Asset Management Information Strategy

Town of New Tecumseth

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Acronyms and Abbreviations

AM	Asset Management
EAMS	Enterprise Asset Management System
GIS	Geographic Information System
KPI	Key Performance Indicators
LOS	Levels of Service

Glossary

Asset Information Standards	Technical documents designed to be used as definitions, rules, or guidelines regarding the data stored within the asset repository and other Asset Management Systems and Software
Asset Information Strategy	A strategic approach to standardizing, managing, reporting, and governing the data in an asset repository
Asset Management Plan	Strategic plan for managing an organization's infrastructure allowing for the best possible investment decisions.
Asset Management Strategies	A set of plans being developed by the Town to implement asset management practices
Asset Repository	Provides a single, centralized database that stores and tracks organizational assets physically and financially
Business Unit	A relatively separate division of a company operating independently and is responsible for a particular range of products or activities
Enterprise Asset Management System	A software which manages assets through their entire lifecycles. They system is also a tool to evaluate, prioritize, schedule, and track operational and maintenance work.

Introduction

A critical component to any Asset Management Plan is the information strategy. It is an outline to identify how the Town of New Tecumseth is going to manage asset data. This is essential because all other associated Asset Management strategies rely on asset data in one form or another. For example, the Lifecycle and Maintenance Strategies depends on data pertaining to an asset's age, replacement cost, useful life, etc. While, an asset's operating contexts and design capacity inform the Levels of Service, and Risk Strategies. The purpose of an asset management plan and its associated strategies is to help improve how municipalities invest in their infrastructure. For example, if two bridges required investment, which bridge should be chosen? To decide, asset information on the age, condition, replacement value, and usage of both bridges would be needed. One bridge could be poor condition and used more frequently. The other bridge could be in very poor condition but not be used at all. If the town only had condition data, money could be invested on the bridge with a very poor condition. Therefore, without proper attribute data unsuitable investment decisions could be made for Town Infrastructure.

While attribute data is vital, not all attributes are of equal importance. Collecting every available piece of data on an asset can lead to a lot of useless information. There is more to manage, maintain and updated when collecting excessive amounts. This could introduce ambiguity and confusion which results in overlapping/duplicated data, or gaps. Therefore, it is important to clearly define the purpose for the information. This will drive what attributes need to be captured. Once identified, standards and collection strategies can be developed.

Standardization will mitigate a silo effect between business units, which occurs when pockets of data have varying levels of quality. It also reduces the introduction of unneeded data by forcing management to justify collection through a change management process. This will minimize requests to gather data which might seem important but is never used. Standardization would also reduce attribute inconsistencies such as naming conventions and data classifications. Consistent standards allow for data across the whole Town to be compared holistically.

The Asset Information Strategy is derived from Ontario Regulation 588/17: Asset

Management Planning for Municipal Infrastructure. Therefore, many of the attributes

identified will support requirement under the regulation. However, various asset

attributes are also critical to the business units and management. Therefore, the

Strategy will consider the Strategic, Tactical, and Operational needs of the business

units.

The Asset Information Strategy will summarize the following:

- Standardization of criteria for selecting level of detail when collecting and
  maintaining data on an asset. Asset Information Standards would also define data
  structure, auditing, streamlining processes etc.

- Data Management which employs a quality management process for auditing and
  updating data in the asset repository.

- Reporting development

- Governance of the roles and responsibilities of a Data Owner; Data Custodian; Data
  Stakeholders; and the Data Committee

The body of the Asset Information Strategy focuses on processes for Standardization,

Management, Reporting, and Governance of attribute data. However, many of the same

principals also apply to other types of asset information including work management

data.

Standardization

The Town of New Tecumseth has chosen a Geographical Information System (GIS) to be the organization's asset repository software. The program was already in use at the Town and held a large portion asset data. As a result, GIS will now be the central location for all asset information. All other modeling, and work management software will draw on the asset data stored within the GIS repository.

