# CHAPTER III IMPLEMENTATION PLAN AND DIGITAL TRANSFORMATION PROJECT DESIGN

3.1. Digital Transformation Framework

The process of developing digital transformation is based on a digital transformation framework. This framework starts from identifying problems or challenges, determining objectives or future conditions to be achieved, determining the capabilities of systems that need to be built so that objectives are achieved, determining the level of digital maturity to be achieved, establishing development steps to increase the digital maturity level, and projection of the entire series of digital transformation development in the form of a timeline.
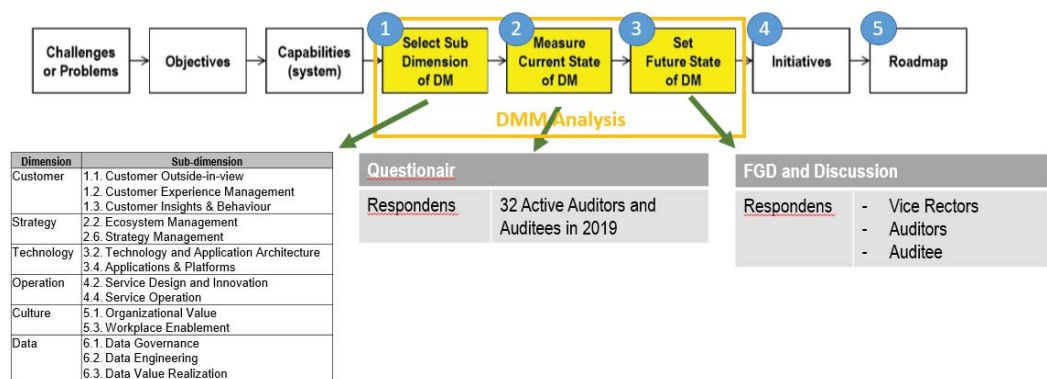
Source: Researcher's Analysis of 2020
Figure 13. Digital Transformation Framework for UMN's Internal Quality Audit

In the previous chapter, the researcher discussed in detail the problems, objectives, and capabilities that underlie the need for digital transformation in the internal quality audit process at UMN. The next step is to determine the digital maturity framework that will be used as the basis and parameters for the development of digital transformation of the internal quality audit process at UMN.

a. Selection of suitable Maturity Model:

Several maturity models were analyzed according to the needs of developing digital transformation of the internal quality audit process at UMN. Of the three models, the TM Forum maturity model was chosen as the most suitable model for transforming the UMN internal quality audit process.

Table 10. Comparison of the Digital Transformation Frameworks

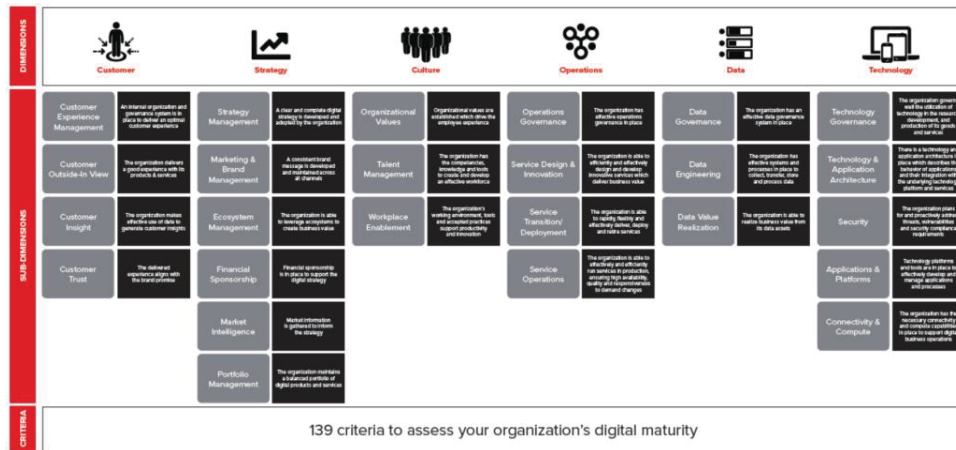|	Internal Audit Maturity Model	Digital Maturity Framework for Higher Education Institution	Digital Maturity Model
By	KPMG (KPMG, 2015)	Valentina Durek (Đurek & Blaženka Divjak, 2017)	TM Forum (TM Forum, n.d.)
+	Explained the maturity model for the internal audit process	Digital maturity framework specifically for the higher education sectors	Digital maturity framework that was used in the technology and communication sectors and can be used in other sectors.
-	It's not a digital framework	Still in the development stage and did not have a practical tool.	Need contextual adjustments in the university audit internal programs
Conc.	Not suitable	Not suitable	Able to be used

TM Forum DMM version 4.0.2 becomes a Digital Maturity Model Framework used to evaluate and determine the direction of digital transformation for the internal quality audit process. This latest version has additional data dimensions than the previous version 2.0. did not exist. Other modifications were also made to the sub-dimension version 2.0, where the total number of criteria changed to 139 criteria items from the previous 110 items.

Table 11. Comparison of TM Forum DMM version 2.0 and 4.0

TM Forum DMM Version 2.0	TM Forum DMM Version 4.0
Five dimensions: *Customer, Strategy, Culture, Operation,* and *Technology*	Add a new dimension: *Data*
Sub-dimension: 24	Sub-dimension: 25, with some adjustment on the previous sub-dimension
Total Criteria: 110	Total Criteria: 139

Source: TM Forum, 2020

Source: TM Forum 2020
Figure 14. TM Forum Digital Maturity Model version 4.0

The business processes that will be subject to this digital transformation project include:

1. The process of making audit instruments

2. Scheduling audits

3. The audit process consists of the use and access of data, collecting evidence, and recording the results of the analysis

4. Preparation of audit reports consisting of preparation, analysis of audit results, and dissemination of results

5. Recording and scheduling of repairs automatically, scheduled and monitored from period to period.

The analysis of what sub-dimensions chosen, will be further discussed in point 3.2.

b. The next step is to measure the current state of digital maturity level.

At this step, the researcher uses a questionnaire to gather information and perception of auditors and auditees involved in the internal audit activities in 2019. This current state will be an initial condition that will be improved in the next step.

c. Next is to set the future state of digital maturity.

At this phase, the researcher conducts an interview with the representation of Rectorates that has a prior concern with the audit impact. Some opinions from expert auditors and auditees will also be collected to strengthen the future set of targets.

Mapping of current conditions is needed to determine gaps with the ideal conditions. The current condition is mapped using a questionnaire as a tool to explore data. The UMN auditors and auditees were targeted as respondents with a total sample size of 11 for the pretest and 32 for the total sample of respondents. The pretest activity was carried out to test the validity and reliability of the instrument. Instruments that have been confirmed to be valid and reliable are then used to obtain the respondents' main data. These results are then processed and used as a map of the current condition. Descriptive statistics are also used to provide an overview of the average distribution of responses that emphasize the maturity level.

The form of qualitative research was then carried out in focus group discussions or interviews with the UMN rectorate and auditor representatives to explore the expected feasibility of the maturity level.

d. After the sub-dimension, current state, and future set are set, the next phase is determining the initiatives or key performance indicators for the development of every sub-dimension.

e. The digital transformation roadmap will be created and proposed with further analysis on the cost and benefit of the implementation of the digital transformation project.

3.2. Digital Maturity Model

The TM Forum Digital Maturity Model is chosen as a framework for digital-transforming the UMN Internal Quality Audit Process. As mentioned before, TM Forum Digital Maturity Model has six dimensions with 25 sub-dimensions and a total of 139 criteria. A brief explanation about every sub-dimension is explained below.

TM Forum Digital Maturity Model:

1. Customer (4 sub-dimensions, 25 criteria)

The Customer dimension evaluates an engaging experience where customers view the organization as their digital partner using their preferred channels of interaction.

Customers	Description
Customer Outside-In View	The organization delivers a good experience with its products & services
Customer Experience Management	An internal organization and governance system is in place to deliver an optimal customer experience
Customer Insight	The organization makes effective use of data to generate customer insights
Customer Trust	The delivered experience aligns with the brand promise

Source: TM *Forum*, 2020

2. Strategy (6 sub-dimensions, 24 criteria)

The Strategy dimension evaluates how well the business plans to increase its competitive advantage through a comprehensive digital strategy and designs a set of initiatives that support the overall business strategy.

