D2.2: Report on Organisational Culture

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Report on Organisational Culture

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List of Abbreviations

CID ..... Criminal Investigation Department
CJ ..... Citizens' Juries
CSI ..... Crime Scene Investigation
CT ..... Counter-Terror
DF ..... Digital Forensic Practitioner
ERF ..... Examination Request Form
ETR ..... Criminal Proceedings Records
FR ..... First Responder
FS ..... Forensic Science Practitioner
ICP ..... Institute of Criminalistics
ICT ..... Information and Communication Technology
IMT ..... Instruction and Methodology Training
INV ..... Investigator
NCTC ..... National Counter Terrorism, Extremism and Cybercrime Agency
NPUC ..... Norwegian Police University College
ETD ..... Extremism and Terrorism Division
OSINT ..... Open-Source Intelligence
OT ..... Other
PJ ..... Judicial Police
POLAMK ..... Poliisiammattikorkeakoulu
PSP ..... Public Security Police
RAB ..... Research Advisory Board
RO ..... Reporting Officer
SIO ..... Senior Investigating Officer
SPA ..... Scottish Police Authority
UoG ..... University of Glasgow
UPTI ..... Technological and Computer Expertise Unit

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1. Introduction

The purpose of deliverable D2.2 *Written report on organisational culture* is to outline the organisational culture of individuals working with digital evidence in five CLARUS partner countries (Greece, Finland, the Czech Republic, Portugal, and the United Kingdom [UK]) with respect to how bias may be introduced. Using a combined inductive and deductive analysis approach, we analysed survey and focus group interview data and examined aspects of organisational cultures which undermine and promote intra- and inter-organisational collaboration within and between the partner countries. The aim of this deliverable is to provide knowledge about the potential sources of misunderstandings, errors, and biases from organisational cultures in the partner countries, as well as their terminologies and communication patterns.

Furthermore, this deliverable is intended to inform and support the development of subsequent deliverables within the project. The deliverable aims to identify when and where the tools developed as part of the CLARUS project may be most useful, and to highlight relevant topics that could be incorporated into the training.

Preliminary results were presented to the Research Advisory Board (RAB) for feedback and critical reflection, and to Citizens' Juries (CJ) to validate findings against broader societal concerns and perspectives. Input from both the RAB and the CJs was integrated into the analysis to strengthen the robustness and relevance of our findings. Their feedback provided alternative interpretations, highlighted contextual factors influencing responses, and suggested refinements in how we framed concepts such as bias, fairness, and systemic influences. This external reflection enabled us to situate our interpretations more clearly, address potential limitations, and align our recommendations with broader societal and professional perspectives.

Objective of WP2

WP2 explores cultures, communication, and interaction in CLARUS partner countries. It analyses patterns of interaction, communication, language, and culture, offering an enhanced understanding of how organisational interaction impacts investigation and examination processes and thereby assesses the context for errors and bias. WP2 is made up of three main tasks: (1) T2.1 *Design and test a case study, which will serve as a pilot considering a cross-border exchange relating to a terrorist case, where digital evidence is used*, (2) T2.2 *Run the case study in partner countries, involving practitioners*, and (3) T2.3 *Analyse the transcriptions of the focus groups in terms of interaction/communication, sources of bias, occupational culture and language*.

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This deliverable is the result of T2.3. The objective of T2.3 is to analyse the focus groups in terms of organisational culture and the potential sources of bias as well as language use in communication across organisational, professional and national borders. The analysis will lead to two reports, (1) this deliverable, which is a written report on organisational culture, and (2) a separate report on language use in communication across organisational, professional, and national borders (D2.3 *Report on language use*).

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2. Conceptualisations

Organisational culture refers to norms, values, and beliefs shared within a certain group reflecting their core values and way of doing things. Cultural features are not necessarily visible but may exist as underlying assumptions that shape behavior, thinking, and decision-making. Since culture influences individuals' behaviors beyond standardized procedures, it plays a central role in shaping actions and driving desired organisational outcomes (Hogan & Coote, 2014).

Agencies involved in digital evidence investigations consist of practitioners from multiple disciplines which are impacted by institutional pathways, work task prestige hierarchies, and underlying values present in their organisational cultures. We therefore acknowledge that culture can both facilitate and mitigate the occurrence of bias. For instance, hierarchical decision structures may limit practitioners' potential to question directions given to them or decisions made, thereby potentially suppressing independent judgment and discouraging individuals from challenging investigative assumptions (Morgan, 2023; Murrie & Boccaccini, 2015).

We approach organisational culture in the light of bias, misunderstandings and error, and are interested in the way in which culture can introduce, reinforce, or hinder efforts to mitigate or counteract these deficiencies effectively. This is important because, although the occurrence of bias does not necessarily result in errors, it increases the likelihood of making erroneous decisions. To ensure objectivity, neutrality, and fairness in the pursuit of justice outcomes, bias, miscommunication, and error should be prevented and mitigated.

CLARUS approaches bias, miscommunication, and error primarily from a systems perspective. From this perspective, deficiencies such as bias and error in digital evidence investigations are driven not only by individual cognitive constraints, but also by broader organisational, structural, and procedural influences that impact how evidence is produced, interpreted, and applied. While this deliverable focuses on this systems perspective, the individual-level perspective is sometimes discussed to contrast findings. See D1.4 *Residual Sources of Bias* for further details on the systems perspective.

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3. Materials and Methodology

3.1. Data Collection and Participants

This report draws on data collected through focus group interviews and a survey conducted among practitioners in five CLARUS partner countries. The data collection procedure is outlined in detail in D2.1 *Guidance on case study and how to run it in each jurisdiction*. In addition to these instructions, the local researchers in CLARUS partner countries who conducted the interviews and the survey were supported through close contact with the researchers from the Norwegian Police University College (NPUC). An overview of the data collection in practice is provided in the following sections.

Translation of Survey and Interview Guide

Before data collection could take place, all partner countries (besides UK/Scotland) had to translate the survey and the interview guide into their local language. This was done by local researchers. The translations were then backtranslated to English by NPUC using Microsoft Copilot. Identified discrepancies were discussed bilaterally between NPUC and the respective local researchers to ensure consistency and minimise variation in word choice, thereby increasing the likelihood of collecting data that aligns with the aims of the deliverable.

Training of Local Researchers

NPUC provided training to all local researchers to ensure that they understood the purpose and objectives of the focus groups. This was primarily done during the third CLARUS milestone meeting in Oslo from 30-31 October 2024. In a plenary session, NPUC first outlined the interview guide and the survey, demonstrated its use, and explained the rationale behind the survey and interview items. Afterwards, NPUC arranged mock focus group interviews so that the main researcher of each of the partner countries could get a feeling for the interview situation they would encounter in the actual data collection. For this purpose, the consortium was split into four groups, each led and moderated by a local researcher from one of the participating partner countries (Finland, Greece, Scotland, and the Czech Republic) who was responsible for conducting the focus groups in their respective country. The main researcher from Portugal was not able to attend the consortium meeting and received an online training (see below).

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In the mock interviews, the consortium members were provided with fictitious role descriptions and instructions to allow for a realistic training of the actual focus group interviews. Nina Sunde, Brita Bjørkelo, Laura vom Kolke, and Piotr Wegorowski—all researchers involved in WP2—attended one of the four mock focus groups to assist and give feedback to allow for the learning outcomes intended for the training.

Since the main researcher from Portugal was not able to attend the consortium meeting, NPUC and UoG (University of Glasgow, Piotr Wegorowski) conducted an online training for them. A mock focus group was conducted with Nina Sunde, Laura vom Kolke, and Piotr Wegorowski as participants so that also the main researcher from Portugal could gain insight into the interview setting and have the opportunity to ask questions.

Data Collection

Before any data was collected, ethical approval for the focus groups was obtained through the University of Dundee (UoD-SHSL-EES-STAFF-2024-25-003). The focus groups took place between 20 December 2024 (first) and 11 June 2025 (last) and were arranged by local researchers in CLARUS partner countries. Participation was based on informed consent obtained by the local researchers. While NPUC encouraged partners to conduct the focus groups in-person, some focus groups were conducted online due to scheduling conflicts and other limitations.

Survey

In the beginning of the focus groups, participants were asked to fill out an online-based survey. The survey questions were based on existing measures as well as own items developed by NPUC. NPUC was responsible for the survey which was conducted in Nettskjema[1], a data collection tool offered by the University of Oslo that provides high security of data and is commonly used in academic research in Norway. NPUC was responsible for plotting all the questions into Nettskjema for each of the CLARUS partner countries and participants were thus able to complete the survey in their local language. The survey included topics such as communication and interaction as well as bias and bias mitigation. Central concepts relevant to understanding the survey questions were elaborated upon. Example questions from the survey are "*Have you ever experienced that others have been misled based on your written or orally presented results?*" and "*How often does system bias influence your daily work?* ***System bias*** *refers to systemic properties and features that can influence the*

[1] https://nettskjema.no/?lang=en

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investigation and contribute to biased and erroneous examination, interpretation and decision-making. For example, organisational structures and processes, and professional cultures in digital forensic and investigative work." The complete set of survey questions can be found in D2.1.

The procedure outlined above was the case for four of the five partner countries—Finnish partners from Poliisiammattikorkeakoulu (POLAMK) faced difficulties with the sharing of data due to local restrictions. The Finnish survey was therefore not provided through Nettskjema, but in a paper-based format by local researchers from POLAMK.

Focus Group Interviews

After completing the survey, participants were introduced to the first part of a hypothetical case study, where a person was severely wounded and a mobile phone with three types of evidence (digital, fingerprint, and DNA) was found. Participants were then asked to discuss how they would normally process the case presented in the scenario, and who they would interact and communicate with. The interview then moved on to more general questions about forensic traces and miscommunication. Example questions from part one of the case study are "*Who among you would be the first to attend the scene or handle the evidence, and what would your work procedure look like in practice?*" and "*Where would you expect the possibility of miscommunication to be most prominent in this case, and why?*". The complete interview guide with information and questions can be found in D2.1.

The second part of the case study introduced participants to additional information: Another victim was wounded and there was an indication that this might be a terrorist attack and opportunities for cross-country communication were created due to the suspect having foreign citizenship and possibly having ties to a terrorist group. Participants were asked how their procedures, communication, and interaction would change in this scenario in addition to more general questions like participants' knowledge of other disciplines and others' knowledge of the participants' own discipline. In part two of the case study, example questions are "*Based on your role, would there be a need for any changes concerning individual or agency roles, procedures or priorities?*" and "*How do you mitigate the possibility of miscommunication in this situation?*".

Transcription, Translation, and Data Sharing

The interviews were transcribed, anonymised, and translated to English by local researchers and/or transcription bureaus. After translation, transcripts were uploaded to SharePoint as MS Word documents. The open-response categories (i.e., qualitative

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survey answers) were extracted from Nettskjema by NPUC and uploaded to SharePoint as MS Word documents. These were translated by local researchers to English and then uploaded to SharePoint.

Due to data sharing restrictions, POLAMK did not share raw data. Instead, NPUC worked closely together with POLAMK in finding a solution for how to conduct the analysis and the details are outlined below under "Data analysis".

Participants

Participants were recruited by local researchers in the partner countries. The sampling method aimed to ensure that the invited participants represented each partner country's system (individuals who are involved in the handling of digital evidence) as detailed in WP1. While not every role needed to be present at every focus group, the aim was that the participants invited to the four focus groups should reflect on who would be involved in a case like the one presented in the scenario.

Four focus groups were conducted in each partner country with three to five participants per group. In the UK, all participants were recruited from Scotland. Table 1 gives more detailed information about the number of participants and survey responses:

	Focus group interviews (group n)	Focus group participants (individual n)	Survey responses (individual n)
UK - Scotland	4	17	17
Finland	4	15	15
Czech Republic	4	16	15
Greece	4	14	14
Portugal	4	17	17
Total	**4**	**79**	**78**

Table 1: Overview of the number of focus group interviews, participants, and survey responses.

Participation in both the survey and the focus group interviews was voluntary. As shown in the table above, one participant from the Czech Republic did not submit their survey response. The reason for this is unknown—it is possible they simply forgot to send it in. Therefore, the number of survey responses is one fewer than the number of focus group participants.

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Overall, 65 men and 14 women participated in the focus groups. While there was an attempt to have a gender balance in the focus groups, this was difficult to achieve due to the commonly somewhat lower representation of women in the invited roles, particularly within the field of digital forensics. Table 2 gives a more detailed insight into the gender balance in the focus groups:

	Men	Women
UK - Scotland	14	3
Finland	12	3
Czech Republic	15	1
Greece	13	1
Portugal	11	6
Total	**65**	**14**

Table 2: Overview of the number of men and women participating in the focus groups.

As previously mentioned, local researchers were asked to invite participants that reflect their local system. As found in WP1, the systems in CLARUS partner countries vary in roles and work tasks. Although each system therefore included a variety of roles, we recoded them in collaboration with partners into four overarching role categories based on shared characteristics to allow for cross-partner comparisons: (1) first responders (e.g., frontline officers and operatives), (2) digital forensic practitioners (e.g., digital forensic lab experts and digital investigators), (3) forensic science practitioners (e.g., forensic science lab experts and crime scene examiners), and (4) investigators (e.g., investigation leaders, investigators and case analysts).

In addition to the four overarching categories, some partner systems (i.e., Finland and UK/Scotland) included additional personnel. In Scotland, an intelligence officer was included, and in Finland, operative analysts and intelligence officers participated in the focus groups. These roles were coded as 'Other'. Table 3 provides an overview of the systems' roles across focus groups and within each partner country.

	First responder	Investi-gator	Forensic science practitioner	Digital forensic practitioner	Other
UK - Scotland	Yes	Yes	Yes	Yes	Yes
Finland	Yes	Yes	No	Yes	Yes
Czech Republic	Yes	Yes	Yes	Yes	No

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Greece	Yes	Yes	Yes	Yes	No
Portugal	No	Yes	Yes	Yes	No

Table 3: Overview of which roles were represented across the focus groups in each partner country.

Data Analysis

Qualitative Data

The interview transcripts were uploaded to NVivo15 for the first round of analysis. Our analysis of the qualitative interview data was informed by Clark & Braun's (2021) approach to thematic analysis. The coding was performed by Nina Sunde and Laura vom Kolke. Using both a deductive and inductive approach, we condensed relevant parts of the interview into thick descriptions. A coding check-in was performed after both researchers had coded a first interview from Scotland to compare results and ensure alignment in the approach to coding the interviews. Most of the primary coding was then performed by Laura vom Kolke. Nina Sunde reviewed the coding and added additional codes where necessary. In the process, we were guided by our intention to stay as close to what was said and transcribed as possible. We were mindful of researcher bias and frequently challenged each others' interpretations.

As previously mentioned, this procedure was conducted for all data besides the data from Finland. NPUC was not given access to the Finnish raw data, and the first step of coding (i.e., thick descriptions) therefore was conducted by local researchers from POLAMK. NPUC arranged a meeting with POLAMK beforehand to provide Finnish researchers with the coding strategy to achieve alignment in the way the data were analysed. After the meeting, POLAMK coded parts of a Finnish interview from WP1 that both POLAMK and NPUC had access to. A coding check-in was conducted by NPUC where thick descriptions from NPUC were compared with those from POLAMK. Feedback was exchanged and POLAMK then coded the Finnish interviews in a similar manner to the way it was done by NPUC with the data from the other partner countries. Upon completion, POLAMK shared their thick descriptions with NPUC, and forwarded participant quotes upon request. This allowed a coherent presentation of results across partner countries.

The first round of coding across all interviews yielded approximately 1500 thick descriptions. The thick descriptions were then exported to MS Excel, allowing us to add columns indicating the unique identifier of the focus group each quote came from, as well as the role of the participant. We then further reduced the thick descriptions into more comprehensive themes in MS Excel.

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Quantitative Data

The quantitative data was exported from Nettskjema to SPSS. Brita Bjørkelo replaced all research questions in foreign languages with their English equivalents. Translated survey responses were subsequently imported into SPSS, where they replaced the original entries in local languages. In SPSS, frequency distributions were computed to analyse the distributions across survey items within each country. Cross-tables were conducted to compare partner countries. Due to the low number of participants, statistical tests of significance were not performed.

The Finnish quantitative data was plotted into SPSS by POLAMK and frequency distributions and cross-tables were conducted. The results were shared with NPUC who integrated them with the results from the other partner countries.

3.2. Abbreviations and Annotations

This deliverable uses role abbreviations to allow for quicker and more fluent reading. The following role abbreviations are used in this deliverable: digital forensic practitioner (DF), first responder (FR), forensic science practitioner (FS), investigator (INV), and other (OT). The abbreviations correspond with the roles listed in Table 3. Further, the quotes from the focus group interviews used in this deliverable are annotated as – [practitioner role *in* FG_country ID and focus group number], for instance – DF in FG_HEL2. Feedback from the Citizens' Juries was referred to as [CJ_country ID], for instance CJ_UK.

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4. Organisational Reflection of Bias, Error, and Miscommunication

This report examines the interaction and communication practices when handling an incident involving digital evidence, which are examined through the lens of organisational culture. Organisational culture can be understood in different ways and there exists a variety of definitions proposed by different scholars (see e.g., Chatman & O'Reilly, 2016; Schneider et al., 2017). While the definitions vary in terms of what elements are emphasised, most scholars agree that culture consists of shared beliefs and norms in an organisation, that culture is socially constructed and learned over time, influences individuals' behavior, and contributes to shaping organisational identity. Put more simply, one can think of organisational culture as a 'way of doing things' in an organisation. In this deliverable, we draw upon Edgar Schein's (2010) definition of culture: a "pattern of shared basic assumptions learned by a group as it solved its problems of external adaptation and internal integration, which has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems" (p. 18).

Schein describes culture as "the set of shared, taken-for-granted implicit assumptions that a group holds and that determines how it perceives, thinks about, and reacts to its various environments (Schein, 1992, cited in Schein 1996, p. 236). According to Schein, norms "become a fairly visible manifestation of these assumptions" and behind them lies the "deeper taken-for-granted set of assumptions that most members of a culture never question or examine. The members of a culture are not even aware of their own culture until they encounter a different one" (p. 236).

To better understand how culture influences interaction and communication practices when handling an incident involving digital evidence, we apply Schein's "Three levels of culture" (2010, p. 24) as an analytical framework in the following. According to the framework, culture manifests on three different levels which are distinct but interrelated.

The artefacts (surface) level consists of visible structures and processes. They can easily be assessed from the outside and include, for instance, observable behavior, ways of communicating, and dresscode in an organisation. However, despite being observable, behaviour can be difficult to decipher.

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The second level (espoused beliefs and values) consists of values, which are stated values and norms of an organisation that can be assessed through enquiry. Such espoused values include, for instance, mission statements and strategic goals that reflect ideals that are supposed to guide behavior within the organisation. This level also includes rationalisations (e.g., how lack of success and success is explained within the group).

The deepest level consists of basic underlying assumptions which are generally invisible. They are unconscious taken-for-granted beliefs and values that fundamentally drive behavior, perception, thought, and feeling in an organisation. This could include assumptions about the organisation's role in society or humanity in general. Schein's three levels highlight the complexity of assessing organisational culture, as certain aspects of culture are deeply embedded and implicit, thereby making them inaccessible to direct observation and only identifiable through indirect observation and interpretation.

Our analysis also draws on the nine identified sources of systemic bias in D1.4 *Residual sources of bias*, which were organisational pressure, hierarchical decision structures, lack of procedural standardisation and independent oversight, superficial peer review and verification procedures, weak feedback systems, cognitive bias embedded in workflows, knowledge and training gaps, language and terminology inconsistencies, and the influence of tools and technology. These sources of bias were discussed or reflected upon to varying degrees in the focus groups and a structured comparison was therefore not feasible. However, we address them in relation to each respective country when the topic is raised in the discussions.

In the first part of this report, organisational culture findings for each of the five CLARUS partner countries will be outlined. While not all countries are discussed in the exact same setup, there was an attempt to discuss the following topics for each of the partner countries: procedural standardisation, communication and interaction, bias mitigation, and training and knowledge. Then, central findings across partner countries will be discussed to contrast similarities and differences, followed by a reflection on how the input from RAB and CJ have informed our analysis. We then move on to final thoughts and suggested measures, strengths and limitations of this research as well as future research and development opportunities, before drawing final conclusions.

4.1. Characteristics of the Organisational Culture in Partner Countries With Relevance to Bias, Error, and Miscommunication in the Handling of Digital Evidence

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Greece

Procedural Standardisation

Part 1

Regarding procedural standardisation of tasks, FRs gave descriptions of different ways their role would approach the scene. One FR explained that they would be the first to attend the scene. After photographing the crime scene and relevant items, they would not collect the digital evidence but wait for the Forensic Science Division to take over and collect the items.

