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A Maturity Model for Maintenance Departments of Public Organisations

An adaptation of the EFQM model

Farah Puspita Sari
4314360

1. BACKGROUND

2. RESEARCH QUESTIONS

3. RESEARCH GOALS

4. RESEARCH METHODS

5. CONCLUSIONS

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RESEARCH BACKGROUND >>

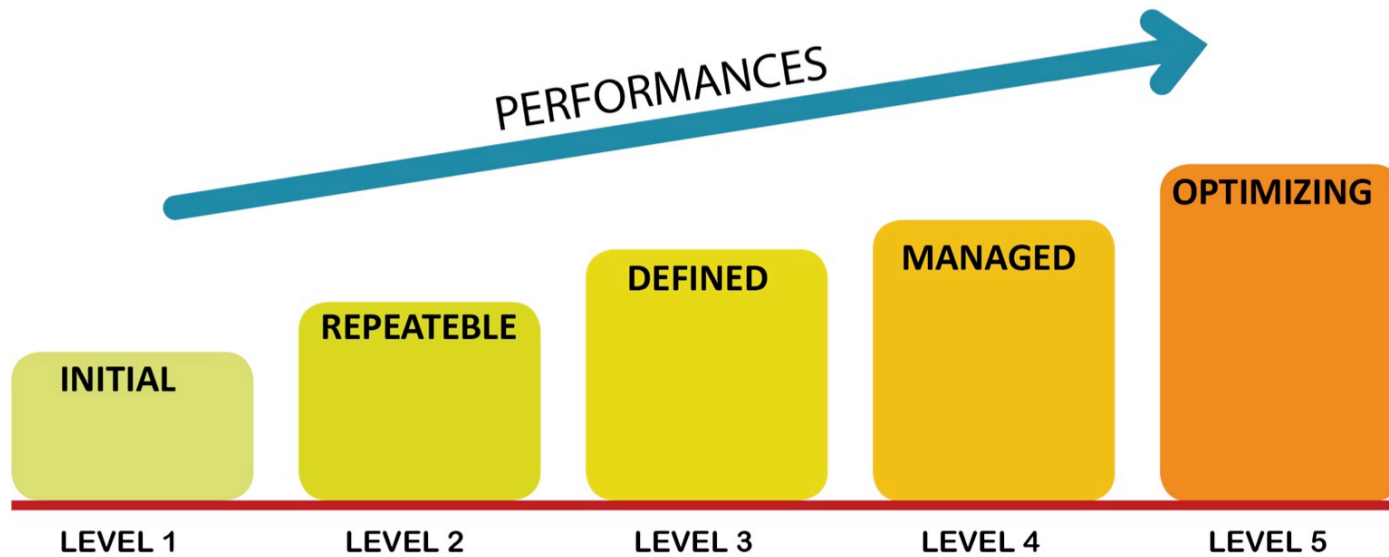




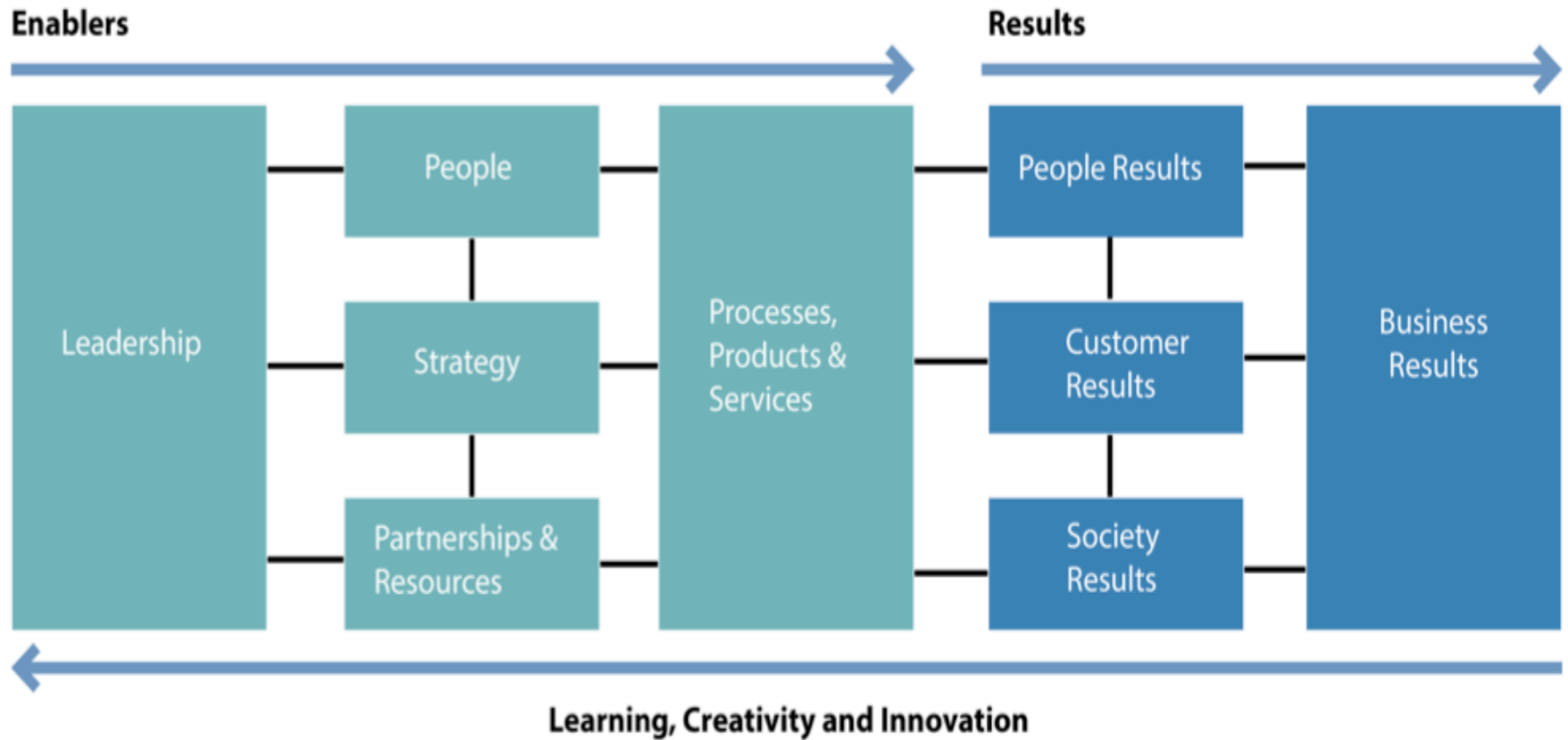
Picture source:www.tco-international.com

“How mature is the Maintenance departments of Public organisations?”





BACKGROUND | The EFQM model



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**RESEARCH QUESTIONS,
GOALS & OBJECTIVES**



What are the important aspects of maintenance organisations can be used to develop a Maturity model for maintenance departments of public organisations?

SUB RESEARCH QUESTIONS

1. What are **the important criteria** of maintenance departments of public organisations?

- What can be seen as important from the **objectives, roles, tasks, and activities** of maintenance departments of public organisations?

2. What **quality improvement tools** can be adopted to measure the maturity levels of maintenance departments of public organisations?

- How does the approach of **the EFQM model** for the organisations?
- What **maturity models** can be implemented to design a maturity model for maintenance departments of public organisations?

3. How can **the EFQM model, the maturity models, and the important criteria** of maintenance department are **related**?

- What **components of the models** and the important criteria can be **used to design a Maturity model** for maintenance departments of public organisations?
- How does **the development** of the **maturity levels**?

Goals

Set up **a maturity model for maintenance departments and an assessment sheet** that focuses on the process of Responsive maintenance and Planned Preventive maintenance at maintenance departments of public organisations.

Objectives

To increase awareness and thought toward improving professionalism at maintenance departments of public organisations.

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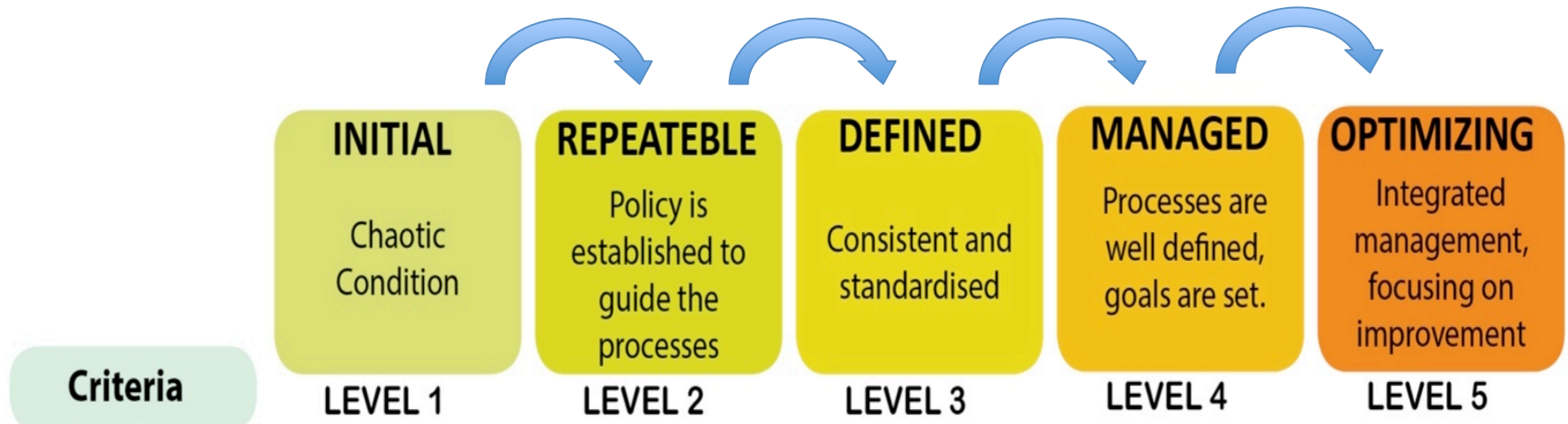
RESEARCH METHOD :

