

# Open Source Intelligence techniques

A quantitative study of the Norwegian Police University College students use of OSINT techniques in their online investigations through their year of practical training.

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A minor thesis submitted in part fulfilment of the degree of MSc. in Forensic Computing and Cyber Crime Investigation with the supervision of Dr Nhien An Le Khac.



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# Abstract

Eric Schmidt, chief executive of Google, estimated in 2021, the size of the internet to be 5 billion megabytes of data (Easytechjunkie.com, 2021). In parallel to this, the website *Statista.com*<sup>1</sup> writes that the number of active users on Facebook increased from 800 million in 2011, to an astonishing 2.9 billion users in 2022.

With so many people living their lives on the internet, the knowledge of this digital arena and the techniques for searching and securing data is becoming an increasingly important area of expertise in the fight against crime. This can strengthen police investigations of criminal cases or provide knowledge in relation to operational assignments and preventive policing.

In their three-year education, police students at the Norwegian Police University College have one year of practical training. They serve in one of the 12 Norwegian police districts during this period. This year will primarily be a period of acquisition of new knowledge but also a period in which the police students are intended for the role of change agents. Change agents in relation to new knowledge from PHS present for the police districts they serve. In this master's thesis, I research the police students' use of OSINT techniques, and then try to find answers to how these techniques were used and whether this contributed to increasing the clearance rate in the cases they investigated.

This minor thesis will also research whether the police students' knowledge of methods and techniques is satisfactorily remembered for adoption in the police districts. Satisfactory in that it does not conflict with recognized information collection principles and follows the approved methods and current legislation. For the police students to use OSINT techniques correctly, the police districts are expected to facilitate this with the right and available equipment. In 2021, the Auditor General's report "Police efforts against crime using ICT" (National Audit Office, p. 5) described a lack of expertise and capacity.

In this context, this thesis will also be intended to shed light on how the students experienced the framework conditions for open sources in their year of practical training and whether there is room for improvement.

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<sup>1</sup> <https://www.statista.com/statistics/264810/number-of-monthly-active-facebook-users-worldwide/>

Based on my research results, I will also discuss whether the knowledge we give students during the first year of study is good enough or whether there is a need for changes in learning objectives and lessons.

## Sammendrag

Administrerende direktør i Google, Eric Schmidt, anslo i oktober 2021 størrelsen på internett til å være 5 milliarder megabyte med data<sup>2</sup>. Samtidig skrev nettstedet *Statista.com*<sup>3</sup> (Q1,2022) at antall aktive brukere på Facebook økte fra 800 millioner i 2011, til forbløffende 2,9 milliarder brukere i 2022.

Med så mange mennesker som lever sine liv på internett, blir kunnskapen rundt denne digitale arenaen og teknikkene for søk og sikring av data, et stadig viktigere kompetanseområde i kampen mot kriminalitet. Dette er kompetanse som har potensiale til å styrke politiets etterforskning av straffesaker eller å gi kunnskap i relasjon til både ordensoppdrag og forebyggend politiarbeidet.

Politistudenter ved den norske Politihøgskolen har i sin treårige utdanning ett år i praksis. I denne perioden tjenestegjør de i ett av de 12 norske politidistriktene. Perioden er først og fremst ment å være en periode med tilegnelse av ny kunnskap, men også en periode der politistudentene har rollen som endringsagenter. Endringsagenter i forhold til ny kunnskap fra politiutdanningen presentert for politidistriktene hvor de tjenestegjør. I denne masteroppgaven forsker jeg på politistudentenes bruk av «Open Source Intelligence techniques (OSINT teknikker), for å forsøke å finne svar på hvordan disse teknikkene ble benyttet, og om dette bidro til å påvirke politistudentenes politiarbeid.

Forskningen ser også på om politistudentenes kunnskap om metoder og teknikker er tilfredsstillende erindret for praktisk bruk i politidistriktene. Tilfredsstillende i den forstand at de ikke er i konflikt med anerkjente prinsipper for informasjonsinnsamling og i samsvar med godkjente metoder og lovgivning. For at politistudentene skal kunne benytte OSINT teknikker riktig, forventes det at politidistriktene legger til rette for dette med riktig og tilgjengelig

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<sup>2</sup> <https://www.Easytechjunkie.com>, (2021).

<sup>3</sup> <https://www.statista.com/statistics/264810/number-of-monthly-active-facebook-users-worldwide/>

utstyr. Riksrevisjonen sin rapport «Politiets innsats mot kriminalitet ved bruk av IKT» (Riksrevisjonen, 2021, s. 5) beskrev i 2021 en mangel på både kompetanse og kapasitet. I denne sammenheng vil masteroppgaven ha til intensjon å undersøke hvordan studentene opplevde rammebetingelsene for bruk av åpne kilder i deres tjeneste ved politistasjonene, og om det der finnes rom for forbedringer. Samtidig som spørsmål om kvalitet og innhold i kunnskapsområdets første studieår vurderes og diskuteres for eventuell revisjon.

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# List of Abbreviations

OSINT	Open Source Intelligence
CIA	Central Intelligence Agency
DPC	Digital Policing Communities
ECHR	European Convention on Human Rights
EU	European Union
FB	Facebook
FFI	Norwegian Defense Research Institute
GDPR	European Data Protection Regulation
HAP	Higher Authorities Prosecutions
IANA	The Assigned Numbers Authority
ICT	Information and communications technology
INDICIA	Norwegian Intelligence Register
ISP	Internet service provider
KRIPOS	National Criminal Investigation Service
NATO	North Atlantic Treaty Organization
NCFI	Nordic Computer Forensic Investigation
NOKUT	National Agency for Quality Assurance in Education
NPUC	Norwegian Police University College
NSD	Norwegian Centre for Research Data
OAG	Office of the Auditor General
POD	The Norwegian Police directorate
SD	Study Department
SOCMINT	Social Media Intelligence
TOR	The Onion Router
UCD	University College of Dublin



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# 1. INTRODUCTION

## 1.1 Audience

The main audience for this Master thesis is primarily educators and teachers related to the education and training of police students. The task will mainly be important to educators in connection with the Norwegian Police University College<sup>4</sup> (NPUC), but educational institutions that train in Open Source Intelligence techniques will also benefit from being made aware of what this master thesis reveals.

## 1.2 Motivation

Ever since I got my first computer in 1985, with the programming language "Basic", I've been greatly interested in computer technology, gaming, and programming.

In 1996, I created my website on the internet that linked all relevant search engines and pages of special interest to the police. Several of my colleagues used this page at the time as a starting point for their online searches. Due to this recognition, I was hired as a regional instructor in the police computer systems in 1997. This was the start of a career in my field of interest. In 2005 I brought my expertise to the Norwegian Police University College (NPUC), as a lecturer in police computer systems. Over the years, this has been partially digitized, and the subject area changed content in the context of the police's competence needs. The new subject was established, and named, Digital Policing in 2014. The subject ranged from digital computer forensics to Open Source Intelligence techniques (OSINT). Since then, the subject has expanded to include several fields of knowledge within the digital police work.

Through studies at Nordic Computer Forensic Investigation<sup>5</sup> (NCFI) at NPUC, I have gained expertise I believe is necessary for this exciting but demanding subject area. In the autumn of 2020, I received approval from my leader to apply for further studies at the University

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<sup>4</sup> <https://www.politihogskolen.no/en/>

<sup>5</sup> <https://www.politihogskolen.no/en/post-graduate/nordic-computer-forensic-investigators/NCFI-macintosh-computer-forensics/>

College of Dublin (UCD). Through my studies, I have gained an increased interest in OSINT techniques. And in this context, I have immersed myself in this area so that my knowledge can later benefit the NPUC through changed lectures and learning outcomes.

## 1.3 Research problem

Lack of knowledge of methods and techniques are among the risk factors affecting both case processing time and the detection rate in the Norwegian police districts. Lack of knowledge has many causes, and in this context, I will mention low knowledge of methods and techniques, little willingness to renew the portfolio of investigative tools, and the ability to recognize and use new tools.

The research problem for this thesis is:

**How capable are the Norwegian Police Students in performing online investigations using OSINT techniques, and are the police districts facilitated for this?**

## 1.4 Research questions

These research questions help to focus on clarifying the research problem.

1. How did Norwegian police students use OSINT techniques during practical training?
2. How did they use the OSINT methodology they learned in their education?
3. How satisfactory was the expertise and facilitation for using OSINT techniques in the police districts where the police students had their practical training?

## 1.5 Hypotheses linked to the research questions

Hypotheses are tentative guesses posited to direct one's thinking and action towards the solution of a problem. Through my research, I will try focusing on not going into

confirmation traps (bias) to only search for answers that confirm my hypotheses. I will endeavor to find answers that are also contrary to what the hypotheses say.

My hypotheses linked to the research questions are as follows:

1. Linked to Q1. The few who used OSINT techniques in their internet investigation in the year of practical training had more interest and competence than the other students.
2. Linked to Q2. The Norwegian police students used only the collection phase of the OSINT methodology.
3. Linked to Q3. The expertise and facilitation for investigating OSINT techniques in the police districts were low.

## 1.6 Scope and limitations

Through the police student's years of practical training, students participate in the 12 Norwegian police districts. This period will primarily be a period of acquisition of new knowledge but also a period in which the police students are intended for the role of change agents. Change agents concerning new knowledge from NPUC unveiled for the police districts they serve. In this thesis, I investigate how capable the Norwegian Police Students are of performing online investigations using OSINT techniques after their first year of study. The thesis focuses on finding answers to how they use the techniques they have learned about in the information gathering process and if and how this helps to increase the detection rate. My master's thesis is based on social science methods, which retrieve empirical data through quantitative surveys. The thesis does not aim to rate the competence of police students through knowledge questions but to gather information about their use and recollection of the knowledge in their years of practical training. I nevertheless ask a few knowledge questions in the survey to validate whether their description of their competence is real and not excessive (Dunning-Kruger effect).

In this thesis, I also research if their knowledge of methods and techniques is satisfactorily remembered for adoption in the police districts. Satisfactory in that it does not conflict with recognized information collection principles by the approved method or legislation. For the police students to use OSINT techniques correctly, the police districts are expected to

facilitate this with the right and available equipment. In this context, this research shows how such equipment was made available to the police students in their year of practical training.

This research must not be regarded as a general knowledge measurement of the Norwegian police, but it nevertheless points to which framework conditions should be met to increase the use of OSINT in the police. The research survey that forms the basis for my discussions was held for students in the bachelor's third and last year. These students completed their first year at the Norwegian Police University College in the summer of 2020. It will therefore be the learning outcome from this year that forms the basis for the student's understanding. Their year of practical training was conducted in the period 2020-2021.

Open-source intelligence will be thoroughly discussed in this master's thesis, and in this context, it will be understood that open sources are a broad term.

In chapters 3,4, and 5 I will present what OSINT is, and what techniques are taught at the Norwegian Police University College. Chapter 6 explains what research methods I have used, and chapters 7 and 8 show my analyses, as well as discuss my findings. The conclusion and my thoughts on further work are presented in chapter 9.

To understand how the education at NPUC is carried out and what subjects' knowledge of Open Source Intelligence is included, I will present the Norwegian police bachelor in the next chapter.

## 2. THE NORWEGIAN POLICE BACHELOR

### 2.1 Framework plan

The NPUC offers a professionally oriented, research- and experience-based police education that is attended in the Police Academy's framework plan<sup>6</sup>. The framework plan is established

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<sup>6</sup> <https://www.politihogskolen.no/globalassets/for-studenter/regelverk-og-innholdet-i-bachelor/rammeplan-og-programplaner/rammeplan-bachelor-politiutdanning-2019.pdf>

by the Board of the NPUC. The primary purpose of the framework plan is to define the different subject areas that are included in the education and what knowledge, skills, and competence the education has as an ambition to provide the individual student to become a police generalist. The framework plan describes that the purpose of the bachelor's program is to educate actionable, reflective police officers who can carry out preventive and enforcing activities so that people's due process, safety and the interests of society are safeguarded.

The University College Board is responsible for ensuring that the framework plan is updated regularly and that the academic communities participate in the quality assurance of its academic content. The University College Board<sup>7</sup> consists of 11 members, four of these are represented by internal teaching positions, and bachelor students represent two. This representation contributes to good professional discussions before the final adoption of the framework plan.

## 2.2 Bachelor's program

The Norwegian police education educates police generalists who can handle most policing tasks at a basic level. This means that newly qualified police officers are not excluded from any competence areas in the Norwegian police. There may still be a need to acquire additional education in certain disciplines to function optimally in the tasks. The education of generalists is perceived as dynamic and makes it easy for Norwegian police officers to apply to the disciplines they find exciting throughout their careers. At the same time, it will be easier for the 12 police districts to rearrange their employees in line with their needs.

The Norwegian police bachelor's degree is a total of 180 credits, divided into three full-time academic years. The education is carried out on one of the 3 campuses of the NPUC located in Oslo, Bodø and Stavern. The second year of education is a year of practical training carried out in the assigned police district according to the curriculum approved by the NPUC<sup>8</sup>. To focus on the subject area OSINT in this thesis, I have chosen to roughly present the main areas taught in Norwegian police education. Thorough knowledge of totality will make it easier to go into depth on what the students learn around the discussed topics. Throughout this

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<sup>7</sup> <https://www.politihogskolen.no/en/about-us/organisation-and-leadership/governing-board/>

<sup>8</sup> <https://www.politihogskolen.no/en/bachelor/>

three-year bachelor's, the subject areas are divided into the four main areas described further down. These descriptions are based on the first year of education, and before the specialization in the third year of study. These four main areas will form the basis of professional skills and knowledge that the students bring with them to the year of practical training.

## 2.2.1 Preventive policing

In the first year of the Norwegian police bachelor, the students should understand that the purpose of preventive policing is to reduce the risk of crime and contribute to public safety. Students learn how to see connections between causes of crime and preventive measures. They should also understand the role and duties of the police in preventive work. The preventive policing proactive section also includes modules from the course Digital Policing, with its topic of open source Intelligence Techniques.

## 2.2.2 Operational policing

Operational policing is based on the police patrol's assistive, preventive, safety-creating and enforcing function. Students learn about critical tasks, methods and tools related to the various functions. For example, the regulations, physical and mental health, social psychology, communication, and conflict management, first aid, the use of means of power and arrest techniques

## 2.2.3 Investigation

Tactical investigation involves the collection, systematization, and assessment of information in a criminal case. Knowledge and skills in investigation and interrogation, including witness psychology, are key in this exercise. Written documentation is an important part of a police investigation, and the writing of police reports is therefore emphasized.

In the first year of study, this area also includes Technical Investigation as Forensic Science and Digital Forensics. These two subjects are merged as a course linked to two disciplines.



## 2.2.4 Police and society

In this main area, students learn about the history, role, functions, and tasks of the police in society. The area also addresses power relations, social control, and social inequality. The academic content derives from philosophy, history, political science, and sociology.

## 2.3 The police students

Surveys held by the Norwegian Agency for Quality Assurance in Education (NOKUT) show how popular Norwegian police education is among young people. NOKUT demonstrates satisfaction across all higher education in Norway, and in its report from 2019 on University College Quality and overall satisfaction, police education ranks at the very top (NOKUT, 2020, p. 23).

In 2019, 4063 young people applied for approximately 521 study places offered by the NPUC (PF.no, 2021). The study places were divided into 22 classes across 3 campuses with 6 classes in Bodø, 6 in Stavern, and 10 in Oslo. The Qualification requirements were general study competence, good physical health, a clean record, driver's license for passenger cars and Norwegian citizenship according to the Study Department at NPUC (SD, 2022)<sup>9</sup>. With high applicant numbers and competition around admission, NPUC attracts students with strong competence and motivation for education in the police profession.

## 2.4 Police generalist

Due to the desire for decentralized police, the Police Role Committee, which was established on December 10, 1976 (Meld. St. 42. 2004–2005, p. 9) concluded that Police Officers should be generalists. When serving a small district, it is necessary to be a generalist. One consequence of this principle is that special units should only be created when it is compellingly necessary to create or preserve expertise. The generalist should be the main actor. NPUC writes more about this in the program plan 2020-2024 (NPUC, 2019), stating

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<sup>9</sup> <https://www.politihogskolen.no/bachelor-politiutdanning/opptakskrav/>

that a generalist is a police officer who possesses basic knowledge and skills in police preventive, crime-fighting, and safety-creating work. The Parliament also states in its white papers that the basic education program shall educate the police generalists (Ibid).

### 3. CONCEPT OF OSINT

To research the Norwegian police students' internet investigations using OSINT techniques, it will be necessary to describe what OSINT is and how the academic communities view this field of work.

*Open Source Intelligence (OSINT) is an intelligence product which has been processed, analyzed, and obtained from publicly available information (Ivaniko, T., 2020)*

Open Source Intelligence is a discipline used to collect information about places, individuals, organizations, and other objects (Lowenthal, 2017). Most intelligence experts extend that definition to include information intended for public consumption. This publicly available information is often sourced from the internet, television, newspapers, and academic journals. OSINT also refers to a much wider scope of openly available information, and information from open sources outside the internet is a part of this (Steele, 2009).

Information collected from open sources is used by several professions in the democratic world. The police, the military, journalists, corporations and recruiting agencies are among the many groups that regularly use OSINT techniques to obtain knowledge about people and organizations. However, not all organizations that use OSINT techniques have the honest ambitions of meeting an information need to fulfill a legal purpose. Hackers regularly use OSINT to identify technical vulnerabilities and human targets for both phishing and social engineering attacks. It is often vital for hackers to find information before attacking a particular organization or individual to make it look legitimate so that the chance of success is maximized.

Corporations and private companies use OSINT techniques in their business strategy to discover growth opportunities and to monitor competition. Their knowledge of OSINT

techniques provides further opportunities to security check employees, management, and shareholders in their contractors.

OSINT has likely been used throughout the ages as an intelligence tool, and there is a debate about the origins of open source intelligence. Some believe that the modern OSINT dates to at least the 1930s. when the British government asked the BBC<sup>10</sup> to launch a service that would capture and analyze print journalism from around the world. Originally referred to as the “Digest of Foreign Broadcast”, this mechanism still exists today (Alertmedia, 2021).

OSINT increased in scope during World War II<sup>11</sup> when the United States established the Foreign Broadcast Information Service (FBIS). This service monitored publicly available information that supported its troop's operations (Hassan & Hijaz, 2018, p. 2). Military intelligence has since begun to use OSINT as the main source of information about its counterparts to collect and analyze approaches that provide guidance and direction to assist commanders in their decisions.

NATO<sup>12</sup> divides open source information into four categories. Open-source information, open source data, open source intelligence and validated open source intelligence (NATO, 2001). In their descriptions, open source data is collected and unstructured information that exists as unprocessed and raw. Open-source information is most often unprocessed information derived from journalists and news. It is the most used category in both Norwegian and foreign police forces and often comprises compiled data that addresses a specific purpose. The latest variant described by NATO is validated open source intelligence. This is OSINT with the greatest credibility. In its handbook, NATO describes OSINT as “*information that has been deliberately discovered, discriminated against, distilled, and disseminated to a select audience. in order to address a specific question*”.