Table 13. Description of Strategy Sub-dimensions

Strategy	Description
Marketing & Brand Management	A consistent brand message is developed and maintained across all channels
Ecosystem Management	The organization is able to leverage ecosystems to create business value
Financial Sponsorship	Financial sponsorship is in place to support the digital strategy
Market Intelligence	Market information is gathered to inform the strategy
Portfolio Management	The organization maintains a

	balanced portfolio of digital products and services
Strategy Management	A clear and complete digital strategy is developed and adopted by the organization

3. Technology (5 sub-dimensions, 29 criteria)

The Technology dimension evaluates the organization's technology capabilities to establish, maintain, and continually transform an environment that supports the delivery of business objectives.

Table 14. Description of Technology Sub-dimensions

Technology	Description
Technology Governance	The organization governs well the utilization of technology in the research, development, and production of its goods and services
Technology & Application Architecture	There are technology and application architecture in place which describes the behavior of applications and their integration with the underlying technology platform and services
Security	The organization plans for and proactively address threats, vulnerabilities, and security compliance requirements
Applications & Platforms	Technology platforms and tools are in place to effectively develop and manage applications and processes
Connectivity & Compute	The organization has the necessary connectivity and compute

	capabilities in place to support digital business operations

4. Operation (4 sub-dimensions, 22 criteria)

The Operations dimension evaluates the organization's performance of day-to-day activities that support the digital strategy's execution.

Table 15. Description of Operation Sub-dimensions

Operation	Description
Operations Governance	The organization has effective operations governance in place
Service Design & Innovation	The organization is able to efficiently and effectively design and develop innovative services which deliver business value
Service Transition/Deployment	The organization is able to rapidly, flexibly, and effectively deliver and deploy and retire services
Service Operations	The organization is able to effectively and efficiently run services in production, ensuring high availability, quality, and responsiveness to demand changes

5. Culture (3 sub-dimensions, 22 criteria)

The Culture dimension evaluates the ability of an organization to create an environment where everyone is willing and able to create business value.

Table 16. Description of Culture Sub-dimensions

Culture	Description
Organizational Values	Organizational values are established which drive the employee experience
Talent Management	The organization has the competencies, knowledge, and tools to create and develop an effective workforce
Workplace Enablement	The organization's working environment, tools, and accepted practices support productivity and innovation

Source: TM Forum, 2020

6. Data (3 sub-dimensions, 17 criteria)

The Data dimension evaluates the organization's ability both strategically and operationally to ethically and effectively use data and information assets to maximize business value.

Table 17. Description of Data Sub-dimensions

Data	Description
Data Governance	The organization has an effective data governance system in place
Data Engineering	The organization has effective systems and processes in place to collect, transfer, store, and process data
Data Value Realization	The organization is able to realize business value from its data assets

Source: TM Forum, 2020

Measurement of the level of maturity
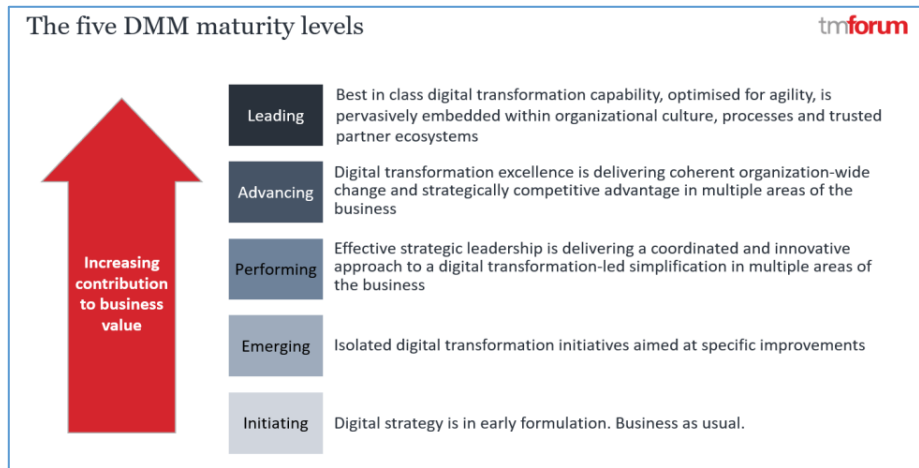
Figure 15. the Maturity Level of TM Forum DMM

Measurement of the level of maturity of the TM Forum DMM is described through five maturity levels, each of which describes the level of contribution to the organization's business value

1. Initiating: The digital strategy is still in its initial concept, business as usual

2. Emerging: Digital transformation is carried out in a limited or separate manner and aims to solve a specific problem or form of development

3. Performing: Strategic leadership works effectively to bring coordination and innovation in the form of digital transformation in a number of business processes

4. Advancing: A perfect form of digital transformation presents a more coherent form of coordination at a broad organizational

scale. Change and development occur on a wide scale and create competitive advantage in various business areas

5. Leading: The best form of implementation in terms of digital transformation capacity, optimal to support agility, a culture within the organization, and create a collaborative ecosystem with trusted stakeholders

3.2.1. Dimensions of the Digital Maturity Model used in the study

Based on the business process and background of the problem, all six dimensions and 14 sub-dimensions (with a total of 36 indicators) are selected from the DMM TM Forum are as follows:

Table 18. Dimension and Sub-dimension that were used in the Digital Transformation of UMN Audit Process

Dimension:	1. Customer (use 3 of 4 sub-dimension)	Customers in this process are BPMI Officer, Auditors, Auditees, and Top Management. The digital transformation project is aimed to give positive effect to the customer's satisfaction
Sub-dimension:	1.1. Customer Outside-in-view a. Personalization b. Ease of use c. Customer delight d. Proactive Care	The sub-dimension of *Customer Outside-in-view* is chosen for its personalization, ease of use, and user satisfaction that will contribute to the quality of the audit process.
	1.2. Customer Experience Management a. Experience-driven design b. Customer Journey Management	The Sub-dimension of *Customer Experience Management* is chosen for its focus on the complexity and dynamic usage that will cover any user experiences in the audit process.

	1.3. Customer Insight a. Voice of the customer	The Sub-dimension of *Customer Insight* is chosen because it focuses on the customers' insight. Auditor's and auditee's opinions are very important as an input to the improvement of the system.
Dimension:	2. Strategy (2 of 6 sub-dimensions)	The dimension of *Strategy* is chosen due to UMN strategies as the owner of the internal audit system is relevant to improving the system in the future.

Sub-dimension:	4.2. Ecosystem Management
	    a. Business Ecosystem
	    b. Ecosystem Design
		The Sub-dimension of *Ecosystem Management* is chosen because the internal audit process affects other processes. It provides an ecosystem where continuous improvement can grow in the entire organization. Its success depends on the entire organization's contribution as auditors, auditee, and the management.

	2.6. Strategy Management
	    a. Vision/Strategy Alignment
	    b. Transformation Governance
		The Sub-dimension of *Strategy Management* is chosen because the existence and the development of the internal audit system should be aligned with the vision of UMN.

Dimension:	3. Technology (2 of 5 sub-dimensions)	The dimension of *Technology* is chosen because technology becomes the backbones of the development of the internal audit system and its digital transformation.
Sub-dimensions:	3.2. Technology & Application Architecture a. Application configurability	Sub-dimension of *Technology & Application Architecture* is chosen because the architectures must be suitable not only for near development but also for the future development of the internal audit system. The configuration of the internal audit system must have compliance with existing infrastructure in UMN and future development.

	3.4. Application & Platform
	    a. Big Data Platform
	    b. Tools Catalog
		Sub-dimension of *Application &*
		Platform is chosen because big data
		and other application tools are
		fundamental. The tools must provide
		functions in creating audit
		instruments, scheduling, data
		mining, gathering evidence, and
		monitor the effectiveness of the
		improvements

Dimension:	4. Operation (2 of 4 sub- dimensions)	The dimension of *Operation* is chosen as the central aspect of the system because it should provide better operational effectiveness and efficiency for the internal audit process than the previous method.

Sub-
dimensions:
	4.2. Service Design and
	Innovation
	    a. Meeting Business
	       Requirements
	    b. Design Thinking
	    c. Process Optimization
		The sub-dimension of *Service*
		Design and Innovation is chosen
		because compatibility with business
		requirements is vital for the system's
		effectiveness and better user
		experience.

