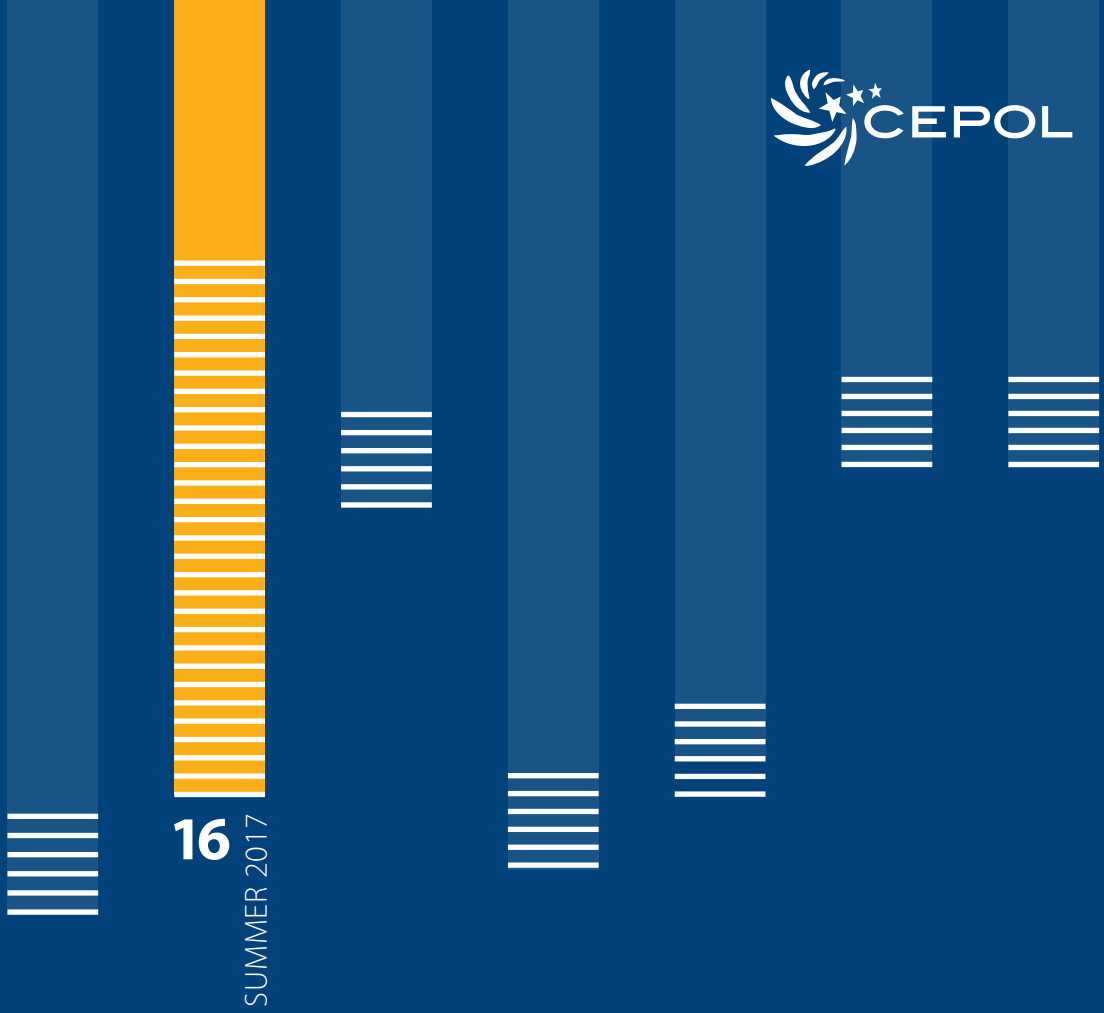

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Serious and Organised Crime in the EU: The EU Serious and Organised Crime Threat Assessment (SOCTA) 2017

Eleonora Forte, Tamara Schotte and Sascha Strupp

Europol used its singular intelligence capability as the information hub for criminal intelligence in the EU to analyse and identify the key crime threats facing the EU today. Informed by its analysis of the prevailing threat, SOCTA 2017 identifies a number of key priorities, which, in Europol's view, require the greatest concerted action by Member States and other actors to ensure the most effective impact. These include cybercrime, the production, trafficking and distribution of illicit drugs, migrant smuggling, organised property crime, and the trafficking in human beings (THB). In addition, Europol recommends focussing on three cross-cutting crime threats with a significant impact across the spectrum of serious and organised crime — document fraud, money laundering and the online trade in illicit goods and services. SOCTA 2017 also explores potential links between serious and organised crime and terrorism. The European Justice and Home Affairs Council will decide on the EU crime priorities at its meeting of June 2017.

The ePOOLICE Project: Environmental scanning against organised crime

Raquel Pastor and José María Blanco

ePOOLICE is the acronym for *early Pursuit against Organised crime using environmental scanning, the Law and Intelligence systems*. It is a project co-funded by the European Union (EU) under its seventh framework programme for research and development (FP7). The project has several objectives: the rapid identification of new organised crime threats, the identification of 'weak signals' by monitoring the external environment (political, economic, social, technological factors), as well as the identification of indicators. The project is based on several methodologies aided by the development of technological tools. It has been tested in several scenarios, especially in human trafficking and cocaine trafficking.

What about AI in criminal intelligence? From predictive policing to AI perspectives

Patrick Perrot

Predictive policing is more and more developed around the world. TV shows and fictions such as 'the minority report' or 'Person of Interest' spread a pre-crime effect that is, nevertheless, very different from reality. Many law enforcement develop predictive analysis to find new opportunities against crime and it is generally dedicated to patrols. The Gendarmerie Nationale in France carried out through the concept of criminal intelligence a way to provide relevant information to describe, understand and foresee crime at different scales: operational, tactical and strategic. The aim is to upgrade the process of decision-making. Because crime is neither a random process nor a deterministic process, some features exist to characterise it. Obviously, it is very difficult and probably not possible to identify all features linked to crime evolution or criminal behaviour. Nevertheless, some characteristics are not so complicated to model in a formal mathematical structure. So, in the age of Big Data, applications of predictive analysis can be overtaken by artificial intelligence (AI). It is very developed in fields like medicine, finance or transportation and could on one hand provide new perspectives to fight crime but also on the other hand raise questions for the future. Who will be the next organisation able to assure the best way to anticipate crime and criminal behaviour? AI could be defined as the capacity of a computer to model human reasoning. A grand challenge is opened for law enforcement but only if they are able to adapt their way of working to this new era. The scope of this paper is to describe the French development in predictive analysis and to highlight the potential use of artificial intelligence in different areas of criminal intelligence without neglecting the risk this new development.

From the Islamic State to the 'Islamic State of Mind': The evolution of the 'jihadisphere' and the rise of the Lone Jihad

Arije Antinori

The terrorist attacks in Orlando (USA) and Magnanville (France) illustrate the globalised power of Jihadi rhetoric and narrative across the Web, reshaping reality and promoting the 'Lone Jihad'. Since 2012, from Mohammed Merah to Omar Mateen, lone wolf terrorism is characterised by the capacity to attack soft targets considered as the main threat for the urban scenario. Law enforcement professionals have to explore the dynamics of the 'Jihadisphere' by considering it not just as a repository but the core of the 'culture of terrorism' globally spread. The author explains the main phases of internet Jihadism evolution focusing on the self-radicalisation process, the rise of lone wolf terrorism (LWT) and the Lone Jihad as a new scenario moving from the Islamic State ideology and propaganda to the 'Islamic State of Mind' (cyber-)experience.

Macro trends in the smuggling of migrants into Europe: An analytical exploration

Paolo Campana

In this paper I take a closer look at the recent trends in two key migrant smuggling routes into the European Union — the eastern and the central Mediterranean — with the aim of identifying the analytical and empirical features of the markets for smuggling services. I show that these markets have the ability to expand considerably and often over a short period of time. I then argue that this is consistent with the presence of many competitive enterprises, low barriers to entry, low skills and (relatively) low capital requirements. The costs to the smugglers of monitoring agents and clients are also likely to be modest, particularly in comparison with human trafficking. The paper concludes by discussing some policy implications, including the adoption of land-based policies (regarded as more effective than naval operations).

Pathways to Understanding Community-Oriented Policing in Post-Conflict Societies

Jaishankar Ganapathy and Tor Damkaas

This paper aims to provide a brief outline of an ongoing research project that is funded by the EU for a period of 5 years. The project titled; 'Community-Based Policing and Post-Conflict Police Reform' will address different aspects of Community-Oriented policing and police reform in post-conflict societies. Community-based policing holds promise but also entails challenges. A clear ambition for the project is to identify both differences and commonalities in community-oriented policing in post-conflict societies. Human Security will form an important backdrop for understanding key issues like post-conflict violence, peacebuilding SSR and COP. In this paper we point to some dilemmas and perspectives regarding SSR, COP, Post-Conflict and Human Security. In addition the paper provides an overview of the role of the Policing Experts Network as project advisors and evaluators for mapped community-oriented policing training and education material.

Community engagement: Considering adult-learning and problem-solving methodologies for police training

Kenneth Murphy

Police engagement with communities is a central focus of many law enforcement agencies. The capacity to successfully integrate in such a way may come naturally to some, but the training through which new police officers are placed should also prepare them for any such organisational ethos. While many police training interventions follow traditional learning delivery platforms, the introduction of interventions which address and consider adult learning approaches and problem-solving supports can significantly contribute to the development of skills and competencies which allow officers to engage even more effectively

with the communities they serve. The inclusion and consideration of various models of learning in the police training and education process is essential, so that maximum benefit from the process can be afforded to learners, the organisation, and, the wider community. This article considers the inclusion of andragogy (Knowles, 1980) and the problem-based learning (PBL) approach to learning in police training, so that the development of skills necessary for community engagement can be facilitated.

Investigative Strategy: The application of strategic principles to criminal investigations

Michele Frisia

Strategy is a wide collection of ideas and insights that have been used since time immemorial to face the 'fog of war'. In the last century the key concepts of strategy have moved into many other fields, such as economics and mathematics. The analysis presented in this paper applied the concepts of strategy to criminal investigations. In both fields a need exists to face and fight against a conscious opposition to win. In order to apply them to modern criminal investigations, the paper borrowed ideas from historical masters of strategy: Sun Tzu and Ernesto 'Che' Guevara; von Clausewitz, Lawrence 'of Arabia' and Mao Zedong; John Boyd and Miyamoto Musashi; *Hagakure*, *36 Stratagems,* but also the doctrine of special forces. The paper analyses how investigations are affected by 'friction' and lack of resource; how detectives could proficiently use knowledge of the adversary, surprise, deceptions and stratagems; how speed, rhythm and timing, but also the adherence to principles of invisibility, irreversibility and completeness, could help to improve the results of criminal investigations. One of the aims of this paper is to show that the study of strategy could effectively increase the ability of investigators to solve cases. We hope that the paper will trigger a debate about the incorporation of strategic thinking into investigative practice and training.

Addressing emotions in Police selection and initial training: a European study

Rui Coelho de Moura and Nelson Campos Ramalho

Police officers have a strong need to control their personal emotions. Research that is focused on emotions is scarce but greatly needed regarding core institutional practices such as police selection and initial training. The purpose of this exploratory study is to uncover the extent to which police selection and training comprehends and addresses emotional issues across Europe. We examined European police forces via CEPOL, surveying the selection and initial training of career police personnel. Data were collected at country level with cross validation to ensure institutional representativeness. Data analysis made use of the MCA technique complemented by hierarchical clustering to identify patterns and emerging typologies. Transcripts from open-response questions concerning future trends in police selection and training were analysed for content. Findings show differing axes for official and officer selection practices and initial training, as well as dissimilar training hours

in psychological subjects. No discernible pattern emerged for either career regarding selection dimensions or psychology subjects in initial courses. These findings rule out a strategic alignment between selection and training and do not allow one to foresee a common policy across countries and careers. An organisational research framework must emerge in order to tackle these issues.

Crowdsourcing and policing: Opportunities for research and practice

Antonio Vera and Torsten Oliver Salge

Crowdsourcing, i.e. digitally enabled processes to solicit contributions from large groups of external actors, is considered a promising approach to improve collaboration between citizens and organisations in both the private and public sector. In the present paper, we explain what crowdsourcing means and how it works. We then review the state of the art in this emerging field of research and examine the manifold opportunities, key challenges and main risks of its application in policing contexts.

Planning and policing of public demonstrations: A case study

Luis Manuel André Elias, Sérgio Felgueiras and Lúcia G. Pais

One of the biggest political events that took place in Portugal since the Carnation Revolution in April 1974 occurred on 15 September 2012. It was a time when the consequences of the financial crisis hit the majority of citizens, and the government announced a tax modification, along with several austerity measures. Accordingly, a group of citizens launched a national protest on the internet called 'To hell with the Troika! We want our lives!'. A few days later, around 23 000 people said 'I'll go' on the Facebook page. Given these kinds of groups, the police had some difficulty to find credible representatives to speak with to adequately plan and execute the policing operation. This event, promoted by organisations outside the traditional political system, has constituted a challenge for the police regarding the constitutional rights of assembly, demonstration, and security and public peace maintenance. This demonstration constitutes the case study to be presented. The main goals are: to describe the police planning and implementation procedures; to analyse the dos and don'ts; and to get some lessons to be learned. Using a qualitative approach, police documents, and interviews with police officers and commanders involved in the policing operation were analysed through a content analysis procedure. Triangulation of data sources and timeline was made. Results are presented in a timeline, enabling the assessment of the whole operation, mainly the management of the information flows and the uncertainty of the goings on in the field.

Between the Military and the Police: Public Security Police and National Republican Guard Officer's attitudes to Public Administration Policies

Nuno Miguel Parreira da Silva

The main goal of the paper is to assess the Public Security Police (PSP) and the National Republican Guard (NRG) officers' attitudes in the context of the recent changes of policies in the Portuguese public administration occurring in these two institutions. This moment assumes significant interest due to the fact that Portugal is redefining security and national defence strategies. From the theoretical point of view, this paper emphasises the importance of knowing a settled opinion of the police officers, as well as their attitudes/behaviours, in the institutional context, especially when exogenous factors cause organisational shifts. On the other hand, considering the complexity of socioeconomic reality, we tried to identify, understand and highlight how the police forces have distinct ways of looking and dealing with these changes of policy. On an empirical level, this paper contributes for an enrichment of literature review, emphasising the moderator role that officer's perceptions play on the policy restructure of public administration, in the relation between the predicted variables analysed and their attitudes to their institutional changes. At the police policy level, suggestions and recommendations useful for adopting future strategies were also included for policymakers to consider.

Writing instruments inks: microspectrophotometry forensic analysis and characteriSation

Ana Cristina de Almeida Assis, Filipa Isabel Romano Inácio, João Sérgio Seixas de Melo and Carlos Farinha

An important aspect in the analysis of written documents is the type of materials used in questionable documents. The present study aims to characterise and create a database of the absorption spectra in the visible region, obtained by microspectrophotometry (in reflectance mode), of inks from blue and black writing instruments, such as ballpoint pens and liquid ink pens (rollerball pens, gel pens, felt-tip pens and fountain pens). The study was performed with 167 ink samples of 36 different brands commonly used in national and international markets. To validate the possible use of the database, a preliminary blind test with 22 samples yielding a consistent and accurate match of 13 samples revealed that this technique has a good potential to obtain a list of inks with the same spectral characteristics. To evaluate the differentiation level of this method, the samples were grouped, based on the overlap of the first derivative spectra. As this grouping systematisation was found to present some limitations when we have a large number of samples, a multivariate analysis of the data was made. For this, a hierarchical cluster analysis (HCA) was performed. The discrimination power was calculated and compared with other studies.

Note from the editors

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Peter Neyroud
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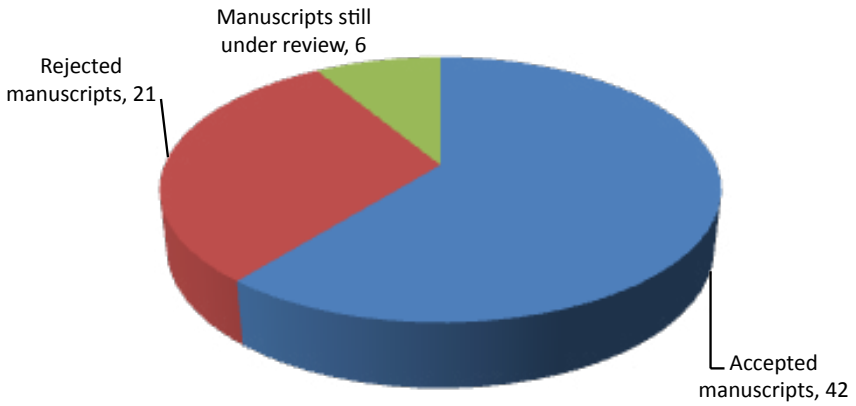
Eduardo Viegas Ferreira
Escola Policia Judiciara,
Portugal

The present members of the editorial board of the *European Police Science and Research Bulletin* were appointed in August 2015 for a term of 2 years. Therefore, the current issue will be the last one published under our editorial guidance.

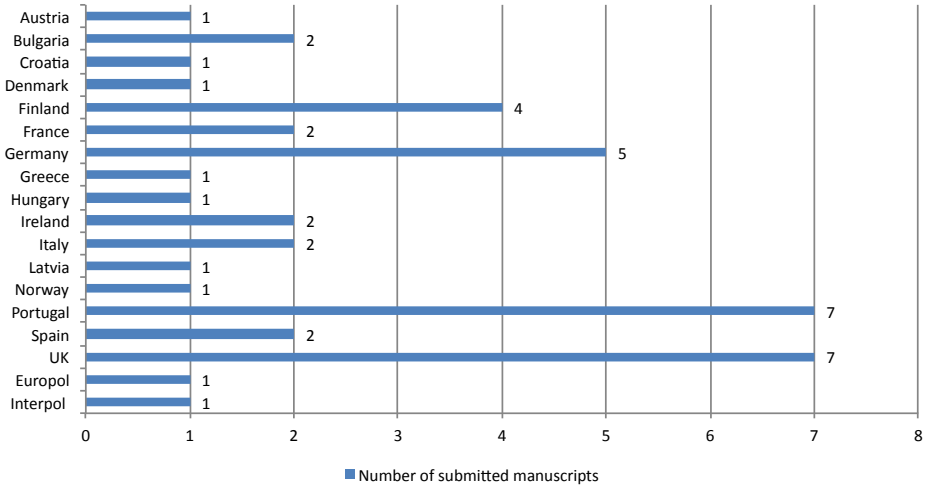
In the last 2 years, we have tried our best to achieve the aims of the Bulletin by publishing research papers, reviews and other information that extend the theory and contribute to improve practice in the fields of policing and law enforcement, in particular in European and international contexts. During this period, 69 manuscripts were submitted to the Bulletin. In order to minimise the length of the review process, we applied a two-stage process: the submissions were first reviewed for publication suitability in the Bulletin by the members of the editorial boards; if suitable, they were then assigned to one of the editors for handling the double-blind peer review process. Of the 69 submitted manuscripts, 42 (approx. 61 %) were ultimately accepted for publication (see Figure 1). Regrettably, 21 manuscripts (approx. 30%) had to be rejected, either because they did not meet the aims and scope of the Bulletin or because of the overall poor quality of the manuscript. The remaining six manuscripts are still under review. The length of time from submission to publication varied substantially. Most papers could be published within 6 months of the date of submission, which is quite fast for a journal with a double-blind peer review process. Unfortunately, for a few manuscripts, it took considerably longer, although we made every attempt to keep delays as short as possible.

Figure 1 — Outcome of the review process



With regard to the geographic origin of the manuscripts that were finally published in the Bulletin (not the nationality of the authors), 16 different countries and both Europol and Interpol are represented (see figure 2). Some countries were obviously more productive than others in the last 2 years. The large number of publications from populous countries such as the United Kingdom or Germany is not surprising. The performance of Portugal and Finland, however, two countries with a relatively small population, is certainly remarkable. The shortage of manuscripts from several countries with large police forces and a long

Figure 2 — Geographic origin of published manuscripts

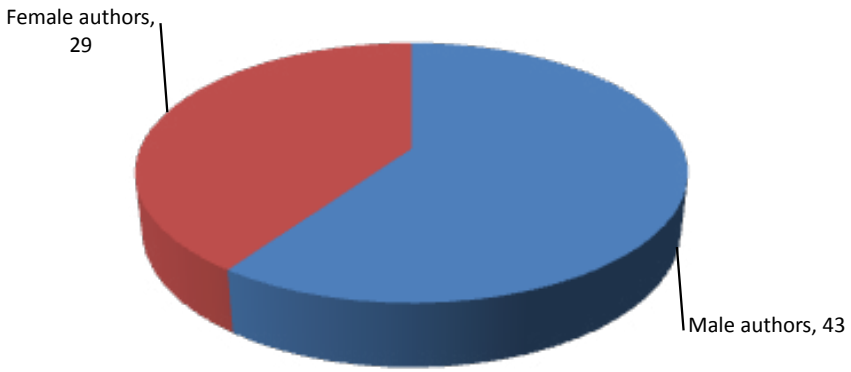


research tradition in the field of policing, such as the Netherlands, is unsatisfactory. For the next years, one important aim of the Bulletin should be to receive more manuscripts from countries under-represented in Figure 2. This would not only support CEPOL's mission to foster European and international law enforcement cooperation, but probably also improve the quality of the Bulletin.

Finally, we would like to highlight the relatively large number of female authors that have published an article in the Bulletin in the last 2 years (see Figure 3). In spite of the traditionally 'male' organisational culture of the police and the fact that woman are still underrepresented in most European police forces, 40 % of our authors were female. Nevertheless, there is still some upward potential, which may be realised by the new editorial board to be appointed shortly.

For this edition, the current editorial board picked papers from very different areas. The subjects treated in this issue range from organised crime to the use of microspectrophotometry in forensic analysis, and include such interesting and relevant topics such as smuggling of migrants, crowdsourcing, internet jihadism, video surveillance or artificial intelligence. We wish the readers a pleasant journey through the ideas raised by the authors and many new insights from reading this issue of the *European Police Science and Research Bulletin*.

Figure 3 — Gender of authors



Serious and Organised Crime in the EU: The EU Serious and Organised Crime Threat Assessment (SOCTA) 2017

Eleonora Forte
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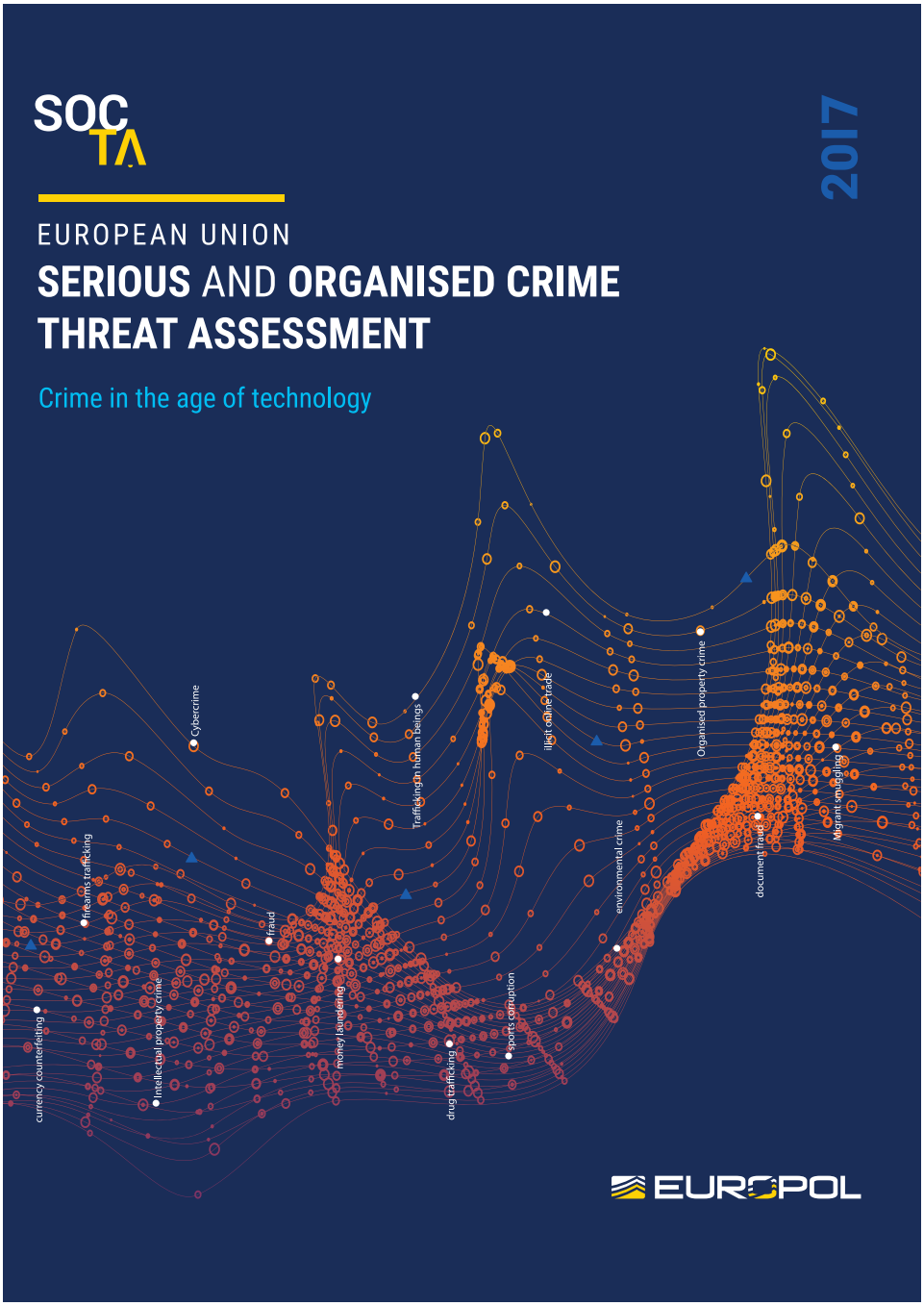
Abstract
Europol used its singular intelligence capability as the information hub for criminal intelligence in the EU to analyse and identify the key crime threats facing the EU today. Informed by its analysis of the prevailing threat, SOCTA 2017 identifies a number of key priorities, which, in Europol's view, require the greatest concerted action by Member States and other actors to ensure the most effective impact. These include cybercrime, the production, trafficking and distribution of illicit drugs, migrant smuggling, organised property crime, and the trafficking in human beings (THB). In addition, Europol recommends focussing on three cross-cutting crime threats with a significant impact across the spectrum of serious and organised crime — document fraud, money laundering and the online trade in illicit goods and services. SOCTA 2017 also explores potential links between serious and organised crime and terrorism. The European Justice and Home Affairs Council will decide on the EU crime priorities at its meeting of June 2017.