Dr. Helen Gibson at Sheffield Hallam University describes the reason for the police use of OSINT in this way: *The reasons why the police obtain information from open sources are wide and varied. And in most contexts, this relates to the task of investigating criminal acts or*

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<sup>10</sup> British Broadcast Corporation

<sup>11</sup> 1940 - 1945

<sup>12</sup> North Atlantic Treaty Organization

*preventing such acts from taking place* (Gibson, 2016). OSINT techniques are often used to shed light on whether an act is a criminal offence worth investigating. Compared to NATO's descriptions, this is purpose-driven OSINT and a key part of evidence-based policing. This is used both in the preventive and investigative perspective. As Ramwell et al. describes it in the book "Open source intelligence investigation", *Basic OSINT investigation, within the context of the internet, seeks to identify the online and the social footprint of these users and extract data* (Ramwell, et al., 2016, p. 198).

OSINT is often used in combination with information from closed sources such as criminal case records, journals from operational policing and the Norwegian Intelligence Register (Indicia). These are closed and user-regulated sources in accordance with the Police Register Act<sup>13</sup> (Politiregisterloven, 2010). Compiled information from police registers and information from open sources may provide the best intelligence product for both proactive policing and investigations.

A police investigation can be both proactive and reactive. It could combine these elements, with the proactive investigation later moving into a reactive phase. Investigations can be initiated by both a police report or by the inflow of information from both open sources and surplus information from closed sources through previously recorded incidents.

Most often, a reactive investigation is initiated because of a police report. Such reactive investigation is often categorized as an open investigation after the time of the crime, where interrogation of those involved is a key part of this, and where the rights of those involved are safeguarded by the rules of the Criminal Procedure Act (Straffeprosessloven, 1981)<sup>14</sup>.

A proactive investigation is often characterized as an initial investigation, using hidden methods such as communication control and undercover police. OSINT also plays an important role where information from open sources helps to verify the hypotheses established in the investigation plan. In proactive contexts, where the purpose is not an investigation but decision support for the police's activities, information gathering from open sources is necessary to achieve qualitative decision-making.

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<sup>13</sup> <https://lovdata.no/dokument/NL/lov/2010-05-28-16>

<sup>14</sup> <https://lovdata.no/dokument/NL/lov/1981-05-22-25>

OSINT is understandably an important process within Intelligence Work and in this context, it's challenging to see the distinction between intelligence work and police investigations. This distinction is important to understand because the law regulates police investigations differently than intelligence work. The Norwegian Intelligence Doctrine (POD, 2020)<sup>15</sup> explains the intelligence concept as follows:

*“Intelligence is a managed process, consisting of systematic collection, analysis, and assessment of information about people, groups, and phenomena to form the basis for decisions”.*

The intelligence doctrine elaborates that the objective data collection influences whether OSINT is ordinary police investigation, preventive police work or linked to intelligence. A more usable description of intelligence is described as *“Information that has been given some added value after being collated and assessed”* (Kleiven, 2005).

If the goal of OSINT is to provide knowledge about an area or topic, a description of an ongoing development, or emergency preparedness, it will be regarded as decision support in intelligence. The preventive police work also aims to acquire knowledge about areas, topics and development, and the objectives are often fulfilled by using OSINT as a pillar of the knowledge-based policing work. Both the locally oriented and more situational preventive policing gathers intelligence information for decisions this way. Investigations, on the other hand, are defined in §226 of the Criminal Procedure Act (Straffeloven, 1981)<sup>16</sup> which states that investigations are intended to determine questions of prosecution, avert, or stop criminal acts, and prepare for proceedings in court

### 3.1 Information gathering types

Information gathering from the internet can be obtained using various techniques. The most common are categorized as passive collection, semi passive collection, and active collection.

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<sup>15</sup> Norwegian Police directorate

<sup>16</sup> <https://lovdata.no/dokument/NLE/lov/2005-05-20-28>

These different categories are used differently depending on which types of information are desirable to collect (Hassan & Hijaz, 2018, p.14).

The most common method is the passive collection of information. This type of information gathering only uses openly available sources, without the risk of depositing any digital traces that indicate that investigations are taking place. Although this collection method is categorized as less risky, it depends on both expertise and equipment. Kriplos<sup>17</sup> writes in their guide “use of open sources on the internet in the police”, that one must have knowledge of search techniques and methods for searching and investigating the internet (Kriplos, 2018). At the same time, one must have knowledge of security, and legal frameworks, and possess the necessary equipment and software.

The semi-passive collection of OSINT sends limited traffic to the target servers to acquire information. The activity through this work cannot provide in-depth information about the object's pages or profiles, but only the most basic. This activity will look similar to normal internet traffic during the investigations. The target can detect this activity with the right expertise.

The active collection method interacts directly with the target server using advanced methods of gathering intelligence. Helped by this harvest of technical data on infrastructure and content on web servers, one can uncover vulnerabilities. For the target, the traffic will be perceived as suspicious or malicious, and the method used will leave digital traces. In the context of information gathering before hacking, this was a preferred method for identifying the data infrastructure (Theastrologypage, 2022)<sup>18</sup>

## 3.2 Open source intelligence and legal issues

Although analyzes in OSINT are carried out using open sources, the work is partially regulated by both national and international legislation. These regulations place restrictions on the police, but simultaneously protect public privacy. It is a difficult balancing act to safeguard citizens' privacy and facilitate the best intelligence for the police.

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<sup>17</sup> Norwegian National Crime Agency

<sup>18</sup> <https://no.theastrologypage.com/active-reconnaissance>

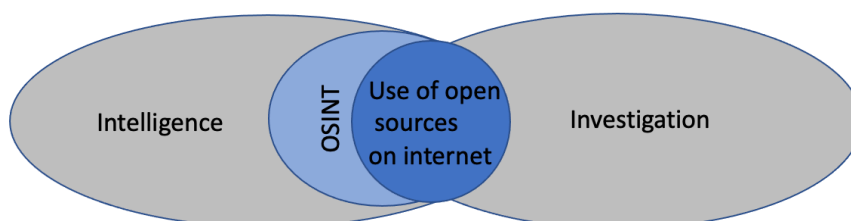
The investigation as a task has been assigned to the police through §223, 1 subsection of the Norwegian Criminal Procedure Act (Straffeprosessloven, 1981<sup>19</sup>). The Attorney General (Circular 3, 1999) describes the purpose of the investigation as follows:

*"The purpose of the investigation is to obtain the necessary information for the decision of prosecution, and to serve as preparation for the proceedings of the case in court."*

The Attorney General has also elaborated on § 226 of the Norwegian Criminal Procedure Act, stating it is the purpose of a police activity that determines whether there is an investigation, not the activity itself. This suggests that where police research intends to avert or stop criminal acts, settle the question of the charge, or prepare for court proceedings, this work is classified as an investigation and the applicable rules apply. The same applies to preparations around child welfare service treatment and the question of whether to act (Ibid).

When OSINT sort under investigation, it will trigger several regulations in both the Criminal Procedure Act and in the Prosecution Instructions (Påtaleinstruksen, 1985)<sup>20</sup> Regulations about an appeal, access to suspects, confidentiality and notification of prosecution decisions must then be considered. When OSINT does not fall under investigation, it will be linked to intelligence-related policing. This police work does not fall under the Attorney General, but under the Minister of Justice and the Police Director of the Police Directorate (Bjerknes & Fasing 2017, p.73). Rules that regulate the police's use of OSINT will then be found in the act of Public Administration (Forvaltningsloven, 1967)<sup>21</sup>, in the Police Act or in parts of the special legislation.

*Fig.1. Relationship between intelligence, OSINT, open internet sources and investigation (Kripos, 2018)*



<sup>19</sup> [https://lovdata.no/dokument/NL/lov/1981-05-22-25/KAPITTEL\\_5-1#KAPITTEL\\_5-1](https://lovdata.no/dokument/NL/lov/1981-05-22-25/KAPITTEL_5-1#KAPITTEL_5-1)

<sup>20</sup> <https://lovdata.no/dokument/SF/forskrift/1985-06-28-1679?q=påtaleinstruks>

<sup>21</sup> <https://lovdata.no/dokument/NL/lov/1967-02-10>

Figure 1. shows the relationship between information used in investigations and information used in intelligence. Data from open sources is processed and put into context. When data is processed and viewed in the context of existing information, we receive the product of Open Source Intelligence. The purpose of the information indicates which of the two tracks the information falls under.

In relation to guiding rules and professional quality, The National Criminal Investigation Service (Kripos, 2018) has devised a guide for searches of open internet sources. The supervisor defines a national standard for how OSINT information should be collected by the police in the most appropriate way. Since its creation in 2018, the guide has been an important document in “Digital Policing” at both the Norwegian Police University College and within the Norwegian police force. The guide refers to descriptions of "best practices" and methods used in OSINT information collection.

The Norwegian Personal Data Act (Personopplysningsloven, 2018) incorporates the European Data Protection Regulation (GDPR, 2018) into Norwegian law. The regulations drawn up by the European Union (EU) intend to ensure the proper processing of personal data.

The Act was developed to strengthen and harmonize privacy when processing personal data in the EU. The regulations are further linked to the EU through obligations made in the Schengen Cooperation (Regjeringen.no, 1996). A collaboration that facilitates equal legislation on issues of privacy and human rights.<sup>22</sup>

The reason for the Regulation’s implementation was to improve the ability of individuals to control information registered about themselves. The EU also believed that the establishment of equal rules for all member states would serve economic developments.

The police, therefore, must show caution in relation to what material is collected, stored, and used. It is required for a lawful purpose to collect and use personal data from defined open sources such as Facebook and blogs on the internet.

The General Data Protection Rules apply in any storage and use of personal data by the police whether or not data is collected from open or closed sources (Sunde, 2018)

When collecting and compiling information elements from various open sources, the police should consider that the information then appears more compromising than what the person

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<sup>22</sup> <https://www.regjeringen.no/no/tema/europapolitikk/tema-norge-eu/schengen-justis-samarbeid/id684929/>



thinks is convenient. Inger Marie Sunde (2013) calls this the "*Ecosystem Effect*". GDPR<sup>23</sup> 2.5.2 states that identifying personal information shall<sup>24</sup> not be retained for longer than is necessary to secure the personal rights of the data subject.

Article 8 of the European Convention on Human Rights (ECHR) states that "*Everyone has the right to respect for their privacy and family life, their home and their correspondence.*" This also affects the police's work around information gathering, as it is not legal to mislead a person into believing they have become friends with someone for the purpose of accessing private status updates on social media. If this is done, it will be classified as infiltration. Infiltration is regulated by the Attorney General and to use such a method, special training and permission must be provided.

The Higher Authorities Prosecutions prohibition of provocation (Circular nr 2, 2018) can be perceived as a restriction on the police investigation. HAP elaborates that, as a method of investigation, provocation is only legal if the circumstances are very serious, and where the provocation does not affect the question of guilt. In this context, we can imagine the use of provocation as a method of investigation in an internet chat with suspects in child abuse cases. This is a case with a penalty, cf. Section 299 of the Penal Code of over 10 years in prison. In minor offences such as the sale of drugs, and where communication between buyer and seller takes place over social media, this form of provocation will be illegal.

### 3.3 Open source intelligence methodology

*A method is a systematic and often detailed approach to solving a problem or a task. A methodology is the study of the different methods within a discipline* (Bjerknes & Fasing, 2018).

The methodology is a complete approach that includes several methods, techniques and tools that together contribute to description of a good process. This process should ensure that the investigator skips no steps and that the Chain of Custody is considered throughout the investigation.

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<sup>23</sup> General Data Protection Regulation

<sup>24</sup> <https://gdpr-info.eu/art-5-gdpr/>

To support strategic, operational, and tactical decisions through intelligence, the police depend on following a good methodology. Preventive, enforcement, and assistive policing are all served by reliability. Intelligence follows, as accounted for, a two-track system. One towards investigation, based on the purpose defined in § 226 of the Criminal Procedure Act (Straffeprosessloven, 1981). And one toward decision support in both preventive and operational policing. Where the initial objective is preventive police work, the collected intelligence information can uncover information that enforces investigations according to the same provision of the Criminal Procedure Act. A proactive investigation is also called an intelligence-led investigation (Gibson, 2016) since the intelligence either provides information about a planned crime or about a criminal trend that is spreading and that the police would influence a change or stop this trend from developing.

There are several methodologies for how the police should collect and process intelligence information from open sources. Common to them all is that they most often possess the same topics, where the numbers vary according to how fine-meshed the methodology is described. The Norwegian police directorate (POD, 2020) communicates through their Intelligence doctrine a visualized picture of their leadership-led intelligence process and methodology.

Fig.2. Intelligence management, OSINT (POD, 2018)

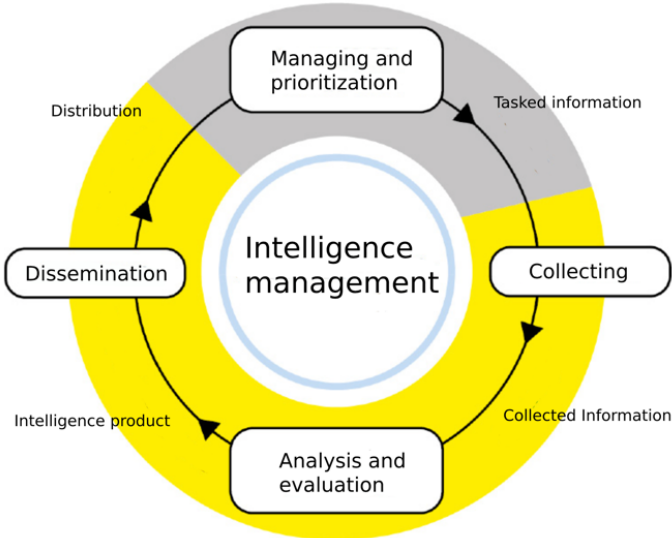
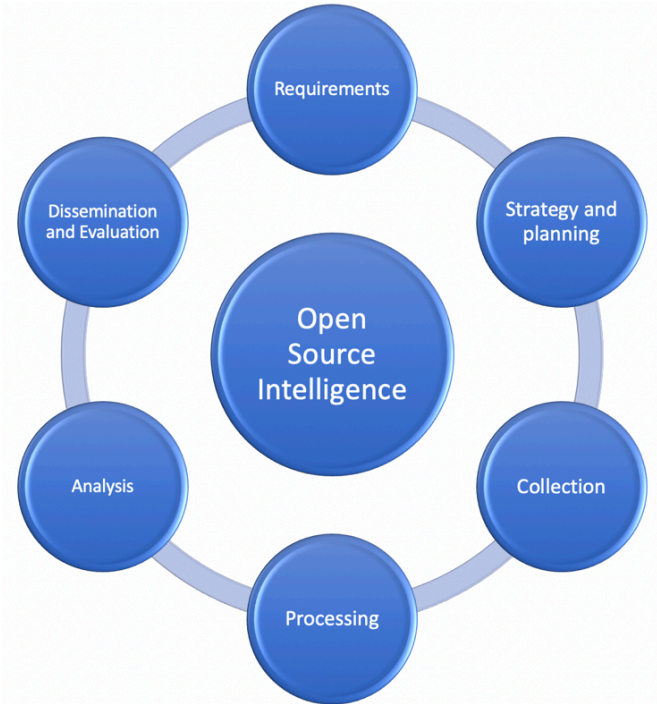


Figure 2. illustrates how the police may develop an intelligence product that can provide leadership support for priorities and decisions. The wheel also illustrates that an intelligence

product can be built on through new collections and analyses based on an increasingly broader understanding of the topic.

Through the bachelor's education of Norwegian police generals, we have decided to teach an OSINT methodology that partially matches the one presented by the POD intelligence doctrine. This new OSINT doctrine was developed by Robert Furuhaug through his Master's thesis at UCD in 2019 (Furuhaug, 2019, p. 56). The difference between these two methodologies lies partly in how the final intelligence product is handled. The OSINT methodology is not only intended for distribution, but also to be compared against the current investigation hypothesis, and then to provide new directions and new hypotheses in a new process. The result is an intelligence process visualized as repetitive.

*Fig.3. Open Source Intelligence Methodology (Furuhaug, 2019)*



The phases of this OSINT methodology deal with 6 main topics. In the following sub-points, I briefly explain which topics are included in each phase.

### 3.3.1 Requirements

Like most similar methodology, this wheel starts by defining a need for information. This need may have origins in a hypothesis-based investigation or the need for information to help as a priority and decision support. At the same time, this need may have originated from obtained information from both open and closed sources. In this context, the process is illustrated as a circle, where collected information reveals new information that can be processed repeatedly.

### 3.3.2 Strategy and planning

*Thorough planning of how to identify the relevant information required to answer the questions and the process of finding and preserving this data is an important first step to extract information that has the necessary quality and accuracy (Gibson, 2016).*

Through this statement, Gibson highlights the importance of the methods and principles being used to accurately obtain information from open sources. It is important that described work processes are followed to safeguard the Chain of Custody. Only through structured work that uses established principles, standards, and processes, can one call the digital investigation forensically sound (Flaglien, 2018). Forensically sound is a term of a recognized method for handling and securing digital evidence under approved principles in the academic community for digital policing.

### 3.3.3 Collection

Although sources are described as open, this does not mean that the information is readily available. As investigators, we need to know what methods and techniques we can use to secure digital footprints from open sources. These footprints can be important information that identify users, IP addresses, e-mail addresses, or information that can provide valuable knowledge about people, places, or objects.

The planning and strategy phase should specify what information is needed. Only then can the collection possess its desired quality. Are we looking for information that confirms a hypothesis in an investigation, or do we gather information about a phenomenon that will

require an effort from the police? These questions will support how the process develops. If we collect information from the internet's many forums, domains, and blogs, we can often use good methods for advanced search techniques in Google<sup>25</sup>. In addition, there are in-game-chats, file sharing services, and several other communication arenas to retrieve digital footprints from. The number of sources is limited only by the imagination and the information needs communicated in the methodology's requirements.

Social media has its own distinct acronym within the intelligence family known as SOCMINT<sup>26</sup> (Omand et al. 2012). Its intelligence techniques often set different requirements for tools than the general information gathering with power searches via Google. The information obtained from social media within an investigation may provide more information, especially in the investigation trail. In a purpose-driven investigation, one will try to shed light on hypotheses with good intelligence from SoMe<sup>27</sup>. Social media can provide answers to several questions related to both persons and organizations. One can also follow trends and developments in relation to both problem areas and topics. Some information opportunities which H. Gibson explains in the book *Open Source Intelligence Investigation* (Gibson, 2016), are listed below:

- Demographic information.
- Friends, family, and colleagues.
- Logs, interests, and activity
- Map of visited places with timestamps
- Opinions and statements

In the collection phase, there are several key concepts and methods that are crucial to follow to safeguard the chain of custody. Both academic environment-approved collection techniques and process descriptions through an audit trail are important. Only through a clear and well-documented process can the decision-makers rely on information being correct.

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<sup>25</sup> [www.google.com](http://www.google.com)

<sup>26</sup> Social Media Intelligence Acronym

<sup>27</sup> Social media

### 3.3.4 Processing

The processing phase describes both conversion and clarification tasks that must be carried out before the analysis of the collected material can start. In this phase lies the conversion of various file formats, time zones and languages, to establish a standard comparable in the upcoming analysis. The identification and interconnection of entities are also important parts of processing. The term entities originates from Latin, and it means "what is". The term is broad, and includes people, objects, places, and interest groups. Modeling of message threads and communication made in forums and on SoMe is also part of the processing. To avoid picking statements out of context, a deeper understanding of the communication must be put together to prevent messages from being changed or misunderstood. A good review of the entire communication thread may be required.

