AN ASSET MANAGEMENT MATURITY TOOL FOR THE MUNICIPALITY OF ENSCHEDE

Bachelor Thesis

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1. Preface

Here in front of you lays my bachelor thesis report, which marks the end of my Bachelor study Civil Engineering and Management at the University of Twente. This three year journey has learned me a lot. Not only regarding Civil Engineering, but also on a more personal level. It was a pleasure to end my bachelor with a thesis for the Municipality of Enschede. I had a lot of fun working for the Municipality and I got a small peak into the organization, which I found very interesting. This thesis would not have been possible without help from numerous people. Firstly, I would like to thank me UT supervisor Dr. Andreas Hartmann for guiding me along my entire thesis with his feedback and help on creating the best possible thesis result. Next, I would like to thank Peter Dijkstra from the Municipality of Enschede for his enthusiasm and support throughout my thesis and, of course, for taking me on board to do a thesis for the Municipality. Also, I want to thank Ina van Dijk, Harry Heijdens and Stefan Volmer for cooperating in the discussion and filling the AM maturity tool, without them there would be no first iteration results. Lastly, I want to thank my family, girlfriend and fellow students for helping me through my thesis by supporting me, especially during these strange times.

Table of Contents

2. Table of Figures

3. Table of Tables

List of abbreviations and explanation of certain asset management concepts:

- AM = Asset management
- The organisation/The Municipality (of Enschede) = The department of stadsdeelbeheer at the Municipality of Enschede.
- AM system = A management system of an organisation which operates according to AM principles and guidelines, with elements to make AM policy and establish AM objectives
- AM portfolio: All assets of the organisation which are part of the set AM context. So all assets which the AM guidelines comply to.
- AM goals: goals the organisation set to the AM system. These goals are set for the AM system itself. Example: create multiyear maintenance plans for all assets.
- Strategic goals: larger, organisational wide goals. Example: the organisation needs to be CO2 neutral within 25 years. (Extra explanation on this is given in Figure 5).

4. Summary

This report presents the results of my research on the asset management maturity of the Municipality of Enschede. This thesis touches upon the problem the Municipality of Enschede has recently encountered. The rapidly changing world of infrastructure demands a lot from an organisation and its assets, therefore, there is ever more need for good asset management. The department of stadsdeelbeheer of the Municipality of Enschede want to know what asset management can do for them and how well their current management system works according to the asset management guidelines. In this thesis report, two questions will be answered. Firstly, what can asset management bring to the Municipality? This will be answered by a literature study with the ISO asset management guidelines as main source. Secondly, what is het asset management maturity of the Municipality? Checking the asset management maturity of the Municipality will show how well the current management system performs according to selected, relevant asset management subjects. This method uses a determined list of AM subjects, on which the municipal employees who are responsible for the management system score their own system.
The literature study lead to the conclusion that the implementation of an asset management system will lead to financial, organisational and social benefits. Better financial performances, more efficient communication and stakeholders will have a more positive feeling about the organisation. The AM maturity check lead to see that the Municipality is very unsure about the current state of the management system. On some AM subjects, they scored their system very well, on others very low. These AM maturity results showed that the Municipality needs to invest in understanding what asset management is and how it needs to be implemented, while on AM subjects like the including of employees, the Municipality is already working according to AM principles. (Amadi-Echendu J. E.; Brown, K.; Willet, R. ; Mathew, 2010a).

5. Introduction

We cannot imagine a world without infrastructure. Every single day we use multiple types of infrastructure to live our ordinary life. Therefore, it is important to maintain the quality of this infrastructure. This performance level can be maintained if the infrastructure is managed correctly. How do you manage such infrastructure? Using Asset management. The need for asset management is rapidly increasing in modern society(Parlikad & Jafari, 2016). This because there is an immense pressure on the assets. The assets are pressured to have a constant performance level by stakeholders or other users, this reflects on towards the organisation which owns the assets(Van Der Velde et al., 2012). They need to, by the use of asset management, make sure that these performance levels are maintained with the least amount of money needed and the minimal time consumed. This together with the lowering of (government) funds makes for a difficult management system(CROW, 2021).

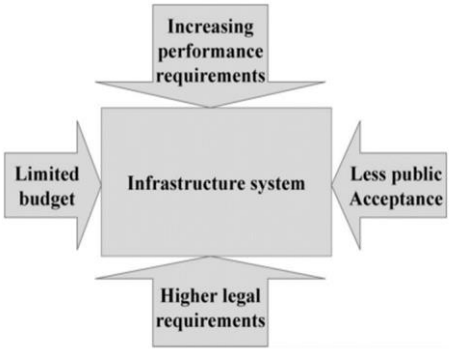

Figure 1: the pressure on infrastructure and its owners. Source: (van de Velde, Jenne; Klatter, Leo; Bakker, Jaap, 2013)

Asset Management is integrated into every organisation. All have some form of assets which they own which they need to manage to make sure the quality and reliability of the assets remain at a sufficient level. This is no other for the Municipality of Enschede. Examples of Municipal assets can be infrastructure and the available public space. As of now, the department of stadsdeelbeheer at the Municipality of Enschede wants to start managing their assets according to the asset management principles (van Dijk, Heijdens, Dijkstra, & Volmer, 2021). As guidelines, the Municipality wants to use the guidelines set by the CROW, a Dutch knowledge institute which has taken the international ISO norms for asset management and made them fitting for Dutch decentralized governments.

The Municipality want to implement an AM system according to the CROW guidelines, but it is not clear to which extend the Municipality already complies with this guidelines (van Dijk, Heijdens, Dijkstra, & Volmer, 2021). This can be check by using maturity checks. Maturity checks are a method used in many different fields of expertise to evaluate an organisation on a certain practise. So, also the asset management practises of organisations can be checked by the use of a maturity tool. One government body who has already checked their AM maturity is Rijkswaterstaat(Bergli, 2017). If you check the asset management maturity of an organisation, you check how well the organisation practices the principles of asset management. Based on a set of criteria/subjects, an organisation is scored on how well the meet those criteria/practise those subjects. How better the score, the better the organisation practises the principles of asset management(IAM, 2016).

6. Research Method

The Municipality of Enschede has a large portfolio of assets which is owns. And this portfolio is constantly growing when the municipality is executing new projects, which can be building new infrastructure, increasing the amount of services which they offer or giving new use to public space. This growing portfolio demands that the department of stadsdeelbeheer from the Municipality of Enschede starts managing their assets in a more efficient and effective way. Therefore, they would like to look into the ways of implementing asset management according to the CROW guidelines.

Research objective

The objective of this research is to find out what AM can bring to the Municipality of Enschede and to analyse the current state of the asset management practise, as to say: analyse the AM maturity of the Municipality based on the CROW vision of asset management (van Dijk, Heijdens, Dijkstra, & Volmer, 2021).

Research questions and sub questions

The following two research questions will be answered in this thesis:

- ***What can AM bring to the Municipality of Enschede?***
  - *What are the advantages of AM?*
  - *What can those advantages mean for the Municipality of Enschede?*
- ***What is the AM maturity level of the Municipality of Enschede and how can they (possibly) improve their AM maturity?***
  - *What is the CROW vision on AM?*
  - *How does the IAM method for determining AM maturity work?*
  - *How would a tool look for checking AM maturity specified for the Municipality?*
  - *Which AM aspects to determine AM maturity will be used in the tool specified for the Municipality?*
  - *How would responsible Municipal employees score the current AM practises of the Municipality?*
  - *Which recommendations can be made to the Municipality to increase their AM maturity.*

Research approach

These questions will be answered by firstly looking into the ISO asset management requirements and the CROW vision on AM. These documents will enlighten the benefits of implementing AM within an organisation. These benefits will then be specified for the Municipality. Next step is creating an AM maturity analyses tool to determine the AM maturity of the Municipality. This tool will include a list of relevant criteria/subjects to score the Municipal AM practise on. This list will be determined using literature from the CROW, the ISO and the IAM. Together with the consultation of municipal employees responsible for the AM practises. This tool will be specified and made fitting for the Municipality of Enschede. This so they can reuse the tool in later stages of their AM implementation cycle. The goal is to also do one assessment of the current AM practise of the municipality during this thesis. This assessment will be done by letting the tool be used/filled in by multiple employees of the Municipality. Then these results will be compared and discussed to come to a final AM maturity score for the current AM practise of the Municipality. After this assessment, possible recommendations will be given to the Municipality on how they might be able to improve their Asset Management practice.

7. What is asset management?

Asset management is a very broadly used term. It is used across multiple fields of expertise, in which asset management can have very different meanings(ISO, 2014b). Between the different fields of expertise, there can be differences in what can be considered assets and there can be differences about the most efficient ways of managing those specific assets. Asset management is a multidisciplinary practise, for all different fields of expertise, asset management requires a combination of decision making on physical, financial and social aspects(Amadi-Echendu J. E.; Brown, K.; Willet, R. ; Mathew, 2010b). In the recent history, asset management has become more and more important within the infrastructure working field. This is because a lot of infrastructure from the industrial revolution is or will come to the end of its expected lifecycle. This means there is a need for a decision on replacing, renovating or enlarging the lifecycle of the existing infrastructure. Also, with the increasing demands from stakeholders to increase the value of the assets while also decreasing the overall costs. More and more technologies arise which can help with meeting these demands, but they also show the need for an integrated form of management to make the decisions about the life of asset (A. K. Parlikad , M. Jafari, 2016). To make these decision, all aspects of the asset: physical, financial and societal need to be considered. This is where asset management comes into place(CROW, 2021).

The definition of an asset as stated in the Oxford English dictionary is: ''All the property of a person or company which may be made liable for his or their debts''(OED, 2021). To translate this into context for the Municipality: the property can be taken as the engineering asset (infrastructure), the person or company in this case is the Municipality and the debt can be interpreted as the value of the asset towards accomplishing the Municipal goals(environmental friendly, bicycle city Enschede etc.) (Amadi-Echendu J. E.; Brown, K.; Willet, R. ; Mathew, 2010). There is one type of assets which Municipalities need to deal with which most organisations do not have: ''objects in public space''. Examples of this can be roads, sewage, greenery, bridges and other artworks(CROW, 2021). To give a visualisation on which types of assets are owned by the department of stadsdeelbeheer Municipality, I refer to Figure 2. Circled in blue are the types of assets owned by the department.

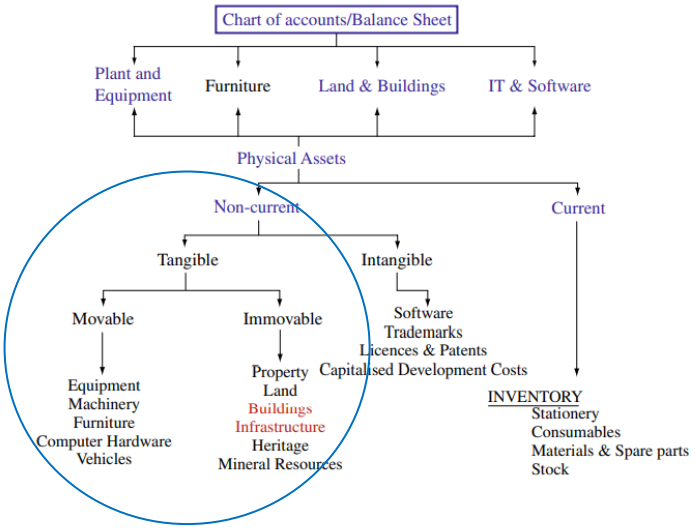

Figure 2: Types of Assets the department owns. Source: (Amadi-Echendu J. E.; Brown, K.; Willet, R. ; Mathew, 2010)

Asset management can be defined in many different ways. Such as: ''the optimal management of assets who are of value to the organisation''(CROW, 2021). However, what is classified as ''optimal'' depends on the goals the organisation has set. However, asset management always remains a balance between performance, risks and costs(CROW, 2021). Another asset management definition can be: ''the total management of physical, as opposed to financial, assets. However, engineering assets have a financial dimension that reflects their economic value which is important to include in engineering asset management''(Amadi-Echendu J. E.; Brown, K.; Willet, R. ; Mathew, 2010b). This definition can be further defined for infrastructure asset management as follows: ''*Infrastructure Asset Management is a strategic and systematic process of optimising decision-making in resources allocation with the goals of achieving planned alignment of an infrastructure asset with corporate goals throughout its lifecycle*''(Amadi-Echendu J. E.; Brown, K.; Willet, R. ; Mathew, 2010b). The general conclusion which can be drawn is that Asset Management is the combination of practises of

an organisation which regard maximizing the value of the organisations owned assets. This value can be financial or societal. To maximize this value, it is important to manage the physical, financial and social/human aspects of the asset(Woodhouse, 2019).

The managing of physical assets considers the current state of the engineering asset. It focusses on the capturing of data and on which information technologies to use to monitor the condition of the engineering assets. The financial asset management focusses more on the financial situation of the engineering asset (is it worth it to repair the structure or is it better to build an entire new structure). The societal/human value of a structure implies the arrangements made regarding maintenance and societal impact of the structure (what is the impact of closing a highway for maintenance on the traffic around a city)(Amadi-Echendu, J. E., Brown, K., Willet, R., & Mathew, 2010)

Asset management should not be about rational choices and optimal technical management, it should be about the needs of the asset users and its environment. The Asset Owner determines the strategic goals of the organisation, these goals determine the requirements for the asset management decisions. This makes it not abnormal that the chosen decision is not the optimal technical decision, but the solution which is presented still accomplishes the set goals(Amadi-Echendu, J. E., Brown, K., Willet, R., & Mathew, 2010). This solution will be a balanced decision between costs, performance and risks. For the risks, the organisation should have a so called ''organisationvaluematrix'' (CROW, 2021). In this matrix, a clear distinction between different levels of performance and the accepted risks which come with that performance level(CROW, 2021). Asset management should provide differing views on basic questions. For example, how can an intervention relating to capability within a project or process help in achieving the organisations its goals.