1. Literature Reviews





	Topics	References
1	Maturity models	The Capability Maturity Model (CMM) by Paulk et.al (1993)
		The Public Commissioning Maturity Model (PCMM) by Hermans et.al (2014)
2	The EFQM model	www.efqm.org
3	Maintenance organisations and	Journals by Straub (2007), (2010), (2011), (2012)
4	Maintenance strategies	Journal of Building maintenance strategies “ Planning under uncertainty” by Lind & Muyingo (2011)

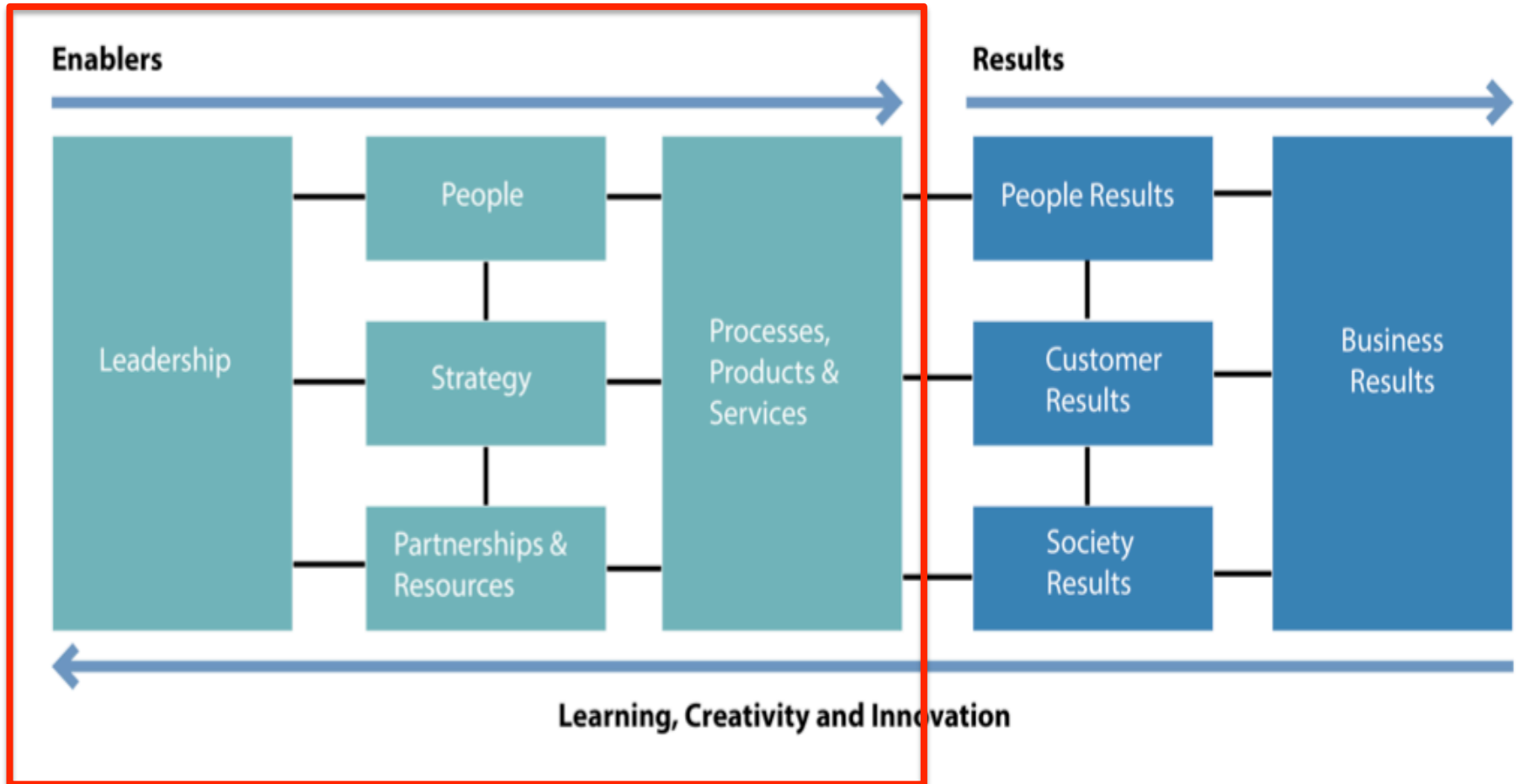


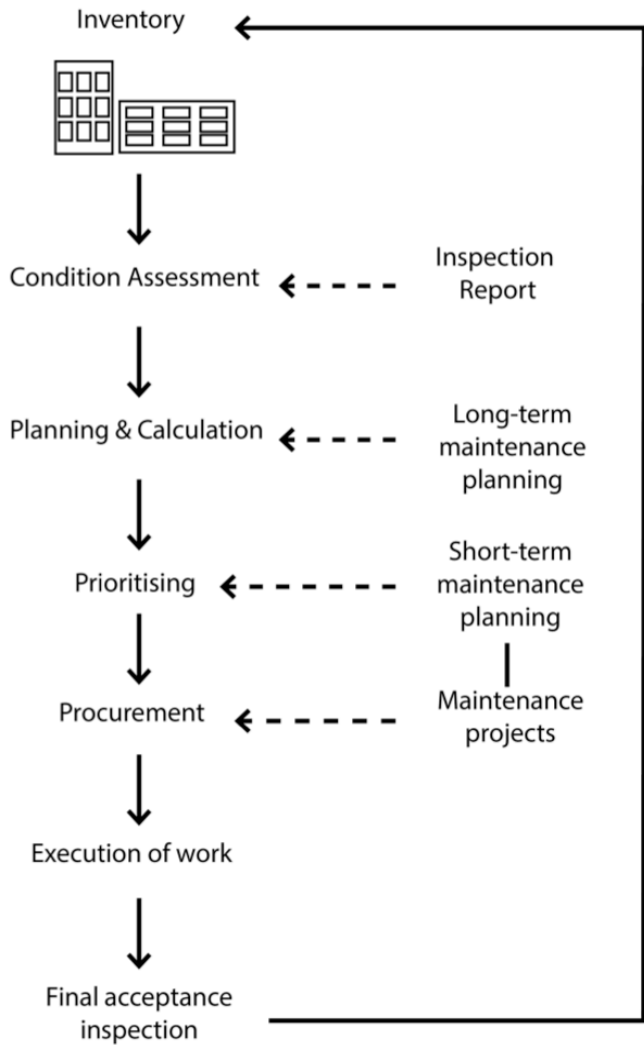
Paulk et.al (1993)

PCMM key aspects

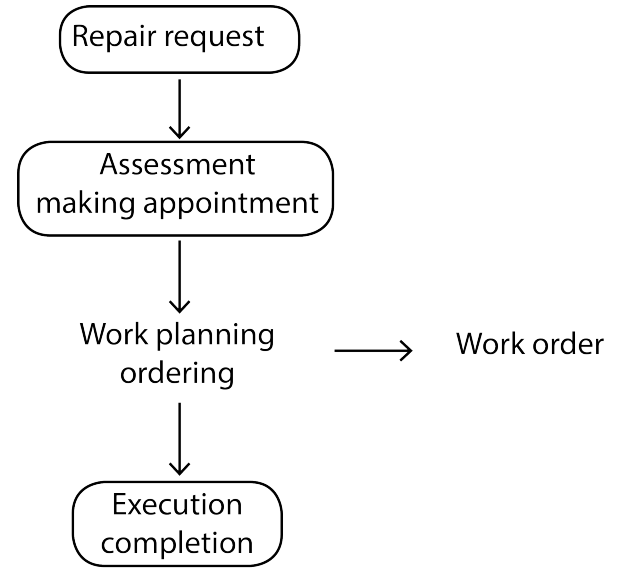
- 1 Organisational strategy & policy
- 2 Culture & Leadership
- 3 People & learning organisation
- 4 Decision models & portfolio
- 5 Stakeholder management
- 6 Public Values
- 7 Public rules of play
- 8 Interaction with supply market
- 9 Managing projects & assignment
- 10 Creativity & Flexibility

Hermans et.al (2014)

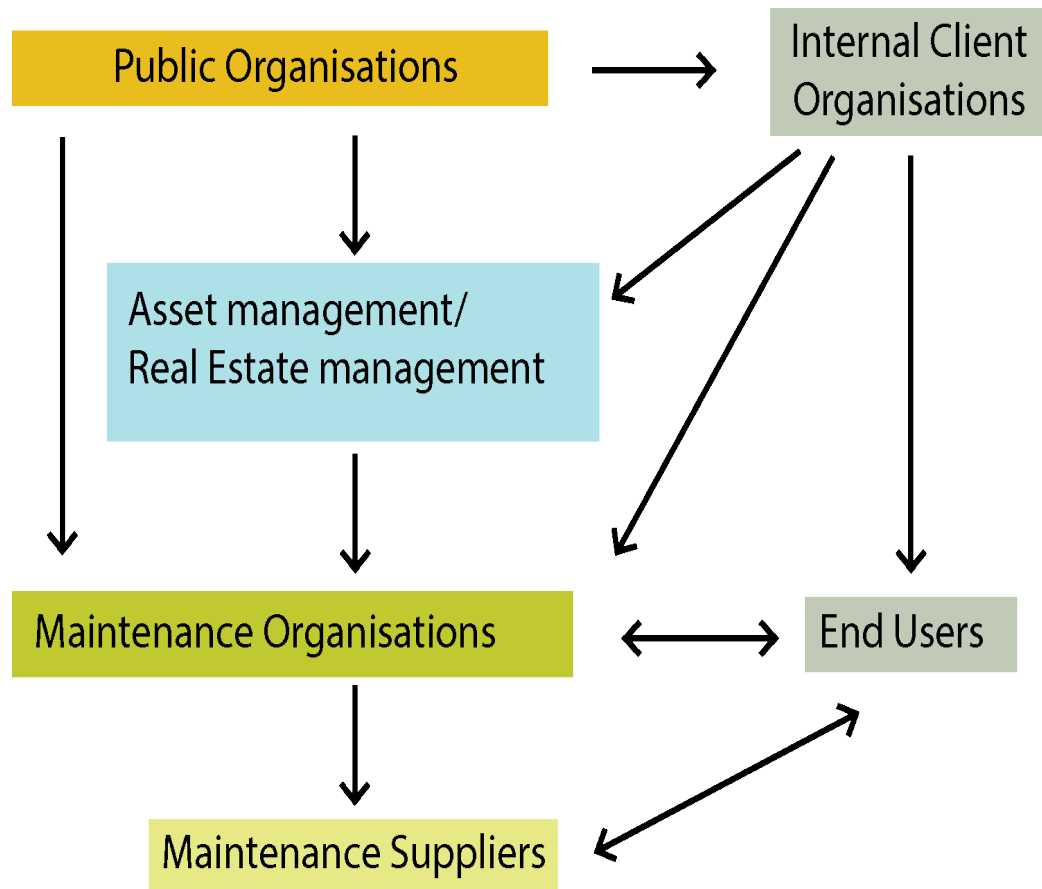




Planned Preventive Maintenance (PPM)