	4.4. Service Operation a. Operation Monitoring	The sub-dimension of *Service* *Operation* is chosen because observation and monitoring activities for the internal audit system are essential to detect anomalies or future development insights.
Dimension:	5. Culture (2 of 3 sub- dimensions)	The dimension of *Culture* is chosen because quality culture becomes an integral part of the internal audit system. The system should promote and foster the growth of quality culture in UMN.
Sub- dimensions:	1.1. Organization value a. Employee impact	The sub-dimension of *Organization* *value* is chosen because auditors and auditee must be aware of their importance and contribution to the quality management system in UMN.

	5.3. Workplace Enablement
	    a. Productive
	       Environment
		The sub-dimension of *Workplace*
		enablement is chosen because a
		conducive internal audit space and

	b. Innovative Environment c. Productivity Tools d. Innovation Tools e. Knowledge Capturing f. Knowledge Sharing	work environment can be deciding factors to the quality of the internal audit process and the continuous improvement.
Dimension:	6. Data (all three dimensions)	The dimension of *Data* is chosen because data becomes one of the main factors in the internal audit process. The speed in providing data, storing data, recalling data, validity, and reliability will be deciding factors in the audit process. The digital transformation should optimize its activities.
Sub-dimensions:	6.1. Data governance a. Metadata management b. Data stewardship c. Master data management d. Data security management	The sub-dimension of *data governance* is chosen because data governance is a deciding factor in the audit process's efficiency.
	6.2. Data engineering a. Data storage b. Data accessibility c. Data life-cycle management d. Data collection e. Data presentation	The sub-dimension of *data engineering* is chosen because data storing, accessibility, life cycle, collection, and presentation become an important aspect of the audit process. It decides the quality of analysis and decision-making during the audit process and further improvements.
	6.3. Data value realization a. Data-driven decision-making b. Data science competence	The sub-dimension of *data value realization* is chosen because decision-making based on reliable data sources is certain for producing a highly accurate and effective decision. Digital transformation in this area should boost its effectiveness and efficiency.

3.3. Benefits of Using the Technology

The implementation of this digital transformation will produce an application or information system to support the internal quality audit process at UMN. This application or information system will be connected to the UMN Local Area Network (LAN), which can be widely used and connected with various functions and data that already exist. Audit evidence data and records can also be stored appropriately and have the ability to be recalled by anyone and whenever needed.

This form of implementation certainly requires compatibility between the prototypes and the existing technology at UMN. UMN Local Area Network has several technological characteristics that need to be adjusted:

a. *Web development*

One of the possible forms of application or information system implementation is web development. It allows the information system to be connected to a vast internet network and can be linked to the UMN official website that has previously existed.

b. Yii2 Framework

Yii2 is a pure OOP-based PHP framework (for version 5.4.0 or higher) for programming or web development. Yii2 has a component-based architecture and sophisticated cache support making it suitable for large-scale development of applications such

as portals, content management systems, etc. Yii2 uses the Model-View-Controller architectural pattern and promotes code organization based on that pattern. Available and ready-to-use features consist of a query builder, ActiveRecord for relational and NoSQL, API REST, caching, and so on.

c. Oracle 12c Database

Oracle 12c is a multi-model database management system framework from Oracle that supports cloud database applications. First released in 2013, Oracle 12c has progressed to the 12.1.0.2 patch.

d. Online editing support

One of the needed features is the support for online editing, where real-time changes to data or reports can be directly stored and accessed together.

Through the application of technology and digital transformation, the improvement of the maturity gap will occur in internal quality audit processes. Benefits to the process are expected to be consistent with value stream analysis, among others:

(1) The process of preparing internal quality audit instruments

Preparing audit instruments will be more efficient when the audit work form can be directly used as a template and duplicated according to the needs of the audit process.

The sub-dimensions relevant to this process include:

- *Customer Outside-in-view (1.1)*

- *Customer Experience (1.2)*

- *Technology and application architecture (3.2)*

- *Application and platform (3.4)*

- *Service Design and Innovation (4.2)*

- *Service Operation (4.4)*

- *Workplace enablement (5.3)*

- *Data engineering (6.2)*

(2) The process of preparing an internal quality audit schedule

The schedule preparation process will also be effective and efficient when the schedule will be automatically notified to auditors and auditees through integration with personal email accounts and online scheduling. It assists auditors and auditees in planning and incorporating an audit schedule in their agenda.

The sub-dimensions relevant to this process include:

- *Customer Outside-in-view (1.1)*

- *Customer Experience (1.2)*

- *Technology and application architecture (3.2)*

- *Application and platform (3.4)*

- *Service Design and Innovation (4.2)*

- *Service Operation (4.4)*

- *Organization value (5.1)*

- *Workplace enablement (5.3)*

(3) The process of searching, recording, and storing audit evidence and data

Through this system, searching, recording, and storing data and evidence can be done online. The effectiveness of these records also increases because data records and evidence can be stored for a long time, can be used as a repository for other purposes, and can be used to compare developments from period to period.

The sub-dimensions relevant to this process include:

- *Customer Outside-in-view (1.1)*

- *Customer Experience (1.2)*

- *Technology and application architecture (3.2)*

- *Application and platform (3.4)*

- *Service Design and Innovation (4.2)*

- *Service Operation (4.4)*

- *Workplace enablement (5.3)*

- *Data governance (6.1)*

- *Data engineering (6.2)*

- *Data value realization (6.3)*

(4) The process of preparing an audit report

The minutes of the audit activities along with the audit findings can be reported directly online. This function allows the preparation of a more comprehensive audit report. Data and evidence are recorded directly; the auditor's judgment is authentically recorded directly.

The sub-dimensions relevant to this process include:

- *Customer Outside-in-view (1.1)*

- *Customer Experience (1.2)*

- *Technology and application architecture (3.2)*

- *Application and platform (3.4)*

- *Service Design and Innovation (4.2)*

- *Service Operation (4.4)*

- *Workplace enablement (5.3)*

- *Data engineering (6.2)*

(5) Monitoring of corrective action

Another important thing that will be developed through this information system is the availability of a corrective action monitoring tool that is integrated with online scheduling/calendars. This tool provides automatic online timeout reminders along with monitoring activities. With this auto reminding system, the potential for missed corrective actions can be minimized.

The sub-dimensions relevant to this process include:

- *Customer Outside-in-view (1.1)*

- *Customer Experience (1.2)*

- *Technology and application architecture (3.2)*

- *Application and platform (3.4)*

- *Service Design and Innovation (4.2)*

- *Service Operation (4.4)*

- *Workplace enablement (5.3)*

- *Data governance (6.1)*

- *Data engineering (6.2)*

- *Data value realization (6.3)*

In summary, the linkage between the potential for process development and the sub-dimensions relevant to it can be seen in the following scheme:

Table 19. The Matrix of the relevance of Sub-Dimensions with the Internal Audit Process

	Process: Creating audit instruments	Process: Scheduling the audit	Process: Searching and storing data and evidence	Process: Writing the audit report	Corrective Action Monitoring
1.1	√	√	√	√	√
1.2	√	√	√	√	√
1.3	√	√	√	√	√
2.2	-	-	-	-	√
2.6	-	-	-	-	√
3.2	√	√	√	√	√
3.4	√	√	√	√	√
4.2	√	√	√	√	√
4.4	√	√	√	√	√

	Process: Creating audit instruments	Process: Scheduling the audit	Process: Searching and storing data and evidence	Process: Writing the audit report	Corrective Action Monitoring
5.1	-	√	√	-	√
5.3	√	√	√	√	√
6.1	-	-	√	-	√
6.2	-	-	√	√	√
6.3	-	-	√	-	√

√: relevant

Source: Researcher's Analysis 2020

3.4. Implementation of the Digital Transformation Project

3.4.1. Measuring the Current State

As mentioned in the previous section, implementing this digital transformation project will go through various stages. One of them is the measurement of the current and future state of the DMM used. In measuring current state and future state, several aspects that are planned are as follows:

Table 20. Current State and Future State

	Measuring *current state*	Measuring *future state*
Data collection method	Survey and distribute questionnaires	Interview/*Focus Group Discussion*
Respondents	UMN's Internal auditors and Auditees (30 people)	Rectorate or UMN's Internal Auditors
Validity and Reliability Check for instruments	Validity: Pearson Reliability: Cronbach Alpha	Interview record as a data source
Tools/instruments quality	Questionnaire design *Pre-test*	Protocol and question structure