> *I would continue my conversation with the witness in order to indicate to me the second point where the cell phone was found. At this second point, of course, the scenario assumes that [...] I have put on gloves and I have grabbed the cell phone. As a first responder, I would never do that. I would wait at the point and have my second colleague wait there until the rest of the forces arrived. As soon as enough forces arrive now at the management level, we would completely block the area, whether it is one area, or two, and we would wait for the rest of the services to arrive who would continue the work from there, to continue the preliminary investigation.* - FR in FG_HEL4

However, another FR stated that they would collect the phone themselves:

> *[...] From that point on, the Emergency action center will also inform the other stations where they will make searches and respect to the objects that, as we said here there are now. In this case, it's a cell phone.*
> *We'll secure it with a bag of gloves so we don't erode or damage the fingerprints or DNA on it and then the proper authorities will take it from there. That's our part of it at least.* - FR in FG_HEL2

The phone would be packaged and transported to the Digital Evidence Examination Division, with an official mail requesting examination of the phone prepared by the preliminary investigation authority. In this initial phase, DFs describe their role in the system as an available resource that could be reached by telephone if assistance was needed:

> *In the first instance, if someone wants any assistance, any information to help him through the laboratories in this case, for example, because there was some information about the mobile phone, we will inform the person who has contacted us that the phone must be kept switched on and charged. Because as*

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> *it was mentioned earlier the battery is very low. I'll have to talk to him, I'll let him know and some a little bit more technical information -- that needs to be put into flight mode. The screen and the device must be photographed data so that there are some evidences from the first time, put it inside a faraday bag, so to speak, if that capability exists, which we hope will soon happen for most pre-trial authorities, but certainly for the special ones, it does exist. And then it must be transported as quickly as possible to the laboratory responsible for the examination, such as ours. So, this is an informal first communication. We can let them know that way. And by phone.* - DF in FG_HEL1

Since acquisition tools are in the lab, DFs would wait for the phone to arrive. They would usually not go to the scene themselves:

> *[...] so if there is no other reason to intervene at the scene, we usually just wait for the cell phone to come to the service. It is usually sent directly afterwards to the part of the laboratory, that is more organized. Obviously, all the tools are there as well. Because for better or worse, at the location of the scene, the possibilities that we have to intervene on the device are more limited.* - DF in FG_HEL2

An INV stated that if the first responders have not done so, they would collect the phone after a handover of information:

> *Then, the evidence, the evidence that you also have on the premises and all the rest you have got, you handed it over to the patrol car, before we entered the scene? If not, we'll pick it up on the spot.* - INV in FG_HEL3

If the lab is overloaded, private forensic experts would occasionally be hired to do the examination. The DF would be in direct contact with the authority requesting the examination to clarify what is needed, how they should prepare their report and what to focus on. The lab activities are based on ISO standards. After establishing the findings relevant to the request, evidence would be returned alongside a formal document. One DF described:

> *These are the questions of course that the competent authority has for us in relation to the case under consideration and from then on, we start our own laboratory activities based on ISO, with which our service is certified. Our goal is to obtain a forensic copy of the device and then answer the questions raised, based on the data we have extracted from the device. [...]. Oh, at the end I will also say this, that finally we answer all these questions that have been asked in the transmittal document formally with the laboratory expert report, where we*

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> *describe of course the device itself, we mention all the laboratory observations actions required for the device and of course years detected with device. We established what was found in relation to our questions and conclusions. After that we return the digital evidence to the competent authority that has sent us a transfer document again in a formal way.* - DF in FG_HEL1

This procedural precision contrasts with the more fluid and situational approach described by another DF, who emphasised the uncertainty that often characterises the early stages of evidence handling when both the nature and relevance of the data may be unknown:

> *In this case, when the evidence reaches us, whether it has to come to us first, or go to the investigation first, it is carefully undertaken, of course, by an examiner who is designated by our department head, who will have to take whatever data he can get from the device. Now in this case, the data he will take may help us find who the owner of the mobile phone is, which could either be the suspect himself, the criminal, let's say, or it could also be the victim's mobile phone, because we didn't know it until that moment, we don't know what it is about, why all that happened at the crime scene. And once we get this data, we form a report. There is always an expert report with which we then inform the service that is conducting the preliminary investigation into the findings we have found. So, then they get to decide what they will do, whether they will inform the prosecutor, how they will act themselves, etc.* - DF in FG_HEL4

Part 2

From the investigation side, the terrorism aspect would lead to a change of leadership and international contact with Europol and Interpol. There would be changes in communication - a scene commander would be appointed for each crime scene, and an incident commander would lead and coordinate the work on both scenes.

> *Certainly now in this case, as we said, the intervening forces have increased. There should always be a scene commander coordinating all the forces because here we have forces in different places acting. Somebody has to be in charge of coordinating all this. Coordinating also the information, which is a great deal.* - INV in FG_HEL3

The responsibility would be passed over to the Police Security Department, and counterterrorism might be involved. The incident commander would pass on information and continue the investigation in parallel until the counterterrorism has officially taken over the case. For the FR, FS, and DF, the actions and communication

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would mostly be the same in this situation. Forensics would come to the site and do the crime scene work.

A DF highlighted that informal communication might increase, and the investigator noted that more people would be involved and the processes would speed up:

> *I can only add to this that possibly, as my colleague said, there will obviously be more informal communication for exchanging information, in these cases just for this reason. Because there will certainly be some things that need to be clarified, there will be perhaps potentially more evidence gathered. If something doesn't come up, further investigation is needed, so there's always more informal communication on that. In those cases, this is the procedure, but that doesn't mean that the formal is overlooked. Because it's always the formal one in the end that ends up being the chosen one, at least in our piece.* - DF in FG_HEL2

Priority of DNA, Fingerprint, and Digital Traces

The different roles provided detailed descriptions of how they would prioritise between the traces. DF, FS and INV roles highlight the need to secure DNA first, digital traces second, and then fingerprints. As described by an FS:

> *Each case is unique and each one should be searched accordingly. That is, we will look for DNA traces and fingerprints and for as far as digital evidence is concerned, but there must be a certain order. There is a specific order to do this process. So, first of all, there will be a biological material taken. Then, it will be sent to the digital evidence laboratory to be checked and once it is done, colleagues who will take all those measures in order not to spoil the fingerprints will come to us as the last section to look for fingerprints. This is the order of procedure. Why is this done? Because DNA is an item that needs special protection, that's why we start with it.* - FS in FG_HEL2

However, an FR would start with fingerprints, then secure DNA, and digital evidence at last:

> *I believe that the least durable is the fingerprint. That is, especially for the mobile phone that we have already mentioned and more extensively, it is the first that is at risk either from poor handling by a police officer or from environmental conditions, for example, a rain, an environment in which it is dirt. You showed us the point that in combination with the rain a fingerprint can be completely lost. The second is DNA which will remain for a longer time and there*

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> *is a risk in this, but it is less sensitive and the third is electronic evidence that we will somehow manage to recover. That is, especially from an electronic device, even if it is discharged again, we will find a way, even if it is erased, that is, again there may be some way to recover it. But this depends on the correct observance of the procedures by all those involved, that is, from the first person who gets there to understand the necessity, the importance and perhaps also how quickly the procedures should be carried out.* - FR in FG_HEL4

The fingerprint first approach was also shared by another INV.

Standardisation Versus Autonomy

Survey results underline a strong emphasis on procedural standardisation in Greece: the majority of respondents reported they rarely (71.4%) or never (14.3%) experience discretion in their daily work, with only a small fraction (14.3%) stating they sometimes do. None indicated often or always. This points to a culture where strict adherence to established rules and protocols dominates practice. The focus groups reflected this, as FRs, INVs, DFs and FSs generally described their roles as tightly guided by manuals, hierarchical instructions, and laboratory standards. Even where some variation appeared, such as differences in whether first responders collected a mobile phone or left it for technical services, these were treated as minor deviations within an otherwise highly formalised system.

Communication and Interaction

Formal Versus Informal Communication

Survey results show that practitioners in Greece predominantly rely on a mix of formal and informal communication during collaboration. A large majority (71.4%) reported using both forms, while smaller groups indicated that they mainly communicated informally (21.4%) or mainly formally (7.1%). This distribution suggests that while formal documentation remains a necessary part of procedure, much of the day-to-day interaction rests on informal channels that enable speed and flexibility.

This reliance on informality was reflected in the focus groups. One INV explained that the standard approach was first to consult forensics by phone and only later formalise the request:

> *When the department will come and examine the crime scene and collect the*

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> *evidence. It will also take the prints, a print for example is the shoe print and it will also collect the DNA, from the crime scene which has been preserved by the first responder. The investigation department is notified by phone, usually in an informal way, because if we follow the formal process with documents and stuff, it's very time-consuming. So usually, in these incidents, the agencies communicate informally. By telephone, they communicate some key points of the case. And that's how the services come to the point.*
> *From that point they must take over the investigation and the case.*
> *Formal communication comes gradually after those steps. It becomes the official document, but this procedure follows at a second time, for informing the services. So, the exploration department precedes the division that will take over the main investigation.* - INV in FG_HEL1

Another INV described a similar sequence, emphasising the importance of informal contact before the formal request was submitted:

> *In this case, these 2 at least, and for this digital evidence would always be done in consultation with the forensic laboratories by phone at first and then with official documents and the rest about what we have to deliver and all these related things sometimes even with the digital evidence office to inform them, because otherwise we talk to the general forensics department that has the officer on duty and she would talk to the respective department. So, those are my thoughts, generally speaking.* - INV in FG_HEL3

Together, the survey and focus group interview data show that informal communication runs ahead of formal documentation and that practitioners view as essential for efficiency and responsiveness.

(Mis)communication

Across roles, participants from Greece in general do not describe miscommunication as being an issue. INVs outline that inter-departmental communication generally functions well. In incidents that concern public safety like the one in the case study, participants expressed that there are no problems with inter-agency or inter-officer communication due to the commonality of such an incident. An INV outlined that the absence of miscommunication issues is due to procedures, but based on the available data, the nature and content of the procedures remains unclear. An FS, however, mentioned that good communication is supported by protocols based on Presidential Decrees that are being followed.

In cases where miscommunication occurs, an INV noted that it may stem from

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uncertainty about the intended recipient of information, such as ambiguity over which department should handle a case. This was confirmed by an FR who stated that issues with miscommunication relate more to external collaborators such as regional departments or headquarters. Further, an INV confirmed miscommunication can occur in the very beginning of the work on a case, when first responders say something wrong, which then causes miscommunication over a short period of time.

None of the participants traced miscommunication back to the use of certain channels or ways of communicating that can cause issues. An FS described how information typically flows within the laboratory, emphasising confidence in internal communication channels and attributing errors to the original source rather than to the transmission process:

> *Among colleagues anyway, there are proper channels for the dissemination of information. I don't feel there is any such problem. That is, if it is going to be wrong, the information comes from the source itself that is wrong. Not from the channels, so to speak, of dissemination.* - FS in FG_HEL2

Nevertheless, an INV outlined the importance of clear communication:

> *Maybe at the scene of a crime, if one of the parties involved uses very technical vocabulary and it is not understandable, it can get a little confusing as to who will do what and what they are going to do? So we need to be clear: I will do this or we have to do this without technical vocabulary that the other colleagues do not know. This is the only way to prevent misunderstandings and mistakes.* - INV in FG_HEL4

When communication issues arise, the strategies practitioners use to resolve them depend on the severeness of the issue to be communicated about. As one INV outlined, while it is occasionally possible to resolve the issue independently, at other times assistance from someone higher up in the hierarchy is required.

Forensic Functions Integrated Into Investigation

In terms of forensic functions being included into the investigation teams, no information indicated such inclusion across the Greek focus groups. The DF role seems to be focused on lab activities, where the devices would be submitted, but they would offer advice if consulted.

Bias Mitigation

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Across roles, participants generally did not seem to be particularly concerned about bias playing a role in their daily work. For instance, a DF outlined that the evidence always comes with a request about what to extract. They therefore experienced no issues with being misled, omitting relevant information, or including irrelevant information.

An FR mentioned that the procedures on every level are so strict that there is little space for bias. Further, to ensure impartiality, protocols and manuals of best practices are followed so that *"(...) there is no chance that someone will see a case differently, within quotation marks"* (INV in FG_HEL3). A development from more to less formality in previous years was also outlined by another FR:

> *Now the mistakes that have been made from time to time, in all procedures have become lessons for us and we adhere to the formality very much, as a result of which there are no second thoughts and prejudice. Not during a joint examination and not afterwards, either for the transmission of information or for communication with other bodies. In other words, let me tell you this, everything is formal and to the fullest indeed.* - FR in FG_HEL4

Working in a team where there will be a second and third opinion helps mitigate bias according to participants. Further, approaching a case in a way where one acts as if everyone is a suspect and everyone is innocent can help keep an open mind and avoid getting biased. As the most important safeguard against bias, an FS outlined one's professional status – finding the perpetrator without being prejudiced to stay on the right track.

Training and Knowledge

Only few Greek practitioners talked about training. Among them was a DF who mentioned that they offer regular training, at least for the central departments. Also training for the trainers is offered regularly. According to a DF, within digital forensics, most (if not all) colleagues are well trained and are responsible for passing on any knowledge they learned during training to the rest of the team.

One DF highlighted how continuous training, both for practitioners and trainers, has led to noticeable improvements in recent years:

> *So, in any case this training is very, very important and that is why it continues to be organized and there are very good results from it. We can see that the mistakes that were made some years ago are now very much reduced. Many*

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> *colleagues are also more familiar with technology and with what they need to know at the scene of a crime, so at least in terms of this communication with the relevant police authorities, there have been generally very good developments, in the past few years.* - DF in FG_HEL1

DFs have sought to ensure to inform all services about risks and details regarding digital evidence. From time to time, they distribute guidance documents to remind staff of key procedures and to support new colleagues. This makes the DFs' work faster and more efficient, and they reported encountering few difficulties in this regard.

Despite not explicitly mentioning training, an FS outlined the importance of knowledge exchange:

> *Periodically, trainees from other agencies come to the Hellenic Police Forensic Science Division to learn what we are doing and to know what we can offer them, because as a Division, we are the national forensic agency of the country and as a consequence we also cooperate with security forces. Military forces and judicial authorities may also ask for some kind of collaboration.* - FS in FG_HEL2

An FS outlined that most colleagues in their department have "worked their way up" and as a result, they know the functions of their colleagues and have personal experience with practicing them. In addition, they try to hold periodic seminars so that colleagues without own experience can learn how to manage the crime scene before FS gets there.

Summary

Summarised, the representatives of the roles in the Greek system displayed notable variations in their procedures at the crime scene of the hypothetical case, particularly among FRs, where some would collect a mobile phone at the scene while others would wait for forensic services to arrive. Despite these differences, organisational culture emphasises formalisation through strict protocols, hierarchical decision-making, and reliance on laboratory procedures based on ISO standards. Communication typically combines informal phone contact with later formal documentation, reflecting both the need for efficiency and adherence to established procedure. Miscommunication was generally perceived as rare, sometimes attributed to clear organisational routines and protocols, though issues could arise in the early stages of an investigation or when responsibilities between departments are unclear.

In relation to bias, participants stressed that formal procedures, manuals, and lessons

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learned from past mistakes minimised discretion and thus reduced the risks of bias. Some highlighted the value of teamwork and second opinions, as well as adopting a neutral stance towards alleged suspects, as additional safeguards. Training and periodic knowledge exchange were also described as essential for reinforcing shared practices and reducing error, suggesting that the organisational culture of standardisation, formality, and continuous learning is seen by practitioners as the main safeguard against mistakes and bias.

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Finland

Procedural Standardisation

Part 1

FRs are typically the first to arrive at the scene, and their actions are managed by the emergency response center (incident commander). The tactical investigation would be informed, and responsibilities would be defined concerning field operations (interviews, crime scene investigation etc.). The INV in charge would personally speak with the first responder patrol about what they observed and ensure witnesses are interviewed without delay.

Crime scene examiners would attend the scene and preserve and collect traces, and in cases where they cannot come, they would be consulted by phone and FRs would conduct the work. Ideally, FRs would use adequate protection (to avoid contamination) if available, but this is not always the case. An INV, however, stated that the FRs sometimes would not collect the traces themselves:

> *Yes, we do, collecting samples would be the technique, our field patrol doesn't necessarily. We're talking about such a serious crime, so they don't take those samples. Instead, we wait three hours for it.* - INV in FG_FIN4

Those working on the scene would communicate over radio in a separate talk group, and over phone when one otherwise would interrupt ongoing communication. A task log would be recorded in a system available to everyone involved.

An FR stated that the telephone and sim card would be seized by FRs, secured, and recorded with caution. They would notify a DF over the phone and consult for advice if necessary. They would place the phone in a digital forensic cabinet for charging, and the DF would handle the phone after ensuring that legal grounds would be in place. If the crime scene was far away from the digital forensic lab and charging was unavailable, it could be necessary to document some data from the phone itself:

> *Once again, I've noticed this there in a remote area where we don't have resources. So, in an emergency, you have to do it manually. We have to do it manually again if we don't have ICT available. We're really losing hours. The concern is that some conversations might get lost in the process.* - INV in FG_FIN3

An INV emphasised that cooperation with the DF must begin immediately. The DF

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would decide what to do with the device and in what order and would ask for additional information if the request lacked sufficient basis for carrying out the requested measures. Forensic science and digital forensics have their own systems and principles they adhere to, as described by an INV:

> *As with the traditional crime scene investigation and sample analysis, the regional crime investigation centers, or whatever they're called nowadays, are of course primarily responsible for this, and are then proceeded within the framework of their quality systems. Then, at that stage, whether it's the first or second stage, or whatever stage it is. When we start doing digital forensics. It proceeds in accordance with the principle of regional responsibility, meaning it's handled by the unit's digital forensics team complies with their procedures and principles. And there's quite a long list of those.* - INV in FG_FIN2

After digital forensics has extracted the content, an INV stated it would be reviewed for relevant content to the case immediately (but did not say by whom). Relevant information will be handed to the analysis and/or intelligence team for them to investigate further.

The INV would collaborate closely with the investigative lead. In urgent situations, all communication would be handled by phone. A message thread could be created if sitting at a computer. Documentation would in such situations would initially be kept to a minimum:

> *I wouldn't go there under such time pressure to document it. I'd just inform ICT that here's the number and that the justification will follow later. That's good enough. With the technical [CSI] side, too, you only need to make the minimum entries to get the process going and ensure the quick samples are sent out very quickly. Depending on how far we are from the lab [reference to named organization removed], I'd try to cut out everything possible from the later fine-tuning of paperwork.* - FR in FG_FIN1

After the urgent phase, a joint meeting with all involved parties would be held, where they would sit down together, review what was done, the findings, and identify the next necessary steps. The INV lead would apply for various coercive measures (e.g. production order) on telecommunications.

An operational analyst should be involved at an early stage:

> *That's such a big issue in a way, how much stuff there is to be found in it. There are so many things to take into account. There should be some kind of case*

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> *sergeant or operational analyst constantly keeping track. Someone should be keeping a diary of everything that has been done and what remains to be done, because otherwise, if some information doesn't get through, things have to be repeated, or something gets forgotten.* - INV in FG_FIN4

Intelligence services would perform proactive monitoring of open sources and gather intelligence as well as be available for the investigation. Intelligence services would process incoming tips and forward potentially relevant information to the investigation team. A dedicated analyst would be focusing on the information processing and would not be involved in the intelligence gathering.

Part 2

An FR stated that the task would be carried out the same way as in part 1, including communications. The biggest change would be that communication would increase, and more people would be involved. When the situation calms down, communication would go from radio to phone calls. The case, including seized material, would be transferred to the National Bureau of Investigation, supported by the local police department:

> *Nowadays, this would be a massive organization for the investigation demanding situations that would be established for this purpose. The National Bureau of Investigation would rely on this incident organization and would need support for the investigation. It is precisely information management and communication within this group that must be handled carefully.* - INV in FG_FIN4

The analysis function would also in part 2 support the lead INV and the investigation team to ensure that information is accessible to everyone. They would map out background information and use networks to investigate who might be involved in the incident.

There would be increased attention to the quality of every sample and action. Practical matters such as overtime authorisations must be handled. The management would probably involve two INV leaders, one leading the actual situation, and one with peace of mind focusing on leading the actual criminal investigation.

Due to the terrorist element in part 2 of the scenario, the Finnish Security Intelligence Service would be involved:

> *And then, when this suspicion of international activity has arisen, I would contact the National Bureau of Investigation and, of course, the Finnish Security and Intelligence Service, who can do their part in the international exchange of*

> *information about these aliases and other matters.* - INV in FG_FIN2

External crisis communication would be established, and a plan for what would be released to the public would be developed. Also, since various other service providers and security actors would engage in communication with the public, joint press briefings could be necessary.

Priority of DNA, Fingerprint, and Digital Traces

An INV emphasised that the prioritisation of traces should be solved in a joint discussion:

> *Also, the negotiation I mentioned earlier, about how to resolve potential conflicts of interest between traditional forensic investigation and digital forensic investigation, should be conducted through or with the tactical [criminal] investigator, or at the very least they should be involved. The technical forensic center must be involved in it if it needs to be considered together. Because the lead investigator and the tactical investigator may have a lot of important information, but for one reason or another, not all of it has reached the ICT investigator, as was mentioned earlier, not all information can ever be passed on. It's always a subset, a kind of compromise and selection of what is shared. Many factors influence that decision-making, and they're not the same in many cases.* - INV in FG_FIN2

The INV also proposed a discussion involving the different parties with expertise as previously mentioned. An FR noted that they had a hunch that digital evidence was the most vulnerable, and thus least robust, and should be prioritised - an opinion shared by an INV. An OT also emphasised securing digital evidence first. However, another INV highlighted the need for seizing DNA first.

Standardisation Versus Autonomy

The survey results indicate that Finnish practitioners experience a considerable degree of discretion in their daily work. Most participants reported that they often (40%) or sometimes (40%) have room for discretion, while smaller groups stated that this was rarely (6.7%), never (6.7%), or always (6.7%) the case. These findings suggest that although procedures are described as standardised and coordinated, there remains space for situational judgement. This aligns with focus group accounts that characterised the investigative process as highly structured yet flexible, or 'a well oiled

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machine', allowing practitioners to adapt to circumstances such as whether first responders should secure digital evidence immediately or wait for forensic specialists.

Communication and Interaction

Formal Versus Informal Communication

The survey results indicate that Finnish practitioners overwhelmingly rely on a mix of formal and informal communication during collaboration. The vast majority (93.3%) reported using both forms, while only one participant (6.7%) stated that they mainly communicated informally. This suggests a strong preference for flexible communication practices that combine official documentation with more immediate channels.

Focus group accounts reflected this pattern, with participants describing incident handling as dependent on multiple modes of communication, with the manner of communication being a combination of face to face, radio, phone, and message thread. Together, the survey and interviews highlight that while formal communication provides necessary documentation, effective collaboration in Finland relies heavily on informal exchanges across a variety of media.