Responsive Maintenance (RM)

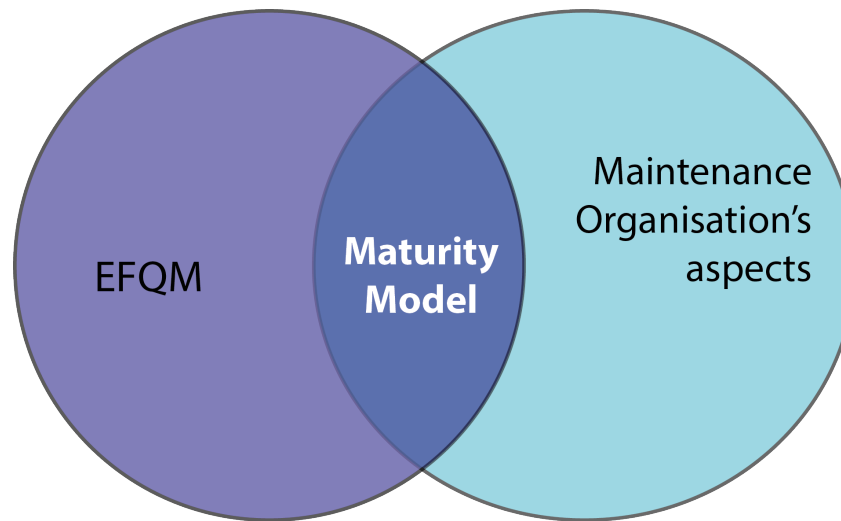


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RESEARCH METHOD :
2. Developing Maturity
Aspects & Levels



RESEARCH STEP 2



Developing the model

7 criteria of mature maintenance departments

- **43 sub criteria**

(section 3.1, page 36)

Maintenance management elements	Criteria of a mature maintenance departments
1. Maintenance objectives	a. Clear Maintenance objectives b. Good cultures toward maintenance c. Having a clear organisation's structure
2. Role of maintenance departments	a. Understand the organisation's roles in planning and controlling b. Understand the maintenance tasks c. Controlling the qualities of maintenance outcomes d. Conduct assessment for internal organisation's performances
3. Organisations and Stakeholders	a. Understand the duties and the role of stakeholders b. Capture the client's requirements and end-users satisfaction c. Maintain the whole process that involving stakeholders d. Maintain partnerships and collaborations
4. Maintenance strategies (Planned preventive maintenance, Responsive maintenance)	a. Having options for maintenance strategies b. Able to select the best strategies c. Having strategies that correlate with output and values of organisations d. Incorporating maintenance policy in organisation's activities
5. Planning and Process	Object valuation: e. Conduct building's elements inventory f. Delivering objective condition assessment g. Applying standard code for assessment h. Understand components of building assets i. Understand the value of building objects (e.g. financial, technical, functional) Organization's strategies: j. Select appropriate strategies for organisation k. Having the desired results of maintenance performances l. Having enough skills and knowledge of maintenance process m. Incorporate TCO/LCC n. Make prioritisation in maintenance planning and services o. Having strategies for building management options Procurement and contract: p. Having rule and regulations for procurement and purchasing q. Following procurement procedures r. Deciding contractual model that appropriate for different maintenance strategies s. Having the selection criteria to select appropriate suppliers

Table 3



5 EFQM enablers

(section 3.2, page 38)

The EFQM enablers	Criteria of mature maintenance departments from table 3
1. Processes and Services	(5) Planning and processes (3) Organisations and Stakeholders (6) Maintenance market and suppliers performances (2) Role of maintenance departments
2. Partnership and Resources	(6) Maintenance market and suppliers performances (7) Innovation (3) Organisations and Stakeholders (5) Planning and processes
3. Leadership	(3) Role of maintenance departments (1) Maintenance objective (4) Planning and processes (7) Innovation (4) Maintenance strategies
4. People	(1) Role of maintenance departments (7) Innovation
5. Strategy	(4) Maintenance strategies

Table 4



20 sub aspects of the proposed maturity model (page 39)

The EFQM enablers	Sub criteria of table 3	New sub aspects definitions in the proposed Maturity model
Processes & Services	5a. Conduct building's elements inventory. 5b. Delivering objective condition assessment. 5c. Applying standard code for assessment. 5d. Understand components of building assets. 5e. Understand the value of building objects (e.g. financial, technical, functional).	a. Performing object valuation
	2c. Controlling the qualities of maintenance outcomes.	b. Supervising maintenance project
	3b. Capture the client's requirements and end-users satisfaction.	c. Responding client's feedback
Partnerships & Resources	5g. Having the desired results of maintenance performances.	a. The use of technology in maintenance process and services
	3d. Maintain partnerships and collaborations. 5q. There is collaboration and agreement model. 6c. Measuring supply market performances.	b. Manage the collaboration with the maintenance market
	5r. Setting goal for suppliers 6d. Reveal the capabilities of the maintenance suppliers.	c. Setting the supplier's goal
	6a. Managing the fragmented market for multi criteria of maintenance projects. 5k. Having strategies for building management options.	d. Manage the resources of the organisation in a sustainable way (This sub aspect is adopted from the EFQM assessment sheet)
	5i. Incorporate TCO/LCC.	e. TCO/LCC (This sub aspect is adopted from the sub aspects of PCMM)
	5l. Having rule and regulations for procurement	f. Procurement process and procedures

Table 6

RESEARCH METHODS | Merging the mature criteria

Maintenance management elements		Criteria of a mature maintenance departments
1	Maintenance objectives	<ul style="list-style-type: none"> a. Clear Maintenance objectives b. Good cultures toward maintenance c. Having a clear organisation's structure
2	Role of maintenance departments	<ul style="list-style-type: none"> a. Understand the organisation roles in planning and controlling b. Understand the maintenance tasks c. Controlling the qualities of maintenance outcomes d. Conduct assessment for internal organisation's performances
3	Organisations and Stakeholders	<ul style="list-style-type: none"> a. Understand the duties and the role of stakeholders b. Capture the client's requirements and end-users satisfaction c. Maintain the whole process that involving stakeholders d. Maintain partnerships and collaborations
4	Maintenance strategies (Planned preventive maintenance, Responsive maintenance)	<ul style="list-style-type: none"> a. Having options for maintenance strategies b. Able to select the best strategies c. Having strategies that correlate with output and values of organisations d. Incorporating maintenance policy in organisation's activities
5	Planning and Process	<p><i>Object valuations:</i></p> <ul style="list-style-type: none"> a. Conduct building's elements inventory b. Delivering objective condition assessment c. Applying standard code for assessment d. Understand components of building assets e. Understand the value of building objects (e.g. financial, technical, functional) <p><i>Organisation's strategies:</i></p> <ul style="list-style-type: none"> f. Select appropriate strategies for organisation g. Having the desired results of maintenance performances h. Having enough skills and knowledge of maintenance process i. Incorporate TCO/LCC j. Make prioritisation in maintenance planning and services k. Having strategies for building management options <p><i>Procurement and contract:</i></p> <ul style="list-style-type: none"> l. Having rule and regulations for procurement and purchasing m. Following procurement procedures n. Deciding contractual model that appropriate for different maintenance strategies o. Having the selection criteria to select appropriate suppliers

6	Maintenance Market & supplier performances	<ul style="list-style-type: none"> p. Able to conducting procurement professionally q. There is collaboration and agreement model r. Setting goal for suppliers s. Carry out final inspection t. There is flexibility in the contracts
7	Innovation	<ul style="list-style-type: none"> a. Managing the fragmented market for multi criteria of maintenance projects b. Designing contracts to incorporate the fragmented markets c. Measuring supply market performances d. Reveal the capabilities of the maintenance suppliers e. Assessing the supplier's performances a. Always innovating and incorporate innovation for organisation's performances b. Having mind-set toward innovation for procurement methods c. Encourage creativity

Table 3

The EFQM enablers	Criteria of mature maintenance departments from table 3
1. Processes and Services	(5) Planning and processes (3) Organisations and Stakeholders (6) Maintenance market and suppliers performances (2) Role of maintenance departments
2. Partnership and Resources	(6) Maintenance market and suppliers performances (7) Innovation (3) Organisations and Stakeholders (5) Planning and processes
3. Leadership	(3) Role of maintenance departments (1) Maintenance objective (4) Planning and processes (7) Innovation (4) Maintenance strategies
4. People	(1) Role of maintenance departments (7) Innovation
5. Strategy	(4) Maintenance strategies