***Key words*:**
Organised crime, Europol, policy cycle, crime priorities, Justice and Home Affairs.

Figure 1 — Front page SOCTA



Introduction

SOCTA 2017 is Europol's flagship product providing information to Europe's law enforcement community and decision-makers. It serves as the cornerstone of the EU Policy Cycle for Serious and Organised Crime ([1]). The Policy Cycle ensures effective cooperation between national law enforcement agencies, EU institutions, EU agencies and other relevant partners in the fight against serious and organised crime. In March this year the second edition of SOCTA was presented, following its inaugural edition released in 2013. SOCTA 2017 delivers a set of recommendations based on an in-depth analysis of the major crime threats facing the EU. The Council of Justice and Home Affairs Ministers will use these recommendations to define priorities for the coming 4 years. SOCTA 2017 is the outcome of the work of many contributors from law enforcement authorities in the Member States, in countries with strategic and operational agreements with Europol, our institutional partners in the EU and Europol. Europol is a key partner to the Member States in meeting security challenges by providing a highly developed platform for the exchange of criminal intelligence as well as analytical and operational support for some of the most complex international investigations in the EU to date. In drafting SOCTA 2017, Europol harnessed this unique information position.

Europol has undertaken the largest-ever data collection on serious and organised crime in the EU. Europol relied on more than 2 300 questionnaires contributed by Member States, Europol's operational and strategic partners outside the EU and our institutional partners as well as operational intelligence held in Europol's databases to produce the most detailed assessment of the nature and scale of criminal threats facing the EU and its Member States yet. Based on an in-depth analysis of this data and a methodology ([2]) endorsed by the Member States, Europol identifies the key threats from serious and organised crime facing the EU today and over the coming years.

The article below provides an overview of the main threats from serious and organised crime to the EU.

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1 The EU Policy Cycle for Serious and Organised Crime in the EU provides a robust framework that brings together the law enforcement authorities of the Member States, Europol and a wide range of multi-disciplinary partners in the fight against serious and organised crime. The Policy Cycle translates strategic objectives at the European level into concrete operational actions against serious and organised crime. The Policy Cycle is a methodology adopted by the European Union in 2010 to address the most significant criminal threats facing the EU. Each cycle lasts 4 years and optimises coordination and cooperation on the crime priorities agreed by all Member States.

2 As part of an iterative process, the SOCTA Methodology is continuously reviewed and refined by experts at Europol and from the law enforcement authorities of the Member States. The SOCTA Methodology allows Europol to understand and assess serious and organised crime holistically. SOCTA analyses and describes criminal markets and crime areas in the EU; the criminal groups or individual criminals carrying out these criminal activities; as well as the factors in the broader environment that shape the nature of serious and organised crime in the EU. Using a mixed methods approach of qualitative and quantitative analysis techniques and a set of clearly defined indicators, Europol is able to identify and specify the most threatening criminal phenomena in the EU. The SOCTA Methodology was also reviewed by an academic advisory group.

Serious and organised crime in the EU

Serious and organised crime is a key threat to the security of the EU. Criminal groups and individual criminals continue to generate multi-billion euro profits from their activities in the EU each year. Some parts of the serious and organised crime landscape in the EU have changed drastically in recent years — in large part due to advancements in technology that have had a profound impact on the wider society and economy. Technology is then also a key component of most, if not all, criminal activities carried out by criminal groups in the EU and has afforded organised crime with an unprecedented degree of flexibility. This flexibility is particularly apparent in the ease with which criminals adapt to changes in society. The internet, the multitude of online platforms and communication channels it hosts have had a huge impact on society, strengthening and transforming the economy, driving innovation and shaping social interaction. However, it is also a key enabler of criminal activity and plays a role in all types of criminality. The impact of technology on crime, however, extends beyond the internet and involves all kinds of technical innovation such as advances in drone technology, automated logistics, and advanced printing technologies. The vital role of technology for organised crime is clearly reflected in SOCTA 2017.

Criminal groups

Criminal groups are as varied as the markets they service and the activities they engage in. In many cases, criminal groups reflect the societies, cultures and value systems they originate from. As societies across Europe become more interconnected and international in outlook, organised crime is now also more connected and internationally active than ever before.

The criminal groups and individual criminals operating in the EU are highly diverse. They range from large 'traditional' criminal groups to smaller groups and loose networks supported by individual criminals, who are hired and collaborate ad hoc. More than 5 000 criminal groups operating on an international level are currently under investigation in the EU. This figure does not necessarily reflect an overall increase in organised crime activity in the EU compared to 2013, when Europol reported on the activities of 3 600 internationally operating criminal groups in the EU. This increase is primarily a reflection of a much improved intelligence picture. The increase also points to the emergence of smaller criminal networks, especially in criminal markets that are highly dependent on the internet as part of their modi operandi or business model. Overall, the number of criminal groups operating internationally highlights the substantial scope and potential impact of serious and organised crime on the EU.

The diversity of the criminal actors operating in the EU is also reflected in the structures of the criminal groups. 30 % to 40 % of the criminal groups operating on an international level

feature loose network structures. An approximate 20 % of these networks only exist for a short period of time and are set up to support specific criminal ventures. 76 % of the criminal groups reported to Europol for SOCTA 2017 are composed of six or more members. The fragmentation of the serious and organised crime landscape and the emergence of more groups and looser networks detailed in SOCTA 2013 did not affect all criminal markets. The fragmentation of criminal markets was particularly pronounced in relation to highly cyber-dependent criminal activities. This includes the large-scale online trade in counterfeit goods, firearms and some illicit drugs as well as different types of fraud such as card-not-present fraud. Around these types of activities, an increasing number of individual criminal entrepreneurs come together on an ad hoc basis for specific criminal ventures or to deliver Crime-as-a-Service (CaaS). However, the majority of international criminal groups in the EU are hierarchically structured.

Poly-criminality

45 % of the criminal groups reported for the SOCTA 2017 are involved in more than one criminal activity. The share of these poly-criminal groups has increased sharply compared to 2013. During the migration crisis, the sustained high level of demand for smuggling services prompted many criminal groups previously involved in other criminal activities to expand their crime portfolio and become involved in the smuggling of migrants. Also the criminal groups involved in the trafficking of illicit goods are the most poly-criminal groups in the EU. These groups typically traffic more than one illicit commodity such as counterfeit goods or different types of illicit drugs. Poly-criminal groups most frequently combine the trafficking of cannabis and cocaine.

Criminal activities

More than one third of the criminal groups active in the EU are involved in the production, trafficking or distribution of drugs. The trafficking and distribution of cocaine and cannabis attract the largest number of criminal groups compared to other illicit drugs traded in the EU. The synthetic drugs market in the EU continues to expand, driven by large-scale production in the EU and the exportation of various substances to destinations worldwide. Other key criminal activities for criminal groups in the EU include organised property crime, migrant smuggling, THB and excise fraud.

Figure 2 — Info graphic on criminal markets

Cybercrime

Cybercrime is a global phenomenon affecting all Member States and is as borderless as the internet itself. The attack surface continues to grow as society becomes increasingly digitised, with more citizens, businesses, public services and devices connecting to the internet. Cybercrime encompasses a broad range of different criminal threats. However, the most threatening aspects of cybercrime involve various types of cyber-dependent crime such as the distribution of ransomware and malware, card-not-present fraud and the online trade in child sexual exploitation material.

The mature CaaS model underpinning cybercrime provides easy access to tools and services across the entire spectrum of cyber-criminality, from entry-level to top-tier players, or any other party, including those with other motivations such as hacktivists or even terrorists. The development and distribution of malware continues to be the cornerstone for the majority of cybercrime. Information-stealing malware, such as banking Trojans, still represent a significant threat, although ransomware has become the leading malware in terms of threat and impact. Network intrusions that result in unlawful access to or disclosure of private data (data breaches) or intellectual property are growing in frequency and scale, with hundreds of millions of records compromised globally each year.

While neither offline nor online child sexual exploitation meet the criteria to be considered 'organised crime' this is still considered a high priority crime within the Member States due to the degree of physical and psychological damage to one of society's most vulnerable groups — children. The internet provides offenders and potential offenders with an environment in which they can operate with an enhanced level of safety and anonymity. In particular, there are a growing number of forums on the Darknet dedicated specifically to the production, sharing and distribution of child sexual exploitation material.

Cybercrime is widespread and risks causing a loss of confidence in online business and/or electronic payments, which are vital for digital economies. The immediate impact of cyber-dependent crime involves the damage and destruction of data, direct financial loss, lost productivity, theft of intellectual property, theft of personal and financial data, embezzlement, fraud, post-attack disruption to the normal course of business, forensic investigation, restoration and deletion of hacked data and systems, and reputational harm. Payment card fraud results in substantial and direct financial losses.

Cybercrime continues to expand in scope and impact. Digital economies and societies are an attractive target for cybercriminals. Technological innovation holds exciting prospects for businesses and citizens alike, but also creates new attack vectors for those criminals seeking to capitalise on these developments. Increasing internet connectivity by citizens, businesses and the public sector, along with the exponentially growing number of connected devices and sensors as part of the Internet of Things will create new opportunities for cybercriminals. Cybercrime will remain a key threat for the foreseeable future.

Drug production, trafficking and distribution

The market for drugs remains the largest criminal market in the EU. 45 % of the criminal groups active in the EU are involved in the production, trafficking or distribution of various types of drugs across Member States. The trade in drugs generates multi-billion euro profits for the groups involved in this criminal activity. The immense profits generated from the trade in drugs fund various other criminal activities. The production capabilities for synthetic drugs in the EU are expanding both in terms of the quantities produced and the number of production sites identified. Synthetic drugs are produced in the EU on an industrial scale and exported to destination markets across the world. Cocaine and cannabis continue to be trafficked wholesale in very large quantities to the EU and are distributed alongside heroin by poly-drug trafficking criminal groups in drug markets across Europe.

Drugs are responsible for a significant share of the trade in illicit goods via online platforms. Online trade is transforming the drugs trade, shifting the interactions between distributors from the street to online platforms. Technology also impacts on the production methods used to manufacture drugs in the EU. Technical innovation and the accessibility of sophisticated equipment have allowed criminal groups to maximise the production output of individual sites. Large-scale cannabis cultivation sites are often maintained using professional growing equipment such as climate control systems, CO_2 and ozone generators. Similarly, laboratories manufacturing synthetic drugs feature advanced equipment and production lines capable of producing synthetic drugs on an industrial scale. Drone technology is expected to advance, giving drones greater travel distance and the ability of carrying heavier loads, as well as making them more affordable. Criminal groups involved in drug trafficking will likely invest in drone technology for trafficking purposes in order to avoid checks at

border crossing points, ports and airports. The production, trafficking and distribution of illicit drugs remains a key threat to the EU and this threat is only enhanced by the availability of advanced production equipment and the shift to online platforms used to trade these illicit drugs.

The production, trafficking and distribution of illicit drugs are the foundation of organised crime in Europe involving more criminals than any other type of serious and organised crime in the EU. The criminals active in this area rely on established and highly successful business models, yet also display remarkable flexibility in adapting to law enforcement action, new legislation, technological innovation and new opportunities created by transport infrastructure developments. The production, trafficking and distribution of illicit drugs remain key threats to the EU.

Migrant smuggling

The migration crisis and the arrival of a large number of migrants in the EU have transformed migrant smuggling to a booming criminal business attracting criminal groups from across Europe and beyond. The scale of migrant smuggling activities in the EU is unprecedented and has increased significantly over recent years. Migrant smuggling is one of the most profitable and widespread criminal activities for organised crime in the EU.

The migration crisis has led to an expansion of the market for the services offered by migrant smugglers and is expected to emerge as a catalyst for a substantial increase in the number of incidents of exploitation in the EU. Migrants represent a large and continuously growing group of potential victims vulnerable to promises of work by criminals even if this entails exploitation. While the migration crisis has not yet had a widespread impact on THB for labour exploitation in the EU, some investigations show that traffickers are increasingly targeting irregular migrants and asylum seekers in the EU for exploitation.

Migrant smugglers and their networks profit from the desire of irregular migrants to find safety and prosperity in the EU. They undermine the ability of law enforcement authorities to control migration flows and generate significant profits which are used to expand their criminal activities across different crime areas. The concentration of irregular migrants in some locations boosts local markets for illicit commodities such as stolen phones and drugs as groups involved in other criminal activities seek to profit from their presence. Some fraudsters may seek to exploit support systems for asylum seekers by trying to defraud healthcare and housing schemes.

Armed conflicts, population pressure and poverty in regions close to Europe will sustain migration flows to the EU. Migrant smuggling networks supply services to virtually all irregular

migrants arriving in the EU. Migrant smuggling will continue to be a key crime threat to the EU for the foreseeable future.

Organised burglaries and thefts (organised property crime)

Organised property crime encompasses a range of different criminal activities carried out predominantly by highly mobile criminal groups operating across the EU. Organised burglaries, thefts and robberies as well as motor vehicle crime and the trafficking of cultural goods all fall into this broad category of criminal activity. However, the criminal groups carrying different types of property crime are also highly diverse. Despite the highly organised nature of MOCG operations, the organised crime involvement in property crimes remains under-investigated. In many cases, incidents of property crime are still classified as petty criminality without recognising the organised crime aspect.

Organised burglaries and thefts are particularly threatening types of organised property crime. Many Member States note a steady increase in the number of reported burglaries over recent years. Highly mobile criminal groups remain heavily involved in organised burglaries and thefts across the EU. The MOCGs involved in this crime area have become even more mobile in recent years operating across the EU and quickly moving between different Member States.

Online marketplaces have made it easier to advertise and sell stolen goods. These marketplaces are now used extensively to sell stolen goods, particularly low-bulk high-value goods such as phones, tablets and other electronic equipment. While most burglaries only require the use of rudimentary tools such as screwdrivers or crowbars, criminal groups also use increasingly sophisticated technologies and techniques to carry out burglaries, such as frequency inhibitors to disable alarm systems. Criminal groups make use of various online services to facilitate their burglaries. This includes checking on social media platforms whether individuals are away from targeted residences, scouting targeted neighbourhoods using free online navigation tools and fencing goods via online marketplaces.

Technology is also providing criminals with new methods of intrusion into ATMs and similar systems. As part of a new modus operandi, attackers drill or burn small holes into the ATM case in order to reach the ATM's computer hardware components. The attackers use this access to intrude into ATM's operating system and force it to dispense cash. Criminal groups involved in the theft of motor vehicles increasingly rely on high tech tools to gain access to vehicles and to overcome security measures. Information on how to overcome car security systems can be easily accessed via online messaging boards and websites. As vehicles increasingly rely on keyless entry systems and other new technologies to aid navigation, driving and entertainment, this trend is set to intensify over the coming years.

Trafficking in human beings

THB for sexual and labour exploitation involves the the recruitment, transportation, harbouring and exploitation of victims. The involvement of criminal groups in THB for labour exploitation is increasing in the EU. Economic disparity is a key driving force behind THB for labour exploitation. Criminal groups cater to the growing demand for cheap labour across many Member States and have access to a large number of potential victims.

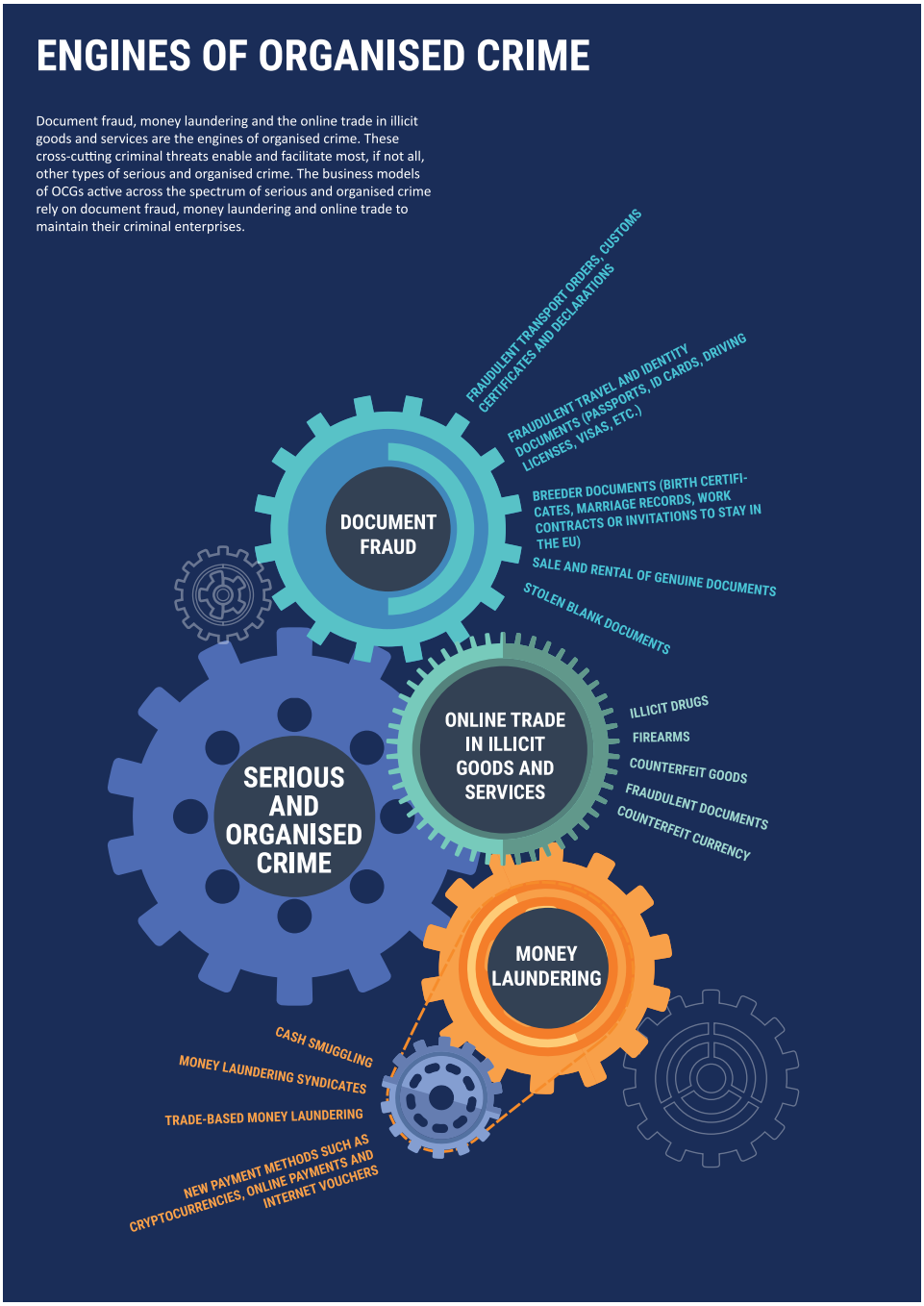
Migrants represent a large and continuously growing group of potential victims susceptible to promises of work by criminals even if this entails exploitation. Europol data shows that THB for labour exploitation involves victims of more than 58 nationalities exploited in the EU. There has been little change in the types of industries featuring labour exploitation. Vulnerable sectors include agriculture, catering, cleaning, construction, entertainment, fishing, hospitality, retail and transportation. The involvement of organised crime in orchestrating THB for labour exploitation continues to be under-investigated in many Member States. While the migration crisis has not yet had a widespread impact on THB for labour exploitation in the EU, some investigations show that traffickers are increasingly targeting irregular migrants and asylum seekers in the EU for exploitation.

Traffickers continue to rely on the use of social media, VoIP and instant messaging applications. These technologies are employed at all stages of the trafficking cycle including the recruitment of victims, advertisement of services, and the monitoring of victims. In addition to recruitment via social media and online platforms, victims continue to be recruited by word-of-mouth and by exploiting family connections.

Cross-cutting criminal threats

Document fraud, money laundering and the online trade in illicit goods and services are the engines of organised crime. These cross-cutting criminal threats enable and facilitate most, if not all, other types of serious and organised crime. The business models of criminal groups active across the spectrum of serious and organised crime rely on document fraud and money laundering to maintain their criminal enterprises. Europol then also strongly believes that disrupting document fraud, money laundering schemes and the online trade in illicit goods and services will significantly reduce the ability of criminal groups to grow their businesses and expand into new markets.

Figure 3 — Info graphic on engines of crime



Criminal finances and money laundering

Most criminal groups and individual criminals active in serious and organised crime in the EU are driven by the imperative to generate and maximise profits. Criminal finance schemes allow criminals to transfer, launder and invest criminal proceeds in the legitimate economy and in their own criminal enterprises. These schemes utilise both traditional and innovative techniques. Traditional methods include the smuggling of cash, the use of Hawala and offshore tax havens as well as trade-based money laundering, the investment in real estate, art and high-value goods. Cash-intensive businesses and gambling services continue to be used to launder criminal proceeds.

Criminal finance has benefitted greatly from technological innovation such as the shift to online solutions for most financial services provided for the legitimate economy. The emergence of new forms of payment such as cryptocurrencies and the appearance of a plethora of highly diverse and often difficult to regulate online payment and banking platforms has afforded criminals with new ways of financing and expanding their criminal businesses. The rapid processing of transactions across multiple jurisdictions and the proliferation of encryption and anonymisation tools represent some of the most significant obstacles encountered in increasingly complex and technically demanding financial investigations.

Some criminal networks, also called money laundering syndicates, have specialised in operating complex criminal finance schemes providing money laundering services to criminal groups active across serious and organised crime. Their clientele include criminal groups involved in cybercrime, different types of fraud, drug trafficking, migrant smuggling, and THB. In some cases, the funds handled by these syndicates also benefit terrorist groups and may be used to finance terrorist acts.

Document fraud

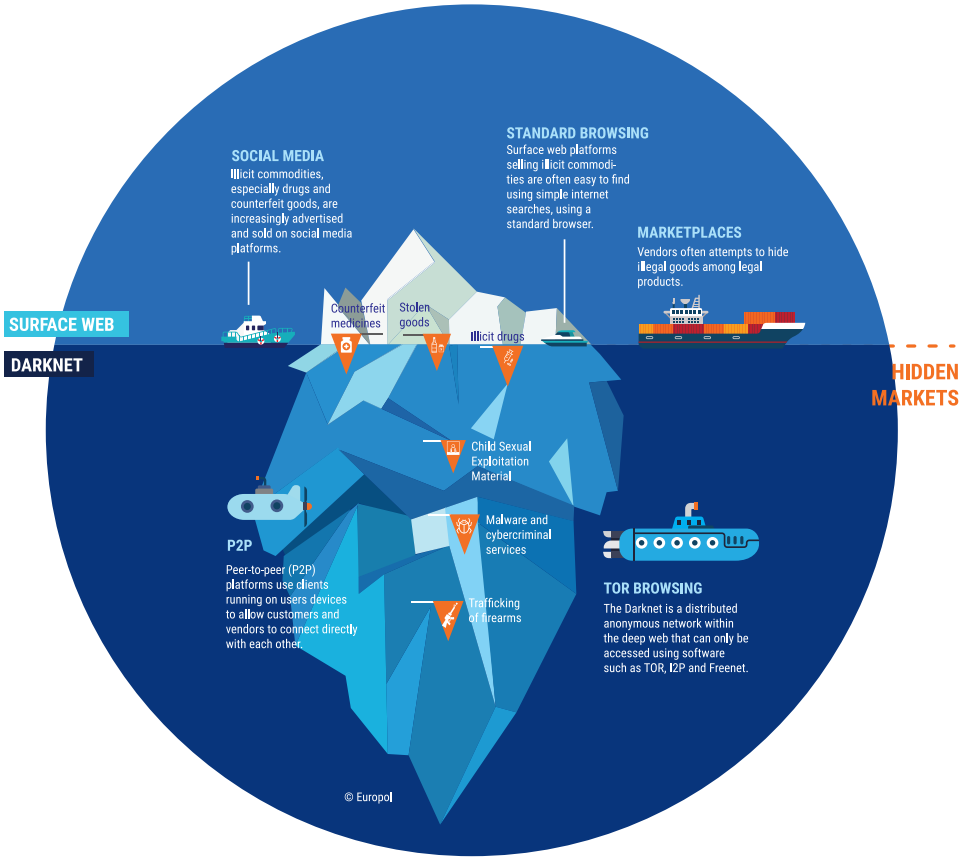
Document fraud is a key facilitator for organised crime. Fraudulent documents are used and traded extensively among criminal groups and represent a significant obstacle in the fight against serious and organised crime. Fraudulent documents are multi-purpose criminal tools and each document can be used repeatedly to support different criminal activities. The production and use of fraudulent documents has also been linked to terrorist actors. Increasingly, fraudulent documents are traded online. Online marketplaces are used by criminals to display the range of genuine documents on offer and allow document forgers to receive orders directly from clients. Organised criminals have been quick to exploit the shift to online solutions for many services in the legitimate economy such as registering companies or obtaining various documents from public authorities. The availability of technology and raw materials traded on the Darknet has resulted in enhanced and more accessible fraudulent documents. This new generation of high quality documents is difficult to detect during checks.

The online trade in illicit goods and services

Online platforms operating in the legal economy have had a profound impact on business models, shopping experiences and customer expectations. The multiplication of sales platforms makes online trade easier, more accessible and cheaper. This development has been mirrored in the online trade in illicit goods as criminals, like legitimate traders, look to opportunities online to grow their businesses. Virtually all illicit commodities are now traded online either on dedicated criminal online marketplaces or by exploiting otherwise legal online platforms. The number of goods on offer and frequency with which new products become available indicate that the online trade in illicit goods is thriving and highly dynamic.

Firearms, in particular, are increasingly traded on online platforms including Darknet marketplaces. Both individual criminals and criminal groups obtain illegal firearms via these

Figure 4 — Info Graphic on Online Trade



markets. Online trade allows individuals with no or limited connections to organised crime to procure firearms. The online trade in illegal firearms via various platforms is set to expand further over the coming years.

