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| Binh Duc Nguyen |
| Researching and AI Testing Strategies For Video Management System. |
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**ABSTRACT**

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Embark on an insightful exploration of testing strategies for ITD Group’s Smart Video Management System within the context of this thesis. This study delves into the realm where cutting-edge technology converges with boundless information. The Video Management System is simulated employing with Python, facilitating a comprehensive understanding of its intricate working.

This thesis also moves us with the transition from manual testing API into advanced methods like unit testing and real cam Testing. Unveiling the features of AI APIs, system bugs, script tests. Moreover, the thesis will analyze similar video management system like Milestone, Kerberos.io for the valuable insights.

With all the above activities, this study illuminates a pathway to be a responsible Software Engineer within the realm of Video Management System.

Keywords Video Management System (VMS), Python, Open Source, Docker, Kubernetes, unit testing, automation, AI APIs, system bugs, script tests, Milestone.

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IntroDuction

## This academic thesis is compiled with data information literacy interspersed with practice, if you are curious about a similar field, please patiently follow the steps from the top down.

## Background of ITD Group’s Smart Video Management System

ITD Group is at the fore of innovative efforts as Vietnam approaches a crucial turning point in its digital transformation in 2023. ITD group has worked on many initiatives as part of its commitment to digital transformation that have transformed business practices in Vietnam and elsewhere, including the creation of a smart camera management system. This system holds great potential in various domains such as time attendance management, building security, road traffic system, monitoring, and highways, offering highly efficient solutions for this area.

The comprehensive nature of the Video Management System project is extensive, as it is built using a microservice architecture. Currently, during the writing of this thesis, the project is still in progress and involves several distinct scopes, including the backend, backend API, AI training model (YOLO v8 currently), API of AI, and various frontend modules for administrator… However, this thesis specifically focuses on in-depth testing of AI APIs for Face recognition, Person detection, and script test for end user of object tracking. Additionally, it delves into VMS research, providing valuable references for the development of ITD Group’s product.

## ITD’s AI description API document (IMPORTANT)

First and foremost, it is necessary to check out the [link here](https://www.notion.so/API-Document-Description-919d28852b3a42ddb4abd0a16573802e?pvs=4) for the AI API Documentation in English version (Which I had honor to be a part of editor).

# Literature review

In this chapter, we explore the World of AI-powered camera systems. We will see how they are used in managing videos, how they’re tested to ensure they work well, and what tools we are using for this study.

To begin, we will look at video management systems that use AI. Then, we will learn about the testing methods to ensure these systems are reliable as well as the software and hardware we are using.

Lastly, we will peek at similar Video Management Systems like Milestone or Kerberos.io. This chapter sets the stage for our deeper dive into how AI is impacting video management.

This chapter lays the foundation for understanding AI camera systems and their impact on Video management.

## Overview of video management systems with AI capabilities

Video management system (VMS) are software platforms designed to manage, record and analyse video footage from surveillance cameras. The integration of Artificial Intelligence (AI) within VMS has significantly transformed the landscape of video surveillance by enabling advanced functionalities that go beyond traditional video management. AI-powered VMS leverages machine learning algorithms to process and understand video data, offering enhanced security, operational efficiency, and actionable insights.

* **Concept 1: AI-enhanced Video Analysis**

Real-time video analysis, including object detection, tracking, and recognition, is made possible by AI using VMS. With the use of these abilities, VMS is able to recognise and classify objects, people, vehicles, and events inside video streams. For instance, AI can watch suspicious conduct, monitor crowd density, detect unauthorised access, and more.

Image:

* **Concept 2: Predictive Analytics and Anomaly Detection**

A VMS with AI integration can predict security breaches by looking at past data and seeing trends. Alerts can be sent out when anomaly detection algorithms spot odd behaviour or events. By addressing possible dangers prior to them becoming more serious, this proactive strategy improves security.

Image:

* **Concept 3: Automated Alerts and Notifications**

Based on established parameters, AI-powered VMS can automatically produce alerts and notifications. This function guarantees quick response to serious occurrences. Security professionals can receive alerts via email or mobile apps, allowing them to take prompt action.

Image: Screenshot of a mobile app notification alerting the user to a security event detected by an AI-enhanced VMS.

* **Concept 4: Face Recognition and Biometric Analysis**

Identification and verification of people are made possible by the integration of facial recognition technology into VMS. This helps with visitor management, access control, and strengthening security procedures.

Image: This surveillance screen example illustrates the facial recognition capabilities of an AI-integrated VMS by labelling observed faces.

* **Concept 5: Data-driven insights for Decision Making**

AI-driven VMS can extract useful information from video footage to support decision-making. The layout of stores and marketing tactics, for instance, can be improved by studying client mobility patterns in retail settings.

Image: A graphic illustrating how data-driven insights from an AI-powered VMS help with strategic choice-making in a retail setting.

## Best practices for testing and quality assurance in Video Management Systems.

To ensure the dependability and effectiveness of video management systems (VMS) with AI capabilities, stringent testing and quality assurance practices are required. Thorough testing ensures that the system works properly, delivering accurate insights and secure monitoring. This section goes into the important best practices used in AI-infused VMS testing and quality assurance.

* **Concept 1: Understanding the project documentation**

Understanding the project documentation provides a solid basis. Understanding the system's architecture, technical specs, and expected functionality are all part of this. Clear project documentation establishes the context required for effective testing and quality assurance initiatives.

As an AI Test engineer, at some company this is also our responsibility to become one of the editors for those project documentations.

* **Concept 2: Understanding the project**

As a swimming class, we need to know firstly the survive way in our working environment. Let’s take a deep dive into how the system work, how to fetch camera from its IP address, RTSP (Real Time Streaming Protocol), how to connect it with our company API, how to connect the AI System Camera into our personal machine (Laptop, PC), how to draw on it for testing the AI by using OpenCV library, …

If you are a beginner, do not hesitate to bother your boss or senior about those doubts, this concept is important. Just think that you need to clarify what is having and what is not having in your company’s project to enhance those functionalities or make some more technical debt reports to your team.

* **Concept 3: Unit Testing and Automation Testing**

To ensure that the backend of AI VMS functions work well, it is vital to ensure that the AI API functions as expected. During the development process, we could employ a variety of technical tools, such as Postman and pytest. If there is a system bug, AI testing engineers must be responsible for providing feedback to both the AI team and the IT team as soon as possible. In other words, as AI testing engineers, we should serve as a link between our company's AI and IT departments.

Automation testing further streamlines this process by automating repetitive test script being executed using testing tools (E.g., Selenium, pytest, unittest, nose2, tox, …)

* **Concept 4: Comprehensive Testing Framework**

An effective testing framework encompasses functional, performance, and security testing.

Individual aspects such as object detection and alert generating are evaluated during functional testing. System reaction times are measured during performance testing under changing loads, assuring responsiveness even during peak usage. Security testing detects flaws that could be exploited.

* **Concept 5: Chaos Testing**

The process of deliberately putting a system to stressful and unexpected conditions is known as chaos testing. This is critical for robustness since it checks the system's resilience, fault tolerance, and capacity to recover gracefully from faults.

* **Concept 6: User Acceptance Testing (UAT)**

End-users evaluate the system's usability and functioning during user acceptance testing. Real-world user feedback assists in finding areas for improvement and aligning the system with realistic requirements.

## Description of the software and hardware used in the thesis.

This section provides an overview of the software and hardware components used in the thesis project's execution.

* **Software Utilized:**

**Python:** Python, a versatile programming language, acts as the foundation for the AI-powered video management system's development. Python's numerous libraries and frameworks enable rapid data handling and AI algorithm integration.

**OpenCV:** OpenCV (Open Source Computer Vision Library) is a critical tool for image and video analysis. Its capabilities are used within the AI-infused video management system to process video streams, detect objects, and perform other analysis.

**Pytest:** To automate testing operations, Pytest, a popular testing framework, is used. Its simplicity and extensibility simplify the validation of numerous system functionalities.

**Streamlit:** The web application framework Streamlit allows for the building of interactive data visualisation dashboards. Streamlit is used in this thesis to present the results of the AI VMS analysis in a user-friendly and interactive format.

**Postman:** Postman, a popular API testing tool, assists in testing the AI API's functioning. Its user-friendly UI makes it easier to validate API endpoints and answers.

**Github:** The collaborative platform GitHub is essential for version control and project management. It ensures team members' smooth communication, version tracking, and the availability of the codebase.

* **Hardware Utilized:** Home security Camera, Laptop Webcam.