Table 4

RESEARCH METHODS | Merging the mature criteria

The EFQM enablers	Sub criteria of table 3	New sub aspects definitions in the
Partnerships & Resources	5g.Having the desired results of maintenance performances.	a. The use of technology in maintenance process and services
	3d.Maintain partnerships and collaborations. 5q.There is collaboration and agreement model. 6c.Measuring supply market performances.	b. Manage the collaboration with the maintenance market
	5r.Setting goal for suppliers 6d.Reveal the capabilities of the maintenance suppliers.	c. Setting the supplier's goal
	6a.Managing the fragmented market for multi criteria of maintenance projects. 5k.Having strategies for building management options.	d. Manage the resources of the organisation in a sustainable way <i>(This sub aspect is adopted from the EFQM assessment sheet)</i>
	5i.Incorporate TCO/LCC.	e. TCO/LCC <i>(This sub aspect is adopted from the sub aspects of PCMM)</i>
	5l. Having rule and regulations for procurement	f. Procurement process and procedures

Table 6

Proposed Maturity Aspects	
The EFQM enablers	Sub aspects
1. Processes & Services	<ul style="list-style-type: none"> a. Performing object valuation b. Supervising maintenance project c. Responding client's feedback
2. Partnerships & Resources	<ul style="list-style-type: none"> a. The use of technology in maintenance process and services b. Manage the collaboration with the maintenance market c. Setting the supplier's goal d. Manage the resources of the organisation in a sustainable way e. TCO/LCC f. Procurement process and procedures g. Appropriate contractual model
3. Leadership	<ul style="list-style-type: none"> a. Continuously improving b. Encourage integrity, transparency, effectiveness, and legality rules. c. Manage the change and flexibility d. Set the mission and vision of the organisation, and incorporate the people of the organisation in doing it e. Developing human resources
4. People	<ul style="list-style-type: none"> a. Innovation and creativity b. Control in organisation c. Managing stakeholders
5. Strategy	<ul style="list-style-type: none"> a. Maintenance policy b. Maintenance strategy (planned preventive maintenance or responsive maintenance)

Table 7

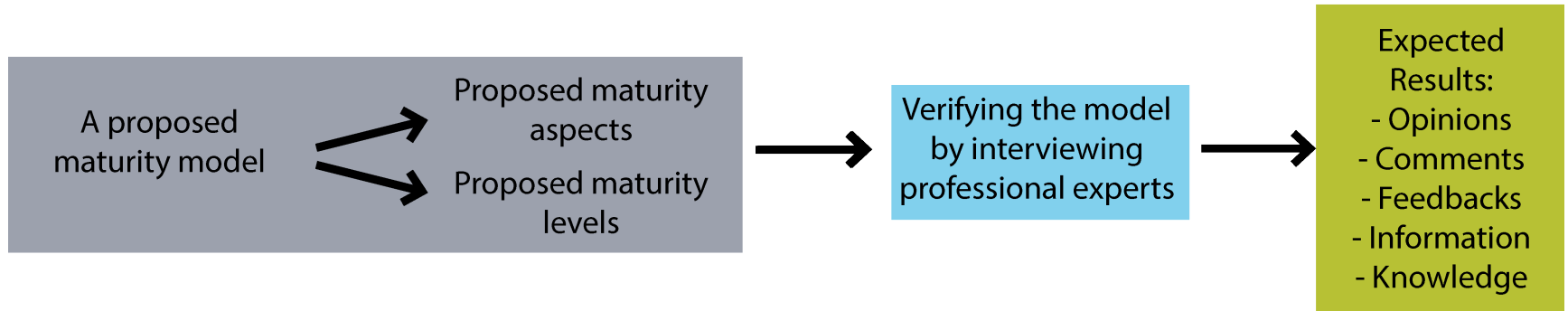
PROPOSED MATURITY MODEL		
THE EFQM ASPECTS	SUB ASPECTS	MATURITY LEVELS DEFINITION
1 Processes & Services	Performing object valuation	<p>Highest level (Level 5 - Optimized): Organisation performing objects valuation as a first step of planning maintenance. This step allow organisation to assess the critical level of maintenance needed for building object.</p> <p>Lowest level (Level 1 – Initial): Organisation does not perform object valuation. The maintenance works are carried based on estimation.</p>
	Supervising maintenance activities	<p>Highest level (Level 5 - Optimized): Organisation supervises the maintenance projects and make sure the results is satisfying the client’s goals.</p> <p>Lowest level (Level 1 – Initial): Organisation does not supervise the maintenance activities, or the work supervising is still chaotic.</p>

Table 8

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RESEARCH METHOD :
3. First Round Interviews