(Mis)communication

Several Finnish participants refer to a risk of miscommunication particularly in the early stages of the investigation, when things are often still somewhat unclear. According to an INV, there is a risk that information will not flow sufficiently. The first person to arrive at the scene therefore has to take responsibility for gathering information. During the initial phase, many new individuals join the investigation and much communication is verbal. An FR points out that an issue with verbal communication is that it leaves more room for interpretation:

> *Yes, personally, I think that in the early stages, when the situation is confusing and the picture is little unclear, and there's the initial organization and then more people join in, technical staff, ICT, and others. And if there's a lot of verbal communication, I see a risk of misinterpretation at the beginning. The more it is written down or otherwise documented, the more one can perhaps refer back to it if you don't understand something. There's so much more interpretation in spoken communication.* - FR in FG_FIN1

An INV noted that more detailed information which needs to be followed up on by someone should not be handled over the phone. Rather, it should be put in writing, for

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instance, through e-mail, to avoid misunderstandings.

At the same time, an INV outlined the importance of face-to-face conversations between INVs and FRs. Such conversations always add depth to the information related to the event according to the participant, as certain things may come up that the FR did not consider important, but could turn out to be critical information. An INV mentioned considering it good practice to go to the scene as a lead INV to gain insight into the incident directly from the first responders. That way, one can also take into account non-verbal communication that otherwise gets lost.

The vast amount of information can disrupt the information flow and cause communication issues. Further, an INV pointed out that it can occur that they are in the possession of critical pieces of information for extended periods of time but lack the capacity to conduct an analysis. According to the participant, the only way to (partially) solve such a problem is preparation in advance.

As mentioned by an OT, even when you understand each other well within your own function, there is a possibility that the same term is used but it is understood differently. Since each person has their own interpretation, having a shared understanding is important. Finland has case coordinators that facilitate communication in cases like the one presented in the scenario:

> *Usually, or at least we aim for it, we have a case sergeant [case coordinator] at the unit who has a sense of where everyone is. Who's doing what, where they are, some are at the hospital, some are conducting device searches, and some are conducting house searches. That person would have a grasp of who's where, and through that we could manage some of the communication, like hey, this came in, could you tip off those guys to do this, that, and the other. It's actually been a surprisingly effective system for us.* - INV in FG_FIN1

According to the INV, having a coordinator has proven beneficial to the overall investigation.

Forensic Functions Integrated Into Investigation

The DFs appear to be formally included in the investigation but functionally detached from its broader context. A DF would usually receive only a subset of the available information, often limited to the device and the specific request from the INVs. They would rarely be informed about the full scope of the case. Communication tends to be one-directional: the DF responds to assignments but does not normally engage in wider investigative dialogue, except when clarifications are strictly necessary. The FS function

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was not included in Finnish focus groups, and grounds for assessment of whether they are included or detached is therefore limited.

Bias Mitigation

An INV noted that it is difficult to eliminate bias completely:

> *Well, if you put it in a somewhat black-and-white way, we can only get rid of bias at the point when we completely eliminate the subjective aspect of this work, that is, the human factor. As long as it's part of the process, we have to accept that subjectivity and human nature bring with them at least some potential for bias.* - INV in FG_FIN2

According to the participant, not even the most rigorous scientific method can fully eliminate bias, because these methods are always interpreted through the lens of human subjectivity. The INV went on to explain that the most important thing is to be aware of the issue of bias and consider both incriminating and exculpatory factors. To recognize bias, training and awareness are highly important.

An FR similarly reflected on the influence of confirmation bias in everyday police work, noting how strong personalities and persuasive communication can inadvertently shape investigative direction:

> *In general police work, sometimes a strong police mindset can be quite one-sided. I clearly recognize that kind of confirmation bias there. I think it's related to the fact that out in the field, there are very strong personalities, people with really strong opinions. Perhaps the work shapes the personality in a certain way, or maybe certain types of people are drawn to it. There's a risk when it is really. For example, we had a very good cop who could present his case very convincingly and justify it well. We've noticed that a few times it has led us in the wrong direction like a sheep on a rope, simply because he is so convincing in presenting their case.* - FR in FG_FIN1

Another first responder mentioned that misunderstandings can occur when first responders start assuming something and then proceed in that direction without considering other hypotheses.

According to an OT, the rush and pressure during the early phases are critical points of risk. The ability to process observations as objectively as possible is mentioned to be an important part of an operational analyst's expertise and professionalism. They have

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further noticed that teamwork is increasingly important in tackling cognitive biases.

An FR noted that group negotiations, whereby one exchanges different views, can help prevent following a single strong opinion in the wrong direction. Another FR outlined that bias mitigation is also about conversation culture:

> *There should be a slightly different culture of discussion with freedom to reflect and think things through, and it shouldn't be seen as a weakness in such a strongly masculine environment. It should be psychologically safe to say, in my opinion, this is going a bit off track. It should always be possible to say things like that. That would specifically eliminate the risk. This might not relate directly to that earlier point. It's more about the tactics or, for example, how we take certain measures in the field, to the operational culture.* - FR in FG_FIN1

One INV emphasised it being important not to get stuck in one's own idea of what seems to have happened. Through discussion, one can broaden one's own perspective and consider potential additional factors. Another INV mentioned having learned a great deal about hypothesis-based thinking through child crime investigations that they have been part of.

Finally, an INV proposed a more structured approach for mitigating bias within police work, suggesting that applying theoretical frameworks such as the theory of alternative hypotheses, or even integrating artificial intelligence-based tools to assist in evaluating these hypotheses, could help reduce subjective influence in decision-making:

> *If we consider how the police as an organization could ensure that such biases don't occur, then perhaps it would require some kind of theoretical method, like the theory of alternative hypotheses or some other scientific method. But can we use this theory of alternative hypotheses in every single case, or do some things need to be handled more lightly? Another option is to use some form of artificial intelligence or other tools to process those alternative hypotheses, which a human would then just review, but maybe something like that could solve it.* - INV in FG_FIN2

Training and Knowledge

According to an FR, it is important to know the capabilities of one's collaborators. This is important so that one, at least to some extent, speaks the same language. An OT stated:

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> *Well, probably in terms of general capabilities, I think this works the other way around too. When I understand the capabilities of forensics, it helps my own work.* - OT in FG_FIN1

It was further proposed that everyone should understand each other's operational methods and this awareness of how the entire chain functions should be established already during basic police training.

From the view of an INV, it's important to know that everything must be communicated to the investigation management. In digital forensics, some experts come from civilian backgrounds while others have police backgrounds. They end up having different understandings of the pre-trial investigation process, which results in different understanding of what is the most relevant from the perspective of the investigation.

According to an INV, the investigation team should have shared information management methods and information needs to be stored in a way that is accessible and easy to use. Further, a key element is the establishment of a clear command structure – information exchange needs to be immediate and leadership should not be burdened with irrelevant information. Leadership needs to be able to see the big picture.

Finally, an INV highlighted the importance of being aware of the specialised expertise available within the organisation and knowing how to access it, noting that such resources often remain underutilised simply because their potential is not fully understood:

> *And there's surely a lot of that kind of special expertise in our organization too, especially on the analysis side, which isn't [used], well, when there's no understanding about what it can produce. Specialists often do a good job of marketing themselves and push themselves forward, even if people don't necessarily know how to ask for them.* - INV in FG_FIN3

Summary

Summarised, participants from Finland described a generally well-functioning and standardised system, where FRs, INVs, FSs, DFs, and OTs operate under defined hierarchies and procedural frameworks. FRs secure initial traces, sometimes in consultation with forensic specialists by phone, while INVs quickly establish communication lines, coordinate with digital forensics, and ensure cooperation with analysts and intelligence. Documentation is often minimised in the urgent phase, with

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more formal reporting and joint reviews following once the situation stabilises. Despite this standardisation, communication challenges were noted, especially in the early stages when information is verbal and subject to interpretation. Case coordinators and case meetings are viewed as mechanisms to reduce miscommunication and maintain shared situational awareness. On evidence prioritisation, views differed: while several participants stressed digital traces as most vulnerable and therefore in need of early collection, others gave precedence to DNA.

Bias was seen as a risk that is difficult to avoid, particularly in the pressured early phases. Participants reflected on risks of confirmation bias, persuasive colleagues, or premature assumptions. Mitigation strategies emphasised teamwork, discussion, and a more open conversational culture that allows questioning without stigma. Training, shared understanding of capabilities, and hypothesis-based thinking were highlighted as further safeguards, showing how organisational culture—through hierarchy, communication routines, and professional norms—both structures work and provides spaces for bias awareness and mitigation.

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Portugal

Procedural Standardisation

Part 1

FRs would be the first on scene. INVs would assist in securing the scene and handling the initial evidence collection, such as witness interviews. INVs would typically not do the crime scene work but wait for the crime scene examiners as they would be more qualified to collect traces. FS working as crime scene examiners would first be briefed by the INVs about relevant traces observed, cordon off the scene, photograph, collect, package properly, catalogue, and describe the traces, and an FS working in lab would be consulted over phone if necessary. As a rule, there would be a second search of the site in case something was overlooked. Later, INVs will decide which sectors of the lab the traces will go to and prioritise what is more important.

FS lab personnel would not go to the crime scene. Rather, the evidence is handed to them and there will first be informal communication which quickly becomes formal. There will be an official letter or email with request for examination. FS would keep the traces until they receive the formal letter requiring an expert analysis, otherwise they would be returned to the investigator. Typically, any request to the forensic science division would be 'very urgent'.

One INV noted that they would go through the phone to see if there is any relevant info, while another stated that they would not touch the phone until technical police come and collect it.

According to an INV, sometimes a continuum of information lacks on the crime scene:

> *When someone arrives to collect the traces, the person who was there in the first place is no longer there. And those who were there in the first place often do the following: hand over the site because they don't know anything else. They hand over the site: 'It's here, it's preserved. You can do your job'.*
> *And there isn't this kind of dialogue, which I think is essential and which often fails here, and therefore for a number of reasons, not just one, but several. And I think the dialogue should start right there, and it often doesn't; and it should end at the end, when the report is produced.*
> *This dialogue should exist throughout the whole process, I think for me it's fundamental and it doesn't exist. There are some cases, which are the result of the personal, extra-professional relationship that sometimes exists between colleagues or closeness.* - INV in FG_POR3

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The phone would be handed to the DF examiner who would not go to the scene but collect the data in the lab. A DF noted that although the standard procedure on scene was to keep the phone live if it was turned on, they would often receive phones turned off:

> *But the truth is that when it reaches us, it's often already turned off. [...] The problem here is that by the time the mobile phone reaches us, it's too late. For example, last generation iPhones... this one is protected with face ID, but it has a password. The latest ones are very difficult to unlock, especially if they've already been switched off, and by the time they reach us, it's already ...* - DF in FG_POR2

A formal request in the form of an official letter or email would come, and a DF would respond in the same way alongside the report. After receiving the formal request, the DF would contact the INV informally by phone or in person. Although most context is irrelevant, they would be interested in checking dates to see if the phone has been tampered with, as well as receiving information about relevant apps:

> *So, as I was saying, the context is often irrelevant to us.*
> *If you want a total extraction, I don't need to know the context, but I'm interested in knowing, for example, if the equipment has been tampered with, if it hasn't, so, dates, and if there's any information that you already know, because sometimes you may know that it's that application or another application.* - DF in FG_POR1

A DF highlighted the importance of clear instructions from the INV to perform effective extractions. One DF provided the following example of ineffective instructions:

> *If they don't tell us the type of crime, there are often requests like: all the images. And it's happened that I've phoned a colleague and asked: are you sure? It was a computer, and I asked: are you sure you want all the images from the computer? And he said: yes. And I said: you don't want to tell me the type of crime, I'd pre-select the images. No, you don't have to know that, I want all the images. The result: he took all the images! I'm even talking about images of the operating system itself, those GIFs, all that Windows rubbish. He took all that, so he took a huge disc full of images, most of which didn't interest him at all, because what he wanted was photographs. When he said 'images', he meant photographs, and I realised that from the start, so I took care to contact him and ask.* - DF in FG_POR1

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An INV emphasised the importance of constant dialogue with the DF performing the examination so they understand what the investigation is about:

> *So I don't want to influence his work or his protocols either, but he realises or gets to understand what the investigation is about. And it will probably be easier to obtain results later on. Sometimes we produce results that don't matter at all or that are careless because they weren't what was wanted.*
> *And not just this initial dialogue, I think this dialogue should be maintained constantly, whenever the need arises. How many times do we have a crime analyst working with us, I was just asking that colleague… the colleague who works with us, you know, on cybercrime, who's been doing exceptional work in terms of OSINT research, open sources and the operation of suspects, and so on. The dialogue with this colleague has to be constant... constant, there's no other choice, because otherwise we won't produce results.* - INV in FG_POR3

Keywords would be sent to the DF alongside the devices to aid their examination. After examination by the DF, the data is handed to the investigation team who would correlate the evidence with other evidence.

An INV described how work is typically divided between units, noting that requests to the digital forensics team are often broad and that case analysis usually remains with the investigators:

> *Sometimes the questions for UPTI, as a rule, are not very targeted, are they? Sometimes it's almost just: extract the content. I honestly don't know if it works like that everywhere. We often make a fairly generic request there. And once the content has been extracted, we analyse it. We also understand that we're the ones with the most in-depth knowledge of the cases, so analysing the content of the mobile phone afterwards would probably be appropriate... unless the team, maybe the digital team, followed the investigation from the start and in parallel...* - INV in FG_POR1

An INV highlighted the need for the DF to know the context when performing examination:

> *Who is going to receive it has to know the history of what happened, they have to know why it's there and for what purpose. [...] In any case, we summarise what happened, which is prior to the questions. Why is that? Because summarising what happened can even give colleagues information that allows them to conclude that something may be important that the Investigation may not have included in the questions. And so, knowing the story helps them realise*

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> *what they also need to look for and how? What are we talking about? Because there may be, there may be elements that they detect during the exam and that only by knowing the context of the investigation can they find relevant or not; if they don't know anything, if it only go the questions without context, it's very complicated.* - INV in FG_POR2

Particular to Portugal are the many units involved in handling an incident such as the one presented in the hypothetical case study. Community police would be involved, and the public security police and national republican guard would be there depending on the area. The Judicial Police (PJ) would be notified and would liaise with the homicide investigation unit, who would send inspectors to the scene. The homicide unit would contact the local crime sector who would send members to the scene.

Part 2

An INV noted that there would be discussions about whether the Public Security Police (PSP) or PJ would be responsible for the case. If PJ would take over, only the investigative power would be handed over and the rest would be done by the INV. Due to the suspicion of terrorism, a preventative service such as counterterrorism would be called. An INV stated that if so, everyone present would no longer be involved due to terrorism and all information would be passed on to the team in charge.

An INV noted that there would probably be more communication over phone due to the escalated situation, and another INV added that much of this communication would be with those in the previous situation to establish whether the incidents are related.

According to an FS, part 2 would involve no change since 'a trace is a trace'. A DF would expect more urgency, more people involved, and more informal contact with the investigation due to more devices, searches, and increased urgency. Another DF noted that if it was regarded as terrorism and thus the responsibility of the PJ, they would no longer be involved. A DF highlighted a potential benefit of the situation: due to more people being involved, there would be a greater chance of validating and improving the technical work.

A DF explained their role in the escalated situation when investigating potential lines of inquiry related to a suspect's digital devices, describing how they would identify and analyse relevant equipment and establish links across different platforms and cases:

> *If we searched the suspect's house, we would then try to find out if there was a computer and if that computer had any information about these forums and applications like Telegram and Facebook, although people usually use them more*

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> *on mobile phones, but it's also possible to use them on computers and synchronise them. So we would try to establish a relationship between the different equipment [devices]. And then we'd work indifferently with either homicides or terrorism, whoever we were asked to collaborate with. I think we could also play an interesting role in the digital investigation, in other words, in gathering information on Facebook and Telegram, trying to get more data and more information on the suspect who says he has nothing to do with the case.* - DF in FG_POR1

As described by an INV, more urgency was expected for part 2, however, urgency was not necessarily clearly communicated and justified:

> *Exactly. What's the problem? It's not that the inspector saying 'this mobile phone, of the five, is the most important'. The problem is: this case, because it's mine, is more urgent. It's more urgent than his, that my investigation is more important than his.* - INV in FG_POR1

Priority of DNA, Fingerprint, and Digital Traces

INVs did not agree on which trace is the least robust. One highlighted the fingerprint as very vulnerable, while another noted DNA as the least robust. However, the INVs seemed to agree that the digital trace was the most robust. The DFs did not agree with each other either, one considered the digital trace the least robust and another rated it as most robust given that communication was blocked. A third DF noted that fingerprint and DNA were less robust than digital traces and should be secured first. An FS also highlighted digital traces as the most robust, and DNA and fingerprints as more susceptible to alteration and contamination. An FS explained the need for communication to decide the order of collection of traces:

> *We have to have the correct information from the investigation, and we have it, [...] and if we don't have it, we have to ask whether or not the mobile phone is relevant to the subsequent investigation, because we have methods of revealing fingerprints that can damage the inside of the mobile phone. If the inside of the mobile phone is relevant, important, we have to use techniques that don't damage anything inside the phone. And this communication is important so that we can be sure that... but even so, mobile phones, only if we are 100% sure that there's nothing relevant inside, or that the information on the mobile phone has already been collected, which sometimes happens...* - FS in FG_POR1

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Standardisation Versus Autonomy

According to the DFs, they would only work on a device if there is an order from the prosecutors office to the criminal investigation judge or with the owners consent. They would not touch anything until the order/consent arrives, even if the INV asks for it.

The survey results from Portugal indicate a moderate level of discretion in practitioners' daily work. Just over half of the Portuguese participants (52.9%) stated that they sometimes experienced room for discretion, while 29.4% reported often, and 5.9% always. By contrast, 11.8% indicated rarely and none reported never. These findings suggest that although investigative work is largely shaped by established rules and hierarchical authorisation, practitioners still perceive meaningful opportunities to exercise judgement. This aligns with focus group discussions in which DFs stressed the importance of clear procedural orders from the prosecutor's office, while also noting differences between older and newer colleagues in reporting practices. The combination of formalised procedures with individual judgement points to an organisational culture that values standardisation but recognises the need for practitioner autonomy in practice.

Communication and Interaction

Formal Versus Informal Communication

The survey results show that Portuguese practitioners rely heavily on a combination of formal and informal communication. Most participants (76.5%) reported that they used both modes in their daily collaboration, while nearly a quarter (23.5%) indicated that they communicated mainly formally. None stated that they would rely primarily on informal communication. These findings suggest that although formal documentation and judicial authorisations are indispensable, especially for digital evidence, informal exchanges are an important practical tool in the early stages of an investigation.

The focus group accounts illustrate this balance. One INV explained that their personal habit was to send a formal letter while also phoning colleagues to provide context. The INV regarded a formal letter as "a little silent" on details and justification. Through informal communication, there is a possibility to add some context and explain to the people involved what they think has happened.

A DF confirmed the formal procedures governing their work, explaining that all requests and responses are exchanged through official written communication and that each case concludes with a detailed written and digital report documenting the methods and

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findings:

> *With UPTI, the request for our collaboration in any diligence, whether outside or inside the laboratory, is always via an official letter or e-mail, so formal. Our response is also via the same official letter or e-mail, and in writing. So we always send a written report with the conclusions or the procedures and a description of the methodology used. Always. And it also goes out by official letter. Accompanied by a digital report of what was found inside the equipment.* - DF in FG_POR1

A DF stated that the informal communication on scene rapidly would turn into formal communication:

> *Well, I think that's where the difference lies. For example, communication, as he said, on site is very informal, it's conversation and from there we then draw up the list of all the traces collected, and from there communication becomes a little more formal. So we send an e-mail and they draft the official letters to the corresponding areas, depending on the situation. What's the point? The corresponding areas that are going to carry out the expertise, the analysis of that trace, were not at the site. I was. And then there's the so-called geographical issue. When it comes to lophoscopy, we often have that informal communication because we're in the same corridor and we end up explaining: oh no, this was here. Sometimes we even have the photographs taken at the scene and we end up showing them, so they can see where it was taken. Because if we have to, we'll do lophoscopy at the site, so that they can then make a comparison, but they have to realise where it was collected, because if they have to, they'll get a lamella and... where was this collected? So we're able to pass on this information, even if it's in an informal way.* - FS in FG_POR1

An INV goes on to describe:

> *We, on site, it's absolutely informal. From that moment on, the traces collected, or the objects that can contain the traces, in the case of the mobile phone, it itself can contain traces, and the digital evidence is also a trace, once they've been removed, collected from the site, then of course it's already a formal communication, which usually involves an official letter. Although, in practice, there is often some informal parallel conversation.* - INV in FG_POR1

A DF describes that although informal communication is frequent in the beginning, it must become formal to obtain authorisation to extract data:

> *Well, with regard to communication, I can receive communications from all sides. I can receive communications from the patrol officer, I can receive communications from whoever is managing the crime scene, these are informal communications. So there may initially be informal communication, but then for the mobile phone to enter the laboratory and be analysed, I need judicial authorisation. So there are several layers until it reaches the laboratory here at DIC [Divisão de Investigação Criminal; Criminal Investigation Division].*
> *But all these contacts can be a bit informal at first, but on a technical level, on a level: 'look, this is a phone, what can I do with it, do you think I should put it in a bag, or do I put it in flight mode?', this technical information that can come to those who are on the spot and don't know it, and then we do it, either through the restrictions we have, we have the work phones or even through the personal phone, whoever has it and who has already had some training with us. Apart from that, all communications become formal, because a judicial authority is required to authorise the extraction of data.* - DF in FG_POR3

(Mis)communication

Also in Portugal, several participants mentioned not experiencing any issues with miscommunication in their daily work.

Others did acknowledge that there can be communication issues. For instance, a DF outlined that there is an attempt to improve communication issues between DFs and INVs:

> *We're trying to improve this by getting in touch more and more, providing training, and when I receive these types of requests, and I've also passed this on to my colleagues in training, which is: when you receive a request that you clearly see is incomplete, you pick up the phone, speak to the investigation and ask for... a duplicate, a statement of what is required, but we do have communication problems.* - DF in FG_POR1

A DF stated that the initial phase is the most critical when it comes to miscommunication:

> *And I think that the initial phase is the most critical, which can turn the process in one direction or the other. I think it's the initial phase that's the most critical and where there could possibly be more complicated failures. Because, as they say afterwards in the laboratory, we have more time to think, whereas not there.* - DF in FG_POR3

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An FS identified omissions as the main source of miscommunication, for instance being asked to go to a scene without really being informed about what is going on. The omissions were attributed to too many individuals being involved in the communication chain, sometimes leading to the story being different from what was first said. All participants agreed that reducing the number of intermediaries through which information passes would improve communication. An INV mentioned that the investigation is particularly vulnerable at the initial point of miscommunication, because the first exchange triggers a series of procedures that can be difficult to stop or reverse.