## Overview of similar Video Management System

As an AI test engineer, it is important to learn the existing features of other video management systems, which allows us to add more to the current perspective, thereby integrating more. More features for the existing camera system of our business. In this section, we will focus mainly on some researches on VMS MileStone and VMS Axis.

### VMS MileStone (Milesight)

Milesight VMS is a video management system designed for use in a variety of environments, from small businesses to large scale enterprises.

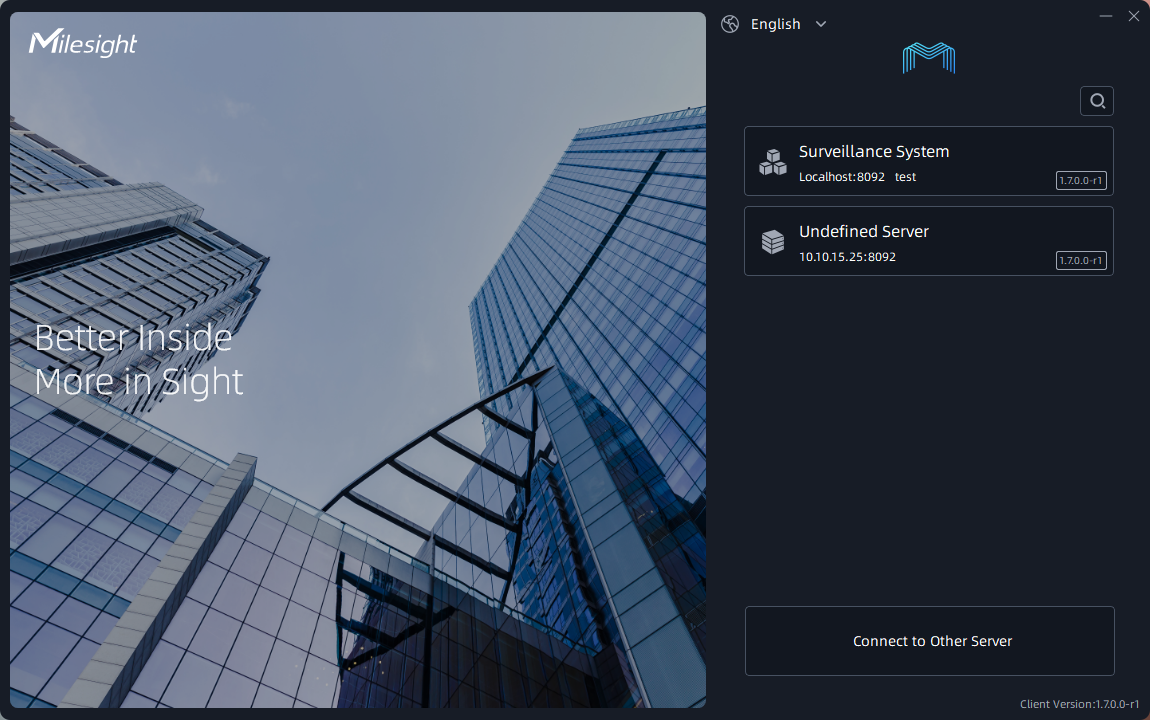


Figure 1.Front Page of Milesight VMS

* **System features:**

**- Video Recording and Storage:** Milestone VMS is primarily designed to record and store video footage from surveillance cameras. This app provides secure video recording with various customizable settings like frame rate, resolution and compression. Up to 8 cameras can be connected at the same time in the free version, but in the more expensive versions, the number will be much larger, possibly up to several thousand cameras.

**- Video analysis:** The software is equipped with advanced video analysis capabilities such as detecting different objects, capturing motion changes, and supporting searching by the above objects.

**- Remote Access:** Milestone VMS allows users to access video footage and analytics from remote locations using a web browser or mobile app. This makes it easy to monitor and manage surveillance activities from anywhere at any time.

**- User Management:** The software comes with a user management module that allows administrators to control access and permissions for each user. It helps ensure that only authorized people can access sensitive video data.

**- Customizable:** The software is highly customizable and can be tailored to meet the specific needs of different organizations. This includes customization of the user interface, video analytics settings, and integration with third-party software.

**- Scalability:** Milestone VMS is designed to handle a large number of cameras and video streams, making it suitable for small to large scale surveillance operations.

**- Reports:** The software provides advanced reporting capabilities that help analyse video data and identify trends. This includes generating reports on video analytics, user access, and system performance.

* **AI Integrated Features:**

Milestone VMS can integrate with a wide range of devices and third-party software such as cameras, access control systems and alarm systems. This provides a seamless and comprehensive security solution for businesses and organizations. Some object detections that Milestone can integrate (need to learn more, not sure):

**- Motion Detection:** Milestone VMS can detect motion in a specific area of camera view and trigger an alert or recording. It can also distinguish between different types of motion, such as human movement or vehicle movement.

**- Face Recognition:** The software can recognize faces in real time and compare them with a database of known faces to identify individuals. This feature is useful in enhancing security and identifying potential threats.

**- License plate recognition:** Milestone VMS can recognize and read license plates on vehicles and compare them with a database of known license plates to identify the vehicle or follow it. track their movements.

**- Object Detection:** The software can detect and track specific objects in the camera view, such as bags or packages, and trigger alerts or logs based on rules predefined.

**- People Count:** Milestone VMS can count people entering and exiting a specific area, such as a store or building. This feature is useful in managing crowds and improving customer service.

**- Audio Analysis:** The software can analyse audio data from the camera and microphone, and detect specific sounds, such as gunshots or broken glass, and activate alarm or recording.

**- Heat Map:** The software can generate heatmaps showing the frequency and duration of activity in the camera view. This is useful in analysing customer behaviour and optimizing store layouts.

**- Object Classification:** Milestone VMS can classify objects in the camera view based on their size, shape and motion. This helps to identify specific objects, such as vehicles or people, and trigger alerts or logs based on predefined rules.

**- Anomalous Behaviour Detection:** The software can detect unusual behaviour in the camera view, such as a person loitering in a restricted area or a vehicle driving in the wrong direction. This helps to identify potential threats and increase security.

**- Mask detection:** Milestone VMS can detect if people in camera view are wearing masks and trigger an alert or record if wearing a mask is required in an area specific area.

**- Distance monitoring:** The software can monitor and detect if people in the camera's field of view are maintaining a safe distance from each other and trigger an alert or record if the social distancing rules are violated.

**- Disappearance object detection**: Milestone VMS can detect when an object has been removed from a specific area of the camera view, such as a piece of art from the gallery. This helps prevent theft and increases security.

**- Camera tamper detection:** The software can detect when the camera is tampered with, such as being covered or moved, and trigger an alert or record.

**- Queue management:** The software can detect and monitor queues or queues in real time, such as in a retail store or at a ticket counter, and generate alerts or notifications. reports to optimize queue management.

**- Perimeter Protection:** Milestone VMS can detect and alert security personnel when someone enters or crosses a predefined perimeter or boundary, such as a fence or wall, to prevent unauthorized access or encroachment.

**- Crowd Detection:** The software can detect and track crowd movements and density in real time, such as during a concert or public event, and create alerts or notifications to manage crowd control.

**- Lour detection**: Milestone VMS can detect and monitor when someone is loitering in a specific area, such as a parking lot or dock, and generate alerts or notifications to increase security.

**- Fall detection:** The software can detect and track when someone falls, such as in a hospital or nursing home, or especially during Finnish winter and generate alerts or notifications to aid in emergency response.

**- Smoke and fire detection:** Milestone VMS can detect and monitor smoke and fire in real time and generate alerts or notifications to enhance safety and reduce response time in case fire.