Gemeente Delft



Gemeente Rotterdam



FMVG TU Delft



FMVG TU Eindhoven



Strukton

First Round Interviews



CBRE Amsterdam



Kloet Onderhoud



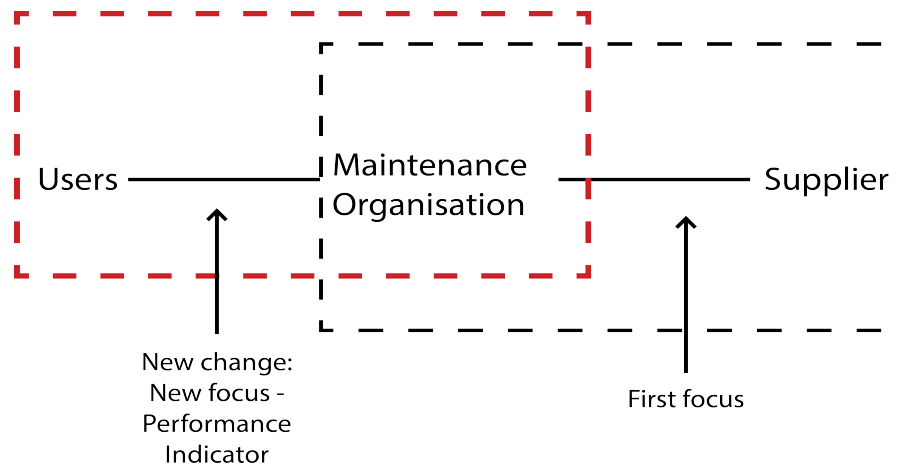
Tiberius
Maintenance

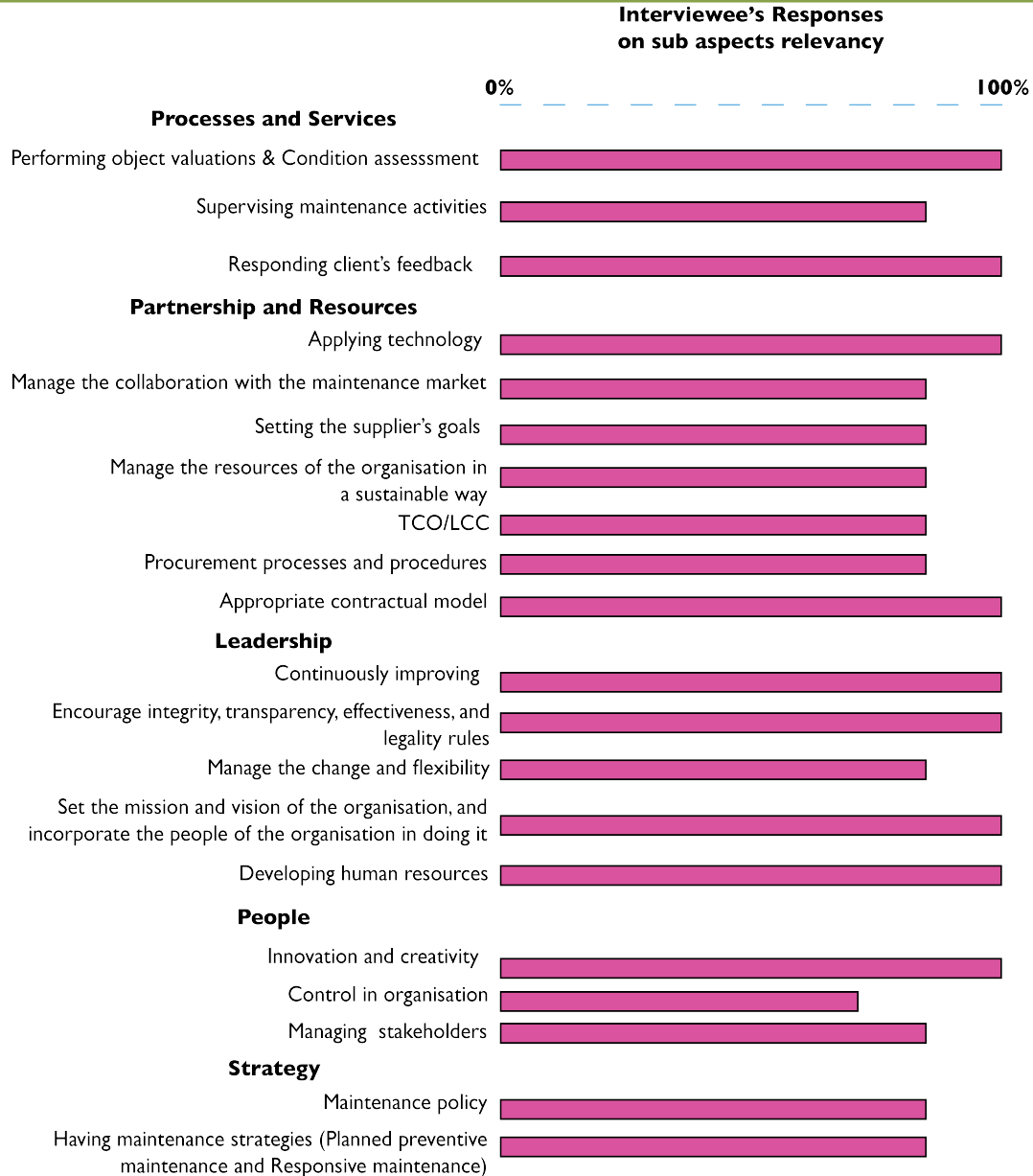


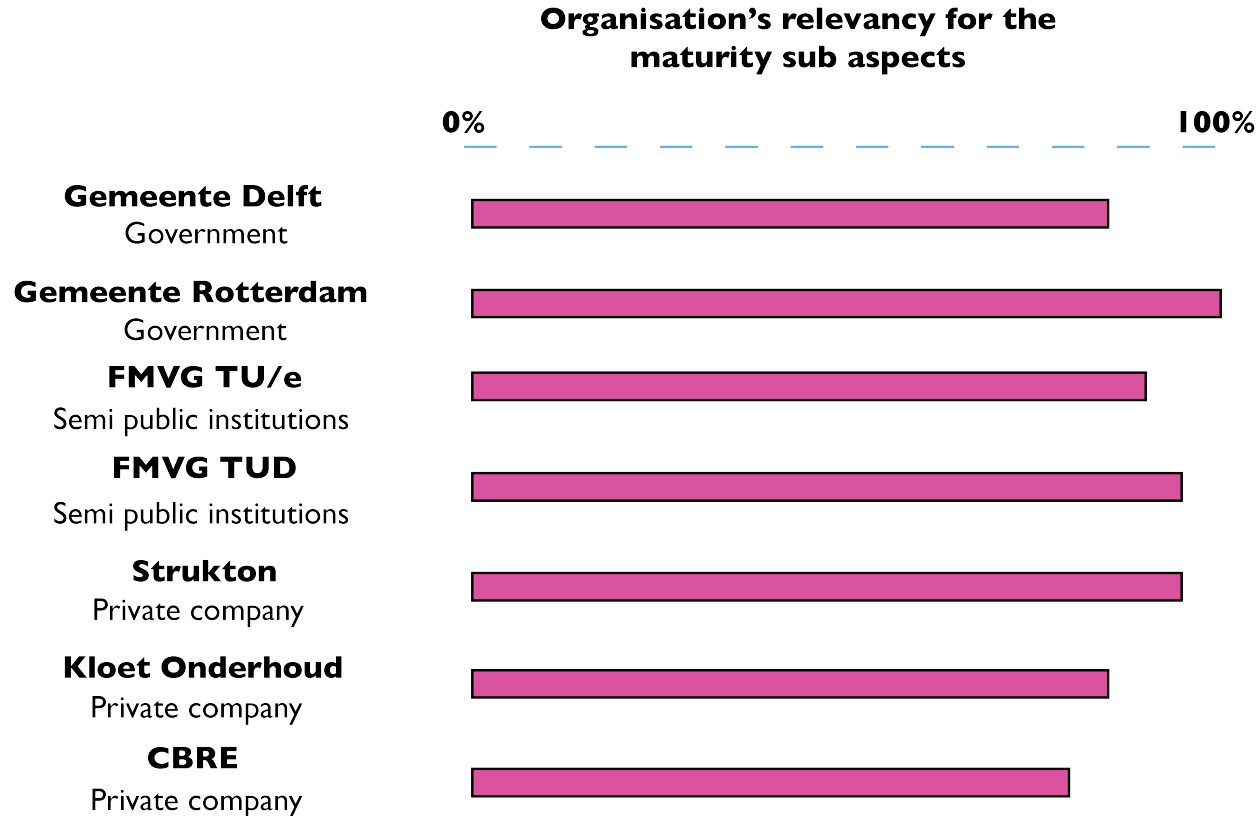
ISSO
Publication

Second Round Interviews

- **People** in the organisation are important.
- Maintenance is an **integral process**.
- **Organisation structure** affects the decision making.
- Relationship and **collaboration**
- **Control** in organisation
- Change optimisation



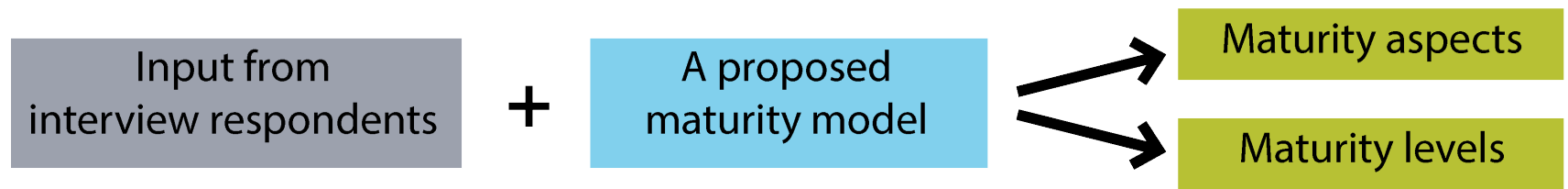


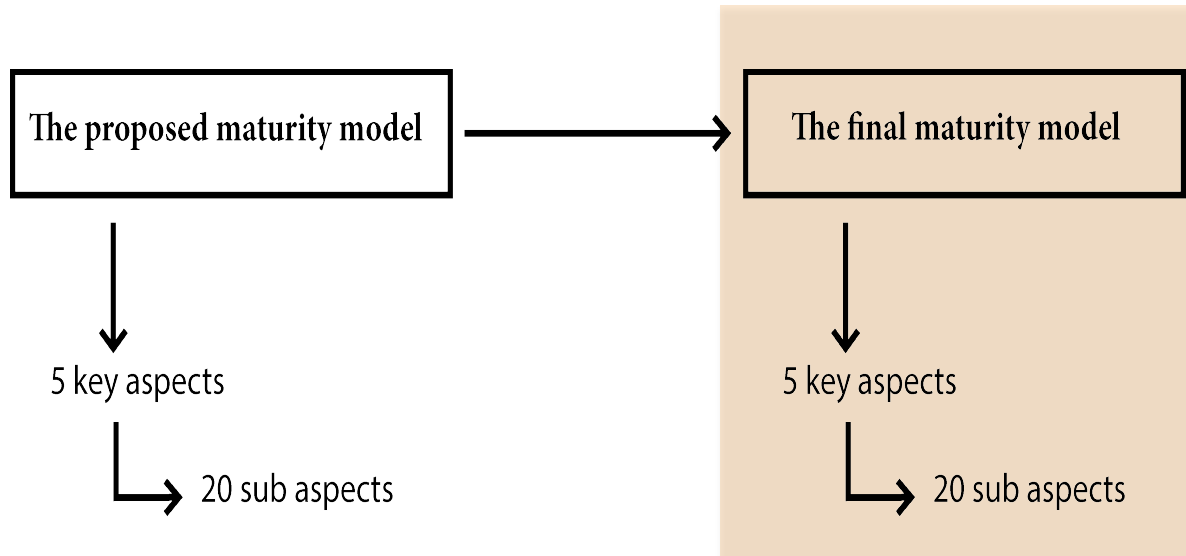


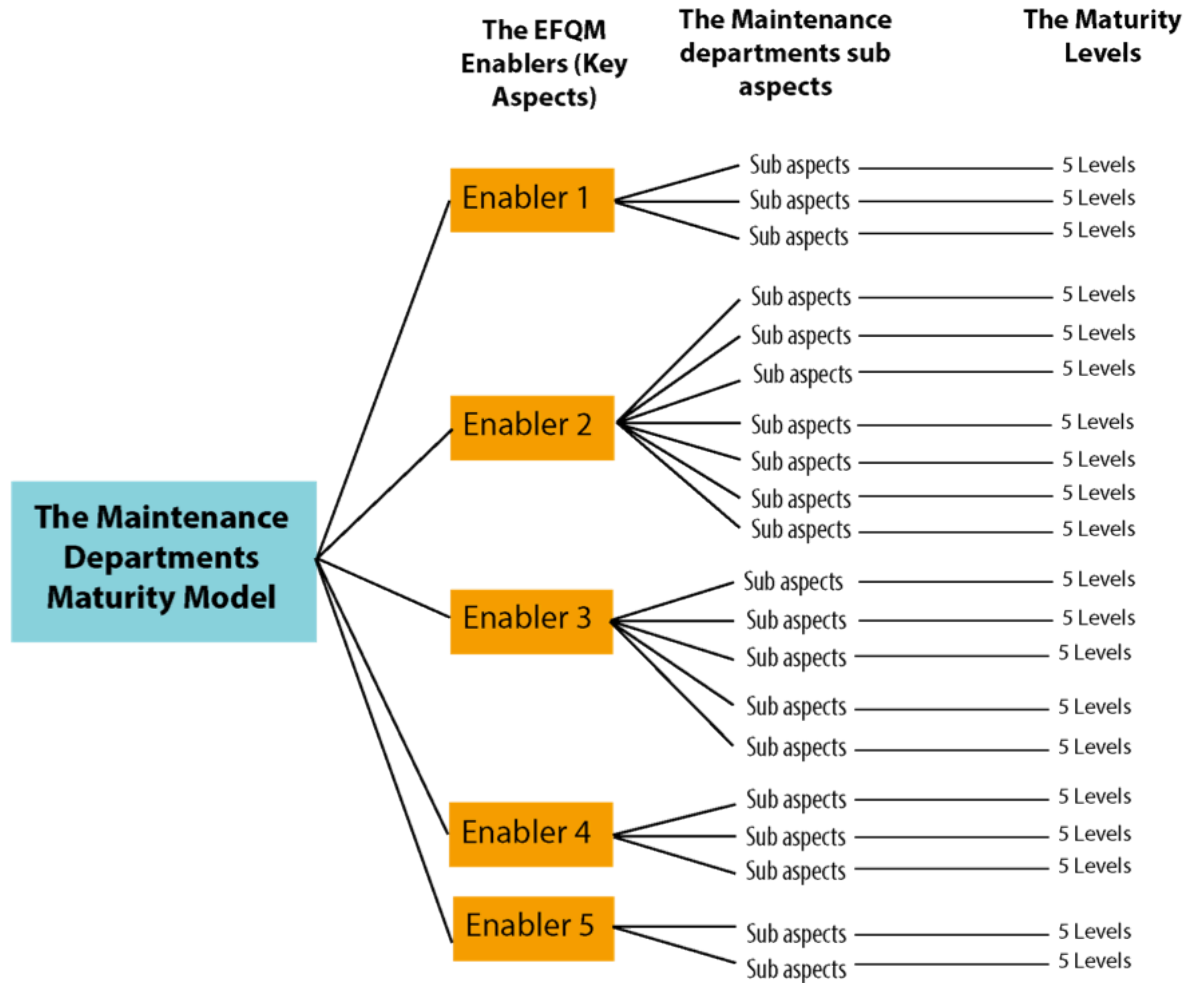
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RESEARCH METHOD :
4. Designing the Maturity
Model