Source: Researcher's analysis 2020

This study uses a questionnaire as a tool in measuring the current condition. Before the instrument can be used for the main respondents, a pre-test must be conducted to ensure that the instrument is valid and reliable.

a) Questionnaire Development

The researcher develops an online questionnaire based on sub-dimensions and criteria chosen before. A total of 36 indicators from 14 sub-dimensions and six dimensions are used to measure the maturity level. The researcher uses a mix of Likert five scale (Uma, 2020) and a categorized answer (Hans, 2020) developed from the maturity indicators mentioned by TM Forum to map the answer and classify the maturity. The targeted respondents are auditors and auditee that are involved in the Audit 2019. A total of 32 auditors and auditee will be targeted as main respondents. Preliminary questions are also asked to get the demography. The question list is provided below:

Table 21. Operational Table for Digital Maturity of Internal Audit Process

Dimensions	Sub-dimensions	TM Code	Criteria	Code	Question/Operational Indicators	Scale
Customer	Customer Outside-in-view	1.1.1	Personalization	CO1	Every auditor/auditee has their own personal account and personalized function.	Likert five scale 1: No personalization 5: Full personalization for every function
		1.1.4	Ease of use	CO2	Internal audit system and its tools are easy to use	Likert five scale 1: Very disagree 5: Totally agree
		1.1.5	Customer Delight	CO3	Internal audit system and its tools are comfortable to use	Likert five scale 1: Very disagree 5: Totally agree
		1.1.7	Proactive Care	CO4	All supports are available during the audit process. All technical problems are anticipated	Likert five scale 1: Very disagree 5: Totally agree
	Customer Experience Management	1.2.2	Experience-Driven Design	CE1	Audit experiences are well-considered and anticipated during the development of the audit system	Likert five scale 1: Very disagree 5: Totally agree
		1.2.8	Customer Journey Management	CE2	Audit experiences of auditors and auditees are well managed	Likert five scale 1: Very disagree 5: Totally agree

Dimensions	Sub-dimensions	TM Code	Criteria	Code	Question/Operational Indicators	Scale
	Customer Insights & Behavior	1.3.3	Voice of the Customer	CI1	Auditors and auditees expectations, preferences, and aversions are actively considered	Likert five scale 1: Very disagree 5: Totally agree
	Ecosystem Management	2.2.1	Business Ecosystem	SE1	UMN has a clear strategy to exploit the business value of audit and quality assurance ecosystem participation	Likert five scale 1: Very disagree 5: Totally agree
Strategy		2.2.2	Ecosystem Design	SE2	UMN designs an audit and quality assurance ecosystem to drive its strategy	Likert five scale 1: Very disagree 5: Totally agree
	Strategy Management	2.6.1	Vision/Strategy Alignment	SM1	Internal audit business strategy encompasses a clear vision	Likert five scale 1: Very disagree 5: Totally agree
		2.6.7	Transformation Governance	SM2	UMN has implemented digital transformation governance for internal audit	Likert five scale 1: Very disagree 5: Totally agree
Technology	Technology and Application Architecture	3.2.4	Application Configurability	TA1	Internal Audit Application can be configured to meet business requirements	Likert five scale 1: Very disagree 5: Totally agree

Dimensions	Sub-dimensions	TM Code	Criteria	Code	Question/Operational Indicators	Scale
	Applications & Platforms	3.4.2	Big Data Platform	TP1	There are big data platform to support data analytics	Likert five scale 1: Very disagree 5: Totally agree
		3.4.4	Tools Catalog	TP2	A set of tools is in place to facilitate and automate tasks	Likert five scale 1: Very disagree 5: Totally agree
		4.2.1	Meeting Business Requirements	OD1	Internal audit business requirement are understood and translated into Architecture and service design	Likert five scale 1: Very disagree 5: Totally agree
	Service Design and Innovation	4.2.2	Design Thinking	OD2	Design thinking is used to understand the auditors and auditees needs and challenges	Likert five scale 1: Very disagree 5: Totally agree
Operation		4.2.4	Process Optimization	OD3	The operational process of internal audit are optimized	Likert five scale 1: Very disagree 5: Totally agree
	Service Operation	4.4.5	Operation Monitoring	OS1	Internal audit process monitoring provides a view of service performance	Likert five scale 1: Operation monitoring is ad-hoc 5: A real-time holistic view of the audit process and stakeholders

Dimensions	Sub-dimensions	TM Code	Criteria	Code	Question/Operational Indicators	Scale
	Organizational Value	5.1.2	Employee Impact	BV1	In the context of internal audit, auditors understand the impact they make on the organization	Likert five scale 1: Very disagree 5: Totally agree
		5.3.1	Productive Environment	BW1	Internal audit workplace supports audit productivity	Likert five scale 1: Very disagree 5: Totally agree
		5.3.2	Innovative Environment	BW2	Internal audit workplace supports innovation	Likert five scale 1: Very disagree 5: Totally agree
Culture	Workplace Enablement	5.3.3	Productivity Tools	BW3	Tools are available to support productivity	Likert five scale 1: Very disagree 5: Totally agree
		5.3.4	Innovation Tools	BW4	Tools are available to support innovation	Likert five scale 1: Very disagree 5: Totally agree
		5.3.7	Knowledge Capturing	BW5	Knowledge and information is effectively captured across the organization	Likert five scale 1: Very disagree 5: Totally agree
		5.3.8	Knowledge Sharing	BW6	Knowledge and information is effectively shared across the organization	Likert five scale 1: Very disagree 5: Totally agree

Dimensions	Sub-dimensions	TM Code	Criteria	Code	Question/Operational Indicators	Scale
Data	Data Governance	6.1.1	Metadata Management	DG1	Metadata is used to maximize the value of information by providing a comprehensive and unified view of data quality, relationship, and data usage	Likert five scale 1: Metadata is not classified 5: Metadata are continuously optimized across all ecosystem partners
		6.1.2	Data Stewardship	DG2	Accountable for data assets provides authorized users with high-quality data	Likert five scale 1: Minimal access for the authorized user 5: Full access for important data in the organization and its stakeholders
		6.1.3	Master Data Management	DG3	Master data management is available to ensure the critical data is readily and consistently available	Likert five scale 1: Master data management is ad-hoc 5: Master data management is consistently optimized in all ecosystem
		6.1.4	Data Security Management	DG4	There are data protection from unauthorized access, use, change, disclosure, and destruction	Likert five scale 1: Very disagree 5: Totally agree

Dimensions	Sub-dimensions	TM Code	Criteria	Code	Question/Operational Indicators	Scale
		6.2.2	Data Storage	DE1	Storage, deletion, and archival of all audit data are well managed	Likert five scale 1: It is not identified and categorized 5: Data used are identified and categorized into a common model
		6.2.3	Data Accessibility	DE2	All data needed during the audit process are accessible	Likert five scale 1: Data accessibility is limited 5: Data needed are always accessible to the approved user and their ecosystem partners
	Data Engineering	6.2.4	Data Life-cycle Management	DE3	Internal audit data flow from creation, to use, to sharing, and deletion is well manage	Likert five scale 1: Very disagree 5: Totally agree
		6.2.5	Data Collection	DE4	The internal audit system is able to gather and collect data used in the audit process	Likert five scale 1: Very disagree 5: Totally agree
		6.2.7	Data Presentation	DE5	The Audit process can present data in a way that is fit for the purpose	Likert five scale 1: Very disagree 5: Totally agree

Dimensions	Sub-dimensions	TM Code	Criteria	Code	Question/Operational Indicators	Scale
	Data Value Realization	6.3.1	Data-Driven Decision Making	DV1	Data that is found in the audit process is used for decision making	Likert five scale 1: Decision making is rarely data-driven 5: Decision is taken based on data from the organization and ecosystem partners
		6.3.2	Data Science Competence	DV2	The audit system and the process have capacities to extract knowledge and insight from data.	Likert five scale 1: Very disagree 5: Totally agree

Source: Researcher's analyst and TM Forum, 2020

The instrument has five levels of answers. Each of them projects a maturity level from "Initiating" to

"Leading." A pre-test needs to be done to check its validity and reliability.

b) Pre-test

Researchers used a questionnaire as an instrument for measuring the DMM level. The levels measured consist of five levels: Initiating, Emerging, Performing, Advancing, Leading, which are then used to determine the current level of maturity and the level of maturity expected to be achieved after the digital transformation project is implemented.