As stated previously, having the ability to collect every attribute on an asset does not mean it should be collected. For example, a bridge asset in the GIS can have up to 166 possible attributes. Some of these attributes include location data, structural data, sub-structural data, material data, costing data, etc. Each of these can be broken down further. For example, location data can be captured based on "street names", "X and Y coordinates", "Location Description" and "Municipality". Costing data can be captured by "Replacement Cost", "Total Cost Rounded" and "Total Cost". Attempting to populate every attribute can lead to a lot of noise in a data set. As a result, any individual tasked with auditing would have to review 166 attributes worth of data for each bridge in the asset inventory. If there were 50 bridges, there would be 8300 bits of asset data which would require updating and maintenance. This can be cumbersome and lead to human error. It can also add ambiguity and cause confusion. For example, "Total Cost" and "Replacement Cost" can be interpreted a variety of ways. As a result, the cost for

the entire bridge inventory could be divided between the two attributes. Part of the costs captured under Total Cost, and the other half captured under Replacement Cost. Data gaps can occur when neither cost field has been populated, which can go unnoticed due to the other 164 attributes. The opposite effect could also occur. Both attribute fields could be populated. Therefore, development of standards for data capture would relieve confusion and ambiguity mitigating overlapping/duplicated data or gaps.

When standardizing data collection, it is important to consider how the data will be used. A clearly defined purpose for the information will drive what assets and attribute need to be captured. The "Asset Management Planning for Municipal Infrastructure" regulation requires municipalities to develop long term processes that allow for the best possible investment decisions for their infrastructure assets. To meet these needs assets with a value of $5000 and up need to be included in the asset repository. The service provided by the asset; its condition; and the cost of replacement are also key pieces of information. Therefore, attributes such as installation data, replacement cost,

and asset condition would need to be included in data capture. This information is critical for budgeting rehabilitation and replacement strategies.

However, Asset Management is not the only stakeholder of the data. Other business units require asset data for work orders, preventative maintenance plans and regulatory requirements. Therefore, assets under $5000 dollars may need to be collected. As well, specification attributes may also be vital. When standardizing the scope of data capture it is important to know how the data is reported on, or how often it may be referenced. Examples of streamlining data include:

- Evaluating the need for the information. Any data that does not actively support Asset Management or the needs of the business unit should not be captured.

- Reviewing legacy data. If it does not fulfill the needs of Asset Management or the business unit it should be archived and abandoned.

- Reviewing attribute fields for completeness. Any field that is has less than 15% populated should be managed the same way as the legacy data.

- Removing excessive attribute fields. Any attribute fields included in a data set that are not populated should be removed from the data set.

Asset Information Standards developed by the Town of New Tecumseth will:

- Define an asset hierarchy which is the foundation for structuring municipal asset data. It will provide insight to the condition and performance of assets in relation to their level of service. It will also enable an enterprise-wide evaluation of risk and mitigation, which supports strategic decision making.

- Define the level of granularity in which assets would be collected. A standard would identify which assets would be collected on a system level (e.g., Air Handling Unit) and which assets need to be collected on a component level (e.g., motor, blower, filter, etc.).

- Identify the scope of what attributes should be collected. A standard will consider the cost of collecting and maintaining each attribute against the value acquired from the data.

- Outline Data Usage by identifying how data is processed to deliver useful information. Standards will also consider how the information is supporting strategic decision making. Is the data directly reported on by management? Or is it referenced through Partner Map Sharing or the Work Order and Asset Management System (City Works and Assetic Predictor)?

- Define the level of quality required for the data in the asset inventory

Data Management

The development of data standards does not assure that the data stored in the GIS asset repository is of good quality. A process must be in place to compare the data to the standards and address any non-conformances. Data requirements can change as business processes evolve. As a result, new attributes may need collection, and existing attribute information may no longer be required. Naming conventions and classification can also change. When standards change the legacy data must be updated as well. Auditing reports are an effective tool for comparing existing data to current standards. Any non-conformances can be addressed improving on the overall quality of the data set. An inventory should be regularly monitored and re-audited to ensure the data is current. Figure 1 provides a visual example of the data management process.