### 3.3.5 Analysis

The ability to analyze the information distinguishes basic OSINT from excellent OSINT (Hribar et al. 2014, as referred to in Gibson et.al. 2016 p. 95). Systematization of information is the first part of the analysis. Information will not become intelligence without analysis. Collected information is sorted, grouped, and evaluated. The results are compared with hypotheses or the information task that initiated the intelligence process. The source reliability is also validated in the analysis based on other information shared from the same source.

Network analysis allows establishing an understanding of which people are interacting. Through friends lists on SoMe, or by collecting information about who follows, likes, or comments on posts from a person or group, the investigator can establish an understanding of a social environment through analysis. This information will allow the investigator to see things in context and enable the investigator to create new hypotheses that can lead to new targets in an investigation.

The multi-source analysis is a part of the analysis, and it will focus on connecting entities through various sources of data. By comparing collected information, the investigation can establish connections in the hypothesis-based investigation. The collected information can

through analysis be compiled and structured and the investigation can more easily establish events in a timeline. There are many intelligence analyses naturally included in this phase. In the presented research question, the analyses I now have presented will be the most important for further discussion in my surveys.

### 3.3.6 Dissemination and Evaluation

Dissemination and evaluation are the last part of the intelligence process. This phase consists of the dissemination and distribution of the finished intelligence product to the investigative management or relevant recipients. The product can be conveyed as a completed intelligence product in decision support for the client or to strengthen or weaken a hypothesis in the investigation. The product can also shed light on new information that needs to be elucidated through a round in the visualized intelligence process.

The evaluation of OSINT and its results should highlight whether the process was carried out under approved methods and principles. One should evaluate whether the information collected is correct and relevant. The result of a good evaluation process can support new techniques and methodology in OSINT techniques going forward.

## 4. OSINT TECHNIQUES

Intelligence techniques aimed at open sources on the internet can be described as the techniques and methods used to obtain valuable information about persons, organizations, objects, or locations from available, open, and digital sources.

The collection of information is one of the most important tasks in the methodology of OSINT. Without it, the investigation cannot analyze hypotheses in a qualitative manner. Similarly, good information is also necessary as decision support for preventive tasks.

The limits of what is defined as internet investigation and work aimed at crime prevention are important for what measures the police can use. If the purpose is to find information to prevent crime, it is part of Evidence-based policing where OSINT is a source of knowledge. If the purpose of securing information from the internet is to investigate a criminal offence, it is called internet investigation. Internet investigations allow for coercive measures defined in Chapter 16 of the Criminal Procedure Act, on seizures and extradition orders (Straffeprosessloven,1981, chapter 16). In this context, investigations may allow for disclosing content on a mail account, closed profile on SoMe, or file content from cloud services.

## 4.1 Computer preparations

Proper use of OSINT techniques requires the investigator to prepare hardware, software, and skills. Key topics that should be considered during this initial phase are questions about what information we are seeking, where we should search for it, and whether it should be carried out without identifying an ongoing information collection.

Every methodical presentation of OSINT techniques should include a discussion of the correct setup of computer equipment. In this context, I point out the necessity of using obfuscation techniques to prevent OSINT investigation and techniques from identifying us. Any identification of ongoing information gathering may change the perpetrator's routines, and information can be altered or deleted before it can be secure in a proper manner.

Using a Virtual Private Network (VPN) to anonymize the investigator's public IP address is essential for information collection. The word obfuscation is often used in such a context, meaning to make something difficult to understand. When using a VPN-assigned IP address, the computer used for search and analysis will not be identified with its ordinary IP address provided by the Internet service provider (ISP). The IP address assigned is provided by the VPN service and is not traceable to the user that subscribed to the internet service.

Another advantage of using a VPN is the encrypted connection from the client out to the domain, which also makes traffic unreadable to other users online.

A proxy server can also provide anonymity on the internet as the solution acts as a relay between a user and the internet. The proxy hides your IP address and can help hide your



online identity and location. A proxy server can also bypass geographical restrictions on the internet, but it also has drawbacks such as a lack of end-to-end encryption and is hence somewhat less secure.

In obfuscation, there will be several methods to use, and I will not explain those which are not part of what the students are familiarized with in their education. On the other hand, I would like to mention TOR<sup>28</sup> internet browsers and networks as a good tool for information gathering. The TOR network is encrypted in several layers, and a person under investigation cannot identify who we are or where we come from while using a TOR browser. A skilled person can see we use the TOR network by using a TOR IP address. In some criminal environments, this can create suspicion that can affect our information collection.

With VPN anonymization, all traffic to the internet will be assigned a new and different IP address. This not only applies to browser contact with websites, but also to general contact with SoMe and other online services. Nevertheless, it is important to understand that we still leave behind some digital traces. These traces are referred to as "User-Agent". User-Agent information is sent to all sites on the internet that we visit, so graphics and html scripts are displayed in the best way in the recipient browser.

These digital traces will enable a competent webmaster to identify us. And the webmaster can see how often a computer with this setup has visited the website.

User agent example:

*Mozilla/5.0 (Macintosh; Intel Mac OS X 10\_15\_7) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/15.2 Safari/605.1.15*

Identification of User-Agent can be prevented if the search and examination computer installs a browser and add-ons that do not stand out in the crowd. The Firefox browser has an add-on that produces a fake User-Agent (User-Agent Switcher and Manager). With this, the user can choose the operating system and browser that will appear to others when surfing the internet.

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<sup>28</sup> The Onion Router

To understand the need for obfuscation techniques a police generalist should know about *Locard's Exchange Principle* (Flaglien, 2018). *“The principle states that whenever two objects come into contact with another, there is an exchange of materials between them”*. This also applies in the technological context where a computer client connects to a domain on the internet to be presented with information displayed in the internet browser. And it applies to all other digital contacts between digital devices.

To make the best use of these anonymization techniques, it is essential for the police to maintain pre-installed search and analysis machines for use at the police stations. These machines should be installed with both TOR browsers and a VPN service. Many police stations already facilitate this, and through the upcoming examination in this master's thesis this will be discussed.

## 4.2 Internet Browsers and SoMe profiles preparation

Search techniques using internet browsers are one of the most important areas of knowledge in OSINT. As such, internet browsers in this line of work must be approved by the academic community. To achieve this, the source code of the software should be open and controllable so it can be confirmed as invisible to other actors.

Internet browsers such as Safari, Firefox, Chrome, and Internet explorer all have the option of including plug-ins in their functionality. Plugins should be discussed and accepted in the academic community in the same way as browsers. This is not only related to leak challenges, but also to ensuring methods are forensically sound. An investigation is forensically sound if it adheres to established digital forensics principles, standards, and processes (Flaglien, 2018). Used plug-ins should thus demonstrate that evidence found or secured by the tools is preserved in its original form. All evidence used in legal proceedings must meet a standard of proof for authentication. The prosecutor must be able to prove that the evidence is authentic and unaltered from its original state. Within this area of expertise, the preservation of the evidence in its unaltered state is called evidence integrity.

A major source of information in using OSINT on the internet is the many social media apps<sup>29</sup> that contain an infinite amount of information. Obtaining and structuring the right information can provide valuable understanding in an investigation. This information gathering from SoMe is discussed as SOCMINT.

Facebook (FB) is a social media platform that provides<sup>30</sup> its users access to decide for themselves who can read their posts. This means that FB is a partially open media, where the user decides what is shared in the circle of friends, or what is shared in "open or closed" groups.

Common to most social media platforms is that the user must have a user profile to create, share, read, comment on, or like a post on social media. On FB it is necessary to use a user profile to log in and find information about various entities. The profile used must not be the investigator's private profile. One of FB's main areas of application is to connect people, therefore the use of a private profile with a friends list will mix the entity from both OSINT searches and privacy. In this context, the account will likely be compromised. At the same time, it is not wise that an initial preliminary investigation identifies the investigator as a friend proposal for the person being investigated. This can damage investigations and intelligence operations and expose officials using their profiles.

Considering these challenges, the police must create their own search profiles on FB to carry out information gathering without being identified. These profiles should look authentic and be without real friends who can give the profiles a suspicious look.

As an investigator, one should know FB's own rules don't allow the creation of fake search profiles as its policies prohibit anyone from pretending to be someone other than who you are. At the same time, it is also required that the profile uses the same name you use in everyday life (Facebook, 2004). The National Criminal Investigation Service writes in their guide for Searches on Internet (Kripas, 2020, p.7):

*Police task is to avert, prevent and investigate crime throughout the whole country, on Facebook as well as on the streets. It seems unreasonable for the police not to do this on*

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<sup>29</sup> Applications. Original acronym for programs running on mobile phones.

<sup>30</sup> Social media (Facebook.com)

*Facebook because Facebook has defined a naming policy that makes police presence impossible. The police's social mission cannot be overruled by Facebook's terms of use.*

There are challenges when creating a search profile for use on FB. One of these is that the search account must be verified to a mobile phone number. In the past, this verification could also be done using an approved mail account, but due to the constant tightening of FB's policy, it will be very difficult to succeed in this. The telephone number used for account verification should not be connected to the investigator or the police.

To prepare search accounts for use on Twitter, Instagram and LinkedIn, the same steps as creating a search account for FB are used. Creating a search account for Twitter is a little easier, as Twitter approves accounts verified only via an approved email address.

### 4.3 Google searches and operators

In the OSINT methodology's collection phase, we need to know good techniques for collecting and securing information from websites and profiles on social networks.

The National Criminal Investigation Service (Kripos) has in its guide, *The use of open sources on the internet in the police* (Kripos, 2018), explained how online information can be secured under approved techniques. This guide is essential to the work of the Norwegian police when using OSINT techniques. Several techniques I discuss in this academic report are also presented in this guide.

Google is the largest internet search engine. The service offers advanced searches on the pages that Google indexes in its databases. These searches can either be performed with a default setup, or with relatively advanced search filters, also called search operators.<sup>31</sup> In this small presentation of search operators, I would like to point out some operators that are focused on during the first year of study at the Norwegian Police University Collage.

Some operators used in the Google search engine:

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<sup>31</sup>[www.google.com](http://www.google.com)

<b>Quotes</b>	<b>“First name Sir name”</b>
<p>Using quotes around the phrases will help us find results that are exact match results, rather than the broad results you will get with standard search.</p>	
<b>And</b>	<b>Tesla and Musk</b>
<p>This command will list all hits on articles and posts that hold both Tesla and Musk on the same page.</p>	
<b>Or</b>	<b>Ford or Audi</b>
<p>This command shows all hits on Ford and all hits on Audi, but no matches on articles where both car brands are mentioned.</p>	
<b>-</b>	<b>Musk – SpaceX</b>
<p>With this command it is possible to find all the hits on Musk and omit those hits that mention SpaceX at the same document.</p>	
<b>Site:</b>	<b>Cybertruck site:vg.no</b>
<p>With this command, it is possible to find all articles about Cybertruck on the news site <b>vg.no</b>.</p>	
<b>Filetype:</b>	<b>site:phs.no filetype:pdf</b>
<p>The File command allows to find file types combined with words or website (Domain).</p>	
<b>Location:</b>	<b>Youth location: London</b>
<p>This command finds the word Youth in a self-defined location. London it this example.</p>	

*	* <b>strategy</b>
The wildcard fills in the blanks and gives all possible variations combined with the word Strategy.	
<b>Cache:</b>	<b>cache:cnn.com</b>
This operator displays the latest indexation of the referenced page at Google.com. And this operator gives the opportunity to find information on a domain, leaving no traces by visiting the page.	

These search operators can be combined to refine the search so immaterial matches are filtered out. A common example of this can be when using quotes around person names referring to a site or a location:

### **"Volodymyr Zelensky" and "Vladimir Putin" meetings site:cnn.com**

On Google's support site, these basic operators are explained and exemplified<sup>32</sup>. This overview of valid operators is part of what NPUC uses in its OSINT training in the bachelor's first year of study. Besides these manual search strings, Google also has an advanced search site. On this site, it is possible to do power searches without knowing operators. It should be noted that manually setting up search operators provides better search results than this advanced search site.

Among well-known OSINT techniques, there is a method for finding information from the "Deep Web". This is the part of the internet not indexed on the search engine's servers. The method is called a 2-step search, and this means searching for a database to search in. Without complicating this too much, I can refer to the challenges of finding good content records on TOR (The Onion Router). If we first identify places to search in Google, we will get the Onion links to these sites. These links can later be used with the TOR browser.

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<sup>32</sup> <https://support.google.com/websearch/>

## 4.4 Reverse Image searches on the internet

Google enables searches on the internet with an image as input. In the academic community for digital policing, this technique is called *reverse image search*. This search opens many possibilities, one of which is to identify where a photo is taken or what the subject shows. This OSINT technique also allows investigators to identify an unknown person on an existing image. To succeed with this, the person one wants to identify should be represented with several images in various articles on the internet, so the search engine gets an identification. Many similar resources on the internet offer reverse image search. And in this context, the search sites used should be reputable and referred to in the academic community or in National Crime Agency's guide: *Use of open sources on the internet in the police* (Kriplos, 2018). This guide points out, among other sites, the online resource Tineye, which is well suited for identifying facial images<sup>33</sup>.

Accepted and well known online OSINT resources are essential for searching and securing information according to approved techniques and principles. The Norwegian National Crime Agency must convey this knowledge to the Digital Policing communities (DPC). Through monthly video meetings in the "OSINT Club", DPC is added knowledge of both tools and techniques accepted by the communities.

When searching with images as input, the police should understand that images from criminal cases should not be used as input in online search engines. A reason for this is the concerns about the leakage of an ongoing investigation and the safeguarding of the privacy of the individuals. Besides this, it should be considered that some search engines are not as friendly and tuned as one assumes, but instead have features for gathering different information about the user. As an example, I would like to mention the search engine Yandex.com, which is founded by Arkady Volozh, one of Russia's wealthiest businessmen with a close connection to Russian President Vladimir Putin<sup>34</sup>.

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<sup>33</sup> <https://tineye.com>

<sup>34</sup> <https://www.theguardian.com/world/2022/mar/05/warnings-raised-over-russian-tech-giant-yandexs-uk-operation>

## 4.5 Digital images and OSINT

Digital images distributed through SoMe and the internet particularly interest police investigations. Images have basically EXIF data recorded in their source code. EXIF is short for Exchangeable Image File, a format that is a standard for storing interchange information in files using JPEG compression. EXIF data may contain information about the image file itself such as:

- Camera make (Mobile phone), model and serial number.
- Lens, focus, aperture used when taking picture.
- Geolocation of where the photo was taken.
- Once the picture is taken and when it has been changed.

This data is interesting to be put in a timeline in the investigator's hypothesis. The information enables the investigator to link the image to the device that shot the image. And not least, the investigator can understand where the picture is geographically taken if the GPS function is activated on the device used.

Digital images from open sources can contain good information in several cases. The most common method of examining an image is to record the visual details of the image itself. There are often identifiers that can be searchable within Google. Such identifiers can include landscapes in the background, business facades, text in scenes, or bedding and wallpaper from an unknown hotel room.

Some of these techniques lead what we call Digital forensics. This knowledge of file and image processing is important to master to identify digital traces that can create new OSINT examinations.

Unfortunately, Facebook and several other SoMe resources wash away EXIF data from the digital images shared on their SoMe platform. This means that the OSINT techniques aimed at these forms of media most often involve identifying image subjects or determining where the image is taken when it is shared, and who has commented and liked this image.



There are simple techniques for finding EXIF data on digital images. Most operating systems will present file properties associated with the files through the file explorer application. The latest operating systems of Mac and Windows computers also have features for presenting an image directly in a map with geolocation information from the EXIF data. In MacOS, this feature is called "Show Inspector". This built-in feature displays all the information stored about the digital image inside the file and in the Filesystem. The operating system Windows 10 also has this ability.

There are several online resources that can be used for information about EXIF data, and in relation to identifying a motive. Common to these resources is that digital images must be uploaded on the internet for further analysis. This is not in accordance with the privacy of the individual being investigated or what I referred to as forensically sound methods.

There are many challenges around information gathering with OSINT techniques, some of which surround whether digital images can identify confidential information about people or addresses in a police investigation. The Police Register Act (Politiregisterloven, 2010)<sup>35</sup> is among the provisions that regulate the duty of silence of the police. The Act states that anyone employed by or serving in the police must prevent others from gaining access or knowledge of what he in connection with the service or work learns about someone's personal circumstances. The duty of confidentiality also applies to information that, based on the consideration of the investigation in the individual case, is necessary to keep secret. Searches and search techniques where the police share an image motif or identifying information must therefore be used with great caution.

## 4.6 Google Maps and Street View

Google Maps is one of many features in Google's universe of applications. Through searches in Google Maps, it is possible to view maps from all over the globe. The maps are advanced and provide a good overview of residential areas, business areas, institutions, public communication, and several other topics at the input location.

After searching for a location in Google Maps, it is possible to show that location in "Google Street view". The application will then give the user a visual impression of standing in the

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<sup>35</sup> Chapters 5 and 6 of the Police Register Act regulate the police's duty of confidentiality in criminal proceedings

street at the selected location. This allows for navigating the streets as a predecessor, while getting a good impression of houses, house entrances, and facades on a location. Investigators should consider that these pictures of the facades in Google Street view can be both 2 and 3 years old. These functions are of great help to the police in both preliminary investigations and investigations, and as object understanding and decision support in preventive policing.

## 5. DIGITAL POLICING AT NORWEGIAN POLICE UNIVERSITY COLLEGE

Digital policing has over the past few years been a proven priority for the Norwegian Police Directorate (POD) and police education at the Norwegian Police University College (NPUC). POD's strategy, "Police towards 2020" (POD, 2017 a) describes three main areas for the police to prioritize in the years leading up to 2025. The ambition of this strategy is for the police to lead crime, provide high-quality police services, and ensure safety in the digital space.

POD explains that the internet is used for business, public administration, and private social life. This opens more doors to criminal behavior. The internet provides opportunities for quick and large yields and reduces the chance of being uncovered and punished. What is found in real-world crime is often found on the Internet in another form. If this is compared to the social mission defined in paragraph 2 of the Police Act (Politiloven, 1995, § 2)<sup>36</sup>, which states that the police shall protect all lawful activities, and maintain public order and security, the importance of increased digital competence becomes clear. POD underlines in its digitalization strategy (POD, 2017 b) that the police must be present where people are, by also being present on the internet. The strategy highlights the police's handling of computer crime and digital traces as one of 4 main topics to increase police competence up to 2025.

The Norwegian Police University College's strategy from 2017 - 2021 (NPUC, 2017) underlines the ambition of educating a police force that can prevent and combat crime in a digital society. The strategy expresses that the NPUC should be essential to the bachelor and further education of police officers who will carry out police work in the digital space. This

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<sup>36</sup> <https://lovdata.no/dokument/NL/lov/1995-08-04-53>

means increasing the scope and quality of teaching, competence development and research in digital policing and information security.

In the spring of 2015, Digital Policing was established at the Norwegian police university college. This was a few months after Police Director Odd Reidar Humlegård acknowledged in the media that internet crime is becoming an increasing problem and that the police so far have not taken this seriously enough (Jørstad, 2014). Digital Policing then became an integral part of the subject "The Police Computer Systems", which focused on police systems training.

## 5.1 Curriculum for the Norwegian police education

Through this master's thesis, I will analyze the answers provided by police students through the assigned survey in January 2022. The survey focused on the students' use of OSINT techniques throughout their year in practical training across various districts from autumn 2019 to the summer of 2020.