- **Facial Emotion Recognition:** The software can detect and analyse facial expressions in real time, such as happy, sad, angry or surprised, and at the same time

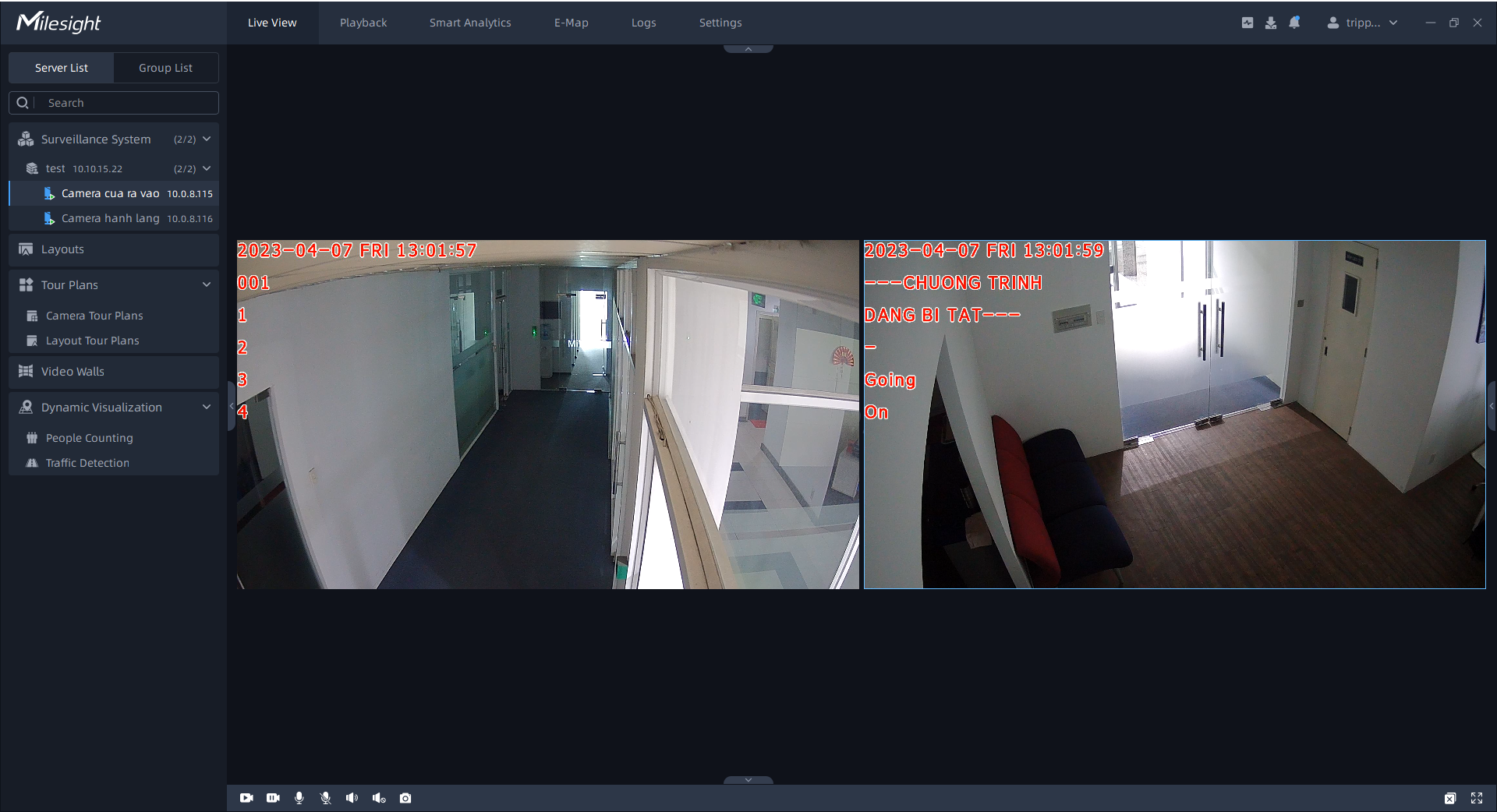


Figure 2 Camera view of Milesight VMS

* **Features that need improvement:**

While the Milesight VMS app is a solid video management system, there are several areas where it could be improved for a better user experience:

- Simplify advanced features and settings to make them more accessible to all users.

- Improve app accessibility by providing alt text for images and icons.

- Resolves crashing and freezing issues reported by some users.

- Provide more detailed documentation and support resources to help users better understand and make better use of the app's features.

- Adjust costs for users, apply promotional campaigns for newcomers or long-term use packages to retain customers.

- Smartphone or mobile devices integration, which is not optimized

### VMS Axis

AXIS Camera Station is a comprehensive video management software designed for small and medium businesses, there are many similarities between Axis and Milesight. However, the integration feature of Axis is considered more convenient because it can allow users to integrate with their smartphones.

* **System features:**

**- Live View:** The live view feature allows users to observe streaming video in real time. This feature provides continuous frames of the current state in the security area.

**- Recording:** Axis Camera Station supports continuous and event-based recording. Continuous recording records video streams 24/7, while event recording only records video when motion is detected, or an alarm is triggered.

**- Playback:** The playback feature allows the user to play back the recorded footage. It offers several playback options, including fast forward, slow motion, and frame-by-frame viewing.

**- Motion Detection:** supports motion detection, can trigger recording and alert when motion is detected in the monitoring area.

**- Alarm Management:** supports alarm management, allowing users to configure and manage alarms for different events, such as motion detection, fake camera impersonation and network problems.

**- Mobile App:** The Axis Camera Station mobile app allows users to access the surveillance system from their smartphone or tablet easily.

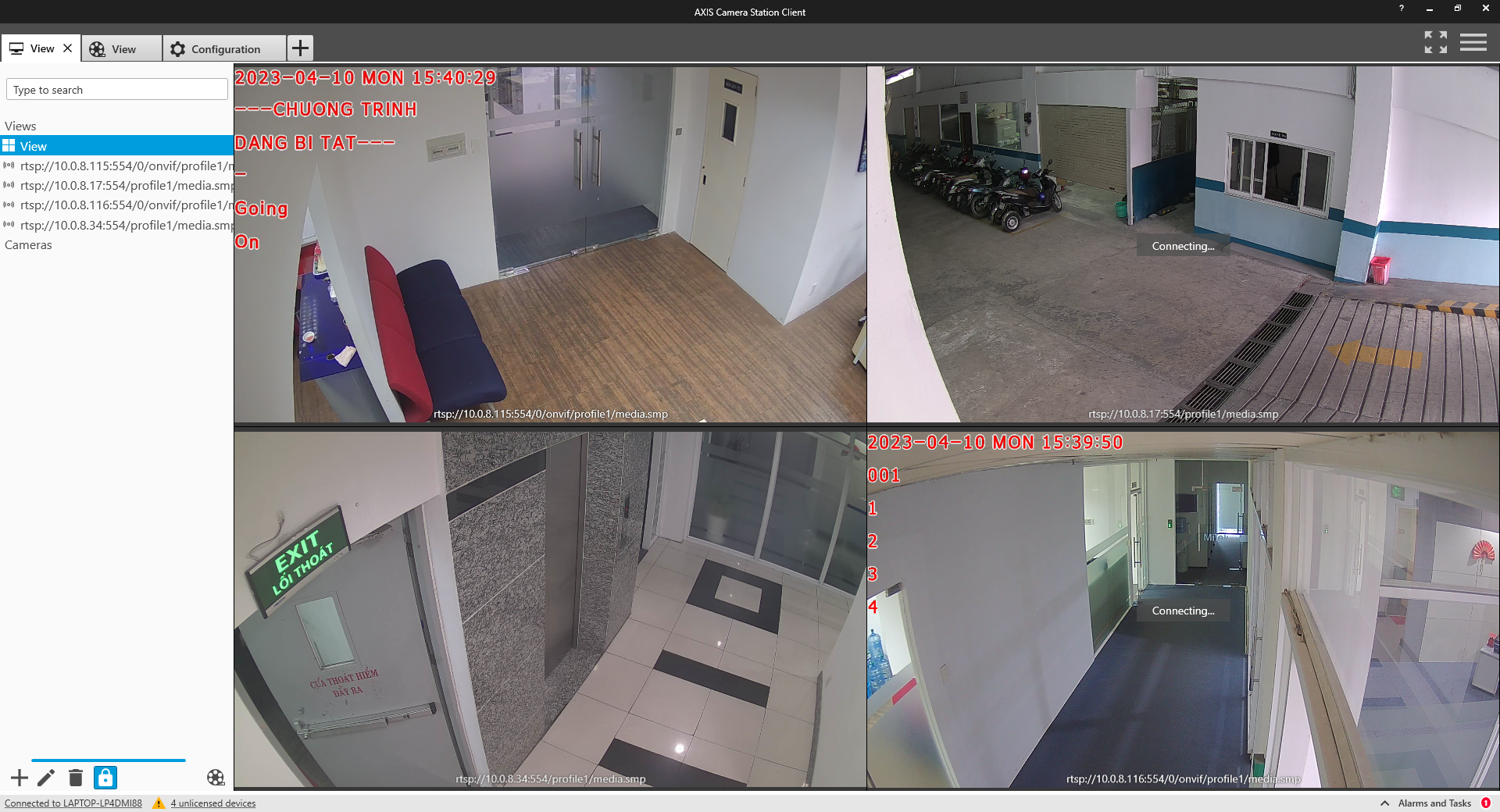


Figure 2 Streaming view of VMS Axis

* **Integration Capability:**

**- Third-party device integration:** Axis Camera Station supports integration with third-party devices, such as access control systems, intercoms, and alarm systems motion. This integration enables a more comprehensive security solution that can be managed from a single interface.