An INV noted challenges in how younger colleagues communicate in their reporting:

> *It could have gone badly and it went very well, it went very well indeed. But all in all, there's a huge communication deficit among the kids who report the crimes, who make the crimes reports. Or because of a lack of sensitivity, sometimes even carelessness, because they even make reports of crimes that are relevant, which don't even include the make and number plate of the car. And they know it, and they know it, but... either because they forgot or because they didn't want to...* - INV in FG_POR4

One DF highlighted professional experience as the most important factor to avoid miscommunication. Another DF further outlined that they try to improve communication by initiating informal discussions before formalising the exchange in writing. A DF encouraged focus group participants to provide feedback if they encountered a report they did not understand, noting that the DFs cannot address misunderstandings unless they are made aware of them.

When asked how their organisations ensure best possible communication, Portuguese participants smiled according to the interview transcript, potentially indicating that the organisation does not have any targeted measures in place. One INV questioned why it's not common to knock on the doors of others one works with and just ask them to explain how things are done and what the other person wants as this would improve the service.

One INV mentioned that while communication inside the police can be difficult, it is even more challenging with bodies outside of the police. Dialogue between different disciplines exists, but only at the corridor level – institutional dialogue is absent according to an FS.

There also seem to be long-standing tensions affecting communication between different police forces:

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> *Firstly, reinforcing the idea that has already been said here, the truth is that this is a historical conflict between the various police forces. I'm not going to make the connection here, but just to put it in context, we've had this problem for years which is we have 'three hundred thousand police' [laughs] for such a small country. And this leads us to the eternal problem of each police force working in its own area of jurisdiction and being very jealous of its space and its work [wanting to keep it intact].* - INV in FG_POR3

An INV outlined that it is often complicated to share information with other forces:

> *As for the police, the PSP, it's well known that we obviously have an interest in protecting the information we work on within our area of jurisdiction and that it's often complicated to share information.*
> *And when this information is shared, it's through informal channels, very much the result of people who have no problem sharing this kind of information and who fight this kind of secrecy; and if things are often brought to a successful conclusion, it's because of this kind of relationships that exists between various colleagues, from various different police forces.* - INV in FG_POR3

The INV further reflected that such informal communication, while effective, is not always institutionally accepted and may even be discouraged, ultimately to the detriment of victims:

> *Institutionally, and this is my experience, and I don't want to be accused [laugh] of saying things here that I shouldn't, but my experience, or at least my perception, is that this type of communication is not well regarded and, I believe, in certain cases even unauthorised.*
> *This raises many problems, which have already been pointed out here before, in the previous intervention. And it only harms one person, who is the victim of a crime. And that's what worries me.* - INV in FG_POR3

An INV explained that it was previously possible to call the PJ picket directly and talk to the inspector, however, this had changed:

> *In the past, I would arrive at the scene of a crime and, if there were traces and it was a crime that fell within the remit of the Polícia Judiciária, for example, I had the autonomy to call the Polícia Judiciária picket directly and explain the situation. In other words, I was on the spot reporting directly to the PJ [Polícia Judiciária] inspector who was listening to me.*
> *Now, someone has decided that you have to go up a hierarchical staircase, then*

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> *someone up here decides and then it's back down the hierarchical staircase to... In other words, it's time consuming, information is lost and objectivity is lost.* - INV in FG_POR4

While a DF added that this has somewhat improved, the INV said that it was still much more efficient and quicker before.

A DF described a shift in reporting practices introduced by newer colleagues, noting that earlier reports often lacked sufficient detail, whereas the newer generation has adopted a more transparent and explanatory approach:

> *In our case, the issue of communication is very important, because our reports, we currently have two situations happening at UPTI, which is: the older colleagues from the old guard and the newer colleagues, the new acquisitions and trained for me. So the ones from the old guard make a report like: 'an extraction was made', bam, and then they send it to the inspector, he stares at it, 'OK, so'?! So there's a problem here, isn't there? The person doesn't really understand what's been done, how it's been done, if it's answering the question, if it's not answering it, if we've succeeded, if we haven't succeeded, and they refer everything to the digital report. The second generation no longer makes reports like this. So we explain the procedures, what was done, the approach, the photographs, everything. All the identifying elements are set out in our paper report.* - DF in FG_POR1

Forensic Functions Integrated Into Investigation

In terms of forensic functions being included into the investigation teams, a DF highlighted that they would be in constant dialogue with investigators. However, the dialogue would typically concern the seized devices.

A DF compared their interactions during an investigation with those of forensic scientists, noting that digital forensics requires greater contextual awareness and ongoing communication, unlike biological analysis, which tends to be more straightforward and conclusive:

> *PT4: The interaction is different from biological to digital. Because in the biological ones, the results... gave this result or this one, there's no adaptation to what we're looking for. Whereas with digital ones, there is. We have to know the case, we have to know the people involved in the case, for example, we have to know the issues that are essential for that, for the digital; whereas they don't, either the DNA accused this person or it didn't, so the report and... (...)*

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> *PT4: Is to collect and analyse. There's no additional communication. You collect the DNA and that's it, there's no interaction, I say, I THINK. Whereas digital doesn't; it involves more communication, much more.* - DF in FG_POR3

Bias Mitigation

In DF, there is an attempt to keep digital forensics and the general investigation separate:

> *There is this attempt to isolate the digital evidence from the criminal investigation teams, there is; because of these issues of too much communication that can bring some manipulation in the delivery of the digital evidence, we try to do that. In the past, teams wouldn't even communicate with digital evidence; nowadays they're more open to it, but we try to keep it to a minimum. This comes from the upper echelons that are implemented for us, it's not... there is this attempt.* - DF in FG_POR3

According to a practitioner, the case knowledge DFs need is limited: they don't need to know what the case involves as DFs normally don't analyse cases and don't intervene much. They do so on occasion, but then it's for technical questions and not the investigation itself.

A DF explained that some bias mitigation measures have been implemented although they may not be noticeable. For instance, they don't want to know ethnicities or gender as it is about analysing the digital evidence in an innocuous way.

An FS outlined the importance of having restricted communication channels:

> *So I think it's essential to pass on all the information at the same time, both before and after, but these restricted channels for passing on information, because otherwise... I'll tell him one thing, and if I tell him I'll tell him another, and maybe I won't even mean it, because I'll forget something that I've said there and not said there. Then when he passes on, for example, he'll pass on something... if necessary completely different. Either because he forgot, or because I didn't tell him in the meantime, but I think these restricted channels are important. (...) So, in general terms, from a general conclusion from this small group only one piece of information goes to that group, and then hierarchically it gets to where it needs to go. Because even with these teams with several units there is always someone who is the local manager.* - FS in FG_POR1

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Whereas one FS mentioned that they don't think bias mitigation measures exist, another mentioned double checking, whereby someone else checks one's work, as an implemented measure. Accreditation was also mentioned:

> *As we move towards accreditation, particularly for laboratories and their staff, there are technical standards and procedures that need to be approved. Some have already been approved and implemented; others need to be approved. (...) And in Portugal, we work a bit with improvisation and the unforeseen, after things happen and as things work out, well or badly or not so well; it's us on site who, faced with the need to solve a problem, discuss opinions. And then, sometimes, something written is born!* - FS in FG_POR2

When it comes to bias mitigation, one INV outlined issues with the implementation, arguing that procedures are often designed by individuals lacking practical field experience and therefore fail to reflect operational realities:

> *These methods are usually implemented by people who don't know anything. [laughs]*
> *It's true! It's true! These methods are implemented by those who don't know anything, by those who have never been in the field, by those who don't have the experience we have. So the methods should be implemented by those who understand and know what they're doing.* - INV in FG_POR4

In one interview, there was some tension between a DF and an INV, whereby the DF outlined an attempt to keep communication between the two to a minimum as a way of avoiding bias and prejudice, to which the INV replied:

> *That's almost a patronising idea of it. [laughs] If I want to... Let's imagine, if my idea is... we can't have any problems at that level. Nowadays, it's almost a criminal offence to say certain things! But if my idea is to investigate a particular ethnic group or minority, what harm does it do to tell my colleague, who is going to do a particular piece of investigation on a particular piece of equipment or an OSINT survey, that it's about the ethnic group X or Y or Z?* - INV in FG_POR3

The INV then went on to say:

> *That's exactly where the communication failure is. If I send you an email saying just this and I don't explain to you the reason behind this, that email, what's in that email, the keywords you expect and so on, you'll never realise. And what*

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> *you do is: you hide behind your protocols, your prejudices, because that's still a prejudice in itself: 'No, no, no; I can't look at this because I might get into fields here...' No.*
> *I want you to go into fields! I want you to go through everything that exists, for example, about this group of individuals with this nationality, because that's exactly what I'm investigating, and therefore put aside all these prejudices. It's not to influence you, but it's what I need.* - INV in FG_POR3

The same INV later added:

> *No. But I had to let you know that this was a mafia we were investigating, a mafia mainly of XXXXXXXX nationality, and that anything to do with XXXXXXXX nationals or even YYYYYYYY nationals was of interest to me for my investigation; and that's what you did and I limited your field of investigation a lot. Now, is this influencing you in any way? No. You get exactly the same kind of results, I didn't influence you at all...* - INV in FG_POR3

This exchange illustrates a fundamental tension between the desire to limit communication to avoid bias and the operational need for contextual information to guide digital forensic work. The INV argued that withholding such context can itself create a form of prejudice by narrowing the scope of inquiry or obscuring investigative priorities. From their perspective, sharing relevant details, such as the specific groups, nationalities, or patterns under investigation, does not necessarily bias the forensic process but instead ensures that the analysis is appropriately focused and aligned with investigative needs. This highlights the challenge of balancing impartiality and bias mitigation with the provision of sufficient context to enable effective and targeted forensic work.

Training and Knowledge

A Portuguese DF outlined that an opportunity to experience other's work in practice is missing:

> *And to say: 'Look, you from that section, from that team, you're going to spend two weeks there, you're going to take a break from your services, and you're going to spend two weeks learning how to do lophoscopy or how to collect traces'.*
> *PT4: That's what's missing. Both on one side and the other. Like me being in the investigation for a week.* - DF in FG_POR3

Likewise, an INV mentioned that it would be useful to invite individuals from other

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services to have them watch and learn like with an internship. This could lead to the following improvement:

> *And after a while, the person leaves there with a completely different experience, with completely different knowledge, they don't bring superior technical knowledge, it doesn't make him a technician in the field, but he realises exactly what the difficulties are, the needs of that particular service.* - INV in FG_POR3

DFs also experience that others sometimes lack knowledge on what DFs can do. This, however, is being addressed, albeit within limited time frames:

> *That's really being mitigated, because now since the XXY course – that's why I asked which one was yours – we've been taking part in the training sessions, even if it's just to say 'Hello, we're here, we're able to do a few things', because they only give us an hour and a half and that's not enough to say much. But that's it, we manage to say something.* - DF in FG_POR1

A DF further stated that knowing what other parts of the investigation need could greatly improve communication and teamwork as the DFs would then better know what others need from them. They have been trying to get more information on what, for instance, homicide and terrorism services do and what is important to them as they otherwise cannot cater to their needs. The DF emphasised that there is a:

> *(...) General lack of knowledge of what they do, to the point where I have colleagues who have been sitting exams for over a year and don't realise the impact this has on the investigation and the whole judicial process, right up to going to court* - DF in FG_POR1

An FS expressed a need for *"training, training, training"* (FS in FG_POR2). However, a different FS outlined: *"There's also a lack of staff, they don't send people to training, because then they're lacking elsewhere too"* (FS in FG_POR4).

The need for training also occasionally becomes apparent in court:

> *So we often stop because we're going to trial hearings, trying to defend the investigations... and we often become aware of things at that moment, things that perhaps we should have done differently, and we have that knowledge, perhaps those who, for example, the crime scene which intervenes more at an early stage, then don't realise the impact that some things have. But it's a bit inevitable and you can only tackle it by sharing more experiences, right?!*
> *I mean training, in our case, specific training with regard to the various*

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potentialities, right? - INV in FG_POR1

Concerning what would be useful to know about other disciplines, one FS feels like they have already learned the modus operandi of other colleagues over the years. A different FS, however, mentioned it would be useful to know more of what others can and cannot do. If there is something FS can't do themselves, but another area can, one might opt to make a suggestion. This was confirmed by an INV, who pointed out that if you don't know about the skills of other specialties, it would not occur to you to reach out to them. Further, knowing more of the little things regarding digital evidence would be useful, for instance, details on what to look out for when going to sites and potential consequences of procedures forensic science practitioners adopt.

An INV mentioned that they certainly lack, in some areas more than others, specific technical knowledge. Ideally, they would know everything, all the capabilities. While the INV has attended a course on digital evidence, they say that they learned nothing in the course.

Summary

Summarised, Portuguese practitioners described a procedural structure where investigators coordinate initial witness interviews and crime scene preservation, while crime scene examiners take primary responsibility for trace collection and documentation. Digital evidence is typically handed to digital forensic units for laboratory extraction, but challenges arise when phones arrive switched off or when requests from investigators are vague or imprecise, leading to inefficiencies. Both investigators and digital forensic practitioners highlighted the importance of ongoing dialogue to ensure examinations are relevant, though this is not always achieved. Organisational complexity, with multiple police forces involved, creates further uncertainty over responsibilities, particularly in terrorism cases. Communication follows a pattern of informal exchanges—often by phone—followed by formal authorisations and written reports, though participants noted risks of omissions, miscommunication at the early stages, and inefficiencies caused by hierarchical procedures.

Bias mitigation was discussed in terms of separating digital forensics from investigations to avoid influence, restricting certain information, and implementing double-checking, and accreditation processes. Training and cross-exposure between disciplines were repeatedly identified as lacking but crucial, with practitioners stressing that understanding each other's capacities and constraints would improve collaboration. Organisational culture thus reflects both efforts to formalise procedures and the persistence of historical tensions, communication barriers, and uneven approaches to

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bias awareness and mitigation.

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Czech Republic

Procedural Standardisation

Part 1

FSs would be the first to attend the scene, either to be called by his supervisor or noticing the incident in the information system (IS JITKA). They would secure the area and start initial investigation by searching for camera footage, interview witnesses etc. An FS noted that they would connect the phone to a power bank, put it in airplane mode, and pack it into aluminum foil. However, a DF noted that Faraday bags are preferable. The phone would be handed to a DF who would collect data from the phone. An FS highlighted the necessity of notifying digital forensics that the phone is on the way to avoid delays:

> *And of course it depends if there exists a danger in delay, so, always it can just somehow instead to have it just anonymously packed and sent to have somebody at some time examine it. So, we just prepare the way beforehand, actually, over the phone or personally, or that way.* - FR in FG_CZ1

The SIM card that was taped on the back of the mobile phone would be processed through the intelligence gathering unit. Upon writing a formal request for examination, the FR would consult the forensic science unit to clarify what they can do. Before submission, the request would be signed and approved by his superior.

An INV described a different approach. They would want crime scene examiners to come to secure the crime scene and collect the cellphone. If the phone required immediate action, it could be collected by the FR under certain standards (gloves, put in envelope). Involvement of departments would be depending on the leads:

> *And also it depends on, I assume, that because primarily it was a violence, so, the colleagues from the violence would arrive and it would further just expand. Based on what would lead it, if there were some signs of extremism, terrorism or rather the drugs.* - INV in FG_CZ1

A DF described that they would not go to the scene, but would be called directly about the mobile phone and they would receive it as soon as possible:

> *I wouldn´t go to such a scene at all, I would sit in the house and somebody would call somebody else and my direct superordinate would order, or rather asked who of us would stay, wait for the phone and see to it at the spot.* - DF in

FG_CZ1

DFs would not expect FRs to collect the phone, but rather that the forensic science practitioner or crime scene examiner (referred to as CSI) would do it:

> *As there are those perhaps, if the first responders arrived there or the PSD [Patrol Service Department], or the local department, or such, so, these should not touch the cell at all. Yeah, it should, that should be, the evidence, collected by the CSI. And, well, the less it is touched the better, essentially, yeah. Only interference that is utterly necessary can be made to avoid the data to be lost. To connect it to the power bank or something like that. And, if not possible, to put it in that airplane (mode) or such, so it is just packed into the package or similar.* - DF in FG_CZ1

The DFs' superior would instruct them to remain available to receive and examine the phone. According to an INV, requests to digital forensics typically concern the extraction of all data, as the responsibility for assessing relevance lies with the investigative team. Before submitting such a request, however, INV would often call digital forensics to check for capacity. When resources are insufficient, DFs may recommend outsourcing to private sector experts. One DF noted that the examination of a single phone can be highly time-consuming:

> *And concerning our forensic workplace, in the phase of the handling of the evidence, it is rather unambiguous as we handle it in the way to obtain data. It means, we take it from the package it has arrived in, connect it to a power supply, special, and the phone is examined which may take even three years.* - DF in FG_CZ2

One DF talked about challenges of preserving phones due to infrastructure problems:

> *This is the thing we recommend. We teach that the CSIs. May personal opinion, as we have said, in practice, it is a nonsense. In reality, if there is a response, action, 30 to 40 phones are brought in. Not all of them wrapped in the aluminium foil, that´s the first thing. The aluminium foil is a kind of, in reality, very secondary lay solution. Normally, it´s the Faradays, and the NDH and NHAOC have it. Normally it is placed in a bag, the bag is large enough to fit also a power bank. It is much better than the aluminium foil because if the phone is in the aluminium foil for too long, besides, that in the aluminium foil also there has to be the power bank which many people do not know, because it charges… of course, but it is not that frequent that a phone without a charger would be delivered to us. So, if it a big number of telephones, we are unable to arrange*

> *the isolation for every single phone anyway. It means, we do not have any room for that examination of phones. So we have a box, Ramsey box, in which we are able to examine the phone if it is one targeted perpetrator and we expect him being technically advanced, so, when the phone arrives in the Faraday bag, we put it in the boxie and will examine it in that. But if we 40 phones arrive and we need the data by the next day, there is no chance to do it in one box, one by one. So, in practice, you pack it in the aluminium foil, we get it and unpack it from the aluminium foil. And that is the practice. As we do not have a room for that, we do not have …. I am saying, we have one little boxie for one phone. Of course, we place the important phones in that, but we are talking about units of pieces.* - DF in CZ1

An INV noted that they would request a full extraction of data, since digital forensic practitioners should not be selecting data:

> *So, concerning the data, anyway, we write a question that a backup of all data from the mobile phone because you do not asses that for us, yeah, the data, it's what we have to do then.* - INV in FG_CZ2

However, there seems to be some tension on this topic. A DF stated: "*[...] the trend of the last years when we are asked to do a backup of a complete data content. It has nothing to do with an expert examination."* (DF in FG_CZ2).

One INV mentioned they would check if digital forensics had capacity to handle the seized data:

> *Well, concerning the phone examination, it´s now quite a big problem that those experts, those 5 experts, it already is a bit but there are so many phones that it is difficult to manage. Only I myself am able to collect 30 phones from people a year and send them for an examination. For example, from one action I had 33 phones and if one needs data and other stuff from them, it is terrible. So, that´s why it´s necessary to call and find out if they´re able to do that at all*. - INV in FG_CZ2

Part 2

FRs would also be the first to attend this scene, as the Extremism and Terrorism Division (ETD) and the National Counter Terrorism, Extremism and Cybercrime Agency (NCTCA) would take time to move to the scene. The procedure would be similar to part 1. If there was a house search, DFs could go there and collect evidence. Also, a DF mentioned expecting more people involved, but other than that they expect no

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changes. An INV stated that communication would be the same, but as this is the escalation is regarded as terrorism, they would need to communicate with legal authorities (the prosecutor general office). The Nationwide competence unit of NCTCA would be informed by the operations officer. The case would get absolute priority. Nationwide competency units would have established routes of communication with Europol and Interpol and would quickly get answers. Private forensics would be hired, as they are faster:

> *Usually, in such cases, we call, consult the thing either with the Institute of Criminalistics or with the forensic expert. If he is able to do the work and when. Luckily, the price doesn´t play the most important role nowadays.* - INV in FG_CZ4

Another INV echoed this solution to constrained internal DF resources:

> *It´s with the Institute of Criminalistics, so I, for example, placed a request for an expert examination but they don´t have that much personnel concerning the workload and we write the date, the date when we need it to be done. And, so, it´s important that the colleague, the forensic expert, contacts me immediately and tells me, like, "dear colleague, I would like but it´s impossible. We´re able to carry it out not in two months but in half a year. And so … or we can advise you to turn to an expert …" and they send me a name, but in the private sector, who has to be paid but it speeds up the proceedings. Sometimes it´s not that important to do it fast. For example in the cases when the suspect is detained or when the delay, like, but if he is detained, it´s of course hurried, it´s probably pushed, like, faster. But it has happened that it was not possible to carry it out faster within the ICP conditions.* - INV in FG_CZ2

Priority of DNA, Fingerprint, and Digital Traces

A DF stated that prioritisation is a challenge but did not provide a view on what should come first. FRs highlighted the vulnerability of DNA and fingerprints when outdoors, rating them as the least robust. INVs considered digital evidence the most robust if placed in airplane mode, followed by DNA, with fingerprints again seen as least robust. Another INV expressed a preference for prioritising DNA, but, in line with others, stressed the importance of consulting experts when in doubt.