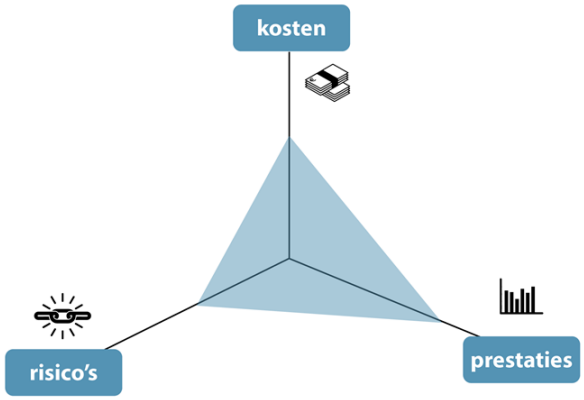

Figure 3: the AM balance between cost, risk and performance. Source: (CROW,2021)

When an organisation starts with implementing AM practices into their current management system, the management system will switch to a so called Asset Management system. So, when, further on in this Bachelor thesis, the term Asset Management (Or AM) system will be used, it is meant that the organisation has (fully) implemented asset management practices into their management system in all ways possible. Within this AM management system, there will be AM policy and AM goals. AM policy regards all policy made within the AM system which have to do with managing the quality of assets. AM goals are objectives related to the organisations assets (performance goals for example) and the AM system (what profit does the AM implementation need to bring). However, outside of the AM goals, an organisation will always have its own strategic/organisational goals. This are the main goals of the organisation to which all practises should benefit. Becoming more sustainable, increasing profit margins or enlarging market share are examples of strategic goals.

Asset management is a versatile way of working. It is a method to change policy points and organisational goals into execution plans to guard these goals and visions. It helps you to make underlaid decisions while taking all needed aspects (performance, risk and costs) into account. Also, it makes the organisation able to secure and exchange knowledge, control laws, create possibilities for improvements and in general lead to better performance of the organisation(CROW, 2021).

As the municipality of Enschede wants to implement the AM strategy as prescribed by the CROW, it is also important to know what the CROW view is on AM and what they propose to change to

municipal policy, in order to improve the AM practises of the department. The CROW (in Dutch: Centrum voor regelgeving en Onderzoek in Grond - Water en Wegenbouw en de Verkeerstechniek), is a Dutch Knowledge institute which is specialised in the soil, water and traffic engineering. It is an institute which covers all different aspects of the Civil Engineering world. The CROW can provide private or public organisations with a large variety of supporting services to help with new technical innovations or policy implementations. They can provide guidelines, give trainings to educate employees or provide practical tools to help companies or organisations coop with the constantly changing society. What has the CROW done regarding asset management? In 2013, the CROW started with the scouting of asset management at decentralised governments. The conclusion of this scouting was that many organisations did see the possible use and advantages of the implementation of asset management, they only did not have as much success with the implementation of the asset management system. The CROW concluded that the missing of tools to concretely shape the implementation of asset management within decentralised governments. Therefore, the steps of implementation were not yet taken, due to the large uncertainty (CROW, 2021).

The CROW has, since then, partnered with many (decentralised) government bodies to help them with the switch from owning and reacting to the state of their assets to managing all aspects of their owned assets. The Municipality of Enschede would also like to start managing their assets in the way the CROW prescribes. What is the CROW view on AM? The CROW thinks that, because of the shrinkage of (decentralised) governments and the decrease of (financial) resources, the focus in managing is and needs to be switching. The focus is switching from ''building and constructing'' to managing already existing infrastructure together with efficiently using and maintaining the currently present public space. What would this mean for organisations, according to the CROW? This means the organisations needs to start managing, controlling and balancing the performances, risks and costs of all owned assets. This managing needs to be done throughout the entirety of the lifecycle of the asset. The goal of asset management, as said by the CROW is: ''maximise the value of every euro which is being invested in assets''. (CROW, 2021)

Within the system of AM, the CROW thinks it is important to have a clear role distribution(CROW, 2021). They distinguish the following roles within the AM process: Asset owner, Asset manager and Service provider. The Asset owner is the one who determines the strategic framework which the infrastructure or public space should meet. The strategic frame consists of the mission, vision and goals for the owned assets. The asset manager maps all risks regarding the assets, manage- and report on the performances of the assets and come up with management regulations/policy. Lastly, the service provider. The service provider is responsible for the execution of the management policy and the maintenance work. This role distribution is important for the effectiveness of the set-up and execution of the asset management system. It provides clarity in the distribution of tasks and responsibilities(Van Der Velde et al., 2012).

Figure 4: Role distribution within the AM system. Source: (Pragma, 2021)

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8. Benefits of implementing AM

One big question is what can asset management practises bring to an organisation. In this case, the municipality of Enschede. Implementing asset management practise into the current management system of an organisation is a very demanding policy switch. This change in practise will ask a lot from the organisation and its employees, therefore it is a logical question ask what these asset management practises will bring to the organisations. Within the ISO 55000 series, this is well defined. And as the CROW vision for asset management is based on the ISO 55000 series, this complements the wishes of the Municipality very well.
The ISO states the following benefits of implementing asset management practices into the management system of an organisation(ISO, 2014b):

- **Improved financial performance**
- **Informed asset investment decisions**
- **Managed risk**
- **Improved services and outputs**
- **Demonstrated social responsibility**
- **Demonstrated compliance**
- **Enhanced reputation**
- **Improved organizational sustainability**
- **Improved efficiency and effectiveness.**

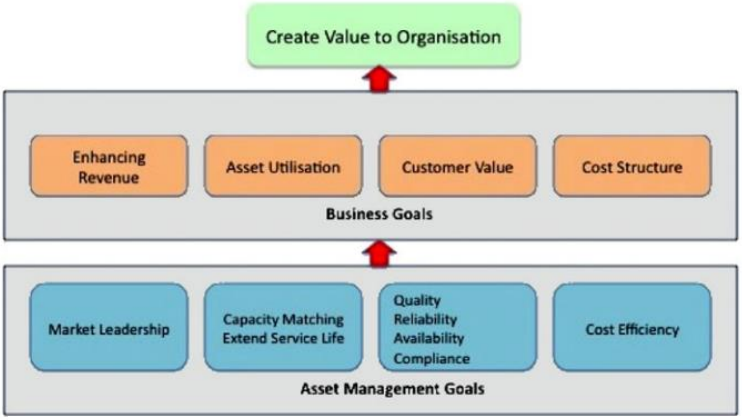

Figure 5: How AM increases the value of an organisation. Source: (Amadi-Echendu J. E.; Brown, K.; Willet, R. ; Mathew, 2010)

Below, all these benefits of implementing asset management practises are shortly explained.

Improved financial performance
Asset management practises will help the organisation with increasing their return on investments and reduces unnecessary costs. These profits are gained while preserving the value of the asset and still working the larger/long-term organisational goals. This because well implemented asset management practises will make the organisation able to make financial decisions with a more birds eye perspective, which will lead to well considered investment decisions with the maximum benefits. For the municipality, an example of this can be that the AM practises will lead to multi-year maintenance plans for its assets. These plans will result in less maintenance cost, because of the regularity of the maintenance, large unexpected cost will be unlikely, which in the long run will lead to better financial results.(ISO, 2014b)

Informed asset investment decision
Asset management practises will also have an impact on the higher levels of management. These practises will improve the decision making by increasing the organisations ability to effectively balance cost, risks opportunities and performances. (ISO) For the Municipality, this would mean that the management decisions made will take a bit longer, but will be more thoughtful. These decisions will make the municipality able to direct resources more efficiently with the least risk. (ISO, 2014b)

Manage risk.
Asset management practises can give an organisation clear insight in the risks of the different investment decisions. When having knowledge on risks and how to possibly mitigate them, the organisation can reduce financial losses (via reducing unforeseen expenses), improve health and safety for employees and users and improve the organisations good will and reputation. (ISO, 2014b)

For the municipality, this will mean that the users of the assets (the public) will have a safer and more pleasant time in the use of the assets. This because there will be less risks involved with the use and less unforeseen repairs which will put the assets out of use(ISO, 2014b).

Improved services and outputs
By the use of asset management practises, the performance level of the assets are kept at a constant high. This will lead to an improved quality of the service the organisations gives via its assets. Also, this constant performance of meeting or even exceeding the expectations of customers/users and stakeholders will increase the credibility of the asset and its asset owner. For the municipality, this would mean an increase in the useability of their assets and a higher stakeholder satisfaction. With as stakeholders being the inhabitants of Enschede. (ISO, 2014)

Demonstrated social responsibility
If the organisation shows that, via asset management practises, the organisation is meeting goals which are important for society, think of climate adaptation or other sustainability goals, it enables the organisation to demonstrate that it takes it social responsibility on different societal or ethical issues. An example for the municipality can be if they, by the use of efficient AM practices become a frontrunner in climate adaptation, they show that they are really working on improving the environment(ISO, 2014).

Demonstrated compliance
If the asset management system is implemented within an organisation, it will also help the organisation with complying to laws and other regulations. By doing this in a transparent (to employees and stakeholders), the organisation can enable demonstration of compliance. This to increase the trust in and credibility of the organisation. For the municipality, this would have minimal effect because they have to comply with laws all the time and even make laws and regulations of their own(ISO, 2014).

Enhance reputation
This is an asset management benefit stated by the ISO which is integrated in all other benefits. As the organisation will have financial, societal and physical improvements because of the asset management practises. These improvements will result in an improved customer satisfaction, stakeholder awareness and confidence. As for the municipality, an increase in reputation will lead to a more positive look on the municipality by inhabitants. This will lead to a possible growth in size of the municipality and maybe even an increase in active inhabitants in working groups or volunteering work(ISO, 2014).

Improved organisational sustainability
The implementation of asset management practise is ought to have positive effects on the managerial structure of the organisation. Asset management promotes the effective managing of short- and long-term effects, expenses and expected performances. This can improve the sustainability of operations and the organisations. This means that the operations will be more efficient and there will be less ‘’waste’’ (time or investment lost). For the municipality, this would mean that there will be no time lost by information needing to pass endless intermediaries until the response is given to the correct person. Also, AM will help the municipality with the creating of long-term maintenance plans (multi-year plans) (ISO, 2014).

Improved efficiency and effectiveness
This goes for many different systems within the organisation. Asset management practises will help with reviewing and improving processes, increase effectiveness and efficiency for procedures and asset performances. For the municipality, this point will mostly affect practises like the maintenance process, the management cycle and the communication between layers of governance(ISO, 2014).

9. Important AM requirements

9.1 ISO 55001 asset management requirements

The ISO 55001 guidelines are part of the ISO 55000 series which focus on asset management practises. The ISO 55001 give requirements for the establishment, implementation, maintenance and improvement of asset management systems within an organisation(ISO, 2014c). These steps together are called the asset management cycle. The standards given by the ISO are meant for the ones involved in all stages of the asset management cycle, the ones who are delivering asset management activities and services providers and internal or external parties who asses the organisation. ISO 55001 also refers to other ISO documents, like ISO 55002(ISO, 2014a) for more guidance on the application of the requirements and ISO 55000 for general information on asset management. This chapter also has additional information from (Urquhart & Busch, 2000) to explain the different points. The ISO 55001 requirements are split in the following (sub)sections:

- **Context of the organisation** (ISO, 2014c)
    - **Understanding the organisation and its context**
      The organisation needs to determine in- and external issues which interfere with its ability to achieve intended outcome of the asset management system.

    - **Understanding stakeholder needs and expectation**
      The organisation needs to determine: 1. Relevant stakeholders. 2. Requirements and expectation these stakeholders have with respect to the assets. 3. Criteria for AM decision making. 4. Stakeholder requirements regarding the transparency of financial information relevant to AM.
      (Urquhart, Tony; Bush, Warwick , 2000)

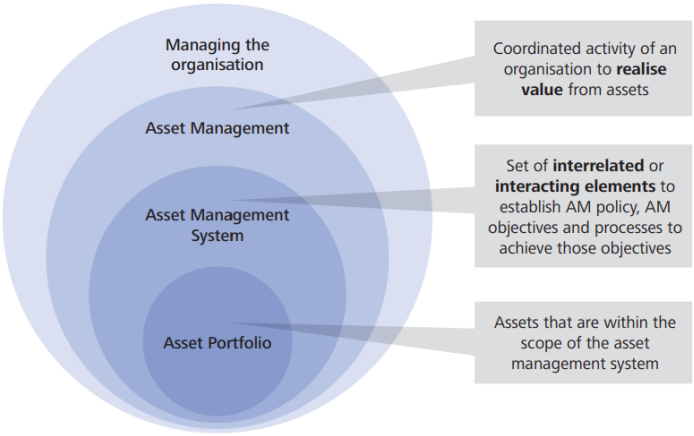

Figure 6:example of AM concepts. Source: IAM

    - **Determining scope asset management system**
      An organisation needs to determine the boundaries of the AM system and ways of applying AM to determine the scope. This scope needs to be aligned with the strategic plan and AM policy. For the scope, the organisation should consider: in- and external issues from the context, requirements from the stakeholder needs and possible interaction with other management systems.

    - **Asset management system**
      The organisation should come up with an asset management system which includes all steps of the AM cycle. This system should also include processes and interaction. Within the strategic plan of the organisation, information about the role and use of the AM system needs to be included, this to support the organisation in meeting its strategic goals.

- **Leadership** (ISO, 2014c)
    - **Leadership and commitment**
      The highest level of management/leadership shall show its commitment to the AM practises by: 1. Implementing AM policy and an strategic plan which are compatible with the organisational objectives. 2. Ensure integration of AM system into organisation business process. 3. Provide sufficient resources for AM practises. 4. Communicate importance AM practises. 5. Ensure AM system meets its set goals. 6. Encourage employees to contribute to effectiveness of AM system. 7. Promote collaboration between different layers of the organisation. 8. Encourage constant improving/learning. 9. Align AM and organisational risk management approach.

    - **Policy**
      Top management has the task to establish AM policy which fits the context of the organisation, provides a clear method for setting AM goals, include regulations on how to meet requirements and keep improving the AM practices. This policy should be in line with the organizational plan and not interfere with other (relevant) policies which are followed within the organisation. It should also be periodically reviewed by, for example, a maturity check. Lastly, the policy should be clearly documented and communicated to employees and stakeholders.

    - **Organisational roles, responsibilities and authorities**
      The responsibilities for different parts of the AM system should be assigned to fitting layers of management. The highest level of management should assign the following tasks to fitting levels of management: 1. Formulating and constantly adapting the strategic plan, including AM objectives. This includes reporting to top management 2. Ensuring that AM system helps the translation of the strategic plan to executive plans. 3. Ensuring that the AM systems keeps following the international standards. 4. Maintaining sustainable, adequate and effective AM.