**- API:** Axis Camera Station provides a wide range of APIs that allow integration with other software solutions. These APIs include goofAPI HTTP, VAPIX API, and ONVIF API.

**- Integrating Video Management Software (VMS):** Axis Camera Station can be integrated with other VMS solutions, such as Milestone and Genetec. This integration enables a more comprehensive video surveillance solution.

**- Cloud integration:** Axis Camera Station can be integrated with cloud-based solutions, such as Microsoft Azure and Amazon Web Services (AWS). This integration allows remote access to a cloud-based video surveillance and storage system.

**- Video Analytics Integration:** Axis Camera Station supports integration with video analytics solutions, such as Axis Video Analytics and BriefCam. This integration enables the use of advanced video analytics and can provide more insight into video footage.

* **Features that need improvement:**

**- Resource-intensive live view:** Live view can be resource intensive, which may affect system performance. This problem can be solved by optimizing the live view feature to reduce its resource usage.

**- Storage Management:** Continuous writes can result in large amounts of data, which can be difficult to manage. Axis Camera Station can improve storage management to make it easier for users to manage their recorded footage. And if user would like to integrate the data on cloud service, be careful with the resource cost.

**- False alarms:** Motion detection can be prone to false alarms, which can be frustrating for users. Axis Camera Station can work to improve the accuracy of motion detection to reduce the frequency of false alarms.

**- Alarm Management:** Setting up and managing alarms can be time consuming. Axis Camera Station can improve its alarm management capabilities to make the alarm setup and management process more efficient.

**- Mobile app functionality:** Mobile apps may not provide the same level of functionality as the desktop version. Axis Camera Station can work to improve the functionality of mobile applications to provide users with a more comprehensive remote access experience.

# simulation of an AI cameara application

A thesis is a scientific document, which means that certain conventions of that language register must be followed. Exact expressions are used instead of using vague ones, for example, “30 **%** of projects taken longer that than the set estimation” is more exact than “A considerable number of the projects take longer than estimated”.

When quoting literature or other sources directly or indirectly, the original source has to always be mentioned. In a word-for-word quote, “quotation marks” are used. Every quoted text, table or figure should take the thought onwards.

All information taken from a source has to be cited, unless the paragraph expresses the writer’s own thinking (Hirsjärvi et.al. 2001, 319).

A list of references is given at the end of the work in alphabetical order. In the assessment of the thesis, also the student’s ability to estimate and evaluate the sources used and his/her ability to analyze and connect the sources used to the topic of study are assessed.

## Appearance

As in this template, the margins are: the upper margin 3 cm, the lower margin 3 cm, the left margin 4 cm and the right margin 3 cm. The recommended font is either Calibri (Body) and Arial. The font size in the body text and in lists is 12. The font size can be 14 in headings and 10 in for example tables. The captions of figures, photos and tables are written in font size 12.

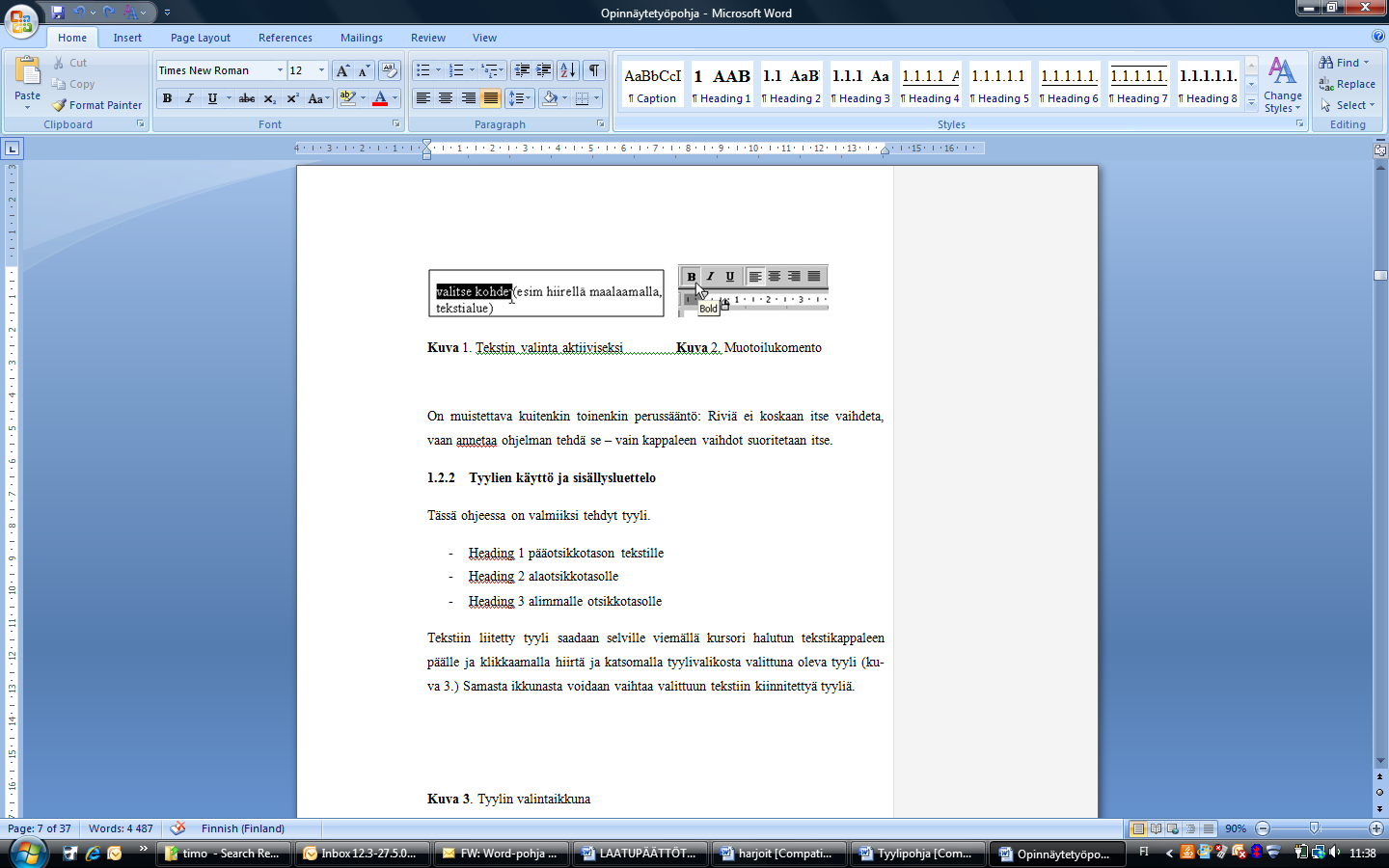
The spacing is 1.5 in the body text. The hyphenation is on and the text is aligned to both the left and right margins. Let the word processor do the row change, press enter only when starting a new paragraph. The spacing between the paragraphs is 12 points (settings: before 0, after 12 pt). A new chapter starts on a new page.

## Use of Styles and Contents Page

These instructions have the following styles included:

* Heading 1 for main headings, font size 14 and bolded in capital letters
* Heading 2 for subheadings, font size 12 , bolded
* Heading 3 for the lower level of subheadings, font size 12, bolded
* Normal for body text, font size 12
* Abstract, font size 12

The style attached with the text can be determined by taking the mouse onto the text and right-clicking the mouse. The style chosen can be seen in the style menu (Figure 1). On the same window, you can change the style.



**Figure 3.** Style menu window. (MS Office screen capture)

When the heading has been formatted using the styles, the contents page can be updated by clicking on the contents page and choosing ”update field” and then by choosing ”update entire table”. The pre-entered heading styles are not used in the abstract and on the contents page or the list of appendices page (heading size 14), the body text on these pages uses style Abstract (font size 12, line spacing 1, paragraph spacing 12 points after).

## Referencing and the List of References

Depending on the field of study, either parenthetical or numbered referencing is used. Parenthetical referencing is used in the School of Business and Economics and The School of Health Care and Social Services. The number referencing can be used in the School of Technology.

Each source referred to in the text must be mentioned in the list of references. Correspondingly, there must a citation of every source in the list of references in the text.