A DF further reported having encountered poor practices in the prioritisation of traces:

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> *For me, personally, it is always a kind of kidding when we receive some kind of device like that and retrospectively it is found out that it is necessary to do the fingerprints and DNA. We had a few cases like that. It depends on what one needs at the moment first. From the operative point of view I would say the data from the phone. And it makes our work a bit more difficult, or not our work, but the work of the DNA and fingerprint experts. It now happened last month. Phones to be examined arrived, the request arrived a week later specifying they needed the fingerprints. After we have had it on a desk for a month and another five experts have touched it. And then it becomes quite interesting with those data. Here there would be a problem that if we were able to obtain all accessible data, it would have to go to either the investigator or an analyst and he would have to specify the particular phone numbers and messages. Or we would provide him with that to have a look. It is more frequent.* - DF in FG_CZ1

Standardisation Versus Autonomy

A DF referred to the existence of a quality management system, explaining that outputs are always checked by another colleague or superior. FRs similarly pointed to standardisation, noting that requests and Criminal Proceedings Records (ETR) must be approved and signed by a superior. INVs repeatedly emphasised the role of hierarchy and rules in structuring responses at the crime scene. One INV explained that the framework is laid down in internal managerial acts and binding instructions which regulate both competences and mandatory stand-by duties:

> *So, actually, it´s the act that is described and we decide. Actually, there are mechanisms in place that there are certain stand-by duties kept for example concerning terrorism. It´s kept non-stop, the whole year, we take turns. There are stand-by duties kept at the district directorates by the criminal police and there it´s negotiated. Of course, it´s stipulated standardly by Binding Instruction of the Police President No. 103 on Criminal Proceedings. It stipulates and we, based on whether we have a local or subject-matter competence, we are, actually, obliged based on the Internal Managerial Acts to investigate further. We cannot say we don´t want it.* - INV in FG_CZ2

The survey results reflect how such formal frameworks are experienced in practice. While most participants indicated they often (40%) or always (33.3%) had room for discretion, a smaller group reported rarely (6.7%) or never (20%). This distribution suggests that although the system is strongly rule-based, professional autonomy remains an important feature of everyday decision-making. The focus groups echoed this tension: investigators underscored the need for clear hierarchy and a single decision-maker, but also recognised that situational judgement was often required, particularly when handling digital evidence or responding to case-specific

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circumstances.

Communication and Interaction

Formal Versus Informal Communication

The survey results show that Czech practitioners rely on a combination of formal and informal communication during collaboration. Nearly three-quarters (73.3%) reported using both modes, while smaller groups indicated that they communicated mainly formally (13.3%) or mainly informally (13.3%). This distribution suggests that while formal procedures are necessary for documentation and authorisation, practitioners value the flexibility of informal contact to clarify requests and avoid delays. The focus groups provide further insight into how this balance is managed in practice.

FRs referred to writing reports in the ETR system, while communication with intelligence gathering units typically took place over the phone. Forensic experts (FSs and DFs) described a dual approach: formal requests were always required, but informal calls or emails were often used to check workload, discuss timelines, and set practical conditions. As one DF explained:

> *I think, it will be most of the things, everything normally. Of course, the forensic experts concerning the ICP or private ones, experts, simply, to call normally, send emails. What we are always interested in …how long it´ll take. So, also the time is, for example for the criminal proceedings, rather important. So, normally communicate. Of course, there is the formal part then when we have to put on paper a request, that 105 and so on. So, a request for an expert examination and so on. So, of course, there´re and will be those formalities, so, use, of course, a request, the official way, on-line, the ETŘ, data box, … that´s what I have.* - DF in FG_CZ2

And the DF continued:

> *That´s why concerning all stuff one has to use also the informal communication, it means the phone, e-mail… Simply set some conditions that are suitable for you "what´s your situation, what´s your workload", etc.* - DF in FG_CZ2

Similarly, INVs stressed that phoning first, before submitting the official request, was a way to save time and prevent the loss of evidence:

> *That´s not to write complexities, some requests, and now somewhere … first call*

> *the person responsible for the forensic expertise. Or a colleague or an external expert. And tell him simply over the phone what we´re after, what we want, etc. And he will advise you what´s fastest. Because, that is exactly that. To call or directly. Better than describe the act and write complicated questions. He will get it on the desk and won´t understand completely he wouldn´t write that exactly because, on the other hand, we don´t have the information what they can and can´t do. So, he´ll write to me and then it would fly like that, there and back, for a month. And within that period the phone will switch off, that´s clear, and besides the perpetrator will cover his tracks, or the witness will simply forget, or the evidence will simply disappear, that harmed person might die but there probably, like, the interview of the witness would seem an exigent and unrepeatable act.* - INV in FG_CZ2

(Mis)communication

Informal communication plays an important role in clarifying requests as they aren't always articulated well enough. For instance, receiving a request that outlines the need to have the phone examined tends to be too general to be of use for DFs.

Communication would go through different channels, also private chat applications:

> *There is a lot of information shared in the private, simply, chat applications where it´s shared. Of course, not containing any sensitive data. But, for example, in Prague a group runs in which there are simply 2,000 police officers who share information among themselves. Well, just it works better than official channels. Simply, from the point of view of unknown perpetrators. Because as the patrols often check someone…. I have a photo from the cameras and place it in the group and someone writes to me "yeah, I know him, I checked him a week ago", etc. But, within the official channels this is more complicated.* - INV in FG_CZ2

Not all Czech participants regarded miscommunication to be a problem. For instance, an INV outlined that there probably is no miscommunication since operation units of the police are well-oriented and have local and subject-matter competence enough to know about other colleagues' jobs. Other participants reported that previous difficulties in communication have improved. For instance, an INV outlined that there has been improvement in communication with certain prosecutors. While there previously was greater distance, the prosecutors now treat them as partners, engage in closer contact and the INV can call in a more informal way.

An INV highlighted the significance of a willingness to communicate in ensuring good

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communication:

> *That´s it, this is how I have seen it in the all years I have been doing the work, that there is not so much trouble in communication but more in the willingness. If you keep telling someone how to do it and he still doesn´t listen as he´s not very interested, you can keep saying that forever. It´s as the colleague has said. Somebody is interested, calls to the ICP and asks "please, give me an advice" and another one just writes it, the request just to pass it somehow to someone else who comes who overtakes the shift…. "Hey, it´s here".* - INV in FG_CZ2

In a similar sense, an INV mentioned that they would just ask if they needed to know something – "*the possibilities are wide and easy"* (INV in FG_CZ1).

There are differing opinions on the causes of miscommunication. A first responder outlined: "*Well, I don´t know, I think that if there occur any problems in communication, it is a problem of a copper himself who cannot communicate"* (FR in FG_CZ1).

A potential source of miscommunication mentioned is the fact that there are 8-10 people involved in communication before it reaches the specialised police officer. According to an INV, by then the first information seems completely different from what the specialised officer was told. As this occurs on a daily basis, the INV emphasised getting information from the initial witness. Although there seems to have been improvement over the years concerning this issue, it is still not good enough according to the practitioner.

The number of people involved in the chain of communication is also relevant to miscommunication, as stated by a DF: "*Well, the more people the more chances to chaos. So, misunderstanding would definitely occur."* (DF in FG_CZ3).

A DF outlined that the biggest risk of miscommunication is communication that did not occur, for instance the absence of a request for help. Another DF outlines that they are always happy to answer the phone and consult with investigators if needed and that the close connection between the two roles works very well.

Forensic Functions Integrated Into Investigation

In terms of forensic functions being included into the investigation teams, digital forensics seemed to be detached and working task based. No forensic science role was present in the focus groups, so there were limited grounds for assessing this aspect.

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Bias Mitigation

A DF outlined that they have an advantage in digital forensics – they are interested in the phone which means that they don't face any bias. Regarding bias mitigation measures, the DF doesn't think there are any, but they draw on experience.

Another DF mentioned that they are a certified workplace so that there are some mechanisms regarding bias mitigation set up. The system of cross-reading, whereby a colleague who has nothing to do with the case reads the expert opinion, is performed. The colleague could then say what should be added and point out parts that are difficult to understand.

An FR agreed that besides following professional principles, there are no particular bias control mechanisms. However, teamwork prevents getting a one-sided view on matters, but the first responder his- or herself outlines that they usually manage everything by themselves. Another FR explained:

> *Well, I think the experience prevents the bias. Of course, if we do not get to some phase of a burnout, am I right? It means that there might some flabbiness appear and a tendency to overlook things and so on. But we are speaking about a healthy approach to work and the commitment. It means that at the beginning we tend to be precipitous, we are inexperienced and there might be mistakes before it settles with time…. [...] So, I think that the time for which we have been doing the specialization and the amount of knowledge we have on the subject helps us to avoid bias, simply.* - FR in FG_CZ4

An INV outlined that it's up to everyone to decide how to go about, but that it's always good to work with a few theories from the extreme left and extreme right and then to gradually cross out. In terms of bias mitigation, asking colleagues to read through written documents regarding understandability and sensemaking could be useful according to an INV. There is a possibility of trying to sound really professional and then becoming entangled in it. Another INV thought that the professionalism of the individual plays a central role.

Being clear, short, and concise when passing information is an important measure according to one INV. Further, an INV highlighted teamwork is important:

> *It is, in my opinion, a combination of experience and team work. After all, it is always a team work of the investigator, operative or more operatives…. And if it's a larger case even more investigators and there are some meetings, come informal communication and sharing of the latest findings within which the views*

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and the ideas somehow direct and it is what helps the prevention of the bias most. - INV in FG_CZ4

Finally, another INV emphasised the importance of considering individual factors:

Also the occupational burnout. That the person is like and thinks somehow. [...] But he'll be fed up with the work and he'll work, as we say, from to and don't want anything else from me. - INV in FG_CZ2

Knowledge and Training

Czech DFs are involved in training courses where they teach how to handle and collect digital evidence. They also conduct a training activity for judges and public prosecutors three times a year, where DFs include information in study files which provide them with an overview. Also Instruction and Methodology Training (IMT) takes place:

We, every year, organize IMTs where representatives of the units with the nationwide competence and other units are invited. There we somehow try to introduce terminology and other things which apply to the collection of electronic data as everything goes through modernisation and the proceses change and it´s necessary to keep the pace. - DF in FG_CZ4

A DF and an INV agreed that methodology training is useful. The DF mentioned that it is useful to consult about how analysts and others handle the technology before it reaches the DF and how they handle the DF's work. The INV outlined that such methodology days are further useful on a personal level:

I had the individual experts for meetings where we talk about the particular problem, it means, when we had as high number of for example CSIs or investigators as possible and the logics was in that. The guys from the Institute or from the OKTEs were describing their standpoint, how they see it, what their procedures are, what the evidence is, which condition they get the evidence in, what they would need, what the new technologies are, new procedures …. This type of interaction among them. First, one reason is that if there is the meeting it is then connected in the personal level. The boys sniff themselves, can communicate with each other, and call each other. They don´t only see the phone number and the rank. They can see the face. That is just a normal guy. Then they are not afraid to call, it is not bothering anyone … Especially, they pass the information. - INV in FG_CZ3

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The INV also mentioned that there are individuals working at the lab who didn't serve elsewhere in the police before and that it therefore was difficult for them to understand some circumstances outside, such as what a crime scene looks like and how you proceed. This was another reason why methodology days were important.

Summary

Summarised, Czech participants described a structured but resource-constrained system, where first responders secure scenes, prepare devices, and notify digital forensics, though some argued phones should ideally be collected by crime scene examiners to minimise handling. Digital evidence is sent to digital forensic labs, where delays due to high caseloads and limited infrastructure can occur, sometimes requiring the use of private experts. Investigators typically request full extractions, while digital forensic practitioners questioned the utility of such blanket requests, stressing the importance of clearer instructions and dialogue. Communication often begins informally by phone to save time, before being formalised through official requests and reports. Miscommunication risks were linked to vague requests, long communication chains, and over-reliance on intermediaries, though one participant noted improvements through closer cooperation with prosecutors and the use of informal communication channels.

Bias mitigation was framed largely as a matter of professional experience, teamwork, and cross-checking of reports, with few formal mechanisms. Respondents acknowledged risks of confirmation bias and overly persuasive colleagues, highlighting the value of multiple perspectives. Training initiatives, including joint methodology days and courses for investigators and prosecutors led by digital forensic practitioners, were considered important for bridging disciplinary gaps and fostering more effective collaboration. Organisational culture thus reflects both standardisation through internal acts and quality systems, and reliance on interpersonal relationships and professional norms to manage bias and communication challenges.

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United Kingdom - Scotland

Procedural Standardisation

Part 1

In Scotland, FRs would be the first to attend the scene due to the 999 call. There would be established coordinators for all strands of enquiry (CCTV, house to house, digital media) who would be responsible for sorting and summarising ongoing enquiries. They would report to the senior investigating officer (SIO), as the single point of contact.

Typically, FRs would not collect a mobile phone themselves, as one explained, noting that such decisions depend heavily on the circumstances at the scene:

> *Again, it's entirely dependent on the situation at the time. If you're unable to secure the locus safely it might be in jeopardy of being compromised so it might be more prudent to seize that device and secure. But again, we would be taking advice with our constant comms with either the duty inspector or the CID on call at the time for that. If we take it as is, that the scene is calm, there is no other kind of concerns or issues, the weather is nominal, then we wouldn't be seizing it unless we were specifically asked to for some reason.* - FR in FG_UK1

Similarly, another FR noted that they would not touch the phone, instead leaving it in place until the FS arrived to collect the evidence. In contrast, another FR described a different approach: seizing the phone immediately and either switching it off or placing it in airplane mode.

If the Criminal Investigation Department (CID) would be involved, FRs would pass information to CID on the radio, who probably would advise the FR to cordon off the area due to the discarded phone and possible blood traces. If not, the FR would communicate back to the sergeant responsible for their team in the control room. Once CID officers enter the scene, they would 'run the show' and direct response officers accordingly. There would be a verbal handover to the CID officers concerning the actions taken on scene, and email contact with investigative actions performed prior to handover. If not already done by the FRs, the FS would cordon off the area. An FS would collect the phone and hand it to the officer in charge at the crime scene or in the forensic lab. The CID officer would liaise with the Gateway and prepare a written examination request including a summary of events, a justification, and information on what type of data they would be looking for.

When the phone arrives at the lab, it would come on an examination request form

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(ERF), and there would be conversations on timescales and what should be done with it. In the forensic science lab it would be prioritised and ready within a day – or even as the officer waited outside. An FS would attend strategy meeting to discuss possible DNA traces on scene or phone, but only at the start of the case:

> *So, from a biology perspective, my first involvement would likely be a strategy meeting, particularly if it was an attempt murder or a murder, so, I would normally be invited along to that. Obviously, the phone itself, I'd have that kind of discussion in the strategy meeting, we would be looking, I'll say interested in DNA, so, we don't know who it belongs to. We would also want to consider; We don't know if the accused is bleeding in this case, so, there's blood at the scene, they would have to consider and also the phone itself. So, we'd have to consider potentially a blood examination of the phone as well and we'd normally have that discussion on the strategy meeting whether that was required.* - FS in FG_UK1

In major investigations such as this, a digital media investigator would be deployed to coordinate the handling of digital evidence. Their role would include extracting data from devices, obtaining telecommunications records from service providers, and initiating internet-based lines of inquiry. The digital media investigator would also serve as the point of liaison with the digital forensic unit, which would ultimately receive both the phone and a formal request through the established gateway.

A DF described how they would be involved in the case:

> *So, I think at this stage of the investigation, I don't think I would be involved I think I'd be waiting for the reporting officer to submit a request to our department. Once that's begun obviously, then I could start investigating, but at this present moment, it would be up to the reporting officer to submit that request.* - DF in FG_UK4

The management at the DF unit would decide priority and assign a DF who performs extraction and creates a review package. The reporting officer responsible for the case would come to review the data and tag relevant information. Then, the DF would write the report with a corroborator with description of the artefacts tagged by the INV.

A DF explains the collaboration with the reporting officer:

> *I say useful in the sort of sense, because it depends on the scenario, of course, and what's the device, but once that's done, we get the extraction. We have a quick sort of scan through ourselves as analysts, just seeing if there's anything that stands out to us, but either way, if there is or isn't, we also get the reporting*

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> *officer to come in and review that data. We sit down with them, just explaining the software to them and the evidence that we've come across and then it's up to them to decide what's important, what's not important. Once they've done that, they will tag for us to make a joint report and then that's when we go into the joint report stage and write it up with a corroborator, just anything what the officer's asked for. So that can be anything from GPS coordinates to messages that have been received on different apps, pictures, videos, basically any data that you can see on a phone can be requested by an officer to be put onto a joint report. Then from that point forward, once we've completed the joint report, it's sent to the reporting officer or depending where the case is, straight to the PF.* - DF in FG_UK3

This procedure was echoed by an INV:

> *I think from then, I would obviously receive the communication from Participant4 about the content of the phone. It would then be up to me to look through the information that's been extracted from that phone and find any relevant information or evidence that would support whatever's happened. I would then liaise back with them with anything that was pertinent to our enquiry or that was evidence and then look to get that in an evidential format so that we could submit it further on down the line, when it went to court.* - INV in FG_UK4

One DF stated that they would most likely be involved in the strategy meeting, too:

> *Yeah, we would most likely be involved in a forensic strategy meeting to identify the workflow of a device that had been identified as being important. After that, we would probably get it, as Participant3 said, we'd have to get it after DNA has been conducted, but for things to come into us, it would have to go through a process. We have a Gateway that before things can just be allowed to turn up. So, there are discussions with the gateway, discussions with our case management team to see what and how we fit that device into our workload. In the first instance, it would be a forensic strategy meeting and then we'd have discussions with the investigation team as to when and how that device is going to come to us before it actually arrives.* - DF in FG_UK1

However, this level of involvement was not consistent across participants, with another DF noting limited representation of digital forensics in such meetings:

> *I know PAR3's talked about forensic strategy meeting, I've heard of some of these things because I actually have a partner who works in forensics as well but we don't tend to have a lot of representation in those meetings I don't think.*

> *PAR3 will be able to correct me there because I've never been in one. But I've not really heard of anyone being involved in forensic strategy meetings from cybercrime which I do think more and more, as it becomes more relevant, I do think there is a need for someone to be on them, yeah.* - DF in FG_UK2

The absence of DFs in strategy meetings was echoed by an FS:

> *Yeah I comment Amy, certainly as PAR4's saying of the strategy meetings, obviously I'm only involved in ones where, well serious crime which probably would be tagged as serious crime. But I've never sat on a strategy meeting where there's been a digital analyst at all. But then we're only usually involved in strategy meetings right at the start of the case when you've got a scene and everything's got to be worked out. Then obviously as investigation proceeds we rarely have, certainly where I'm involved the strategy meetings, we would just be involved at the start. But at that point there's never been an analyst as PAR4 was saying, certainly that I'm aware of.* - FS in FG_UK2

Part 2

For the FRs, not much would be different in the escalated scenario. The main task would be to preserve the evidence and make sure the specialists could analyse it as good as possible. An INV noted that they would attend the scene in the same way as in part 1, but the counterterror unit would quickly take over the ownership of the case. This would entail a complete shift in practices, and more available resources. DFs could come out in a van and start the analysis immediately.

Who would be in charge would hinge on the categorisation of the incident:

> *PAR5's probably better placed than me to say to be honest. I'm not really too sure. I suppose it would be pretty similar, like the CID would usually take on murders where the suspect is known, like a sort of Category C murder, whereas a Category A murder would usually go to the Major Investigations Team and quite often if there's a lot to do people from the CID will then be moved across to assist with the enquiry. I don't know how things work with things that are pushed into the CT side but I would imagine it would be broadly similar given that it would need quite large amount of resources, I would imagine.* - INV in FG_UK2

Due to the terrorism aspect, security services (who can do things quicker than the police) would be involved and would get real time info about the suspect. There would also be a switch to secure communication.

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According to an FS, forensic operations would likely be called and give a more overarching forensic response. One FS stated that the approach would not change much, but there would be more pressure to get the work done quicker. Everything would be scaled up, more people would be involved, and there would be an extra layer of management. A single crime scene manager to lead the coordinators on each scene would probably be deployed.

A DF noted that the priority of the case would increase and other work would be dropped. The same DF as in part 1 would continue working on the case and strategy meetings would continue. Since the digital forensics department has a DF specialised in counterterrorism, they would either work jointly or this specialist would take over the case. There would still be email communication, but this would be secure communication due to national security.

Priority of DNA, Fingerprint, and Digital Traces

An FR said they would prioritise DNA and then the digital traces. A DF noted that this prioritisation would be done in the strategy meeting. The DF stated that they would prioritise DNA, then digital traces (using gloves), and lastly fingerprints since taking fingerprints can destroy the device. This was echoed by an FS.

An FS described how phones are typically prioritised for identification work, explaining the sequencing of DNA, digital, and fingerprint examinations to minimise contamination and preserve evidence integrity:

> *If we're looking for an identification what's often happened is the phone comes to us first, even there is an urgency to get the digital; the digital setup is not clean. So, we would, if there was no blood anticipated, we might just do a DNA taping around the edges and the buttons, and maybe even take off the casing and have a look there. Ideally, if it didn't interfere the digital side, even swab the sim card and things like that. But we wouldn't need to wait for the end of all the DNA biology then to get it to digital because all of those samples, they would by dry samples and could sit in a sort bag within the bag and then it could go to digital. And if it's needed later, then it come to us and the samples would be ready or we could just take those samples into the DNA and get rid of the item, and the item would then be able to go to digital while the DNA was running in parallel. Then after digital, would be the time to go for fingerprints. So, it doesn't matter that it's been in a none-clean environment as long as digital have worn gloves and taken all those precautions then it can come in. Because the fingerprint side of it*

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would potentially damage the phone, dirty the phone, so, we've got to consider that. So, that would be after the digital. - FS in FG_UK4

Standardisation Versus Autonomy

How the incident is managed depends on the categorisation. The gateway is an obligatory passage point for forensic evidence and forms a bridge between police and scientific disciplines. The gateway has to approve the ERF before the task is forwarded to biological forensics or digital forensics. An FS noted that, due to the gateway system, they do not receive tasks that don't make any difference to the case:

Amy, it is probably worth mentioning, we have a police gateway system. So, this is a set of staff to facilitate submissions to SPA. So, they can form a bridge, sometimes between the scientific disciplines and the police, it's like, okay, all of this has been collected, what can you do? And they will feed back. So, the ERF has to be approved by them when it comes in, so they are literally a gateway, so we don't get things submitted that won't actually provide any evidential difference. - FS in FG_UK4

The survey results from Scotland suggest that practitioners perceive a relatively high degree of discretion within a framework of structured procedures. Most participants indicated they often (41.2%) or sometimes (35.3%) experience room for discretion, while smaller groups reported rarely (11.8%), always (5.9%), or never (5.9%). This pattern highlights that while processes such as the gateway system and forensic strategy meetings provide clear rule-based structures, practitioners still see themselves as able to exercise judgement in their work. Focus group accounts reinforced this duality, describing the investigative process as methodical and coordinated, yet flexible enough to allow officers to make case-specific decisions, for example in handling digital devices at the scene or prioritising evidence types.