Table 22. Responses Descriptive Statistic for Pre-test

Statistics

		CO1	CO2	CO3	CO4	CE1	CE2	CI1	SE1	SE2
N	Valid	11	11	11	11	11	11	11	11	11
	Missing	0	0	0	0	0	0	0	0	0
Mean		2.00	2.27	2.46	3.00	2.55	2.64	2.91	2.91	2.82
Mode		1	2	1a	3	3	2a	3	2	2
Std. Deviation		1.183	1.191	1.293	1.414	1.293	1.120	1.136	1.221	1.168
Variance		1.400	1.418	1.673	2.000	1.673	1.255	1.291	1.491	1.364

		SM1	SM2	TA1	TP1	TP2	OD1	OD2	OD3	OS1
N	Valid	11	11	11	11	11	11	11	11	11
	Missing	0	0	0	0	0	0	0	0	0
Mean		2.55	2.00	1.73	1.73	1.73	2.73	2.55	2.64	2.55
Mode		2	1	1	1	1	3	3	2	3
Std. Deviation		1.214	1.342	1.191	1.272	1.191	0.905	1.128	1.027	0.820
Variance		1.473	1.800	1.418	1.618	1.418	0.818	1.273	1.055	0.673

		BV1	BW1	BW2	BW3	BW4	BW5	BW6	DG1	DG2
N	Valid	11	11	11	11	11	11	11	11	11
	Missing	0	0	0	0	0	0	0	0	0
Mean		3.82	3.09	2.73	2.55	2.46	2.73	2.46	2.00	2.00
Mode		4	3	2	2	2	2a	2a	2	1a
Std. Deviation		0.751	0.944	1.104	1.128	0.934	1.272	1.128	0.775	1.000
Variance		0.564	0.891	1.218	1.273	0.873	1.618	1.273	0.600	1.000

		DG3	DG4	DE1	DE2	DE3	DE4	DE5	DV1	DV2
N	Valid	11	11	11	11	11	11	11	11	11
	Missing	0	0	0	0	0	0	0	0	0
Mean		1.55	2.36	2.00	2.18	2.55	2.36	2.36	2.36	2.91
Mode		1	2	2	2	2	2a	3	1a	2

| Std. Deviation | 0.688 | 1.286 | 0.894 | 1.168 | 1.036 | 0.924 | 1.206 | 1.120 | 1.221 |
| Variance | 0.473 | 1.655 | 0.800 | 1.364 | 1.073 | 0.855 | 1.455 | 1.255 | 1.491 |

a. Multiple modes exist. The smallest value is shown

Source: Researcher's analysis 2020

In the descriptive statistics table above, the calculations for the mean, mode, and variance of each criterion are obtained. The results show that the focus of the distribution of digital transformation maturity levels in the pretest conditions is at the Performing level, and quite a lot is still at the initiating level. The distribution is presented by the following histogram:
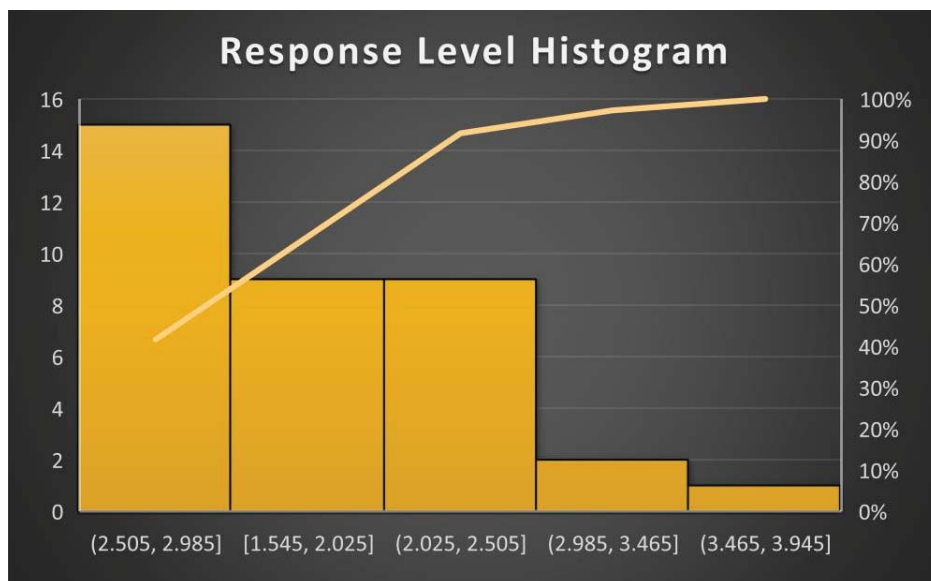
Source: Researcher's analysis 2020
Figure 16. Histogram of Responses mean for Pre-test
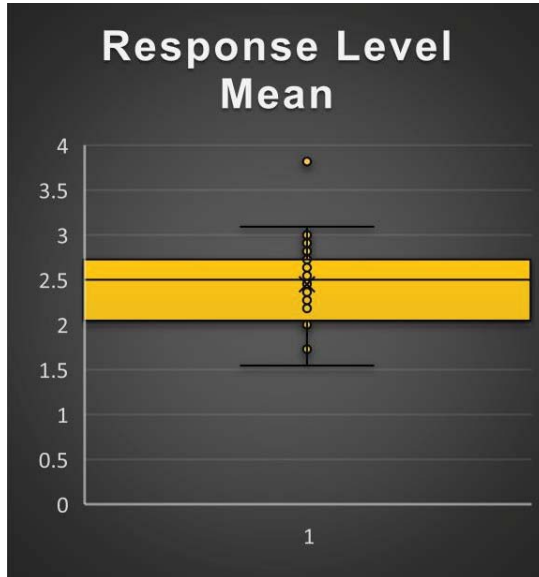
Source: Researcher's analysis 2020
Figure 17. Responses Mean Distribution for Pre-test (Box&Whisker)

Source: Researcher's Analysis 2020
Figure 18. Radar chart for Pre-test responses

In the histogram and graphic above, it can be seen that most of the opinion is at the level of 2.505 to 2.985, followed by 1.545 to 2.025, and 2.025 to 2.505. This condition shows that the UMN internal quality audit process's digital maturity level is at the Emerging level.

Pretest Validity and Reliability Test

The number of samples used in the pre-test process was 11 respondents or more than 30% of the total 32 respondents who will be used as data sources for the current condition of the digital maturity level of the internal quality audit process. The results of the validity test show that of the total 36 indicators, all indicators show valid results, with the calculated r-value greater than the r table value (0.602 for N = 11).

The results of the reliability test show that all questions are reliable enough to be used as a measurement. All Cronbach Alpha values are above 0.6, which indicates that this instrument is reliable as a measurement tool.

Table 23. Validity Test and Reliability Test for Pre-test

Variables	Indicators	Validity Test			Reliability Test	
		R-Value	Pearson	Conclusion	Cronbach A	Conclusion
Customer Outside-in-view	CO1	0.602	0.752	Valid	0.858	Reliable
	CO2	0.602	0.882	Valid		
	CO3	0.602	0.822	Valid		
	CO4	0.602	0.895	Valid		
Customer Experience Management	CE1	0.602	0.965	Valid	0.908	Reliable
	CE2	0.602	0.953	Valid		
Customer Insights & Behaviors	CI1	0.602	1	Valid	N/a	Reliable
Ecosystem	SE1	0.602	0.958	Valid	0.906	Reliable

| Variables	Indicators	Validity Test			Reliability Test	
		R-Value	Pearson	Conclusion	Cronbach A	Conclusion
Management	SE2	0.602	0.954	Valid		
Strategy Management	SM1	0.602	0.906	Valid	0.804	Reliable
	SM2	0.602	0.924	Valid		
Technology and Application Architecture	TA1	0.602	1	Valid	N/a	N/a
Applications & Platforms	TP1	0.602	0.969	Valid	0.929	Reliable
	TP2	0.602	0.965	Valid		
Service Design and Innovation	OD1	0.602	0.807	Valid	0.699	Reliable
	OD2	0.602	0.86	Valid		
	OD3	0.602	0.708	Valid		
Service Operation	OS1	0.602	1	Valid	N/a	N/a
Organizational Value	BV1	0.602	1	Valid	N/a	N/a
Workplace Enablement	BW1	0.602	0.913	Valid	0.923	Reliable
	BW2	0.602	0.862	Valid		
	BW3	0.602	0.844	Valid		
	BW4	0.602	0.884	Valid		
	BW5	0.602	0.932	Valid		
	BW6	0.602	0.7	Valid		
Data Governance	DG1	0.602	0.861	Valid	0.877	Reliable
	DG2	0.602	0.879	Valid		
	DG3	0.602	0.861	Valid		
	DG4	0.602	0.904	Valid		
Data Engineering	DE1	0.602	0.869	Valid	0.908	Reliable
	DE2	0.602	0.82	Valid		
	DE3	0.602	0.885	Valid		
	DE4	0.602	0.797	Valid		
	DE5	0.602	0.924	Valid		
Data Value Realization	DV1	0.602	0.865	Valid	0.698	Reliable
	DV2	0.602	0.888	Valid		

Source: Researcher's analysis, 2020

c) Measuring the current state

The pre-test indicates that the instrument is ready to be used. The next activity is to launch the instrument and collect the respondents' data to measure the current state.