**3.3.1 Parenthetical Referencing (Harvard referencing)**

In the text, the source is referred to by marking in parentheses the family name of the author and the year of printing followed by a comma and the page or pages used. When referring to a written work as a whole page numbers are not given (Hall 2012). When referring to specific pages the pages are given (Hall 2012, 120-121, 132). However, it must be apparent in the text, which passages are the author’s “own” text and which have been cited from a source.

When you are writing, and you are referring to source material, you will mark the length of the citation with small details. If the reference applies to one sentence, the name of the author, the year and the possible page number, separated with a comma after the year, is written within that sentence before the full stop. Used sources are mentioned both in the text and in the list of references (Hirsjärvi, Remes & Sajavaara 2001, 318). 

An electronic source is referred to in the same way as a traditional source. The web address of the source is not given in the text; it is given in full in the list of references and the access date (Accessed xx.xx. 20xx) is given. (Hirsjärvi et al. 2001, 253­–254.)

If the source has several authors (three or more), all authors are mentioned in the reference on the first time. Later on, only the first name is mentioned, then et al., year of the publishing and pages referred to. For example, the reference on the first time would be (LaGrega, Buckingham & Evans 2009, 34), later on when referring to the same source (LaGrega et al. 2009, 56–58).

If the text is compiled from many sources, the sources are written in the same parentheses, usually in the alphabetical order but also the order of importance or the year of publishing can be used. The references are separated with a semicolon, e.g. (Huff 2009, 111; Morrill 2010[[1]](#footnote-1))

The writings by the same author are separated with the help of the year of publication and are written in the order of publishing. Writings by the same author in the same year are separated with small (lower case) letters, e.g. (Smith 2008a, 2008b, 2010).

If the source does not have an actual author, the text is referred to using the first words that appear in the list of references, for example, (Quarterly Review 2014).

It has to become apparent from the reference how much of the text is based on the sources. If the contents of a whole paragraph are cited, the reference is written at the end of the paragraph after the full stop. The reference ends with a full stop before the close bracket. An example: ...end of the text. (Hall 2012, 120–121.)

If the reference applies toa short part of the text or one sentence, the reference is written within the sentence. An example: As Hirsjärvi et al. (2001, 320) point out, inexperienced writers generally put the reference or possibly a significant number of names of authors at the end of the paragraph because they cannot differentiate, which part of the text is their own production and which part of the contents is based on sources.

A direct quote of several sentences (longer than three lines) is separated from the rest of the text using indention and spacing 1. Quotation marks are not necessary in this case but the citation is:

Direct quotes are useful for defining or describing specific concepts, whereas paraphrasing or summarising information from other sources shows that you understand the content and general idea. Try to summarise resources in most of your work and use direct quotes when they'll have a strong impact. You should make it clear that you understand the quote and its context, and justify why you've used a quotes instead of paraphrasing. (University of Portsmouth, n.d. online)

More information can be found in research guides.

**3.3.2 Number References /Footnotes**

In number referencing, the sources used are numbered and the citation is placed in a footnote[[2]](#footnote-2).

The number reference is placed inside the sentence before the full stop, if the reference is for that sentence only. If the reference covers several sentences, the reference is placed at the end of the last sentence the reference applies to, afterthe full stop marking the end of that sentence. The reference to an entire paragraph is placed after the last sentence after the full stop.

Otherwise, the same principles are complied with as with the parenthetical referencing[[3]](#footnote-3).

## Examples of List of References

The list of references is written in an alphabetical order by the name of the author, also in the number referencing. Different types of sources are not grouped. However, there are various ways for carious sources to write down the source information. This chapter gives examples for how different sources are entered in the list of references. In the basic pattern for a source reference, there are four different parts: Who. What. When. Where. *Who* refers to the author, *when* to the time when the text was produced, *what* to the title and *where* to the publication outlet or the publisher. (Hirsjärvi, Remes & Sajavaara 2009, 339.)[[4]](#footnote-4)

### Printed Books

Last name of the author, Initial(s) of the first name(s). Year of publication. Name or title of the book. Edition. Place of Publication. Publisher.

Best, R.J. Market-Based Management: Strategies for Growing Customer Value and Profitability. 4th ed. Upper Saddle River, NJ. Pearson Prentice Hall.

Saunders, M. & Lewis, P. 2012. Doing Research in Business and Management: An Essential Guide to Planning your Project. Harlow. Financial Times Prentice Hall.

### Printed Articles (e.g. in Periodicals or Compilations)

Last name of the author, Initial(s) of the first name(s). Year of publication. Name of the article. Name of the publication. Number of volume, number of issue, number of the first page – number of the last page.

Naaranoja, M., Haapalainen, P. & Lonka H. 2007. Strategic management tools in projects - case construction project. International Journal of Project Management 25, 7, 695–669.

Name of the author, Initial(s) of the first name(s). Year of publication. Name of the article. In: Name of compilation, pages. Editor(s) of the compilation. Place of publication. Publisher.

Lawrence, J. A. &  Dodds, A. E. 2003. Goal-directed activities and life-span development. In Handbook of Developmental Psychology*,* 517-533. Valsiner, J. & Connolly, K. (Eds.) London. Sage Publications.

### 2.4.3 Electronic Publications (e.g. Online Articles, Web Pages and Sites, DVDs and CDs)

Name of the author, Initial(s) of the first name(s). Year of publication. Name of the article. Date of access. In: Name of the compilation. Type of media. Editor of the compilation. Place of publication. Publisher. Location in the compilation.

With electronic publications, it is possible to start the reference with the administrator of the site, if the author is not mentioned.

Hyphens are not used to divide the URL-reference, nor should the reference be divided to different lines where there is a hyphen in the URL. If the URL has to be divided into two lines, it is done at the stroke so that the slash starts the new line. [[5]](#footnote-5)

Bailey, C. D., Hermanson, D.R. & Louwers, T.J. 2008. An examination of the peer review process in accounting journals. Journal of Accounting Education 26, 2, 55-72. Accessed 26.1. 2017. doi:10.1016/j.jaccedu.2008.04.001.

Ministry of Education and Culture 2016. Education lies at the Heart of Society. Accessed 1.8.2016. http://www.minedu.fi/export/sites/default/OPM/

Julkaisut/2016/liitteet/Education.pdf?lang=en.

McConnell, W.H. 1993. Constitutional history. The Canadian Encyclopedia. CD-ROM. Macintosh version 1.1. Toronto. McClelland & Steward.

National Action Plan on Fundamental and Human Rights 2012-2013. Reports and Guidelines 20/2012. Helsinki. Ministry of Justice. Accessed 4.9.2018. http://oikeusministerio.fi/material/attachments/om/julkaisut/el7vSVubn.

Statistics Finland 2009. Report on Service Industry Development. Accessed 22.2.2011. http://www.stat.fi/artikkelit/2010/art\_2010-03-26\_004.html.

Russell Publishing 2016. Urban rail development. Eurotransport Online Magazine 3, 4, 16-18. Accessed 22.8.2016. http://www.eurotransportmagazine.com/20268/past-issues/issue-4-2016/issue-4-2016-digital-version/.

Tamura, S., Sheehan, J., Martinez, C. & Kergroach, S. 2005. Promoting Innovation in Services. Paris. Organisation for Economic Cooperation and Development (OECD). Accessed 1.6.2016. http://www.oecd.org/dataoecd/21/55/ 35509923.pdf.

Torkko, S. 2010. The Report on Internal Audit. Accessed 1.6.2015. http://intra.puv.fi/attachment/e865047a81b0a6b2a94c639db22554bb/b80b02ccb/ 925a401f2423b229584d/Raportti+sis.audit\_2010.doc.

### 2.4.4 Interviews

Ilomäki, R. 2016. President. Lahti University of Applied Sciences. Interview 25. February 2016*.*

### 2.4.5 Conference Presentations

Diong, B. Tippens, S. Francis, T. & Herndon, M. 2015. A New Photovoltaic Module Design Paradigm: Cell Strands that Track the Sun. ASME 2015 9th International Conference on Energy Sustainability June 28-July 2, 2015. San Francisco.

### 2.4.6 Sources that Start with an Official Abbreviation (e.g. Laws)

L 30.12.1997/1336. Accounting Act. Act in the Finlex database. Accessed 9.11.2010. http://www.finlex.fi/fi/laki/ajantasa/1997/19971336.

