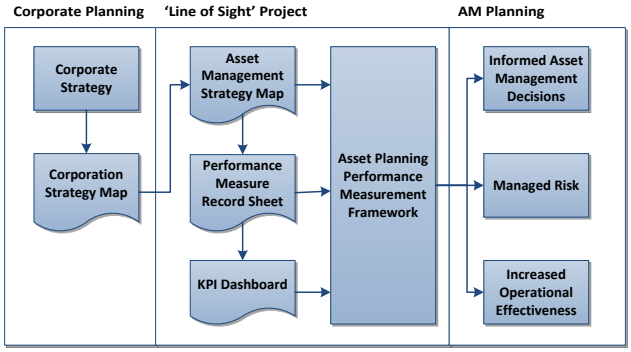

Figure 6 Asset Planning Performance Measurement Framework

The integration of the Strategy Map, Performance Measure Record Sheet and KPI Dashboard is termed the 'Asset Planning Performance Measurement Framework' (Figure 6). Figure 6 details the improved communication of the 'line of sight' between Corporate and AM Planning. An example of the 'line of sight' is where alterations in the Corporate Strategy Map result in a review of the AM Strategy Map to ensure alignment. The record sheet is then used to highlight the measures that are affected and a subsequent review of these may result in new measures added or old ones deleted. This ensures the framework maintains its relevance and is dynamic to change. The benefits of informed AM decisions, managed risk and increased operational effectiveness are achieved through the application of this framework. Each of these benefits display linkage and result in ensuring regulatory compliance by aligning with the ISO 55001.

4. Conclusions and Future Work

The structured consultative approach enables the development of a 'line of sight' between the corporate, AM objectives and its relevant performance measures as per the ISO 55001. This is validated using the AM function at the Water Corporation as an example. The result is the creation of the 'Asset Planning Performance Measurement Framework', which utilises the dashboard and record sheets to monitor the performance towards achieving the objectives within the strategy map. The framework is dynamic to change and targeted at both executive and operational levels. This ensures improved communication of the AM priorities to enable informed asset investment decisions, well managed risks and increased operational effectiveness.

Potential extensions to the work include developing an approach to satisfy the full set of requirements for an AM System as per the ISO 55001. This includes developing weighting mechanisms and composite indicators to summarise performance, as well as setting appropriate targets. It is important to review and update the Strategy Map and the associated measures periodically and in line with significant external and internal shifts to maintain its relevance. The approach developed in this project is to be validated at another Water Utility and extended to relevant industries such as gas, electricity and offshore oil and gas to test the frameworks suitability for other AM Practitioners.

5. References

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