- **Planning** (ISO, 2014c)
    - **Actions to address risks and opportunities for the AM system**
      When keeping in mind the above specified context and requirements, the organisation needs to identify all risks and opportunities which can assure the AM systems can meet its intended goals, prevent undesired (side)effects and enable constant bettering of the system.

    - **AM objectives and planning to achieve them**
      Organisation will determine AM objectives based on stakeholder requirements and other financial, technical or other relevant requirements. The objectives need to be consistent with the organisational objectives and AM policy. The objectives need to be based on the AM criteria from the organisations context and be part of the strategic plan. Also, the objectives need to be constantly updated to keep fitting within the strategic plan and meeting the stakeholder requirements.

      To accomplish these objectives, the organisation should make, document and maintain (AM) plan(s). The organisation needs to ensure that all relevant criteria are taken into account while making the AM plan. The plan needs to contain the following: 1. The way to and important criteria of decision making. 2. All needed managing methods. 3. Tasks that need to be done. 4. Resources, responsibilities, deadline and time horizon for AM plans. 5. Method for evaluating results including review period. 6. Actions regarding (accepted) risks, implementation and significance. (Urquhart, Tony; Bush, Warwick , 2000)

- **Support** (ISO, 2014c)
    - **Resources**
      Organisation needs to provide all resources needed for the different phases of the AM cycle and to meet the AM objectives.

    - **Competence**
      Determine demands for responsible person(s) for the asset, AM and AM system performance. Also, the organisation should ensure new persons to gain this competence, if needed bring in knowledge for that and document that this competence is present.

    - **Awareness**
      All persons who work on tasks which affect the achievement of the AM objectives need to be aware of the AM policy and their contribution to the larges organisational goals.

    - **Communication**
      Determine the level and ways of communication needed which remain relevant to the assets, AM and AM system. This includes on what, when, with whom and how to communicate.

    - **Information requirements**
      These are needed to support the organization its assets, AM and AM system. In doing this, the organisation needs to include thoughts about: significance of identified risk, roles and responsibilities, AM processes, procedures and activities, information provision towards stakeholders and availability of information on the choices made by the top management. The organisation needs to identify the attribute and quality requirements of available information and have a plan on how and when the information is gathered and processed. The organisation should strive for an consistent and traceable stream between financial, technical and other non-financial data. This is needed to meet the legal and regulatory requirements and comply with stakeholder demands and organisational objectives.

    - **Documented information**
      Documents are needed; as required by the International Standard, to meet legal requirements and for the effectiveness of the AM system. These documents need structural updating and creation of new documents. This all while ensuring a proper identification and description, constant format and an evaluation of its sustainability and adequacy. Next to that, these documents need to be controlled in such a way that they are always available and suitable when needed. Also, they need to be protected well to maintain the integrity of the document. The organisation needs to accomplish this by clearly stating where the documents can be distributed to and who has access, store the documents in an safe environment and keep track of all changes which are made to the document.

- **Operation** (ISO, 2014c)
    - **Operational planning and control**
      The organisation needs to manage the process of meeting the set requirements. This means implementing all actions and plans which are mentioned above, create criteria for the process and keep control over the process by documenting and monitoring the risks which may arise during the process.

- **Management of change**
  Changes, temporary or permanent, in the management system have impact on the achieving of the AM objectives. Therefore, all changes and the risks they bring need to be assessed before they are implemented.

- **Outsourcing**
  When an organisation gives away part of the tasks for achieving the AM objectives, it is important that they remain to control the outsources tasks to stay able to assess the risks. The organisation needs to document how these outsourced activities are controlled and also integrated within the AM system. In this documentation, it should become clear which tasks(in detail) will be outsourced, who will be responsible for managing the outsourced processes and the guidelines for information provision between Asset Owner and service provider.

- **Performance evaluation** (ISO, 2014c)
  - **Monitoring measurement, analysis and evaluation**
    The organisation has to come up with a plan which includes; what needs to be monitored, what will be the methods used, when will the monitoring happen and when will the results be processed. There will be reported on the performance and state of the asset, the AM (financial and non-financial) and the effectiveness of the AM system.

  - **Internal audit**
    The organisation should have set periods after which internal progress meeting should be arranged. These meetings should help towards determining whether the AM system conforms to the set requirements by the hosting organisation and the international standard requirements. These so called internal audits need to be set up, criteria need to be determined, objectivity needs to be determined and documentation needs to be retained as evidence. A maturity check is a good example of such an audit.

  - **Management review**
    The highest level of management shall also review the AM system of the organisation, also after a set period of time. They will focus on sustainability, adequacy and effectiveness. Furthermore, the management should consider: the progress made from the last management review, changes in internal or external issues which may influence the AM system, information on AM performance (how well did it help the organisation), AM activity, changes in the risks an possibilities of improvement. From this review, new decisions on the AM practises of the organisation will be made to possibly improve them.

- **Improvement** (ISO, 2014c)
  - **Nonconformity and corrective action**
    When, within an asset of an organisation, an incident occurs, an organisation should firstly take action to control, correct and mitigate the consequences. After that, a decision needs to be made if the organisation wants to tackle the cause of the incident. If they want to take action to tackle the cause, this action needs to be reviewed if it was effective. If the cause lies within the AM system, changes should be made to that as well.

- **Preventive action**
  Identifying potential failures in advance and assessing if those failures will need preventive action is an important aspect of AM. This is done by looking into to risks, the chance of occurrence of the failure and the possible damages done by the failure.

- **Continual improvement**
  An organisation should constantly try to improve sustainability, adequacy and effectiveness of its AM practises and AM system.

9.2 What does the CROW see as important aspects for AM practises.

The CROW is basing its vision and priorities regarding asset management on the ISO 55000 series. The ISO 55000 series are a series of documents which contain international guidelines on asset management practises. One point made in the ISO 55000 documents is the working with tasks. Tasks are classified as an assignment together with a responsibility. The use of tasks ensures that; all tasks are executed and none are forgotten about, every person involved knows who does what and who to address for certain tasks, responsibility is taken for the execution of tasks and that for all tasks it is clear why they need to be executed and what the impact of that certain task is on the management process.(CROW, 2021)

Figure 7: the CROW AM vision of iAMpro

The tasks the CROW states as ‘‘main’’ tasks are:

- Decision making
- Directing use of public space and infrastructure
- Managing public space and infrastructure
- Execution/implementation

Next to that, the CROW has stated three preconditional tasks for asset management. These being:

- Manage data and information
- Managing the organisation
- Quality management ISO 55001

Below, all of these tasks will be described on why they are important for the asset management implementation and practise of organisations.

Decision making (CROW, 2021)
Working according to the asset management principles and practices has influence on the entirety of an organisation. Therefore, the decisions made on the general policy of the organisation will influence how the asset management policy will turn out to look for the organisation. Asset management is integrated within decision making from policy development, planning, contracting and execution to monitor, manage and improve.
This decision making determines the requirements/demands the assets should meet. For example, if sustainability comes out as a high important policy point, the assets should be managed in a way that the performances contribute to this policy goal. To make this performance level, it is also important to gain insight in the possible risks in case of failure. To do this, a clear view on which risks are acceptable and which not is needed within the organisation.

Directing use of public space and infrastructure (CROW, 2021)
One of the most important asset management activities is the choosing between projects, which one can start and which will be delayed? Which infrastructure will be replaced and which need maintenance? The directing of the use of public space and infrastructure has direct impact on the environment, use possibilities and experience of the public space, all factors which need to be accounted for while managing assets. For this directing, there is a need for correct information. Is the condition of the asset known, what is the expected lifetime or is there maybe structural maintenance which needs to be executed. Also, information if the assets are still making the performance criteria, and if the assets do not match the criteria, what needs to happen for them to regain that performance level. Again here, risk analyses is important. What are the risks if certain maintenance is not executed or projects are stalled? Also here it is important to have clear which risks are acceptable and which not. This is necessary to be able to prioritise projects in a structured and explained way. Evaluating asset performances are done using the plan-do-check-act cycle. This to check if the right choices have been made and if there is need for extra guidance.

Managing public space and infrastructure (CROW, 2021)
This task contains activities like planning, preparing and monitoring the execution. Planning consists of the needed regulations to accomplish your AM goals. An essential element of AM is to look around. With a reliable planning, you can gain a lot, like a decrease is cost and nuisance. A reliable planning is also needed to meet stakeholder expectations. As with the previously described task, the preparation of the execution is an important aspect of the AM, because of its addition to the clear distribution of roles, tasks and responsibilities. Another part of the AM practise is the outsourcing policy. Does the organisation maintain their own infrastructure or do they outsource it to an external firm? For the AM practise, contracts with measurable results are needed for control over the performance level of the assets. These measurable results should be obtained by monitoring and standardised inspections. Also the maintenance activities should be monitored: how severe is the damage? How long did it take? How long after the maintenance did the problem occur again? Etc. This monitored data also helps with creating multi-year plans for other similar infrastructure, which is another important AM practise.

Execution/implementation (CROW, 2021)
Within asset management practises, the execution is closely linked to the goals of the organisation, policy, strategy, directing and planning. This because all plans which are made beforehand are put in place in this phase and can be evaluated if they work good enough to accomplish the given goals. Information provision to the Service provider is also essential for linking the maintenance choices and the asset performances. The asset manager needs to check if the maintenance is done according to the predetermined agreements, otherwise no clear conclusion can be drawn from the relation between the maintenance contract and the asset performance. AM can be of high importance when a project is part of a larger network (for example a new bridge in a new housing area). Good AM practises will result is the minimal nuisance for the rest of the project (and also the local inhabitants).

Manage data and information (CROW, 2021)
In order to be able to make well substantiated decisions regarding construction and management, information provision is key. This can be information regarding the state of the asset, performance of the asset, how much the asset is used, lifecycle expectation or other physical aspects of the asset. This information makes the asset owner and asset manager able to determine which steps need to be taken to maximize the value of the asset. The information needed to make AM decisions are not only technical, also information on the wishes of stakeholders and the societal value of the asset need to be taken into account during this decision process. One type of information which is becoming more and more important is the information on the sustainability of the assets. The world needs to become greener and the assets need to meet those goals as well.

Another important aspects of the information and data is the refresh rate of the data, is the data regularly updated? How long is data usable?

Managing the organisation (CROW, 2021)
The implementation of asset management within an organisation is a case of process-managing. The knowledge of different asset management aspects is important to a good asset management practice. An indication of a good asset management practise is that all included departments base their practises and policy on one approach which is integrated across the entire organisation. To make this a success, it is again important to all roles, tasks and responsibilities are clear for everyone. Also, everyone should understand what their part is in the larger picture of the AM practises of the entire organisation. AM will demand, during the implementation, a lot from the organisation. Therefore, it will be important to sometimes step outside of the organisation and evaluate the process and look which AM practises can improve. This step will also part of this report, for more information on this I would like to refer to the chapter: AM maturity tool. The CROW advices organisation which are switching to the AM based practises to have a Null-measurement: where does the organisation stand at this moment regarding AM practises. This Null-measurement will be the bases on which the progress of the implementation will be based. This research will function as this Null-measurement as the Municipality of Enschede is currently on the brink of implementing AM practises into their current policy.

Quality management ISO 55001 (CROW, 2021)
The ISO 55000 series are the base for many views on AM practises. As for he CROW, they base their norms regarding asset management on the ISO 55000 series. The ISO 55001-guidelines specify all requirements for starting, implementing, maintaining and improving AM practises within an organisation. The iAMPro is the AM practises track from the CROW, the process steps from that track are based on the ISO 55001 norms, but then specially developed to fit the infrastructure sector.
An AM system is a structured and strictly aimed way of working. This to, in an efficient and profitable way, accomplish the goals of the organisation. The aim of the system is to coordinate the contribution and collaboration between different part of the organisation. The ISO55001 gives requirements on values of assets to stakeholders and/or to the organisation in accomplishing the set goals, decision making, performance of assets and the organisation itself.

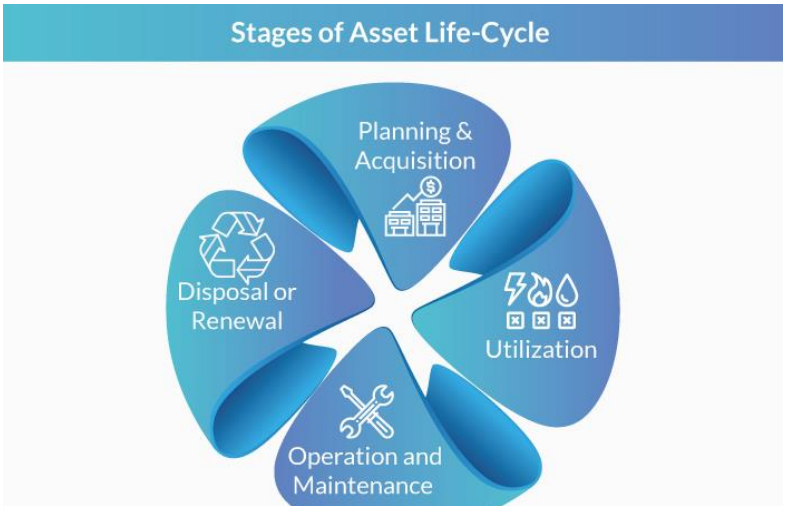

Figure 8: Stages of the Asset lifecycle. Source: (Assetinfinity, 2021)

10. AM maturity check

One of the main goals of this bachelor thesis is to make a tool to determine the AM maturity of the Municipality of Enschede. But what is a (AM) maturity check? A maturity check is a way of analysing, assessing and benchmarking an organisations performance on a certain practise(IAM, 2016). This based on a set of criteria/subjects on which the organisation is evaluated. The scoring is mostly done by a set of persons from within the organisation or by external assessors with a large knowledge about the organisations policy and practises, this to have multiple views on the AM performance of the organisation. Then with the use of a discussion, the final scores are determined(Bergli, 2017). A maturity check shows what an organisation does with the information or content that it produces. It is a check on how the responsible employees think that the organisation is using the content and information it produces to its advantage(Ladley, 2012). Maturity checks are not a onetime event, they can/should be used multiple times over time. The first check being a baseline from which the organisation can check if it has improved from that point onwards. If the maturity check is, for example, done yearly. The change in scores will indicate the progress (or even possible decrease) in the quality of the evaluated practise in the past year.