Figure 1: Quality System Enhancement Auditing Process

Source: https://www.enhancequality.com/auditing/

In 2019 the Town of New Tecumseth underwent a business shift. The introduction of the Ontario Regulation 588/17: Asset Management Planning for Municipal Infrastructure

prompted the municipality to re-evaluate the asset inventory. To meet the requirement

of the regulation the Town introduced a new Enterprise Asset Management System. This

system included Cityworks and Assetic Software which draw on the data stored in the

GIS. As a result, the purpose for the data housed in asset repository changed. There is an

opportunity to define data management standards and update all legacy data to meet

those standards. The organization can identify any information that is missing and

review any existing information that is incomplete or not in use.

When auditing the legacy data, the Town must consider the following:

Level of Accuracy - Does the data correctly represent the asset it relates to? If an

asset is replaced, does the information get updated in the Asset Repository?

Completeness - Are all assets and required attributes populated?

Validity – Is the data stored in the correct format?

Consistency – Does the same asset have the same identifier across datasets? Are

similar assets classed the same way? Are Like assets housed in the same table? Is

the source data consistent? Is the level of granularity the same? Are the units of

measure consistent?

Uniqueness – Is each asset recorded only once? It is important to avoid an asset

being captured multiple times

Timeliness- What is the time delay between a change to an asset and the

corresponding data change? This links to the level of accuracy in the data set.

Any non-conformances with data Accuracy, Completeness, Validity, Consistency, and

Uniqueness would be considered a gap. A cleansing process would need to be

implemented to bring the data up to an acceptable level of quality. Data cleansing is a

gradual process. The AM Asset Hierarchy included in Appendix A can be used to

strategically structure the collection and processing of the data. Prioritizing which gaps

to address first should be based on criticality, ease of collection, and resource (staff)

availability. The next steps would be to plan and execute data collection processes until

the gaps have been addressed. Appendix B is an example of one of these processes and

will be outlined as part of the data standards. As stated previously, data audits and

cleansing are repetitive processes which should be replicated at regular intervals.

Reporting

A recurring theme throughout the Asset Information Strategy is the importance of

clearly defining the purpose for the data in an asset repository. One use for attribute

data is referencing. For example, trades staff can look up specification data on an asset

for repair, rehabilitation, or replacement activities. Unfortunately, precise attribute data

(referenced when required) does not provide a holistic view of the asset inventory.

A Plan, Do, Check, cycle is a continuous improvement method used to maintain the quality of products, processes, and services. Figure 2 illustrates how this relates to Asset Management. The Check process is used to regularly assesses components of the Asset Management Plan such as: the state of the infrastructure; the town's levels of service performance, the budgeting plans, etc. Reporting is a crucial tool of the Check Process. Effective reporting can improve analysis, decision-making; illustrate positive and negative trending; illustrate key performance indicators; and demonstrate regulatory compliance. Action plans could develop to address any undesirable results from a report.

Figure 2: Quality Management Cycle for Asset Management

Source: https://www.calgary.ca/CS/IIS/Pages/Asset-Management-Policies.aspx

Just like asset attributes data, a report must have a purpose. Organizations can run the risk of producing many reports which do not lead to any action should an undesirable

result be present. This results in wasted effort for a report with little value to the organization.

Therefore, during the design process the following questions should be asked:

- What is the organization attempting to evaluate?

- Who is the intended audience?

- How should the information be presented?

- What decisions would be based off the data?

- What attribute data is required?

As stated earlier, the "Asset Management Planning for Municipal Infrastructure" regulation requires municipalities to develop long term processes that allow for the best possible investment decisions for their infrastructure assets. This requires the Town to generate reports for:

- The lifecycle of the town's assets (organized by category)

- The current performance of each asset category

- Replacement cost of the assets in each category

- Condition information in the category

- Life cycle activities undertaken to maintain current levels of service to the town

These types of reports can determine the effectiveness of how each Asset Management

Strategy is being implemented. Therefore, the quality of the data in the asset repository

is critical to accurate reporting.

It is still important to consider that asset attribute data and reporting are not exclusive

to the AM group. Each business has their own Key Performance Indicators (KPIs), and

regulatory requirements they must follow. Therefore, those needs must be considered.