I will present the curriculum the students were given in the first year of their education before practical training. Nevertheless, towards the end of my thesis, I will present changes made in the subject of Digital Policing and OSINT techniques after 2020.

The curriculum's task is to define and introduce the general learning outcome across the various subjects of the bachelor's degree. The distribution of the total 180 credits over this three-year education is regulated in this document. The curriculum explains that the Norwegian police education should be of high professional quality. There shall be a close link between professional subjects, disciplines, and practical fields. Police science is supposed to be essential. Experience and research-based knowledge, digital competence and ethics shall be consistent (NPUC, 2017, p.3). This clarifies that digital expertise, especially toward digital policing, will aim to be part of all disciplines.

Digital Policing is primarily merged with Forensic Science in the first year of the bachelor's program. The course is named *Digital Policing and Forensic Science*<sup>37</sup>, and the subject was assigned 7.5 credits in the first year of the study in 2019-2020 (B1).

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<sup>37</sup> Dipokrit01

Table 1. The first academic year at NPUC (B1)

<b>Subjects in the bachelor's first year of study in 2019-2020</b>	
Preventive policing	7,5 Credits
Order and emergency response	16,5 Credits
Tactical investigation	7,5 Credits
Police, society, and ethics	11 Credits
Digital policing and Forensic Science	7,5 Credits
Criminal law and criminal procedure	10 Credits

In Figure No.4, I have highlighted the two subjects through which digital policing was lectured during the first year of study. The green marking shows the preventive policing that was lectured to students in B1 during the autumn semester of 2019. The orange marking shows digital policing and forensic science. This subject was conducted in the spring semester of 2020 for the same students.

By reading the description for preventive policing at B1, we can understand that elements from Digital Policing are domiciled in the subject:

*“Prevention is about being at the forefront and preventing crime and undesirable incidents from happening. The purpose is to reduce the risk of crime and contribute to safety and public safety. Societal development, technological developments and police strategies suggest that prevention and evidence-based approaches require an increased level of ambition in terms of police quality and capacity in prevention”<sup>38</sup>.*

<sup>38</sup> [https://www.politihogskolen.no/globalassets/for-studenter/regelverk-og-innholdet-i-bachelor/rammeplan-og-programplaner/programplan-bachelor-polititdanning-tredje-studiear-2019-2022\\_politihogskolen.pdf](https://www.politihogskolen.no/globalassets/for-studenter/regelverk-og-innholdet-i-bachelor/rammeplan-og-programplaner/programplan-bachelor-polititdanning-tredje-studiear-2019-2022_politihogskolen.pdf)

The description of the subject also explains that general competence includes an understanding of and reflection on police tasks in practical, preventive work across both the physical and digital spaces. Students should also be able to describe the intelligence process and explain the police generalist's role and tasks in this.

Through this understanding, it is natural that open source intelligence belongs in this subject. Knowledge of the methods and techniques of Digital Policing are also in this group.

The knowledge the students acquire about open source intelligence in preventive police work is built on in Internet investigation. This topic is held in the spring semester, and it is part of Digital Policing and Criminal Intelligence.

## 5.2 OSINT in the Bachelor

To discuss whether an added competence in OSINT techniques is remembered and used, it will be necessary to shed light on what learning outcomes were intended for the students through B1<sup>39</sup> at NPUC.

The learning platform Canvas is highly important to education at NPUC<sup>40</sup>. On it, all subjects are represented. Each subject area continuously shares lessons and subject matter into separate modules. The learning platform allows for digital teaching resources such as textual information and files in PowerPoints and PDFs. Canvas can also display videos and allows for submissions and student feedback. The basic education at NPUC combines the use of different educational frameworks in teaching. The dissemination of knowledge takes place not only in classrooms, but also in auditoriums, apartments for practical training, and on videos and presentations shared on Canvas. Through a variety of dissemination methods, the teaching is carried out according to student needs.

### 5.2.1 OSINT lessons in Preventive Policing

Through my presentation of the courses in the bachelor's degree, I have described which framework applied to the students in the period between autumn 2019 and summer 2022.

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<sup>39</sup>First year of study. Bachelor one.

<sup>40</sup>Norwegian Police University Collage

OSINT was first presented to the police students in the course Preventive Policing. In this course, 5 teaching sessions were conducted, each of two hours. The points below show which elements were included in the knowledge building. I choose not to spend too much time presenting everything, but only the main points of the completed lessons.

### **Computer networks (2 hours lesson in the classroom)**

This lesson was not a direct OSINT related lesson, but a lesson meant to develop the knowledge and foundation to better understand the internet, and to see things in context. The topics here dealt with communication on a network, Mac addresses, IP addresses, Network Address Translation (NAT) and Dynamic Host Configuration Protocol (DHCP).

### **Internet (2 hour lesson in the classroom)**

The students were presented with the organization and allocation of public and local IP addresses. The Assigned Numbers Authority (IANA) and the Regional Internet Registries (RIR) were presented, to later use the competence to investigate and be able to trace an IP address. The structure of Domain Names, URLs and key protocols was also reviewed during these 2 teaching hours.

### **OSINT lesson 1 (2 hours lesson in the classroom)**

In this lesson, students became familiar with what information in open sources is, and how we can make use of it. The lesson aimed to present our used OSINT methodology described earlier in this paper. During these two hours, students got to discuss his/her thoughts on what OSINT is and how it can be used. Measures to maintain safety and to avoid exposure were presented and discussed in the same student groups. The use of Proxy servers, VPNs and TOR was explained and reviewed by the teachers. These are measures I presented in this paper under the chapter Computer Preparations.

### **OSINT lesson 2 (2 hours lesson in the classroom)**

This lesson presented the search engines' indexing and varied ranking of hits. It included presentations and exercises in searches using Google operators, the same ones that were reviewed in this paper's chapter on Google searches and operators. The same chapter also presents the term "Two-step search" that was reviewed and given assignments on during these hours. During the second half of the lesson, the students were presented with what information digital images can provide for an investigation.

The aforementioned "Reverse Image Search" was presented, and the students were tasked with locating a poster on a building façade in Oslo. The building façade was easily found in Google Maps. The façade was visible in Google Street View and the sign became legible if students put the street view back in time.

The students were made aware of the fact that images provide good opportunities in relation to both EXIF data and image motifs. One can search with images as input to discover where the image comes from or what or who is depicted.

### **OSINT lesson 3 (2 hours lesson in the classroom)**

This lesson presented an individual task assigned to each student. Since the OSINT lessons were included in the police preventive subject, this work requirement was linked to police prevention. The assignment dealt with violent incidents involving youth gangs at Ullhaugen Middle School in Vallevik. The Preventive Policework Department intended to start a project to stop this development. More information was needed about these recurring episodes of violence. Based on tips and information from those the police had spoken to, it was believed that threats and agreements were communicated through various social media platforms. One person mentioned in the youth gang was "Frank Ullen", and he was registered with profiles on both Facebook and Twitter to make this real.

The assignment given to the students was to create a strategy and plan on how to obtain the information to map this environment. This strategy was intended to initiate the thought process and how information can be gathered from open sources, and how this information can be planned and presented to an audience.

In the spring of 2020, OSINT technique lessons were part of the Digital Policing and Forensic Science. Through 3 2-hour lessons in the classroom, we reinforced students' understanding with new exercises and lessons in OSINT techniques.

### **5.2.2 OSINT lessons in Digital Policing and Forensic Science**

In this subject, these two disciplines were combined. The subject did not have many common denominators, but it represented areas of expertise that dealt with handling a crime scene.

During the spring semester, the disciplines held a joint exercise in the Exercise Apartment. The learning objective was police work on a crime scene in relation to forensic science learning objectives and in relation to the search and seizure of digital evidence and traces under the learning objectives in Digital Policing.

Examinations were held digitally with questions from both subjects. The exam was digitized and arranged in the exam platform Inspira, due to NPUC's Corona shutdown in the spring of 2020.

Through the learning platform Canvas, we started the spring semester in this course by presenting what Internet investigation is. Both internet investigation and OSINT have been explained in this master's thesis.

For the knowledge of OSINT techniques, methods, and principles to be fortified, we shared the previous PowerPoint lessons from OSINT in preventing policing in Canvas. Also, the lessons that dealt with IP addresses were re-shared as we know through experience that the students find this difficult to understand.

The internet investigation and use of OSINT techniques were taught through a theme week in the spring of 2020. Throughout this week, we arranged the following three classroom teaching sessions:

### **OSINT lesson 1 (2 hours lesson in the classroom)**

Taught during this session were the various anonymization methods, including VPN and TOR, explained under the OSINT preparations section. The teachers then presented the browser as the internet investigator's most important tool and shared the possibilities that exist in using various browsers and various add-ons and web resources to find and secure evidence.

Some of the web resources presented:

*Waybackmachine*<sup>41</sup> used to find older information from pages on the internet.

*White and Yellow Pages*<sup>42</sup> used to find people on the internet.

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<sup>41</sup>[www.waybackmachine.com](http://www.waybackmachine.com)

<sup>42</sup> [www.wayp.com](http://www.wayp.com)



*Namecheck*<sup>43</sup> used to find a user on multiple social media sites.

*Exif.regex.info*<sup>44</sup> a tool for finding EXIF data on images using online services.

*Google reverse image search*<sup>45</sup> for searching with an image as input.

### **OSINT lesson 2 (2 hours lesson in classroom)**

During these two hours, the students worked under supervision in small groups of three. They were presented with two assignments to be investigated and documented using what they had learned in the subject. A picture of a wall from Gdansk in Poland was to be identified, and a photo taken out of an airplane window was to be identified with aircraft type and flight departure. This was not an easy task, but by following the knowledge of searching further on elements in the image, such as the flight wing, most groups identified the aircraft. The flight departure was possible to find via the photo's geolocation and proximity to the airport. The airport's timetables shared on the internet could be compared with the timestamp in the picture and the aircraft model. These exercises provided a solid understanding of the term "follow the breadcrumbs", to understand how to get good results in internet investigation.

### **OSINT lesson 3 (2 hours lesson in the classroom)**

The goal of this lesson was to provide students with training and an understanding of how an OSINT report can be presented to an audience. The assignments from the previous lesson were completed and the methodology was presented as a process description and visualization of findings. The students' presentation was carried out as the last phase of the OSINT methodology and shed light on whether the process was carried out in accordance with approved methods and principles.

### **Other factors around these lessons**

Throughout the spring semester in 2020, these lessons were held for the first-year students at all NPUC locations. The ambition of the academic group was to present how to create anonymous search profiles on Facebook, and to collect information from open profiles. However, due to Corona and campus closures, we failed in this without physically being able to meet and prepare. The topic of using such profiles was nevertheless well communicated in the lessons in SoMe profile's preparation.

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<sup>43</sup> [www.namecheck.com/en/](http://www.namecheck.com/en/)

<sup>44</sup> <http://exif.regex.info/exif.cgi>

<sup>45</sup> <https://www.google.no/imghp?hl=no&ogbl>

## 5.3 Exam results in DipoKrit01 2020

Digital Policing and Forensic Science were merged into one subject area in 2019, as the subjects have a lot in common (chapter 5.1). This is also reflected in the exam, which in recent years has been arranged as a joint exam.

The exam for the police students researched in this master's thesis was, due to the corona shutdown, arranged as a digital home exam in the exam module "Inspera.com". The exam was divided into two blocks, where each represented one of the two disciplines. The students were given 3 hours to answer the 57 questions in the exam.

4 of the questions were aimed at internet investigation and OSINT. In addition, one of the biggest cases had internet investigation as a topic. I have done no detailed analysis of how the scoring in these questions was organized, but I still present the results as they may affect the students' capability of using of OSINT techniques. This information is delivered from the Study Office at NPUC, and it is added to the appendixes in Chapter 11.

545 students attended this exam. Several candidates in attendance were students from previous years who retook the exam for various reasons. 277 of the candidates were women and 266 of the candidates were men.

Of the 277 participating women 23 (8%) failed. The average grade among the women was C. Grade C is a middle grade on a scale from A-F, where F is a fail. Grade C can translate to "Good". Of the 266 participating men 22 (8%) failed. The average grade among men was D. Grade D is on a scale from A-F a grade a little lower than "Good".

156 of the registered candidates were awarded a D, and 82 of the candidates received a grade of E. These two grades are in the lower part of the Norwegian grading scale. Only 5 of all candidates received the best grade "A". 4 of these were women.

From this data, we can understand that the level of competence in Digital Policing and Forensic Science should have been higher. We can see that women did somewhat better than men under this exam. Whether the results are related to external factors such as

homeschooling during the Corona epidemic, or the difficulty level of the exam is not known. The result says little about competence in internet investigation and using OSINT techniques, but it describes the overall level of competence in this subject where 50% of the learning outcomes are linked to Digital Policing.

The exam was held in June, 2 months before the police students started their year of practice in the Norwegian police districts. This recent knowledge measurement may affect the capability expected to be found in this research.

## 6. RESEARCH METHODOLOGY

This chapter explains the purpose of this research and the systematic and theoretical approach used to collect and evaluate data throughout the process.

Science can be defined as systematic activities that aim to acquire and organize knowledge on different phenomena to explain and predict aspects of reality. The natural sciences explain phenomena, while the social sciences aim to understand people and their interactions. Both research methods explain how to find answers to a research question.

Natural science relates to phenomena without language and the ability to understand themselves and their surroundings. It will not be possible to ask these study objects whether they are animals, cells, atoms, genes, or a computer program (Johannessen et. al, 2010). The social science method is about how we should obtain information about social reality, how this information should be analyzed, and what it tells us about social conditions and processes. It is a matter of collecting, analyzing, and interpreting data, and this is a key part of empirical research.

### 6.1 Purpose of the research

Lack of knowledge of methods and techniques are risk factors that can affect both case processing time and the detection rate in the Norwegian police districts. Lack of knowledge has many causes, and in this context, I will mention low knowledge of methods and techniques and low willingness to renew the portfolio of investigative tools and the ability to recognize and use new tools.

Through the police student's year of practical training, students participate in the 12 Norwegian police districts. This period will primarily be a period of acquisition of new knowledge, but also a period in which the police students are prepared for their roles as change agents. Change agents in relation to new knowledge from NPUC unveiled for the police districts they serve. In this thesis, I research how capable the Norwegian Police Students are in performing online investigations with OSINT techniques after their first year of study. I will try to find answers to how they use the techniques and the methodology they have learned about and if and how this helps to increase the detection rate.

I also research whether their knowledge of methods and techniques is satisfactorily remembered for adoption in the police districts. Satisfactory in the sense it does not conflict with recognized principles of information collection under the approved method or legislation. For the police students to use OSINT techniques correctly the police districts are expected to facilitate this with the right equipment. In this context, I will research how such equipment was provided to the police students in their year of practice, so I can consider this when discussing Future Work in this thesis.

## 6.2 Methodical Approach

A research problem can be a question that articulates the issue I am attempting to find an answer to using a methodical approach. A good research problem can keep the researcher focused and the reader interested. My research problem is:

**How capable are the Norwegian Police Students in performing online investigations with the use of OSINT techniques, and are the police districts facilitated for this?**

My research problem is through this thesis investigated, problematized, and discussed according to the principles of the general research methodology.

To better understand the researcher's problem in this thesis, I have broken it up into two parts. The first part of this research problem highlights the police student's capability to use OSINT techniques in online investigations and how these techniques and the methodology was used. This should be seen in the context of the recollection of knowledge they were given

throughout the first year of study and the quality and content of this education. The second part of the research problem asks how the police districts are facilitated for internet investigations with these techniques.

Research questions to my problem should show what I am trying to discover, and with the purpose, provide guidelines for which research methods I will use. These questions will help to focus on and clarifying the research problem.

1. How did Norwegian police students use OSINT techniques in the year of practical training?
2. How did they use the OSINT methodology they learned in their education?
3. How satisfactory was the expertise and facilitation for using OSINT techniques in the police districts where the police students had their practical training?

As a police educator at the NPUC, I had advantages in running research projects using empirical methods, including collecting data from police students during their education. Through Canvas, and through our often digitized student contact, a simpler process is opened using empirical quantitative research methodology. In this context, the research method is "a process that describes how to collect and interpret data" (Johannessen, Tufte, & Christoffersen, 2010).

Empirical research is defined as any research in which the conclusions of the study are drawn from concrete empirical and therefore "verifiable" evidence. This can be obtained using quantitative research that "attempts to put a causal relationship between variables" (Balsvik & Solli, 2018). One of the biggest advantages of quantitative research methodology is that it is well suited for comparing and analyzing larger amounts of data. A research survey aimed at NPUC students creates answers from 521 respondents in their third year of study.

When choosing a research method, I assessed whether my research questions could be answered according to in-depth interviews in relation to the qualitative method. A method that gathers its empirical research base through in-depth interviews and participatory observation. A combination of these over a long period is often called fieldwork. Such fieldwork could have been feasible but would require a larger research resource.

To be a lecturer and examiner in Digital Policing, while interviewing my students about their capabilities in online investigation and OSINT technique, could present undesirable challenges that affect the research results from these qualitative methods.

*Through both observation and surveys, a quantitative method may draw general conclusions based on a large sample of persons* (Eliasson, 2010, p.31). A triangulation of various methods could also be used in this research. A triangulation where both quantitative and qualitative research together provide a good basis for research analysis and discussions.

In my research, I investigate how the students used the OSINT techniques and the methodology they have learned, and how they considered themselves and others in relation to these. In this context, I have used the social science method to get as best as a possible picture of reality. My research in this thesis is empirical as both theory and hypotheses are supported by data. If a theory is not supported by data, it becomes speculation (Svartdal, 2009).

In Chapter 7, I present the method I have used to analyze my descriptive statistics. Descriptive statistics are a basic statistical analysis of quantitative data collected using quantitative methods. The analyses I then do are univariate analyses where I analyze only one variable. Then I compare several variables to see connections with bivariate analysis. This tells us something about the empirical relationship between two variables.

*An examination of the connection between two variables is called a bivariate analysis* (Johannessen et.al., 2010).

## 6.3 Literature Review

In this section I have chosen to present central literature referred to in this research. The literature is mainly curriculum literature at NPUC, and not found by me through research. Nevertheless, as a professional employee at the NPUC, I have been involved in the selection process of syllabus literature.

Furuhaug, F. (2019) Minor thesis “OSINT Methodology”.

Furuhaug presenterer I denne masteren den metodikken som NPUC har valgt å presentere for studentene i deres første studieår.

Gibson, H. (2016). Acquisition and preparation of Data for OSINT. In Akhgar, B., Bayerl, P.S. & Sampson, F. (Ed.). *Open Source Intelligence Investigation*.

The book explains what preparations should be made before starting OSINT investigation, so that anonymity is maintained.

Hassan, N. & Hijazi, R. (2018). *Open source intelligence methods and tools: A Practical Guide to online Intelligence*.

The book explains some of the techniques that can be used in the information gathering phase.

Ramwell S., Day T., Bibson H. (2016). Osint in an increasingly Digital World, In Akhgar, B., Bayerl, P. S. & Sampson, F. (Ed.). *Open Source Intelligence Investigation: From strategy to implementation*.

The book explains the investigation process at all levels through the use of open sources.

Ivaniko, T. (2020). Doctor's thesis “*Open Source Intelligence (OSINT): Issues and Trends*”.