All types of commodities such as counterfeit medicine, cannabis, cocaine, heroin, synthetic drugs and new psychoactive substances, specimens of endangered species, excise tobacco, counterfeit currency, cultural goods, stolen vehicle parts and accessories, as well as compromised payment card data are sold and purchased online. In addition to illicit commodities, criminal services are also traded online. The expanding crime-as-a-service business model, prevalent in many crime areas, provides customers with access to a wide range of criminal services. Online trade will continue to prompt organised crime groups to develop new business models that increase profits and further reduce the risk of detection.

As the engines of organised crime, criminal finance, document fraud and the online trade in illicit goods and services will continue to drive organised crime forward. The online trade in illicit goods and services will increasingly shape business models and dictate the way successful organised crime groups operate. Europol recommends targeting these key cross-cutting threats to disrupt organised crime groups active across the landscape of serious and organised crime in the EU.

The full report can be accessed on the Europol website at:
https://www.europol.europa.eu/activities-services/main-reports/european-union-serious-and-organised-crime-threat-assessment-2017

The ePOOLICE Project: Environmental scanning against organised crime

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Abstract
ePOOLICE is the acronym for early Pursuit against Organised crime using environmental scanning, the Law and Intelligence systems. It is a project co-funded by the European Union (EU) under its seventh framework programme for research and development (FP7). The project has several objectives: the rapid identification of new organised crime threats, the identification of 'weak signals' by monitoring the external environment (political, economic, social, technological factors), as well as the identification of indicators. The project is based on several methodologies aided by the development of technological tools. It has been tested in several scenarios, especially in human trafficking and cocaine trafficking.

***Key words*:**
Organised crime, environmental scanning, early warning, future trends.

Introduction

ePOOLICE is the acronym for *early Pursuit against Organised crime using environmental scanning, the Law and Intelligence systems*. It is a project co-funded by the European Union (EU) under its seventh framework programme for research and development (FP7). More precisely, it was granted as a result of the fifth security research call of this programme (FP7-SEC-2012-1) as an answer to a topic included in the activity *Security and society* and within the area *Foresight, scenarios and security as an evolving concept*. The topic addressed by the ePOOLICE project was *'developing an efficient and effective environmental scanning system as*

part of the early warning system for the detection of emerging organised crime threats'. Therefore, this is the project's main objective ([3]).

According to the EU request, the project's objectives were:

- to conduct research into technologically-/actor-driven systems and tools which support environmental scanning to enable the rapid identification and qualification of new organised crime threats through the systematic monitoring of the external environment for the detection of 'weak signals' of upcoming opportunities and threats;
- to scan the environment to feed new and emerging threats into the serious and organised crime threat assessment processes;
- to identify a combination of technological resources and human actors in order to improve the process of detecting and selecting new OC threats that warrant EU level analysis and EU-wide responses;

in order to improve

- the process of detecting and selecting new organised crime threats at EU level;
- the effectiveness of the end-users (LEAs, criminological institutes and private businesses);
- the ability of strategic decision-makers to counterbalance detected upcoming threats before they materialise;
- the understanding of the technologies and trends, leading to the strategic planning into security issues of all stakeholders.

Methodological Approach

Environmental scanning (ES) is the main objective and subject of the ePOOLICE project, and therefore, an agreement regarding its definition and scope needed to be reached in order to achieve a common understanding among all parties within the project, so all efforts could be coordinated towards a common and successful goal.

After some internal discussion the agreed definition of environmental scanning (ES) to be used in the scope of the ePOOLICE project was adapted from Maree Conway from *Thinking Futures*, as follows: '*the art of systematically exploring and interpreting the external environment to better understand the nature of trends and drivers of change and their likely future impact on Organised Crime*' (Conway 2016).

([3]) Further information about the project can be retrieved from: https://www.epoolice.eu and http://cordis.europa.eu/project/rcn/106659_en.html

The environmental scanning fits into the strategy development and implementation cycle, which consists of scanning, thinking, making decisions and planning. Though all steps are interdependent, each one of them needs to be considered as a separate process. We understand environmental scanning as a systematic and formal process with two main objectives:

- Understanding the nature of change in the environment;
- Identifying opportunities, challenges and future developments.

Its main goal, however, is to provide an answer to the questions raised (i.e. what is happening and what could happen), through the determination of what we know and what we do not know about a concrete phenomenon, from a strategic perspective. The Pestle model has traditionally been a part of environmental scanning and monitoring activities in most organisations. It is a process of analysis that aims to study the political, social, economic, technological, legal and environmental issues affecting a sector or a field, configured as a first step in many future studies (Bensoussan and Fleisher, 2013). This method is sometimes called STEEP. It is a way to break the general environment into sub-categories or segments, aiding the following of an analytic process in which we can research each of the components of a phenomenon with strategic management purposes.

The process involves the understanding of each of the mentioned segments as well as their effects on the object of the study, answering the following questions: What are the current key events and trends in this segment? What evidence supports the existence of these trends? How have these trends evolved? What are the nature and degree of change on turbulence within trends? How do these trends affect organised crime? Pestle represents a '*System of Systems Analysis'* approach (SoSA), also known as a *'Federation of Systems'* (Svendsen, 2015).

Scanning is the first step. It provides information about what is happening in the external environment, about what is changing, and about what issues require attention on a continuing basis. This information, after being evaluated and analysed, has a strategic purpose, as it contributes to creating the "big picture" of the criminal phenomenon that will finally will allow the adoption of strategic, tactical and operative decisions. To identify these options, a good knowledge about external drivers of change is needed. This implies the monitoring of events that can be grouped in trends, so that drivers, which move trends in certain directions, can be detected and the changes can be analysed. Major changes in the environment induce changes in crime, so it becomes essential for law enforcement agencies to scan this environment and to look for its evolution in order to be best prepared for the emerging organised crime threats.

Environmental scanning does not analyse known crime trends but non-criminal drivers of change, and looks for their potential impact in criminal trends in the future. This is the rea-

son to follow the Pestle (Politics, Economics, Social, Technological, Legal, and Environment) model to assess key variables that define the factors of change. Using a model such as Pestle provides a starting point for the ES. A Pestle analysis provides key information for risk analysis. Criminal phenomena are continuously evolving, and organised crime groups have the abilities to adapt their activities, objectives, modus operandi, detecting opportunities in the political, economic, social and technological landscape. For example, a Pestle approach is largely adopted by the FATF methodology for money laundering risk assessment, or researching on terrorism (Blanco and Cohen, 2014). A methodology that structures basic information and enables the application of SWOT analysis, risk analysis or trend analysis.

Accordingly, as stated in the *ePOOLICE Description of Work* (DoW), the ePOOLICE environmental scanning systems provides a systematic overview of the surrounding environment, so that 'weak signals' that may trigger a heavy and oriented situation awareness computation can be detected in order to better appreciate and anticipate the emerging organised crime. H. Igor Ansoff introduced the idea of 'weak signals' in his famous paper on strategy: '*Managing Strategic Surprise by Response to Weak Signals*', published in 1975. Ansoff wrote: "*We might call this graduated response through amplification and response to weak signals, in contrast to conventional strategic planning that depends on strong signals. Such a practical method for planning a graduated response can be developed. The first task is to explore the range of weak signals that can be typically expected from a strategic discontinuity*" (Ansoff 1975: 23).

Ansoff defines weak signals as signals that have a higher degree of uncertainty based upon human assessment of uncertainty. The concept of weak signals entails that the weak signal is an antecedent to the event. However, factors that are not necessarily understood in a conditional or causal fashion can also be identified. Researchers have proposed different definitions for this concept. Ponomareva, J. V. and Sokolova, A. V. (2015) collect the existing definitions of weak signals (WS), and propose the following one: "*[Weak signals are] events that characterise a high degree of uncertainty and lag time, there is at the start no complete and relevant information about their consequences, but they indicate future changes and can lead to serious transformations in the current social and economic situation; sometimes WS may be harbingers of disruptive events or witnesses to new possibilities"(p.4).* Of course, following Hiltunen (2008), there are objective weak signals which can be applied in all areas and subjective weak signals which are more important for specific fields.

An example of this in the organised crime field could be the development of 3D printers, which could be used to produce firearms. We know that it is possible now to manufacture metal firearms, being more expensive to get the printer than to purchase a firearm in the dark market. So, from an early warning model, we can establish an indicator to monitor the cost of 3D printers. Ponomareva and Sokolova (2015) offer an example applied to bioprinting. Weak signals are the way in which we can improve present and future risk analysis, anticipating the alert about possible impacts, although in the present moment we cannot establish a high probability.

An environmental radar scans a virtual environment represented by huge volume of open source information describing: tangible and intangible resources (water, petrol, climate, culture, etc.); political, legal and social organisations; technological advances and innovation.

The described ES concepts are directly related to the Europol definitions of *Crime Enablers* and *Crime-Relevant Factors* (CRF) in its SOCTA (2013) methodology and reports: '*Crime enablers are a collection of "Crime-Relevant Factors" (CRF) that shape the nature, conduct and impact of serious and organised crime activities. CRF affect crime areas and the behaviour of both criminal actors and their victims. They include facilitating factors and vulnerabilities in society creating opportunities for crime or crime-fighting. They are the instruments by which serious and organised crime operates and are common to most areas and most groups. Certain enablers are particularly relevant for multiple crime areas and provide opportunities for different OCGs in their various activities. These horizontal crime enablers include the economic crisis, transportation and logistical hotspots, diaspora communities, corruption, legal business structures (LBS) and professional expertise, public attitudes and behaviour, risks and barriers of entry to criminal markets, the internet and ecommerce, legislation and cross-border opportunities, identity theft and document fraud and violence (…). CRF are facilitating factors and vulnerabilities in the environment that have an influence on current and future opportunities or barriers for OCGs and SOC areas. CRF are analysed via horizon scanning, which aims to identify future trends in society and future crime threats' (Europol 2013:11)*

The ePOOLICE project identifies these CFR through the use of environmental scanning, weak signals, and trend analysis.

Trend analysis aims to identify trends and to detail the forces that are influencing, in what direction and at what speed (i.e. the intensity of change). A trend is a pattern of observable change, a set of processes that are not easily changed and that will continue in the future. Trends are affected by drivers. A driver is an agent or a factor that guides a change. From each driver, it is possible to identify the indicators that help measure and assess its impact. This fosters a model to follow up on a matter that is also complemented with a determination of the effects on the phenomenon researches as well as their impact and probability of occurrence. The paper written by Blanco and Cohen (2014) on the future of the fight against terrorism in Europe is an example that is based on the model chosen by RAND Europe (2013) for the analysis of the future of society in Europe in 2030, and on Lia's model (2005) to study the future of terrorism, as well as the models used by the Proteus program of the American intelligence services. A similar process was followed by Europol to point out the future drivers of organised crime (Europol, 2015). For example, when addressing cocaine trafficking, this was the preliminary approach developed during the ePOOLICE project, pointing out that each one of these key factors needed to be defined, specifying how they were operationalised in the context of cocaine trafficking. The proposed indicators are not the only existing ones, but reasons of efficiency in the project made it advisable to take

existing indexes of general acceptance, keeping in mind that sometimes perhaps these indexes could not be the best way to measure a specific variable.

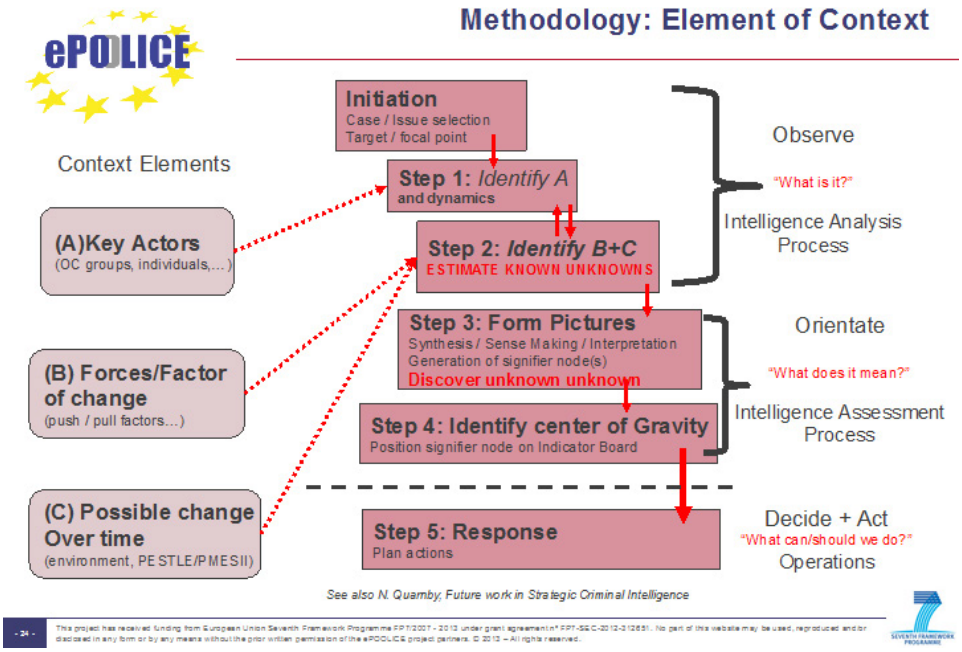
- **Economic:** markets evolution (concentration, actors), prices, profits, drug demand, drug supply, economic crisis, inequality, poverty, economic freedom ...
  - *Indicators*: Economic Freedom Index (The Heritage Foundation), Unemployment rates, Gini index, GDP …
- **Political:** weak or failed states, corruption, geography (border control, mountains …), judiciary system, armed conflicts, behaviour of elites, means shortage, political system, links with terrorism, violence ...
  - *Indicators*: Corruption Index (Transparency International), Democracy Index (EIU), Fragile States Index (FP) and its components, Global Peace Index, Global Terrorism Index, number of …, % of …
- **Social:** demography (age, sex, nationalities …), migrations, education level, human development, unemployment, health system, urbanisation …
  - *Indicators*: urbanisation trends, Human development index (UN) …
- **Technological:** internet use for trafficking, drones (for transportation, for example through borders), deep web, Darknets, Black markets (Silk road) innovation, laboratories, online payments, bitcoin...
  - *Indicators*: internet penetration, number of users of applications, laboratories detected, amount of payments online …
- **Legal:** legal system, judicial system, prison …
  - *Indicators*: new legal frameworks alerts, number of prison population …
- **Crime:** age, sex, nationalities, type of crime, day of the week, hour, place, modus operandi, means used, media seized …
  - *Indicators*: a set of criminal statistics.

The methodological approach used in ePOOLICE was based on the concepts established by Europol, with the framework of an environment scanning system:

Two ways of managing open sources to identify new trends were proposed:

- Semantic search in internet. The objective is not only to find information but also to interpret it in a way that could facilitate the work of security analysts.
- The establishment of an indicators system.

Figure 1 — ePOOLICE Environmental Scanning System



Semantic search

Semantic search seeks to improve search accuracy by understanding the searcher's intent and the contextual meaning of terms as they appear in the searchable dataspace (series of databases), whether on the Web or within a closed system, in order to generate more relevant results. Semantic search systems take into consideration several points, including the contexts of search, location, intent, variation of words, synonyms, generalised and specialised queries, concepts matching and natural language queries to provide relevant search results (Tony, J., 2012). Semantic searches allow the direct classification of the collected information in order to match entities from other pieces of information. It uses several methodologies: concept mapping, graph patterns, logics, and fuzzy relations and fuzzy logics.

The first key step was the identification of key terms. A literature review facilitated several sources, like dictionaries and glossaries. It is very important to point out the use of slang, and the need to introduce these kind of specific terms to collect information and detect trends. For example, in regards to cocaine trafficking, we identified a broad selection of terms in slang and different languages: "*24/7, aspirin, Charlie, Carrie, Otoban, Dinamite, BLO, Big C, Diablo, Dios, Devil's Dandruff, Devil's Drug, Devil's Dick, Paradise, Polvere di stelle, Polvo Feliz, Polvo de Oro, Heaven Dust, Haven Dust, Happy Powder, Happy Trail, Dream, Beam, Soplo, Soddio, Angie, Gulosa, Ice, Icing, Flakes, Snow, Neive, Nieve, Snow White, Biancaneve, Bianca, Blanca,*

Blanche, Branca, Branquinha, Beyaz Ten, Caballo blanco, Belaia loshadi, White girl, white tornado, white lady, white dragon, white ghost white powder, polvo blanco, polvere bianca, poudre, pudra, sugar, azúcar, koks, cocco, coconut, coco, Coke, perico, perica, farlopa, calcetín, cama, Paco, Fefe, Bernie, Cecil, Baby, Bebé, Love Affair, Fast white lady, Lady C, Lady Caine, Dama blanca, girl, girlfriend, Mamá Coca, She, Her …" (Saviano 2014: 108).

Keywords are selected through the analysis of the concrete field, using taxonomies, dictionaries, semantic domains and specific terms. Keywords are clustered following the aim that ePOOLICE is pursuing. Keywords were selected through the analysis of specialised reports from United Nations (UNODC), EMCDDA, national security reports and dictionaries/glossaries, or slang dictionaries ([4]).

Talking about cocaine trafficking, main clusters, selected from different reports and dictionaries because of their frequency and relevance, could be:

- **Producer countries:** Colombia, Peru, Bolivia …
- **Origin countries:** Brazil, Venezuela, Caribbean Islands (Jamaica, Netherlands Antilles, Martinique) …
- **Transit countries:** Guinea Bissau, Mali, Cape Verde, Madeira, Azores, Canary Islands, Benin, Gambia, Ghana, Guinea, Nigeria, Sierra Leone, Mauritania, Togo, Algeria, Libya, Morocco, Black Sea, Baltic Sea, Balkans, Spain, Portugal, the Netherlands …
- **Destiny**: Portugal, Spain, France, the Netherlands, UK, Germany …
- **Roles:** international wholesaler, national wholesaler, retailer, boss, manager, partner, transporter, tester, money collector, mixer, storer, law enforcement official, courier, money deliverer, drug abuser, drug addict, drug baron, drug dealer, drug peddler, drug runner, drug smuggler, hitman (sicario), networks, drug treatment …
- **Groups:** narcos, Mafia, 'Ndrangheta, cartels, FARC, AQIM, Galicia traffickers, Sinaloa Cartel, Zetas, Outlaw Motorcycle Gangs OMCGs, Hell Angels …
- **Drug trafficking activities:** Cultivation, production, dispensing, distribution, logistics, marketing, frauds obtaining prescription drugs, processing, importation, manufacturing, possession (for own use, with intent to sell), sale, supply, distribution, trade, payment, recruitment, transportation, consumption, drug flows …

[4] Some examples:
- Multilingual dictionary of narcotic drugs and psychotropic substances under international control https://www.unodc.org/documents/scientific/MLD-06-58676_Vol_1_ebook.pdf
- Terminology and Information on Drugs https://www.unodc.org/documents/scientific/Terminology_and_Information_on_Drugs-3rd_edition.pdf
- Demand Reduction. A Glossary of Terms http://www.unodc.org/pdf/report_2000-11-30_1.pdf

- **Other crimes**: money laundering, other trafficking activities (weapons, human beings, other drugs, tobacco, medicines …), extortion, kidnappings, smuggling, terrorism, fiscal fraud, corruption, counterfeit …
- **Drugs:** Cocaine, crack cocaine, cocaine hydrochloride, cocaine base, coca leaves, cannabis resin, pure cocaine, Erythroxylum, cocaine paste, herbal cannabis, opium, heroin, crack, LSD, marijuana, hashish, synthetic drugs (amphetamine, methamphetamine, ecstasy), psychoactive substances …
- **Precursors:** pre-precursors, precursor chemicals, acetic anhydride, potassium permanganate, manganese dioxide, methyl ethyl ketone, acetone, toluene …
- **Chemicals:** laboratories, secondary extraction laboratories, HCl, HCl manufacturing, fertiliser, plastic, herbs, clothing, liquids, guano, beeswax, upholstery, polypropylene …
- **Adulterants, cutting agents:** anaesthetics lignocaine (lidocaine) and benzocaine; painkillers such as phenacetin (a carcinogenic substance) and paracetamol; and other agents such as hydroxyzine, boric acid, glucose, manitol, lactose and caffeine, levamisole …
- **Transport:** Routes, Containers, couriers, mules, postal services, airports, digestive tract, ships, airplanes, aircraft, submarine …
- **Police activities:** Drug raid, squad, forensic science, asset confiscation, arrestees, entrapment, drugs seized, seizures, arrests, detentions, interceptions, wastewater analysis …

With the technological opportunity to collect, classify and interpret information on the Internet, Guardia Civil and the University of Aalborg selected a representative case from the news that could be taken as an example. They analysed several pieces of information that could contain several of the key elements about cocaine trafficking: origin, destiny, location of the seizure, criminal group, concrete characteristics, kind of drug, weight or dates, showing that an intelligent entity extraction system can help to analyse this phenomenon.

Figure 2 — Semantic Search Analysis (I)

Digital Journal: A Global Digital Media Network http://www.digitaljournal.com/print/article/352569 [18-06-2013 16:24:23]	Source (news journal) URL Time accessed
Fishermen 'catch' $2.5 million worth of cocaine off Florida coast	Heading (summary of the event)
A group of fishermen working a couple of miles off of a Florida coastline recently snagged a large amount of cocaine. Officials estimate the catch is worth about $2.5 million.	≺ drug ≺ contraband (= thing that is illegal to traffick) Value (imprecise) of the contraband
Posted Jun 18, 2013 by Leigh Goessl	When it was posted and by whom
Five fishermen were recently on a commercial expedition about two to three miles off the coast of Destin, Fla., in the Destin East Pass, which is located in the Gulf coast off Florida's panhandle. According to ... said an Okaloosa County Sheriff's Office statement dated June 12 [PDF]. "The fishermen provided statements and turned the bale over to authorities. The Drug Task Force collected and processed the bale and determined that it contained 25 kilograms [55 pounds] of cocaine."	Location (imprecise) of the event Link to source (PDF file, attached News1a.pdf) applied for some information (we go to this source to get the more original, detailed information) The amount of the contraband
It is believed the drugs may have originated in Venezuela. Okaloosa County Sheriff	Origin of the contraband; notice that it is not certain but believed by the sheriff
... Investigators also noted a "00" on one of the bricks. It is believed this indicates a drug cartel. ...	Signs of drug cartel (not certain, but believed to be) ≺ OC gang

The analysis of this piece of information allowed for 'translating' the meanings that a semantic system should search in the existing content on the internet. In this case:

Figure 3 — Semantic Search Analysis (II)

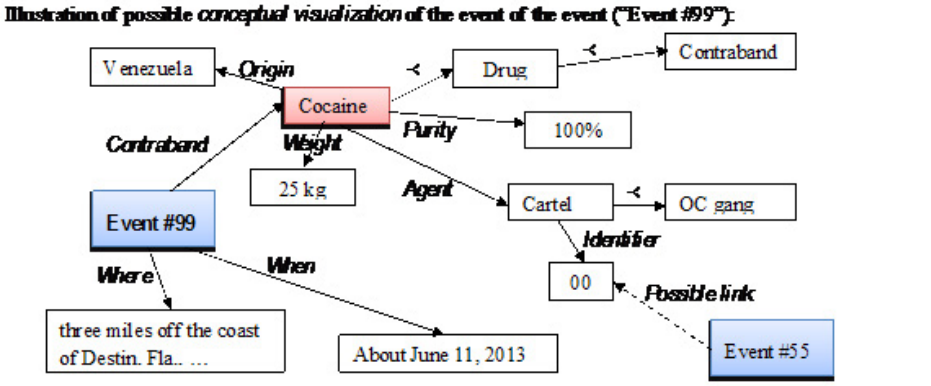


Figure 1: Conceptual visualization of the event. Other events may link to some of the attributes as illustrated for Event #55.

This system and the information in the web would allow to collect, classify and detect changes in patterns (strategic purposes), and to match data, for example if in another part of the world a package of cocaine marked with '00' appeared (operational purposes).

After the definition of the semantic domain, a continuous process, the next step was the selection of sources, based on the experience of law enforcement agencies officers. Sources are evaluated, following the systems used in intelligence analysis, reliability of sources and credibility of information (Hibbs and Pherson, 2013).

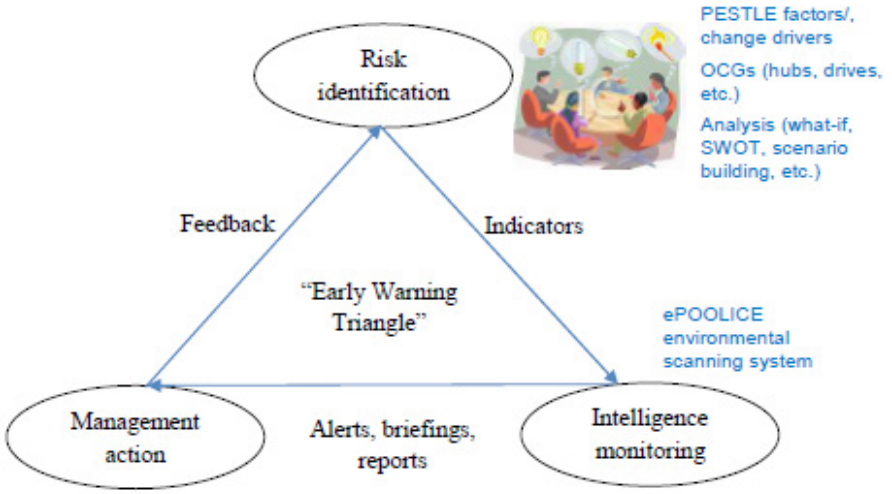
Indicators

The identification of indicators, about the evolution of the cocaine trafficking landscape, was a key question during the project. An indicator must be **specific** (precise and unambiguous, so it's clear what it is that you are aiming to achieve), **measurable** (there should be a clear and transparent measure of success), **relevant** (should reflect what the organisation is trying to achieve), **timed** (it should be clear when the target should be delivered), **appropriate** (to the subject at hand), **economic** (available at a reasonable cost), **adequate** (provide a sufficient basis to assess performance) and **monitorable** (amenable to independent validation).