### 2.4.7 Other Sources (e.g. Minutes, User Instructions and Statistics)

VAMK University of Applied Sciences IT Basics. Accessed 22.2.2011. http://www.puv.fi/en/study/atk-aapinen/

Unpublished sources (e.g. research reports or study material handouts that have no ISSN or ISBN number) are marked like this:

Merker, G. 2007. *Profitability in Business*. Heinmann University.

### 2.4.8 E-mail

Givens, B. 2003. Research and Development Activities in SMEs. Email bgivens@hereitis.com. 20.2.2013. Printed 23.2.2013.

### 2.4.9 Standards

The standard code and number. The name of the standard. Edition. Place of publishing: Publisher. Year of publication. Number of pages.

### 2.4.10 Patents

Country of Publication. Year of Publication. Name of the patent. Holder of the patent, domicile. (Patent inventor) Application number, application date. Date of publishing. Number of pages.

# APPEARANCE

Note the following in the appearance of the text:

1. **Figures,** drawings and photos are numbered with a running number. The word ”Figure” and the number are bolded (e.g. **Figure 1.)** but notthe caption i.e. the text that names and explain the figure.. The caption text ends in a full stop and it is placed under the figure. The figures are separated with a blank line before and after from the text. Make sure that you make reference to figures in the text.
2. **Tables** are separated with a blank line before and after the table. The word ”Table” and the number are bolded (e.g. **Table 1.)** but not the caption. The caption of a table ends in a full stop and it is written above the table.
3. **Formulas** are numbered with a running number. The number of the formula is written inside brackets on the right edge of the text and the beginning of the formula is placed so that all formulas begin at the same spot. An example:

E = mc2 where E=energy (1)

m= mass

c= the speed of light

1. **Appendices** (APPENDIX 2)include information that is not essential to understand the matter being discussed but is referred to in the text. All figures, tables and lists that demonstrate the contents of the thesis but are too big in size or lesser in importance to be integrated in the text are marked as appendices. The questionnaires or interview questions used are also placed in the appendices. They are numbered with a running number. The first matter found in the appendices referred to in the text is then Appendix 1, the next one Appendix 2. If there are many appendices, a list is drawn up and placed after the contents page.

1. **A new chapter** is startedon a new page.Each chapter should have at least two subtitles. In addition, each chapter should contain at least two paragraphs and a paragraph should contain at least three sentences.
2. **To emphasize** the text **bolding**, *italics* etc. can be used but sparingly and consistently. Underlining is not recommended.
3. **Dash (**–**)** is used between limits expressed either in numbers or in words (no hyphen -). E.g. between 1941–1944, items 4–7, September – October, pages 12–15. **In Word, the dash is produced with the combination [ctrl] [minus][[6]](#footnote-6).**

8. Subheadings are spelled so that important words are written with a capital initial. Prepositions and articles are written in small case. The title of the thesis in the abstract is spelled the same way, e.g. This is What a Good Title Looks Like.

# ENDING PHASE – ASSESSMENT OF THE THESIS AND MATURITY TEST

European Qualifications Framework (EQF) is made up of two levels with which the learning results the education learning results are described. The EQF levels describe the depth knowledge, skills, and competence of a learner. EQF has been developed to make it easier to compare different qualifications in the EU. National Qualification Framework (NQF) is used nationally. More information can be found on [Qualifications Frameworks](https://www.oph.fi/en/education-and-qualifications/qualifications-frameworks) can be found on the Finnish National Agency for Education’s website.

The assessment of the thesis is based on EQF standards. See Table 3 (Appendix 2[[7]](#footnote-7)) of the evaluation criteria in use at VAMK and the criteria for the UAS Master’s degree in Table 4 (Appendix 4[[8]](#footnote-8)). The emphasis of evaluation is on the student’s input, the novelty value and of the work and its applicability to practice and the documentation of the work.

## The Presentation Time of the Thesis

The time for the presentation of the thesis is agreed with the supervisor and the supervisor will appoint an opponent for the presentation. A written thesis report is submitted to the supervisor and the opponent at least two weeks prior to the presentation.

In thepresentation seminarthe student presents his/her completed thesis orally to the audience in the language of the degree programme. The students act as opponents in turns. The opponent’s task is to ask questions and assess the thesis and the presentations critically but in an appropriate manner. The aim is to bring up the strengths and weaknesses of the thesis and the opponent’s reasoned opinions on the thesis. The opponent fills the in Opponent’s Assessment Form and submits it to the supervisor of the thesis at the presentation occasion. The presentation seminar is public and the listeners have a possibility to ask questions from the author of the thesis.

## Maturity Test, Bachelor’s Degree

The maturity test is based on the Universities of Applied Sciences Decree [(1129/2014 8 §)](http://finlex.fi/fi/laki/ajantasa/2014/20141129) which states that for the Bachelor’s degree the student must write a maturity test on the field of the thesis, which shows knowledge in the field and good language skills. The UAS will decide on the language when the student has received prior education in other language than Finnish or Swedish and 7 § of the said Decree does not apply to them.

In its Degree Regulations (1.8.2022) in 9 § VAMK has declared that “to be awarded a degree, the student has to write a maturity test related to the topic of the thesis. The maturity test demonstrates knowledge in the field and skills in Finnish or Swedish. The maturity test is written in the language of the student’s primary and/or secondary education. If the student has received primary and/or secondary education in some other language than Finnish or Swedish, the maturity test is written in the language of the degree programme or the Director of Unit can agree with the student about taking the maturity test in some other language.”

The students studying in English-medium degree programmes, who have received their primary and /or secondary education in Finnish or Swedish, write the maturity test in Finnish or Swedish, not in English.

The student agrees with the supervisor on the writing of the maturity test. The objective of the maturity test is to show that the student masters the topic of the thesis and the language. The maturity test is written in a supervised test situation without any source material on paper or as an electronic examination in EXAM-system. Maturity test can also be an online essay. The supervisor gives two topics of which the student chooses one. The topic can be a heading or phrasing of the heading can be left to the student.

When written on concept paper, the standard length of the maturity test is approximately four pages with writing on each line, if the paper in questions is large-checked and writing on every other line if the paper is small-checked, approximately 450-600 words. Length of the EXAM maturity test and online essay is also 450-600 words.Three hours is given for writing the maturity test. The assessment is pass or fail. Both the supervisor and language teacher assess the maturity test. Students with dyslexia have the right for special arrangements, provided that they have an expert’s statement on dyslexia.

Maturity test can also be offered to be published as an article in Vaasa University of Applied Sciences Energiaa web magazine, after supervisor’s content and language checking. In aforementioned case, the publication instructions of web magazine applies to maturity test published as an article. Student must include permanent URN address of thesis (Theseus link) as a refence to the article.

Requirements for an approved maturity test:

1. The contents of the maturity test and that of the thesis have to correspond with each other.

2. The text is readable, and it is easy to tell the capital letters and small letters and words apart.

3. The writing has a headline. The headline and the contents have to correspond with each other.

4. The text is divided into paragraphs*.*

5. The spelling and use of punctuation is correct.

6. The relation between the sentences and clauses are clearly stated.

7. The word order is unambiguous and in harmony with the information given.

8. The style of the writing is formal.

9. The text is based on language, notfor example on diagrams, charts or figures.

10. The writing is a well-structured and a unified entity.

11. The reader has to be able to understand the text as its own entity. The writer must not presume that the reader is familiar with the thesis.

The student can be failed in the maturity test if there are severe or reoccurring errors or defects in the contents or language. The student can register for a retake, having looked into the checked maturity test and having received guidance on the writing. The language of the maturity test is stated in the diploma.

## The Maturity Test for the Master’s Thesis is a Thesis Press Release

The student who completes a Master’s Thesis at VAMK has two options regarding the maturity test, one is to write a thesis press release and the other one is to write a traditional maturity test[[9]](#footnote-9). The student agrees on the choice with the supervisor.

A press release maturity test written is written in a formal style and in an interesting way. The test is written in the student’s language of primary/secondary education. The press release is typed in font size 12. The length is two pages in maximum.

The most important information of the press release is placed at the beginning of the text and other, supplementary, information is subsequently added towards the end of the document. The main points are highlighted in the heading and in the lead paragraph. In other words, the aim is that headline captures the essence of the research. The headline is followed by a lead paragraph, which complements the headline by presenting the central content of the research. The body text of the press release subsequently presents the research through concise description, justification and illustration of the results.

It is assumed that the reader of the press release is interested in the topic area. The press release answers the questions: what was researched, who did the research, where did the research take place, when, how (methods), why was the research of importance, who did it and who supervised it. The most important information is placed at the beginning and supplementary information at the end.