The book explains the challenges and trends in OSINT analyses online and on social media.

NATO. *Open Source Intelligence Handbook*. November 2001.

NATO defines OSINT differently than the purpose driven police investigation since the purpose of the intelligence information is different. Nevertheless, interesting to compare these methods.

## 6.4 Quality assurance

### 6.4.1 Ethical challenges

*Ethics concerns principles, rules, and guidelines for assessing whether actions are correct or wrong. Such rules also applied to research activities (Johannessen et al., 2011, p. 89).*

There will always be ethical challenges around the collection of research bases through an established relationship. It will be necessary to reflect on these challenges so that the basic material for my research can be collected accurately and gently from the target population.

*In social science, population may refer to objects, but most often this refers to the people or entities to which a problem relates (Johannessen et.al., 2010).* The population in this thesis refers to students in the class of 2019-2022 at the NPUC while they attended their year of practical training (2020-2021) in one of Norway's twelve police districts.

Ethical tradeoffs regarding the conduct of the survey were carefully considered before the survey was held. Both under voluntary participation and anonymization of the respondents. I assessed how sensitive and invasive the information collected would be, and whether the students had enough competence to understand what they consented to. Professor Dag Ingvar Jacobsen puts it this way:

*“Researchers have a duty to carefully consider how research can affect the research subjects and how the research is perceived and used. This puts anyone who wants to conduct studies facing some ethical dilemmas. These must be clarified as far as possible before starting research” (Jacobsen, 2015, p.45).*

## 6.4.2 Validity and Reliability

*The validity says something about the validity of our results, while the reliability says something about whether the survey is trustworthy. It is important that it is reliable (Jacobsen, 2005).*

Through the research, I followed international standards to ensure good quality and reliability. One of the most important standards was research integrity which encompasses the basic principles of reliability, honesty, respect, and accountability.

*The validity of an investigation concerns the validity of the data material for the issue to be discussed (Grønmo, 2004).* This is referred to as internal validity, which required me to



identify what I want to investigate. A common way to assess validity is to critically discuss the data collection and what is relevant for this type of research.

*The validity and reliability complement each other as overarching criteria for assess the quality of the data we have collected (Grønmo, 2004).*

Sometimes, survey results are affected by the survey itself. It was important to start by assessing all aspects of the survey that could interfere with the results of the research. These thoughts greatly affected the choice of the quantitative research method in this thesis, along with the discussed ethical challenges. To make sure that the research survey was of high enough quality, it was tested on colleagues in the academic community before it was distributed.

To ensure validity in my survey, the respondents evaluated their competence in some questions. It is possible that respondents with low competence evaluate their competence higher than it is (Dunning-Kruger effect). To reduce this effect, my survey had questions that measured actual competence. I found nothing indicating this effect among the respondents.

Reliability can be established where a research survey produces the same results when carried out several times. My study was conducted on students at the NPUC's three campuses. The results show small, or no differences based on the different campuses.

## 6.5 Inductive and deductive research approach

*A research project may have an inductive or deductive approach. A deductive approach starts with the researcher having assumptions that empirical data are collected in order to control (Jacobsen, 2005).*

The Deductive method is based on a hypothesis or assumption of what one wants to investigate. Conclusions are then extracted from the hypothesis. An inductive approach is the opposite of a deductive approach, i.e., the collection of empirical data without having too many assumptions in advance (Jacobsen, 2005). My research approach is inductive as the collection of empirical data intended to answer the research questions without too many assumptions. However, I have formulated three hypotheses with assumptions. These

assumptions must govern but are investigated both for and against their validity. Here I present my hypotheses aimed at each of my research questions:

1. Linked to Q1. The few who used OSINT techniques in their internet investigation in the year of practical training had more interest and competence than the other students.
2. Linked to Q2. The Norwegian police students used only the collection phase of the OSINT methodology.
3. Linked to Q3. The expertise and facilitation for internet investigation using OSINT techniques in the police districts were low.

## 6.6 Data collection and survey

Here, the focus group are the police students in the last year of their education. These students have completed a year of practical training and can thus describe their use of OSINT techniques. At the three bachelor campuses, there are 521 students in the third year of study. These 521 students are the population in this research.

*Surveys are both effective and the most widely used method in psychology and social sciences (Svartdal, 2009).*

Since it would be difficult to motivate all 521 students to answer a survey, I distributed the survey to all third-year students at NPUC. This way, it was easier to collect data which, after the survey, I could draw a representative sample from. It was necessary to investigate whether the sample could be proportional to different variables.

At Norwegian Police university college, 51% of all students in their third year of study are women. This means it was not necessary to take special steps to safeguard the participation of both sexes in the survey. The student population is divided into three campuses of the NPUC. To ensure that all the locations were represented with the right quota, I presented a comparison table that shows participation from these three locations.

**Table 2. Responding students on the 3 NPUC locations.**

	Students at NPUC	Respondents	Percent of students
NPUC Stavern	154	77	50,00%
NPUC Oslo	235	90	38,29%
NPUC Bodø	132	46	34,83%
<b>Total</b>	<b>521</b>	<b>213</b>	<b>40,88%</b>

Table 2 shows that the 213 respondents are distributed well across the three campuses of the NPUC. The participation from Stavern could be described as somewhat higher than in the others, but the deviation (11,71%) must nevertheless be interpreted to be within the norm.

Statistical inference uses gathered information to draw conclusions about the population from which the sample was taken. This means that the sample represents the entire population and that its results are approximately the same as what would be received if all persons had been examined. Considering the respondents' gender and their locations, 213 of the 521 students will provide a good basis for interpreting the results of the research as significant. Significant because the research base in relation to population and dropouts can be discussed as large. And through this robust population of 213, we can assume that the responses received in the survey can be interpreted to be less random.

To gather material for research analysis, I constructed a survey with questions for providing answers to my research questions. For the survey to provide research data that could be easily interpreted, I constructed a survey with fixed questions. The responses to the questions consisted of predefined answers that the respondents could choose. Answers such as “yes, no and do not know”, can easily be measured against grades in a scale from 1-6. Collected data can then show trends that support my further discussions.

*Standardization such as fixed question and answer-alternatives will allow the researcher to look at the similarities and variations that respondents respond to (Johannessen et. al., 2010).*

Reflect on the fact that survey data can often mislead because its design and implementation are low-quality. To get the best results, it was important for the survey to represent well-defined and well-written questions that the population was asked to answer.

There were several advantages to choosing a survey to establish empiric documentation. Surveys are usually self-managed in the platform in which they are distributed, and the cost associated with such surveys is often low, as the construction and distribution of the surveys are carried out in already established digital channels. Another advantage of digital data collection is that these methods are usually approved by institutional control authorities as they are rarely invasive.

## 6.7 The design of the survey

The purpose of collecting quantitative data through a survey is to gather primary findings that can be easily systematized. Digitally, the population is often led through a closed response survey. This means that the answer options are pre-filled. One advantage of this is that the analysis of the results will be simplified. Researchers must take responsibility for ensuring that the answer options are of sufficiently good quality.

According to Professor Dag Ingvar Jacobsen, three elements are most important to prepare surveys (Jacobsen, 2015, p. 252).

- Specification of what needs to be measured.
- Correct design of the questions.
- Choice of method of implementation.

The survey I used in my Master's thesis was intended to give answers to my research problem. The problem was deconstructed into 3 research questions. It was therefore necessary to design a survey that with simple questions could answer these 3 questions and provide the basis for thorough qualitative research not concluded on assumptions.

The survey consisted of 4 main parts:

1. Introduction
2. Background questions
3. Experience questions
4. Knowledge questions

## **Introduction**

In the first section of the survey, the participants were informed that the survey was anonymous. The responses would not affect oneself or colleagues. It was explained that the objective of the survey was to control the knowledge in previous learning objectives, and how this was used. The participants were made aware that the survey also aimed to measure how satisfactory the expertise and framework conditions for OSINT techniques were in the police districts where they spent their year of practical training. Excerpts from the introduction to the survey:

*In this survey you will be completely anonymous. None of the answers you give will affect you or your colleagues in any way. The objective of the survey will be to uncover knowledge in previous learning objectives, and at the same time give us an understanding of the framework conditions given in the bachelor's year of practice, within the topic of digital police work.*

To raise awareness and avoid misunderstandings, the introduction briefly described the concepts of open and closed sources. This clarification was included so descriptions of the use of OSINT techniques did not include police applications into the criminal justice system. Excerpts from the introduction to the survey:

*The police are increasingly using techniques for information gathering from open sources (OSINT). Knowledge and methodology related to this field is one of many success criteria for good information gathering in both investigation, preventive, and intelligence work. The questions in this survey will mainly deal with your competence and experiences in this area of knowledge. Keep in mind that searches in police records, such as Indicia, BL, PO, Agent, etc. are not considered searches in open sources. On the other hand, searches for information on the internet and in the social media are understood as searches in open sources.*

## **Background questions**

This part of the survey contained questions about which NPUC campus the student belonged to in the first year of study, and which police districts the student worked in throughout the year of practical training. The questions were asked so I as a researcher could reveal how the framework conditions in the 12 police districts differed, allowing me to identify variations in learning outcomes on different NPUC campuses.

## **Experience questions**

The question directed at experience was linked to how they used OSINT techniques and whether they had followed part of the OSINT methodology in practice. The answers to these questions also enabled me to see how learning outcome descriptions can adapt to students' actual use. The questions intended to shed light on whether the students restricted their use of OSINT due to fear of exposure or lack of knowledge.

## **Knowledge questions**

The knowledge questions were asked to reveal how competent the students rated themselves to be. As I described, there may be a possibility that respondents with low competence evaluate their own competence higher than it is (Dunning-Kruger effect). To reduce this effect, the survey had questions that measured actual competence.

The survey also contained questions intended to reveal the students' use and understanding of new technology and social media in their everyday lives. The questions were intended to measure the students' digital understanding, and to see connections between knowledge of OSINT, patterns of use, and results in the police investigations.

## **6.8 Permission to conduct a survey**

Any research involving human subjects will require approval to conduct a survey.

Through my preparatory work, I have communicated with the Ethical review board at UCD. There was uncertainty as to who should approve the survey since the survey was aimed at Norwegian police students at the NPUC.

UCD concluded that it would be appropriate for the survey to be approved by the Norwegian Centre for Research Data (NSD)<sup>46</sup>.

To use a survey as research data, it was important to follow the ethical conditions stipulated by NSD. This mainly concerned privacy and protection for disclosing traceable and identifying information. NSD provides data protection services to 130 Norwegian research and education institutions. These include all Norwegian universities and most university

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<sup>46</sup> <https://www.nsd.no/en>

colleges, as well as NPUC. The purpose is to ensure legal access to necessary personal data for research.

To get permission to collect data for this student survey, I called NSD and discuss my research project with them. NSD was informed that I was preparing data collection from students at NPUC, and that the master's thesis was part of my study at University College Dublin (UCD). NSD informed me there was no need for an application process when collected information cannot be interpreted as sensitive. In my survey, identifying information about the participants was washed away when exporting research data from MS Forms to MS Excel for later analysis.

Since NPUC is one of NSD's educational institutions with the right to approve research on these terms, I contacted Bachelor Management at NPUC in Oslo. After describing my research and its academic and ethical frameworks, the survey was approved and NSD was notified of the outcome, with nothing to note about this process.

## 6.9 Conducting the survey

The survey was provided to the 22 classes in the spring semester in the third year of study at NPUC. Out of this population of 521 police students from 3 campuses (Oslo, Bodø and Stavern), 355 participated in the video lecture where the survey was provided. Out of these participants in the lecture, 213 students responded to the survey.

To conduct a reliable survey that gave validity of the data material, it was important to use a software platform to which both me as a researcher and the students were licensed to. At NPUC, teachers and police students have access to the Microsoft (MS) Office 365 Suite. MS elaborates on their support pages that everyone with a MS account (Hotmail, Live, or Outlook.com)<sup>47</sup> is licensed to use MS Forms. MS Forms is a new application in Office 365 Education, that allows teachers and students to create custom quizzes, surveys, and questionnaires.

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<sup>47</sup> <https://support.microsoft.com>

MS Forms is compatible with many digital devices connected to the internet. Computers with Windows and Mac operating systems, and mobile devices with Android, iOS and Windows operating system all work with MS Forms. MS Forms also provides the opportunity to export the survey to MS Excel for further analysis in a worksheet. Due to this compatibility, MS Forms was used in the empirical phase where the database was gathered for further research.

The survey was limited to 25 questions I wanted to be answered. The time spent on these questions was estimated to be 7 minutes. The questions were intended to answer my research questions in the best way for later methodical discussions.

The MS Forms survey was presented via a hyperlink in one of Digital Policing's live video lessons in Preventive Policing for students in their third year of study. The hyperlink was communicated as both a QR code (Quick Response code) in a PowerPoint and as a hyperlink in the live video lesson's comments section. I used these two options to open the survey, ensuring as many students as possible were able to start the survey experiencing no problems.

The survey was available during the 15-minute break between classes, and it was conducted in Norwegian, the student's native language, to avoid unnecessary misunderstandings. The survey was presented by the lecturer before the lesson break, and all students were made aware that participation in the survey was voluntary and anonymous as discussed under the Ethical Challenges section.

## 6.10 Response rate and dropouts

213 of 521 police students from all three NPUC campuses responded to the survey. This is a response rate of 40.96% and a 59.04% dropout from the total population. The number of students is distributed as follows:

Bodø: 46 of the 132 Students responded. This is a response rate of 34,84%.

Oslo: 90 Students of 235 responded, which corresponds to a response rate of 45,10%.

Stavern: 77 Students of 154 have responded, which corresponds to a response rate of 50,00%.



59.04% of police students have chosen not to respond to this survey. Some of this can be justified by the limited distribution. A survey distributed in a video lecture that only 355 students followed will severely limit their participation. Another reason may be that the students did not have the time or opportunity to respond, or that they found this to be uninteresting. Consider that the students participate in many surveys throughout the academic year, and at some point, they reach a saturation point.

*Research on non-responses shows that it is often not accidental that some groups drop out, and that there are specifically three groups this applies to (Jacobsen, 2015).*

Dropout groups are:

- Those who are not interested in the issue
- Those who have no knowledge about the questions they are asked
- Those who do not want to pronounce themselves

**Table 3. Total student and survey participation from NPUC's campuses.**

Campus	Students	Percent of population	Percent of the respondents to the survey
Respondents from Bodø	46	8,90 %	22,00 %
Respondents from Oslo	90	17,30 %	42,00 %
Respondents from Stavern	77	14,80 %	36,00 %
Dropouts	307	59,00 %	-
<b>Total Respondents</b>	<b>213</b>	<b>41,00 %</b>	<b>100,00 %</b>
Total students	521	100,00 %	-

The results show that the participation from Oslo was larger than from the other campuses. This can be related to the different sizes of the departments. Oslo had 10 classes at this study level, and Bodø and Stavern had 6 classes at the same study level.

# 7. ANALYSES AND RESULTS

## 7.1 Analyses

In this section, quantitative analysis counts phenomena. This means counting how many units with different values on the variables were studied (Tuftte, 2018, p. 42).

I will present a selection of the questions and results I have received in the survey. The results will be descriptive<sup>48</sup> and presented clearly, so this can support further discussion. In this section, the possible reasons for the results will not be addressed. This will be discussed in chapter 8 – Discussion.

Some of my key findings are highlighted in table format and as figures. Presentation as figures often visualizes results in a more understandable way. On the other hand, tables can present more information, so together my choices will complement each other. To present my findings accurately, without trimming or small adjustments, the calculated percentage is displayed in the tables with two decimals. *The concept of trimming can be described as to alter the collected material in order to better fit the conclusions that the researcher wishes to draw* (Balsvik, 2019, p. 201).

## 7.2 Univariate and bivariate analysis

Univariate analysis analyzes a variable at a given time. With this variable, one can analyze one value in the descriptive data collection. *An examination of the relationship between two variables in a data collection is called a bivariate analysis* (Johannessen et.al., 2010).

Bivariate analysis can be useful for testing simple hypotheses on association and can also show the extent to which we can predict the value of a variable if we know the value of the second variable.

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<sup>48</sup> <https://snl.no/deskriptiv>

Through univariate and bivariate analyses of collected data, I will present the findings and the results that together answer my research questions. The first phase of the data analysis will be to present the conducted univariate analysis.

## 7.3 Results

*Table 4: Students participation in different police districts in their year of practical training.*

Police district	Frequency	Percent	Valid Percent	Cumulative Percent
Agder	11	5,16%	5,16%	5,16%
Finnmark	8	3,75%	3,75%	8,91%
Innlandet	20	9,38%	9,38%	18,29%
Møre og Romsdal	17	7,98%	7,98%	26,27%
Nordland	16	7,51%	7,51%	33,78%
Oslo	13	6,10%	6,10%	39,88%
Sør-Øst	26	12,03%	12,03%	51,91%
Sør-Vest	26	12,03%	12,03%	63,94%
Troms	10	4,69%	4,69%	68,63%
Trøndelag	14	6,57%	6,57%	75,20%
Vest	23	10,79%	10,79%	85,99%
Øst	29	13,61%	13,61%	100,00%
<b>Total</b>	<b>213</b>	<b>100%</b>	<b>100%</b>	

The largest participation among the students was 29 (13,61%). These students had their year of practical training in Øst Police District. This is Norway's second largest police district covering the eastern part of Norway. Oslo Police District, which is Norway's largest, is represented by only 13 (6,10%) students in this survey.

**Table 5. Did the students use OSINT techniques in the year of practical training?**

OSINT techniques	Respondents	Percent of respondents (213)	Valid Percent	Cumulative Percent
Used	185	86,85 %	86,85 %	86,85 %
Did not	18	8,45 %	8,45 %	95,30 %
Didn't remember	10	4,69 %	4,69 %	100,00 %
<b>Total</b>	<b>213</b>	<b>100 %</b>	<b>100,00 %</b>	

In the first year of study, the students received lessons on how the police uses OSINT techniques on the internet and social medias platforms as information gathering for an investigation, preventive policing, and intelligence. They were asked if they used this knowledge in the year of practical training. 185 (86,85%) of the 213 respondents to the survey used these techniques. 18 (8.45%) did not use OSINT technique.

**Table 6: Students who did not use OSINT techniques or did not remember if they did, described the following reason.**

	Frequency	Percent of respondents (213)	Percent of frequency
I didn't quite get the need for this.	12	5,63%	21,43%
I didn't have a field of work where this was relevant.	2	0,93%	3,57%
I didn't really remember what this was like.	5	2,34%	8,93%
I didn't have access to an analysis machine	9	4,22%	16,07%
No procedures were made for how to use OSINT locally	14	6,57%	25,00%
I was afraid to make mistakes	4	1,87%	7,14%
There are no situations where searches in open sources could have made a difference	7	3,28%	12,50%
I didn't have time	-	0,00%	0,00%
Other	3	1,40%	5,36%
<b>Total</b>	<b>56</b>	<b>25,24%</b>	<b>100%</b>

The 18 (8,45%) respondents who did not use, and the 10 (4,69%) respondents who forgot whether they used OSINT techniques or not, gave these justifications in table 4. To describe the reason(s) for further analysis, participants were given the opportunity to choose several of the pre-filled options. The largest frequency was found in the alternative “No procedures made for how to use OSINT in the police district”. None of the respondents stated that they did not have time to use these techniques.