Other methodologies have been applied during the project in order to complete the Environmental Scanning System: literature review, SWOT analysis, push and pull factors, expert panels and workshops, trend analysis, trend evaluation and future studies technics. An ePOOLICE workshop on *Factors driving future crime* was held on 11-12 March 2015 in Las Palmas, Spain. The ePOOLICE partners Aalborg University, Isdefe and Guardia Civil organised the workshop. It was hosted by the Guardia Civil in the premises of the Centro de Coordination Regional de Canarias (CCRC). The complete methodological approach from the project has been recently published (Larsen, Blanco, Pastor and Yager, 2017).

The next figure provides a simplified view of the driving factors in the context of the ePOOLICE system (for environmental scanning) and the methodological framework considered for applications of the ePOOLICE system, borrowing the Early Warning Triangle from Gilad (Gilad, 2003).

Figure 4 — Driving Factors in the Context of the ePOOLICE System



The ePoolice Solution System

The ePOOLICE project — in close collaboration with law enforcement partners, as well as criminological and legal experts — developed a prototype of an environmental scanning system through the implementation of solutions applying the technological advances and breakthroughs as provided by the RTD partners. The solutions were tested and evaluated through running realistic use case scenarios that were developed with the support of the end-user partners in the consortium. Three were the main scenarios chosen for such these test as a proof of concept: cocaine trafficking, trafficking of human beings (THB) and copper theft.

Central to the solution was the development of an environmental knowledge repository (EKR) of all relevant information and knowledge, including scanned information and derived, learned or hypothesised knowledge, as well as the metadata needed for credibility and confidence assessment, traceability, and privacy protection management. For an effective and efficient utilisation, as well as for interoperability purposes, the repository applies a standard representation form for all information and knowledge.

For effective and efficient scanning of the raw information sources, the project developed intelligent environmental radar that utilises the knowledge repository for focusing the scanning.

The main solutions provided by the project are supporting:

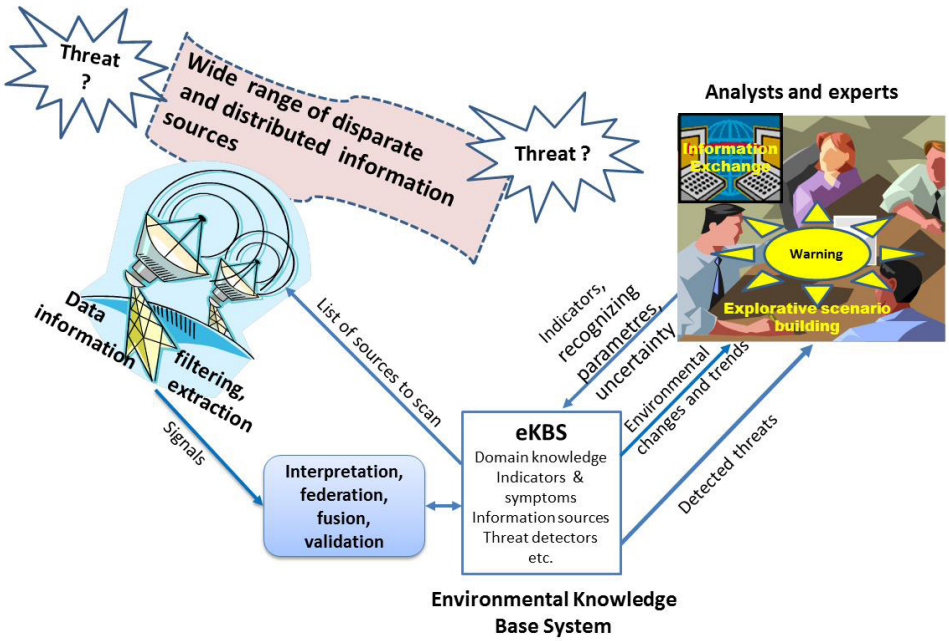
- Detection of organised crime:
  - Detect the existence of criminal activities typically run by organised crime;
  - Discover organised crime and underlying criminal organisations as early as possible to prevent further formation of stronger, more resilient criminal systems.
- Prediction of the evolution of organised crime. This requires environmental scanning system for analysing and developing scenarios of possible threats in the future.

The environmental scanning system (prototype) developed during the ePOOLICE project provides a systematic overview of the surrounding environment to better appreciate, assess and anticipate an emerging crime, through the monitoring of the environment and the capture in real time of relevant information present in heterogeneous open sources, including analysis reports, governmental information, web, news, academia, non-governmental and international organisations, and subject matter experts.

The system supports:

- Different information sources;
- Multilingual support — with English and German demonstrated;

Figure 5 — The ePOOLICE System



- The dissemination and exchange of information and knowledge of potential interest to the law enforcement agencies;
- The visualization of potentially emerging OC threats for OC threat assessment;
- The early warning with alerts in cases of detection of potentially emerging new OC threats;
- The storing and utilisation of hypothesis and notes from users;
- The utilisation of user feedback on findings for refinement of the system's domain knowledge; analysis and decision-making in addressing emerging OC threats, considering the validity and the seriousness of the detected threats.

In addition, ePOOLICE refines a methodology — comprising legal, privacy and ethics aspects — to monitor heterogeneous information sources and to identify and prioritise indicators in order to outline a strategic early warning process. Thus, the monitoring system has knowledge about a number of organised crime types and their facilitators, identifying signatures and indicators.

Functionalities available to the end-users (analysts) are:

- browse, navigate, and zoom in the findings;
- select a geographical or/and temporal view for information of interest;
- refine the system's knowledge of OC types, criminal hubs, modus operandi, indicators, signals, etc.;
- refine the set of relevant sources, their importance, and scanning frequency;
- provide additional knowledge, information, hypothesis, hunches, etc., to be properly utilised by the system;
- share and discuss findings with relevant colleagues in the police collaboration;
- perform ad hoc queries and analyses in the EKR as needed in an analysis case.

The system supports the above functionalities, and can further:

- use feedback from analysts to extract and propose new indicators/signals and adjust its warning/alert levels;
- propose new sources to be scanned;
- evaluate and estimate the importance and optimal scanning frequency of sources, based on usage behaviour monitoring and possibly explicit user feedback and inputs;

- use information/knowledge while considering quality issues (e.g. completeness, accuracy, reliability, etc.) and the nature of the knowledge (e.g. factual, belief, hypothesis, etc.) for reasoning properly in answering a user query/question;
- monitor the EKR use for privacy issues.

All information and knowledge in the EKR is highly tagged (e.g. kind of knowledge, source, registration time, credibility, importance, sensibility, etc.) as this is needed for its proper utilisation and for the traceability of findings. All accesses by human operators and analysts, as well as by subsystems, are logged as required or needed for documentation, e.g. in case of violation of privacy, and for tuning and optimising the system.

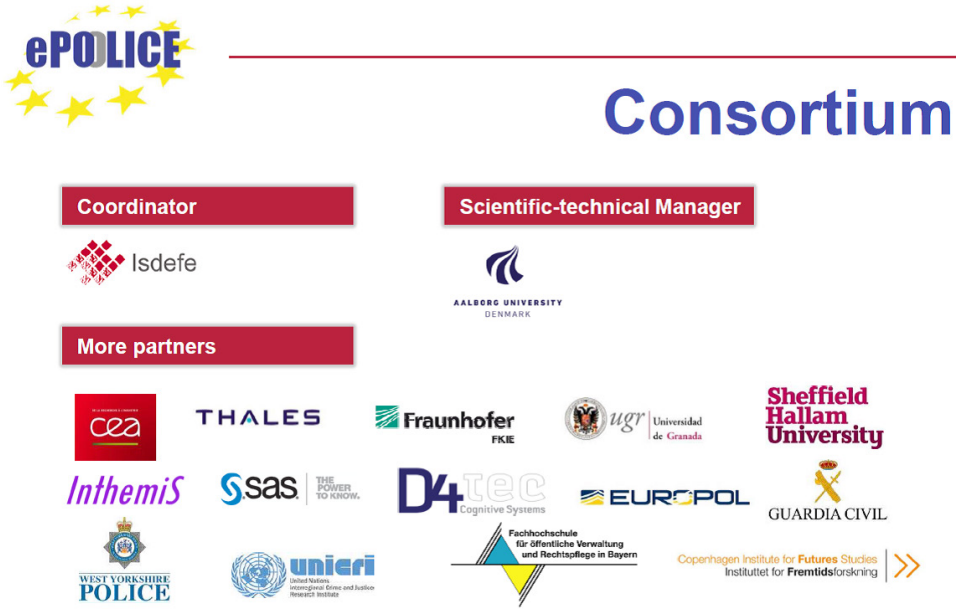
ePoolice Implementation

The project aimed (cf. FP7 call) 'to conduct research into technologically-/actor-driven systems and tools which support environmental scanning'. Therefore, ePOOLICE was an end-user centric project that required a sound understanding of the needs of potential end-users — something which was critical for the success of the project. This understanding included the domain, the problem targeted, the user and stakeholder needs and requirements. The development of the system prototype was guided by the end-user needs and the ethical/legal issues through active participations of LEAs and application of use case scenarios providing a problem-oriented drive for the project and using privacy by design approach.

But ePOOLICE counted too on the involvement of other end-users and stakeholders. An *End user and Stakeholder Advisory Board* (EUSAB) was established at the very outset of the project in order to reinforce the involvement of the end-users to ensure that the work conducted in the framework of the project was consistently of the highest quality and that the practical needs of end-users were being addressed and maintained throughout the duration of the ePOOLICE project.

The consortium was comprised of strong and complementary partners with different profiles and backgrounds — the aforementioned five end-users, academia, R & D organisations, SMEs and large companies — as it is shown in the figure below:

Figure 6 — The ePOOLICE Consortium



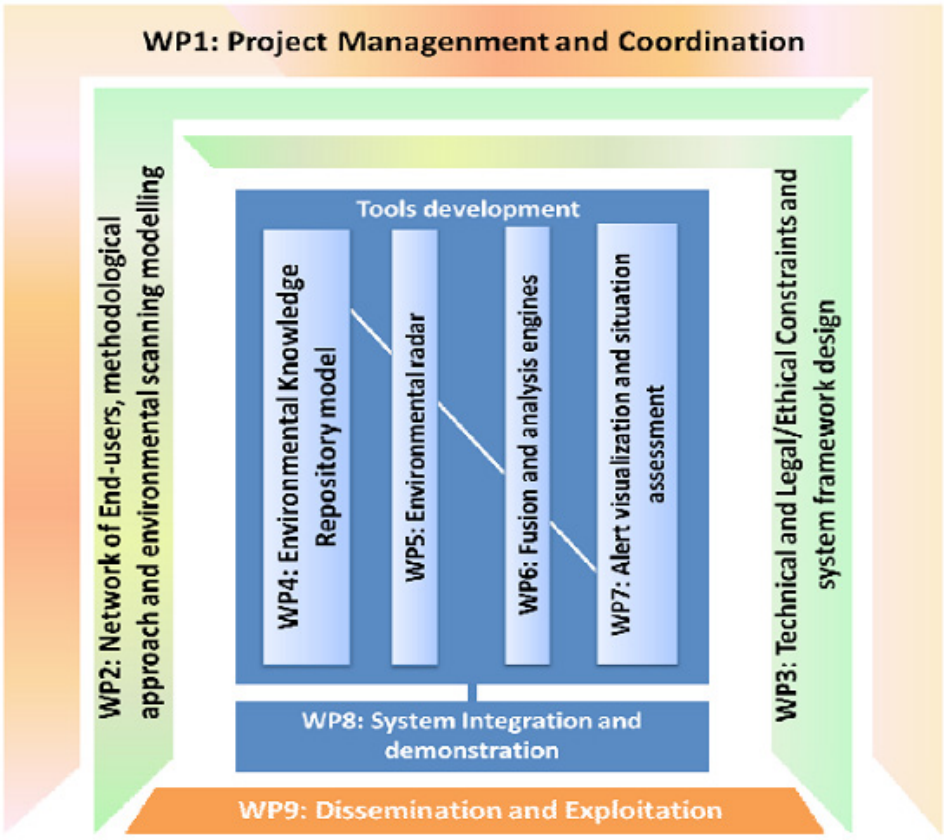
The work in ePOOLICE was organised into nine different work packages, as shown in the following figure. This structure responded to the needs of the project, supported effective project coordination and represented a clear and efficient distribution and organisation of the consortium expertise.

Conclusion: Evaluation of ePoolice Results

The ePOOLICE project had a duration of 3 years. It started in January 2013 and finished in December 2015. In that latter month, the results of the ePOOLICE project were presented in a final workshop with end-users, held in ISDEFE premises in Madrid, where a demonstration of the developed prototype was carried out in front of 28 representatives from 17 different end-user organisations including Member States national LEAs and Europol, Interpol and Unicri.

Being a FP7 project, the results of ePOOLICE were also presented to and reviewed by the European Commission (EC), who were supported by an external reviewer on this task. It must be pointed out that, as the system is a prototype (TRL 6), it is not possible to be used directly by end-users and it is not in the market.

Figure 7 — The ePOOLICE Work Packages Structure



The feedback got from these review and evaluation sessions was mainly collected in two final reports, one prepared by the consortium as a deliverable of the project and another issued as result of the European Commission final review. The conclusions can be summarised as:

- Overall, it can be concluded that the end-users' evaluation of the proposed environmental scanning system was positive. There was a great interest among end-users to further develop the system prototype into a useful product given that the system demonstrated was found good and interesting.
- For this further development a continuation of the project was proposed. Different options are being studied and a good choice seems to be that end-users and partners organise for further collaboration, e.g. through another comparable (R & D) security project. Seventeen letters of support from different end-users were received supporting this initiative for continuation.

- In considering a second phase project, the possibility should be assessed to include together with the current ePOOLICE framework — environmental scanning for strategic use — also the support of investigative and operational use: social media analysis, information from Darknet, or virtual identities.
- For the proper inclusion of social media analysis, especially for its usage in investigations, the ePOOLICE continuation should include a strong legal and ethical approach for its technologicial research and development process, with special care in the legal treatment of personal data.It may further include proposing a standard for privacy security in such systems, considering the results of the ethical research.
- The second phase project should be specified to ensure that the objectives will be met at a given technology readiness level (TRL 8 or 9). This would involve piloting by the end-user, who have already expressed a clear an interest in it.

Considering all the above, ePOOLICE continuation possibilities are being explored within the EU H2020 projects ([5]). But key questions are waiting for an answer:

- What can ePOOLICE provide to the LEA community now? According to the call from the European Commission the system ePOOLICE is a prototype that should be developed for its implementation. But in this moment it offers a broad set of analysis, and deliverables, about environmental scanning methodologies and technologies involved. So, it could be considered a starting point for the debate, with scenarios and technologies tested and evaluated by the Commission.
- What other uses could the system have in criminal analysis? Although the tests were focussed on human beings trafficking, cocaine trafficking and copper robbery, the ePOOLICE project offers the key elements to apply the methodological approach and the technologies developed to other criminal phenomena.

([5]) How could I get more information? The European Commission aims to go beyond the state of the art in matters related to security. The H2020 calls for research emphasise the need to take into account previous projects in order to avoid duplicating efforts. In these terms all the information that is not classified should be accessible for researchers and LEAs. Contact information: http://cordis.europa.eu/project/rcn/106659_es.html

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From the Islamic State to the 'Islamic State of Mind': The evolution of the 'jihadisphere' and the rise of the Lone Jihad

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Abstract
Recent terrorist attacks in Orlando (USA) or Magnanville (France) highlight the globalised power of Jihadi rhetoric and narrative across the Web, reshaping reality and promoting the 'Lone Jihad'. Since 2012, from Mohammed Merah to Omar Mateen, 'Lone Wolf Terrorism' is characterised by the capacity to attack soft targets considered as the main threat for the urban scenario. Law enforcement professionals have to explore the dynamics of the 'Jihadisphere' by considering it not just as a repository but the core of the 'culture of terrorism' globally spread. The author explains the main phases of internet Jihadism evolution focusing on the self-radicalisation process, the rise of lone wolf terrorism (LWT) and the Lone Jihad as a new scenario moving from the Islamic State ideology and propaganda to the 'Islamic State of Mind' (cyber-)experience.

***Keywords*:**
Terrorism, jihad, jihadisphere, radicalisation, mediamorphosis.

Preamble

The author wants to clarify that all the spiritual concepts typical of the Islamic religion — such as, for example, references to jihad — do not regard their original meaning. On the contrary, they regard the violent-based ideological distortion typical of the violent extremism and terrorism that has self-defined jihadist, as reported in Open Source Jihad (OSJ), a section of the digital magazine Inspire, published by al_Qaeda in the Arabian Peninsula

(AQAP) — strictly connected to Ansar al_Shari_a, the Yemen-based branch of al_Qaeda — as of June 2010, and its 16th issue.

The author wants to underline the evolution of the jihadism across the Web and the rise of the Lone Jihad thanks to open source (cyber-)ecosystem. Therefore, the contents of this article are not related to any Deep Web and Dark Web. In this article, as well as in several scripts, the author expresses the concept of 'cyber' by using the term '(cyber-)' — in brackets — to highlight the already blurred boundary between 'real' and 'cyber' (as not real) dimension of life. Therefore, shortly, it won't be opportune to identify the cyber dimension as 'other' in comparison with the uniqueness of the human experience, especially within social dynamics. According to the author, this is totally redefining the concept of criminality, imposing a new semantic, as well as new methodological and technical interpretation in the monitoring, analysis, prevention and counter-action activities. Hence, law enforcement professionals need a comprehensive and holistic approach to operate in a systemic and multi-dimensional way in order to develop education, innovation and motivation at the same time, as essential drivers to deal with the evolution of criminal complex phenomena (Antinori, 2014a).

'Mediamorphosis' of Terrorism

Today, Member States have to consider the so-called 'jihadism' as one of the main threats not just from a national and/or European Union perspective, but more specifically for an interconnected EU–MENA region in terms of geo-strategic vision in jihadism. This is a result of the involvement of trans-national and trans-continental hostile entities and dynamics in contemporary terrorism, as well as the process of 'media-weaponisation' (Antinori, 2014b: 169) and 'glocalisation' of terror across digital media after the globalisation.

European law enforcement has to enhance the prevention, anticipation and counter-actions of the activities conducted by jihadist terrorists all over EU territory, as well as their massive media campaign promoted through the internet and social media platforms.

Thus, a concerted and efficient intervention strategy, in terms of prevention and countering, can be implemented only developing a deep insight of the phenomenon — considering its traditional roots as its completely new codes, (cyber-)social dynamics and technological assets — which is becoming the first globalised criminal phenomenon in human history. Therefore, it is opportune to identify relevant elements in order to understand what jihadist threat represents today in its own whole complexity. Furthermore, it is very important to highlight how this threat is changing in the last 2 years — which saw the rise of the self-proclaimed Islamic State — and how the jihadism will evolve in the near future when visual culture, digital nomadism, communication and information will perform an essential role in people's daily life.

The end of the 20th century and the beginning of the 21st century represent a crucial segment of time for jihadism, thanks to the concept that the author calls 'mediamorphosis' (Antinori, 2015a: 4). It is a rapid process of transformation in which the medium is not only a container of messages aimed to generate terror, such as in traditional propaganda strategies, but it also becomes 'media-terror' itself, an asymmetric weapon of the globalised contemporary reality throughout the violent action/representation nexus.

Hence, communication technology has a relevant impact especially through the development of digital and social media, in the dynamic of (cyber-)social transformation of terrorism, as well as its (cyber-)social environment, actors, resources, strategies and modi operandi.

The 'mediamorphosis' is strongly linked to the transition from the 'analogue' world — organised into a hierarchy and institutional centres of information and knowledge production which used a one-to-many communication model — to the digital. The latter is a reticular and globalised world exclusively based on a many-to-many communication model — founded on the 'cross-mediality' and populated by user-generated and remediated (Bolter and Gruisin, 2000) contents and spread out through the Web, able to violently invade our daily life. For these reasons, law enforcement professionals should develop new cross-disciplinary skills, particularly in the interrelated social sciences, communication/media studies and computational sciences. Such cross-disciplinary skills have to focus on the integrated system of information and data necessary to understand the terrorist threat and its unceasing evolutionary change.

Internet Jihadism and Jihadisphere

In order to understand the essence of jihadist mediamorphosis and, thus, the threat change currently in place we have to go back 11 years ago.

On 9 July 2005, the Egyptian Ayman al_Zawahiri, al_Qaeda strategic leader, sent a letter to the Jordan Abu Musab al-Zarqawi, Jordanian qaedist leader of al_Qaeda in Iraq (AQI), in which he described the battle of terrorist entities by saying 'more than half of this battle is taking place in the battlefield of the media, […] in a race for the hearts and minds of our Umma' (US DNI, 2005).

In 2005, the international community considered this statement as a traditional cyber-terrorist threat specifically related to the critical infrastructures protection or even as a cybergeddon future scenario.

Unfortunately, the purely 'revolutionary' aspect expressed by such assertions was underestimated, as well as the deep impact that the 'battle' should have produced in terms of social change and threat in the following decade.

The 'media battle', the 'race for the hearts and minds' can be considered as the delineation of a conflicting scenario completely new which occurs, *in primis*, through the (cyber-) social environment as a result of the development of the internet Jihadism phenomenon (Antinori, 2017a).

Thus, it is impossible approaching jihadism by trying to isolate it from its media nature which represents its essence and allows us to consider it a global criminal phenomenon. Just consider that the Islamic State, since its self-proclamation, has been developing the first globalised collective imaginary of the Digital Age. Some roots of such imaginary are connected to Western visual and media culture, completely opposite to Islam aniconism.

With respect to jihadism, it is opportune to specify that we are not in front of a static and monolithic phenomenon but it is extremely dynamic and its development occurs according to a complex evolution path whose phases are briefly described as following:

Table 1
Internet Jihadism

INTERNET JIHADISM					
PHASE	**TIMELINE**	**COM MODEL**	**WEB**	**TARGET ACTOR**	**MAIN DEVICE**
TERROR ARENA	1998-2004	Post-analog	1.0	Groups (AQ, Hamas, Hizbollah)	Desktop
DIGIHAD	2004-2014	Post-analog, early digital	1.5	Groups (AQ) and virtual communities	Laptop
CYBER JIHAD	2014-2016	Digital, cyber-social	2.0	Groups (IS, AQ) hacking groups and individuals	Tablet/mobile
LONE JIHAD	2016-	Cyber-social	2.5	Individuals and groups (IS, AQ)	Smartphone

The ongoing evolutionary change of internet Jihadism is strongly connected to the 'mobile convergence', that is the convergence of several media and tools as television, camera, navigator, book, newspaper, telephone, radio, planner, game, music, mail, chat, intimate communication, pray, wallet, etc., in one portable and soon wearable device.

In particular, the author points out Digihad as crucial phase, not only for its 10-year time frame, but for the massive exploitation of the internet carried out by al_Qaeda through the dissemination of violent videos of propaganda, tactical manuals and doctrine texts. Since 2010, thanks to the issue of Inspire (the first jihadist serialised online pdf magazine published by AQAP), the Open Source Jihad (OSJ) violent concept began to 'pollinate' the

Web, forums, blogs and sharing platforms, promoting do-it-yourself attacks and inspiring young generations of self-proclaimed 'jihadi warriors' as we have been experiencing since 2013 in Western countries.

al_Qaeda uploaded a great part of the online material to celebrate its iconic and charismatic leader Osama Bin Laden according to its strategy. The totality of online-shared media gave life to the Jihadisphere (Antinori, 2015b), the terrorist infosphere (Floridi, 2015). At the beginning, it was considered merely an online repository. Then, thanks to (cyber-)social evolution, it has been expanding its interactive power, becoming the 'living' core of the 'culture of terrorism'. The Jihadisphere represents the socio-relational (cyber-)environment promoting the appealing, persuasive and seductive power of the 'jihadentity' — jihadist identity (Antinori, 2016) — as demonstrated by the Western foreign terrorist fighters who left their own countries to join the ranks of the Islamic State. The Jihadisphere has a strong impact on youngsters potentially representing 'Generation-T' (Antinori, 2015c: 32), the next generation of lone wolf terrorists 'cultivated' through ad hoc specific rhetoric and narratives to incite them to attack.

As a result of that, the author suggests to adopt a comprehensive, multi-dimensional and holistic approach to analyse the Jihadisphere, as (cyber-)social ecosystem. It is necessary to deeply understand jihadism complexity, assets, actors, violent radicalisation models and its particular ability to create (cyber-)experience.

RadicaliZation and Self-RedicaliZation

In order to understand how the (cyber-)environment can be useful to trigger the jihadist self-radicalisation process and the relevance of this threat for the future generations, it is important to point out some differences. The traditional, face-to-face, radicalisation is based on a simple Manichean dichotomy between 'pures and unpures', and is appealing for barely educated people that live in a context typified by a lack of tools and resources.

The 'traditional' radicalisation, as well as the self-radicalisation process, represents a fundamental challenge for law enforcement professionals.

The main differences between the two processes are shown below:

1) (Traditional) Radicalisation — it is based on an 'analog' environment and human relations. The process is characterised by local issues, blood-ties, face-to-face dynamics and direct participation. The individual is looking for religiousness to mitigate his distress, and becomes vulnerable to jihadist recruiters that misuse Islam for terrorist purposes. In a restricted socialisation environment, such as prison, the brotherhood, solidarity and in-group dynamics can activate the emotional drivers pushing the individual to the

jihadisation. The need of religious participation and ritual prayer led by 'hate imams', using hate speech to legitimate the violence against others, facilitate individual radicalisation. The jihadist proselytism and propaganda are restricted to a small group of participants, as affiliates, thus secrecy is an asymmetric asset for jihadism.

The option mentioned above makes law enforcement professionals use 'traditional' tools and methodologies to deal with behaviour profiles, standard criminal organisation models, communication dynamics and events timeline.

2) (Cyber-) Self-radicalisation — it occurs across the cyber-ecosystem and is mainly typified by global issues. The superficial religious knowledge based on simple stereotypes and few religious concepts characterise many violent products shared across the jihadisphere. The (cyber-)connections between supporters, followers, proto-jihadists and jihadists produce new (cyber-)slangs, concepts, thanks to the use of mobile devices, instant messaging apps, online game chats, etc. There is no geographic distance between people, the jihadisphere is the (cyber-)social environment as a completely new place in which the individual has his own experience. Space and time limits fall in a never-ending (cyber-)hub of hate and violence where i-nculturation and self-training are open and available for everyone whether they are active participants or not. The jihadisphere is created to provide open sources, activities and experiences across internet and social media platforms. The visibility and representation are an asymmetric asset for jihadism.