Within the infrastructure field of asset management, there are multiple standardised methods on how to determine the AM maturity of an organisation like the CEDR, IAM or TRV method(Bergli, 2017). But, to have the best AM maturity check for an organisation, you should make your own AM maturity tool which contains the criteria/subjects relevant for that specific organisation. A good example of this is Rijkswaterstaat, who made their own specified AM maturity check(Bergli, 2017).

For the AM maturity checking tool for the Municipality of Enschede, I will determine the list of relevant subjects/criteria for the AM practises of the Municipality. This list will be based on the CROW definition of AM (CROW, 2021) and the ISO AM guidelines(ISO, 2014c). The list of subjects will be extended by subjects from the IAM method for determining AM maturity, if those are considered to be also relevant(IAM, 2016).

Why will the list of subjects from the IAM method be used to extend the point from the CROW and ISO? Rijkswaterstaat worked together with Trafikverket to make a report which evaluated the available methods to determine the AM maturity of an organisation. From this report, it was concluded that the IAM method for AM maturity was the best basis for the AM maturity tool for the Municipality of Enschede. The other methods discussed in the report (RWS, TRV and CEDR) were all very specialistic or already defined for a certain organisation. The IAM method was criticised as to be too broad and abstract. Therefore, I think the list of criteria/subjects given in the IAM method will be, together with the CROW and ISO definition of AM, a good starting point for the AM maturity check tool for the Municipality of Enschede. As IAM method shows a broad overview of all AM maturity aspects, it can be a good source for finding extra possible relevant AM subjects(Bergli, 2017).

1. Asset Management Policy

The principles and mandated requirements derived from and consistent with the organizational strategic plan, providing a framework for the development and implementation of the asset management strategy and the setting of the asset management objectives.

Maturity Level	Definition
0	• The organisation has not recognised this subject and/or there is no evidence of commitment to develop it.
1	• The organisation has identified the need to address this subject, and there is evidence of intent to develop it. • Processes are poorly controlled and reactive. Performance is unpredictable. Proposals may be under development and some basic requirements may be in place.
2	• The organisation has identified the means of systematically and consistently achieving competency in this subject, and can demonstrate that these are being progressed with credible and resourced plans. • Processes may be planned, documented, applied and controlled at a local level or within functional departments, often in a reactive mode but able to achieve expected results on a repeatable basis. The processes are insufficiently integrated, with limited consistency or coordination across the organisation.
3	• **The AM Policy has been authorized by the top management** • **AM Policy is appropriate to the purpose, scale and nature of the organization** • AM Policy provides a set of principles, intentions, organization's mandated requirements and commitments. • **AM Policy provides a framework for development and implementation of the Strategic Asset Management Plan.** • **AM Policy is consistent with Organisational Plan, organizational objectives, stakeholder requirements, constraints and other relevant policies within the organization** • **The policy sets out the organization's commitment to satisfy applicable (e.g. legal, regulatory, etc.) requirements and to continual improvement** • **The policy is effectively communicated to employees and stakeholders as appropriate** • **The AM Policy is regularly reviewed and updated to support continual improvement.**
4	• The organisation can demonstrate that it is systematically and consistently optimising its practices in this subject, in line with the organisation's objectives and operating context. • Methods used for quantification, optimisation and integration of this subject, both specifically and in coordination with other subjects, are proportionately applied and evidently more sophisticated than those required of any relevant ISO 55001 clauses. • Innovation and continual improvement in this subject is evident as a cultural, normal way of life and can be widely demonstrated with evidence of results.
5	• The policy includes a commitment to achieving excellence through innovation and demonstrating excellence through benchmarking. • There is evidence of relevant application of the policy in all parts of the organization and in outsourced service providers • Policy includes a commitment to optimise asset life cycle value within any absolute constraints • Policy includes commitment to cross-disciplinary collaboration in seeking best value in delivery of organisational objectives

Figure 9: IAM example for an AM maturity tool. Source: (IAM, 2016)

A maturity check is a method of assessing an organisation on a chosen practice. The tool which can be used for a maturity check can/should look like the example given in Figure 9. This example is taken from the asset management maturity tool form the IAM(IAM, 2016). A maturity check tool exists out of an short explanation of the subject which is scored, a score table (mostly 0 to 5) and an explanation of the different scores. As seen in Figure 9, the subject 'asset management policy' is explained after which the scores 0 to 5 are presented together of an explanation of what it means to give a certain score. These explanation is important to limit the possibility of interpretation for the persons filling in the tool. An maturity tool is (normally) filled in by employees of the organisation responsible for the evaluated practises or by external evaluators which have expert knowledge on the topic. Those scores are then analysed to see where the organisation is lacking in its practises which are evaluated.

How does an (AM) maturity tool work? Firstly, the tool is created for an organisation which wants to evaluated itself on a certain practise. In case of the Municipality of Enschede, the tool will be created to assess their current management practises on different subjects important to a good AM system. As said before, the Municipality of Enschede is currently looking into the possibilities where and how to implement AM policy into their current management system. Therefore, the first iteration done with this tool will be somewhat of a Null-assessment to see where the Municipality started and how much they have improved the next time they do an assessment iteration.

Secondly, the list of AM subjects on which the organisation will be assessed needs to be determined. This list is made up from the things the organisation finds important point in their management system. These are mostly points which are important to the meeting of the organisational goals from the strategic plan. For the tool for the Municipality of Enschede, the list will be determined via the use of 3 sources. The first source is the list of important AM subjects from the CROW. As known, the Municipality of Enschede want to implement the AM system as prescribed by the CROW. Therefore it is only logical to implement the AM subjects important to the CROW in the AM maturity tool. The second source will be the AM requirements from the ISO 55001 asset management guidelines(ISO, 2014c). The list of relevant AM subjects will (possibly) be extended by looking into the list of AM subjects from the IAM as a third source(IAM, 2016). Which of the AM subjects obtained from those sources are relevant for the Municipality will be determined in a workshop/interview setting with three municipal employees responsible for the owning, managing and advising on the assets and there performance. The last source will be again the three municipal employees but now with their own input on what they think are important AM subjects which the tool should focus on. This can be subjects which are important for their responsibilities or that they find important organisational goals.

Lastly, for all relevant subjects selected to be included in the tool, a scoring system is needed. The scoring will be from 0 to 5, with every score representing a certain level for that criteria. An example of this is given in Figure 9. Explanations on the scores will be provided within the tool so that the employees using the tool have a clear idea of what the scores mean which they give.

What type of result should we get from the AM maturity check tool? We should get a score for all different subjects which are relevant for the municipality. From this scores, we can see where the municipal practises might be lacking and where they will need improvements. The scores will be combined from the different employees who fill in the tool. However, there separate scores will also be mapped, so that it is possible, in case of large differences, to analyse where this differences lay and why the are there.

10.1 AM subjects for the Maturity tool

For the making of the AM maturity tool for the Municipality of Enschede, it is the first step to determine which AM subjects are relevant to judge. These relevant aspects are obtained from different sources: the ISO 55001 guidelines, the CROW vision regarding asset management and (if needed) AM subjects from the list of subjects from the IAM method for determining AM maturity. All these aspects are discussed in a workshop/interview with municipal employees which are responsible for the AM practises of the Municipality of Enschede.

10.1.1 Important AM subjects from the ISO 55001 guidelines(ISO, 2014c)

- AM CONTEXT: Is the context of the AM system clearly defined within the organisation?
- Stakeholder demands: Is there an overview present of all demands from (relevant) stakeholders for the AM system?
- AM system: Is there a plan for an or present AM system which defines different interactions, roles and strategic plans of the organisation which is well documented?
- AM Policy: Is their AM policy present and documented which contains all policy aspects: rules, requirements, possible interference etc. ?
- Role distribution: Is there a clears distribution of roles and responsibilities for the different tasks within the AM system?
- Plans to achieve AM goals: Are there within the organisation clear (AM) plans to achieve the (AM) goals?
- Learning competences: Are there possibilities within the organisation for an employees to learn new competences so they can bare more responsibilities within the AM system?
- Employee contribution: How clear is it to employees what their contribution is to the larger organisational goals?
- Communication: Are there clear guidelines for the way of communicating within the AM system?
- Documentation: Are there clear guidelines for the documenting, quality, authorisation and availability/distribution of information within the organisation?
- Risk management: Are the risks of all proposed changes evaluated before the change is implemented?**
- Outsourcing: Is there, in the case of outsourcing, clear documentation available on which task (in detail) is being outsourced, how the tasks stays under control of the organisation, who is responsible for the outsourced task and which requirements are set on the information provision?**
- Monitoring Assets: Are there guidelines for the monitoring of the assets (what, how and when)?
- System evaluation: Are there guidelines for the evaluating of the AM system, considering its progress in regards to the last evaluation?*
- Irregularities: Are there set actions which can be executed in case of irregularities?
- Risk management 2: Has a risk analysis been made for all possible problem which might occur at a certain asset? Then looking at the chance of the risk occurring and how severe the consequences of the risk will be**
- Internal Audits: Are there possibilities for internal audits where employees can share their vision on the AM system and its workings?**

The second important source for important and relevant AM subject is the AM vision of the CROW. This vision is largely based on the ISO 55000 series, only it has been made applicable for(decentralised) governments. That is why I will only mention the subjects which come forward from only the CROW vision (so the subjects who are already mentioned in the ISO 55001 list are not again mentioned below if they are also part of the CROW vision). This to make sure that no aspects are mentioned multiple times and to maintain clarity in both lists.

10.1.2 Important AM subjects obtained from the CROW vision (CROW, 2021)

- Role distribution: Is there, within the organisation, a clear Asset Owner, Asset Manager and Service Provider?
- Organizational goals: Are the organisational goals represented in the choices made in the AM policy?**
- Accepted risk: Is there an organisationvaluematrix present which includes all accepted risks for achieving a certain performance level?**
- Information stream: Is there a constant stream of information about the state of the assets? How recent is the information which is present?**
- Risk management Maintenance: How well documented is the information about the risks of practises which directly influence the state of the assets, such as the delay of maintenance?
- Strategic goal planning: Is there a planning present which states the pace of which goals need to be met when?*
- Measurable results: Do the contracts which are signed off for maintenance contain measurable results?
- Measuring results: How well are the maintenance results measured? Think of time it takes until new maintenance is needed, cost and time needed for the maintenance etc.*
- Multiyear plans: Are the multi-year-plans available for the maintenance of all assets?
- Checking maintenance: Have agreements been made on the checking of the maintenance of the assets, to see if it is done according to the contract, so there can be a conclusion drawn of what the effect of the maintenance is on the asset performance?
- Null-Measurement: Is there a Null-measurement present from which the organisation can determine how much it has improved since the last evaluation?*

10.1.3 Maybe to add extra subjects from the IAM method for determining AM maturity.(IAM, 2016). To (possibly) extend the AM maturity tool, the subjects below are taken from the IAM AM maturity tool. The subjects shown below are subjects which were not mentioned in the ISO guidelines or the CROW vision, but can maybe still be relevant for the Municipality.

- Birds eye perspective: Are investment choices made by taking a birds eye view and checking the entire asset portfolio, together with an evaluation of short and long term effects?
- Commitment: Is the top management of the organisation committed to the AM practises?*
- Resource distribution: Is there a strategy for the distribution of resources?*
- Minimizing downtime: Is there a strategy for the minimizing of ''downtime'' of an asset during maintenance?
- System Engineering: Are the norms of system engineering followed within the AM system?*
- End of lifecycle: Are there plans for the assets when they reach the end of their lifecycle?

10.2 Relevant AM subjects for the Municipality.

On the 20th of May 2021, an online interview was held with 4 employees of the Municipality of Enschede who are responsible for the different aspects of the current management policy. The employees involved were:

- Head of the department stadsdeelbeheer
- Delegated outsourcer and teamleader department stadsdeelbeheer + external supervisor bachelor thesis
- Policy advisor
- Senior advisors

In an interview setting, all above mentioned important AM subjects were discussed to see if they were relevant for the Municipality of Enschede, so if they needed to be included in the AM maturity tool yes or no. From this interview, multiple conclusions can be drawn. Namely, that some aspects

from the list are not relevant for the municipality and that other subjects will be combined with one or multiple other subjects. This being combining them into one new subject, or that one smaller subjects becomes a requirement for the scoring of a larger subject. This for the tool to remain manageable for the municipal employees. The subjects with to symbol are concluded to be relative for the tool, the subjects which have a * behind them are considered irrelevant (and therefore will not be used in the tool) and the subjects which have a ** behind them will be combined in a way (mostly used as scoring criteria for a broader subjects) with other subjects.
The next subjects were taken out because of irrelevancy, why they were irrelevant is also shortly explained:

- **Are there guidelines for the evaluating of the AM system, considering its progress in regards to the last evaluation?** The municipality did not find this relevant because the tool will be there guidelines.
- **Is there a planning present which states the pace of which goals need to be met when?** This subject is above the management level of the department of stadsbeheer. This planning is made by the highest management and the department just has to follow those.
- **How well are the maintenance results measured? Think of time it takes until new maintenance is needed, cost and time needed for the maintenance etc.** The municipality already monitors larger maintenance but they do not see the small day to day maintenance as part of their AM system. This subject will likely, however, be included in the AM subject about multiyear maintenance plans as a scoring criteria.
- **Is there a Null-measurement present from which the organisation can determine how much it has improved since the last evaluation?** This aspect is considered irrelevant for now because the municipality is just starting to implement AM. It will, however, be named in the recommendations for further development of the tool.
- **Are the norms of system engineering followed within the AM system?** This is, for the initial tool, to complex. However, this subject does was found relevant in maybe a later stage. Therefore, this subject will be found in the recommendations for future extensions for the tool.
- **Is the top management of the organisation committed to the AM practises?** The interviewees did not think this is a relevant subject, to quote: ‘’If we want to implement AM we assume everyone is committed, otherwise it will not work anyway’’.
- **Complex subjects with regards to risk management.** To keep the tool manageable in the starting phase of the AM cycle, all complex risk management aspects will be taken out and put into an extra ‘’module’’ which will be put as a recommendation to enlarge the AM maturity tool after the initial implementation phase. However, all basic risk management subjects will be taken into account for the tool
- **Is there a strategy for the distribution of resources?** This aspect is not relevant because this strategy is determined in the management levels about the top layer of the department of ‘’stadsdeelbeheer’’.