**Table 7: Students who were afraid of making mistakes were most concerned about these reasons.**

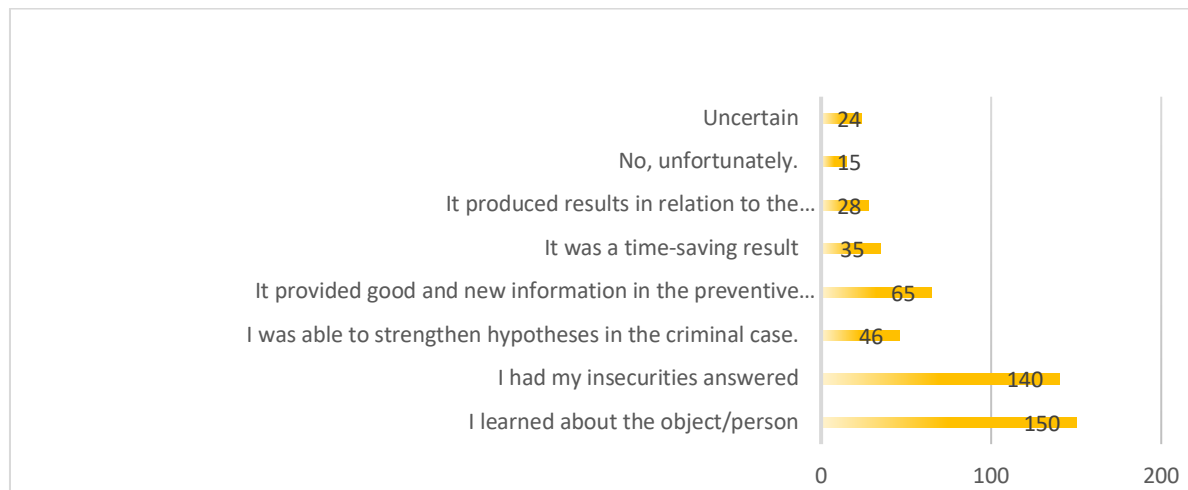
	Frequency	Percent of respondents (213)	Percent of frequency
Exposing myself and my own privacy	100	46,95%	29,85 %
Destroying an ongoing investigation	92	43,19%	27,46 %
Exposing police equipment/network attack	26	12,21%	7,76 %
Using the wrong methodology	59	27,70%	17,61 %
Collecting incorrectly information (Fake news)	34	15,96%	10,15 %
Collecting immaterial information (Fake news)	23	10,80%	6,87%
Other	1	0,47%	0,30 %
<b>Total</b>	<b>335</b>	<b>335,00%</b>	<b>100,00 %</b>

Answers to this question show why parts of the respondents were afraid to use OSINT techniques (Table7). Question: *"If you were afraid of making mistakes, what were you most worried about?"*. Out of 213 respondents, 160 (75%) answered that they were afraid to use OSINT techniques. These 160 respondents chose between several pre-filled answers. 100 students (46,95% of the survey respondents) chose the alternative "fear of exposing themselves and their private lives" as a reason. Then ranked “fear of destroying an ongoing investigation” with a frequency of 92 (43,19% of the survey respondents). Only 53 (25%) were not afraid of using these techniques, or for various reasons chose not to describe this fear in the survey.

**Table 8. Students use of OSINT techniques affected their cases in these areas.**

	Frequency	Percent of respondents (213)	Percent of frequency	Cumulative Percent
I learned about the object/person	150	70,42%	29,82%	29,82%
I had my insecurities answered	140	65,72%	27,83%	57,65%
I was able to strengthen hypotheses in the criminal case.	46	21,59%	9,15%	66,80%
It provided good and new information in the field of preventive police work	65	30,51%	12,92%	79,72%
It was a time-saving result	35	16,43%	6,96%	86,68%
It produced results in relation to the scorecard/prioritization	28	13,14%	5,57%	92,25%
No, unfortunately.	15	7,04%	2,98%	95,23%
Uncertain	24	11,26%	4,77%	100,00%
<b>Total</b>	<b>503</b>	<b>236,11%</b>	<b>100,00%</b>	

**Figure 5. How did Students use of OSINT techniques affected their cases? In frequency.**



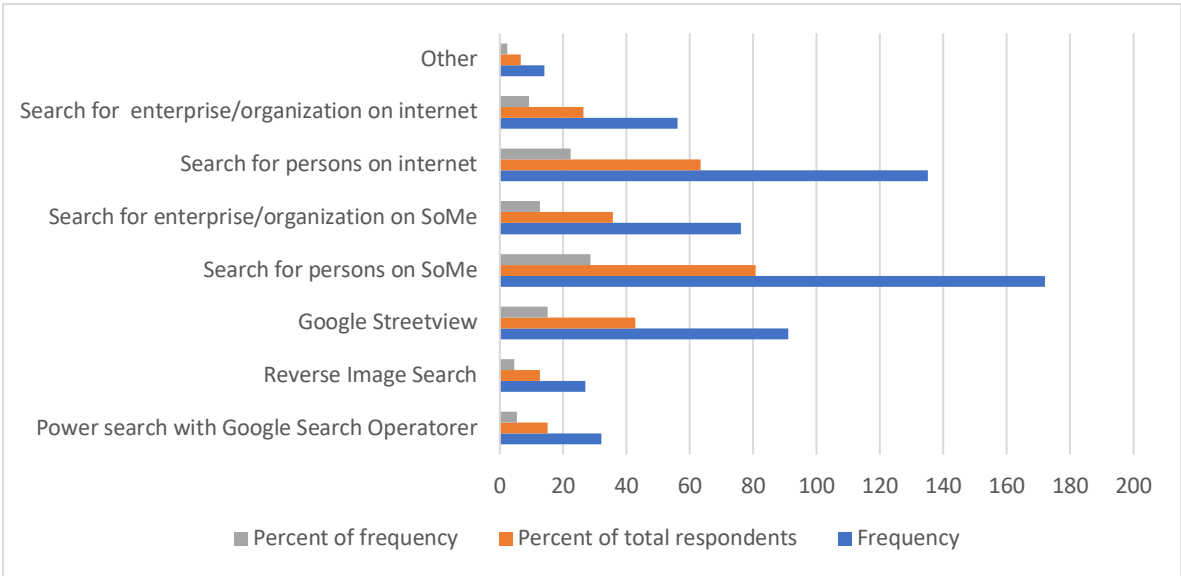
In table 8, the students could choose several alternatives to shed light on the gains provided by OSINT techniques. The findings are visualized in Figure 5. When the survey respondents were asked how OSINT techniques affected their policework, 200 (93.9%) of the total respondents answered. 150 (70,42%) selected the option “I learned about the object/person” and 140 (65,72%) selected the option “I had my insecurities answered”. This question had a

dropout of 13 (6.10%) students. It's hard to see why so many respondents chose not to answer this non-mandatory question. The question was designed with good answer options for both negative and positive responses, and the possibility of a neutral choice for uncertainty.

**Table 9. OSINT techniques used by the students in their work**

OSINT techniques used	Frequency	Percent of respondents (213)	Percent of frequency
Power search with Google search operators	32	15,02%	5,22%
Reverse Image Search	27	12,68%	4,40%
Google Street view	91	42,72%	14,84%
Search for persons on SoMe	172	80,75%	28,05%
Search for enterprise/organization on SoMe	76	35,68%	12,39%
Search for persons on internet	135	63,38%	22,02%
Search for enterprise/organization on internet	56	26,29%	9,13%
Other	14	6,57%	2,28%
Dropout	10	4,69%	1,63%
<b>Total</b>	<b>613,00</b>	<b>287,79%</b>	<b>100,00%</b>

**Figure 6. OSINT techniques used by the students in their year of practical training**



203 (95,30%) of the 213 respondents responded to this question (table 9 and figure 6). The question provided several alternatives, and the total frequency was 613. The alternatives "Search for persons on SoMe" 172 (80,75%) and "Search for persons on internet" 135 (63,38%) were the most popular.

There is a logical breach in these results, as 203 of the respondents describe which techniques they have used. This is more than the 195 respondents who initially described that they had used OSINT techniques.

*Table 10. Those that partly followed the OSINT methodology from the first year of study, performed the following of the 6 phases:*

	Frequency	Percent of respondents (213)	Percent of frequency
Information needs and strategy	101	47,41%	23,33%
Planning and preparation	63	29,57%	14,55%
Collection	160	75,11%	36,95%
Processing/Validation	48	22,53%	11,09%
Analysis	38	17,84%	8,78%
Distribution and evaluation	23	10,79%	5,31%
Dropout	18	8,45%	0%
<b>Total</b>	<b>433</b>	<b>211,70%</b>	<b>100%</b>

When asked which part of the OSINT methodology the respondents used, 195 (91.55%) of the 213 participants responded (Table 10). This gave a dropout of 18 (8.45%). The 195 respondents had a frequency of 160 (75,11%) on the OSINT methodology's Collection Phase. The question was not mandatory, and it did give the opportunity to choose more than one option. Figure 6 shows the same tendency visualized. 13 (6,10%) of the respondents who did not answer this question, were among the 18 respondents in table 3, that did not use OSINT techniques.



*Table 11. Students access to dedicated computers for search and analysis in the police district.*

	Frequency	Percent of respondents (213)	Valid Percent	Cumulative Percent
Yes	18	8,45%	8,45%	8,45%
No	127	59,62%	59,62%	68,08%
Uncertain	68	31,92%	31,92%	100,00%
<b>Total</b>	<b>213</b>	<b>100,00%</b>	<b>100,00%</b>	

Table 11 illustrates students' access to dedicated search and analysis machines in their year of practical training. All 213 respondents answered this question. Only 18 (8.45%) confirmed that they had access to such a machine in B2.

*Table 12. Students use of dedicated computers for search and analysis in the police district.*

	Frequency	Percent of respondents (213)	Cumulative Percent
Yes	9	4,22%	4,22%
No	56	26,29%	30,51%
No Access	124	58,21%	88,72%
Dropout	24	11,26%	100,00%
<b>Total</b>	<b>213</b>	<b>100,00%</b>	

Only 4.22% of the responders used dedicated computers for search and analysis. Compared to table 12, 50% of those with access to a dedicated computer for search and analysis used it. This question was answered by 189 respondents, with a dropout of 24 students. The question was not mandatory, and it did not give the opportunity to choose more than one option.

**Table 13. Devices used for OSINT techniques and analysis at work.**

	Frequency	Percent of respondents (213)	Percent of frequency
Dedicated search and analysis computers	5	2,34%	1,44%
Ordinary (BL) police computer	99	46,47%	28,45%
Personal computer/tablet/mobile	91	42,72%	26,15%
Police tablet/mobile	146	68,54%	41,95%
Other	7	3,28%	2,01%
Dropout	10	4,69%	0%
<b>Total</b>	<b>348</b>	<b>168,04%</b>	<b>100,00%</b>

When respondents were asked what type of computer they used for OSINT techniques and analysis in their internet investigation, 203 (98.59%) of the 213 in the population responded. 146 (68.54%) of respondents answered that they used the Police tablet/mobile phone when they used OSINT techniques. The question was not mandatory, and since there was a high possibility that the students had used several platforms, it was possible to choose more than one option. There is a clear discrepancy in these results. 203 students responded and described what device they used to generate OSINT techniques. This is significantly more than the 195 respondents who initially answered that they had used OSINT techniques. Including those who were unsure or who couldn't remember, the maximum number of users of OSINT techniques is still only 185. This contrasts with the 203 respondents who in this question describe their use of equipment.

**Table 14. Did the students get enough time to conduct OSINT analyzes?**

	Frequency	Percent of respondents (213)	Percent of frequency
Yes	110	51,64%	51,64%
No	9	4,22%	4,22%
Sometimes	85	39,90%	39,90%
Dropout	9	4,22%	4,22%
<b>Total</b>	<b>213</b>	<b>100%</b>	<b>100%</b>

When asked if the students were given enough time to conduct OSINT analyzes, 204 (95.77%) of the 213 respondents answered (Table 14). Only 9 (4.41%) responded that they

were not given enough time for this work. The question was not mandatory, and it did not give the opportunity to choose more than one option.

**Table 15. Students who got help by student supervisor to conduct OSINT analysis**

	Frequency	Percent of respondents (213)	Cumulative Percent
Yes	34	15,96%	15,96%
No	60	28,16%	44,12%
Sometimes	73	34,27%	78,39%
Did not need help	39	18,30%	96,69%
Dropout	7	3,28%	100,00%
<b>Total</b>	<b>213</b>	<b>96,33%</b>	

Out of 213 respondents in the survey, 206 chose to answer this non-mandatory question (Table 15). 34 in the total population (15,96%) responded that they received help from the student supervisor for their analyses, and 73(34,27%) of the total respondents answered that they sometimes received help from the student supervisor. This question could only be answered with one option.

**Table 16. Student supervisor’s and the respondent’s competence in the use of OSINT techniques, rated by the respondents.**

	Frequency related to Student Supervisor competence	Frequency related to Student competence	Supervisor Percent	Student Percent
Poor	23	4	10,79%	1,87%
Not recommendable	76	70	35,68%	32,86%
Good	68	109	31,92%	51,17%
Very good	36	28	16,90%	13,14%
Excellent	7	1	3,28%	0,46%
Dropout	3	1	1,40%	0,46%
<b>Total</b>	<b>213</b>	<b>213</b>	<b>100,00%</b>	<b>100,00%</b>

In this part of the survey, I was able to reveal how the students rated themselves and their supervisor in the context of competence in the use of OSINT techniques. Through predefined responses, 210 of the survey respondents (213) chose to rate their competence. 212 students

also rated their student supervisor's competence in this non-mandatory question. This rating was based solely on the student's unqualified experience of the student supervisor's level of competence while using these techniques. These questions were asked separately, but I have added them to the same table.

As shown in table 16, 109 (51.17%) of the 212 respondents rated their competence as "Good". Student supervisor competence was rated by 210 respondents, of which 68 (31.92%) rated the supervisor with the same competence. Of these 210 respondents, 23 (10.79%) rated their supervisor's competence as "Poor". Only 4 (1.87%) students of 212 respondents rate their own competence as "Poor". The results show a clear difference in student and supervisor competence.

**Table 17. Respondents expertise/interest in computers and data.**

	Frequency	Percent of respondents (213)	Percent of frequency
Educated in the field	4	1,88%	1,05%
Big interest in data and computers	25	11,73%	6,56%
Played computer games, and have thereto technical expertise	33	15,49%	8,66%
Built computers myself	13	6,10%	3,41%
Great practice from work and studies	15	7,04%	3,94%
Only competence from what I have learned in B1* at NPUC	149	69,95%	39,11%
No special competence	42	19,71%	37,27%
Dropouts	2	0,93	0,52%
<b>Total</b>	<b>381</b>	<b>100,00%</b>	<b>100,00%</b>

\*Bachelors first year of study.

210 (98.59%) of the respondents answered this non-mandatory question. 42 (19,717%) answered that they had no special competence or interest in computers and data. 149 (69,95%) of the same respondents answered that they had no other competence besides what they learned during their first year of study at the NPUC. The question allowed the respondents to choose several of the pre-filled answers. Only 25 (11,73) of the respondents answered that they had a big interest in computers and data.

**Table 18. Responses to the question: Do you know what NFT (Non-Fungible Token) is?**

	Frequency	Percent of respondents (213)	Valid Percent	Cumulative Percent
Yes	50	23,47%	23,47%	23,47%
No	162	76,06%	76,06%	99,53%
Dropouts	1	0,47%	0,47%	100,00%
<b>Total</b>	<b>213</b>	<b>100,00%</b>	<b>100,00%</b>	

In table 18, 212 of the 213 respondents answered this non-mandatory question about non-fungible tokens. Only 50 (23,47%) respondents knew what this was. 1 student did not answer this question.

**Table 19. Responses to the question: Is it possible to find EXIF data on a photo you secure from a Facebook profile?**

	Frequency	Percent of respondents (213)	Valid Percent	Cumulative Percent
Yes	64	30,05%	30,05%	30,05%
No (Correct)	125	58,69%	58,69%	88,73%
Uncertain	24	11,27%	11,27%	100,00%
<b>Total</b>	<b>213,00</b>	<b>100,00%</b>	<b>100,00%</b>	

In table 19, all 213 students responded to this not mandatory question about EXIF data on digital images on Facebook. 125 (58,69%) of the respondents answered “No” to this question. A total of 88 (41.31%) respondents were uncertain or answered the question incorrectly.

**Table 20. The table shows how many respondents who have used a private SoMe account for OSINT.**

	Frequency	Percent of respondents (213)	Valid Percent	Cumulative Percent
Yes	118	55,40%	55,40%	55,40%
No	95	44,60%	44,60%	100,00%
<b>Total</b>	<b>213</b>	<b>100,00%</b>	<b>100,00%</b>	

In table 20, 118 (55.40%) of all 213 respondents used their private SoMe accounts in the context of OSINT on social media. The question was not mandatory, but all respondents answered it.

**Table 21. How many of the respondents who manage to create their own dedicated social media search profile(s) used for OSINT, during B2?**

	Frequency	Percent of respondents (213)
On my own	21	9,85%
With some guidance	28	13,14%
I did not manage	6	2,81%
I didn't get guidance	63	29,57%
I didn't see the need	93	43,66%
Dropouts	2	0,93%
<b>Total</b>	<b>213</b>	<b>100,00%</b>

Table 21 shows that 211 of the 213 survey respondents selected one of these options. A frequency of 93 (43.66%) respondents checked that they did not see the need to create a dedicated search profile on SoMe. 6 respondents did not manage to create search profile(s) used for OSINT.

**Table 22.** *The table shows what social media’s the police students have user accounts on.*

SoMe	Frequency	Percent of respondents (213)	Percent of frequency
Facebook	210	99,06%	36,65%
Twitter	95	44,81%	16,58%
Linkedin	33	15,57%	5,76%
Instagram	202	95,28%	35,25%
Telegram	32	15,09%	5,58%
None	1	0,47%	0,17%
Total	573	270,28%	100,00%

Table 22 shows on which social media applications the police students have user accounts. Out of 213 participants in this survey, 212 answered this question. The question provided the possibility of selecting multiple platforms. The question is not asked in relation to how many respondents use their accounts daily, but in relation to how many people own an account. 210 of the 212 respondents have accounts on Facebook.