Partnerships and Resources (*example*)

Sub Aspects	Level 1 INITIAL	Level 2 REPEATABLE	Level 3 DEFINED	Level 4 MANAGED	Level 5 OPTIMISING
Applying Technology	Use <u>basic</u> technology (e.g. Microsoft Office)	Use <u>specific IT</u> system to support maintenance process (e.g. Plano)	Use an <u>integrated</u> system between different departments in the organisation (e.g. FMIS).	Use <u>integrated</u> systems that inline with the management of the whole organisation. <u>Able to link it with suppliers and stakeholders</u>	Have very well <u>integrated</u> systems and evaluate its efficiency and effectiveness to seek <u>improvement.</u>
Manage collaboration with maintenance markets	Manage collaboration when it <u>needed.</u>	Manage collaboration <u>only with important/</u> visible maintenance markets.	Able to manage collaboration <u>with all</u> maintenance markets.	Manage collaboration <u>with all</u> markets to <u>support the</u> organisation management.	<u>Evaluate</u> strengths and weakness in managing collaboration. Seek <u>improvement.</u>

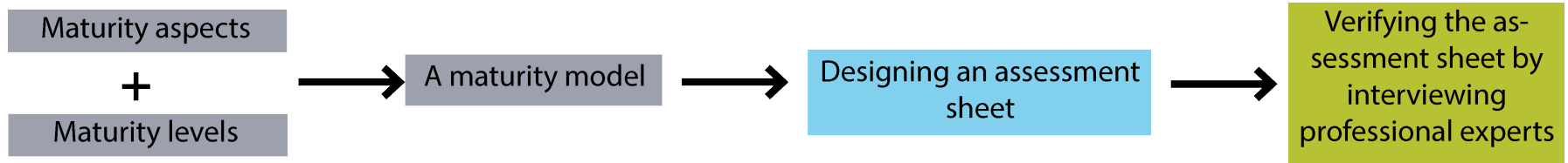
LEVEL	CHARACTERISTICS
LEVEL 1 Initial	A maintenance department has a basic or standard approach in performing their activities.
LEVEL 2 Repeatable	A maintenance department has increased their awareness. Procedures are made. However, they start to use specific tools only for their specific or major activities that are visible for their organisation.
LEVEL 3 Defined	A maintenance department already has well developed processes and systems that connected to all aspects of activities.
LEVEL 4 Managed	A maintenance department can integrated their processes, procedures, and all aspects that support their activities with the management of the whole organisation and stakeholders.
LEVEL 5 Optimising	A maintenance department has the ultimate management systems and starts to evaluate their own strengths and weaknesses. In this level, a maintenance department will seek for improvement by learning from their strengths area.

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RESEARCH METHOD :
5. Designing the
Assessment Sheet



RESEARCH STEP 5



Maturity aspects (the EFQM enablers)	Maturity Sub Aspects	Number of question(s)
1 Processes and services		1
	Performing object valuation & condition assessment	2
	Supervising maintenance activities	1
	Responding client's feedback	1
2 Partnership and resources		1
	Applying technology	1
	Manage the collaboration with the maintenance market	1
	Setting the supplier's goal	1
	Manage the resources of the organisation in a sustainable way	1
	TCO/LCC	1
	Procurement process and procedures	1
	Appropriate contractual model	1
3 Leadership		1
	Continuously improving	1
	Encourage integrity, transparency, effectiveness, and legality rules	1
	Manage the change and flexibility	1
	Set the mission and vision of the organisation, and incorporate the people of the organisation in doing it	1
	Developing human resources	1
4 People		1
	Innovation and creativity	1
	Control in organisation	1
	Managing stakeholders	1
5 Strategy		1
	Maintenance policy	1
	Having maintenance strategy (Planned Preventive maintenance and Responsive maintenance)	1

Maturity Model assessment sheet

Instruction:

Please choose only one answer that reflects with the current situation in your organisation the most.

A. PROCESSES AND SERVICES

1. How does your organisation manage maintenance processes and services?
 - a. We have unclear procedures for delivering and services. Our people work according emerging needs in our organisation. Our success in maintenance processes is depending on individual performances.
 - b. We have basic standard procedures to deliver the maintenance process only for specific maintenance services. We plan our maintenance services based on the previous project success. Our project estimations are based on the expert knowledge.
 - c. We have standard maintenance processes that are consistent and integrated for most all maintenance services. Our management can track the progress of our maintenance services. Our projects estimations are based on our organisation standards.
 - d. We have maintenance processes that are integrated with our mission of organisation success. Our management use the data and involving stakeholders to make decisions.
 - e. We have processes to evaluate our effectiveness and efficiency of delivering maintenance services. Our goal is to improve our maintenance performances.
2. How does your organisation perform object assessment?
(Here, the object assessment is an assessment that is conducted to value the building objects within the aspects of functional, financial)
 - a. We don't have specific standards (e.g. accounting standard for building financial value) for the assessment. Our assessment are based on emerging needs and driven by the individual.
 - b. We use our standardized procedures to value the building objects of which the bigger scale maintenance services will be performed. We use our own standards.
 - c. We use national standardised procedures to assess the building objects for most all scales of maintenance services.
 - d. We value the building objects, compile the data, and then we use and share it for all level in our organisation management and for our stakeholders.
 - e. We recognise our strengths and weaknesses in valuing the building objects and learn from it. We always improve our processes in valuing the building objects.
3. How does your organisation perform condition assessment?
(Here, the condition assessment it is an assessment for the technical aspects of building components)
 - a. We don't have specific standards (e.g. NEN 2767) for the assessment. Our assessment are based on emerging needs and driven by the individual.


- supervise the visible/bigger maintenance activities.
 - c. We supervise all of the maintenance activities based on the standard procedures we have.
 - d. We supervise all of the maintenance activities and we involve suppliers to do it. We have good collaboration with suppliers and we trust them.
 - e. We evaluate our efficiency and effectiveness of our supervising activities.
5. How does your organisation respond to client's feedbacks?
 - a. We respond to feedbacks when it is emerges.
 - b. We have established systems (e.g. forms, questionnaires, on line feedback, etc.) to response the feedbacks from clients.
 - c. We are consistently using our standardised systems to response feedbacks from clients.
 - d. We use the data from client's feedbacks to make decisions in our organisation management. We also ask feedbacks from other stakeholders.
 - e. We evaluate our systems and our responses to client's feedbacks. We review its strengths and weaknesses.

B. PARTNERSHIPS AND RESOURCES

1. How does your organisation manage partnerships and resources of the organisation?
 - a. We match our needs and our available resources only when the maintenance services have to be delivered.
 - b. We establish partnerships with our important clients, suppliers, and stakeholders.
 - c. We develop our partnerships with all of the clients, suppliers, and stakeholders.
 - d. We are able to manage our partnerships and organisation's resources to fit and support the success of entire organisation activities in maintenance.
 - e. We learn from our strengths and weaknesses to improve our partnerships and resources management.
2. How important is technology (e.g. IT system) for your organisation in providing maintenance services?
 - a. We use basic technology (e.g. Microsoft office) to support our maintenance processes.
 - b. We use specific IT system to support the specific maintenance processes.
 - c. We use an integrated IT system between different departments in the organisation that supports all of our maintenance processes.
 - d. We use IT systems applicable for delivering maintenance services that are in line with the organisation's management systems. We are able to incorporate data from our clients, suppliers, and stakeholders and support our collaboration.
 - e. We have very well integrated IT systems and we evaluate its efficiency and effectiveness to seek improvement.
3. How does your organisation manage the collaboration with the maintenance markets?
 - a. We manage our collaboration with the maintenance market when it is needed.
 - b. We are engaged with the most important and visible maintenance markets and we are able to develop mutual collaboration.
 - c. We are able to manage our collaboration with most all of the maintenance markets. Our relationships are consistent.
 - d. We manage our collaboration with all maintenance market to support the success of the management of our organisation. We are able to determine our goals by collaboration with maintenance markets.
 - e. We evaluate our strengths and weaknesses in managing our collaboration with the maintenance market and improve it.