   Law enforcement professionals have to develop new tools and trans-disciplinary skills to deal with complexity, 'technolution' — technology-based criminal phenomenon evolution — multiactoriality, new (cyber-)social sub-culture and code, pathways profiles, instead of behavioural ones.

From its inception, the Islamic State has been able to exploit the emergence of the mobile culture in order to foster the self-radicalisation, encouraged by the development of specific technological resources to guarantee the security of information. Considering the relevance of the semantic as media battle asset, the author calls that process 'jihadisation' (self-radicalisation to jihadism) to underline the clear difference between religion and terrorism.

The jihadisation basically considers four different modalities, as follows:

1. 'imam of hate' preaching;
2. 'brotherhood' and recruitment in prison;
3. (cyber-)sociality across social media platforms;

4. 'mobile radicalisation' as self-isolation.

The acceptance of the jihadentity, that is jihadist identity model proposed across internet and social media platforms by the Islamic State, is based on six principal factors of context, shown below:

A. Violent cultivation — the promotion of a formal and informal violence-based system of justice;

B. Personal vulnerabilities — the capability to target specific audiences all over the world to inspire vulnerable people to attack;

C. 'Culture of terrorism' — the sub-culture globally widespread to reinforce in-group dynamic;

D. Mobile generation issues — the role of mobile culture for the digital natives and mobile born generations that perceive space and time in a completely new way;

E. Cyber-narcissism and compulsive selfism — the need of self-representing through the Web, sharing of oneself image and actions, using emphatic model and linguistic code based on a 'mythical' past by using concepts as knight, princess, realm, etc.

The jihadist self-radicalisation is exclusively connected to the internet, social media platforms and mobile apps. It is characterised by the providing of a complex (cyber-)experience across the Jihadisphere, especially for Western young audiences satisfying their fruition needs.

This process is articulated in an eight cross-levels system, as follows:

1. Literacy and education — books, magazines and app which, since his early childhood, provide the person with a view of life based on the recognition of the Adversary and the need/legitimacy to eliminate it;

2. Economy — misrepresentative exploitation of the zakat as a religious pillar based on the coining of Dinar as identification coin of the Caliphate;

3. Creativity — encouraging the realisation of user-generated contents, such as wallpapers, stickers, photos, magazines, books, videos, comics, nasheed, app, videogames and game mods. In this way, young individuals reinforce the collective identity, jihadist 'image' and the gamification dynamics used to activate hetero-direct violence.

4. Glocalisation — building and reinforcing of the collective consciousness and jihadist critical mass, able to involve more individuals in the active participation and/or promotion of the online spread of jihadism at a global level. From here the main role of the followers is guaranteeing the cross-media 'bouncing' of the jihadist media campaign and promoting violent self-determination at a local level according to always more asymmetric modalities.

5. Sadistic behaviour — posting, reading and watching violent contents through hyper violent tubes, social media, reinforced from the 'post-branding' following the attacks;

6. Technical training — manuals, handbooks, magazines and training videos;

7. Multi-actoriality — rhetoric and narratives which glorify and put several jihad interprets in connection, such as 'classic' mujahidin, foreign terrorist fighters, self-started actors, home-grown, lone wolf terrorists, followers, United Cyber Caliphate, sleeping cells;

8. Money income — criminal trafficking, THB, narcotics, money-laundering.

Therefore, the seductive power of the jihadist 'offer' in terms of complex (cyber-)experience is able to turn the self-radicalised individual into a lone wolf terrorist.

Conclusions

During the last year, the Islamic State has been launching its massive online media campaign to celebrate the lone wolf terrorist and promote the 'Lone Jihad' — focusing on the asymmetric power of the tactical-violent actions — improving its ability to create fear. Young individuals are particularly encouraged to attack against the Adversary, mainly soft targets, in several ways — shooting, stabbing, bombing and suicide-bombing, mowing down, stoning, intoxicating, hitting and screaming — getting inspiration from the Jihadisphere.

The lone wolf terrorist represents one of the most relevant threat of the contemporary scenario, though he is not a lone actor *stricto sensu* due to his (cyber-)life. In fact, the recent lone wolf attacks reveal the terrorists need to (cyber-)socialise and online share their actions.

The increasing power of the Jihadisphere and the spread of the Lone Jihad attacks imply that law enforcement professionals' analysis move from a traditional 'static' approach — based on the repository categorisation of the jihadist products — to a holistic approach based on multi-dimensional and proactive analysis of the interactions between the 'live' interactions across the Jihadisphere. The new perspective makes possible to understand the evolution of Lone Jihad and self-radicalisation phenomenon and its impacts on the new

generations with the aim to prevent and anticipate the 'Islamic State of Mind', as the most dangerous threat for the near future, in a 'swarm wolf' scenario (Antinori, 2017b).

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Macro trends in the smuggling of migrants into Europe: An analytical exploration

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Abstract
In this paper I take a closer look at the recent trends in two key migrant smuggling routes into the European Union — the eastern and the central Mediterranean — with the aim of identifying the analytical and empirical features of the markets for smuggling services. I show that these markets have the ability to expand considerably and often over a short period of time. I then argue that this is consistent with the presence of many competitive enterprises, low barriers to entry, low skills and (relatively) low capital requirements. The costs to the smugglers of monitoring agents and clients are also likely to be modest, particularly in comparison with human trafficking. The paper concludes by discussing some policy implications, including the adoption of land-based policies (regarded as more effective than naval operations).

***Keywords*:**
Human smuggling, illegal border crossing, migration, central Mediterranean route, eastern Mediterranean route.

Introduction

Illegal migration into the European Union is hardly a new phenomenon. Nonetheless, the magnitude of the flows witnessed by the bloc has registered a steep increase in the past few years, particularly at its southern borders. According to figures released by the European Border and Coast Guard Agency (Frontex), some 2 million illegal border crossings have been recorded between 2010 and the end of 2016 just at the Greek and Italian borders. This poses an extremely difficult challenge to law enforcement agencies across Europe, and more generally to Member States and the European Union as a whole. In this paper, I will

take a closer look at the evidence on migrant smuggling collected by individual Member States and then collated and disseminated by Frontex through a number of official reports (see References for details). The goal of this paper is to tease out the analytical features of the market for (human) smuggling services by exploring the macro-level evidence on illegal border crossings. This, in turn, should offer policymakers an analytical base upon which to build future policy responses.

The market for smuggling services

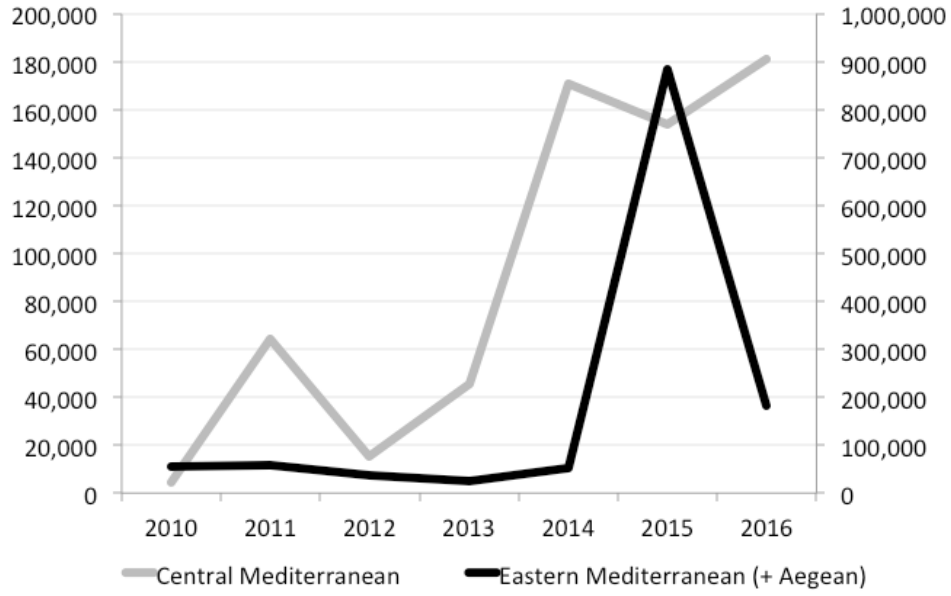
In this work, I interpret human smuggling as an illegal trade in which the commodity traded is primarily the illegal entry into a country (Campana and Varese 2016; Kleemans 2011). This sets smuggling apart from human trafficking, as in the latter case the commodity traded is primarily control over a person (see Campana and Varese 2016 for a discussion; also UN 2000a, b). Trade normally takes place in a market, which, by definition, is characterised by supply and demand. In this specific instance, migrants constitute the demand-side of the market. They are willing to buy a service, i.e. illegal entry into a country, for a variety of reasons (e.g. leaving war zones, poverty, economic hardship or persecution) that we shall not explore further. The demand for smuggling services is satisfied by a number of sellers. In this specific market, sellers are collectively defined as smugglers. Furthermore, the analysis presented below will focus on the Greek and the Italian borders to minimise potential biases related to the thorny issue of double-counting that affects the data on the Balkan and the Albanian routes; the Albanian and the Balkan illegal border crossings are — potentially to a very large extent — a subset of the Italian and Greek illegal border crossings.

Eastern and Central Mediterranean routes: macro-level trends

In the EU terminology, illegal border crossings into Greece and Italy are normally referred to as, respectively, the eastern Mediterranean route (this also includes the Aegean Sea) and the central Mediterranean route (this also includes the Ionian Sea and Malta). Figure 1 offers an overview of the number of illegal border crossings for these two routes between 2010 and 2016. It is worth recalling here that, from an analytical point of view, 'illegal border crossing' is the commodity supplied by smugglers. For ease of reading, I will henceforth refer to this commodity as IBC.

Both the central Mediterranean route and, even more remarkably, the eastern Mediterranean route have shown a considerable increase in 2014-2015. The rate of change year-on-year gives a further indication of the extent of the growth experienced by these markets. The number of IBCs along the eastern Mediterranean route increased by 1.641 % from 2014 to 2015. This translates into 885 386 illegal entries in 2015 compared to 50 834 in the previous year (+ 834 552). IBCs also increased remarkably along the central Mediterranean route:

Figure 1 — Illegal Border Crossings (2010-2016) ([6])

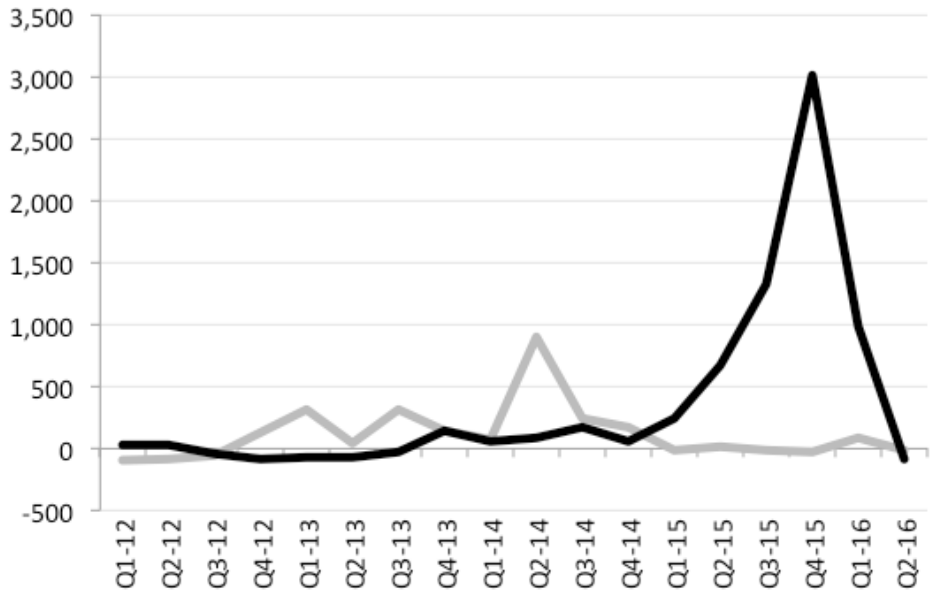


+ 199 % between 2012 and 2013 followed by + 277 % (2013-2014). Interestingly, this route also recorded a + 1.344 % year-on-year change between 2010 and 2011: this is a level of growth similar to that registered by the eastern Mediterranean route in 2015 ([7]). In other words, the ability of the market for smuggling services to grow by such very high rates does not appear to be a specificity of a single route. When favourable conditions arise, the market for IBCs is quick to expand. Figure 2 offers a more fine-grained picture based on quarterly data. To take into account the seasonality of the phenomenon (mostly due to weather and sea conditions), each quarter is compared to the same quarter of the previous year.

The ability of the market for IBCs to expand quickly is confirmed by the quarterly analysis. For instance, between Q4/14 and Q4/15, IBCs in the eastern Mediterranean route increased by 3.011 %. This is reflected in the absolute number of IBCs: they rose from 14 152 in Q1/15 to 68 168 the following quarter (+ 678 % year-on-year), then to 319 146 in Q3/15 (+ 1.329 % year-on-year) and finally to 483 910 in Q4/15 (+ 3.011 % y-on-y). The picture also shows the likely effect of the implementation of the EU–Turkey agreement that came into force in the second half of March 2016: notice the slowdown in Q1/16 and the negative growth in Q2/16 compared to Q2/15 (– 87 %). The available evidence suggests that, while the EU–Turkey agreement appears to have fallen short of completely 'shutting down' the eastern Mediterranean route (as 172 982 IBCs were still recorded between January and September 2016),

([6]) Central Mediterranean route is plotted on the left scale; eastern Mediterranean route on the right scale.
([7]) Although from a lower base: from 4 450 to 64 241 IBCs.

Figure 2 — IBCs: Rate of change for central Mediterranean (grey) and eastern Mediterranean (black), Q1 2012-Q2 2016, percentage of change year-on-year for each quarter



there has been nonetheless a considerable decrease over the 2015 peak (885 386 IBCs) ([8]) It is worth noting here that the EU–Turkey agreement is based mostly on a set of land-based policies (as opposed to naval operations such as those carried out in the central Mediterranean).

Theoretical implications

What are the analytical implications of the evidence discussed? The recent trends in smuggling activities presented above suggest that markets for smuggling services are able to grow considerably and often over a relatively short period of time. Such an ability to expand in response to changes in external factors (i.e. higher demand and/or lower pressure from law enforcement agencies) does not seem to be confined to a single route. In fact, both the eastern Mediterranean and the central Mediterranean routes have registered similar percentage increases at different points between 2010 and 2015. It is worth noting that we are considering here only 'successful' IBCs, i.e. situations in which the smugglers have managed to deliver successfully the services they promised (leaving aside considerations about the quality, safety and price of these services). The volume of activities generated by scammers and inept smugglers is not counted. The number of IBCs is therefore an indica-

([8]) The level of IBCs recorded in 2016 is still higher than that recorded in 2014 (50 834, see Figure 1).

tion of the level of successful market exchanges. So, what characteristics should a market possess to achieve an output consistent with the pattern described above?

I will now turn to a discussion of these characteristics with a caveat: a macro-level analysis such as the one discussed in this paper allows only for some preliminary conjectures on the analytical features of the market for smuggling services: additional micro-level studies are certainly needed to gain a more detailed picture.

Firstly, the absence of large monopolies. Arguably, monopolies would find it hard to satisfy such a sudden and vast increase in demand for their services. On the contrary, the trends in smuggling activities described seem to be consistent with a situation of market competition, i.e. a condition under which buyers and sellers are free to enter a given market.

Secondly, assuming that a large number of new smugglers have indeed entered the market to satisfy the large and sudden increase in demand, the implication is that these markets are likely to have low barriers to entry.

Thirdly, the high rate of growth suggests that the level of resources required for an actor to enter the market successfully or for an existing actor to expand his operations is likely to be relatively low. These resources include skills and capital requirements. For incumbents, the set-up costs are also likely to be relatively low.

Moreover, I have argued elsewhere (Campana 2016a) that one of the key factors hindering the growth of human trafficking organisations is (high) monitoring costs. Acquiring control over a victim with the purpose of exploitation entails a high degree of monitoring (on monitoring costs more generally, see Reuter 1983 and 1985). Although not directly comparable, a parallel reading of the data on IBCs and non-EU victims of human trafficking identified in the European Union immediately shows that the two phenomena manifest themselves at a different level of magnitude: on average, 2 198 non-EU victims of trafficking were identified between 2010 and 2012 (these are the most recent figures available at the EU level: see Eurostat 2015: 39; cf. Figure 1) ([9]). Thus, the expectation is that monitoring costs in the case of human smuggling are drastically lower than in the case of trafficking.

Finally, to support sudden and sizeable expansions in the market, smugglers and migrants alike need to rely on an infrastructure that is able to handle transnational payments and is equally flexible. According to many sources, the *hawala* system appears to perform this role well, and it is a popular choice among actors seeking a financial infrastructure to support smuggling-related transactions (on *hawala* more generally, see Varese 2015; van de Bunt 2008).

([9]) Non-EU victims of Human Trafficking identified in the European Union were 2 421 in 2010, 2 002 in 2011 and 2 171 in 2012 (Eurostat 2015: 39).

Policy implications

What policy implications can be drawn from the discussion above? In a context in which States aim to minimise illegal migration, the ability of the market for smuggling services to grow exponentially and over a relatively short period of time poses a dramatic challenge for law enforcement authorities and states alike. The presence of low barriers to entry and a competitive environment means that the market can meet sudden surges in demand, but also that the void created by the arrest of a single smuggler can quickly be filled by other actors.

While the EU–Turkey agreement appears to have been relatively successful in decreasing IBCs in the eastern Mediterranean, the EU naval operations in the central Mediterranean do not appear to have been able to achieve the same outcome. The latest EU naval operation in the Mediterranean, the so-called 'Operation Sophia' (Eunavfor MED), was launched with the goal of tackling human smuggling through 'the boarding, search, seizure and diversion of smugglers' vessels on the high seas' (EUEA 2016: 1). The available evidence does not point in the direction of a success in this respect ([10]). Furthermore, it is difficult to imagine how naval operations can be successful in reducing the number of IBCs without adopting an Australian-type policy of towing intercepted boats back to a third country (incidentally, this was done by Italy on 6 May 2009; on 23 February 2012, the European Court of Human Rights ruled the push-back of boats to Libya to be illegal: see *Hirsi Jamaa and others* v. *Italy*, 27765/09). Amenta et al. (2016) have empirically tested the effect of naval operations on the market for smuggling services in the central Mediterranean, and have concluded that 'Operation Mare Nostrum' and its replacements appear to have increased the size of the market for smuggling services. They have shown that these operations have produced a number of unintended consequences, including (a) stimulating departures from Libya, and thus the profits for smugglers, and (b) providing a subsidy to smuggling organisations by way of an 'insurance package' offered by smugglers to migrants.

Land-based policies may prove to be more effective than sea operations (Shortland and Varese 2014 have come to a similar conclusion in relation to tackling Somali piracy). Smugglers appear to be rational actors who enter this market when the opportunities arise and the benefits outweigh the costs. Therefore, working on the structure of incentives (and disincentives) in transit countries may prove to be an effective strategy in reducing the size of the market for IBCs.

Finally, there are indications that the market appears to be more demand-driven than supply-driven. This supports the adoption of wider policies that reduce the necessity to migrate and/or to rely on the smuggling market when needed. For instance, the adop-

([10]) There is little doubt about the ability of 'Operation Sophia' to provide humanitarian assistance to migrants — which is, indeed, a very noble task.

tion of schemes that resettle refugees directly from war-torn zones would be a step in this direction.

Conclusions

This paper has taken a closer look at macro-level trends in human smuggling into the European Union to tease out some analytical and empirical features of the market for smuggling services. It has shown that this market was able to grow considerably and often over a relatively short period of time in relation to both the central Mediterranean and the eastern Mediterranean routes. In this paper I then conjectured that, for a market to be able to achieve such an outcome, it must possess at least some of the following features: firstly, the absence of large monopolies. The existence of market arrangements more geared towards competition seems to be consistent with the trends observed and the preliminary evidence presented ([11]). Secondly, the presence of low barriers to entry. This includes low skills and (relatively) low capital requirements; newcomers are likely to face relatively low set-up costs. Furthermore, monitoring costs are in all probability limited, particularly when compared to related phenomena such as human trafficking. Moreover, a key element is the existence of an infrastructure to support financial transactions that is able to match and adapt to sudden changes in the smuggling market. The *hawala* system appears to possess this quality. Finally, some policy implications were discussed.

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([11]) Additional evidence is discussed in Campana (2017).

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What about AI in criminal intelligence? From predictive policing to AI perspectives

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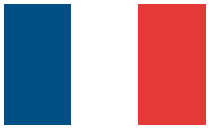


Abstract
Predictive policing is more and more developed around the world. TV-shows and fictions such as 'the minority report' or 'Person of Interest' spread a pre-crime effect that is, nevertheless, very different from reality. Many law enforcement bodies develop predictive analysis to find new opportunities against crime and it is generally dedicated to patrols. The Gendarmerie Nationale in France carried out through the concept of criminal intelligence a way to provide relevant information to describe, understand and foresee crime at different scales: operational, tactic and strategic. The aim is to upgrade the process of decision-making. Because crime is nor a random process neither a deterministic process, some features exist to characterise it. Obviously, it is very difficult and probably not possible to identify all features linked to crime evolution or criminal behaviour. Nevertheless, some characteristics are not so complicated to model in a formal mathematical structure. So, in the age of Big Data, applications of predictive analysis can be overtaken by artificial intelligence (AI). It is very developed in fields like medicine, finance or transportation and could on one hand provide new perspectives to fight crime but also on the other hand raise questions for future. Who will be the next organisation able to assure the best way to anticipate crime and criminal behaviour? AI could be defined as the capacity of a computer to model human reasoning. A grand challenge is opened for law enforcement but only if they are able to adapt their way of working to this new era. The scope of this paper is to describe the French development in predictive analysis and to open the potential use of artificial intelligence in different area of criminal intelligence without avoiding the risk of its new development.

***Key words*:**
Artificial intelligence, crime analysis, predictive policing, GAFAM, law enforcement.

Introduction

As proposed by the International Association of Crime Analysts (2014) 'intelligence' is perhaps one of the most confounding terms in crime analysis. Indeed, it is very difficult to embrace all the characteristics of crime in one field. Nevertheless, criminal intelligence in France is considered as the way to collect any kind of information required to fight crime by anticipation. For several years, the fight against crime in France, based on a posteriori methods has not been any more efficient and able to contain the criminal evolution. Indeed, the possibilities available to offenders in term of mobility or IT resources, allow him to commit multiple crimes with a great effect and minimal risk. The techniques of investigation are until today essentially reactive as illustrated by forensic sciences. Since Edmond Locard or Alphonse Bertillon, who were two pioneers in forensics, science has contributed to the resolution of many crimes. However, an a posteriori point of view is not sufficient today to face new forms of offences and offenders. The appropriation of new technologies in the field of common crime as serious and organised crime requires an evolution of law enforcement to adapt their modus operandi to anticipation and proaction. This is the reason why the Gendarmerie Nationale develops a criminal intelligence integrating new methods of prediction.

Criminal intelligence is defined as a concept that regards investigation and public safety. While in the first case, the aim is to analyse individuals or groups involved in crime, in the second case, the aim is more preventive by providing a macro view of crime and evaluating explaining features at different scales (short, medium and long term). In crime investigation as in public safety, criminal intelligence consists in collecting, analysing and valorising data to propose a way to reduce or decrease the number of offences by anticipation. Anticipative policing appears as an application of mathematical techniques to identify likely targets and prevent crime or solve past crimes by making statistical predictions. For 2 years, the Gendarmerie Nationale has developed a predictive approach of criminal risk (Berk, 2012; Perrot 2014; Perrot and Achi, 2015) oriented to common crime as serious and organised crime. Data analysis is, of course not, a new concept but the process of examining large data sets containing a variety of data to uncover hidden patterns, unknown correlations, crime trends, criminal preferences and other useful information needs to be encouraged in the Big Data era. Mathematicians are able to predict with a reasonable doubt hotspots, as well as when each type of crime might occur, by a careful and probabilistic analysis. But, within the development of a discipline that finds a name in 1956, Artificial Intelligence (AI), exciting new opportunities were now available. Is it reasonable to think that artificial intelligence could help law enforcement in the fight against crime? This paper will discuss the appearance of AI in many applications since 1956, its applications against crime and the interest for law enforcement to use it in criminal intelligence.

What about AI?

In the field of AI, Alan Turing appears as a pioneer. In 1950, he defined a test based on indistinguishability from undeniably intelligent entities-human beings and designed to provide a satisfactory operational definition of intelligence (Turing, 1950). The computer passes the test if a human interrogator, after posing some written questions, cannot tell whether the written responses come from a person or not. In 1950, the term 'AI' didn't exist but the idea that machines will be able to imitate human reasoning had emerged. Another great mathematician, John McCarthy, proposed in a summer school (Dartmouth College conference) in 1956 a name (or two letters) to a concept: Artificial intelligence (AI) (McCarthy, 1959). McCarthy tried to develop a language able to translate human reasoning in computer instructions. At this time, it was very difficult to imagine all the possibilities of such a way, but today in the Big Data era, many perspectives are opened and a great challenge is in front of law enforcement. AI is based on mathematical models used to solve real-world problems and have demonstrated all its relevance in many domains as varied as biometrics, medicine, transportation, or education.