The text must be linguistically concise, understandable, written in clear formal language and according to Finnish, Swedish or English language standards. Use short phrases and divide the text into paragraphs. As the press release is written for the so called general public, avoid complicated professional terminology. If it is still necessary to use some professional terms, remember to explain them.

At the end of the press release, under the heading “Additional information” (“Lisätietoja”, “Tilläggsinformation”) the name of the person who can give additional information on the topic is given. In practice, this is the name and contact details of the writer of the thesis.

After the approval of the press release, the student can freely use it for her/his own purposes. The supervisor of the thesis forwards the press release to the communications department of VAMK and they can use it as a press release if they wish. The student can be failed in the maturity test written as a thesis press release if there are inadequacies or deficiencies in contents or language.

**Additional information**

Opiskelija, O. 2017. Vientikaupan haasteet ulkomaan kauppaa aloittelevassa yrityksessä. Opinnäytetyö. Koulutusala, tutkinto-ohjelma. Vaasa: Vaasan ammattikorkeakoulu.

Oili Opiskelija, YAMK, Liiketoimintaosaaminen, Vaasan ammattikorkeakoulu [oili.opiskelija@edu.vamk.fi](mailto:oili.opiskelija@edu.vamk.fi), GSM 040 123 4567.

Opinnäytetyö on tallennettu Theseus-tietokantaan osoitteessa <https://publications.theseus.fi/>.

The supervisor’s / supervisors’ name(s) are added at the end.

If the student chooses the traditional maturity test, or s/he has not earlier written a maturity test in a previous educational programme, the supervisor gives two alternative headings for topics that the student can choose between. The supervisor can either give a headline for the topic or it can be left to the student to formulate an exact headline for the topic given. The maturity test is written in supervised situation without any material available.

The length of the maturity test is approximately 450-600 words, written on every line if the square size of the graph paper is of the larger type (7 mm) and on every second line if the square size is smaller (5 mm). The time for writing is 2 h and 15 min (135 min). The maturity test is assessed by the supervisor and the language proofreader and the grading scale employed is pass/fail. A person with a dyslexia is entitled to special exam arrangements provided that the student has a dyslexia certificate issued by an authorized person.

For passing, a maturity test must meet the following requirements:

1. The content of the maturity test must correspond to the topic of the thesis.
2. The text is readable; it is easy to tell capital letters and lower case letters and words apart.
3. The text has a headline. The content must reflect the headline.
4. The text is divided into paragraphs.
5. The spelling and use of punctuation is correct.
6. The relation between clauses and sentence is clear.
7. The word order is unambiguous and resonates with the presented information.
8. The language is formal and academic in style.
9. The text is based on language, not on charts, formulas or figures.
10. The text well-organized and a coherent entity.
11. The reader understands the text as a whole. The writer cannot assume that the reader is familiar with the thesis.

The student can be failed in the maturity test can be failed if there are remarkable and reoccurring deficiencies or mistakes in content, language or layout. The student can sign up for a retake of the maturity test after having seen the corrected test and after receiving additional guidance. A note on the language of the maturity test is included in the graduation certificate.

Instructions for Publication

AS states above, the thesis written for A UAS degree cannot be classified entirely. Therefore, the student has to tell the client explicitly that after the thesis has been published in Theseus, it is available for everyone on the Internet. If the thesis contains such confidential information from the client’s perspective, which can be deemed classified for a legal reason, such information can be annexed with the thesis and the annex can be classified. The thesis can also written so that the name of the client is not disclosed.

After the supervisor has approved the final version of the thesis, the student is to

Primarily enter **the final version** of the thesis on the Theseus- electronic library in pdf-format, before applying for the graduation. Log in to Theseus using HAKA credentials (Log in). The thesis can be converted to pdf-format in the word processor by choosing “Save as” and then by choosing pdf as a file format. The thesis is saved at the address [www.theseus.fi](http://www.theseus.fi). While saving, you will be inquired if you wish your thesis to be dealt with like a book (all rights reserved) or do you want a so called creative commons licence for your thesis, which means that other people may use your thesis without your permission. You will also have to give an email address to which information of the saved thesis is sent, as well as your student number and password. Possible large attachments can be saved separately. The thesis will not show immediately in Theseus but the library staff will first check the saved information and publish the thesis after that. If the thesis has more than one author, only one of them saves the thesis in Theseus. Additional information can be found at <http://www.theseus.fi/web/guest/ohjeita>.

If student does not give permission to publish thesis in open collection of Theseus, he/she submits the thesis into restricted collection. Universities of Applied Sciences in Finnish higher education recommend the open collection based on the declaration for open science. More information at <https://submissions.theseus.fi/en/index.html>

In case of technical problems, please contact [pirjo.teppo@uwasa.fi](mailto:pirjo.teppo@uwasa.fi), telephone +358 29 449 8255

A completed thesis has to include all the data needed to assess the objectives of the thesis, the reliability of the process, conclusions and their generalisation. If the thesis is a unique work, a presentation or an exhibition, it has to be documented in pictures or video so that one can get a good idea of the thesis without seeing the original production.

Removing the thesis from the database or submitting a new version of it is possible only in exceptions, and even then only through the supervisor.

The library will receive an email notification when the student has sent the thesis to Theseus. The library staff will publish the thesis but due to seasonal backlogs, this may take a while. The student can graduate even though the thesis has not been published in Theseus if there is proof that it has been submitted there.

## Thesis Assessment, Bachelor’s Thesis

The assessment of the thesis is done by the thesis supervisor. The opinion the possible client of the thesis work about the level of the thesis and its usability are taken into account. When the thesis supervisor has given the student the permission to publish the work, the student turns in the thesis passport (or alternatively checks out the process in Wihi).

The thesis can be graded after the student has presented the thesis is a seminar, written the maturity test, submitted the thesis to Theseus.

The theses are assessed on the scale from 1 to 5 and attention is paid to the management of the research or project process, theoretical background, implementation, results and reporting. The EQF level 6 criteria have been taken into account in the assessment criteria. If the supervisor suggests either grade 1 (pass) or 5 (excellent), another examiner will have to read the thesis as well.

In an excellent thesis (5) the topic of the thesis develops the professional field and it is of importance for the field. The theory of the thesis or the project and the practical application form a clear unified, and logical entity. An excellent thesis also discusses the reliability of the work and the results as well as the validity of the used study methods. In an excellent research based thesis qualitative and/or quantitative research methods have been used very well paying attention to evaluating the used qualitative/ quantitative method. In an excellent project a high level of professional understanding and skill and is shown and in addition the used methods and the reached results have been estimated.

**Thesis Assessment, Master’s Thesis**

The thesis can be assessed when the thesis supervisor has given permission for publication. The supervisor is in charge of the assessment. The supervisor will take into account the possible client’s opinion of the quality of the thesis as well as the usability of the thesis in practice.

The thesis is assessed on the scale from 1 to 5 and attention is paid to the selection of topic, management of the research or project process, theoretical background, implementation, results and reporting. In a Master’s Thesis the assessment criteria are based on the EQF 7 level criteria. In an excellent thesis (grade 5) the topic is significant with regard to the development of the field and the theory and practical part of the research or project together form a clear and logical entirety. In an excellent thesis, the reliability of the results and suitability of the methods (validity) have been dealt with. In an excellent project, commendable expertise has been shown, and methods used and results have been assessed.

If the supervisor suggests either grade 1 (pass) or 5 (excellent), another examiner will have to read the thesis as well. The assessment criteria for a Master’s Thesis can be found in the appendix (Appendix 3) and on VAMK’s webpages under Thesis/Master’s Thesis assessment criteria.

# references

Albertson, S. 2004. Managing research process as an essential resource for improving organizational performance. International Journal of Research 53, 5, 515-521. Accessed 22.9.2016. doi: 10.1005/s10551-008-9988-Y

Black, S. 2013. Consumer Research from Ethical Point of View. Accessed 22.9.2016. http://black.findarticles.zez/p/articles/mi\_m1365/is\_12\_31

Bryman, A., & Bell, E. 2011. Business Research Methods. Oxford. Oxford University Press.