The primary test is conducted on 32 respondents, consisting of all auditors and some auditees involved in the 2019 Internal Audit process. More than 65% of respondents have experience as both auditor and auditee. The next 25% have experience as an auditor only, and the rest of 9.4% only as auditee. Most of them (81.25%) are coming from academic backgrounds (as lecturers), and the rest is from supporting departments. Most of the auditors (76,67%) have audit experiences of more than five times (it is equal to more than 20 audit hours). Only two respondents that involved in only two audit processes.
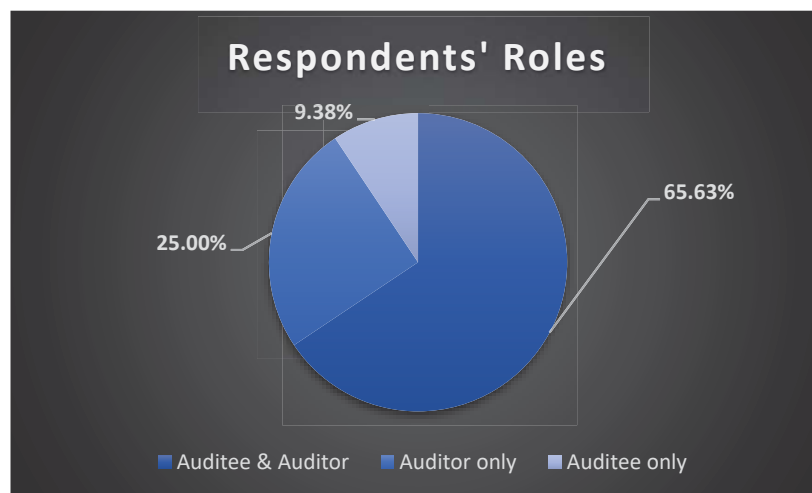
Source: Researcher's analysis, 2021
Figure 19. Respondents' Role
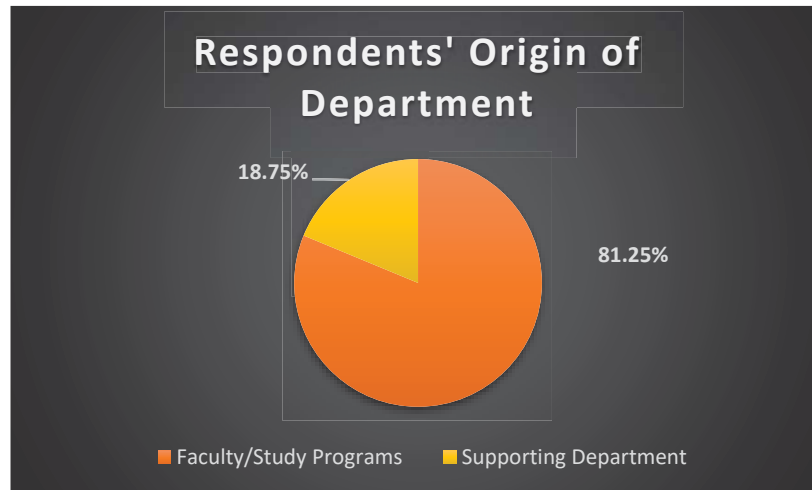
Source: Researcher's analysis, 2021
Figure 20. Respondents' Origin of Departments
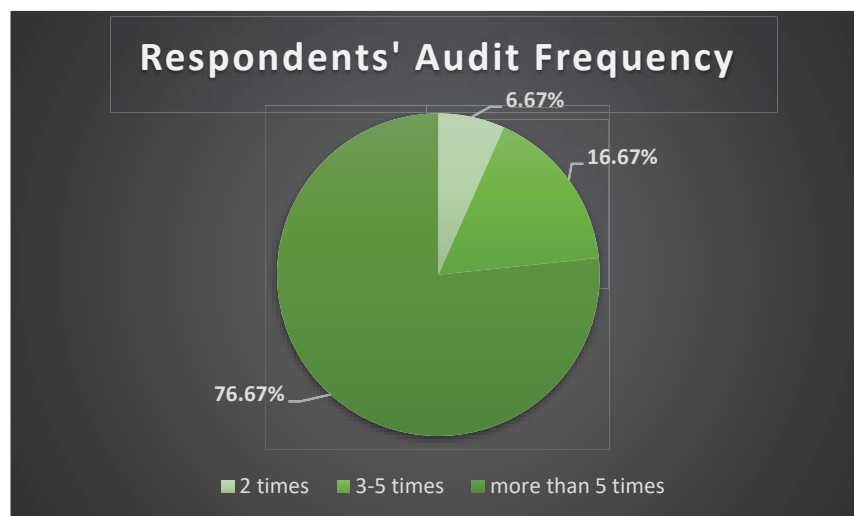
Source: Researcher's analysis, 2021
Figure 21. Respondents' Audit Frequency

The demographic information shows that almost all of the respondents

have a strong background, experience, and expertise in the internal quality

audit. This condition strengthens the data reliability that is collected through the questionnaire.

The validity test measured for the main test shows that the instrument is still valid (similar to the validity test for pre-test). All indicators show a calculated Pearson R-value that greater than the R table value of 0.349 for N = 32.

The reliability test also shows a similar result with the pre-test that the instrument is still reliable. All indicators show a Cronbach alpha that greater than 0.5.

Table 24. Validity and Reliability Test for the Main Test

Variables	Indicators	Validity Test			Reliability Test	
		R-Value	Pearson	Conclusion	Cronbach A	Conclusion
Customer Outside-in-view	CO1	0.349	0.828	Valid	0.816	Reliable
	CO2	0.349	0.871	Valid		
	CO3	0.349	0.83	Valid		
	CO4	0.349	0.696	Valid		
Customer Experience Management	CE1	0.349	0.95	Valid	0.889	Reliable
	CE2	0.349	0.947	Valid		
Customer Insights & Behavior	CI1	0.349	1	Valid	N/a	Reliable
Ecosystem Management	SE1	0.349	0.968	Valid	0.933	Reliable
	SE2	0.349	0.968	Valid		
Strategy Management	SM1	0.349	0.9	Valid	0.789	Reliable
	SM2	0.349	0.918	Valid		
Technology and Application Architecture	TA1	0.349	1	Valid	N/a	N/a
Applications & Platforms	TP1	0.349	0.95	Valid	0.874	Reliable
	TP2	0.349	0.937	Valid		
Service Design and Innovation	OD1	0.349	0.869	Valid	0.856	Reliable
	OD2	0.349	0.913	Valid		
	OD3	0.349	0.863	Valid		
Service Operation	OS1	0.349	1	Valid	N/a	N/a
Organizational Value	BV1	0.349	1	Valid	N/a	N/a

Variables	Indicators	Validity Test			Reliability Test	
		R-Value	Pearson	Conclusion	Cronbach A	Conclusion
Workplace Enablement	BW1	0.349	0.874	Valid	0.904	Reliable
	BW2	0.349	0.813	Valid		
	BW3	0.349	0.828	Valid		
	BW4	0.349	0.812	Valid		
	BW5	0.349	0.86	Valid		
	BW6	0.349	0.771	Valid		
Data Governance	DG1	0.349	0.839	Valid	0.885	Reliable
	DG2	0.349	0.907	Valid		
	DG3	0.349	0.898	Valid		
	DG4	0.349	0.816	Valid		
Data Engineering	DE1	0.349	0.813	Valid	0.89	Reliable
	DE2	0.349	0.718	Valid		
	DE3	0.349	0.914	Valid		
	DE4	0.349	0.851	Valid		
	DE5	0.349	0.883	Valid		
Data Value Realization	DV1	0.349	0.826	Valid	0.575	Reliable
	DV2	0.349	0.849	Valid		

Source: Researcher's analysis, 2021

After ensuring the data validity and reliability, the next step is to analyze the data for the current state.