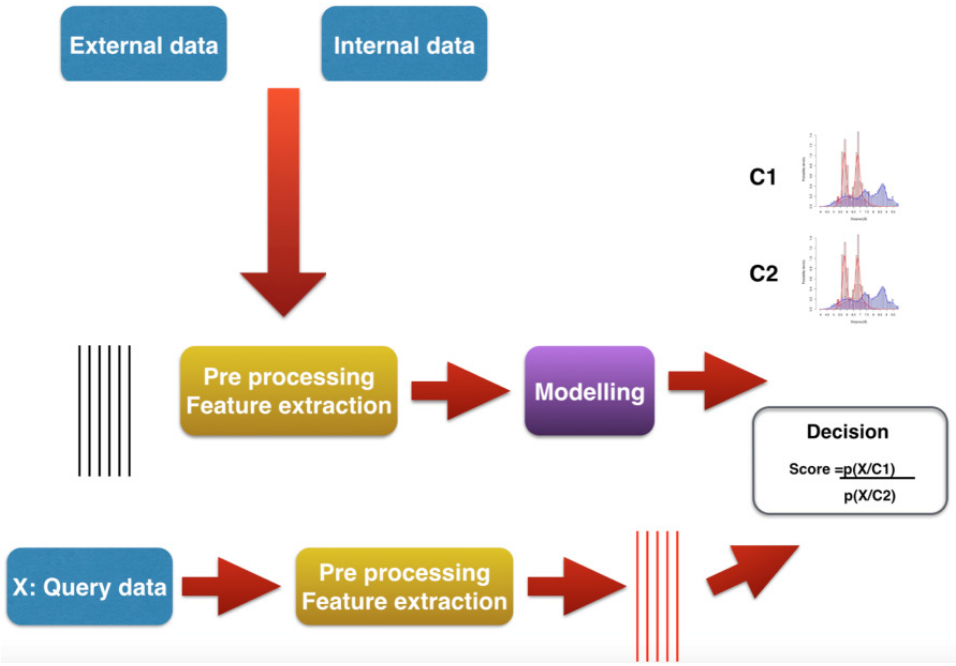
The AI core is called machine learning (Breiman, 2001a; Marsland, 2009) and its extension deep learning or q-learning for tomorrow. This discipline aims to understand the fundamental principles of learning as a computational process and combines tools from computer science and statistics from large datasets. Machine learning is very relevant to recognise but also to predict new patterns and provide a possibility to improve performance with feedback. To this end, machine learning has been applied, ranging from fuzzy logic reasoning to artificial neural network creation, in an effort to imitate the human logic and the way correlations or inference may be achieved. It is based on a set of observations to learn a model like in the case of the famous Pavlov's Dog experiment. In other words, within an expert system based on machine learning, we have a training sample of n observations on a class variable 'Y' that takes values (1, 2,..., k,) and p predictor variables, (X1, ..., Xp). Our aim is to find a model for predicting the values of 'Y' from new 'X' values.

Among the large range of machine learning methods, we can cite neural networks, Gaussian mixture models, classification tree or random forest and so on. Neural networks are based on modeling the neurons and feeding the network a set of training data to find patterns. A Gaussian mixture model is a probabilistic model that assumes all the data points are generated from a mixture of a finite number of Gaussian distributions with unknown parameters. Classification tree consists in modeling by recursively partitioning the data space and fitting a simple prediction model within each partition. As a result, the partitioning can be represented graphically as a decision tree. Based on the classification trees theory, random forests (Breiman 2001b) try to classify a new object from an input vector, put the input vector down each of the trees in the forest. Each tree gives a classification, and we say the tree 'votes' for that class. The forest chooses the classification having the most votes (over all the trees in the forest).

So, the machine learning theory is based on different phases: feature extraction, training, test and evaluation. Feature extraction is a type of dimensionality reduction that efficiently represents interesting parts of a query object as a feature vector. In the training phase, the features of an object or pattern are stored as reference features to generate numerical templates for future comparisons. The numbers of reference templates that are required for efficient recognition depend upon the kind of features or techniques that the system uses for recognising the object. In the recognition phase, features similar to the ones that are used in the reference template are extracted from an input object whose identity is required to be determined. The recognition decision depends upon the computed distance between the reference template and the template devised from the input utterance. The more training data, the better the pattern recognition. Figure 1 illustrates an expert system based on a phase of enrolment of data to create model, a phase of pattern recognition and a phase of decision.

The level of performance of an expert system is quantified most typically by a 'receiver operating characteristic', called 'ROC curve' or a detection error tradeoff curve called DET curve. This curve reveals the compromise between the 'false acceptance rate' and the 'false rejection rate'. The false acceptance rate is the frequency with which query data from different sources are erroneously assessed to be from the same source and the false non-match rate is the frequency with which query data from the same source are erroneously assessed

Figure 1 — Expert system principle



to be from different sources. The performance of a system falls on a point on the ROC curve whose location is a function of the matching 'threshold' applied. A higher match threshold reduces false acceptance rate and increases false rejection rate. On the contrary, a lower match threshold reduces the false rejection rate but increases false acceptance rate.

The decision step is a binary hypothesis testing problem expressed by:

H_0: impostor object

H_1: client (real) object

The $P_{fa}=P(x=1|H_0)$ is the probability of false acceptance then $P_{fr}=P(x=1|H_1)$ is the probability of false rejection

According to the Bayesian theory, these two kinds of errors are weighted by costs and summed into a single cost function, the Bayesian risk function:

$$B_{risk}= P(H_0).C_{fa}.P_{fa}+P(H_1).C_{fr}.P_{fr} \quad (1)$$

with $P(H_0)$: probability of an impostor object, $P(H_1)$: probability of a genuine object, C_{fa}, cost of false acceptance, C_{fr}, cost of false rejection.

$P(x|H_0)$ is compared to a threshold that divides the decision region between a region of acceptance and a region of rejection. If an object's matching score happens to fall above the thresholds, it is considered as genuine, if it is below as imposter.

One of the main advantages of an artificial intelligence system is its capacity to continuously learn any kind of information increasing the efficiency of a decision. Such a system takes into account different views, different perspectives and thus is proposing a more complete analysis. But what is important to consider is that AI is first an empirical science. AI follows a hypothesis-and-test research paradigm. The performance of these systems are very linked to the databases and to the algorithm used.

AI has developed so rapidly over the past few years struggling lesser to make sense of what they see or hear. Computers can now outperform humans in some cases. This is the case in the field of object recognition, face recognition, facial expression, speaker recognition and even emotion identification.

So, AI applications are more and more developed and common in our world. In 1997, Deep Blue, an expert system built by IBM, has already defeated the world chess champion, Garry Kasparov, in a six-game match after a defeat in 1996. Then, in 2011, another system from IBM called Watson, in reference to John Watson, the founder of the society, won in a jeopardy

game against humans. And recently, AlphaGo from Google, based on Monte-Carlo tree search with deep neural networks defeated a human European champion. Independently from this cases revealed by media, AI progresses day after day at a very high speed in many areas. For instance, Google, Apple, and Microsoft are competing to transform vehicle transport with self-driving vehicles. Some applications open up new ways for human to interact with embodied conversational agents (Wiendl et al., 2007) able to perceive not only the virtual but also the physical world as well as reactive behaviour control. Google and Facebook are designing chatbots that make decisions for users about diverse activities like commercial, shopping or travel arrangements. Such innovations could not be external to police affairs.

Application against crime: From predictive analysis to AI

The first step before the development of AI could be the predictive analysis development as we see in many countries. Among concrete applications, we can cite the modeling of crime characteristics in order to anticipate new occurrences. The Washington Times headlined about prediction: 'Never a crystal ball when you need one'. Even if such a ball does not appear as the good way, forecasting based on scientific methods is a real way of progress for criminal intelligence. Spatial and temporal methods appear as a very good opportunity to model criminal acts. Common sense reasoning about time and space is fundamental to understand crime activities and to predict some new occurrences. The principle is to take advantage of the past acknowledgment to understand the present and explore the future. Based on multiple methods including exponential smoothing algorithms (simple, double, triple), autoregressive integrated moving average techniques and neural networks, a prediction analysis is carried out on different offences. These models are fitted to offence time series data either to better understand the data or to predict future points in the series. They are applied in some cases where data show evidence of non-stationarity. Results are derived from two different sets of past data. The first one is used to train the algorithm and build the model and the second one is used to evaluate the performance of the model. Data from 2008 to 2013 constitutes the training set and data from 2014, the evaluation set. Based on the prediction model, a future evolution is proposed for 2015 as illustrated in Figures 2 and 3. The curves (below) illustrate a temporal evolution of a specific offence month per month. Blue colour characterises the real evolution, red, the prediction model and green, the predictive evolution.

Based on this curve, it is possible to optimise the allocation of resources during some specific periods but also to evaluate the performance of some modus operandi used in the past (last year or last month). Indeed, the delta between real and predicted value in 2014 must be explained in order to evaluate the efficiency of police operations and to optimise next actions. This kind of curve is developed for many offences and so, a prioritisation of actions

Figure 2 — Construction of the prediction model

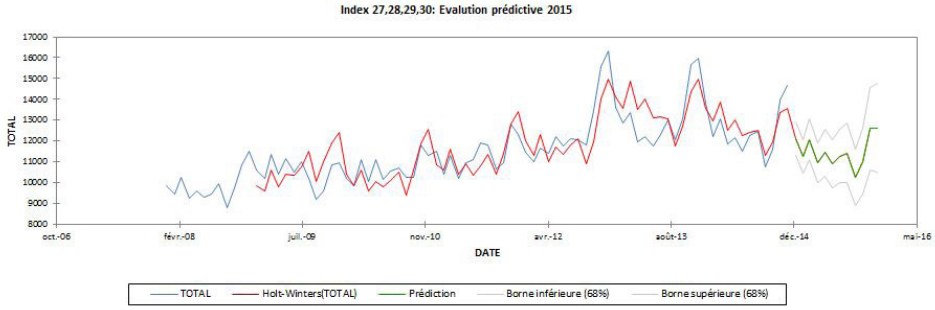
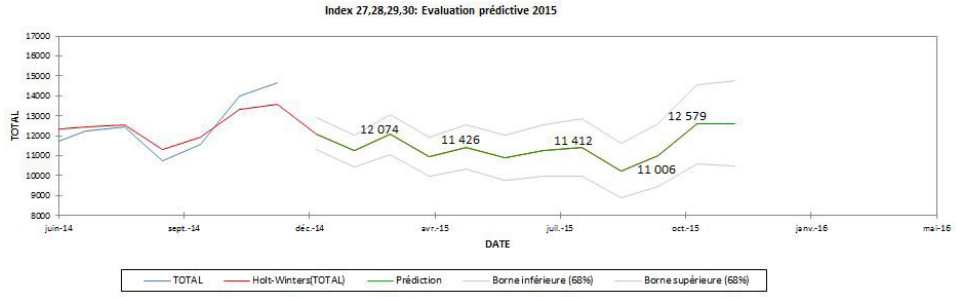


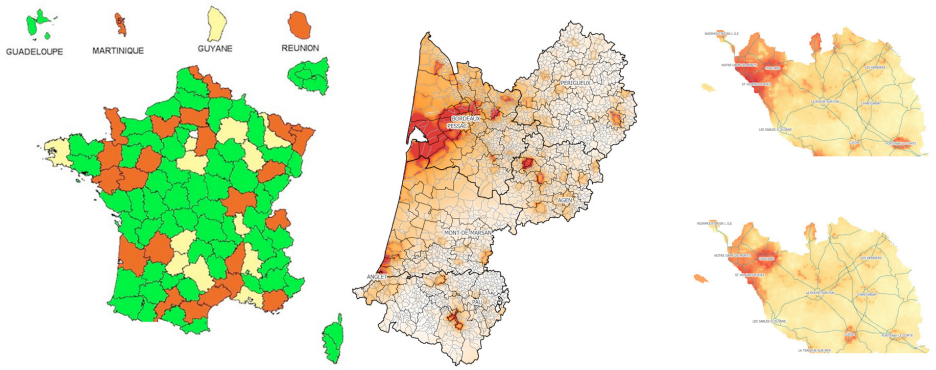
Figure 3 — Predictive evolution



can be proposed targeting the right offence at the right time. Complementary to a temporal view, a spatial analysis can also be carried out at different scales as proposed in Figure 4.

The main interest is to identify trends, patterns, or relationships among data, which can then be used to develop a predictive model and propose short, medium and long-term trends (Hoaglin et al., 1985) in order to inform police service at different levels. A map visualisation is very interesting and relevant to anticipate crime or criminal moving by evaluating the places of concentration or the dispersion movement. Such work can be completed by the association of external data in order to find explanation. For instance, based on a regression model it is possible to explain crimes like burglaries from social and economic data like urban development and population growth.

Figure 4 — National-Regional-Departmental view of a predicted offence



Because crime is neither a random nor a deterministic process, some features exist to characterise crime and perhaps offenders or police officers. Based on this assumption, it is possible to mechanise some tasks and upgrade predictive policing by applying AI techniques on the question of crime and to get benefits from machine intelligence.

Web 3.0, also considered as the semantic web, is a space where the data has its own meaning and its own means of production from connected objects. This web offers the possibility to deliver observational, behavioural and tailored content to individuals rather than to 'crowds'. Web 3.0 is a web of targeting based on massive data. From this concept a new form of police could emerge: a police 3.0 or 4.0 taking account of the analysis of massive data, the exploitation of connected devices and a capacity to provide individual profiles by anticipation. The question is to know who will be the master of this new police? The answer to this question is a real subject and challenge for the next years. The GAFAM (Google, Apple, Facebook, Amazon, Microsoft) and the NATU (Netflix, Air BNB, Telsa, Uber) global corporates collect more and more data every day and have a real capacity of analysis and produce objective results. In 2015, Bill Gates expressed that AI is entering a period of rapid advances. AI will fundamentally change how humans move, communicate and live. Today personal data and private information cannot be fully controlled. GAFAM are at the forefront of innovation in artificial intelligence, with active research exploring virtually all aspects of machine learning, including deep learning and more classical algorithms. They gather large volumes of direct or indirect evidence of relationships of interest, applying learning algorithms to understand and generalise. In the field of crime analysis it is easy to imagine some concrete applications:

— To recognise a known criminal in a specific area and send an email on a personal smartphone;

— To identify geographical and time hotspot areas of crime;

— To make a profile of criminal based on massive data;

— To indicate the level of multiple offences in a specific area; and

— Why not to replace a police officer by a virtual agent in specific tasks.

It could be very exciting to visualise on one's own smartphone a risk of theft or aggression on a specific area or to get an estimation of the number of pickpockets around us. It might provide the citizen with a sensation of control of his or her own security — but isn't it an illusion? Indeed, all these applications cause a risk for privacy and for the power to decide. In addition, without any control of the data, it will be very difficult to evaluate the reliability of the information. The risk is real and the best way to protect people from abuses and to avoid a police driven by ROI (Return On Investment), is to allow and rely on the development of AI applications by law enforcement.

In an era of accountability, law enforcement cannot rest on past accomplishments against crime for very long. Law enforcement must go one step further but step by step by rigorously respecting privacy. It is more and more important to be flexible and creative to face a criminality in constant and quick evolution. This new vision for future is a great and exciting challenge. Using computer to analyse how offenders react to questions combined with the ability to identify what sort of people they are, could also provide new opportunities to help investigators.

An expert system is able to autonomously learn crime activities and behaviours which otherwise would be masked in a global environment. From a theoretical point of view, AI can be used in three different cases:

— To model criminal acts;

— To model behaviour and criminal way of reasoning;

— To model behaviour and investigator way of reasoning.

The objective is to extract knowledge from these three sources and why not from a fusion of these sources. Nevertheless, to transform a theoretical point of view to practical applications is not so easy.

A possible use of AI is to model specific profiles of criminals. The principle of this approach consists in evaluating the possibilities that a suspect relates to an a priori class. The advantage of an AI is to train the model from criminological theory and from real case reports. These kind of applications could be realised to build a class model for specific criminals but also for victims. Analysis of the patterns formed by prolific offenders could be built on many elements, like their movements, their area of living, advertising or working, their habits, their type of crime, their previous convictions, their home, their daily activities, their social networks, the offence locations, etc.

Based on the same principle and in the case of financial crimes linked to sensible companies, a profile based on social engineering could define an evaluation risk of attacks. A first condition is to get a history of past cases in order to build a dataset of victims and another one of non-victims. The competitive hypothesis developed in the decision process is:

H_0: non-victim company

versus

H_1: victim company

and the risk for a query company to be victim is calculated by (1).

This kind of analysis starts to be used in order to find the most probable possibility. In future, it could also be possible to model the behaviour and the investigator's reasoning. But it is necessary to know: what is an investigator? — and this is a very complex problem to solve. In many cases, the investigation process is a logical enterprise in a logical environment, formed by the legal procedure. In addition, an investigator uses his own experience to increase his relevance. These different aspects can be modeled by an expert system based on the principle of training. One source of the investigator reasoning is the results of interviews carried out with the agents that could be used to train a model. A police officer on patrol most likely uses deductive reasoning and learns everything by experience (Bosio, 2011). So, the challenge for an expert system is to be able to incorporate experience and a way of reasoning. Yet, knowledge and intuition of the police officer play a central role. All the process is not logical and an investigator in front of a situation needs to keep an open and adaptive attitude. Technical and logical knowledge, although necessary, is not sufficient to account for the global process of investigation. Patrizio Bosio emphasises that the everyday experience of a police officer is imbued with grey areas and with excellent, albeit concealed, knowledge.

Currently, we can consider that a virtual agent able to provide objective help to a real investigator doesn't seem realistic because of the heterogeneity and the complexity of the situation that is not uniquely logical. Formal or informal perception plays an important role in the grip on reality for investigators. Because the human brain is not a chess program, AI is not completely ready today to emulate it. Understanding criminal investigations also requires inferring a hidden factor, namely, the intention of the police officer. But we cannot exclude for the future that the extension of AI in this field is based on an analysis of police officer patterns. Analyses could for instance include experience, age of investigators, trajectories, modus operandi of investigations, crime type, and so on.

In conclusion: the integration of AI is still a process under construction. Machines are learning to see in increasingly reliable and useful ways, opening up a wide range of opportunities and perspectives for law enforcement. AI can increase the capacity to receive real-time alerts of abnormal behavior and quickly respond to time-sensitive and critical events. Indecision and delays are the parents of failure, the aim is to upgrade human decision-making thanks to AI. The risk is to see these perspectives developed by private societies or industrial groups instead of law enforcement.

Conclusion

The aim of this paper is to prepare law enforcement to the unavoidable use of AI techniques. Generally in AI, systems are autonomous and can decide what to do and then do it. In the case of security, these kind of perspectives are not admissible, the decision must be human. The human decision-maker must be considered as the centrepiece for police operations even if powered by AI that accelerates the decision. Human decisions must be a sanctuary in the field of police activities. In such a way, AI methods provide mainly a support in the process of decision-making. It is an exciting time for the field, as connections to many other areas are being discovered and explored, and as new machine learning applications bring new questions to be modeled and studied. It is safe to say that the potential of AI and its application against crime lie beyond the frontiers of our imagination but must be limited by questions of privacy. Information communications technologies cannot supplant privacy obligations. This is one of the main reasons why law enforcement must be engaged in this way of development. The grand challenge is not for tomorrow but for today. And don't forget that AI can also be used by the criminal offender. What will be the future criminal uses of automated crime? How will criminals take advantage of advances in AI to extend and improve their criminal activities? We have already seen the very beginning of these activities in cyberspace. But what happens when computers think and can improve themselves on new forms of previously unanticipated forms of criminality?

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Pathways to Understanding Community-Oriented Policing in Post-Conflict Societies

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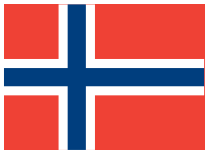

Abstract
This paper aims to provide a brief outline of an ongoing research project that is funded by the EU for a period of 5 years. The project titled 'Community-Based Policing and Post-Conflict Police Reform' will address different aspects of Community-Oriented policing and police reform in post-conflict societies. Community-based policing holds promise but also entails challenges. A clear ambition for the project is to identify both differences and commonalities in community-oriented policing in post-conflict societies. Human security will form an important backdrop for understanding key issues like post-conflict violence, peacebuilding SSR and COP. In this paper we point to some dilemmas and perspectives regarding SSR, COP, post-conflict and human security. In addition the paper provides an overview of the role of the Policing Experts Network as project advisors and evaluators for mapped community-oriented policing training and education material.

Keywords:
Post-conflict, community-oriented policing, human security, SSR, police training and education.

Introduction

Police reform in post-conflict societies has been receiving significant attention in recent years. Global threats (terrorism, drug and trafficking networks, etc.) often originate in conflict and post-conflict contexts where maintaining law and order is extremely challenging. The international community and the EU spend billions supporting police reform processes in post-conflict contexts (Bloching, 2011). However, increased use of resources and effort has so far failed to result in effective policing and trust-building in these societies. For example, in post-conflict societies, emphasis is usually placed on the police fighting

insurgency rather than crime; widespread corruption, abuse of police powers and lack of professionalism are some of the other factors that impede a well-functioning civilian police. A well-functioning national police force that is able to uphold the rule of law is crucial to state building. The rule of law is an important bastion of police reform in countries undergoing transition from conflict to post-conflict status (Mani, 1999). An all-inclusive approach to police reform is therefore essential to restore trust-based relations between police and the community in post-conflict societies (Bayley, 2001). Community-oriented policing (COP) is widely acknowledged to be an important policing model that can greatly enhance better cooperation and trust between the police and the community (Alderson, 1977, 1979, Bennett, 1994 and Greene, 2000).

Aims of the research

This joint research project seeks to provide solid empirical knowledge and analysis by conducting a comparative study of the causes and implications of security or insecurity in post-conflict societies. The project will be a unique study of community-oriented policing (COP) practices and experiences that captures both successes and failures, and compares them. Our comparative analysis will shed light on existing COP practices in South Asia (Afghanistan and Pakistan), Africa (Kenya, Somalia and South Sudan), Central America (Guatemala, Nicaragua and El Salvador), and south-eastern Europe (Bosnia and Herzegovina, Serbia and Kosovo). The selection is based on these countries' relevance in relation to the EU and international organisations' engagement in police reform.

It aims to reflect both success stories and worst-case scenarios. The underlying assumption is that key analytical, process-oriented lessons can be learnt both from what works and from what definitely does not work. Integrating security discussions into development discussions through the concept of human security gives us a good opportunity to study COP practices in post-conflict contexts.

One of the main aims of the research is to generate knowledge about human security at the local level. In our opinion, those best positioned to understand the interplay between security and development challenges are the community of women, children and men. In most post-conflict societies, issues of personal security and livelihood security are quite often intimately intertwined, and there will therefore be a need to understand how local communities cope with issues of human security, and how state institutions like the police can contribute to rather than threaten human security. As Marenin rightly points out, '… the fundamental problem and goal for the state, the police, and civic society remains security, which is broadly conceived as less crime and more social order, more physical and mental safety, and confidence by the people that they will be able to live and work knowing that they and their way of life will be protected' (Marenin, 2009: viii).

A unique feature of the research project is the presence of a Police Experts Network (PEN) comprising policing experts and professionals with extensive institutional and mission experience, whose role will be to support research planning and the dissemination of research findings on police practice. The findings from the research process will help to facilitate COP curricula, education and training in the case countries.

Challenges and dilemmas of police reform

It was not until the late 1990s and early 2000s that police reform gained increasing attention from policymakers and international reform actors as an important part of international assistance for capacity building in post-conflict societies. Despite this, however, research on police reform has remained sparse as an independent academic field of study (Zielger and Nield, 2001). There are several reasons for this lack of interest.

- Firstly, police reform and security sector reform (SSR) are used interchangeably as identical concepts in post-conflict security discourses. Policymakers recognised SSR as a much broader concept in security matters in international assistance and state-building interventions. As the DCAF Report points out, there is '…. little growth in knowledge about policing within the police community concerned with neither SSR, nor an increased sense of how the police matter in SSR and how policing affects the human security of a population' (Marenin, 2005: 29).
- Secondly, much of the SSR approach has primarily focused on a militarised security discourse, thereby undermining the importance of police reform efforts in post-conflict societies. Holm and Eide clearly describe this dilemma when they mention: '... the overly military focus of traditional international relations research on the one hand and, on the other, the more alternative approaches of the peace research community, which has tended to reject the importance of effective state power' (Holm and Eide, 2000: 2). In other words, the law and order role of the police has received much less attention, despite its potential for dealing with day-to-day law and order issues that affect the community. As Tonita Murray points out, '… there is considerable knowledge and experience available to adapt to police organisations in post-conflict societies, but such accumulated knowledge and experience is not being tapped into' (Murray, 2007: 118).
- Thirdly, some researchers have pointed to the western-centric approach to SSR, where the focus is on western-style models of reform and policing (Brogden, 2005**)**. Bayley argues that international police reform focuses on issues that are beneficial to donor countries rather than recipient countries (Bayley, 2005). Despite these dilemmas and challenges, sustainable development and building of peace and stability depends on the trust established between police and the people, as much as it depends on institutional police reform. This is where community-oriented policing becomes relevant.

The role of the police is crucial in post-conflict situations, especially in the transition from military to civilian-based security. However, this role is not very often clear. In these situations, tensions often arise between those advocating 'hard' security, such as combating well-armed and organised insurgents, and those concerned with law and order issues in and between communities on a day-to-day basis (Mani, 1999, Ferguson, 2004, Pinot and Wiatrowski, 2006). There is therefore a need for a police service that can both deal with armed insurgents and with day-to-day law and order issues in communities. However, the reform seems to lack mechanisms for interacting with communities, learning more about their particular security needs and finding ways to work together to address them. The best way of doing this in such diverse, volatile environments cannot be decided at policy level, however, but rather at the local level together with those whose lives are actually at stake. The importance of policing in post-conflict societies is clearly identified by Marenin: 'People want and need jobs and deserve employment, but they also need protection against normal criminals and organised violence. The issue of what to address first in post-conflict construction has no obvious answer, except to say that local civic society needs to have a strong voice in determining priorities and the sequencing of reconstruction projects, and that civic society and the state have both soft and hard security needs' (Marenin, 2005:10). Without community involvement and support, police reform efforts have little chance of succeeding.

Scope of Community-Oriented Policing in Post-Conflict Societies

One of the crucial questions that arise in post-conflict contexts is how to improve relations between law enforcement agencies and citizens, especially when the latter have been the victims of violence and corrupt behaviour perpetrated by the law enforcement agencies themselves. Trust between police and communities are extremely weak. That is why a civilian police service is clearly important as part of the state-building effort in post-conflict societies. The creation of a strong and successful police service and its ability to impose the rule of law is of fundamental importance to overall human security (Mani, 1999). This is where COP can re-establish broken links between communities and police, establish them where they may never have existed, or renegotiate them where they were poor in the past. However, this transition is not an easy one, because, in many post-conflict societies, the police themselves are viewed as a cause of insecurity, due to violent and abusive behaviour, corruption and their inability to deal with local law and order issues. Despite these challenges, COP as a policing model holds much promise in restoring and building trust in police/community relations.