11. The final AM maturity tool

When the relevant AM subjects were determined, it was time to put together the AM maturity tool for the Municipality of Enschede. In Figure 11, you can see one of the 17 AM subjects taken out of the tool, for the complete tool including scoresheet can be found in References

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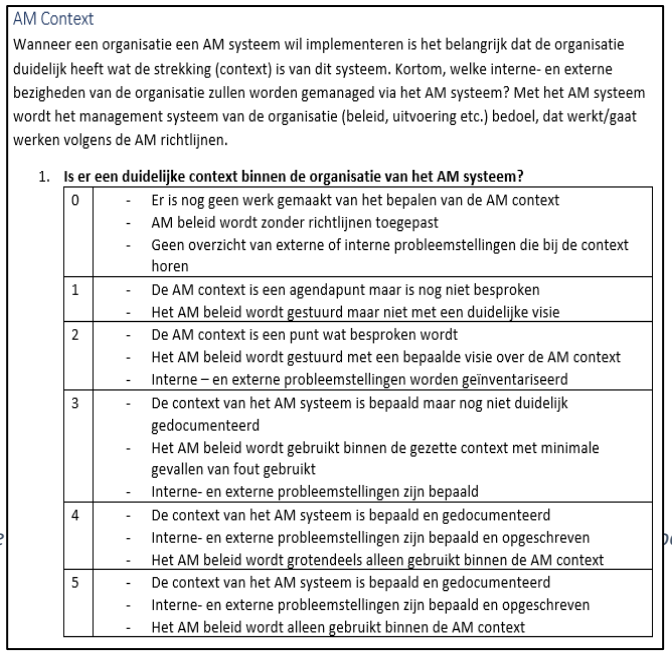
Appendix A: AM Maturity tool.
One AM subjects within the tool consists of 3 parts: an explanation of the subject, a statement which needs to be scored and a scoring system from 0 to 5 with a good clear explanation what the levels 0 to 5 mean. The tool is inspired by the layout of the IAM method for checking the AM maturity of an organization.

As you can see, the layout of the tool made for the Municipality has nearly the same layout as the one from the IAM method, however, the content is completely different. Firstly, there are only 17



AM Context

Wanneer een organisatie een AM systeem wil implementeren is het belangrijk dat de organisatie duidelijk heeft wat de strekking (context) is van dit systeem. Kortom, welke interne- en externe bezigheden van de organisatie zullen worden gemanaged via het AM systeem? Met het AM systeem wordt het management systeem van de organisatie (beleid, uitvoering etc.) bedoel, dat werkt/gaat werken volgens de AM richtlijnen.

1. **Is er een duidelijke context binnen de organisatie van het AM systeem?**

0	- Er is nog geen werk gemaakt van het bepalen van de AM context - AM beleid wordt zonder richtlijnen toegepast - Geen overzicht van externe of interne probleemstellingen die bij de context horen
1	- De AM context is een agendapunt maar is nog niet besproken - Het AM beleid wordt gestuurd maar niet met een duidelijke visie
2	- De AM context is een punt wat besproken wordt - Het AM beleid wordt gestuurd met een bepaalde visie over de AM context - Interne – en externe probleemstellingen worden geïnventariseerd
3	- De context van het AM systeem is bepaald maar nog niet duidelijk gedocumenteerd - Het AM beleid wordt gebruikt binnen de gezette context met minimale gevallen van fout gebruikt - Interne- en externe probleemstellingen zijn bepaald
4	- De context van het AM systeem is bepaald en gedocumenteerd - Interne- en externe probleemstellingen zijn bepaald en opgeschreven - Het AM beleid wordt grotendeels alleen gebruikt binnen de AM context
5	- De context van het AM systeem is bepaald en gedocumenteerd - Interne- en externe probleemstellingen zijn bepaald en opgeschreven - Het AM beleid wordt alleen gebruikt binnen de AM context

Figure *ool*

Nr. Aspect	AM aspect
1	AM Context
2	Stakeholder eisen
3	AM systeem
4	AM beleid
5	Plannen voor het bereiken van AM doelen
6	Vergroten van competenties
7	De bijdrage van werknemers
8	Communicatie
9	Documentatie
10	Assets Monitoren
11	Rolverdeling
12	Risico analyse level 1
13	Meetbare contracten
16	Minimaliseren downtime
17	End of Lifecycle

Figure 10: All 17 AM subjects relevant for the Municipality

subjects in the AM tool for the Municipality, rather than the 39 of the IAM tool. Secondly, the AM aspects for the Municipal tool are constructed by looking at the CROW and ISO important AM subjects and guidelines, with some small additions from the IAM method. And lastly, the scores in the tool for the Municipality are explained in a way which fits the Municipality, the IAM score explanations are made to fit any organization.

The tool as shown in References

Adey, B. T. (2019). A road infrastructure asset management process: gains in efficiency and effectiveness. *Infrastructure Asset Management*, *6*(1), 2–14. https://doi.org/10.1680/jinam.17.00018

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Woodhouse, J. (2019). What is the value of asset management? *Infrastructure Asset Management*, *6*(2), 102–108. https://doi.org/10.1680/jinam.17.00040

Appendix A: AM Maturity tool is the final result. The tool contains a small scoresheet at the end for the Municipal employees to fill in their score. The score explanations are set up in such a way that minimal interpretation is possible. This is the tool send to different Municipal employees with functions within the management system, these scores are analysed in the upcoming chapter. The tool is made in Dutch for the municipality, because they are a Dutch organization with also non-English speaking personnel.

12. Results and recommendations

The AM maturity tool is filled in by municipal employees, with responsibilities within the AM system, to see what the AM maturity of the organization is at this moment. It can also be filled in by experts who score the organization from the outside, but as for this bachelor thesis, it is filled in by four municipal employees:

- Head of department stadsdeelbeheer
- Delegated outsourcer and teamleader department stadsdeelbeheer
- Senior advisor for department stadsdeelbeheer
- Policy advisor

These employees are all responsible for certain aspects of the AM system. Both the Head of the department and the delegated outsourcer can be seen as Asset Owners and the Senior advisor and Policy advisor as Asset managers. Therefore, their input is very valid for the tool. Also, the difference in roles within the AM system can lead to different views on the state of the AM practises. If there are very large differences, the reasons will be discussed in the discussion chapter of this report. The tool could be filled in by as many employees as wanted. Of course, the more employees, the more representative the results become. However, it is important that the employees filling in the tool do have an (important) function within the AM system, this so that the scores they give are well thought off.

Scores given

Below are the scores for all 17 subjects of the AM maturity tool given by the four employees.

Table 1: Scores given on AM subjects by municipal employees

Nr. Aspect	AM subjects	Senior advisor	Head department	Outsourcer	Policy advisor	Average
1	AM Context	2	1	1	2	1,5
2	Stakeholder eisen	0	3	2	2	1,75
3	AM systeem	1	0	1	1	0,75
4	AM beleid	1	2	3	3	2,25
5	Plannen voor het bereiken van AM doelen	1	4	4	3	3
6	Vergroten van competenties	5	5	5	4	4,75
7	De bijdrage van werknemers	2	2	2	2	2
8	Communicatie	2	3	4	4	3,25
9	Documentatie	1	0	4	3	2
10	Assets Monitoren	2	4	4	4	3,5
11	Rolverdeling	1	3	3	3	2,5
12	Risico analyse level 1	0	1	4	3	2
13	Meetbare contracten	5	3	3	4	3,75
14	Meerjarenplannen	3	2	2	2	2,25
15	Investeren	5	3	3	2	3,25
16	Minimaliseren downtime	1	0	2	2	1,25
17	End of Lifecycle	1	2	2	1	1,5

In Table 1, you can see the scores given by the employees on the different AM subjects. The first two columns are the AM subjects with their corresponding number. Column 3 up to 6 are the scores given by the employees and the last column is the average score of the employees combined. You do

see some larger differences in scores, but also a lot of unity on certain AM subjects. Differences can be seen in the subjects of Stakeholder demands (Eisen in Dutch), Documentation and Risk analyses level 1. This differences can be because of the different views from the different functions of the employees. For example, the senior advisor has a more external look into the documentation and risk analysis and may therefore see the flaws in the current practises, which the other employees see as normal. On subjects like learning new competences (vergroten competenties in Dutch) and Employee contribution (Bijdrage van werknemers in Dutch), the municipal employees were very unity. This is think is because those are organisational wide policies which do not differ between functions.

If we visualize the results of the first iteration of the AM maturity tool, we get a figure as shown in Figure 12. This figure clearly shows the difference in scores between the different employees. However, you can also clearly see where the employees agree on the subjects which need improvement. Most of these point which need improvement regard the foundation of implementing AM within an organization. But more on that you can read in the chapter:

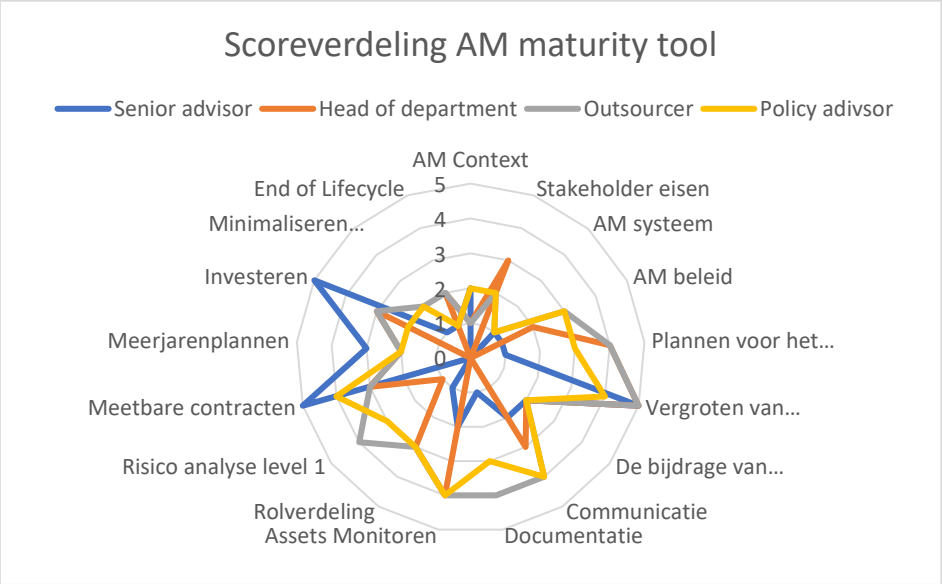

Figure 12: Score distribution AM maturity tool

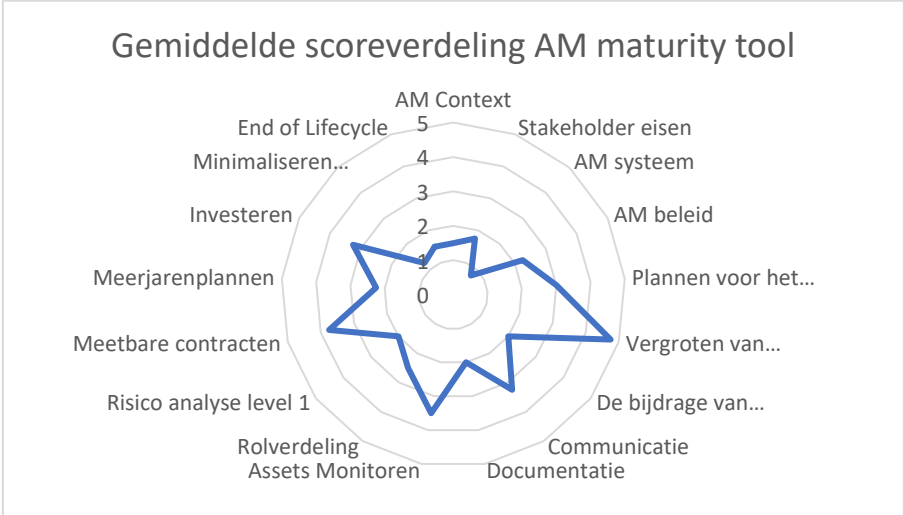

Figure 13: Average scores AM maturity tool

13. Recommendation for improving municipal (AM) practices

Clarity of AM concepts

What came forward from the conversations with the employees, the scores of the AM maturity tool and the feedback received on the tool is mostly that the Municipality of Enschede is still in a very prior phase of the implementation of asset management. Therefore, my first recommendation would be for the Municipality of Enschede to dive into the general AM points. Therefore, they can use this report or themselves purchase NEN, CROW or ISO documents to help them with getting that clear view on what AM is and what is needed to transform their current management system into an Asset Management system. One thing to start with is for the Municipality to get a clear understanding of the AM concepts which are often used like: AM Context, AM policy and the AM system. This understanding will lead to a better and swifter implementation of the AM system and faster results of the AM practices(Woodhouse, 2019). After this, the department can look into the implementation of AM by first setting AM goals: what do they want to reach using AM within their own management system. Then they can determine how these goals need to be reached: what needs to change in their policy to meet those goals? I recommend looking into the long term asset plans, like decommissioning or maintenance plans first, because these are core AM subjects.

Long term vision

Another recommendation for the Municipality to improve their AM practices is to dedicate more time and resources to the management practices for the long term asset management. For example, put time into making plans to minimize downtime and decommissioning of the assets at the end of their lives. These two aspects are only examples. The general message is that the Municipal management system needs to broaden its perspective more to really become an AM system.

Differences in information

Next to that, there are very clear differences between the scores of the different employees who filled in the tool. I recommend the Municipality to look into this phenomena and see where this problem lies. Is this because of the difference in opinion, or is it an example of the difference in information provided to the different roles within the department. If the last thing is the case, I recommend the Municipality to look into the differences in information which lead to this variety in scores. A way of doing this is by implementing a discussion with all employees who filled in the tool after every iteration.

Creating unity in Asset portfolio

Lastly, a point brought forward by the head of the department of stadsdeelbeheer was that there is a large difference in the current ways the different assets of the Municipality are managed. If this is indeed the case, I recommend the Municipality of Enschede to identify the AM state of all assets to determine an AM implementation strategy. For a good AM system, it is important to have unity and structure in the way that the organization its assets are managed. Therefore, my advice would be to firstly create an AM method for the different aspects which can be used for all assets. And secondly, when this method is set, make effort in getting all assets to the same level of AM implementation, before increasing this level on the assets which are already at a higher AM level.