Table 25. Responses Descriptive Statistic for Current State

Descriptive Statistics of the Current State Responses

		CO1	CO2	CO3	CO4	CE1	CE2	CI1	SE1	SE2
N	Valid	32	32	32	32	32	32	32	32	32
	Missing	0	0	0	0	0	0	0	0	0
Mean		2.56	3.03	2.88	3.16	3.13	3.31	3.22	3.38	3.41
Mode		3	3	3	3	3	4	3	4	4
Std. Deviation		4.000	4.000	3.000	4.000	4.000	4.000	3.000	4.000	4.000
Variance		1.243	1.177	1.008	1.194	1.185	1.148	0.906	1.070	1.073

		SM1	SM2	TA1	TP1	TP2	OD1	OD2	OD3	OS1
N	Valid	32	32	32	32	32	32	32	32	32
	Missing	0	0	0	0	0	0	0	0	0
Mean		3.56	2.72	2.63	2.31	2.13	3.16	3.16	3.25	2.84
Mode		4	3	3	3	2	3	3	3	3
Std. Deviation		4.000	4.000	2a	3.000	2.000	3.000	3.000	4.000	2.000
Variance		1.162	1.276	1.185	1.091	0.976	0.987	1.139	1.078	1.051

		BV1	BW1	BW2	BW3	BW4	BW5	BW6	DG1	DG2
N	Valid	32	32	32	32	32	32	32	32	32
	Missing	0	0	0	0	0	0	0	0	0
Mean		4.06	3.56	3.41	3.06	2.97	3.22	2.91	2.41	2.34
Mode		4	4	4	3	3	3	3	2	2
Std. Deviation		4.000	4.000	4.000	4.000	4.000	4.000	3.000	2.000	2a
Variance		0.716	0.914	0.979	0.948	0.897	1.099	1.118	0.911	1.066

|		DG3	DG4	DE1	DE2	DE3	DE4	DE5	DV1	DV2
N	Valid	32	32	32	32	32	32	32	32	32
	Missing	0	0	0	0	0	0	0	0	0
Mean		2.09	2.75	2.38	2.38	2.94	3.00	3.13	2.69	3.41
Mode		2	3	2	2	3	3	3	3	4
Std. Deviation		2.000	3.000	2.000	2.000	3.000	4.000	3.000	3.000	4.000
Variance		0.893	1.047	1.008	1.040	0.948	1.047	1.238	1.061	1.132

Source: Researcher's analysis, 2021

From the table above, it can be seen that most of the criteria (70%) laid in the level of 2.5 to 3.5. The next 20% is occupied by the level of 2.0 to 2.5. The mean distribution for the total 36 criteria laid between 2.6 to 3.2. Thus, the maturity level of the UMN internal quality audit system is at Performing level.

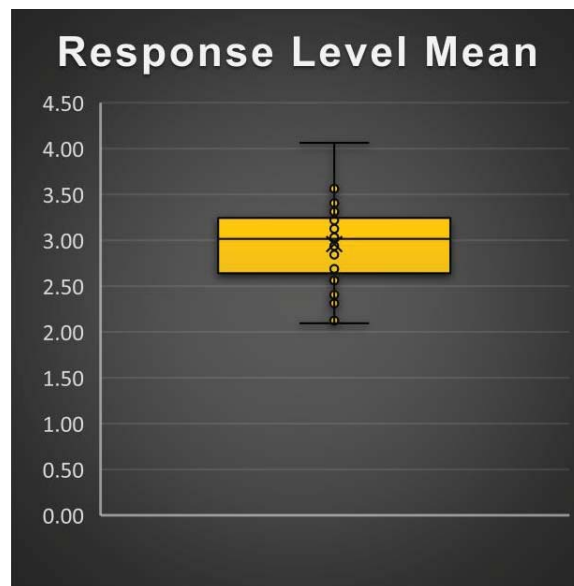*Table 26. Mean for Main Dimension of Current State*

Mean for Main Dimension	CO	CE	CI	SE	SM	TA	TP	OD	OS	BV	BW	DG	DE	DV
	2.91	3.22	3.22	3.39	3.14	2.63	2.22	3.19	2.84	4.06	3.19	2.40	2.76	3.05

Source: Researcher's analysis, 2021
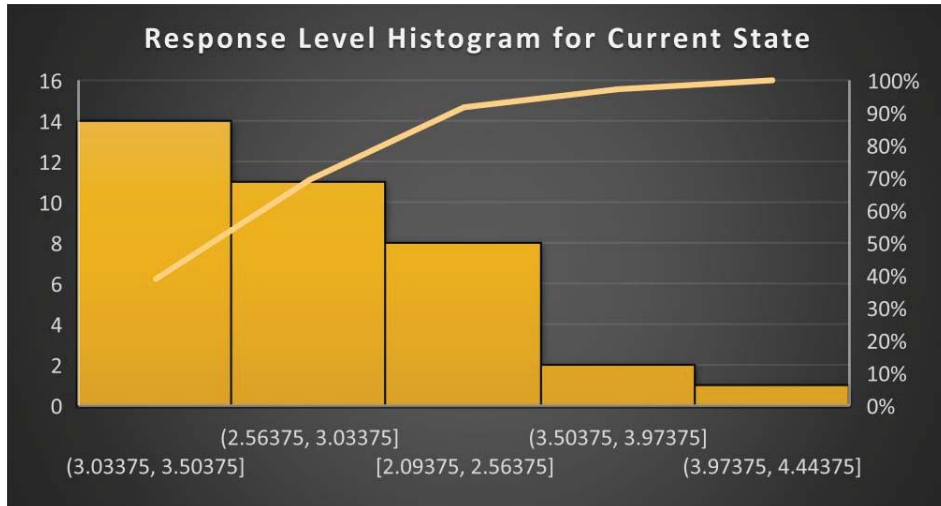
Source: Researcher's analysis, 2021
Figure 22. Histogram for Current State Responses

Source: Researcher's analysis, 2021
Figure 23. Box and Whisker for Current State

The current state for every dimension is needed to be set and determined to provide an initial condition. Comparing the current state with the future state will provide gaps that can be improved. Based on the criteria data, there are 14 dimensions on the current state and their level description as the initial condition that are ready to be improved by the digital transformation project

Table 27. Current Level Responses and the Description

Dimension and Sub Dimension		Code	Mean (0-5)	Current Meaning
Customer	**Customer Outside-in-view:** The organization delivers a good experience with its products & services	CO	2.9	**Only part** of the experience and comfort of auditors and auditees that can be accommodated by the current system
	Customer Experience Management: An internal organization and governance system is in place to deliver an optimal customer experience	CE	3.2	**Only some** of the functions in the system are considering the user experience
	Customer Insights & Behaviour: The organization makes effective use of data to generate customer insights	CI	3.2	**Most** of the auditors' and auditee's expectations have been accommodated by the system
Strategy	**Ecosystem Management:** The organization is able to leverage ecosystems to create business value	SE	3.4	The quality assurance ecosystem is **well established and well understood** to support the current organizational strategy
	Strategy Management: A clear and complete digital strategy is developed and adopted by the organization	SM	3.1	Organizations have a vision, but are still **trying to integrate strategies** within it. Digital transformation governance is **adopted only by some functions**
Technology	**Technology and Application Architecture:** There is a technology and application architecture in place which describes the behavior of applications and their integration with the underlying technology platform and services	TA	2.6	**Some applications** are flexible, reliable and configured in the organization
	Applications & Platforms: Technology platforms and tools are in place to effectively develop and manage applications and processes	TP	2.2	Big data implementation is **limited**. **Limited** catalog of tools and functions
Operation	**Service Design and Innovation:** The organization is able to efficiently and effectively design and develop innovative services which deliver business value	OD	3.2	**Several** functions are in accordance with business requirements, apply design thinking, and are able to optimize processes
	Service Operation: The organization is able to effectively and efficiently run services in production, ensuring high availability, quality and responsiveness to demand changes	OS	2.8	Audit process monitoring only **provides a partial picture** of process performance
Culture	**Organizational Value:** Organizational values are established which drive the employee experience	BV	4.1	The leadership character is in accordance with the organizational strategy. Auditors and auditees understand their roles and functions in the organization
	Workplace Enablement: The organization's working environment, tools and accepted practices support productivity and innovation	BW	3.2	**Only a few functions** support a convenience and conducive audit process, encourage innovation, have tools that support, and are able to capture and share knowledge
Data	**Data Governance:** The organization has an effective data governance system in place	DG	2.4	Metadata, data stewardship, data management, and data security are still in **their infancy / early stages**
	Data Engineering: The organization has effective systems and processes in place to collect, transfer, store and process data	DE	2.8	Data storage, access, life-cycle management, collection, and query are **only available in each department.**
	Data Value Realization: The organization is able to realize business value from its data assets	DV	3.0	Data-based decision making has **only a few functions**