Like the concept of human security, there is also wide variation in the definitions and interpretations of COP used by different actors, thereby raising questions about its utility at the operational level. In our project, we aim to capture the diversity of COP perspectives by looking at it from two angles: the top-down angle, which includes government poli-

cies and efforts, and police perspectives from the national, regional and local levels; and the bottom-up angle, which includes how COP is perceived by different communities of women, youth, men and minorities. The role of NGOs and civil society in general will also form an important part of our research.

Post-conflict

At first glance, the term 'post-conflict' can seem to be a misnomer, especially if we look at the countries that are involved in our research project. It can be argued that countries like Afghanistan, Somalia and South Sudan can hardly be classified as 'post-conflict' given the persistent violent conflicts that feature in the news almost every day. However, while conflicts can be devastating, they also vary within each region or country. For example, some areas in a country will experience relative calm and peace with very little violence, while other areas of the same country will experience violent conflicts in the form of insurgencies, conflicts about resources or a general lack of law and order.

Afghanistan is a good example of this variation. For example, parts of the country are experiencing heavy conflict as a result of local and cross-border insurgencies by the Taliban and ISIS, while other parts of the country are relatively calm. Our fieldwork in Nimruz bears testimony to this. It is a region where there is relative peace and calm with very little insurgency or violent threats to the local population.

Therefore, for the purpose of our research project 'Community-Based Policing and Post-Conflict Police Reform' project proposal 2014, (Acronym ICT4COP) ([12]), 'post-conflict country' primarily refers to countries where there have been high levels of violence and some degree of intervention, either in the form of national or international military or police missions, and that are undergoing some form of recovery and reform process (ICT4COP, 2014: 13).

Human Security as a conceptual framework

An interesting perspective in our project is linking security and development through the concept of human security**.** It links them by placing the security of populations, as opposed to the security of states, at the centre of the security debate. Whether the government is present or not, local populations must constantly negotiate the terms of their security or insecurity with whomever is in power in order to reconstruct their lives.

The concept of Human security (UNDP, 1994) originated in 1994 with the Human Development Report on aid and security discourses. Human security focuses on two main areas:

([12]) ICT4COP: This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under grant agreement No 653909.

'freedom from fear' and 'freedom from want'. It focuses on broader aspects of security, (economic, food, health, environmental, personal, community and political security) and on the different forms of interlinked insecurity people experience (Alkire, 2002). The concept recognises violence and poverty as major threats that are somehow related, although in ways that may not be immediately apparent. In its broadest sense, the term focuses on human vulnerability, encompassing threats of all kinds (Tadjbakhsh and Chenoy, 2007). At the policy level, there has been an ongoing debate about what this broad and all-inclusive concept means in relation to existing security and development policy, and whether it can lead to a meaningful shift in how international actors approach their engagement in post-conflict and fragile environments (MacFarlane and Kong 2006, Mack, 2002). Advocates of the concept point to its strength in bridging the gap between security, violent conflicts and development agendas, while critics point to its ambiguous and multi-interpretative nature and question its usefulness at a practical level (Paris, 2001, Gasper 2010).

As there is no common consensus on the definition itself, many countries have approached it in different ways. For example, the Canadians have used the concept to humanise their security agenda by concentrating on key issues like poverty alleviation, strengthening governance and accountability, human rights and social justice in their peace operation missions (Axworthy, 1999), while the Japanese take a broader view of human security, their emphasis being on its humanitarian aspect. They have set up a Human Security Trust Fund to provide funds that can be used operationally on the ground to assist community development projects in fields such as education, health, agriculture, landmine removal, etc. (Atanassova-Cornelis, 2006, Glasius, 2008). Nonetheless, whatever the focus, the question remains how the relationship between conflicts, violence and poverty can best be understood in post-conflict societies, and how this can be addressed in a more integrated way by actors at the local level. In the report Security Now: Protecting and Empowering People, the Commission on Human Security (2003) points to the involvement of a plethora of actors, such as NGOs, regional organisations and civil society, in managing human security, and stresses that empowering people is an important factor in human security and that state and human security are dependent on each other. As the report tellingly points out, 'Without human security, state security cannot be attained and vice versa. Human security requires strong and stable institutions. Whereas state security is focused, human security is broad' (Commission on Human Security, 2003:6). An accountable national police is a prerequisite for good state-building.

Police Experts Network

A common complaint running through different police reform missions is the challenge of capacity and competence building in a long-term perspective. Police reform and capacity building in conflict and post-conflict societies takes time. As A. Rathmell mentions in the case of Iraq; '…programmatic delays combined with the very short time horizons

hampered the implementation of the capacity building, reform, and institutional-building programmes' (Rathmell, A. et al., 2005: xi). One of the ideas behind the establishment of and inclusion of the Police Experts Network (PEN) in ICT4COP was to create a forum that could bring together academia and practitioners on the ground (i.e. individuals with police experience). The Police Experts Network is coordinated by the Norwegian Police University College (PHS), and aims to mobilise a range of police experts and professionals linked to police institutions, NGOs, IGOs and police missions who can directly integrate and apply research findings in training/education programmes in post-conflict countries. Our project-based Police Experts Network includes policing experts and police professionals with responsibilities in key European and international institutions/organisations/missions and from case countries. For each case country, a network of police experts and research actors will be formed to interact during the entire research process.

As of February 2017, 56 individuals (13 female) representing 20+ different nationalities are registered as Police Experts Network members, 35+ with a policing background.

One of the main tasks will be to engage members in discussions on community-oriented policing in post-conflict settings. Training and education materials collected from focus countries (where the project will directly study police–community relations) and from selected European countries and international organisations where COP training and education is provided will be mapped in order to identify and disseminate 'best practices' and 'lessons learned'. PEN will also be activated to assist with other work packages under the ICT4COP project on developing Community-Oriented Policing Handbooks.

For the research project, the Norwegian Police University College has created an electronical database platform for 'COP training and education'. The database is only accessible to PEN-members and researchers involved in the ICT4COP-project. It will include information on:

- Owners and authors: who owns the material, what are the intellectual property considerations and who is responsible for its development/maintenance, contact person.
- Is the course only available for training law enforcement personnel or can a wider audience (NGOs, etc.) be given access to and the right to use the material.
- Is it a basic, intermediate or advanced course/training?
- Are the courses accredited and are ECTS credits obtained after successful exams.
- Delivery method: i.e. self-learning, online learning, classroom-based or a combination.
- Technical requirements for successful delivery of the course.
- Assessment: is the course assessed, and if so how?

In addition to the abovementioned mapping questions, several additional questions have also been included that are relevant to the research project.

- Who are the actors involved in COP training and education?
- Who were/are the actors involved in the development of strategies for COP training and education?
- What are the links between national governments and COP training and education strategies?
- Who attends the community-oriented policing training that is mapped?
- Are there cultural differences in the interpretation of the notion 'community-based/oriented policing'?
- Are there different approaches to and understandings of the notion 'community-based policing' in the mapped material?

The ICT4COP timeframe is 5 years ending in June 2020. The advantages of connecting practitioners and researchers are twofold. Firstly, the researchers find that contact with police officers with 'boots on the ground' has distinct value. Secondly, the members of the Police Experts Network will be in a better position to interpret the mapped training material from a practitioner's point of view, as intended. For example, the need to delineate the research efforts became obvious in the case of Pakistan, a federal country with a huge variety of different, independent police agencies/forces and education institutions. In one region, namely Punjab, almost 10 different basic and advanced police education institutions have been identified, and the same applies to other regions in Pakistan. National knowledge at the local level about the organisation and structure of the police has proven to be of great value when mapping training material.

In the latter phase of the project, handbooks and other material will be made available to the EU and other international institutions educating and training police personnel serving on police reform missions. The PEN members will also be engaged in the development of elearning modules in Community-Oriented Policing in close cooperation with Ruhr-University Bochum, Germany. By involving these police professionals, the project aims to influence the way COP is understood and practiced by institutions/countries that contribute to policy, training and education through the EU and international organisations. It will also create a forum promoting reflection and a better understanding of the differences between the institutions that provide police personnel and host country institutions as regards their understanding and practicing of community-oriented policing. Continuity is an important factor for a successful police education and training in post-conflict societies. One of the biggest challenges in police development programmes as pointed out by Albrecht and Jackson is 'how to retain and pass on institutional memory remains a real issue' (Albrecht, P. and Jackson, P., 2009: 173). This is where PEN will be an important bridge

between the research process and the application of the findings in COP education and training curricula both in Europe and case countries.

Moving Forward

The study approach will be explorative and qualitative. Our research will be conducted in all case countries in close collaboration with the experts in our Police Expert Network and ICT partners. Data will be collected through semi-structured interviews, focus group meetings, case histories and key informants. Participants will include communities of women, men, youth, ethnic groups and other groups that may be relevant in the particular context, from both the city and village level in all case countries. Data will also be collected from government and non-government institutions, civil society, the police establishment and other authorities that will be relevant to our project. In short, our data will comprise state-centric and people-centric perspectives on the issues of COP and human security.

Of course, individuals' perspectives and experience are crucial to our understanding. They can lead to new and different ways of looking at and understanding the issues at hand. However, while it must be remembered that narratives are not static and will always contain contested elements, they nonetheless help researchers, practitioners, communities of women and men and policymakers to understand how individuals locate and experience their social world (Hopkins, 2004).

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Community engagement: Considering adult-learning and problem-solving methodologies for police training

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Abstract

Police engagement with communities is a central focus of many law enforcement agencies. The capacity to successfully integrate in such a way may come naturally to some, but the training through which new police officers are placed should also prepare them for any such organisational ethos. While many police training interventions follow traditional learning delivery platforms, the introduction of interventions which address and consider adult learning approaches and problem-solving supports can significantly contribute to the development of skills and competencies which allow officers to engage even more effectively with the communities they serve. The inclusion and consideration of various models of learning in the police training and education process is essential, so that maximum benefit from the process can be afforded to learners, the organisation, and, the wider community. This article considers the inclusion of andragogy (Knowles, 1980) and the problem-based learning (PBL) approach to learning in police training, so that the development of skills necessary for community engagement can be facilitated.

Keywords:

Police training, adult learning, andragogy, problem-based learning, community engagement.

Introduction

Given the changing nature of society and the resultant demands placed on any police service, the question of what exactly are the most appropriate methods of educating police officers is a recurrent one. Chappell (2008) reminds us that it is only in the last 50 years or so that the study of law enforcement training has achieved its own space in the broader sphere of training and development. Some approaches to police training utilise teacher-centred approaches at their core (Werth, 2009) and were often developed on a military model without enough thought perhaps being given to the transactional elements of learning (Vodde, 2008). The teacher-centred approach is viewed by some as one which does not allow a person to develop the ability to act outside set sequences to solve problems or to deal with changes (Gagne, 1962). The role of the police in society requires officers to have the ability to think critically and problem-solve effectively (Birzer, 2003). With this challenge, there is increased debate on how police training should be constructed and delivered. In this article, the concepts of andragogy and PBL are introduced to the debate, with the intention of considering more than just traditional training methods when it comes to the training of police officers for the modern world.

Doing the basics of policing

In recent years, the return to a policing model which places community policing at the centre of its operational strategies (Tilley, 2003, cited in Newburn 2003) has been a catalyst for the examination of how police training is delivered. McCoy (2006) stipulated that this necessitates the police officer 'to be a problem-solver, be self-directed, have respect for diversity, and be an effective communicator' (p. 88). Once selected for basic police training, student police officers must be facilitated in developing the skills necessary to do their job effectively, as protectors of the community.

The following words were written by a police consultant in New York almost a century ago, and while a variety of police skills are mentioned, the unchanging role of the police officer as a problem-solver and decision-maker is remembered:

> *'On his first tour he (the police officer) may be called to handle a serious incident wherein several persons are injured … summon medical and police assistance, arrest the person or persons criminally responsible, procure witnesses and … take a mental picture of the scene, assist the injured, render first aid, get the data report and keep the traffic moving. He may have to cope with a holdup or the commission of some other serious crime when he will have to bring into play his power of observation, his knowledge of human nature and his native cunning (sic.)' (Cahalane, 1929, p. 166).*

Training is the keystone in the process which assists in the development of these necessary skills and, therefore, consideration must be given to what can best achieve this targeted end capability.

So why consider andragogy?

While there are many theories of adult learning, one of the best known of them is the theory of adult learning known as andragogy (Knowles, 1980). Andragogy places at its centre the premise that there are significant differences between the way in which adults and children learn, and seeks to focus on those different needs exhibited by adult learners. Knowles differentiated between andragogy and pedagogy, as viewed in the traditional sense, and thought it important to consider what exactly each brought to learning.

Knowles (1980) stated that 'the pedagogical model assigns to the teacher full responsibility for making all decisions about what will be learned, how it will be learned, when it will be learned, and if it has been learned' (pp. 55-56). Andragogy, on the other hand 'is a theory which is vastly in contrast to the traditional pedagogical model and it advocates both the self-directed learning concept and the teacher as the facilitator of learning' (Knowles, 1980, p. 57).

> *'The five assumptions underlying andragogy describe the adult learner as someone who (1) has an independent self-concept and who can direct his or her own learning, (2) has accumulated a reservoir of life experiences that is a rich resource for learning, (3) has learning needs closely related to changing social roles, (4) is problem-centred and interested in immediate application of knowledge, and (5) is motivated to learn by internal rather than external factors' (Merriam, 2001, p. 5).*

Long (2004) mentioned the concept which supports 'the unimaginative traditional view of the adult learner represents the adult as a big child' (p. 24), while the needs of the adult learner dictate that they need to know and understand why they are learning, how it applies to their lives and how it can benefit them. A child will attempt to achieve prescribed levels of success whereas an adult will need further and more expansive meaning and application put to the learning. However, it should also be noted that most adult learners possess high levels of motivation and task-orientation. This adult need for fulfilment, and practical direction to their learning, is central to the theory of andragogy, and life-long learning in general (Laal and Salamati, 2012).

Implications of andragogy for instruction

Galbraith (2004), when expressing the purpose of teaching adults, stated that it is the facilitation of personal growth which is at its core. This development should be done with the aim of improving 'the professional, social and political aspects of learners' (p. 3). This point can be broadened as it is directly indicative of the student-centred approach applied in the use of andragogy. The 'learner leader' is there to facilitate the growth, not to direct it in a pedagogical fashion. Even though the instances and circumstances of when adult learning takes place may change, it is this central pivot of the process which must be remembered. The importance of the facilitator does not diminish with the taking of this approach. It is essential that the facilitator of adult learning is accessible and supportive throughout the process. The facilitator must remain accessible and continue to be regarded as a resource.

Knowles (1980) also considered the importance of the 'learning climate' (p. 46) for adult learners, and saw it as imperative that the physical environment and the psychological climate is conducive to creating a secure and supportive place in which adults can learn. The option of questioning that which is being presented to them and not just having to accept it because the 'teacher' says so is a core climate requirement for adult learners in this regard. What should not be separated from the creation of this environment is the behaviour of the facilitator towards the learners. To bring it back to basics, the consideration that you are in fact planning to address adult learners must be included in lesson planning, to ensure the creation of a stimulating learning environment. The adult learner is the most important focus of all the orbiting decisions and agreements as the adult learner is experienced, motivated, self-directed and ready to learn. What a platform for a facilitator or programme designer to begin from?

Learning from problems

Barrows and Tamblyn (1980) defined problem-based learning (PBL) as 'the learning that results from the process of working towards the understanding of a resolution of a problem' (p. 1). Problems are presented to students and are then used as the centre from which the enhancement of problem-solving, critical thinking and the development of independent learning skills can grow. The process is student-centred and refers to the fact that the main responsibility for learning is placed squarely on the shoulders of the students. The PBL approach first developed in the field of medical education and it involved the embedding of the learning process in problems, or scenarios, based in real-life. This approach soon drew attention from other educational fields as to its further application.

The approach is grounded in the constructivist approach to learning (Ultanir, 2012) and as such follows the associated assumptions which proffer that: 1. knowledge is constructed

individually and socially from interactions with the environment; 2. different phenomena invite multiple, related perspectives; 3. knowledge is anchored in relevant contexts; and, 4. meaning and thinking are connected to the culture and community in which we interact (Hung et al., 2007). This constructivist, student-centred approach 'empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem' (Savery, 2006, p. 12).

Andragogy and PBL in police training

'Educational theorist Jerome Bruner suggests that a curriculum ought to be built around the great issues, principles and values that society deems worthy of continual concern' (Rippa, 1969, cited in Glenn et al., 2003). While Bruner wrote about education, Glenn et al. (2003) commented that his vision 'is no less applicable to the education of those who serve the public' (p. 51). Therefore, the changes in society which have seen police forces begin to adopt more community-focused policing strategies should also be considered as influences on the choice of training selected to enable the successful implementation of these strategies.

Depending on circumstance, different training models require the consideration of the principles of both pedagogy and andragogy. In this situation, both sets of principles should not be considered as opposites but as methods of achieving the best experience possible for the learners. Knowles (1984) reminded us that, while andragogy should be acknowledged as being a model of learning which includes certain assumptions about how adults learn, the pedagogical model should not be discarded as a method of learning. Rather than seeing pedagogy and andragogy as in opposition, and pitting them against each other, they should be seen as two ends of a spectrum (p. 43).

The suggestion that pedagogical training methods still remain dominant over those considering andragogical methods in police training is one that has been argued by many (Birzer and Tannehill, 2001; McCoy, 2006; and, Marrenin, 2004, cited in Ryan, 2008). Birzer (1999) suggested that there must be a 'symbiosis' between the implementation of a self-directing training environment and the support which is given to police officers working under the community policing ethos. The further suggestion that 'many similarities exist between the andragogy theory and the community policing philosophy' (Birzer, 1999, p. 18) also supports the premise that incorporating both mindsets into the learning environment will develop the problem-solvers sought by modern day policing.

Glenn et al. (2003) have detailed the case for restructuring the training methods used in police training and make the case for training which facilitates the development of skills essential for community police officers, but point out the necessity in some circumstances to stand by the traditional method of instruction. When giving instruction in the firing of

a weapon, Glenn et al. (2003) agree 'there is little need or desire for individual variation' (p. 57), as precise, exact and definite instruction is required in the use of the weapon. However, the individual police officer will be able to make decisions surrounding the use of the firearm, in a way that goes beyond the rote learning of how to operate it in different situations, once training has been structured to reflect the necessity.

A change of mindset is required which embraces the pedagogical model alone, to a model which embraces the principles of adult learning in a positive and meaningful way, along with the view already held. The differences in the needs of the learner at the centre of both of these models will now be contrasted. Peace (2006) stated that this view must be taken to ensure training may be transformed to meet the needs of society and that 'the cornerstone of the success of the community-oriented neighbourhood policing strategy must now rest with the foundation training provided' (p. 336).

Gianakis et al. (1998, p. 486) contended that the requirements for a new approach to policing communities need to be supported by changes in the support structures of the police organisation. These support structures must include the training afforded to its members.

> *'By re-organising the police force into a community-oriented, decentralised and independent organisation with participatory management we can get both satisfied customers and satisfied employees. Police must engage in community-based processes related to the production and maintenance of local human and social capital. The means by which these goals are to be achieved are through the development of strong relationships and institutions and individuals in the community' (Feltes, 2002, p. 53).*

Reith (1956) explained that the policing concept embarked upon by the first commissioners of the London Metropolitan Police was:

> *'…unique in history and throughout the world because it derived not from fear but almost exclusively from public cooperation with the police, induced by them designedly by behaviour which secures and maintains for them the approval, respect and affection of the public' (p. 140).*

The context of teaching is vitally important in achieving such interaction and community integration. Tharp et al. (2000, cited in John-Steiner and Mahn, 2003) stated that effective teaching requires teachers 'to seek out and include the contexts of students experiences and their local communities' points of view and situate new academic learning in that context' (p. 134). This contention that learning, development and teaching takes place in a social and historical context is furthered by Vygotsky (1994) when he stated the importance of knowing where and when a person is from cannot be ignored. Birzer (1999) attested to the importance of the training curriculum in training police officers, both at their induction and throughout their career. The structured, formal way in which training is approached puts

a high emphasis on expertise but 'puts undue stress on students and does not encourage effective learning or support the community policing mission' (p. 18).

Peace (2006) goes on to say that 'behaviourist teacher-centred tuition is effective in addressing the need for programmed instruction, while the humanist student-oriented approach will succeed in enabling affective issues to be explored' (p. 346). While the use of adult learning principles is not suitable in all areas of training, in this instance, to achieve the skills required to foster a community policing ethos within An Garda Síochána, it is a method which is applicable.

> *'The training conducted in the police academies should highlight self-directed learning on the police recruit's part. This can go hand-in-hand with community policing. For community policing to be successful police officers have to be self-starters. When they (the police officers) discover a problem they will be expected to solve it in cooperation with members of various groups in the community. What better place to implement the self-starter role of a police officer than in a police recruit training academy? Recruits in training academies will benefit from an environment that incorporates many of the principles from the andragogy model of learning' (Birzer et al., 2000, p.18).*

While the 'traditional' method of police training just referred to is behaviourist in its essence, and takes a teacher-centred approach to learning, where topic experts give their knowledge to students as passive recipients (Werth, 2009), this process does not altogether support the development of analytical, critical decision-making and problem-solving in most cases (Birzer, 2003; McCoy, 2006). It is on this point that many writers state the benefits of problem-based learning as a method of police training, over, or at the very least in conjunction with, traditional police training methods. The similar skills required by their students to carry out their roles, albeit in different environments and situations, brought police educators to examine the abilities of PBL as a tool to foster the use of critical thinking, problem-solving and self-directed learning. Police training facilities began to engage with the concept and the Royal Canadian Mounted Police training centre at Regina, Saskatchewan became the first to implement the methodology in the 1990s (Werth, 2009). Soon after, law enforcement agencies throughout North America and around the world followed the lead.

While police training has used the PBL method to develop certain skills, it is accepted that there are some topics within police training which still utilise a more traditional, behaviourist style method of training (Moody, 2010), with these topics including firearms training, self-defence and physical training. While literature and research has shown that approaches embracing andragogy and problem-solving have their place in the training of police officers, it should be remembered that these approaches are not designed to replace more traditional pedagogical models of training, but to work hand in hand with them to address the needs of those undergoing the training.

Police training in an Irish context

At the foundation of the Irish State in 1922, An Garda Siochana (translated as Guardians of the Peace), the Irish Police Service, embraced a community policing approach to the delivery of its service in the community. This concept of policing sees the police as being part of the community, working in the community, and solving the problems which the community experiences. While community policing was central to the ethos of An Garda Siochana from its inception a focus on the core skills required to carry out such policing needs to constantly considered. The skills and techniques include the ability to problem-solve, make decisions, critically analyse situations and exhibit a level of confidence while doing so. Some are naturally possessive of these skills, while others need them to be garnered, developed and realised. Therefore, it is essential that every effort is made to allow this process to take place while undergoing all manners of training.

Encouragement the ethos of community policing and problem-solving in the training environment will assist in the development of skills and allow transfer of learning to the workplace. If you can show significance in the outside world, for the skills being learned in training, then the transfer will take place from the classroom to the outside world. This acknowledgement by An Garda Siochana that community policing is central to the work and ethos of the organisation reinforces the need for training to support and develop the achievement of this ethos. McCoy (2006, p. 79) stated that it is essential that there is a shift away from traditional police training methods to enable the achievement of the required skills for community policing to be achieved. A move from teacher-centred instruction must make way for learner-centred training.

> *'Community policing does not allow the police officer to use his patrol car as a shield from the public. Instead, community policing demands that the officer establish trust, communication and ultimately, a problem solving partnership with the citizens he or she serves to make a lasting difference in the community. We no longer want to diffuse a problem, we want to solve it' (Birzer et al., 2000, p. 8).*

As a result of the direction chosen for the delivery of the policing service in Ireland, the development of the individual in this regard is essential. No longer can all training be teacher-centred and pedagogical in its essence. Therefore, the relevance of adult learning and problem-based learning theories to police training is clearly evident, when what is being sought from police officers is examined and what can be delivered using these theories is acknowledged. Current Garda Siochana basic training is built around the PBL approach to instruction and integrates the learning of police procedures with the development of the capacity to problem-solve and make decisions. This approach to achieving a more applied and analytical police officer is central in the delivery of the BA in Applied Policing which all new entrants to the organisation need to complete successfully.

Conclusion

While traditional police training is based on a pedagogical model which revolves around discipline and curriculum content, changes in policing requirements within modern society challenge the types of police officers which this sole method of training may produce. Positive working relationships, and community interaction, between the police and the public are essential. There is a place and a time for the use of pedagogical instruction, yet the consideration of other methods of training is viewed as being essential, as the introduction of self-directed learning principles will encourage the further development of students. Having learned how to problem-solve and approach situations with a level of analytical capacity perhaps not possible to achieve with traditional learning methods alone, will allow a transition from the learning environment to the operational policing arena. The expansion of the use of adult learning principles and PBL can move the training from the traditional teacher-centred situation to a more learner-centred one, therefore supporting the individual and society in the process.

An Garda Síochána is an organisation which realises this self-confidence in the individual as core to the implementation of the philosophy of community policing. The power of self-confidence within the individual is essential in attaining a high level of engagement and communication with the community. This is why the context of learning is so important. Police officers operate in an individual capacity when making decisions on a constant basis. The ability to carry out such a process is not one which is granted to all, but it is one which can be learned and developed. While many different skill sets are essential to the effective working of the police service, problem-solving and decision-making are at the centre of these core skills and can be assisted in development using the learning interventions discussed. While these interventions are essential to educating police officers in an Irish context, it should be remembered that not all the current training that is delivered needs to be cast aside and redeveloped but rather complimented where possible by other approaches to learning.