14. Conclusion and Recommendations for further research

14.1 Conclusion

In the research done within this thesis, the following two questions were answered: ''what can AM practises bring to the Municipality of Enschede'' and ''What is the AM maturity level of the Municipality of Enschede''. It can be concluded that implementing AM practices into the current management system will benefit the Municipality of Enschede in various ways. As stated in earlier chapters, the Municipality will be able to provide better asset performances to its most important stakeholders, they will increase their own management efficiency because of increase in clarity within the organization about how, when and to whom to communicate(Adey, 2019). Also, the implementation of a full AM system will help in structuring the large quantities of plans and policies. For example, the AM implementation will help in making a general, organisation wide approach to crucial aspects of a management system like risk analyses, stakeholder demands and maintenance plans. The AM will provide guidelines to the organisation which will make it able to equalize all ways of documenting for a certain type of assets or methods. This will provide clarity and understandability across the entire organisation.

The organisation will also experience less quantified benefits, like the increase in stakeholder satisfaction and recognition of the organisation. The improvement and the maintaining of the asset performance levels due to the AM practices like maintenance plans, constantly adapting financial strategies and the use of maintenance results to come up with a better maintenance strategy will lead to less nuisance for the stakeholders which regularly use the assets. This will lead to more stakeholder satisfaction and the organisation having a better public status.

The AM maturity tool was set up the enable the Municipality to gain insight into the current state of their management system and field on which they need to improve to properly implement an AM system. The tool was filled in and gave some interesting results.

As again can be seen in Figure 12, the department of stadsdeelbeheer at the Municipality of Enschede has some areas, regarding asset management, as on which it can improve. The scores given by the municipal employees indicate that on the subjects visualized in the lower half of Figure 12, the Municipality scores rather well. For example, the parts on enabling employees to learn new competences (in Dutch: vergroten van competenties) and on making contracts with measurable results (in Dutch: Meetbare contracten).

However, the results of the first iteration of the tool also clearly show where the municipal (AM) practices are currently lacking. Most of those subjects had to do with the starting phase of the AM cycle. This was not surprising as the Municipality already mentioned at the start that they have not started implementing AM practices into their management system yet. Examples of these subjects are: AM system (in Dutch AM systeem), AM policy (in Dutch: AM beleid) and AM context.
Some other subjects on which the employees gave the Municipality a low score were: minimizing downtime (in Dutch: minimaliseren downtime) and End of Lifecycle. These subjects are not part of the core AM practices, but are still very important to pay attention to if you want a complete AM system. I do found that more surprising because I supposed that the municipality would have had plans for minimizing the time their assets cannot be used and what to do when their assets life come to an end.

14.2 Recommendations for further research

There are some aspects within this thesis on which further research can be useful to find extra information to put this thesis research into better context. Also, as discussed with the municipal employees, some extra AM subjects for the tool are also mentioned in this recommendation. Here below are all important AM subjects from the ISO, CROW or IAM stated which were left out of the original tool, but can be added to the tool after some time into the AM implementation cycle. These subjects were for now to complex, but when the organisation has implemented more AM aspects into their management system, these subjects are at the correct level to be also evaluated. For these aspects, the scores still need to be determined. Because of them not being relevant for this research, I did not fully work out all scores for these AM subjects.

The subjects which can potentially ben added to the tool after some time are:

- Is there an organisationvaluematrix present which includes all accepted risks for achieving a certain performance level?
- Are the norms of system engineering followed within the AM system?
- Is there a Null-measurement present from which the organisation can determine how much it has improved since the last evaluation?
- Has a risk analysis been made for all possible problem which might occur at a certain asset? Then looking at the chance of the risk occurring and how severe the consequences of the risk will be

Another part which I would recommend for further research is the actual implementation phase of asset management with the Municipality of Enschede. In this research, I mostly focussed on the step: what is AM and what can it bring the Municipality. So the focus was on WHY the Municipality should implement AM, not on HOW they should implement AM. I would recommend the Municipality of Enschede to look into the actual changes which are needed to switch their current management system to an AM system. For that, the Municipality can use the scoring system used in the tool to see what they need to change to get a higher score on specific AM subjects, and therefore switch more towards a full AM system.

14. Discussion

Of course there are also parts of this Bachelor thesis research which can be discussed. In this chapter I will go over certain parts of this thesis which, while looking back, could have been better or can be improved in possible further research.

Firstly, the asset management implementation is in all available documentation (CROW, ISO etc.) seen an organisation wide change in management system. However, for this thesis, I was taken on by the department of ''stadsdeelbeheer'' within the Municipality of Enschede to take a look at asset management implementation within their department. This made it sometimes difficult to narrow down the AM guidelines from ISO or the CROW to fit just this department. For example, the ISO asset management guidelines talked about the presence of timelines within the organisation on when which strategic goal needs to be met. When bringing up that point in the AM maturity tool discussion, the feedback from the municipal employees was that this was a management decision made by higher management levels exceeding the department. Therefore, this subject was taken out of the tool. This went for other AM aspects as well. However, these are still important aspects although they are outside the scope of the department. Ignoring can mean having an incomplete AM system.

Secondly, the results of the first iteration of the tool can be discussed. One reason why was put forward by Ina van Dijk, she stated the following: ''*I found the filling in of the tool rather difficult because we have multiple assets and for all assets we are on a different level''.* This point is also mentioned in the recommendations for improving municipal (AM) practices. Because of this difference in (AM) levels of the assets, the scores presented in the first iteration of the tool are more like averages, so some assets have a higher AM level then the score indicate and other assets can have a lower AM level than the score indicates.
Continuing on discussing the scores, a point brought forward by Stefan Volmer was that the AM concepts used in the tool were not always fully understood by the employees. The concepts were explained in the tool but not in a very extensive way to keep the tool concise. However, this lead to a non-complete picture of the AM concepts. This could have been solved by providing a more extensive explanation within the tool, also more aimed at the basic AM concepts, not only the subjects from the tool.

The last point of discussion is the difference in scores between the different employees. On some aspects, all employees agreed. But on most of the scores, there was a noticeable difference in the scores. This can be found back in Table 1. I think that this is due to the change in function. Within different positions within the municipal management structure, employees see the assets differently and have other methods of working which can be more or less like asset management according to the ISO norms then methods used by colleagues in other functions within the department. This will be fixed when the Municipality will start with implementing AM across the department. This will lead to a more unite view on the assets and the way they are managed. However, these differences are not only bad, they also light up the discussion within the department which leads to more thought about AM practises and more developments coming from those discussions.

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Appendix A: AM Maturity tool

Below you can read the full AM maturity tool made for the Municipality of Enschede. The tool is made in Dutch because the Municipality of Enschede is a full Dutch organisation.

De AM maturity tool, inclusief score en uitleg van de scores

Beste werknemers van de Gemeente Enschede, hier voor u ziet u de Asset Management maturity check tool die ik voor mijn bachelor thesis voor u heb gemaakt. In opdracht van de afdeling stadsdeelbeheer (met als contactpersoon Peter Dijkstra), doe ik onderzoek naar asset management (AM) binnen de afdeling stadsdeelbeheer. Dit onderzoek gaat vooral om de stappen: wat kan AM de afdeling opleveren en hoe kan de afdeling controleren hoe het implementeren van AM gaat. Voor die laatste stap heb ik dus deze tool gemaakt, die de belangrijkste aspecten van AM beleid toets binnen de afdeling. *In de tool wordt naar de afdeling gerefereerd als: de organisatie.* Het idee is dat als u dit leest, ik van u vraag om deze tool in te vullen. Dat betekent: voor elk AM punt (1 t/m 17) graag een score geven op basis van wat u denkt, welke score bij het huidige management systeem van de afdeling past. (Scoretabel staat op de laatste pagina).

Ik hoop u zo voldoende geïnformeerd te hebben en ik hoop dat u de tool zo kan invullen. Voor vragen mail mij gerust op j.deruin-3@student.utwente.nl

AM Context

Wanneer een organisatie een AM systeem wil implementeren is het belangrijk dat de organisatie duidelijk heeft wat de strekking (context) is van dit systeem. Kortom, welke interne- en externe bezigheden van de organisatie zullen worden gemanaged via het AM systeem? Met het AM systeem wordt het management systeem van de organisatie (beleid, uitvoering etc.) bedoel, dat werkt/gaat werken volgens de AM richtlijnen.

1. **Is er een duidelijke context binnen de organisatie van het AM systeem?**

0	- Er is nog geen werk gemaakt van het bepalen van de AM context - AM beleid wordt zonder richtlijnen toegepast - Geen overzicht van externe of interne probleemstellingen die bij de context horen
1	- De AM context is een agendapunt maar is nog niet besproken - Het AM beleid wordt gestuurd maar niet met een duidelijke visie
2	- De AM context is een punt wat besproken wordt - Het AM beleid wordt gestuurd met een bepaalde visie over de AM context - Interne – en externe probleemstellingen worden geïnventariseerd
3	- De context van het AM systeem is bepaald maar nog niet duidelijk gedocumenteerd - Het AM beleid wordt gebruikt binnen de gezette context met minimale gevallen van fout gebruikt - Interne- en externe probleemstellingen zijn bepaald
4	- De context van het AM systeem is bepaald en gedocumenteerd - Interne- en externe probleemstellingen zijn bepaald en opgeschreven - Het AM beleid wordt grotendeels alleen gebruikt binnen de AM context
5	- De context van het AM systeem is bepaald en gedocumenteerd - Interne- en externe probleemstellingen zijn bepaald en opgeschreven - Het AM beleid wordt alleen gebruikt binnen de AM context

Stakeholder eisen

Voor een organisatie is het belangrijk dat er duidelijk is wat er wordt verwacht wordt van de organisatie zijn assets. In het geval van de Gemeente zijn de inwoners van de gemeente een goed voorbeeld van belangrijke stakeholders. Het is belangrijk om te weten wat zij van de assets verwachten om goed doordachte beslissingen te maken.

2. Is er een overzicht aanwezig van alle relevante stakeholders en hun gestelde eisen aan de assets?

0	- Er is nog geen actie ondernomen om de eisen van stakeholders te inventariseren - Er is geen lijst bekend van stakeholders
1	- Het proces van het bemachtigen van de eisen van stakeholders is in gang gezet - Er wordt gekeken naar welke partijen mogelijke stakeholders kunnen zijn
2	- De eisen van stakeholders zijn geïnventariseerd maar nog niet gefilterd op relevante stakeholders - Er is een lijst met mogelijke stakeholders, maar nog niet duidelijk welke daarvan relevant zijn
3	- De eisen van alleen relevante stakeholders zijn geïnventariseerd - Lijst met relevante stakeholders is bekend
4	- De eisen van alleen relevante stakeholders zijn geïnventariseerd en gedocumenteerd - Lijst met relevante stakeholders is bekend
5	- De eisen van alleen relevante stakeholders zijn geïnventariseerd en gedocumenteerd en geverifieerd - Lijst met relevante stakeholders is bekend

AM systeem

Voor het voeren van een goed AM beleid is het belangrijk dat er eerst een goed AM systeem staat waarin alle belangrijke zaken zijn gedefinieerd. In dit aspect wordt er getoetst of deze zaken daadwerkelijk aanwezig zijn of dat er een plan ligt om ze te implementeren. Met het AM systeem wordt het management systeem van de organisatie (beleid, uitvoering etc.) bedoel, dat werkt/gaat werken volgens de AM richtlijnen.

3. Is er (een plan voor) een AM systeem aanwezig waarin de verschillende interacties, verantwoordelijkheden en (strategische) plannen van de organisatie zijn gedocumenteerd?

0	- Er is geen plan om een AM systeem te implementeren - Er zijn geen interacties, rollen, verantwoordelijkheden of links met strategische plannen geïdentificeerd
1	- Er is een plan aanwezig dat er een AM systeem geïmplementeerd gaat worden - De interacties met andere systemen zijn niet geïdentificeerd - Er zijn geen links gemaakt tussen het AM systeem en de strategische doelen - Er is geen duidelijkheid binnen de organisatie over verantwoordelijkheden binnen het AM systeem
2	- Er is een plan aanwezig dat er een AM systeem geïmplementeerd gaat worden - De interacties met andere systemen zijn geïdentificeerd maar niet gedocumenteerd - Er zijn enkele links gemaakt tussen het AM systeem en de strategische doelen, maar die zijn niet gedocumenteerd - Er is matige duidelijkheid binnen de organisatie over verantwoordelijkheden binnen het AM systeem
3	- Er is een AM systeem wat al geïmplementeerd is - Interacties met andere management systemen zijn geïdentificeerd maar niet gedocumenteerd - Er zijn enkele links gemaakt tussen het AM systeem en de strategische doelen, maar die zijn niet gedocumenteerd - Er is duidelijkheid binnen de organisatie over verantwoordelijkheden binnen het AM systeem maar deze is niet gedocumenteerd
4	- Er is een AM systeem wat al geïmplementeerd is - Interacties met andere management systemen zijn geïdentificeerd en gedocumenteerd - Er zijn enkele links gemaakt tussen het AM systeem en de strategische doelen, maar die zijn niet gedocumenteerd - Er is duidelijkheid binnen de organisatie over verantwoordelijkheden binnen het AM systeem
5	- Er is een AM systeem wat al geïmplementeerd is - Interacties met andere management systemen zijn geïdentificeerd en gedocumenteerd - Er zijn enkele links gemaakt en gedocumenteerd tussen het AM systeem en de strategische doelen. - Er is duidelijkheid binnen de organisatie over verantwoordelijkheden binnen het AM systeem

AM Beleid

Voordat er AM beleid kan worden ingevoerd binnen een organisatie is het belangrijk om te evalueren hoe het huidige beleid eventueel al AM principes volgt. Voorbeelden van AM beleid zijn: een keuzestrategie voor investeringen, onderhoudscontracten met externe partijen of een plan over het minimaliseren van de tijd dat een asset niet gebruikt kan worden vanwege onderhoud.

4. Is er een AM beleid aanwezig waarin alle beleidsaspecten: regels, eisen, mogelijke interferentie, etc. goed gedocumenteerd zijn?