### 7.3.1 Bivariate analysis and cross-tabulations

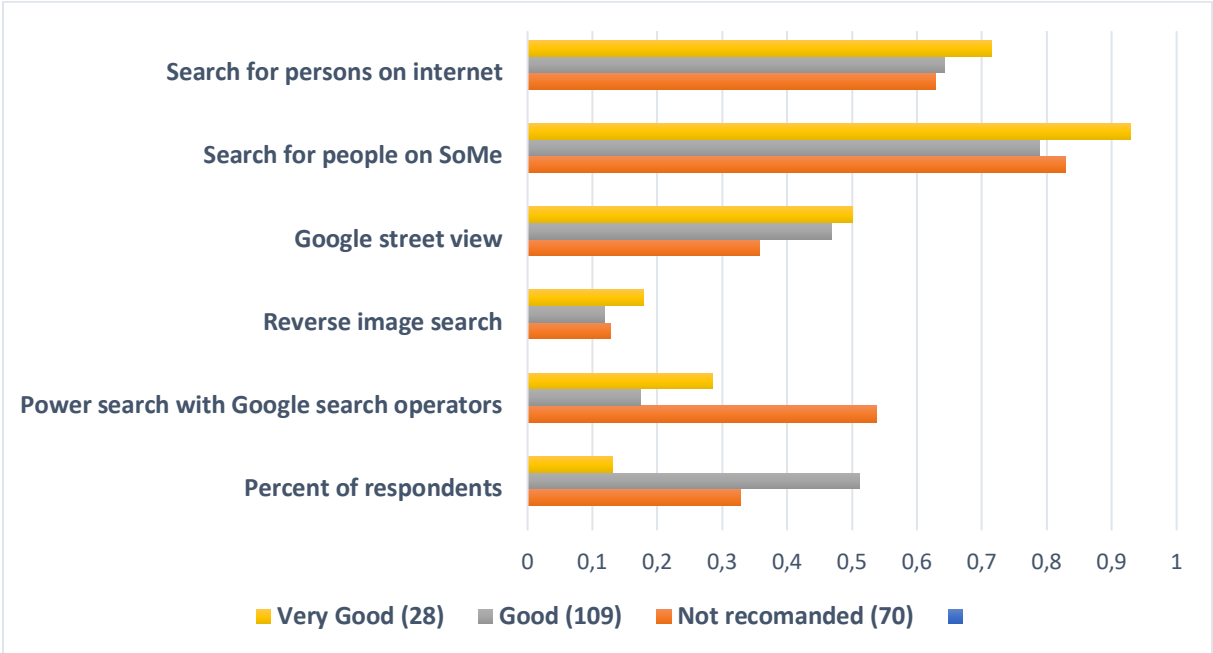
The easiest way to research the relationship between phenomena is bivariate analysis. Table 23 shows a compilation of samples of respondents from the survey, and their responses aimed at the use of OSINT and Digital Policing competence. I have previously explained my thoughts on the representative share of the population, and in this context, I choose to present these figures mainly as a percentage (%). Such a view will also give a simpler visual impression.

**Table 23. Shows a selection of methods used at different skill levels as a percentage.**

Self-defined competence	Percent of respondents (213)	Power search with Google search operators	Reverse image search	Google street view	Search for people on SoMe	Search for persons on internet
Not recommended	32,86 %	53,72 %	12,85 %	35,71 %	82,85 %	62,85 %
Good	51,17 %	17,43 %	11,92 %	46,78 %	78,89 %	64,22 %
Very good	13,14 %	28,57 %	17,85 %	50 %	92,85 %	71,42 %
Mean		33,24%	14,21%	47,45%	84,86%	66,16%

Table 23 and figure 8, shows a selection of findings related to four groups among the respondents, including the participants, and their responses aimed at the use of OSINT and Digital Policing competence. The largest proportion of respondents (84.86%) report having used the techniques they learned around searching for people on social media. In this sample, those with self-reported competence "Very Good", make up the largest share (92.85%) in this finding with a deviation from the mean value of +7.99%.

**Figure 8. Visualization of a selection of methods used at different skill levels as a percentage.**



\*Figure 8 visualizes Table 24.

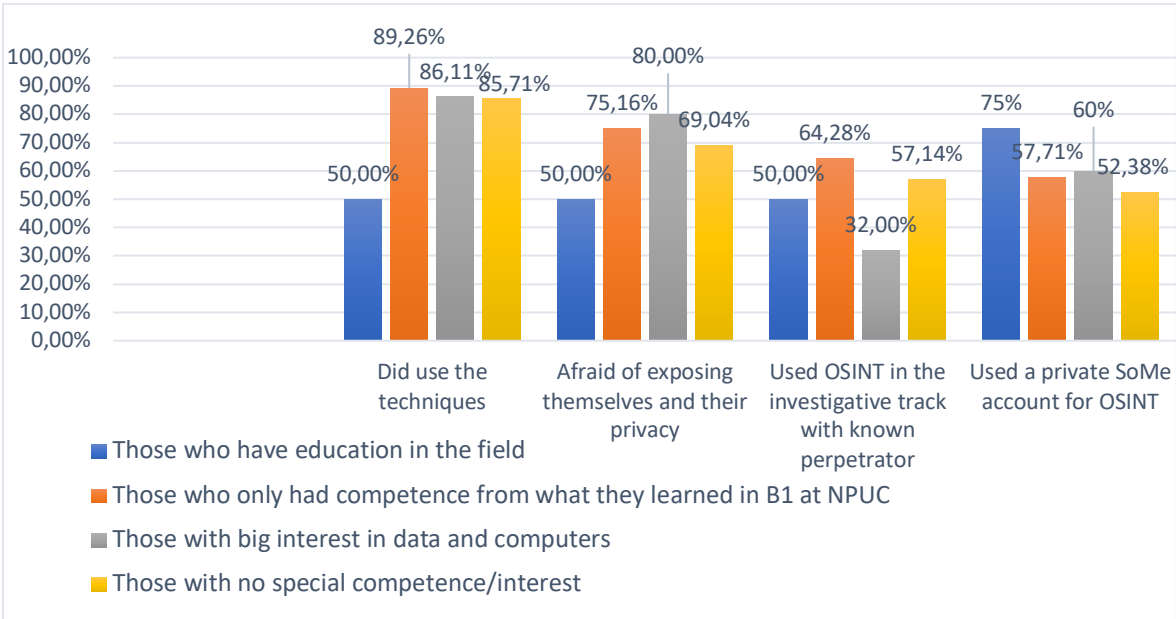


**Table 24. Shows a selection of various findings related to four different groups in the sample.**

<i>Respondents</i>	<i>Respondents</i>	<i>Did use the techniques</i>	<i>Afraid of exposing themselves and their privacy</i>	<i>Used OSINT in the investigative track with known perpetrator</i>	<i>Used a private SoMe account for OSINT</i>
Those who have education in the field	1,88%	50,00%	50,00%	50,00%	75,00%
Those who only had competence from what they learned in B1 at NPUC	69,95%	89,26%	75,16%	64,28%	57,71%
Those with big interest in data and computers	16,90%	86,11%	80,00%	32,00%	60,00%
Those with no special competence/interest	19,71%	85,71%	69,04%	57,14%	52,38%
Mean	52,11%	77,77%	68,55%	50,85%	61,27%

Table 24 shows four groups of respondents and their use of OSINT techniques in B2. The group that only reports competence from what they learned in B1 constitutes the largest in this sample with 69.95% of total respondents. It was also this group that used OSINT techniques most frequently (89.26%), with a positive deviation from the mean value of 11.49%. The group that reported a great interest in data and computers was the group with most fear of exposing themselves and their privacy (80%). This is a deviation from the mean value of +11.45%.

**Figure 9. Visualization of table 23, with various findings related to four different groups in the sample.**



*Table 25. Different phases of OSINT methodology used within different police disciplines.*

	<i>Frequency</i>	<i>Information needs and strategy</i>	<i>Planning and preparation</i>	<i>Collection</i>	<i>Processing/Validation</i>	<i>Analysis</i>	<i>Distribution and evaluation</i>
Investigation track with unknown perpetrator	70	33%	20%	45%	18%	13%	9%
Investigative track with known perpetrator	148	57%	36%	84%	28%	21%	13%
Preventive policing	112	60%	38%	79%	22%	18%	12%
The intelligence track – No criminal proceedings	79	63%	35%	81%	30%	23%	18%
Operational activities and assignments	119	55%	40%	83%	26%	21%	13%
Total frequency	528						
Mean		53%	34%	74%	25%	19%	13%

Varying phases of OSINT methodology are used within the police disciplines (Table 25). The collection phase is the most popular, with an average of 74%. 69% of all respondents answered that they had used parts of the methodology within "Investigative track with known perpetrator". 84% of these had worked within the collection phase. This is a deviation of +10% from the mean value.

## 8. DISCUSSION

### 8.1 Introduction

In this thesis, I have presented what the police students at NPUC learned about OSINT techniques and methodology in their first year of study, from 2019 to 2020.

Learning elements related to OSINT in various subjects in B1 are presented to help understand which competence the students were intended for. The research problem that questions the students' capability and the police district's facilitation of this work is discussed in this chapter.

The research questions in this chapter will help clarify to what extent the research problem is correct through discussion around the findings in the survey presented in chapter 7.3. The discussions seek answers to both researcher questions and my hypotheses. This chapter will also highlight interesting findings in the empirical material that may affect the researcher's problem.

These are the research questions asked in chapter 1:

1. How did Norwegian police students use OSINT techniques during practical training?
2. How did they use the OSINT methodology they learned in their education?
3. How satisfactory was the expertise and facilitation for using OSINT techniques in the police districts where the police students had their practical training?

I have chosen not to present percentages with decimals to make it easier to understand the numerical material discussed. *Measuring societal phenomena is associated with so much uncertainty that decimals will give the impression of a level of precision for which there is rarely a basis* (Johannessen et al., 2010, p. 280).

### 8.1.1 How did Norwegian police students use OSINT techniques in the year of practical training?

Aimed at the research question in the headline, I constructed the following hypothesis to use in the analysis. The reasons were to avoid bias and to present what I assumed to be correct. By defining this assumption, it was easier to ensure that I maintained the different perspectives in the research.

*The few who used OSINT techniques in their internet investigation in the year of practical training (B2), had more interest and competence than the other students.*

In the following sections, I present interesting findings from the empirical data presented in the previous chapter. These findings can be linked to how the students used OSINT techniques in B2, and what factors influenced this use.

### **Who used OSINT techniques?**

In the research survey, the respondents were asked about their use of OSINT techniques in the year of practical training. The question was asked as follows:

*In B1, you learned about how the police use searches in open sources and social media in connection with information gathering for investigation, preventive policing, and intelligence. Information gathering in connection with assignment development in the practical Policing was also part of this. Did you use any of this knowledge in B2?*

86% of the respondents answered that they used OSINT techniques in B2, and only 8% of the students answered that they did not use these techniques. The empirical data also shows that 5%, in addition to those who did not use OSINT, were unsure whether they had used OSINT techniques or not.

There may be several reasons why 13% of the respondents did not or may not use OSINT techniques in B2. And part of the reason for this may be limited knowledge of the techniques, and what they can provide of information in the investigation. To clarify this outcome, I chose to let this 13% describe the reason for not using OSINT. Out of these, 7% responded that no procedures were made for using OSINT locally. Additionally, 7% of the same respondents answered that they did not get the need for this. None of these students answered that they did not have time to use OSINT techniques. Surprisingly, half of this 13% of respondents reported the shortcomings of procedures in the police district, which influenced their use of these techniques. The methods and techniques that the students established knowledge of in B1 did not require local OSINT procedures in the police districts. On the other hand, the students were made aware of VPN, TOR browser and other methods described in Chapter 4.1 to retrieve Information from open sources without being identified. These methods can be practiced from their computers without any kind of procedures from the local police district.

When the respondents were asked to rate themselves concerning competence in OSINT techniques, 51% rated themselves with the grade of "Good", while only 13% rated themselves as "Very good". 33% rated themselves with the grade of "Not recommendable".

If I compare this with Table 18, which describes the students' expertise and interest in computers and data, 20% of respondents do not have a particular interest or expertise. And a total of 70% answered that they have no other competence than what they learned in Digital Policing in the first year of study (B1).

To assure the quality of the respondents' statements about their competence, I compared this with one of the knowledge questions presented in Table 20, "Is it possible to find EXIF data on a photo you secure from a Facebook profile? ». In this question, 58% answered correctly. Those among the respondents who had rated themselves with the grade "Good" had 81% correct answers. And this is a deviation of +23% Relative to the main value. Those who rated themselves with the grade "Very good", had 75% correct answers with a slightly smaller deviation of +17% from the mean value. If I interpret these values, I will assume that the grades the respondents have given themselves relate to the realities.

The research shows in table 23 that there is no correlation between the use of OSINT techniques and competence as proposed by the hypothesis. Only 50% of those who had education in the field used OSINT techniques. And 89% of those who only had B1 expertise used these techniques.

### **Afraid of making mistakes**

75% of all respondents were afraid of making mistakes when using OSINT techniques, and 47% were most afraid of exposing themselves and their privacy. This may also point to uncertainty related to competence in being anonymous when investigating on the internet. 43% of the same group were concerned about spoiling the ongoing investigation, which could be linked to fears of being identified or the fear of using insufficient techniques. Part of the reason for this fear may be that only 4% had access and used dedicated analytical machines for OSINT. At the same time, it should be assumed that the respondents should have been able to install the TOR browser and VPN service with the expertise they were provided in the first year of study. In this context, it must also be considered that VPN service has a subscription price few will pay if not particularly interested in the topic.

### **Which device did they use?**

46% of the respondents used an ordinary (BL) police computer when using OSINT techniques at work. And a whopping 69% of all respondents used the police tablet and mobile

phone for this work. It would be easy to assume that the devices than were used for Google Streetview in the context of Operational activities, but only 49% were aimed at this. 86% of those who used the Police tablet and mobile phone used the devices for searching for people on SoMe.

These devices run on identifiable IP addresses, and installation of Tor browser, VPN or SoMe search profiles is impossible on these devices. In this context, it is understandable that 75% of the respondents were concerned about identification. This can be linked to limited competence and technical facilitation in the police districts.

### **Did the techniques influence their work?**

The survey shows that the students mainly used people searches on SoMe and searches for people on the internet. When asked if the OSINT techniques influenced their investigations, 70% of all respondents answered that OSINT techniques provided knowledge of the person/object they were searching for. 65% of respondents received information that made them less uncertain in the cases they were working on. This empirical data gives the reason to believe that NPUC gives the students competence that benefits the police. Out of all respondents, as many as 61% used the techniques in the Investigative track with known perpetrators. 56% used these techniques in operational activities and assignments, and as many as 53% of respondents used these techniques in the context of preventive policing.

Since so many (70%) of the students answered that they have no other competence than what they learned in Digital Policing in the first year of study. It can be interesting to point to the exam results in Digital Policing in the summer of 2020. The average of this exam gave the same student cohort the grade of "Good", which may also affect my hypothesis in this chapter.

## **8.1.2 How did they use the OSINT methodology they learned in their education?**

When data from open sources is processed, viewed, and analyzed in the context of existing information, we get a product called Open Source Intelligence. Using only a part of the methodology will not provide an intelligence product. However, the techniques discussed to gather the information are nevertheless OSINT techniques. In this section, I research whether

the methodology has been applied in their practical training (B2) year. The empirical data findings will answer whether police students only performed simple searches, or whether some of the work could be categorized as Open Source Intelligence according to the methodology.

In this thesis, OSINT techniques and methods are presented to create a broader understanding of what learning outcomes Norwegian police university colleges want students to possess after the first year of study. With this understanding, we will be able to investigate to what extent the knowledge was used in B2. In this section, I will discuss my research question against my research problem, and I will try to shed light on my hypothesis without going into the confirmation trap by only researching to support this opinion.

My hypothesis:

*The Norwegian police students used only the collection phase of the OSINT methodology.*

### **Most used and least used phases.**

In the survey, the students were asked if they used the OSINT methodology presented in their first year of study. 92% responded that they followed parts of this methodology. 75% of the respondents answered that they had used OSINT techniques within the collection phase of the methodology. And 21% of these students said they only had worked within this phase.

A large proportion of the police students have been using OSINT techniques and the collection phase of the methodology through B2. This is very positive, as open source information is often free and informative. At the same time, it is surprising that some students have not retrieved any kind of information for use in their police service throughout an entire working year. This may, of course, be because the students do not fully understand that searches in these open sources are part of the OSINT technique, and the collection phase covers that exclusion from this.

Only 11% of the respondents had distributed their results according to the distribution phase. A distribution could be a police report in a criminal case or a presentation for colleagues at the police station. At the same time, we can assume that some of the students who did not complete the distribution phase used their findings to strengthen hypotheses in their criminal

cases. 22% of the respondents ticked this off for strengthening their hypotheses in their investigations. Only 7% described their use of OSINT techniques in their police reports.

### **Those who used all phases in the methodology.**

3% of the police students completed all 6 phases of the OSINT methodology. This can be perceived as a very limited use of OSINT methodology. In this context, there will be reasons to assume that much of the respondents' information collection cannot be directly linked to Open Source Intelligence, but as searches with OSINT techniques for identifying persons or crime scenes. It should be emphasized that this 3% share of respondents may be too small to indicate an exact tendency. At the same time, analysis of this cohort shows that all these respondents increased their knowledge of persons and objects, and as much as 83% of the same cohort had their hypotheses strengthened in the criminal cases they investigated.

### **Collection phase.**

21% of all respondents performed only one phase, the collection phase, of the methodology. Of these, 14% strengthened their hypotheses, and 61% strengthened their knowledge of persons and objects. These are weaker figures that contrast the results of those who performed all methodology phases. At the same time, the empirical data show that 98% of those who only used the collection phase, used techniques to retrieve information about people from SoMe. On average, 81% of all respondents used OSINT techniques in SoMe to identify people, and therefore 98% were perceived as somewhat high. At the same time, 81% is an average that is not adjusted for police disciplines.

98% can therefore be understood in the context of the police discipline *operational activities and assignments*. In this discipline, the distribution of assignments to the police patrols will occur with police communications and mobile phones. Assignments are most often communicated orally or as text, and witnesses and offended are named without a picture. In this context, simple searches in SoMe for identification will support the patrol before arriving at the scene.

If we look at police investigations with known perpetrators, it is within this discipline that the survey has provided the greatest frequency. 69% of the respondents have used OSINT techniques within this discipline. This results in a deviation of +19% compared to the average frequency among the five defined police disciplines (50%). A whopping 84% of those who



investigated criminal cases with known perpetrators worked in the methodology collection phase. This is a deviation of +10% relative to the mean. At the same time, only 13% of this cohort distributed this work in their police reports. This does not deviate from the mean, but 13% is nevertheless perceived as low.

In investigations targeting known perpetrators, it will be easier to use OSINT techniques than in cases without input values. *Unique identifiers* such as name, place of residence and birth data will simplify searches both on the internet and on SoMe. These searches belong to the methodology's collection phase and support what the empirical data provides in this area. Only 33% of respondents say that they have used the OSINT methodology in investigating cases involving unknown perpetrators. 45% of these respondents used OSINT techniques to collect information. This deviation is -38% relative to the mean of 83%. And only 33% of the same group completed the information needs and strategy phase. This is also a deviation of -20% relative to the average value.

### **Preventive policing**

Within preventive policing, 53% of respondents used part of the OSINT methodology. This is 15% of the frequency distribution among the different police disciplines and a deviation of -5% from the mean. The collection phase was the most used phase with 79%. In the discipline of preventive policing, one would expect that the OSINT techniques and data collection would make up a much larger proportion than what appears here. At the same time, we must assume that some of the figures for preventive policing fall under the police discipline *Police intelligence-No criminal proceedings*, referred to in Chapter 3. This is intelligence as The Norwegian Police Directorate describes: "*Intelligence is a managed process, consisting of systematic collection, analysis, and assessment of information about people, groups, and phenomena to form the basis for decisions*". This includes OSINT, which aims to form a basis for decision—a decision that is largely not connected to the purpose-driven investigation trail but in the direction of preventive policing. If we merge these two disciplines into one discipline for statistics, we get a frequency of 191 respondents. This cohort then represents the disciplines with the largest proportion of users within the collection phase, compared to the total frequency of 528. The share then amounts to 36%, a deviation of +16% from the mean value of 20%.