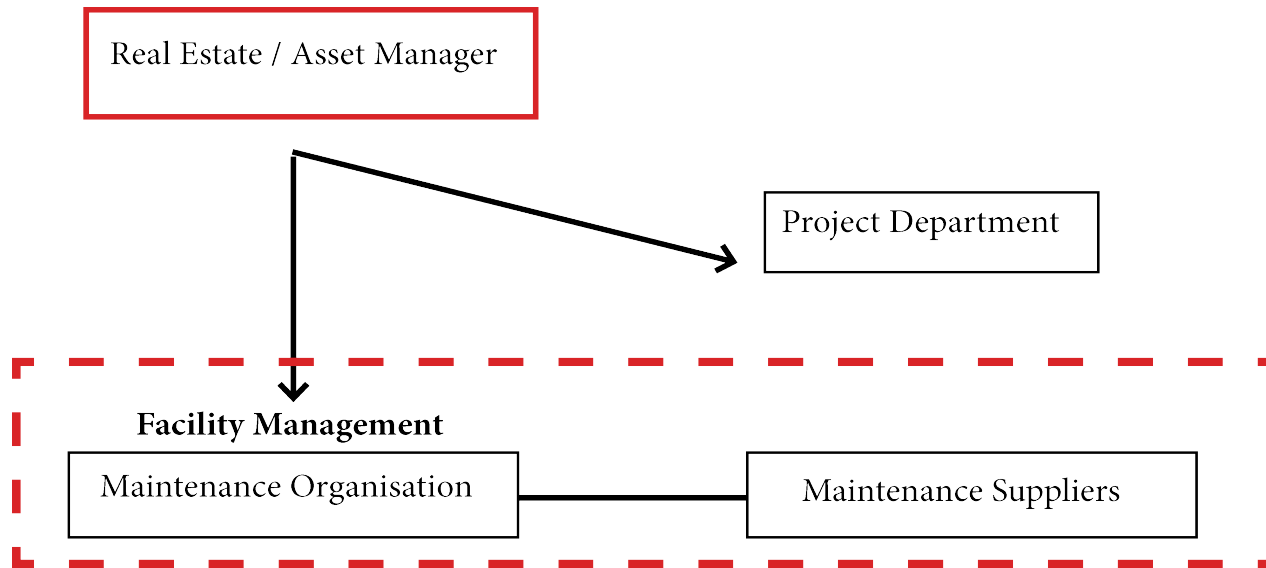
2. How important is technology (e.g. IT system) for your organisation in providing maintenance services?
- We use basic technology (e.g. Microsoft office) to support our maintenance processes.
 - We use specific IT system to support the specific maintenance processes.
 - We use an integrated IT system between different departments in the organisation that supports all of our maintenance processes.
 - We use IT systems applicable for delivering maintenance services that are in line with the organisation's management systems. We are able to incorporate data from our clients, suppliers, and stakeholders and support our collaboration.
 - We have very well integrated IT systems and we evaluate its efficiency and effectiveness to seek improvement.

Maturity Level = Total scores/ total number of questions

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RESEARCH METHOD :
6. Second Round
Interviews





- Add probing questions
- Improving the definitions & more examples in the multiple choices
- Adding question of innovation strategy

The proposed
assessment sheet

26 questions



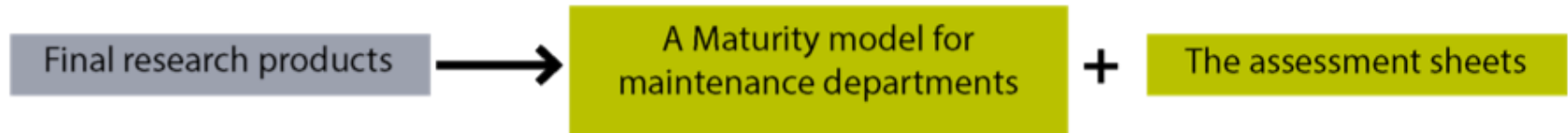
The final
assessment sheet

- **27 questions**
- **Changing multiple answers**

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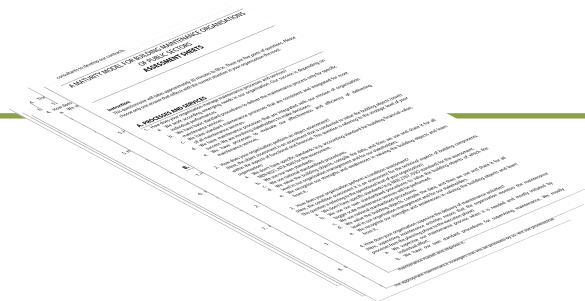
FINAL RESULTS





FINAL RESULTS | The final maturity model

	Level 1 INITIAL	Level 2 REPEATABLE	Level 3 DEFINED	Level 4 MANAGED	Level 5 OPTIMIZING
PROCESSES & SERVICES	The organisation has not set clear procedures for delivering maintenance services. The people work according emerging needs in the organisation. The organisation success in maintenance processes is depending on individual performances.	The organisation has basic standard procedures to deliver the maintenance process only for specific maintenance services. The organisation plan their the previous project success. Their project estimations are based on the expert knowledge.	The organisation has standard maintenance processes that are consistent and integrated for most all maintenance services. The management can track the progress of their maintenance services. The organisation's projects estimations are based on their organisation standards.	The organisation has maintenance processes that are integrated with their mission of organisation success. The management use the data and involving stakeholders to make decisions.	The organisation has processes to evaluate their effectiveness and efficiency of delivering maintenance services. The organisation's goal is to improve their maintenance performances.
PARTNERSHIPS & RESOURCES	The organisation doesn't have clear procedures to manage their partnerships and resources. The organisation matches the needs and their available resources only when the maintenance services have to be delivered.	The organisation has their recourses documented to fit with the important maintenance processes/activities. The organisation establishes partnerships with their important clients, suppliers, and stakeholders.	The organisation plans their resources to meet with the overall process for the specific needs in the organisation. The organisation develops their partnerships with all of the clients, suppliers, and stakeholders.	The organisation is able to manage their resources to fit and support the success of entire organisation activities. Their partnerships with clients, suppliers, and stakeholders are well defined, and the organisation is seeking for innovation in partnerships model.	The organisation learns from their strengths and weaknesses to improve their partnerships and resources management.
LEADERSHIP	The leaders are having difficulty in establish vision and mission for the people in the organisation. The organisation's leaders cannot become role models, and having difficulty to manage the maintenance processes. People are not encouraged to follow the organisation's value.	The leaders set vision and mission. The leaders act as role models following the organisation's value. The leaders encourage people to apply their mission to focus on their maintenance processes.	The leaders are able to plan the processes and manage the people in their organisation to apply organisation mission for all processes in the organisation.	The leaders are able to manage the strengths and competences of the organisation and make sure that the value is inline with the value of the management organisation.	The leaders evaluate the organisation's strengths and weaknesses and improve it.
PEOPLE	People are important for the organisation but the skills and competence of the people are difficult to recognised. Success of the organisation is depending on the individual effort.	The organisation develops procedures to recognise the skills and competences of people in their organisation.	The organisation has consistent and standardised procedures to recognise and to manage the skills and competences of their people. The organisation has people development program that in line with the maintenance department career path.	The organisation measures the competences and skills of their people and integrates it with the career development in the organisation management.	The management of the people in the organisation are well integrated. The organisation evaluates the systems and seeking for improvement.
STRATEGY	The organisation have no planned strategy, but it will emerge when it is needed.	The organisation has clear strategies. Their strategy aims to control the primary process and the primary maintenance activities.	The organisation has standardised and consistent strategies. Their strategies are applicable for all processes and activities in their organisation.	The organisation's strategies are integrated and support the success of the organisation management. The organisation always innovates to seek the best strategies.	The organisation evaluates their strategies. The organisation knows their strengths and weaknesses and they improve it.



A MATURITY MODEL FOR BUILDING MAINTENANCE ORGANISATIONS OF PUBLIC SECTORS ASSESSMENT SHEETS

Instruction:

This questionnaire will take approximately 30 minutes to fill in. There are five parts of questions. Please choose only one answer that reflects with the current situation in your organisation the most.

A. PROCESSES AND SERVICES

1. How does your organisation manage maintenance processes and services?
 - a. We work according emerging needs in our organisation. Our success is depending on individual performances.
 - b. We have basic standard procedures to deliver the maintenance process only for specific maintenance services.
 - c. We have standard maintenance processes that are consistent and integrated for most of all maintenance services.
 - d. We have maintenance processes that are integrated with our mission of organisation success. We are involving stakeholders to make decisions.
 - e. We have processes to evaluate our effectiveness and efficiency of delivering maintenance services.
2. How does your organisation perform an object assessment?

(Here, the object assessment is an assessment that is conducted to value the building objects /assets within the aspects of functional and financial. This question is referring to the strategic level of your organisation)

 - a. We don't have specific standards (e.g. accounting standard for building financial value, NEN 8021, NTA 826) for the assessment.
 - b. We use our own standards.
 - c. We use national standardised procedures.
 - d. We value the building objects, compile the data, and then we use and share it for all level in our organisation management and for our stakeholders.
 - e. We recognise our strengths and weaknesses in valuing the building objects and learn from it.
3. How does your organisation perform a condition assessment?

(Here, the condition assessment it is an assessment for the technical aspects of building components. This question is referring to the operational level of your organisation)

 - a. We don't have specific standards (e.g. NEN 2767, ISO standard) for the assessment.
 - b. We use our own standardized procedures to value the building objects of which the bigger scale maintenance services will be performed.
 - c. We use national standardised procedures.
 - d. We value the building objects, compile the data, and then we use and share it for all level in our organisation management and for our stakeholders.
 - e. We recognise our strengths and weaknesses in valuing the building objects and learn from it.
4. How does your organisation supervise the delivery of maintenance activities?

(Here, supervising maintenance activities means that the organisation monitors the maintenance processes from the planning phase to the execution phase)

 - a. We supervise our maintenance process when it is needed and mostly initiated by individual effort.
 - b. We have our own standard procedures for supervising maintenance. We mostly

27 questions:

- 5 parts
- 5 multiple answers per questions.
- ±30 minutes to fill in.

The background features several overlapping, semi-transparent purple geometric shapes, including rectangles and trapezoids, some with white outlines. These shapes are arranged in a way that creates a sense of depth and movement across the black background.

CONCLUSIONS



What are the important aspects of maintenance organisations can be used to develop a Maturity model for maintenance departments of public organisations?