0	- Het beleid van de organisatie wordt niet gevoerd volgens de AM richtlijnen
1	- Er wordt gewerkt aan het beginnen met beleid voeren volgens de AM richtlijnen - Nog geen documentatie aanwezig over regels, eisen etc. waar dit beleid aan zou moeten voldoen.
2	- Er wordt gewerkt aan het beginnen met beleid voeren volgens de AM richtlijnen - Documentatie aanwezig over regels, eisen etc. waar dit beleid aan zou moeten voldoen.
3	- Er wordt beleid gevoerd volgens de AM richtlijnen - Regels en eisen voor het beleid zijn afgesproken maar niet gedocumenteerd
4	- Er wordt beleid gevoerd volgens de AM richtlijnen - Regels en eisen voor het beleid zijn afgesproken maar onvoldoende gedocumenteerd
5	- Er wordt beleid gevoerd volgens de AM richtlijnen - Regels en eisen voor het beleid zijn afgesproken en gedocumenteerd

Plannen voor het bereiken van AM doelen

Het implementeren van AM besluitvoering is een ding, maar de organisatie moet ook de doelen duidelijk hebben die zij wil bereiken door middel van het AM beleid. Deze AM doelen zijn niet te verwarren met de strategische doelen van het hogere management, die plannen zijn buiten de context van deze tool. Een voorbeeld van een AM doel is bijvoorbeeld: het behouden van het prestatieniveau van de assets. En een strategisch doel kan zijn: binnen 10 jaar CO2 neutraal zijn als organisatie.

5. Zijn er binnen de organisatie duidelijke (AM) doelen gedefinieerd en zijn er (AM) plannen opgesteld om deze doelen te bereiken?

0	- Er is binnen de organisatie geen duidelijkheid wat de precieze (AM) doelen zijn behaald moeten worden - Hierom kunnen er ook geen plannen gemaakt worden om deze doelen te behalen
1	- De (AM) doelen van de organisatie worden bepaald - Er zijn nog geen plannen gemaakt om hoe die doelen te bereiken
2	- De (AM) doelen zijn bepaald maar niet gedocumenteerd - Er zijn nog geen plannen gemaakt om hoe die doelen te bereiken
3	- De (AM) doelen zijn bepaald maar niet gedocumenteerd - Er worden plannen gemaakt om hoe die doelen te bereiken
4	- De (AM) doelen zijn bepaald en gedocumenteerd - Er zijn plannen gemaakt hoe die doelen te bereiken, maar nog niet gedocumenteerd
5	- De (AM) doelen zijn bepaald en gedocumenteerd - Er zijn plannen gemaakt om hoe die doelen te bereiken en deze zijn gedocumenteerd.

Vergroten van Competenties

Voor het blijven kunnen werken volgens het AM systeem is het nodig dat er steeds meer werknemers hogere verantwoordelijkheden kunnen dragen. Dit kan bereikt worden door het verzorgen van cursussen of andere leermogelijkheden voor de werknemers van de organisatie.

6. Bied de organisatie mogelijkheden voor werknemers om nieuwe competenties te leren en zo meer verantwoordelijkheid te kunnen krijgen binnen het AM systeem?

0	- Er zijn geen kansen voor werknemers om binnen de organisatie te leren. En moedigt ook niet aan extern bij te leren
1	- De organisatie bied geen kansen voor werknemers om binnen de organisatie, maar moedigt werknemers wel aan externe door te leren - Organisatie vergoed het (externe) leerproces niet
2	- De organisatie bied geen kansen voor werknemers om binnen de organisatie, maar moedigt werknemers wel aan externe door te leren - Organisatie vergoed het (externe) leerproces niet of voor een klein deel
3	- De organisatie bied kansen voor werknemers om nieuwe competenties te leren - De organisatie vergoed het leerproces niet of voor een klein deel
4	- De organisatie bied de kansen voor werknemers om nieuwe competenties te leren, maar promoot dit niet actief - De organisatie vergoed het leerproces
5	- De organisatie bied kansen en moedigt werknemers aan om nieuwe competenties te leren - De organisatie vergoed het leerproces

De bijdrage van werknemers

Voor een goed werkend AM systeem is het belangrijk dat alle werknemers het gevoel hebben en houden dat zij deel uit maken van het grotere geheel en ook dat ze bijdragen aan de grotere doelen van de organisatie. Dit houd hun gemotiveerd en zal het AM systeem ten goede komen.

7. Is er duidelijkheid voor werknemers wat hun bijdrage is aan de AM doelen van de organisatie?

0	- Werknemers krijgen weten niet wat hun bijdrage is aan de AM doelen van de organisatie - De organisatie heeft geen actief plan of werknemers hiervan bewust te maken - Er worden geen interne audits gehouden
1	- Werknemers weten niet wat hun bijdrage is aan de AM doelen van de organisatie - De organisatie heeft een plan om werknemers hiervan bewust te maken - Er worden geen interne audits gehouden
2	- De organisatie is bezig met het bewust maken van werknemers van hun bijdrage aan de AM doelen van de organisatie. - Er worden geen interne audits gehouden
3	- Werknemers krijgen weten wat hun bijdrage is aan de AM doelen van de organisatie - De organisatie heeft geen actieve houding werknemers hiervan bewust te maken - Er worden binnen de organisatie incidenteel interne audits gehouden
4	- Werknemers krijgen weten wat hun bijdrage is aan de AM doelen van de organisatie - De organisatie heeft een plan om werknemers actief op te hoogte te houden van hun bijdrage. - Er worden regelmatig, maar met lange tussenpauze, interne audits gehouden
5	- Alle werknemers zijn op de hoogte wat hun werkzaamheden bijdragen aan de AM doelen van de organisatie - De organisatie zorgt actief dat werknemers hiervan op de hoogte blijven - Er worden regelmatig interne audits gehouden

Communicatie

Volgens de AM richtlijnen is communicatie een heel belangrijk onderdeel van een goed werkend AM systeem. Het kunnen overslaan van tussenpersonen, duidelijk hebben waar (of bij wie) de informatie terecht moet komen en meteen weten welke manier van communiceren het gewenste resultaat brengt zal de organisatie zeer ten goede komen.

8. Zijn er duidelijke richtlijnen voor communicatie binnen het AM systeem?

0	- Er zijn geen richtlijnen opgesteld voor communicatie - Geen contactpersonen aangewezen voor de verschillende secties binnen de organisatie, communicatie loopt via veel tussenpersonen. - Geen richtlijnen voor de manier van communiceren
1	- Er zijn geen richtlijnen opgesteld voor communicatie - Geen contactpersonen aangewezen voor de verschillende secties binnen de organisatie, communicatie loopt via veel tussenpersonen. - Richtlijnen voor de manier van communiceren zijn intern bekend maar niet gedocumenteerd
2	- Er zijn richtlijnen opgesteld voor de communicatie binnen de organisatie - Geen duidelijke contactpersonen aangewezen voor de verschillende secties binnen de organisatie, communicatie loopt via veel tussenpersonen. - Geen richtlijnen voor de manier van communiceren
3	- Er zijn richtlijnen opgesteld voor communiceren, maar nog niet gedocumenteerd - Contactpersonen aangewezen per sectie van de organisatie zijn door de tijd heen ontstaan maar niet aangewezen - Richtlijnen voor communiceren zijn intern wel bekend maar niet gedocumenteerd
4	- Er zijn richtlijnen opgesteld voor communiceren, maar nog niet gedocumenteerd - Contactpersonen aangewezen per sectie van de organisatie, maar nog niet voor iedereen duidelijk wie de contactpersonen zijn - Richtlijnen voor communiceren zijn intern wel bekend maar niet gedocumenteerd
5	- Er zijn duidelijke afspraken gemaakt en gedocumenteerd over de communicatie binnen de organisatie - Iedere (sub) sectie binnen de organisatie heeft een duidelijk aangewezen contactpersoon - Voor het aangewezen contactpersoon is het duidelijk: hoe te communiceren (formeel/informeel en via welk medium), wanneer te communiceren en waarover en met diegene gecommuniceerd moet worden

Documentatie

Het snel kunnen vinden van informatie is een belangrijk hulpmiddel in een efficiënt AM systeem. Daarentegen moet je ook waken dat niet iedereen alle informatie kan inzien. Dit kan namelijk lijden tot onenigheden binnen de organisatie. Volgens de AM richtlijnen is het dus belangrijk dat hier richtlijnen voor worden opgesteld.

9. Zijn er duidelijke richtlijnen voor het documenteren, de kwaliteit, het inzien van en de beschikbaarheid van informatie binnen de organisatie?

0	- Richtlijnen zijn niet aanwezig - Voor de documentatie bestaan geen objectieve kwaliteitseisen - Er is geen duidelijk systeem achter de autorisaties voor verschillende documenten - Er zijn geen eisen voor de beschikbaarheid van documentatie (openheid, recentheid etc.)
1	- Richtlijnen zijn niet aanwezig - Voor de documentatie bestaan objectieve kwaliteitseisen, maar deze zijn niet duidelijk terug te vinden - Er is geen duidelijk systeem achter de autorisaties voor verschillende documenten - Er zijn geen eisen voor de beschikbaarheid van documentatie (openheid, recentheid etc.)
2	- Richtlijnen zijn niet aanwezig - Voor de documentatie bestaan objectieve kwaliteitseisen, maar deze zijn niet duidelijk terug te vinden - Er is regelgeving voor de autorisaties voor verschillende documenten - Er zijn geen eisen voor de beschikbaarheid van documentatie (openheid, recentheid etc.)
3	- Richtlijnen zijn niet aanwezig - Voor de documentatie bestaan objectieve kwaliteitseisen, maar deze zijn niet duidelijk terug te vinden - Er is regelgeving voor de autorisaties voor verschillende documenten - Er zijn eisen voor de beschikbaarheid van documentatie (openheid, recentheid etc.) Daarentegen zijn deze niet duidelijk opgesteld
4	- Richtlijnen zijn aanwezig - Voor de documentatie bestaan objectieve kwaliteitseisen, maar deze zijn niet duidelijk gedocumenteerd - Er zit een duidelijke redenatie achter de autorisaties voor verschillende documenten - Er zijn eisen opgesteld voor de beschikbaarheid van documentatie (openheid, recentheid etc.)
5	- Richtlijnen zijn aanwezig - Voor de documentatie bestaan objectieve kwaliteitseisen, die zelf ook gedocumenteerd zijn - Er zit een duidelijke redenatie achter de autorisaties voor verschillende documenten - Er zijn eisen opgesteld en opgeschreven voor de beschikbaarheid van documentatie (openheid, recentheid etc.)

Asset monitoren

Een van de hoofdpunten van AM is het behouden van de prestatieniveaus van de assets. Dit kan alleen gedaan worden door goed en regelmatig te monitoren. Het is dus ook belangrijk dat hier regels en richtlijnen voor zijn.

10. Zijn er richtlijnen(wat, hoe en wanneer) aanwezig voor het monitoren van de assets?

0	- Er zijn geen afspraken gemaakt over hoe (welke methode), wat(welke asset en welke eigenschap) en wanneer (hoe regelmatig) de assets moeten worden gemonitord
1	- Er zijn richtlijnen voor welke eigenschappen van assets gemonitord moeten worden, maar niet met welke methode en met welke regelmaat - Deze richtlijnen worden niet gecontroleerd
2	- Er zijn richtlijnen voor welke eigenschappen van assets gemonitord moeten worden - Er zijn richtlijnen voor welke methode gebruikt moet worden voor t monitoren van de assets - Er zijn geen richtlijnen voor de frequentie van het monitoren - Deze richtlijnen worden niet gecontroleerd
3	- Er zijn onofficiële regels over hoe, wat en wanneer de assets moeten worden gemonitord. Deze zijn daarentegen niet gedocumenteerd. - De richtlijnen worden niet gecontroleerd en nageleefd
4	- Er zijn duidelijke richtlijnen opgesteld en opgeschreven die bepalen: welk asset gemonitord wordt, op welke manier dat gebeurt en met welk interval er gemonitord wordt bij het genoemde asset - Er wordt niet gecontroleerd of het monitoren volgens de richtlijnen gebeurt
5	- Er zijn duidelijke richtlijnen opgesteld en opgeschreven die bepalen: welk asset gemonitord wordt, op welke manier dat gebeurt en met welk interval er gemonitord wordt bij het genoemde asset - Er word regelmatig gecontroleerd of de richtlijnen worden nageleefd en er zijn gevolgen wanneer dat niet gebeurt

Rolverdeling

Een punt wat uitbouwt op het eerder genoemde punt over het AM systeem. Binnen dat systeem is het hebben van een goede rolverdeling erg belangrijk. De volgende rollen moeten verdeeld worden: Asset Owner (asset eigenaar, degene die bepaald wat de doelen van de assets zijn), Asset Manager (brengt de risico's in kaart en beheert/rapporteert de prestaties van de assets) en Service provider (uitvoering van het onderhoud van de assets). Volgens de AM richtlijnen zorgt deze rolverdeling ervoor dat er binnen de organisatie duidelijkheid is wie verantwoordelijk is voor welke taken binnen de AM cyclus. De rolverdeling zorgt ook voor soepele werkzaamheden omdat alle werknemers weten wat ze moeten verwachten van collega's en wat collega's van hun verwachten.

11. Is er een duidelijke Asset Owner, Asset Manager en service provider? *

0	- Er is geen duidelijke rolverdeling gemaakt russen Asset Owner, Asset Manager en service provider - Er zijn geen plannen om deze rolverdeling binnenkort te maken
1	- Het principe van Asset Owner, Asset Manager en Service provider is bekend maar wordt nog niet helemaal begrepen binnen de organisatie
2	- De organisatie is bezig om het principe van de rolverdeling de begrijpen en bijpassende werknemers te zoeken bij de verschillende rollen
3	- Er is binnen het management van de organisatie een idee wie de Asset Owner, Asset Manager en Service provider rol zou moeten krijgen, maar deze zijn nog niet aangewezen
4	- Er is een rolverdeling binnen de organisatie wie Asset Owner, Asset Manager en service provider is - Deze rolverdeling is niet bekend binnen alle werknemers van de organisatie
5	- Er is een rolverdeling binnen de organisatie wie Asset Owner, Asset Manager en service provider is - Deze rolverdeling is bekend binnen alle werknemers van de organisatie

Risico analyse level 1

Het managen en identificeren van risico's is een belangrijk speerpunt van Asset management. Na overleg met de verantwoordelijke werknemers van de Gemeente is besloten om de complexe risico analyse punten nog niet in de tool te verwerken maar als aanbeveling voor latere toevoeging toe te voegen. Daarentegen is dit punt over risico analyse wel in gezet, omdat het een basis punt is.