It is evident that through their year of practical training, Norwegian police students have used the OSINT methodology. The use is most frequent within the collection phase, but it must be borne in mind that simple techniques for identifying persons, objects and crime scenes dominate without this being linked to several phases of the methodology.

### 8.1.3 How satisfactory was the expertise and facilitation for using OSINT techniques in the police districts where the police students had their practical training?

One prerequisite for using OSINT techniques in the police districts is that the student supervisors and the police students have a basic understanding of data and knowledge of the techniques discussed in chapter 4 of this master's thesis.

In this section, I will discuss what my research shows in the context of the research question presented in this chapter's headline. I will also try to shed light on my hypothesis without going into the confirmation trap by only researching to support this opinion.

My hypothesis:

*The expertise and facilitation for investigation using OSINT techniques in the police districts were low.*

The research data available in this thesis gives a good picture of student and student supervisor understanding of OSINT techniques. Among all respondents, 36% of the students gave their student supervisors "Not recommendable" on a scale of grades from poor to excellent, which was the second worst character.

Only 32% of students rated the student supervisors with the grade "Good", which is the median. At the same time, the survey shows that police students also gave themselves middle grades. Only 51% of the respondents gave themselves the grade "Good". And as many as 33% of the respondents gave themselves the "Not recommendable" grade.

These figures should be understood in the context of perhaps too high expectations of student supervisor competence. Many of these who qualify to supervise police students have most often been in the police service for several years. And for that reason, it's been a long time since many in this group graduated from the NPUC. At the same time, it must be considered that the subject of Digital Policing with learning outcome descriptions containing OSINT techniques was less developed a few years back. In this context, one cannot expect an equally in-depth knowledge of the techniques unless one is particularly interested, or that the student supervisor has chosen to graduate in this subject area.

Framework conditions are not just about what expertise the police students encounter in the police districts, but also elements such as computers and software, recognition for methodology and time available for their investigations affect this.

Only 8% had access to dedicated computers, and only 4% of the respondents used dedicated computers for search and analysis. Trøndelag Police District and Nordland Police District are ranked highest in being able to offer facilitation for this. In this context, a dedicated computer for search and analysis is a separate computer that uses a VPN or solutions that do not identify oneself or the police. 67% of all respondents reported that the police district did not have such computers.

69% of the respondents answered that they used police tablets and mobile phones for their OSINT searches. This may reinforce the impression that the framework conditions for such work should have been better, as dedicated computers are not more readily available. At the same time, it must be considered that a large proportion of the respondents used techniques such as Google Street view, or as previously described, identification of people via the profile pictures on SoMe. These are techniques that the survey shows are most often used in operational activities and assignments. Techniques are carried out without the police patrol returning to the police station to use dedicated devices.

To get good framework conditions to collect and process information from open sources, the police students should be given enough time to carry out their OSINT techniques. At the same time, time should also be given for planning, preparing, analyzing, and describing used techniques and findings in their police reports. Only 9% of the respondents reported not getting enough time. And a total of 92% responded that they had enough time or enough time

occasionally to do this kind of work. This means that time limits in most situations do not adversely affect the framework conditions.

Through the year of practical training, many students needed help from the Student Supervisor regarding their OSINT analyses. 50% of the respondents received help or occasionally received help, and 28% did not receive help. Whether the lack of help was based on Student Supervisors' lack of understanding of OSINT, or whether this was based on limited time and capacity are not researched. At the same time, it is easy to believe that all requests for help cannot be fulfilled due to capacity. The two Norwegian police districts, Sørøst og Sørvest police districts, were the police districts where the respondents reported that they received the most help from the Student Supervisors in the context of OSINT analysis.

It is important to be aware that the age composition in the police force is variable in Norway. Many of the oldest police officers are often less interested in data and computers than the youngest officers. This, in turn, affects what is prioritized and what is not. In this context, the use of OSINT techniques can be called off as somewhat unnecessary knowledge that the young people bring with them from the Police Academy. In this context, it can be challenging for police students to challenge an established working environment on modern OSINT techniques.

## 8.2 Challenges of not using OSINT methodology and techniques

A well-worked and well-documented analysis distinguishes the scientific approach from superficial claims. In this thesis, I have tried to document my assertions against the research results from the survey directed at the students.

There are many reasons why using OSINT techniques has become a central part of the topic of Digital Policing in the Norwegian police bachelor. The methods are many and simple, and completely without the need for knowledge of advanced computer coding or the like to succeed. At the same time, the gain is the infinite amount of information accessed by power searches on Google and the extraction of information from social media.

In this thesis, I have presented the difference between open source intelligence and open source information (NATO, 2001). The difference will lie in the fact that the intelligence product is a somewhat more processed product than pieces of information in what is known as open source information. In this landscape, it is important to obtain information from open sources according to a methodology that follows a common strategy for such processes in the police. Information collection should be based on a clarified need before setting a strategy. An unsystematic search for unknown elements will not have the necessary quality and accuracy, according to H. Gibson (Gibson, 2016). But it can lead to random findings of interest. The Attorney General regulates random findings through the circular *Legality Control of Coercive Measures*. This states that when searching, one should not look for random findings, but have a purpose for the search (Attorney general, 2021). We can discuss whether looking for information using OSINT techniques is a police search regulated by the Criminal Procedure Act. But at the same time, one often looks for information supporting a hypothesis. And this purpose-driven information collection aimed at the person or enterprise defines as police investigation. If we understand securing information from the internet and SoMe in the context, we will be limited by the Attorney General's circular. In this scenario, one will benefit from following an OSINT methodology approved by the academic community.

The surveys that underlie this thesis show that few police students worked according to all phases in the OSINT methodology. Most students got information from the internet at best from the collection phase when searching for persons on SoMe or persons on the internet. This may be because using internet sources as professionally investigative methods and using OSINT methodology for systematization and analysis is not yet a well-integrated or recognized part of the investigation process.

The collection of information from OSINT according to a methodology requires that the police know how to maintain operational security and anonymity. Without such knowledge, the police will be compromised, and countermeasures from the person we seek information can be implemented. Some of these countermeasures can harm the investigation or make the investigation significantly more difficult. Known countermeasures can be deleting posts on SoMe, closing, or deleting accounts, removing blogs, or new posts with incorrect or false information to mislead an ongoing investigation. In the worst case, the police officer

identified can be compromised through threats and reprisals. The survey highlighted this fear among the police students; 47% of the respondents were afraid to expose themselves and their privacy.

Earlier in this thesis, I wrote about the growing digitization in people's lives. Internet Bloggs, YouTube, TikTok<sup>49</sup>, interest groups on the internet and accounts on SoMe are among the many possible locations where it is increasingly crucial that the police have the expertise to find information. Without this expertise, the police will not go along with digital societal developments, and important clues will be overlooked in the investigations with the consequences this can have on the development of crime. H. Gibson describes the police use of OSINT as follows:

*"The reasons why the police obtain information from open sources are in most contexts related to the task of investigating criminal acts or preventing such acts from taking place"* (Gibson, 2016).

The survey shows that the vast majority of students have their own accounts on the largest social media sites, such as Facebook, Instagram, and Twitter. This gives reason to assume that these students master knowledge about the collection of open-source information from SoMe. When using the correct preparation, method and techniques, this information will qualify to meet parts of the competence need. A competence that is both topical and in demand in most Norwegian police districts.

## 8.3 Challenges linked to Digital Policing

Through my research, I have gathered several reports that jointly call for a higher competence in the Norwegian police. The reports must be interpreted for what they are, but at the same time, we must be critical of reports and academic papers concluding on assumptions through less thorough qualitative research. Research based on interviews of a population with strong opinions without professional knowledge. In this context, it will serve the research results well if such research can be reinforced using quantitative research methods. This is referred to as the "Mixt method". And the main argument for mixing methodology is that it can provide a

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<sup>49</sup> <https://www.tiktok.com>

better and deeper understanding of the topic one wants to shed light on, thereby strengthening confidence in the conclusions.

The Norwegian Government White Paper 29 (2019–2020) "*A police force for the future*", describes an altered crime picture and the challenges and needs for changes it entails. The report explains that ICT crime and digitalization of crime challenge the police's competence. This crime creates a need for competence that applies to all levels of the police, both basis competence, special competence, and prosecution competence. The report is also referred to in the report from The Auditor General, "*Police efforts against crime using ICT*" (Auditor General, 2021, p. 5). This report concludes, among other things, that a lack of competence prevents uncovering and solving ICT crimes.

Several reports describe the low digital competence of the Norwegian police, with different solutions to rectify this. The survey I have conducted shows that the police students find that the framework conditions for using OSINT techniques in the police districts are not satisfactory. Neither is the competence of the student supervisor. The OSINT techniques are key parts of Digital Policing in the context of the collection of information and preparation. But the techniques are perceived as a less recognized investigation tool by Norwegian police. At the same time, 67% of the police students in the survey report that they have neither special expertise nor interest in data and computers. Whether this lack of interest is due to a poor understanding of the importance of the data is uncertain, but the attitude can be reinforced if OSINT methods and techniques are not incorporated into the daily police work.

OSINT methods and techniques change frequently and in parallel with the frequent changes of the open sources. New functionality in the applications requires new techniques and expertise. And this can be a challenge for the police, where the police generalists most often receive their training only at the beginning of the police education. The Norwegian Defence Research Institute (FFI, 21/02532, p. 83) writes in their report:

*The ongoing technological revolution and the digitization of society result in a number of new challenges and tasks, including for the police and prosecution services. These must therefore be continuously further developing the ability to adapt, inconvincible and rapid*

*development in line with the changes in the community. This is necessary to remain relevant and to be able to solve the social mission.*

## 9. CONCLUSION AND FUTURE WORK

### 9.1 Conclusion

My research problem for this thesis is: *How capable are the Norwegian Police Students in performing online investigations with the use of OSINT techniques, and are the police districts facilitated for this?*

By answering my research questions and through the discussion in chapter 8, I have answered the research problem. The main features and results of this thesis can be summarized like this:

86% of the respondents in the research survey used various OSINT techniques in their year of practical training. The techniques were used despite 75% of students worrying about becoming compromised, making mistakes, or destroying ongoing investigations.

Techniques around people searches on social media and the internet are most frequently used. 81% of all respondents used OSINT techniques on social media for the identification of people, and 70% responded that OSINT techniques provided knowledge of the persons and objects they were investigating. When comparing police disciplines and tasks, it was the investigations of known perpetrators where the students most frequently use OSINT techniques (69%).

Very few police students use all phases of the OSINT methodology. Generally, the collection phase is most popular. This is clearly related to what technique is used and in which police discipline the search techniques are used. The research shows that very few police students refer to their use of OSINT in their police reports (13%).



By comparing self-certified competence, validated by knowledge questions, the reported gains from OSINT analyses show that OSINT techniques are used competently. The knowledge of OSINT and the techniques that police students bring with them to the year of practical training is perceived as good enough to qualify as recognized investigative tools in the police districts. This thesis shows that police districts should invest in higher competence among their employees and dedicated computer equipment adapted for open source intelligence analyses.

## 9.2 Future work

This research shows that the competence police students bring with them in their year of practical training is perceived as a satisfactory starting point. This relevant knowledge of methodology and OSINT techniques must be maintained with good facilitation and expertise in the police districts.

In recent years, several actors have advocated a broader focus on both digital competence and infrastructure. The Norwegian Defense Research Institute wrote a 2021 report, (FFI, 21/02532. P.86) explaining what they believe was a prerequisite for keeping the police relevant and competent in dealing with the increasing amount of information in society. The police's ICT services in the Norwegian Police Directorate wrote about the same needs in their report "Strategy for future ICT functions in the police" (POD, 2018). The need for the development of expertise and secure digital solutions to realize the police's goals and ambitions to stay ahead and be innovative. The report also referred to the strategy "Police against 2025" (POD. 2020) which provides further guidelines about the desire for modern digital solutions and increased digital competence.

The Norwegian Police University College (NPUC) should, like other relevant actors, communicate the desire for increased investment in competence and equipment to police districts and the Norwegian Police Directorate. Newer solutions and infrastructure must be expected in most areas of Digital Policing. Dedicated solutions must be established, and investment must be made in increased competence of employees within Digital Policing and OSINT techniques.

This master's degree sheds light on which techniques are used and in what context they are used. This provides the professional environment with a basis for discussing necessary changes to OSINT training. Changes that should provide students with greater confidence in their use of the techniques, and enhanced training about the police disciplines where the techniques are used.

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# 11. APPENDIXES

## 11.1 Survey questions translated to English

In this survey you will be completely anonymous. None of the answers you give will affect you or your colleagues in any way. The objective of the survey will be to uncover knowledge in previous learning objectives, and at the same time give us an understanding of the framework conditions given in the bachelor's year of practice, within the topic of digital police work.

The police are increasingly using techniques for information gathering from open sources (OSINT). Knowledge and methodology related to this field is one of many success criteria for good information gathering in both investigation, preventive, and intelligence work. The questions in this survey will mainly deal with your competence and experiences in this area of knowledge. Keep in mind that searches in police records, such as Indicia, BL, PO, Agent, etc. are not considered searches in open sources. On the other hand, searches for information on the internet and in the social media are understood as searches in open sources.

1. Which campus do you belong to?
  - a. NPUC Oslo
  - b. NPUC Stavern
  - c. NPUC Bodø
  
2. Where did you have your year of practical training?
  - a. Agder police district
  - b. Finnmark police district
  - c. Innlandet police district
  - d. Møre and Romsdal police district



- e. Nordland police district
- f. Oslo police district
- g. Sør-Vest police district
- h. Sør-Øst police district
- i. Troms police district
- j. Trøndelag police district
- k. Vest police district
- l. Øst police district

3. In B1 you learned about how the police use searches in open sources and social media in connection with information gathering for investigation, preventive policing, and intelligence. Information gathering in connection with to order and emergency response was also part of this. Did you use any of this knowledge in B2?

- a. Yes
- b. No
- c. Can't remember

4. If you did not use the knowledge  
(check several if desired)

- a. I didn't quite get the need for this.
- b. I didn't have a field of work where this was necessary.
- c. I didn't really remember how to.
- d. I didn't have access to an OSINT and analysis Computer
- e. There were no established routines for this where I served.
- f. I was afraid to make mistakes.
- g. There are no situations from my practice where searches in "open sources" could have made a difference?
- h. I didn't have time for such searches in my practice

- i. Other reasons.
5. If you were afraid of making mistakes, what were you most worried about?  
(Check more if desired)
- a. Exposing myself and my own privacy
  - b. Destroying the ongoing investigation
  - c. Exposing police equipment/networks to attacks
  - d. Using the wrong methodology
  - e. Collecting incorrect information (Fake news)
  - f. Collecting immaterial information
  - g. Other
6. In what policy context did you use searches in open sources:  
(check several if desired)
- a. Investigation – unknown perpetrator
  - b. Investigation – known perpetrator
  - c. Preventive - Knowledge-Based
  - d. Intelligence – outside criminal proceedings
  - e. Operational activities/operations/Assignments
  - f. Other
7. Did your OSINT analyses affect the cases you worked on?  
(Check more if desired)
- a. I learned about the object/person
  - b. I had my insecurities answered
  - c. I was able to strengthen hypotheses in the criminal case.
  - d. It provided good and new information in the preventive track
  - e. It was a time-saving result
  - f. It produced results in relation to the scorecard/prioritization
  - g. No, unfortunately.

h. Uncertain

8. If you fully or partially followed the methodology we learned in B1, which of the 6 phases did you conduct in your surveys? (Check more if desired)

a. Information needs and strategy

b. Planning and preparation

c. Collection

d. Processing/Validation

e. Analysis

f. Deployment and evaluation

9. What techniques did you use in your OSINT analysis?  
(Check more if desired)

a. Advanced search in Google with "search operators"

b. Reverse Image Search

c. Google Street View at addresses

d. Search for person on SOME

e. Search for enterprise/organizational information on SOME

f. Search for person on the internet

g. Search on internet for enterprise/organizational information

h. Other

10. Did you describe your OSINT investigations in the criminal cases?

a. Yes, in separate analysis report

b. Yes, in a police report

c. Yes, in parole or debriefing

d. Other

e. No

11. Did you have access to an OSINT and analysis computer?

a. Yes

- b. No
- c. don't know

12. If you had access to a dedicated OSINT and analysis computer, did you use this?

- a. Yes
- b. No
- c. Didn't have access

13. Were there established routines for how this should be used?

- a. Yes
- b. No
- c. Didn't have OSINT and analysis computer

14. Which computers did you use in your OSINT examinations during working hours?

(Check more if desired)

- a. Analysis and OSINT computer
- b. Ordinary "BL-PC"
- c. Private computer/tablet/mobile
- d. Police tablet/mobile

15. Did you have enough time to conduct your searches in open sources?

- a. Yes
- b. No
- c. Sometimes

16. Did you get help or guidance for your OSINT investigations?

- a. Yes
- b. No
- c. Sometimes
- d. Didn't need help

17. How would you evaluate your student supervisor's competence in OSINT techniques?

- a. Excellent

- b. Very good
- c. Good
- d. Fair
- e. Poor

18. How would you evaluate your own competence in OSINT techniques?

- a. Excellent
- b. Very good
- c. Good
- d. Fair
- e. Poor

19. Do you have any special expertise/interest in data?

(check several if desired)

- a. I am educated in the field
- b. I have a big interest in data
- c. I have always played a lot of computer games and have thereto technical expertise
- d. I have built my own computer(s)
- e. Great practice from work and studies
- f. Only from what I learned in B1 at NPUC
- g. Not really

20. Do you know what NFT (Non-Fungible Token) is?

(Don't use google here)

- a. Yes
- b. No

21. Is it possible to find EXIF data in a photo you secure from a Facebook profile?

- a. Yes
- b. No
- c. Uncertain

22. What social media (SoMe) do you have user accounts on?

(Check more if desired)

- a. Facebook
- b. Twitter
- c. LinkedIn
- d. Instagram
- e. Telegram
- f. None

23. If you have a social media user account, do you have multiple user accounts on any of these?

- a. Yes
- b. No

24. Have you ever used a private account for OSINT on SOME?

- a. Yes
- b. No

25. Did you create social media search profile(s) that you used for OSINT in the year of practice?

(These are profiles that do not identify you as a user. Not illegal under Norwegian law)

- a. Yes, on my own
- b. Yes, with a little guidance
- c. No, I didn't manage.
- d. No, didn't get guidance.
- e. No, I didn't see the need.

# 11.2 Exam results in Dipokrit01 2020



PHS-Studieavdelingen (BODHJE)

FSPHS (16.06.2022 Kl. 11:11)

Side 1 av 1

## FS580.001 Resultatfordeling

Eksamen: DIPOKRIT01 1 H 2020 VÅR

Digitalt politiarbeid og kriminalteknikk - Hjemmeeksamen

7,5sp

Karakterregel: Bokstavkarakterer

	Totalt	Kvinner	Menn
Antall kandidater (oppmeldt):	543	277	266
Antall møtt til eksamen:	543	277	266
Antall bestått (B):	498	254	244
Antall stryk (S):	45 8%	23 8%	22 8%
Antall avbrutt (A):	0	0	0
Gjennomsnittskarakter:	D	C	D
Antall med legeattest (L):	0	0	0
Antall trekk før eksamen (T):	0	0	0

Karakter	Antall	Kvinner	Menn
E	82	35	47
D	156	84	72
C	197	105	92
B	58	26	32
A	5	4	1