Communication and interaction

Formal Versus Informal Communication

The survey results indicate that practitioners from Scotland overwhelmingly rely on a combination of formal and informal communication during collaboration. The majority (88.2%) reported using both modes, while a small minority (11.8%) indicated that they mainly communicated formally. None stated that they relied primarily on informal exchanges. This suggests that while official documentation remains central, much of

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the practical work is supported by ongoing informal dialogue.

The focus groups illustrated this in detail. FRs described using mobile phones or face-to-face conversations, while DFs noted that communication typically begins informally, often by phone, before being formalised through email or official reports. Informal exchanges were also maintained during the course of an investigation, with reporting officers, crime scene officers, or investigators frequently dropping in for quick discussions. As one DF explained:

> *I'm with that role specifically, we tend to have like kind of less formal chats with the investigation team as it's going on, so, outside of the forensic strategy meeting. There will probably be somebody on the investigation team, Participant1's described that role perfectly, who we will have constant contact with as we're working through things and how it's progressing. So, it might not be the SIO all the time, we'll pretty much have constant dialogue with somebody on the investigation team as digital forensics is ongoing and even before it comes to us, just chatting to see basically what the deal is and what they're after. So, they're perfectly described, Participant1's described exactly what I was going to say.* - DF in FG_UK1

(Mis)communication

While there are established formal lines of communication, for instance for submitting evidence for a report, an FR outlined that the organisation remains flexible in the sense that there can be informal discussions when needed. Indeed, informal communication plays a central role among DFs in Scotland:

> *Yeah, we have our formal ways of communicating but more useful is the informal ways that we communicate with the investigation team. You can convey things and get points across much easier in the kind of informal chats that you have with them than the formal ways that we deal with, like joint reports and stuff like that. Like Participant1 was saying, the point of contact for all these big investigations that we have where we kind of know each other a bit more is a massive improvement on that as well because you have a bit more of a relationship with somebody and you can chat more about how things are going. So, that sort of informal communication is more productive than the formal structure that we have.* - DF in FG_UK1

Several participants from Scotland perceived miscommunication not to be an issue. As one DF explained, by the time evidence reaches them, extensive dialogue has usually taken place, reducing the likelihood of errors:

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> *I guess from our perspective because we're generally one of the last ports of call for something to happen. There has been so much discussion about everything, it's rare that we miscommunicate because if you were in a little instance of that then you'd probably notice that some miscommunication had happened. So it wouldn't become an issue if that makes sense because there has been so much communication before something even gets to us then, all that has been ironed out. We have so much dialogue with the investigation you're probably not going to be in a position where there is miscommunication.* - DF in FG_UK1

An FR likewise observed that miscommunication rarely posed problems during investigations, emphasising that inquiries are generally methodical and supported by regular, structured communication:

> *What I was thinking when you were asking the question Amy, was that I don't often feel like miscommunication is an issue during these investigations. I think we've talked about, it's quite methodical when the machine gets going and it all starts working, and we try and slow things down as much as possible to avoid things like miscommunication. So, I can't actually think of an example in a major enquiry where we've had major issues caused by miscommunication. And actually, I think we routinely communicate well.*
> *PAR2: I'd agree with that.*
> *INT: Does everyone else agree?*
> *PAR2: Yeah.* - FR in FG_UK1

A DF noted that they are very good at communicating and sharing experiences within the digital forensics team. As a unit, they are very conversational and can talk to anyone. A DF further outlined that they are open to be contacted, asked questions, and give advice to others. However, the DF added that that superiors might have a different opinion on this:

> *I don't know if our team leaders would be too happy about getting a raft of new kind of like phone calls. But at the end of the day, my personal opinion is we're a support branch, we're there to help officers conduct their enquiries and that involves giving them guidance and advise on what to do with digital evidence. - DF in FG_UK2*

According to an FS, good communication is achieved through the use of ERFs, since they provide a clear line of what was requested.

An FS described that they have to examine many items which involves speaking to

meany different teams. The process is perceived as very streamlined in terms of everyone knowing their role, that things are discussed and agreed upon in strategy meetings and results can be turned around in short time.

According to an FS, good communication is ensured through corroboration and clear language:

> *So, we have corroboration and just a general philosophy of trying to report things in a manner that a lay person can understand, because that's our ultimate arena anyway, the court. So, we're trying to get our findings across to a jury so, we might include some more technical matters in our summary reports or court reports that the end aim, the interpretation within that would always be so it could be understood by a lay person. We have somebody who writes that and then somebody who would check that, so, a second scientist who has independently looked at the evidence and independently done an interpretation, and then we come together and we check over how we're writing it as well. - FS in FG_UK4*

Several participants agreed that the beginning of an investigation presents a great risk of miscommunication. They described that there could be chaos at the scene where many tasks would need to be handled simultaneously. Moreover, they highlighted the original handover as a weak spot. An FR outlined that many investigative actions are not written down which means that things can be missed at that point. Also, when officers change, individuals are sometimes given different information. Further, since there is individual variety in how things are done and there can be difficulties with continuity, it is important to have an ongoing conversation. When people change so often then there can be *"a real kind of breakdown"* (FR in FG_UK3) in communication.

Forensic Functions Integrated Into Investigation

In terms of forensic functions being included into the investigation teams, digital forensics seems to mostly be detached from the investigation team. DFs described that they would rarely go to the scenes of crime and would occasionally be included in strategy meetings. However, an INV commented that their attendance at strategy meetings rarely happened. The direct contact would mainly be with the reporting officer after a request was received by gateway. In contrast, the forensic science function was routinely included on scene and in strategy meetings.

One DF described limited direct communication in their workflow, noting that most interactions are mediated through formal request forms and internal gateways rather than direct exchanges with investigating officers:

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> *For our part as an analyst, we don't really have much direct communication with anyone really part from the RO and that's, even then there's some cases where we don't have direct communication with the RO really at all. So from my work flow if a device is to be examined an ERF [Examination Request Form] will go through an examination request form, that'll go through our gateway which I think there's a similar thing for the forensic services where they decided if it's all proportionate, if we've got legal access, all that kind of stuff. Then it'll be one of our cybercrime team leaders will then assign the case to an analyst and the production will be called in or it might be dropped off by an officer so that we might speak to an officer who was at the scene if they're still go it when they drop it off physically or maybe someone like PAR2 he drops it off physically then there might be some informal chat there regarding what they're kind of looking for, that kind of thing. But generally if it goes to productions and then it gets called into us, there's no real direct communication. I would then do my work on the device and then we've got a case management system which I won't say too much about because it's really rubbish, it's supposed to automatically send through the results to the RO and the interested parties. So unless I physically phone the RO or email them to ask them for more information if I need it, then there's not generally a lot of direct communication*. - DF in FG_UK2

Bias Mitigation

Corroboration was commonly mentioned by participants as an implemented bias mitigation method. One INV mentioned that they could not think of any bias measures at the top of their head, but it was about being open-minded and not getting tunnel vision. With their background, training, and team around for discussions (and with everyone being encouraged to speak up), they would be able to somewhat stop simply going down one route.

DFs generally were of the opinion that bias is a less relevant topic within digital forensics. The reason for that is that *"the data is the data, it's hard to bend the data one way or the other, so, it's not really something that you have bias in, I suppose [...]"* (DF in FG_UK1). Another DF stressed that their role is limited to reporting on the data provided, without offering subjective interpretations:

> *Yes, I think that's a big thing with others, joint reports at the end of it, and even at the beginning, we will say, "This report is based on what the reporting officer has chosen." Which basically is meaning that as analysts, we've not chosing, you know, we can't speak for that data. We don't speak for the data. We only write*

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> *the report based on the data given to us. So we're not asked for an opinion on what we think of the case. We're just going from the facts, basically. - DF in FG_UK3*

Another DF similarly argued that bias has little influence on their work, and that bias was more likely to arise during data interpretation by the reporting officer:

> *[...] I don't think biases really come into our examination. Maybe obviously, it's subconscious but we would approach every single case in the same way, we have standard procedures that we would be following. Every device, every single phone is examined in the same way, the same order, you take photographs, you extract the data, you know, we follow these workflows.*
> *So, there isn't really room for sort of biases to come into that, maybe when we're actually examining the data, there would be, but in most cases, it's probably the reporting officer who is examining the data, which has been extracted from the phone.* - DF in FG_UK4

Among the FSs, following reporting guidelines, having agreed processes, and being aware of biases were mentioned as mitigation measures. An FS mentioned:

> *In that respect, we are aware that bias can happen and unconsciously as well. So we do try and have a sort of training and we all get together to discuss things like that and mitigating procedures.* - FS in FG_UK3

Moreover, there was emphasis on reporting in consistent ways. Including the prosecution and defense hypotheses and evaluating findings against both were mentioned by several FSs. For instance:

> *But, I don't know, the fact you're coming separately and then together, so, separate interpretations and then coming together is another guard against any bias like that. But the whole structure of what we do is against doing this; it's in all the forensic courses, all the forensic training from the start for us, so, you know, it's a bedrock of all we do. I don't think it's too much of an issue.* - FS in FG_UK4

One FR noted the challenge of information overload in major investigations, where large volumes of input from multiple sources can shape enquiries and reinforce individual biases:

> *And certain people may favour a certain line of enquiry or believe for whatever bias they hold that they might want to pursue that. Ultimately I think it comes*

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> *down to experience and then leadership really from the senior officers to try and encourage people to be as objective as possible and keep an open mind during these investigations. But it can be difficult when there is so much information coming in.* - FR in FG_UK1

That the volume of incoming information in major investigations is a challenge was confirmed by an INV.

One INV assumed that first responders can potentially bias the investigation. As first responders need to assume that everything they're initially being told is correct, it is the responsibility of all other parts of the chain to not get biased by what they're told as the initial information can be inaccurate in many ways.

An FR, however, stressed that their involvement is limited to the evidence-gathering phase, which places them too early in the process to develop biases about the direction of an investigation:

> *So in terms of actually producing a kind of confirmation bias, I'm not in a position. All I'm doing is looking at the evidence that's in front of me, and the kind of background stories and the data analysis and that that follows. We're not obviously generally privy to that depending on whether or not we are the reporting officer, but I see it's something like this one, we wouldn't be. But the fact of the matter is that we were almost too early in the investigation phase to actually have any kind of biases to where the investigation is going to go. So it's very unlikely that it would have any kind of factor or bearing on what we are doing.* - FR in FG_UK3

Training and Knowledge

An FS outlined the importance of having updated and comprehensive information at all times. Even small insignificant changes to a version of events could have a large impact on the opinions they would provide, particularly if there were defense positions. This was also highly relevant in later stages:

> *[...] not to put the police down but we often get to court and it's like are you aware of a defence position and you've never been provided that by the police but they have given a defence position and now you're getting fired all this in the box and it's like we could have fully addressed that in the report.* - FS in FG_UK2

In order to do one's job correctly, knowing about other people's roles and being up to

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speed on processes as these change all the time was mentioned as being useful to an FS. This could be particularly relevant as forensic science appears to be somewhat isolated in the investigative chain:

> *Because we kind of sit in a bit of a bubble really because we come in, we sort of do our bit but after that sort of initial interaction with the police, are interaction is really quite limited and usually just with the reporting officer to provide updates. So kind of once it gets out with into the digital realms we're completely sort of naïve to that [...]* - FS in FG_UK2

One FR highlighted the value of understanding the limits of other disciplines and their specific roles within the wider investigative process, noting how even brief exchanges with colleagues can provide greater insight than formal training sessions:

> *So even in the conversation we've had with Participant 3 [the DF] today, I've learned more about cybercrime in the last 1 hour and 40 minutes than I have probably in sitting in any seminar or anything like that. They've tried to give us a training course that they usually like to give us. So it's about understanding the limitations of everybody and what everybody's role is specifically in terms of a kind of overall picture.* - FR in FG_UK3

Having to make quick decisions while not making any mistakes was highlighted as a challenging task for investigators:

> *[...] it's these quick decisions you've got to make when you get there, be that PAR1 , PAR2, myself, whoever's there, what do you do with that phone and a lot of time you're doing it blind, and you're just kind of hoping you've made the right decisions. Whereas a lot of the time it's not and you're getting your knuckles rapped, you could have done this, you could have done this better. But at that time you've got to make that decision to switch the phone off to put it on charge, to put in a Farraday bag, so quick decisions you've got to make and you're always going to get it wrong, but I think as long as you do it with the best intentions and can explain your rationale then that's all you can do.* - INV in FG_UK2

Summary

Summarised, participants from Scotland described a highly structured but flexible system, where first responders preserve the scene until CID officers, the crime scene manager, and specialist coordinators take charge. Phones are typically left for crime

scene officers, though some first responders noted seizing them if conditions required. Evidence is formally submitted via the Gateway using ERFs, ensuring proportionality and coordination between police and forensic services. Digital forensics is generally detached, receiving devices after strategy meetings, though involvement varies, with some analysts rarely represented at early stages. Digital forensic practitioners emphasised their task-based role: performing extractions, preparing review packages, and producing joint reports with reporting officers, while forensic science practitioners highlighted their early involvement in strategy meetings to discuss DNA or blood on devices. Communication blends formal structures with frequent informal dialogue, which practitioners regarded as more effective and productive. Miscommunication was generally seen as rare, attributed to well-established processes, though initial handovers, and rapid scene work were considered vulnerable points.

Bias mitigation was linked to corroboration, considering both prosecution and defence hypotheses, and standardised workflows. Digital forensic practitioners often regarded bias as less relevant, given the perceived objectivity of data. Still, risks such as information overload, first-responder assumptions, and leadership influence were noted. Training was seen as critical, especially for understanding the limits of other disciplines and adapting to evolving processes, with participants stressing that quick on-scene decisions must be justified even if imperfect. In terms of organisational culture, the participants from Scotland emphasise standardisation, corroboration, and joint working, while relying on informal relationships to maintain communication and mitigate bias.

4.2. Analysis - Main Findings Across Partner Countries

In this section, we will present the main findings across partner countries through the lens of organisational culture, with particular focus sources of bias, miscommunication and, consequently, the risk of error. The findings are analysed with particular attention to sources of bias and the risk of error. Edgar Schein's (2010) three level model is applied to distinguish between visible practices (artefacts), stated ideals (espoused values), and underlying assumptions that guide behaviour, perception, thought, and feeling. As described previously, parts of organisational culture are implicit, making them inaccessible to direct observation and dependent on indirect observation through interpretation of verbal and written data. While the three levels are applied as an analytical strategy, we also rely on Argyris and Schön's (1978) ladder of inference to explore how practitioners move from data to interpretation, decision, and action when relevant. By analysing the data through the three levels and the ladder of inference it is possible to highlight how implicit cultural assumptions and reasoning processes shape the handling of digital evidence across the partner countries.

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Insufficient Procedural Standardisation

Across the partner countries, a central finding is the notable variation in procedures for handling digital evidence, which reflects broader cultural and organisational trends. Practitioners described differing practices in the sequencing and prioritisation of DNA, fingerprints, and digital traces, with some roles emphasising the fragility of biological material and others highlighting the urgency of preserving digital content. While standardisation efforts are present in certain contexts, many accounts revealed reliance on discretion, informal communication, and situational judgement, producing inconsistencies both within and between professional roles. This variability is shaped by the degree of autonomy afforded to practitioners: in some settings, procedures are tightly rule-bound and leave little scope for discretion, whereas in others, investigators and analysts exercise more independence in deciding the order of collection or the means of preservation.

A further trend concerns the organisational positioning of digital forensic experts. They are formally included into the investigation in all countries. However, their functional integration varies. Some partner countries included the forensic functions into strategy meetings, seeking their advice when planning the forensic part of the investigation. In other partner countries, they are more detached and are engaged only through formal requests. This creates a situation where the forensic function is integrated as a technical service provider but structurally isolated from the decision-making processes that shape investigative priorities. Taken together, these trends illustrate how different balances of standardisation versus autonomy, and formal versus functional integration shape the handling of digital evidence, and how such balances can foster both efficiency and vulnerability to miscommunication and error.

In the survey, participants were asked about the extent of discretion they perceive at work: "*In your daily work, do you have room for discretion in your work, as opposed to adhering to standard operating procedures?*". The response options were: "*always*", "*often*", "*sometimes*", "*rarely*" and "*never*". As portrayed in Figure 1, the results revealed variation across countries and participants' answers ranged from 'never' to 'always'. Overall, the most common responses were 'often' (M = 30.2) and 'sometimes' (M = 28.5). Portugal stands out as an exception, as none of the participants reported 'never' having room for discretion. In the Czech Republic, discretion appears most prevalent, with 73.3% indicating that they often or always experience it. At the opposite end, practitioners in Greece report very limited discretion: none selected 'often' or 'always', and 85.7% stated that they rarely or never experience such autonomy.

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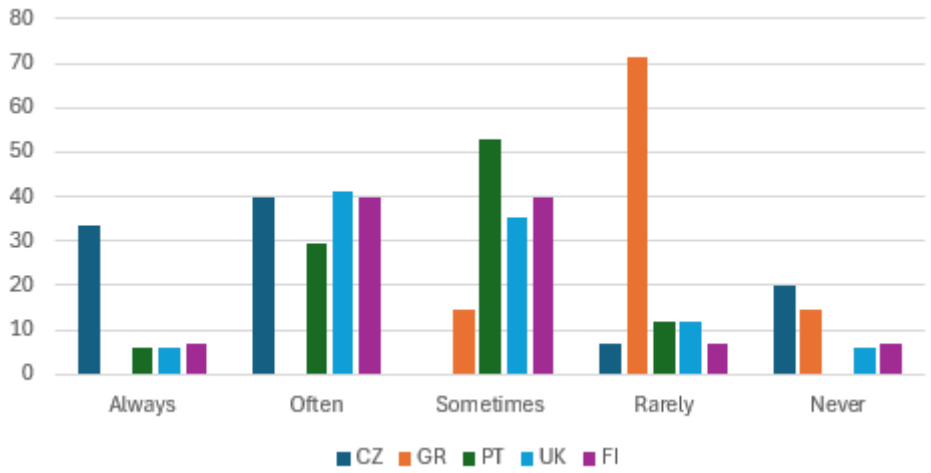

Figure 1: Room for discretion in their work (in %).

To better understand these inconsistencies, they can be interpreted through Schein's three levels of organisational culture. The variations in how procedures are described and implemented illustrate the variation in procedural standardisation across the partner countries. At the level of artefacts, inconsistencies are visible in observable practices such as whether first responders collect digital evidence themselves or wait for forensic experts. At the level of espoused values, practitioners emphasise the importance of clear procedures and standards, but their accounts show that these values are not consistently enacted. At the level of underlying assumptions, there appears to be a tacit belief that professional discretion and experience can adequately compensate for missing or unclear procedures. This reliance on discretion may foster flexibility, but it also reproduces inconsistencies and increases the potential for miscommunication and error.

The survey results reinforce this interpretation, showing variation in perceived room for discretion across countries, with some practitioners reporting little or no autonomy while others experience significant independence. Together, these findings indicate that what is formally valued as procedural clarity often masks deeper cultural assumptions that standardisation can be bypassed when necessary. These variations can also be informed by the ladder of inference (Argyris & Schön, 1978). Practitioners are exposed to the same traces, but individuals perceive and interpret their importance differently, for instance due to their knowledge or situational understanding. These factors shape decisions about prioritisation and the actions that follow. For example, in some contexts DNA is regarded as more fragile and thus prioritised first, while in others digital traces are considered more urgent. These actions reinforce existing assumptions, as future cases are approached with the same reasoning patterns.

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Cross-Border Collaboration

Communication across national borders and international collaboration is a central theme in CLARUS, and the scenario was designed to stimulate reflection on how such processes are managed. However, since each focus group only included participants from one partner country, the collaborative element was not enacted in practice. As a result, the topic was not consistently addressed across all countries.

In most cases, international cooperation follows established routines through designated national contact points. For instance, Finnish participants reported that the National Bureau of Investigation and the Finnish Security Intelligence Service act as primary channels for international exchanges, while Czech participants highlighted the role of NCTCA, which liaises directly with Europol and Interpol to obtain rapid responses.

International requests extend beyond police-to-police cooperation. In this scenario, where potential evidence was located on social media platforms, requests would also need to be directed to service providers such as Facebook, Apple or Telegram. Czech and Greek participants noted that they already have routines for such requests, while Greek participants emphasised that translation requirements—from Greek to English for the request and back again for the response—add both time and financial costs to the process.

Tendency to Combine Formal and Informal Communication

Across the partner countries, a clear tendency emerges to combine formal and informal channels of communication when handling digital evidence. Practitioners consistently reported that initial exchanges are often informal, typically conducted by phone or face-to-face, to ensure speed and flexibility in urgent situations. These informal contacts are then followed by formal documentation, usually in the form of official letters, emails, or reports, which provide the necessary legal and procedural authority. The interplay between informal and formal communication is regarded as pragmatic: informal channels enable rapid clarification, technical guidance, and coordination across disciplines, while formal processes ensure accountability and compliance with judicial requirements.

In the survey, participants were asked to indicate their use of formal and informal communication: "*How do you communicate during collaboration?*" with the following response options: "*mainly formal*", "*both formal and informal*", and "*mainly informal*". The data indicated that the majority of participants rely on both formal and informal

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modes of communication rather than one alone, underscoring this dual approach as a structural feature of investigative practice. However, reliance on informality introduces risks of ambiguity, selective transmission of information, and uneven access to knowledge, particularly when procedures are not consistently reinforced through subsequent formalisation. Thus, the tendency to combine communication modes reflects a functional adaptation to the complexities of digital forensic work, but it also highlights potential vulnerabilities where informal exchanges are insufficiently documented or formalised.