The EFQM enablers	Sub aspects
1. Processes & Services	<ul style="list-style-type: none"> a. Performing object valuation b. Supervising maintenance project c. Responding client's feedback
2. Partnerships & Resources	<ul style="list-style-type: none"> a. The use of technology in maintenance process and services b. Manage the collaboration with the maintenance market c. Setting the supplier's goal d. Manage the resources of the organisation in a sustainable way e. TCO/LCC f. Procurement process and procedures g. Appropriate contractual model
3. Leadership	<ul style="list-style-type: none"> a. Continuously improving b. Encourage integrity, transparency, effectiveness, and legality rules. a. Manage the change and flexibility b. Set the mission and vision of the organisation, and incorporate the people of the organisation in doing it c. Developing human resources
4. People	<ul style="list-style-type: none"> a. Innovation and creativity b. Control in organisation c. Managing stakeholders
5. Strategy	<ul style="list-style-type: none"> a. Maintenance policy b. Maintenance strategy (planned preventive maintenance or responsive maintenance)



	Level 1 INITIAL	Level 2 REPEATABLE	Level 3 DEFINED	Level 4 MANAGED	Level 5 OPTIMIZING
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1. “ What are **the important criteria** of maintenance departments of public organisations?”
 - What can be seen as important from the **objectives, roles, tasks, and activities** of maintenance departments of public organisations?

	Maintenance management elements	Criteria of a mature maintenance departments
1	Maintenance objectives	<ul style="list-style-type: none"> a. Clear Maintenance objectives b. Good cultures toward maintenance c. Having a clear organisation’s structure
2	Role of maintenance departments	<ul style="list-style-type: none"> a. Understand the organisation roles in planning and controlling b. Understand the maintenance tasks c. Controlling the qualities of maintenance outcomes d. Conduct assessment for internal organisation’s performances
3	Organisations and Stakeholders	<ul style="list-style-type: none"> a. Understand the duties and the role of stakeholders b. Capture the client’s requirements and end-users satisfaction c. Maintain the whole process that involving stakeholders d. Maintain partnerships and collaborations
4	Maintenance strategies (Planned preventive maintenance, Responsive maintenance)	<ul style="list-style-type: none"> a. Having options for maintenance strategies b. Able to select the best strategies c. Having strategies that correlate with output and values of organisations d. Incorporating maintenance policy in organisation’s activities

Table 3 of chapter 3

5	Planning and Process	<p>Object valuations:</p> <ul style="list-style-type: none"> a. Conduct building’s elements inventory b. Delivering objective condition assessment c. Applying standard code for assessment d. Understand components of building assets e. Understand the value of building objects (e.g. financial, technical, functional) <p>Organisation’s strategies:</p> <ul style="list-style-type: none"> f. Select appropriate strategies for organisation g. Having the desired results of maintenance performances h. Having enough skills and knowledge of maintenance process i. Incorporate TCO/LCC j. Make prioritisation in maintenance planning and services k. Having strategies for building management options <p>Procurement and contract:</p> <ul style="list-style-type: none"> l. Having rule and regulations for procurement and purchasing m. Following procurement procedures n. Deciding contractual model that appropriate for different maintenance strategies o. Having the selection criteria to select appropriate suppliers p. Able to conducting procurement professionally q. There is collaboration and agreement model r. Setting goal for suppliers s. Carry out final inspection t. There is flexibility in the contracts
6	Maintenance Market & supplier performances	<ul style="list-style-type: none"> a. Managing the fragmented market for multi criteria of maintenance projects b. Designing contracts to incorporate the fragmented markets c. Measuring supply market performances d. Reveal the capabilities of the maintenance suppliers e. Assessing the supplier’s performances
7	Innovation	<ul style="list-style-type: none"> a. Always innovating and incorporate innovation for organisation’s performances b. Having mind-set toward innovation for procurement methods c. Encourage creativity

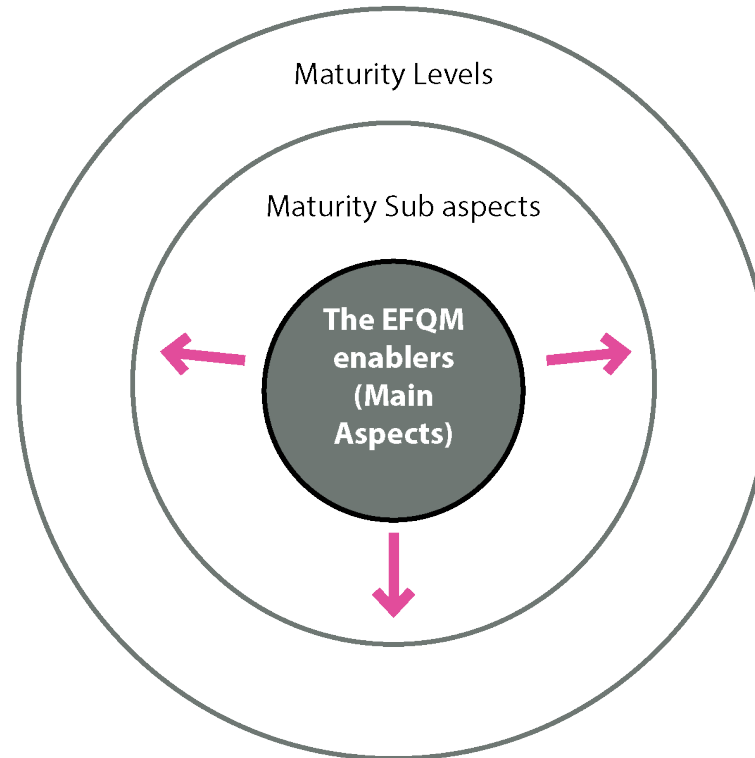
2. “What **quality improvement tools** can be adopted to measure the maturity levels of maintenance departments of public organisations?”

- How does the approach of the EFQM model for the organisations?
- What maturity models can be implemented to design a maturity model for maintenance departments of public organisations?

Quality improvement tools	Components
1. The EFQM model	<ul style="list-style-type: none"> • Enablers • The assessment sheet
2. The Capability Maturity Model (CMM)	<ul style="list-style-type: none"> • 5 levels development • Maturity level definitions
3. The Public Commissioning Maturity Model (PCMM)	<ul style="list-style-type: none"> • Aspects & sub aspects • Designing steps
4. The Project Management Maturity Model (PMMM)	<ul style="list-style-type: none"> • Maturity levels development
5. INK (Instituut Nederlandse Kwaliteit)	<ul style="list-style-type: none"> • Maturity level definitions

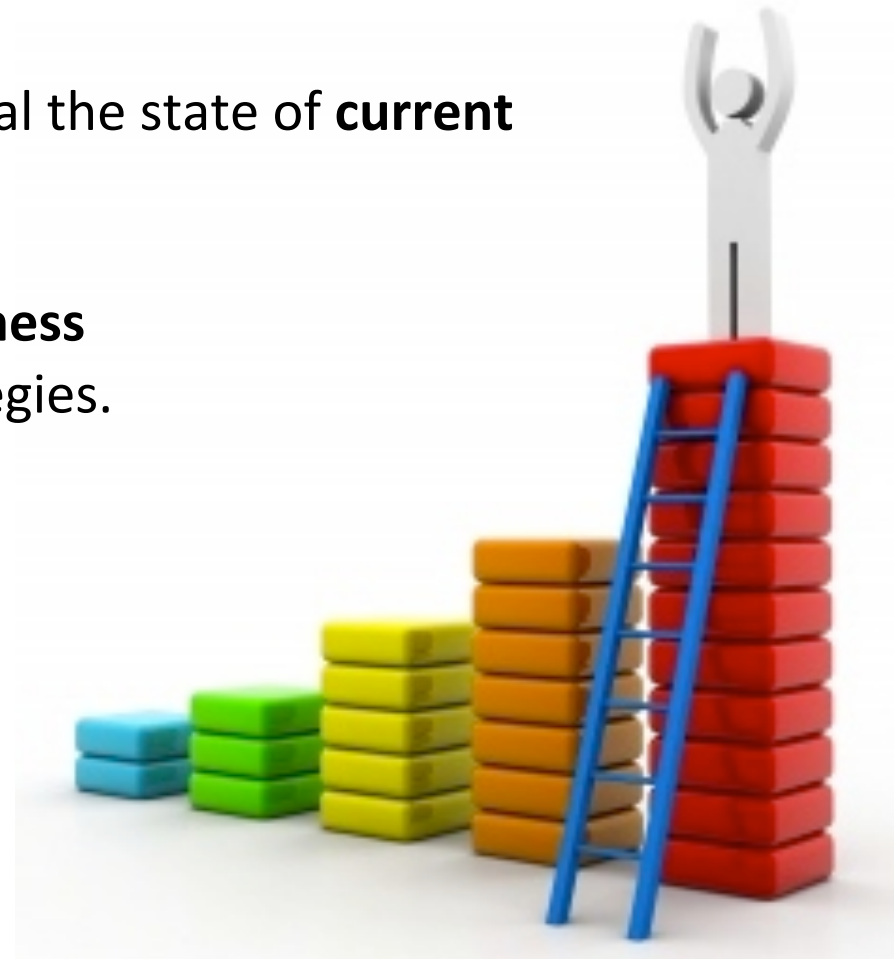
3. "How can the EFQM model, the maturity models, and the important criteria of maintenance department are related?"

- What components of the models and the important criteria can be used to design a Maturity model for maintenance departments of public organisations?
- How does the development of the maturity levels?



The Maturity model:

- Quick scan tool.
- Use the **assessment sheet** to reveal the state of **current level**.
- **Review** the maturity levels table.
- Give **insights and increase awareness**
- **Guidance** for designing new strategies.



Thesis Limitation

- **Subjectivity** by the researcher and interviews respondents.
- Use only the EFQM **enablers**.
- No **real strategies** to improve the levels.
- Language barrier.

Further research recommendation

- The type of maintenance organisations.
- Use the EFQM **Results factors**.
- Discuss more real possible strategies.
- More in depth organisation's research (e.g. site visit).

THANK YOU