12. Worden binnen de organisatie risico's geanalyseerd van beleidskeuzes die invloed kunnen hebben op de staat van de asset, zoals het uitstellen van onderhoud? En zijn deze risico's duidelijk gedocumenteerd?

0	- Er is geen documentatie aanwezig over risico's met betrekking tot de staat van de assets - Er zijn geen plannen om deze risico's te gaan analyseren - Er is geen methode bekend binnen de organisatie hoe risico's moeten worden geanalyseerd
1	- Er is geen documentatie aanwezig over risico's met betrekking tot de staat van de assets - Er zijn plannen om deze risico's te gaan analyseren - Er is geen methode bekend binnen de organisatie hoe risico's moeten worden geanalyseerd
2	- Er is geen documentatie aanwezig over risico's met betrekking tot de staat van de assets - Er zijn plannen om deze risico's te gaan analyseren - Er is geen duidelijke methode bekend binnen de organisatie hoe risico's moeten worden geanalyseerd, maar er zijn wel methodes bekend die geschikt kunnen zijn
3	- De organisatie heeft duidelijk gedocumenteerd wat de risico's zijn van beslissingen zoals het uitstellen van onderhoud - Er is geen duidelijke methode die gebruikt wordt om dit soort risico's te inventariseren, dit zorgt voor grote verschillen in kwaliteit en structuur binnen de analyses
4	- De organisatie heeft duidelijk gedocumenteerd wat de risico's zijn van beslissingen zoals het uitstellen van onderhoud - Er zijn verschillende methodes die gebruikt worden om dit soort risico's te analyseren, wat zorgt in verschillen binnen de documentatie van de analyses
5	- De organisatie heeft duidelijk gedocumenteerd wat de risico's zijn van beslissingen zoals het uitstellen van onderhoud - Er is een duidelijke methode die structureel gebruikt wordt om dit soort risico's te analyseren

Meetbare contracten

Het is voor een organisatie belangrijk dat wanneer deze een contract afsluiten (bijvoorbeeld in het geval van uitbesteding of onderhoud), dat de resultaten van deze contracten kan worden geëvalueerd. Dit kan door middel van ervoor te zorgen dat de eisen die in de contracten worden opgenomen meetbaar moeten zijn. Een belangrijk onderdeel van AM is namelijk efficiëntie en effectiviteit.

13. Bevatten de contracten die worden afgesloten voor het onderhouden van de assets meetbare resultaten?

0	- De contracten die zijn afgesloten bevatten geen meetbare resultaten - Er is geen plan voor het controleren van de taken die in de contracten worden gespecificeerd
1	- De contracten die zijn afgesloten bevatten geen meetbare resultaten - Er is een plan voor het controleren van de taken die in de contracten worden gespecificeerd, maar nog geen duidelijke methode en frequentie - De in het contract genoemde partijen zijn niet op de hoogte van het plan voor het meten van de resultaten
2	- De contracten die zijn afgesloten bevatten geen meetbare resultaten - Er is een plan voor het controleren van de taken die in de contracten worden gespecificeerd, met duidelijke methode en frequentie - De in het contract genoemde partijen zijn deels op de hoogte van het plan voor het meten van de resultaten
3	- De afgesloten contracten bevatten meetbare eisen voor de resultaten van de werkzaamheden - De resultaten worden eigenlijk niet gemeten of gedocumenteerd - Niet alle partijen genoemd in het contract zijn op de hoogte van de verwachte (meetbare) resultaten
4	- De afgesloten contracten bevatten meetbare eisen voor de resultaten van de werkzaamheden - De resultaten worden incidenteel gemeten en worden gedocumenteerd om te kunnen zien wat het effect van de werkzaamheden is op de prestaties van de assets - Niet alle partijen genoemd in het contract zijn op de hoogte van de verwachte (meetbare) resultaten
5	- De afgesloten contracten bevatten meetbare eisen voor de resultaten van de werkzaamheden - De resultaten worden regelmatig gemeten en worden goed gedocumenteerd om te kunnen zien wat het effect van de werkzaamheden is op de prestaties van de assets - Alle partijen genoemd in het contract zijn op de hoogte van de verwachte (meetbare) resultaten

Meerjarenplannen

Een van de meest genoemde aspecten van het werken met asset management zijn het werken met en creëren van meerjarenplannen. De meeste van deze plannen zijn dan voor het onderhoud aan de assets om het prestatieniveau te behouden. Ook bij dit punt wordt het monitoren van onderhoud meegenomen, omdat dit een belangrijk middel is om meerjarenplannen op te kunnen stellen.

14. Zijn er voor alle assets meerjarenplannen voor het uitvoeren van onderhoud?

0	- Er zijn geen meerjarenplannen opgesteld voor de assets, alle beslissingen worden met een korte termijn visie genomen - Er wordt niet gekeken naar het resultaat van gedaan onderhoud
1	- Er zijn geen meerjarenplannen aanwezig voor de assets - Beslissingen worden wel gemaakt met het oog op de lange termijn maar niet volgens één bepaald plan - Resultaten van onderhoud worden niet verzameld of geanalyseerd
2	- Voor sommige assets zijn er meerjarenplannen aanwezig, beslissingen worden afwisselend gemaakt voor korte er lange termijn - Resultaten van onderhoud worden niet verzameld of geanalyseerd - Meerjarenplannen staan vast en worden niet aangepast
3	- Voor de meeste assets zijn er meerjarenplannen aanwezig, beslissingen worden genomen met oog op de toekomst - Resultaten van onderhouden worden verzameld, maar er wordt eigenlijk niks mee gedaan
4	- Voor alle assets zijn er meerjarenplannen aanwezig, beslissingen worden genomen met oog op de toekomst - Resultaten van onderhouden worden verzameld en geanalyseerd - Meerjarenplannen worden niet aangepast als de resultaten van het onderhoud laten zien dat dat nodig is, maar met een vaste periode tussen het aanpassen
5	- Voor alle assets zijn er meerjarenplannen aanwezig, beslissingen worden genomen met oog op de toekomst - Resultaten van onderhouden worden verzameld en geanalyseerd - Meerjarenplannen worden constant aangepast als de resultaten van het onderhoud laten zien dat dat nodig is

Investeren

Volgens de richtlijnen van AM is het belangrijk om beslissingen te nemen terwijl er gekeken wordt naar het gehele plaatje (birds-eye perspectief), daarmee wordt een asset portfolio breed perspectief bedoeld. Een goed voorbeeld daarvan is het maken van keuzes voor investeringen (tijd en of geld). Worden deze beslissingen gemaakt door alleen bij het betreffende asset af te wegen of het de investering waard is, of wordt er breder gekeken of er andere plekken zijn waar de middelen harder nodig zijn.

15. Worden investeerkeuzes bekeken vanuit een asset portfolio breed perspectief en beoordeeld op korte en lange termijn effecten?

0	- De keuzes worden niet gemaakt vanuit een asset portfolio breed perspectief maar per asset los - Afwegingen worden niet gemaakt door te kijken naar korte of lange termijn effecten maar door te doen wat nu gedacht wordt wat nodig is
1	- De keuzes worden niet gemaakt vanuit een asset portfolio breed perspectief maar per asset los - Afwegingen worden gemaakt door te kijken naar alleen korte termijn effecten
2	- De keuzes worden niet gemaakt vanuit een asset portfolio breed perspectief maar per asset los - Afwegingen worden gemaakt door vooral te kijken naar de lange termijn effecten
3	- De keuzes worden gemaakt door te kijken met een asset portfolio breed perspectief - Keuzes worden gemaakt door vooral naar korte termijn effecten te kijken.
4	- De keuzes worden gemaakt door te kijken met een asset portfolio breed perspectief - Keuzes worden gemaakt door vooral naar lange termijn effecten te kijken.
5	- De keuzes worden gemaakt door te kijken met een asset portfolio breed perspectief - Keuzes worden gemaakt door zowel korte- als lange termijn effecten mee te nemen in het besluit

Minimaliseren downtime

Als eigenaar van assets die door vele gebruikt worden, is het belangrijk als gemeente een plan te hebben over hoe de overlast door onderhoud aan de assets geminimaliseerd kan worden. Bijvoorbeeld: hoe lang een weg dicht mag zijn voor onderhoud, hoe lang kan een brug eruit liggen of hoe lang mag een park niet begaanbaar zijn vanwege snoeiwerkzaamheden. Deze zaken worden ook wel ‘’downtime’’ genoemd.

16. Is er een strategie voor het minimaliseren van ‘’downtime’’ tijdens gepland onderhoud?

0	- Er zijn geen richtlijnen bekend over aanvaardbare lengtes van downtime van assets voor onderhoud - Er is geen data van voorgaand onderhoud of over de eisen van stakeholders beschikbaar voor het maken van de richtlijnen - Er wordt niet gehandhaafd of het onderhoud gebeurt op de manier zoals afgesproken om de ‘’downtime’’ te minimaliseren
1	- Er zijn geen richtlijnen bekend over aanvaardbare lengtes van downtime van assets voor onderhoud - Er is geen data van voorgaand onderhoud of over de eisen van stakeholders beschikbaar voor het maken van de richtlijnen - Er wordt gehandhaafd of het onderhoud gebeurt op de manier zoals afgesproken om de ‘’downtime’’ te minimaliseren
2	- Er zijn geen richtlijnen opgesteld binnen de organisatie over het minimaliseren van ‘’downtime’’ alleen er wordt wel gewerkt via het principe dat de ‘’downtime’’ zo klein mogelijk moet zijn - Er is data van voorgaand onderhoud of over de eisen van stakeholders beschikbaar, maar deze data wordt niet gebruikt in het opstellen van de richtlijnen - Er wordt niet gehandhaafd of het onderhoud gebeurt op de manier zoals afgesproken om de ‘’downtime’’ te minimaliseren
3	- Er zijn binnen de organisatie richtlijnen opgesteld voor de maximale tijd die een bepaald asset buiten gebruik mag zijn - Richtlijnen zijn niet opgesteld op basis van stakeholder eisen en data over voorgaand onderhoud, maar op intuïtie - Er wordt actief gecontroleerd of het onderhoud verloop zoals afgesproken om de ‘’downtime’’ minimaal te houden
4	- Er zijn binnen de organisatie richtlijnen opgesteld voor de maximale tijd die een bepaald asset buiten gebruik mag zijn - Richtlijnen zijn opgesteld op basis van stakeholder eisen en data over voorgaand onderhoud - Er wordt niet gecontroleerd of het onderhoud verloop zoals afgesproken om de ‘’downtime’’ minimaal te houden, achteraf wordt geëvalueerd of het onderhoud volgens afspraak is verlopen
5	- Er zijn binnen de organisatie richtlijnen opgesteld voor de maximale tijd die een bepaald asset buiten gebruik mag zijn - Richtlijnen zijn opgesteld op basis van stakeholder eisen en data over voorgaand onderhoud - Er wordt actief gecontroleerd of het onderhoud verloop zoals afgesproken om de ‘’downtime’’ minimaal te houden

End of Lifecycle

Met het oog op een veranderende wereld en een steeds groter belang van duurzaamheid, is het volgens de AM richtlijnen belangrijk dat organisaties een plan hebben voor wanneer de assets het het einde van hun leven bereiken. Dit zodat de assets op een milieuvriendelijke manier verwerkt kunnen worden.

17. Zijn er plannen voor een asset die aan het einde van zijn leven komt, ook kijkend naar het milieu aspect?

0	- Er zijn geen plannen binnen de organisatie aanwezig waarin wordt beschreven hoe assets ontmantelt worden aan het eind van hun leven - Er wordt binnen de organisatie niet gekeken naar de milieueffecten van het ontmantelen en afvoeren van de assets
1	- Er zijn binnen de organisatie richtlijnen over de assets ontmantelt moeten worden aan het einde van hun leven, maar dit zijn geen duidelijke uitgeschreven plannen - Er zijn geen plannen gemaakt over hoe en of de asset vervangen moet worden door een nieuwe zelfde asset, door een ander soort asset of dat de asset geen vervanging nodig heeft - De organisatie heeft geen duidelijk beeld van de milieu effecten van het ontmantelen van de assets
2	- Er zijn van alle assets van de organisatie duidelijke plannen over hoe de assets ontmantelt moeten worden aan het einde van hun leven - Er zijn geen plannen gemaakt over hoe en of de asset vervangen moet worden door een nieuwe zelfde asset, door een ander soort asset of dat de asset geen vervanging nodig heeft - De organisatie heeft geen duidelijk beeld van de milieu effecten van het ontmantelen van de assets
3	- Er zijn van alle assets van de organisatie duidelijke plannen over hoe de assets ontmantelt moeten worden aan het einde van hun leven - Er zijn plannen gemaakt over hoe en of de asset vervangen moet worden door een nieuwe zelfde asset, door een ander soort asset of dat de asset geen vervanging nodig heeft - De organisatie heeft geen duidelijk beeld van de milieu effecten van het ontmantelen van de assets
4	- Er zijn van alle assets van de organisatie duidelijke plannen over hoe de assets ontmantelt moeten worden aan het einde van hun leven - Er zijn plannen gemaakt over hoe en of de asset vervangen moet worden door een nieuwe zelfde asset, door een ander soort asset of dat de asset geen vervanging nodig heeft - De organisatie heeft een duidelijk beeld van de milieu effecten van het ontmantelen van de assets - De organisatie heeft geen plannen om deze milieu effecten te minimaliseren.
5	- Er zijn van alle assets van de organisatie duidelijke plannen over hoe de assets ontmantelt moeten worden aan het einde van hun leven - Er zijn plannen gemaakt over hoe en of de asset vervangen moet worden door een nieuwe zelfde asset, door een ander soort asset of dat de asset geen vervanging nodig heeft - De organisatie heeft een duidelijk beeld van de milieu effecten van het ontmantelen van de assets - De organisatie heeft plannen om deze milieu effecten te minimaliseren.

Scoreformulier

Naam:…….
Functie:…….

AM aspect	Score (0-5)
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