With regard to cross-country differences, none of the Finnish participants reported that they would primarily use formal communication, whereas Portugal had the highest proportion indicating this preference at 23.5%. By contrast, the Czech Republic had the largest share of participants favouring mainly informal communication, at 13.3%.

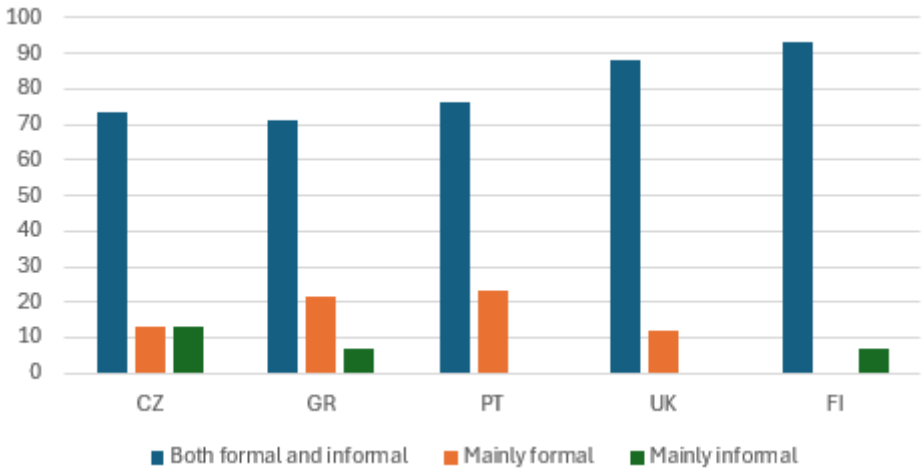

Figure 2: Formal versus informal communication (in %).

The dual reliance on formal and informal modes of communication can also be understood through Schein's three levels of organisational culture. At the level of artefacts, this pattern is visible in observable practices such as phone calls preceding or running parallel to written requests, or verbal clarifications supplementing official reports. At the level of espoused values, practitioners emphasise both efficiency and accountability, and the combination of formal and informal channels is justified as a way of balancing these values. At the deeper level of underlying assumptions, there appears to be a taken-for-granted belief that formal procedures alone are insufficient to ensure effective collaboration, and that trust and personal initiative are necessary to 'make the system work'. While this interplay provides flexibility and responsiveness, it also reflects a cultural assumption that informality is both inevitable and acceptable, even when it introduces risks of ambiguity or unequal access to information.

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Trivialisation or Denial of Miscommunication and Bias

Although some practitioners demonstrate awareness, another cross-cutting theme is the tendency among practitioners to trivialise or deny the existence of miscommunication and bias, even when their own accounts reveal conditions under which these risks may occur. In several focus groups, participants insisted that miscommunication was not a problem, attributing smooth collaboration to clear procedures or professional experience. Yet, there were also recollections of scenarios where unclear responsibilities, inconsistent terminology, or reliance on verbal instructions created opportunities for misunderstanding. A similar pattern was observed regarding bias: while some acknowledged that cognitive or confirmation bias could influence investigative decisions, many maintained that strict protocols or the technical nature of digital forensics left little room for such distortions. In some cases, bias was reduced to a theoretical problem rather than a practical concern, with participants asserting that impartiality was guaranteed by their role or by scientific methods.

Interpreted through Schein's three levels, at the level of artefacts, the focus group and survey data describe visible processes in the form of depicting examples of miscommunication and bias. At the level of espoused values, the co-existence of denial or downplaying of bias and miscommunication may illustrate rationalisations and reflect one of the ways participants explain why it is that they "do as they do". One way to interpret that when some professional cultures privilege confidence and procedural compliance over critical reflection is to see it as an expression of an unconscious and taken-for-granted belief and value at the level of basic assumptions. The result is a missed opportunity to address systemic vulnerabilities, as potential errors are reframed as unlikely or individual rather than organisational challenges.

Miscommunication

Participants were also asked about their experiences of being misled or misleading others in their daily work: "*Have you ever experienced that information that you received in requests or communications about assignments have misled you in your real-life investigations?*". Response options were: "*never*", "*once*", and "*multiple times*". The distribution of responses of those experiencing being misled is presented in Figure 3.

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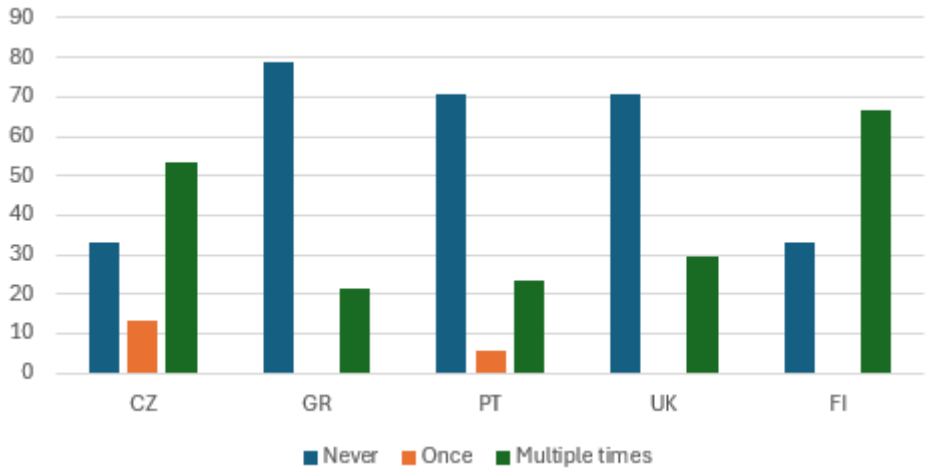

Figure 3: Experiencing being misled by others (in %).

To contrast this, participants were further asked whether they themselves had ever misled others: "*Have you ever experienced that others have been misled based on your written or orally presented results?"* with the response options: "*never*", "*once*", and "*multiple times*". Results are presented in Figure 4.

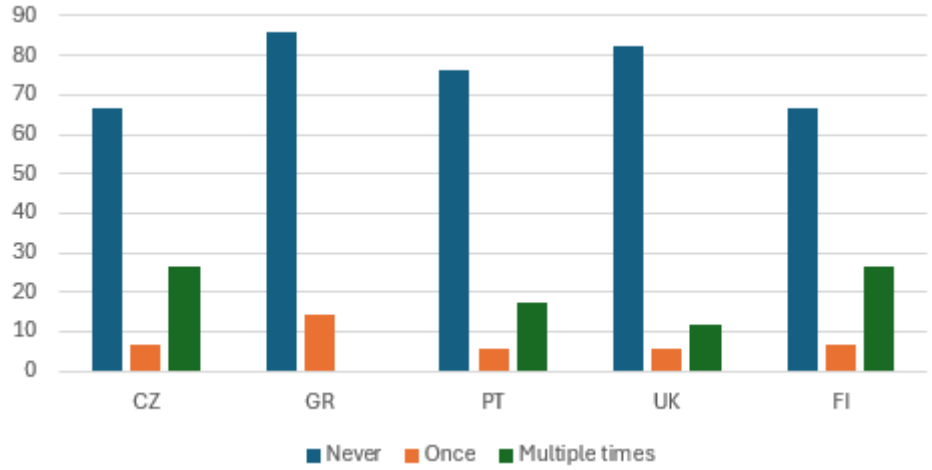

Figure 4: Experiencing that you have mislead others (in %).

A comparison of the two sets of responses suggests that being misled by others is reported more frequently than misleading others oneself. One of the components of the fundamental attribution error is to misjudge the causes of behaviour by systematically interpreting one's own behaviour in the most positive way possible (Ross, 1977). In addition, individuals place too much emphasis on internal conditions at the expense of the importance of external conditions. This also leads to systematically viewing the

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negative behaviour of others as an expression of internal conditions and one's own negative behaviour as a result of external conditions. The asymmetry depicted above may thus indicate that participants themselves are not aware of their own blind spots. However, it could also illustrate potential shortcomings in feedback processes.

Interpreted through Schein's three levels, participants, at the level of artefacts, perceive it as more probable to be misled than themselves misleading others. On an individual level, this asymmetry may as previously mentioned be understood through one's overconfidence in one's own abilities (i.e., the fundamental attribution error). At the level of espoused values, the asymmetry may be seen as an illustration of a group value, for instance "we are good at our job". This underlying assumption may illustrate that we trust "our own" (e.g., discipline, closest work group, those we know) more than "them" (e.g., other disciplines, distant work groups, those we do not know).

Experiences with Bias

Survey data further illuminate how practitioners experience bias in their daily work. Regarding confirmation bias, participants were asked: "*How often does confirmation bias influence your daily work?*" with the following response options: "*always*", "*often*", "*sometimes*, "*rarely*", and "*never*". They were also given the following description: "*Confirmation bias refers to the tendency to (unconsciously) seek out information that aligns with what one believes or thinks has happened, and to explain away or overlook information that contradicts those beliefs or perceptions*." The largest share of respondents reported experiencing it sometimes (M = 41.9), followed by rarely (M = 39.6). Cross-country differences emerged, with Greece having the highest proportion of respondents stating they never experience confirmation bias (28.6%), while in Finland no respondents (0%) reported never encountering it.

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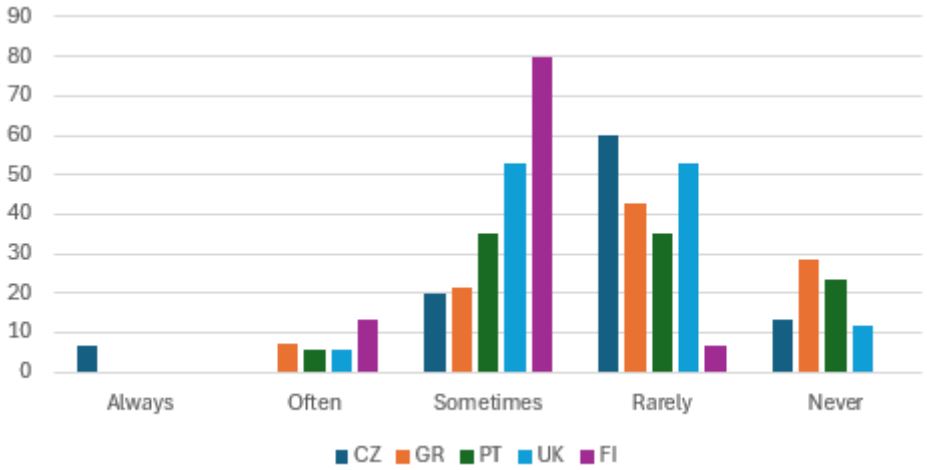

Figure 5: Influence of confirmation bias in daily work (in %).

Regarding system bias, participants were asked: "*How often does system bias influence your daily work?*" with the response options: "*always*", "*often*", "*sometimes*", "*rarely*", and "never". The following description of system bias was provided: "*System bias refers to systemic properties and features that can influence the investigation and contribute to biased and erroneous examination, interpretation and decision-making. For example, organisational structures and processes, and professional cultures in digital forensic and investigative work*". In contrast to confirmation bias, system bias was largely negated: 57.3% stated they never experience it, while smaller proportions reported sometimes (M = 21.9) or rarely (M = 19.4). Country-level patterns show that respondents in Scotland (76.5%) and Greece (71.4%) most frequently indicated never experiencing system bias.

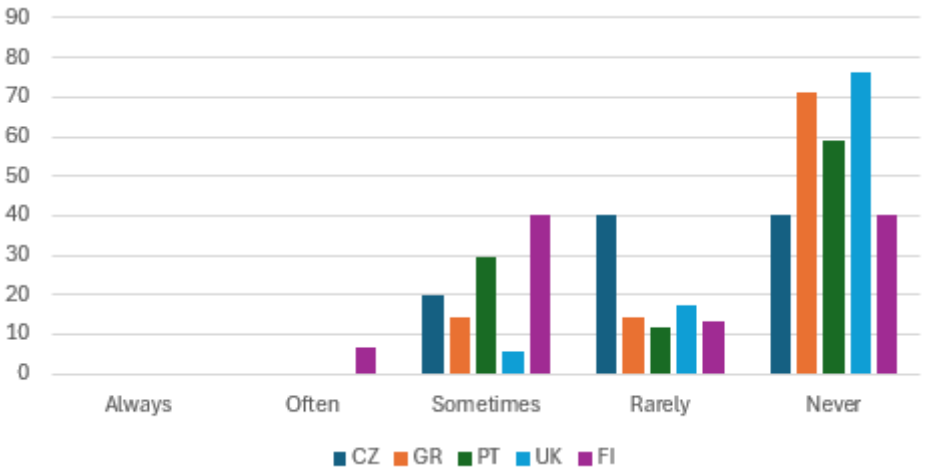

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Figure 6: Influence of system bias in daily work (in %).

These findings suggest that confirmation bias is more commonly recognised than system bias. One explanation may be that participants are more familiar with confirmation bias from training or the forensic science and policing literature, whereas system bias is less studied and known, making it harder to identify. Viewed through Argyris and Schön's ladder of inference, interpretation and conclusion depend on initial observation; without familiarity with the concept of system bias, participants may lack the frame of reference necessary to notice relevant indicators, leaving them with no data on which to base their survey responses.

Another explanation may lie in the widespread assumption that organisational structures and procedures are designed to prevent systemic bias, even though previous findings (WP1, D1.4) suggest that residual sources of systemic bias remain. The combination of partial awareness of confirmation bias and denial of systemic bias points to a general underestimation of the role of bias in decision-making. While awareness alone is not sufficient for mitigation, a lack of acknowledgement can create blind spots that may increase the risk of error.

The reluctance to acknowledge miscommunication and bias reflects deeper cultural dynamics, which can be unpacked using Schein's three levels of organisational culture. At the level of artefacts, this dynamic is visible in practitioners' repeated claims that miscommunication or bias don't affect their daily work, even when accounts given in the focus groups describe situations where misunderstandings or cognitive shortcuts clearly occur. At the level of espoused values, professionalism, strict adherence to procedures, and reliance on technical expertise are emphasised as safeguards against error, supporting the narrative that bias and miscommunication are largely absent. At the deeper level of underlying assumptions, there appears to be a tacit belief that acknowledging such vulnerabilities can undermine professional credibility and organisational reliability. This assumption may create a culture in which errors are reframed as isolated, unlikely, or attributable to individuals rather than systemic features of work. As a result, opportunities for collective reflection and institutional learning can be constrained, sustaining blind spots that heighten the risk of recurring miscommunication and unrecognised bias.

Bias Mitigation

Participants were asked about the use of bias mitigation strategies: "*Do you make use of strategies to avoid confirmation bias, and if so, which ones?*" with the following response options: "*I don't make use of such strategies*", "*I am aware of this pitfall and*

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assess the risk of bias while working", "*I rely on my professional integrity*", "*I have knowledge of the risk for confirmation bias from education/courses*", "*I make use of procedures or methods that are meant to prevent confirmation bias*", "*I work with hypotheses as a starting point for investigations*", "*I base my results on observable (empirical) information*", "*I ask for a second opinion from a colleague*" and "*Other*", with the latter category giving individuals the opportunity to further elaborate. While a detailed discussion of which measures are suitable for mitigating bias is beyond the scope of this deliverable, it is important to note that not all of the measures mentioned above are considered effective in addressing bias. Instead, some aspects (e.g., professional integrity) are occasionally misperceived as protective against bias which provides insight into what participants (erroneously) believe helps safeguard their work against bias.

Most participants make use of one or more bias mitigation strategies in their daily work. The most frequently reported strategy for mitigating bias was asking a colleague for a second opinion (M = 62.16, SD = 10.72). This was followed by actively acknowledging the risk of bias and assessing it during one's work (M = 61.48, SD = 14.99). The least frequently reported measure was relying on knowledge about confirmation bias acquired through education or courses bias (M = 31.18, SD = 19.94). This is noteworthy, as it indicates that bias mitigation is missing from training agendas. Since there is a lack of understanding of bias from education, individuals are left to their own interest in and ability to detect bias and counteract it.

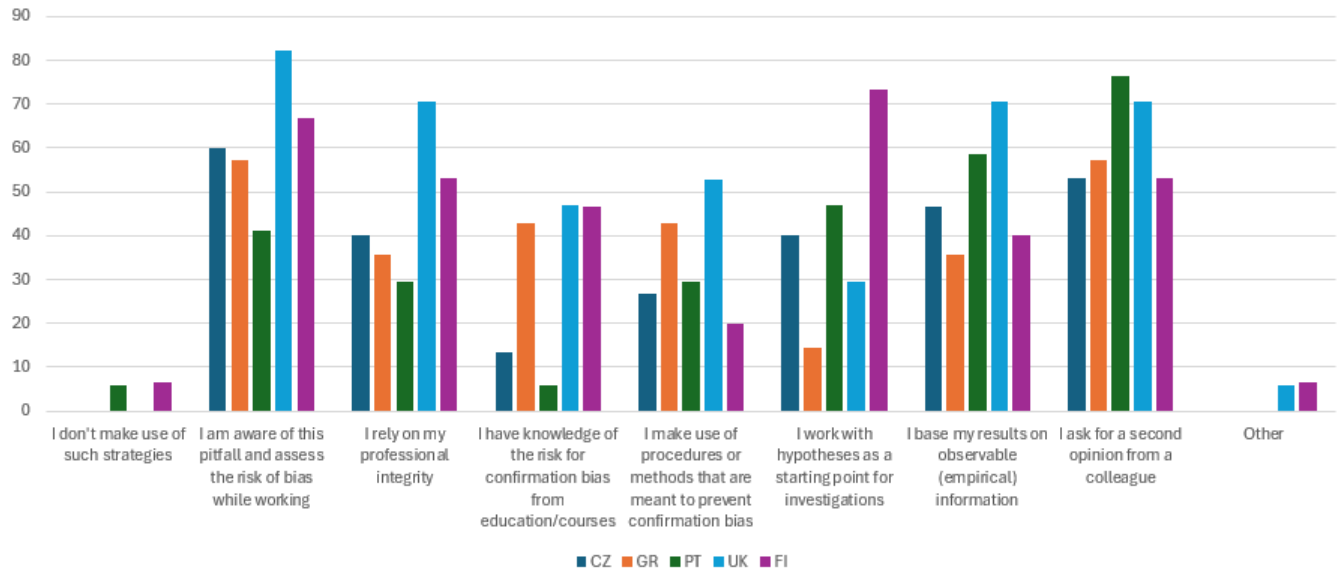

Figure 7: Use of bias mitigation measures (in %).

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Relying on one's professional integrity was also commonly answered, ranging from 29.4% of Portuguese practitioners doing so to 70.6% of Scottish practitioners indicating that they mitigate bias this way. While professional integrity is important to achieve fair justice outcomes, it is not an effective bias mitigation strategy. Bias is not an issue of a lack of integrity or professional misconduct, but rather an involuntary phenomenon that can even impact the most honest and dedicated practitioners (Dror, 2020). This reflects a lack of understanding of bias and knowledge gaps in how to mitigate it.

There were also notable cross-national differences. With regard to relying on knowledge acquired through education or courses about confirmation bias, only 5.9% of participants from Portugal and 13.3% from the Czech Republic reported using this strategy, compared with 42.9% or more in the other countries. This suggests a particular need to strengthen training in these contexts, ensuring that both the phenomenon of bias and effective mitigation strategies are systematically included in professional education.

The strategy of using alternative hypotheses as a starting point for the investigation had the highest variation among countries (M = 40.82, SD = 21.96). While 73.3% of the participants in Finland would apply this strategy, only 14.3% of the respondents from Greece stated this. This finding may indicate a greater emphasis in police education and training on the role of multiple hypotheses as part of the investigative strategy in Finland compared to the other partner countries.

Using Schein's three levels of organisational culture, the findings show at the artefact level that practitioners often use informal strategies like seeking a second opinion while formal strategies in addition to training on bias mitigation seem to be less common. At the level of espoused values, ethical conduct and professional integrity are emphasised albeit not being sufficient bias mitigation measures. This may indicate a belief that bias is an ethical issue and not the result of cognitive processes, which is one of several fallacies concerning confirmation bias (Dror, 2020). At the level of underlying assumptions, practitioners generally seem to lean on professional experience, viewing it as a general solution to navigating challenges and problems encountered at the workplace.

Lack of Feedback and Reflection Culture

Across the partner countries, a lack of feedback and reflection culture was noted. When contrasting the replies to the question of experiences with having been misled by others and experiences of misleading others, the former seems to be more common

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than the latter as previously discussed. This can indicate that feedback might not be flowing well enough within the organisation and that individuals aren't informed that they have mislead others, allowing misunderstandings to persist unadressed and risking that misunderstandings will keep occurring in the future. Feedback plays an important role in performance improvement and ensuring learning across organisational boundaries. It can create an arena where learning and dialogue are emphasized, and misunderstandings are understood to be a normal occurrence in a workplace that is characterized by a high degree of complexity and a large amount of multiple parallel tasks.

When assessing this finding using Schein's three levels, at the level of artefacts we did not observe that feedback was embedded in organisational practice, for instance through a debrief after closing a case or time reserved for collective reflection. The basic assumptions that could govern the organisations might offer some insight on why feedback is not so common. For instance, there might exist an unconscious belief that mistakes are not to occur in police work and they should therefore be hidden and fixed without actively bringing them up. Further, hierarchical structures might also play a role whereby giving feedback to superiors could pose issues due to a belief that superiors should not be critiqued. Feedback might therefore only flow in certain directions (i.e., hierarchically downwards). Interpreted through the ladder of inference, the underlying assumption behind not recognising this as a missing system-level safety component may be the belief that 'reflection involving mistakes is unsafe'. This, in turn, can shape how participants continue to approach new situations, thereby reinforcing the absence of systemic feedback and learning. Such beliefs can weaken psychological safety of individuals, which is the "shared belief that the team is safe for interpersonal risk taking" (Edmondson, 1999, p. 354) and is seen as a prerequisite for organisational learning. This tacit belief is often taken for granted, and lack of psychological safety can create uncertainty about one's own work and others' evaluations and leaves little space for admitting errors and asking for help from others.