Source: Researcher's analysis, 2021

Source: Researcher's analysis, 2021
Figure 24. Response Level for Dimension Mean Radar Chart

3.4.2. Measuring the Future State

The measurement of the future state involves participation from the Rectorate representative. Vice-Rector of Academic responsible for academic governance of every faculty is joined the interview. The data collection method uses a structured interview that explains the purpose of the interview, current condition or level of maturity, and discussing future state that feasible to achieve in three to six months.

The discussion question "Taking into account the development time of 3 months to six months, at what level will the audit information system

capability be developed?" is asked to every sub-dimension. The result of the interview for determining the future state is explained below.

Table 28. Future state target and the description

Dimension and Sub Dimension		Code	Mean (0-5)	Future State
Customer	**Customer Outside-in-view:** The organization delivers a good experience with its products & services	CO	4.0	**All** of the experience and comfort of auditors and auditees that can be accommodated by the current system
	Customer Experience Management: An internal organization and governance system is in place to deliver an optimal customer experience	CE	4.0	**All** of the functions in the system are considering the user experience
	Customer Insights & Behaviour: The organization makes effective use of data to generate customer insights	CI	4.0	**All** expectations of auditors and auditees have been accommodated by systems that applied across organizations
Strategy	**Ecosystem Management:** The organization is able to leverage ecosystems to create business value	SE	4.0	The quality assurance ecosystem is **well established and well understood** to support the current organizational strategy and **is starting to develop** to support the entire organization ecosystem
	Strategy Management: A clear and complete digital strategy is developed and adopted by the organization	SM	4.0	The strategies are **fully aligned** with the vision. All organizations implement **risk management** and **transformation roadmaps** consistently
Technology	**Technology and Application Architecture:** There is a technology and application architecture in place which describes the behavior of applications and their integration with the underlying technology platform and services	TA	4.0	**All applications** are flexible, reliable and configured in the organization
	Applications & Platforms: Technology platforms and tools are in place to effectively develop and manage applications and processes	TP	3.0	A bigdata platform **is available** and **most of the functions** already have a catalog and documentation **of the tools used**
Operation	**Service Design and Innovation:** The organization is able to efficiently and effectively design and develop innovative services which deliver business value	OD	4.0	Business requirements are **understood by all functions**. All **functions also apply design thinking** and optimize processes
	Service Operation: The organization is able to effectively and efficiently run services in production, ensuring high availability, quality and responsiveness to demand changes	OS	4.0	Audit process monitoring provides **a real-time overview of process performance**
Culture	**Organizational Value:** Organizational values are established which drive the employee experience	BV	4.0	The leadership character is in accordance with the organizational strategy. Auditors and auditees understand their roles and functions in the organization
	Workplace Enablement: The organization's working environment, tools and accepted practices support productivity and innovation	BW	4.0	**All functions** support a convenience and conducive audit process, encourage innovation, have tools that support, and are able to capture and share knowledge **effectively**
Data	**Data Governance:** The organization has an effective data governance system in place	DG	3.0	Metadata, data stewardship, data management, and data security are defined and used **in several functional areas**
	Data Engineering: The organization has effective systems and processes in place to collect, transfer, store and process data	DE	4.0	Data storage, access, life-cycle management, collection, and querying are available, **applied consistently, and are optimized across departments / across organizations**
	Data Value Realization: The organization is able to realize business value from its data assets	DV	4.0	Data-based decision making runs optimally **throughout the organization**

Source: Interview data, 2021
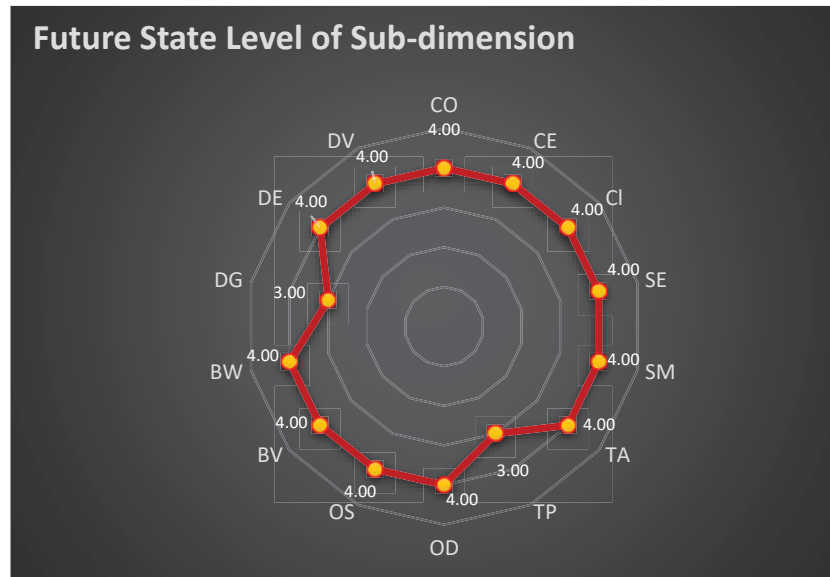
Source: Researcher's analysis, 2021
Figure 25. Future State Level of Sub-dimensions

3.4.3. Implementation

Through the gap between current conditions and future targets, the digital transformation is then compiled and managed to be resolved within the available time and resources. This planning will involve experts in IT and web developers who will begin to participate in making application prototypes and developing information systems.

The Alpha and Beta versions of the prototype are expected to be completed at this stage. The Beta Prototype will then begin to be installed and tested in the internal audit process in 2021. This new information system will be continuously monitored and analyzed to fulfill needs or comply with the internal quality audit business process. Various small-scale improvements and

developments will be expected at this stage. After this phase, it is hoped that the prototype will be truly ready to be launched and used in the long term.

3.5. The Formulation of Digital Transformation Case Studies

The case study formulation of UMN internal quality audit process digital transformation refers to a case entitled *Assessing the Digital Maturity Level of Higher Education Institutions* (Durek et al., 2018). The study proposes a methodology in prioritizing and simultaneously assessing the factors or elements that are considered to be contributing to the Digital Maturity Framework in the tertiary sector in Croatia.

This research examines various frameworks and their components using both qualitative and quantitative approaches in analyzing and assessing the Digital Maturity Framework in higher education. The framework components consist of Leadership, Planning, and Management with eight elements, Quality Assurance with six elements, Scientific Research Work with six elements, Technology Transfer and Service to Society with three elements, Learning and Teaching with seven elements, ICT Culture with six elements, and ICT Resources and Infrastructure with seven elements.

The Quality Assurance element becomes a foundation for selecting the DMM TM Forum dimensions, which are used in this Digital Transformation Project. The components of leadership, quality assurance, ICT culture, and ICT infrastructure are examples of elements that become parameters for

measuring the success of the Digital Transformation Project of the internal quality audit process at UMN.

The expected result from this case study is that the digital transformation will be able to bring benefits to the effectiveness and efficiency of the internal quality audit process at UMN while encouraging the creation of quality culture and quality policymaking. The effectiveness of the digital transformation process on the audit process is reflected in:

- Well supported audit decisions or judgments
- Effective monitoring system for corrective actions that leads to improving organizational performance

The efficiency of the digital transformation process in the audit process is reflected in:

- Reduced time for creating audit and scheduling instruments
- More efficient communication and scheduling because of its integration with personal scheduling
- Recorded data and evidence can be stored for a long time and can be easily recalled whenever needed.
- Reporting audit results, monitoring audit results, and monitoring corrective actions can be easily carried out and conveyed in a form that is easy to understand or follow.