However, the process for identifying a requirement, highlighting the required attributes,

and designing a report still apply.

Examples of business unit reports are as follows:
- Water and Wastewater service complaints

- Planned versus Reactive maintenance trends

- Road maintenance

- Capital Projects progress

- Budget reporting etc.

A lot of the data required for the above reports overlap with what is required by Asset

Management. However, additional attribute data and report structures will also be

required.

Governance

It is a large endeavor to standardize, maintain, and report on the data in the asset repository. This is usually the responsibility of the Data Owner. They are accountable for the quality of one or more data sets. They control what information is housed in the repository and are responsible for standardization. The data owner has a holistic view of how, where, and why the data is in the system, and what needs to be reported. There are attributes that may be specific to the business units and attributes that may no longer be required by the business units. Sometimes data may be for informational reason and not for any decision-making purpose. The figure below illustrates on how information from different stakeholders or business units flows in the repository. The information may be from an As-built drawings, data from studies like RNS, Condition assessments, data provided by external stakeholders like developers, consultants etc. The Data Owner reviews the data and decides if they are important for decision-making. It is the critical and important information that will reside in the asset repository in GIS.

A Data Custodian controls the database structure. They are responsible for maintaining the data in the repository in accordance with the business requirements. This can be done through a ticket

system or a change management process. It is common for the Data Owner to also be the Data Custodian. However, this approach is not a practical for the Town of New Tecumseth. The Enterprise Asset Management software leverages the existing GIS data. The custodians of the GIS database are not the data owner in this case. Consequently, the Data Owners do now have direct access to the database to adjust attributes, and model structures. The two need to collaborate closely to ensure the integrity of data in the asset repository.

A Data Stakeholder is a group or individual that could affect or be affected by the data.

They are typically business unit managers who draw on the data for various purposes.

Stakeholders can provide input as to what data is housed in the repository. They can also

make requests for data collection projects, and standard updates. However, a Data

Stakeholder does not control those standards or what gets captured. If a Stakeholder

requires any changes to a standard, they can do so through a change management

process. This mitigates impulsive requests resulting in superfluous

or incomplete data. Examples of stakeholders would include managers, council, the

Engineering Department, the Planning Department and Steering Committees.

To ensure the needs of every business unit, and the AM group is met the Data Owner,

Data Custodian and representatives from each stakeholder must work closely together.

Data Committee

The Town of New Tecumseth is working on the process for coordinating the 3 groups

identified above. This can be done by designating a group, or cross functional team

across various services areas in the data committee.

This Committee would be the Data Owner whose role would be to:

- Standardize what assets and attributes are collected

- Standardize the data model structure

- Standardize data collection process

- Standardize change management processes for requests to alter data models, data standards, Cityworks configurations.

- Monitor the quality of data in the database

- Liaise with other business to address any requests of concerns

Members of a Data Committee can include but are not limited to:

- The Manager of Asset Management

- The Manager of Information Technologist

- The Manager of Engineering

- Business Analyst

- GIS Representative

- Infrastructure Asset Management Technologist

- Engineering Representative

- Representative from Water and Wastewater

- Representative from Roads and Fleet

- Representative from Facilities & Property, Parks and Recreation

- Finance Representative for Tangible Capital Assets

- Representative from Fire

In summary, the Data Committee would oversee and enforce all standards in place to manage the data in the Asset Repository. The Data Custodians would be part of the data committee making the partial owner of the data but not solely responsible for the data. Stakeholders can liaise with be Committee member in their business to ensure their needs are met.

Conclusion

That Asset Information Strategy is a strategic approach to standardizing, managing, reporting, and governing the data in an asset repository. Standardizing the information in the asset repository generates a data structure which is simple to audit and maintain accuracy. Management processes

are used to ensure the data is accurate and up to date, as well as meeting each standard. Clean data leads to more accurate reporting which allows the organization to make better investment decisions. All this can be achieved through a governance process in which the data owner is a

Committee of designates who are also Stakeholders of the data. As stated above, clean structured data leads to a holistic picture of all the assets owned by the Town, which is the foundation for the Asset Management Plan.