Limited Cross-Disciplinary Knowledge

Findings across the partner countries reveal a theme of limited cross-disciplinary knowledge, particularly concerning the capabilities and constraints of other professional roles in the investigative chain. While practitioners expressed appreciation for training within their own fields, opportunities to gain insight into the practices of neighboring disciplines were described as rare. Several participants noted that misunderstandings could stem from investigators not knowing what digital forensics can or cannot deliver, or from forensic specialists lacking awareness of investigative priorities. Knowing both possibilities and limits of what others can contribute allows for more effective collaboration. Having realistic expectations of what others can contribute across

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different disciplines also helps to set more realistic expectations of what to expect when seeking assistance. This allows for more effective communication, leading to less misunderstandings and fostering better collaboration.

Where training initiatives included cross-disciplinary elements—such as short exchanges or joint seminars—these were regarded as highly valuable, but they remained sporadic rather than institutionalised. The lack of systematic knowledge exchange means that collaboration often depends on personal initiative or prior relationships, reinforcing inconsistencies in practice. Importantly, the absence of structured cross-disciplinary training also restricts shared vocabulary, leaving room for ambiguous requests, inefficient workflows, and missed opportunities to integrate evidence effectively. This gap highlights how organisational silos are reproduced through training practices, and how limited mutual understanding may contribute both to communication challenges and to the persistence of bias in investigative work.

Using Schein's three levels of organisational culture, we find that at the level of artefacts, the gap in cross-disciplinary knowledge is evident in the absence of structured training initiatives, such as joint seminars or systematic exchange programmes, leaving collaboration dependent on ad hoc arrangements or personal initiative. At the level of espoused values, practitioners frequently stress the importance of collaboration and mutual understanding, yet these values are not consistently translated into formalised practices. At the level of underlying assumptions, there seems to be an implicit belief that each discipline should remain focused on its own expertise and that understanding others' work is optional rather than essential. This assumption sustains organisational silos, weakens shared vocabularies, and increases the risk of misunderstandings when evidence must be integrated across domains. By situating the findings within Schein's framework, it becomes clear that the challenge is not only one of resources or training, but also of deeper cultural assumptions about the boundaries of professional responsibility.

Training

In addition to a need for better cross-disciplinary knowledge, participants acknowledged the importance of training. Several participants outlined that training is provided to practitioners on a regular basis and the usefulness and need for further training opportunities were emphasized. Training ensures that practitioners have the knowledge and skills they need to perform their work effectively and consistently, thereby reducing variability in practices. Individuals being open to and acknowledging the need for training generally reflects a culture where individuals are committed to learning and value continuous professional development.

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However, from a cognitive bias perspective, training is only useful if it also includes human and cognitive factors and focuses on how bias can become relevant in the decision-making process. The survey offered some insights on bias training in partner countries as outlined further above. Particularly in Portugal and the Czech Republic, only few participants indicated that they had acquired knowledge of the risk of confirmation bias from education. In the other partner countries, about half of the participants indicated that they knew of confirmation bias from education or courses.

When assessing the training culture in partner countries in terms of Schein's three level model, participants referred to training programs at the artefact level. Therein, practitioners get together for skill development as well as peer interaction and discussion. Also training for the trainers was mentioned by one practitioner, ensuring that also those who deliver training have sufficient and up-to-date knowledge of constantly evolving practices. The value that participants expressed of receiving training reflects espoused values where learning and development is emphasised. Finally, the acknowledgement of the need for ongoing training suggests an underlying assumption of the importance of staying current with ongoing developments and maintaining high levels of competence as a part of one's professional integrity. This presence of the existing training culture provides a valuable opportunity to integrate the topics of bias mitigation and cognitive factors. This would enhance the comprehensiveness of the training provided and allow for improved professional development and enhanced digital investigations.

Summary

Summarised, the findings across partner countries highlight a set of cultural and organisational dynamics that shape the handling of digital evidence. Procedural approaches vary, with different balances between standardisation and professional discretion, and with digital forensic expertise integrated into investigations to differing degrees. This variation can foster flexibility and responsiveness, though it also creates potential for inconsistency. International collaboration emerged as an important theme, but was unevenly discussed across countries, and mainly addressed in terms of established contact points and formal routines. While standardisation frameworks provide structure, they may also pose practical challenges, such as translation delays or the complexities of working with private service providers. Communication practices typically combine informal and formal channels, a pragmatic approach that balances efficiency with accountability, though some risks may arise if informal exchanges are not systematically formalised. Practitioners often express confidence that miscommunication and bias are limited in their work, even though accounts and survey data indicate that such factors can play a role.

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Awareness of confirmation bias is more common than awareness of system bias, and mitigation strategies are frequently grounded in experience and professional integrity, supplemented by practices such as seeking second opinions—albeit not necessarily being effective. Feedback and structured reflection appear less common, which may limit opportunities for collective learning. Similarly, limited cross-disciplinary knowledge can make collaboration dependent on personal initiative, though participants emphasise the value of joint training and exchange. Training more generally is recognised as an important resource and offers opportunities to further integrate cognitive and human factors into professional development and strengthen practices across the investigative process.

4.3. Input From Research Advisory Board and Citizens' Juries

Both the RAB and the CJs proposed alternative interpretations of our findings. Interpretation is a central aspect of qualitative research, and there will inevitably be multiple ways of framing and understanding a quotation or a graph. Responses may be shaped by a variety of factors, including the wording of questions and definitions (e.g., using the word "bias" compared to a word like "fairness"), their order, and the broader context of the data collection. Likewise, the interpretation of results is influenced by the perspectives and theoretical lens adopted by the researcher. Different approaches to handling such issues have different advantages and disadvantages and a discussion of these is outside the scope of this deliverable. In presenting our findings, we have, however, emphasised making our interpretations explicit and clarified the theoretical position guiding our analysis.

The RAB observed that the local context, particularly the work climate and level of psychological safety, may have influenced participants' responses. This is an important consideration, as such factors can shape how openly individuals share their views. Given the small size of our sample, it is possible that the responses reflect local dynamics rather than broader organisational culture. This underlines the need for caution when interpreting the findings and highlights the value of situating them within their specific context.

The CJ_CZ noted that the CLARUS project creates an opportunity for more open and constructive discussions around the topic of bias. In a similar fashion, the CJ_UK recommended that WP leads reflect on how CLARUS can make bias visible in a constructive, non-accusatory manner. This aligns closely with our own recommendations. We have emphasised the importance of strengthening knowledge, as assumptions and misconceptions about bias can foster defensive attitudes and

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perpetuate fallacies and myths. To address this, we propose training as a key measure to enhance understanding of bias at both individual and systemic levels. In particular, we recommend scenario-based training, enabling participants to experience sources of bias and their potential effects on forensic or policing decision-making in a safe environment, without consequences for the fair administration of justice. The CJ_PT also emphasised the importance of training and dissemination strategies to support professional adoption of the CLARUS tools, underlining that technological innovation alone is insufficient without accompanying education and communication efforts.

A discussion point raised in the CJ_UK was that confirmation bias is common, but opinions diverged on whether systemic bias is genuinely absent or merely unnoticed. This input prompted us to clarify this distinction in our analysis, to avoid an interpretation that systemic bias does not exist simply because participants are unable to observe it.

The CJ_GR reflected on the use of a single solution to address systemic bias in all countries. This jury was divided, while most highlighted the importance of acknowledging different organisational cultures since their systemic biases would differ from country to country and arise from history, institutions, culture and economic conditions. Modifying the solution to the local language was also noted as an important factor. This view was also echoed by the CJ_FIN. In contrast, some highlighted the importance of a common European culture and that a tool was imperative to achieve this. The CJ_UK highlighted that CLARUS outputs need to be flexible, culturally attuned, and supportive of reflection and shared standards, not simply prescriptive. Similarly, the CJ_PT stressed that the justice system's credibility depends not only on harmonised tools but also on clear communication and standardised procedures among justice professionals, reinforcing the view that trust is contingent on both technical and cultural coherence.

The CJ_FIN observed that their country was unique in that none of the respondents reported relying primarily on formal communication during collaboration. Although the survey question referred specifically to communication among colleagues, this finding prompted an interesting discussion within the CJ_FIN about the importance of carefully considering when formal or informal communication is most appropriate—particularly in interactions with the public, where informal communication can help build trust but may also undermine it if it diverges from expectations of formality, especially when addressing serious matters.

The RAB raised forensic discretion as an issue for discussion. In CLARUS, the question concerning experiences with discretion was directed to all participants, not only forensic practitioners. This led us to further examine whether forensic discretion differs from the

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discretion exercised by police officers, the latter being far more extensively studied. Our material provides initial insights into this question, which will be explored in greater depth in future academic publications.

An input from the CJ_UK was that leadership plays a key role in shaping organisational culture, a point that also resonates with discussions among WP2 participants. The managerial level, however, represents a notable gap in our current data material. Given that leaders influence both the formal structures and the informal norms that underpin organisational culture, their perspectives are essential for a more complete understanding of how system bias may emerge and be sustained. Future studies should therefore explicitly include the managerial level when examining organisational culture and systemic bias.

The CJ_PT also highlighted a strong public demand for greater transparency and participation in justice reform. Participants proposed the creation of citizen panels, open communication channels, and civic education initiatives to strengthen trust and accountability. This perspective expands the focus of CLARUS beyond professional practice, suggesting that genuine trust in justice depends not only on institutional competence but also on active public engagement.

4.4. Final Thoughts and Suggested Measures

Based on the analysis, several measures can be suggested to strengthen the handling of digital evidence across partner countries.

Procedural clarity could be improved through greater standardisation in areas where practices diverge, while still preserving scope for professional discretion when required by situational demands. Possible measures to enhance clarity and reduce the risk of miscommunication include development of Standard Operating Procedures for handling digital devices on crime scenes, and standardisation of requests for digital forensic analysis. Further research would be valuable to identify which aspects of digital evidence work benefit most from standardisation and which require flexibility. The lexicon developed in CLARUS is expected to be a valuable measure for enhancing coherence and reducing misunderstandings caused by unclear terminology, thereby supporting the standardisation of procedures and tasks. Moreover, the bias checking tool is expected to reduce bias-inducing language in documents involved in the criminal investigation process, including digital evidence handling. The findings indicate that multiple actors and roles are involved in handling digital evidence from the crime scene to the courtroom, making implementation across these roles essential for the lexicon and bias checking tool to function as intended. For effective use, the relevant roles

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must be aware of their existence, they must be accessible at the point of need, and they must remain comprehensive and up to date to ensure continued relevance. Sustained maintenance, integration into training, and embedding within organisational routines will therefore be crucial to maximise its impact and support users throughout the digital evidence process.

A key measure is the earlier and more systematic integration of digital forensic expertise into investigative teams, ensuring that their input informs casework from the outset rather than being limited to formal requests. Communication practices could also be strengthened by ensuring that informal exchanges are consistently followed by proper documentation. While informal channels such as phone calls or verbal briefings are often necessary for speed and coordination, they carry a risk of ambiguity if not reinforced. Fostering an environment where feedback and clarity are actively encouraged would help shift perceptions of miscommunication from being seen as an individual shortcoming to being recognised as a systemic issue that requires collective attention. It may, however, seem that such integration conflicts with the need to minimise task-irrelevant information in forensic analyses to maintain objectivity and prevent bias. This is not a matter of competing aims but of organising the investigative process effectively. The same individual should not both participate in status meetings and conduct the forensic analyses, as this separation allows a clearer boundary between investigative discussions and analytical work. In doing so, integration can occur without compromising analytical neutrality, ensuring that analysts remain focused solely on task-relevant information and that findings retain their evidential integrity.

Bias mitigation emerged as another area requiring development. Findings indicate limited awareness of how cognitive factors influence investigative decision-making, with some participants assuming that technical processes such as data extraction are inherently objective. Misconceptions, such as the belief that bias can be prevented solely through professional integrity, highlight a need for more systematic education. Bias can be an uncomfortable topic, as acknowledging it may feel like questioning one's professional ethics. Organisational culture therefore plays a crucial role in creating space where bias is understood as a collective challenge, addressed openly through training and reflective practice. Integrating cognitive and human factors into training programmes would enable practitioners to recognise and mitigate bias as part of their everyday work.

The focus group findings suggest that the bias checking tool may be valuable for raising awareness of bias risks in dissemination practices. At the same time, they highlight the importance of careful implementation. Without a foundational understanding of how bias shapes decision-making, or how communication and behaviour influence others, there is a risk of overreliance on the tool as a supposed 'solution' to bias. Because bias

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is complex and difficult to address, dependence on a single tool may even divert attention from other necessary measures to prevent systematic unfairness. For instance, adjusting biased language in a report cannot correct an investigation built on selectively gathered data that disadvantages a suspect. Likewise, a tool's indication that report language is neutral may be misinterpreted as evidence of overall accuracy, despite errors such as misinterpreted analytical outputs or the omission of exonerating evidence. In this sense, overreliance on the tool's capabilities may itself contribute to systemic bias. To reduce misunderstandings concerning the tool's scope, a descriptive name of the tool has been adopted ('Clear Communication Checker'). Also, an explanation is included in the tool's menu to clarify what it detects. To support effective integration, the bias checking tool should be introduced alongside training and a sandbox phase in which users can test it on non-operational documents before applying it to organisational documents.

Developing a stronger culture of feedback and reflection would also support organisational learning. Structured debriefs, knowledge-sharing forums, and cross-role reflection sessions could help transform individual experiences of miscommunication or bias into opportunities for systemic improvement.

Finally, expanding cross-disciplinary knowledge through institutionalised measures such as joint seminars, short-term exchanges, and scenario-based exercises would foster mutual understanding, reduce communication gaps, and build a stronger shared vocabulary across professional roles. In line with recommendations from the Portuguese Citizens' Jury, such initiatives could also extend to the public domain, through citizen panels, open communication channels, and educational activities that promote transparency and informed engagement. Strengthening dialogue between justice professionals and the public would enhance accountability and contribute to building long-term trust in digital evidence practices. Collectively, these measures point to targeted improvements that can enhance investigative practice and reduce the risk of error in the handling of digital evidence.

4.5. Strengths and Limitations

An important strength of this research is its systematic and collaborative design. By combining surveys and focus groups across five partner countries, the study captures both breadth and depth, providing insight into national specificities while also enabling cross-country comparison. Measures to ensure consistency—including translation and back-translation of instruments, structured training of local researchers, and joint coding checks—enhanced reliability and reduced variation arising from local practices. The diversity of participants, representing a range of professional roles involved in

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handling digital evidence, further strengthened the ecological validity and richness of the dataset.

At the same time, several limitations must be acknowledged. The overall number of participants is relatively small, and the gender distribution reflects the imbalance often found in the field. The absence of Finnish raw data and reliance on locally produced thick descriptions, may have introduced inconsistencies in the analysis. The focus group method, while valuable for collective exploration, may restrict individual perspectives and is sensitive to group dynamics. The modest sample size also precluded statistical testing of survey data, limiting the generalisability of quantitative findings. As such, cross-country comparisons should be interpreted with caution; the sampling strategies and participant numbers do not allow for strong conclusions regarding roles or national differences.

Another limitation concerns the transcription and translation process. Moving from the original languages to English may have led to a loss of nuance or subtle meaning. At the same time, the analysis was not carried out by researchers from the partner countries themselves but by an external partner (NPUC). As a 'third party' without ties to any participating country, NPUC's involvement may have helped reduce the risk of either positivity or negativity bias towards one's own system. However, this distance also meant that some organisational nuances or contextual references may have been overlooked or misinterpreted.

4.6. Future Research and Development

This report provided insights into some aspects of organisational culture among those working with digital evidence investigations in Greece, Finland, the Czech Republic, Scotland, and Portugal. CLARUS partner countries could consider this a starting point to diving deeper into their specific organisational culture, examining how established assumptions, practices, and values influence the treatment of digital evidence in their own contexts. Given the relatively small sample from each country, the findings should not be considered generalisable, but rather indicative of trends and issues that merit closer attention. Future work might focus on identifying cultural strengths that already support accuracy, collaboration, and learning, while also addressing areas where cultural dynamics create vulnerabilities to miscommunication, inconsistency, or bias.

By engaging in more fine-grained, country-specific studies, organisations can better understand how factors such as hierarchy, professional identity, and training traditions shape investigative practice. This could form the basis for tailored interventions that respect local contexts while promoting cross-national learning. Moreover, comparative

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research across partner countries can help to illuminate how different cultural approaches to discretion, communication, and feedback influence investigative outcomes, offering valuable lessons for both policy and practice. In this way, the findings presented here can serve not only as a diagnostic overview but also as a catalyst for reflection, dialogue, and future organisational development.

With regard to the research presented in this deliverable, we acknowledge that additional dimensions of organisational culture, as well as deeper exploration of the aspects discussed, were beyond the scope of this report but warrant further exploration. We plan to address these in greater depth in upcoming academic publications, where there will be an opportunity to expand on and complement the findings presented here.

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5. Conclusion

This report examined organisational culture in the light of bias across five CLARUS partner countries. Using a systems perspective and combining deductive and inductive thematic analyses of survey and focus group data, it identified aspects of culture that can shape digital evidence investigations and contribute to bias. Applying Schein's (2010) three-level model and Argyris and Schön's (1978) ladder of inference, the study revealed that visible practices, stated ideals, and underlying assumptions together influence how professionals interpret, communicate, and decide. The analysis highlighted five key aspects of organisational culture: variability in procedural standardisation, a tendency to combine formal with informal communication, limited feedback and reflection culture, trivialisation or denial of miscommunication and bias, and limited cross-disciplinary knowledge. These patterns, related to procedure, communication, awareness, and knowledge, collectively frame how bias may arise and how it can be mitigated.

Across the partner countries, differences in procedures, discretion, and integration of forensic functions were not merely operational but appeared to be rooted in deeper cultural assumptions about professionalism, trust, and autonomy. While procedural frameworks exist, discretion and informal communication remain central features of practice. These enable flexibility but can also lead to inconsistencies and miscommunication. Bias and miscommunication were occasionally trivialised or denied, possibly reflecting a broader discomfort with acknowledging error. Awareness of confirmation bias was greater than that of systemic bias, suggesting that organisational structures and hierarchies are often perceived as neutral rather than as potential sources of bias. Weak feedback mechanisms further limited opportunities for organisational learning and reflection, reinforcing hierarchical communication and potentially reducing psychological safety. This can inhibit open dialogue and prevent recognition of recurring errors.

The findings highlight the importance of strengthening procedural clarity without undermining necessary discretion. Standardisation measures such as the CLARUS lexicon and harmonised protocols for digital evidence handling can improve coherence and reduce ambiguity, provided they are accompanied by reflection, training, and feedback systems. Early and systematic integration of digital forensic experts into investigations could enhance both efficiency and the evidential value of digital traces. Ensuring that informal exchanges are followed by documentation could help support both agility and accountability. Bias mitigation requires a cultural as well as a procedural response. Framing bias as a shared challenge rather than a professional weakness can support more open dialogue and learning. Incorporating human and

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cognitive factors into training, using scenario-based exercises, can further expose practitioners to bias mechanisms in realistic settings. Such approaches can strengthen awareness, enable reflection, and promote critical thinking across roles and hierarchies.

A culture of feedback, cross-disciplinary learning, and open communication is essential for accuracy and fairness in digital investigations. Institutionalising mechanisms for structured debriefs, joint seminars, and reflective dialogue could transform individual experiences into organisational learning. Leadership plays a crucial role in modelling openness, supporting psychological safety, and balancing procedural compliance with adaptive judgement. Ultimately, organisational culture shapes the fairness and reliability of digital evidence investigations. There remains untapped potential for CLARUS partner countries to leverage this connection. By fostering a culture that prioritises bias awareness, prevention, and reflection—alongside procedural clarity and cross-disciplinary collaboration—organisations can strengthen objectivity, integrity, and public trust in digital evidence practices across Europe.

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References

Argyris, C., & Schön, D. A. (1978). *Organizational learning: A theory of action perspective*. Addison-Wesley.

Chatman, J. A., & O'Reilly, C. A. (2016). Paradigm lost: Reinvigorating the study of organizational culture. *Research in Organizational Behavior*, *36*, 199-224. https://doi.org/10.1016/j.riob.2016.11.004

Clark, V. & Braun, V. (2021). *Thematic analysis: A practical guide*. Sage.

Dror, I. E. (2020). Cognitive and human factors in expert decision making: six fallacies and the eight sources of bias. *Analytical Chemistry, 92*(12), 7998-8004. https://dx.doi.org/10.1021/acs.analchem.0c00704?ref=pdf

Edmondson, A. (1999). Psychological safety and learning behavior in work teams. *Administrative Science Quarterly, 44*(2), 350-383. https://doi.org/10.2307/2666999

Hogan, S. J., & Coote, L. V. (2014). Organizational culture, innovation, and performance: A test of Schein's model. *Journal of Business Research, 67*(8), 1609-1621. https://doi.org/10.1016/j.jbusres.2013.09.007

Morgan, J. (2023). Wrongful convictions and claims of false or misleading forensic evidence. *Journal of Forensic Sciences, 68*(3), 908-961. https://doi.org/10.1111/1556-4029.15233

Murrie, D. C., & Boccaccini, M. T. (2015). Adversarial allegiance among expert witnesses. *Annual Review of Law and Social Science, 11*, 37-55. https://doi.org/10.1146/annurev-lawsocsci-120814-121714

Schein, E. H. (1996). Culture: The Missing Concept in Organization Studies. *Administrative Science Quarterly*, *41*(2), 229-240. https://doi.org/10.2307/2393715

Schein, E. H. (2010). *Organizational culture and leadership* (4 ed.). Jossey-Bass.

Schneider, B., González-Romá, V., Ostroff, C., & West, M. A. (2017). Organizational climate and culture: Reflections on the history of the constructs in the Journal of Applied Psychology. *Journal of Applied Psychology*, *102*(3), 468-482. https://doi.org/10.1037/apl0000090

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