Deal, J. & Prince, D. 2007. Developing Assessment of Learning. Accessed 21.10.2016. http://site.ebrary.com/lib/vamklibrary/docDetail.action?docID=10185362&p00=learningandassessment>

Digh, P. 2009. One pedagogical style does not fit all. Education Magazine 47, 11, 79-81. Accessed 22.10.2016. http://proquest.umi.com/pqdweb?index=1

European Commission 2016. Learning Opportunities and Qualifications in Europe. Accessed 22.10.2016. <https://ec.europa.eu/ploteus/search/site?f%5B0%5D=im_field_entity_type%3A97>

Hirsjärvi, S., Remes, P. & Sajavaara, P. 2001. Tutki ja kirjoita. Helsinki. Tammi.

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Metsämuuronen, J. 2006. Tutkimuksen tekemisen perusteet ihmistieteissä. 3. edition. International Methelp Ky. Jyväskylä. Gummerus Kirjapaino Oy.

Pommelin-Andrejeff, L. 2020. Kovakantisen version toimittaminen/oppariohje. 6.8.2020. Email Leena.Pommelin-Andrejeff@vamk.fi Printed 6.8.2020.

University of Portsmouth. Writing about others Work: Using Direct Quotation. Accessed 9.2.2021. <https://www.port.ac.uk/student-life/help-and-advice/study-skills/research-reading-referencing-and-citation/writing-about-others-works-using-direct-quotations>.

Walliman, N. S. R. 2011. Research Methods: The Basics. London. Routledge.

**APPENDIX 1**

**Thesis passport** (to be given to the supervisor for filing after the thesis is finished). **N.B. Wihi platform can be used for monitoring as well.**

Name of student \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Group \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Contact information\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Topic of thesis \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Client \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

At latest Date Signature

1. Introduction to thesis and related assignments completed

\_\_\_\_\_\_\_ \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Approval of topic \_\_\_\_\_\_\_ \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Thesis plan approved \_\_\_\_\_\_\_ \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Interim seminar presentation held \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Contents of thesis approved \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. Layout and language approved \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. Abstract in foreign language accepted \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
7. Thesis submitted to the opponent \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
8. Participation in presentation seminars

- excluding acting as an opponent and own presentation

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Presentation of own thesis held \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Acting as an opponent (title/student)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Maturity test accepted \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. I hereby assure that I saved my thesis in electronic form into Theseus at the address

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Address Signature of the student

APPENDIX 2

**APPENDICES**

You can enclose as appendices for example a questionnaire used in the study or other material that is related to the study.

Material that the client wished to classify can be enclosed as an appendix; in this case, the appendix is not included in the published version submitted to Theseus or in the hardbound version.

**THE TITLES AND NUMBERING OF APPENDICES**

The appendices are numbered and given a title. When you refer to an appendix in the text, use the correct referencing practice. Remember to mention the number of the appendix.

Table 3. Thesis Assessment Criteria

|  | **Excellent (5) - Very good (4)** | **Good (3)** | **Satisfactory (2) - Passable (1)** | **Fail 0** |
| --- | --- | --- | --- | --- |
| **Choice of topic** | The topic is significant and current with regard to  developing the field of study. The topic meets the need of the client from the working life. With respect to the choice of topic, the student is able to question and justify the development needs in his/her field of study. The topic is, from the point of view student's professional knowledge, skills and qualifications, innovative and opens up new perspectives in working life. | The topic meets the needs of the client. With respect to the choice of topic, the student has an understanding of the development needs in his/her field of study and is able to analyse them and present them in logically. The topic develops the student's professional knowledge, skills and qualifications and is challenging | With respect to the choice of topic, the student recognises the development needs in the field. The topic corresponds to the student's professional knowledge, skills and qualifications. The topic develops the student's knowledge and skills, and the student is able to justify in what way | The choice of the topic is not based on the proven needs of the working life nor to the development of the field of study. The minimum requirements of Polytechnic Degree (EQF 6) are not me |
| **Knowledge basis** | The student has built up the knowledge basis of selected diverse sources that are relevant to the topic. S/he is able to make syntheses and draw conclusions logically based on the material. The student uses and defines the concepts in a diverse way and with the thesis creates new usable theory in the field. | The student recognises the phenomenon/topic showing expertise in the field. The use and definition of concepts is analytical and justified. The student has built up a wide knowledge basis using reliable sources. The student defines the phenomena critically, diversely and creating new perspectives. | The student's acquaintance with the topic is good but narrow. A more wide approach would be needed in the understanding and definition of concepts. The knowledge basis is narrow. The use of sources is wide but making syntheses and analyses and drawing conclusions based on the sources has proved out to be difficult. | The knowledge basis is incomplete, narrow and invalid. The minimum requirements of Polytechnic Degree (EQF 6) are not met. |
| **Implementation** | The student finds the essential questions of the topic/problem in a creative way and restricts the problems in a justified and logical way. The student has found the appropriate methods to approach the topic and manages them well. The student's expertise can be seen in the process as well as the sharing of the expertise with the co- operation partners. The student assesses his/her work process analytically and shows a capability to develop. | The student recognises the essential questions regarding the topic and restricts the problem successfully with regard to the topic and the requirements of the thesis. The student uses methods appropriate to the topic and shows that s/he manages them. The student works autonomously but is also able to do constructive co-operation with other parties. The schedule and work process is managed. The student's approach to the thesis shows initiative, development ability and reflection. | The student recognises relevant questions regarding the topic/problem but the restriction of the problem is vague. The methods applied are conventional and their management according to the given model. Keeping the schedule and following the plan is difficult. The student finishes the thesis in accordance with the objectives and showing expertise. | The approach is clearly insufficient and the thesis is not finished in the agreed schedule or at all in spite of instructions and guidance. The knowledge basis, methods and implementation do not have valid connection. The minimum requirements of Polytechnic Degree (EQF 6) are not met. |
| **Analysis and discussion of results** | The results show expertise that is interesting from the viewpoint of the development in the field. The student is able to analyse complex problems, utilising the knowledge basis, in a new way and make a feasible application out of the results serving the working life (new perspective, innovation, advancement of the field). The student is able to form a clear opinion and a model of further action and development needs in the field and to justify them. | The student is able to apply wide knowledge basis successfully in solving the problem in the field of specialisation. The student is able to critically view the results, theories and methods used. The student is able to apply the results and suggest further action relevant to the working life and the field. S/he is able to define the development needs concerning knowledge and skills in the field. | The results of the thesis meet the objectives on most parts. The student is able to view the results critically and assess his/her own skills and expertise with respect to the objectives but superficially. The student is able to suggest further action and development, meeting the basic requirements regarding the skills and knowledge in the field. | The results do not have any relation to the problem, theory or methods. The results cannot be applied to develop professional practices. The critical assessment of the results is insufficient.  The minimum requirements of Polytechnic Degree (EQF 6) are not met. |
| **Reporting** | The report shows interesting expertise with regard to the development of the field. The report shows excellent mastery of the language and it conveys the student's thinking clearly and in a logical and illustrative way. The language is flawless and business style. The oral presentation is convincing and brings up the student's expertise well. | The student is able to present the results and conclusions analytically, illustratively and with good reasoning. S/he can communicate the results successfully to various interest groups showing critical thinking developing expertise. The language is flawless and business style. The oral presentation is illustrative and directed to the target group | The student follows the reposting instruction issued by the UAS. The report is structured and the language fairly good business style. The oral presentation is structured and concentrates on the presentation of the contents. | The reporting instructions have not been followed. There are flaws in the language and structure. Plagiarism can be detected in the report. The minimum requirements of Polytechnic Degree (EQF 6) are not met |

1. The sources of this template serve also as good tips. Huff’s book Designing Research for Publication (2009) is a good work on doing research. [↑](#footnote-ref-1)
2. The Word program numbers the footnotes automatically. If you add a footnote afterwards at any part of the text, the program will take care of the correct numbering. Number referencing is in use in some engineering degree programmes. The citation should include the name of the author, the year of publication and possible page numbers. [↑](#footnote-ref-2)
3. See chapter 3.3.1 Parenthetical referencing. Detailed instructions can be found in academic writing guides. [↑](#footnote-ref-3)
4. Use guides on methodology and academic writing to help you. [↑](#footnote-ref-4)
5. More information on referencing electronic material on The Institute of Finnish Language website at <http://www.kielitoimistonohjepankki.fi/> in Finnish (sähköiset lähteet ja viitemerkinnät). [↑](#footnote-ref-5)
6. This may vary from program to program. You should find out on your own device how to produce the correct mark. [↑](#footnote-ref-6)
7. The assessment criteria and grades, Bachelor’s degree [↑](#footnote-ref-7)
8. The assessment criteria and grades, Master’s degree [↑](#footnote-ref-8)
9. The supervisor gives two topics to the student to choose from. [↑](#footnote-ref-9)