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Investigative Strategy: The application of strategic principles to criminal investigations

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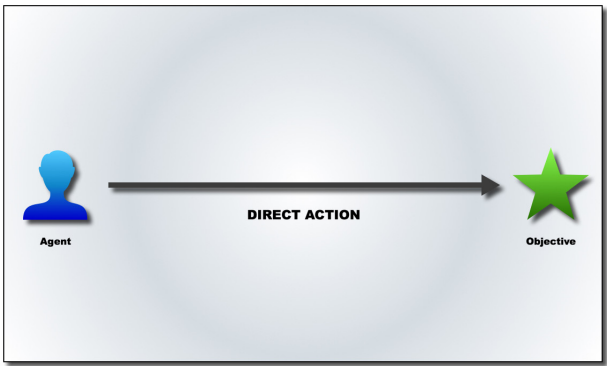
Abstract
Strategy is a wide collection of ideas and insights that have been used since time immemorial to face the 'fog of war'. In the last century the key concepts of strategy have moved into many other fields, such as economics and mathematics. The analysis presented in this paper applied the concepts of strategy to criminal investigations. In both fields a need exists to face and fight against a conscious opposition to win. In order to apply them to modern criminal investigations, the paper borrowed ideas from historical masters of strategy: Sun Tzu and Ernesto 'Che' Guevara; von Clausewitz, Lawrence 'of Arabia' and Mao Zedong; John Boyd and Miyamoto Musashi; Hagakure, 36 Stratagems, but also the doctrine of special forces. The paper analyses how investigations are affected by 'friction' and lack of resource; how detectives could proficiently use knowledge of the antagonist, surprise, deceptions and stratagems; how speed, rhythm and timing, but also the adherence to principles of invisibility, irreversibility and completeness, could help to improve the results of criminal investigations. One of the aims of this paper is to show that the study of strategy could effectively increase the ability of investigators to solve cases. We hope that the paper will trigger a debate about the incorporation of strategic thinking into investigative practice and training.

Keywords:
criminal investigations, strategy, strategic investigation, investigations strategy, tactics

Figure 1 — The agent wants to reach the objective. The easiest way is the direct one.



Some thoughts about strategy

'Strategy' has been defined in many ways by people who studied it: sometimes like an art, sometimes like a science, more often like both.

In defining what strategy is, it might be useful to explain what strategy is not. Strategy isn't 'praxeology', the study of human actions. Neither is it an easy way to find the best approach to do something, putting actions in the right sequence. It isn't either a collection of tips and tricks nor a wide and broader look, a deeper analysis, a vision, which help us to look forward in the future. All these features are maybe characteristics of a good strategy, but they aren't enough to define completely what strategy is.

For example, understanding how to climb a mountain, finding the best way to store books in a library, planning the economic balance for the next 10 years of our community; all these activities refer to 'static' elements, that need to build carefully an all-embracing plan

Figure 2 — The agent can't reach the objective if an opposition stands in front of it.

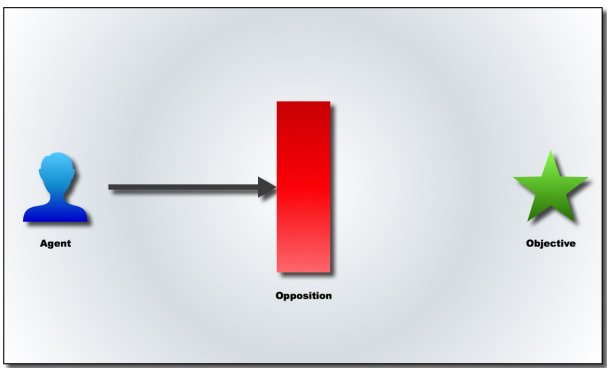


Figure 3 — To reach the objective the agent could use force, to break through the opposition. This could be called 'a strategy' but in fact doesn't have a strategic content.

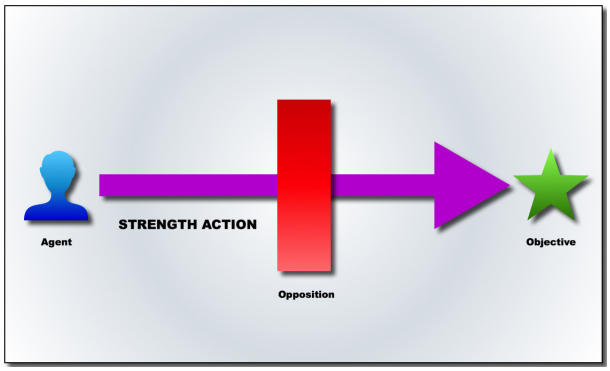


Figure 4 — Otherwise, the agent could find a strategic solution

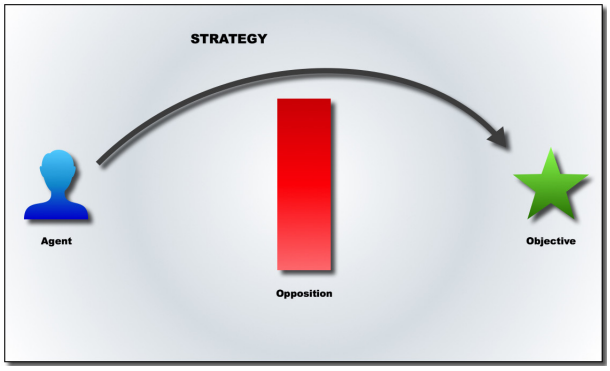
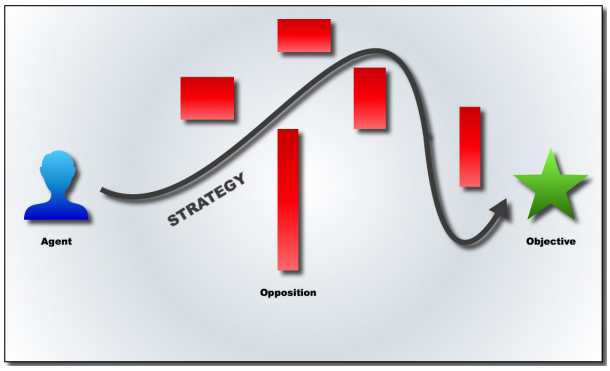


Figure 5 — Actually our adversary is conscious and dynamic, and so he will carry out counter moves.



or programme, but which don't present the essential element of strategy: the existence of an active and conscious opposition.

The existence of this kind of opposition changes the rules of the game. Every action we take forces our 'enemy' to change his plans, and each change forces us to review our plans. Fighting a war, playing chess, catching a criminal, are all activities which involve an 'adversary' who wants the same things we want, or wants to stop us from reaching our goals, or both. So strategy is **intensely dynamic**, because the active and conscious opposition from our 'antagonist' changes steadily and continuously our plans.

Strategy takes account of these actions and reactions, of this recursion, pushing us to remain flexible and to develop appropriate plans to still achieve the objective.

The logic of strategy is not like a straight line and neither is it like a circle: it's more like a spiral moving in time from us to the adversary and back to us, while shifting itself a little every time. For this reason, the logic of strategy is called 'paradoxical' (Luttwak, 2001): it's anything but linear. Its language is very difficult to understand for people used to building solid but 'non-strategical' plans because strategy continually feeds on itself with complexity and with recursion, and requires also a 'liquid mind' ready to change in a flexible way.

Also, strategy is not about technique. Sometimes people use the adjective 'strategic' to describe some type of planes, missiles, rifles or instruments. These things can push their effectiveness far into space or time, but these capacities don't have anything to do with strategy (see below).

Finally, strategy is not tactics. It is very easy to confuse the two, because often strategic principles can be applied without any change also in the tactical fields. This feature of strategy is very interesting but also add complexity to the concept. Firstly, ideas, principles,

Figure 6 — If we follow a strategical principle, the best way to achieve our objective is also a longer way: this is the paradoxical logic of strategy.

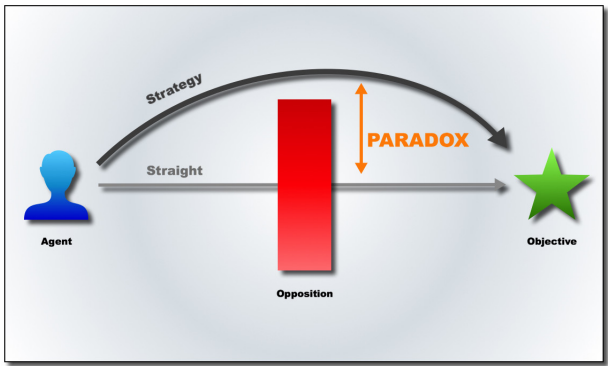


Figure 7 — It's important that tactics sum each other up in a proper manner, to pursue objectives of strategy.

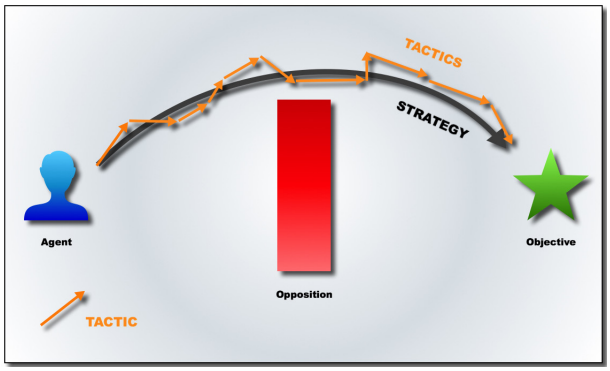
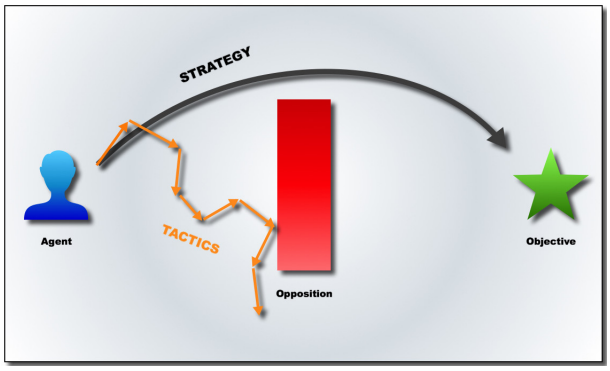


Figure 8 — Otherwise, if tactics are unable to support each other in a strategical way, it's impossible to reach the objective.



intuitions, rules of a 'level' of strategy influence that level in a spiral way, like we have explained above. Secondly they affect directly and strongly higher levels of strategy ([13]). So, for example, technical innovations and scientific discoveries about weapons change directly technical confrontation between attack and defence (i.e. spear-shield). But the changes in this technical level will soon influence the tactical level, affecting the way people fight with new weapons and armours. Also tactical choices made by leaders on the combat fields will clash one against the other, altering geometry and time-management on the battlefield, changing the strategical way to plan the entire war.

([13]) Many authors, many doctrines, considered a different number of levels in war. Tactical and strategic levels can be found in the ancient scripts. Russian doctrine and WWII practice introduced the operational level, placed in the middle of the first two, and afferent to carry out the operations. And finally strategy expanded in several subcategories: grand strategy (for national interests), theatre strategy, operational strategy, global strategy, grand tactics, and so on. On the other side, the lowest level, the technical, has interest for strategy. Today we referee to all this levels as 'levels of strategy'.

Some thoughts about criminal investigations

Investigation can be defined as the inquiry, the looking into, the examination of elements about something that is not known in order to ascertain facts or information. This search is not an aim in itself. The first phase, 'collection' of elements, serves for the second phase, finalised to assembly a 'reconstruction' and to understand as much as possible of what we are investigating about.

All different kind of investigations can be divided into two main groups. The ones that have an opponent who actively works to prevent us from achieving our goals (like criminal investigations); and the others, which don't have this kind of obstacle (like historical or scientific investigations).

Only criminal investigations will be considered here in this paper, because of the presence of a conscious opposition, of an active opponent, that is the linking element to strategy.

Here it's important to say something about our 'opponent'. In this paper it's irrelevant if the 'antagonist' is a single person, several people who jointly commit a crime or a group of criminals used to work together. The theoretical frame doesn't change neither if a conspiracy is uncovered nor if a criminal organisation is involved. The principles and ideas of strategy are so strong that they can be successfully applied to a wide range of 'adversary' types.

Otherwise it's important to distinguish between investigations directed only to the past (a typical case is the classical homicide investigation) and others directed to the future (like those involving drug dealing or terrorism). Obviously, every investigation involves either research about the past as well as expectations about the future, but the latter one is much more important for strategic planning, because the past is now written while the future will depend to some extent on what the 'antagonist' chooses. For example, at the start of the investigation of a homicide, most of the early activities do not involve any direct contact with the 'adversary'. Detectives will search for clues and evidence, will analyse phone and surveillance records, and so on. But when detectives will begin to interview people, their actions could reverberate far away from them (because of people talking with other people, or the press writing about inquiries, etc. …). Then the 'adversary', even without direct confrontations, could understand that detectives are doing 'something', and maybe also anticipating what they do.

Strategy applied to investigations

Von Bismarck (probably never) said: '*Fools say that they learn by experience. I prefer to profit by others' experience*' (Liddell Hart, 1961: 3). Strategy, a complex and deep discipline, has its origins in the military world with the aim of building a complex set of principles that could help future generations in the difficult and changing environment of war. History has taught us that strategic principles work and work well, so the insights and methods of strategy successfully migrated to the worlds of economics, psychology, diplomacy, mathematics and to many other fields (Bozzo, 2012). So we think that their application to criminal investigations can effectively be useful and successful.

The general objective of this work is to apply ideas, principles and methods of strategy to criminal investigations, in order to obtain an advantage during their execution.

The frame of our study is a criminal investigation against an active and conscious opposition (one, two or several people) here referred to as the antagonist or adversary. This opposition generates a conflict that must be won. Our moves have effects and the adversary has two choices: staying still (because of unawareness, misunderstanding or conscious resolution) or manoeuvring against us (in all the many possible ways).

In the later sections we will discuss piece by piece all the different facets of the strategic world.

Friction

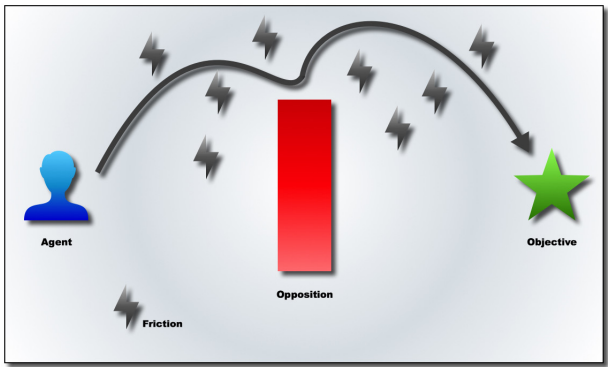
After the Age of Enlightenment many authors tried to describe war in a scientific way, assuming it was a mechanical system obeying mathematical laws. They failed. Only one of these authors achieved immortality by introducing a fundamental concept of strategy: friction (Clausewitz, 1832).

Because of friction, a real machine will never achieve the efficiency supposed by theory. At the same manner the 'war machine', composed of men, vehicles, weapons, logistics and many other parts, will never live up to what is idealised in the plan. A fighter must face fear, lack of information, exertion and chance, and all of them increase friction.

Equally, friction affects investigations. A surveillance camera out of order, a witness moved abroad, an ill detective, the company which could give information gone bankrupt. We could list many incidents which are able to dramatically change the proceeding of an investigation. The more complex the inquiry, the more friction we have to deal with.

Daily life repeats itself continuously and so friction naturally decreases to very low levels. Instead wars and crimes appear every time in a different way, in a different place, with differ-

Figure 9 — Friction forces agent to change his plans.



ent problems, and therefore friction plays a major role in strategy, because the surrounding environment is so different from the social life environment.

We can't eliminate friction, but we can minimise it. The key word is habit (Clausewitz, 1832), and especially getting accustomed to difficulties, experience in overcoming obstacles, good and realistic training. But also the fortitude to achieve and accomplish the feat can help us to face friction (Tsunetomo, 1906). Finally it helps to have a simple, elegant and flexible plan, which aims to reduce the discrepancy between what we aspire for and what we get. Then simplicity becomes a fundamental guideline in strategic thinking (Clausewitz, 1832), through limitation of objectives, use of intelligence and exploitation of available innovation (McRaven, 1996). During investigations simplicity can help to control the unexpected and achieve goals faster.

Limited resources

Uncertainty is a typical fact in the world of strategy. It's impossible to have a complete and certain view of the 'battle' field and this implies that nobody can be sure to obtain his goals. While uncertainty increases friction, a good plan can deal with this 'dark blanket' (Sun Tzu, circa 500 BC), this 'fog that clouds views and minds' (Clausewitz, 1832).

If we could know and do anything, anywhere, anytime, we wouldn't need a strategy. But in the real world supplies are restricted and so the limitations of resources are essential elements of the strategy itself. Our task is to minimise waste and bad management, and rightly prioritise the goals we want to reach. Limited resources so emphasise the essence of strategy: making choices.

In the investigative field it can happen that only a few people have to face different fronts; some of which seem very promising while others less. But it often happens that priorities overturn each other. All investigative agencies have limited resources (men, vehicles, time

and money) and this forces to consider wisely the prospects of success of every inquiry and furthermore to revise that evaluation whenever it's necessary.

Also the single inquiry suffers from forced choices, because of limitation of resources that implies to give up some investigative actions on behalf of others, even if this leads to obtaining less evidence.

Knowledge of the adversary

As seen, logic of strategy is 'paradoxical', because it doesn't follow the ordinary and straightforward way we might expect (Luttwak, 2001). In fact, we and our 'antagonist' will actively react to the mutual attacks with reciprocal counter-moves. To accomplish successfully this task the knowledge of our antagonist is fundamental (Sun Tzu, circa 500 BC). Understanding *how* he/she thinks and decides can help us to deduce *what* he/she thinks. This lets us find the paradoxical lines of our reciprocal interaction, which improve completeness of our information and reduce uncertainty and thus friction.

To understand a criminal, you have to know his environment, his background, his lifestyle and his beliefs. To forecast how people may respond to solicitations you have to get used to having to do with different kinds of people, because humans can react in a lot of strange and unpredictable ways.

For example, during an investigation involving wiretapping, the suspect may react to appropriate stimulation. But kind and intensity of those reactions could be very diversified: an emotional person, unused to crime, may talk a lot to all his friends, when instead an experienced criminal will avoid any conversation. To forecast criminal behaviour, we need to take into account not only personal background, but also the social disvalue rather than prestige of the committed crime: a suspect of child abuse will hardly confide his secret to anyone, while a histrionic robber may find pleasure while boasting of his successes.

Surprise

Knowledge of the adversary isn't enough to contrast effectively his opposition. We have also to change our approach to the fight. This change means that we have to shift from our old type of thinking (static) to a new and different view (dynamic). It's really important to decide where to concentrate our efforts: where the antagonist is unprepared (Sun Tzu, circa 500 BC) and where he doesn't defend himself (Sun Pin, circa 350 BC), to remove his options and to reduce its freedom of action (Liddell Hart, 1967). To obtain the most significant impacts we have to choose our methods wisely (Musashi, 1642), to be accurate in our details but at the same time to maintain a broad view (Tsunetomo, 1906). The indirect approach requires choosing the line of least expectation, exploiting the line of least resistance, but especially not acting while our opponent is on guard and not renewing an attack along the same line or in the same form after it has once failed (Liddell Hart, 1967).

All this planning must not harden our mind and we must remain ready to seize the opportunities, even if they appear unexpected (Sun Tzu, circa 500 BC). During investigations for one kind of crime, it may happen that we uncover a different felony. Obviously it's important to evaluate the seriousness of the two criminal offences, and the jurisdiction on them, but at the same time we shouldn't close our view only on our primary task, otherwise we could lose a cheap chance to '*pilfer a goat*' (Stratagem XII — Anonymous, circa 500 AD).

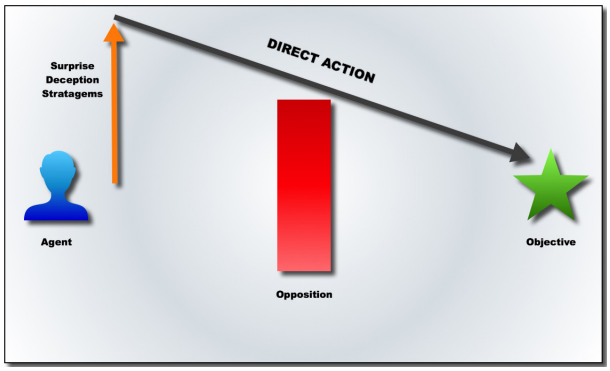
Gaining **surprise** is a good way to bypass the antagonist, but surprise **costs** (Luttwak, 2001). In fact, to obtain surprise we need to use some resources, diverted away from our primary task, which becomes harder to gain. The cost of surprise carries with it the added risk of failing in our primary action. In history many warriors and theorists, for fear or scepticism towards its costs, avoided surprise, deception and stratagems, while few men built on them their fame and success.

If we want to pursue and seek surprise, we can use a lot of ways: diversion, stratagems, speed, rhythm and timing. But also the variation of the methods, that can affect all levels of fight, is effective. At a technical level, the change of methods can obtain a sure and rapid win. For example, when wiretapping was first used in investigations it worked very well in collecting evidence, but after a while criminals understood the nature of the threat and changed their habits. They shifted to safer methods of communications like writing on paper (downgrading) or social networking (upgrading). But with technical progress even internet software has been intercepted without too many hardships, and so criminals turned back to be easy preys; but soon the cycle started again when they found new ways to avoid wiretapping, and so on. This sequence of cyclical phases is typical of the contraposition between attacks and defences (effect 'spear-shield'), which shows continue rollovers between the supremacy of one over the other, it's inherent in the nature of strategic world (Joxe, 1991). This effect propagates itself to the superior tactical level, because the change in the use of techniques influences the way of fighting and so affect the tactics. So any changes in the way of conducting battles spread their effects up to the strategic level (Luttwak, 2001).

Change can vice versa begin at the high strategic level. We could on purpose elaborate a new strategic way of acting to obtain surprise, and then pack some suitable tactical tools, which maybe could require new technical elements. This inverse way happens less often, in fact only a great strategic can orchestrate so complex a task. It could happen for example when a strategic plot is built against crime, starting with a large view plan, the introduction of new and powerful laws, which requires special teams, special investigative techniques, special equipment.

The surprise can be interpreted as a suspension of strategic concept (Luttwak, 2001). In fact, strategy deals mainly with prediction of antagonist behaviour and construction of a smart deployment able to disjoint the antagonist force. But when our opponent is taken by surprise, our task is easy: the road ahead is clear to the target. Strategy works to obtain surprise,

Figure 10 — Surprise in a suspension of the entire predicament of strategy. If the surprise reaches its goal, the strategy is (for a while) no longer useful and the agent can go straight forward towards the objective.



but once obtained its logic is useless, until the surprise runs out alone and we need to deal newly with strategy.

Deception

To get surprise one can resort to deception. Warfare is the way of deception (Sun Tzu, circa 500 BC) but also criminal investigations (when the law allow us to do so) feeds on it. In fact, if our antagonist has a clear and reassuring view of our confrontation, it will be very hard to move freely and to reach our objectives. Thus, we have to masquerade everything.

Deception can be of several types, according to magic theory ([14]) (Rampin, 2005), but the principles are two: to hide the truth, or to put out a falsehood. This can then be done by action or by omission, which in criminal investigations is a very important resource, because it allows us (usually) to avoid breaking the law.

Three useful tools that again arise from illusionism, help us to hide or to show what we want. The first is misdirection: the opponent's attention is pushed elsewhere while we lay our trail. The second is timing: time is used to lower the antagonist's defences (for example: showing the same thing several times and then applying a slight change, or waiting with patience for the right time to act to obtain the best effect, or changing the rhythm, or synchronising the various converging branches of an operation). The last tool is scripting, that works if we are able to build a story that is credible for the adversary. It's important to calibrate the story on the foe's capabilities; with a low level antagonist we have to build a complete and solid plot, while with a smart opponent we must work on a story full of holes that the adversary

([14]) The military and intelligence made large use of deception and sometimes also of magicians. Soviet *Maskirovka* was an art able to move in one day thousands of tanks, but fake tanks, and to hide real tanks within metres from the enemy. The British 'A' Force during WWII enlisted counterfeiters, illusionists and screenwriters to build from nothing false combat units, fake attack plans and amazing stories of all kind for the enemy.

should fill by himself, reinforcing in that way his trust in what he hasn't got by others but has built on his own.

Deception helps us to achieve the unpredictability (Sun Tzu, circa 500 BC), that casts doubt on the adversary and makes his information incomplete and inaccurate. Deception allows you to *'create something out of nothing'* (Stratagem VII — Anonymous, circa 500 AD).

Undercover operations obviously require the highest level of deception among all investigative techniques, also because of the intense contact with the antagonist. But all inquiries can benefit from deception and from the 'fog' that can be projected on our foe. Deception is also of staggering use during interviews, controlled deliveries and other situations of direct contact with criminals.

Stratagems

To induce deception and surprise you can use stratagems which have existed in war from the beginning of time. They should not be confused with strategy. Stratagems are only a little part of the strategic insights and in particular they are the complementary element of planning. In fact, planning must have a rigid core which could prevent strategy to fully express its flexible characteristics. Stratagems instead 'live in murky waters' (Anonymous, circa 500 AD); a stratagem causes rapid and unpredictable changes which could make up the loss in adaptability and originality produced by a too rigid plan.

Stratagems are very important and their use can greatly change the effectiveness of our action, because 'who is skilled in designing tricks is nearly inexhaustible' (Sun Tzu, circa 500 BC). In every field of knowledge (war, chess, law …) lives a wide tradition of stratagems for that specific sector, but there are also strategic guidelines about their general composition. One of the most famous collection are the *36 stratagems* (Anonymous, circa 500 AD), considered by Mao Zedong too dangerous for publication. We have already seen applications of some of these stratagems in the text, but let us look carefully at two of them which are of special value for criminal investigations.

Stratagem XIX, '*Remove the firewood from under the cauldron*' (Anonymous, circa 500 AD). It's impossible to touch the cauldron when is hot, so we have to move our attention to the origin of the heat and attack it. At the same manner when we deal with a bandit or a criminal organisation which is too difficult to attack directly, one way is to cut off the sources of its strength: money, friendship, weapons, workers …

Stratagem XXVIII, '*Pull down the ladder after the ascent*' (Anonymous, circa 500 AD). The power of this stratagem lies in its relentlessness. If we are able to push and lead the antagonist in an apparently safe direction, thus putting him where we want him, we can then derive the greatest advantage. For example, when we aren't able to find the 'den' of a criminal, where we know he holds important evidence of his guilt, the only way is to bring him to

lead us to the stash (combining here also with Stratagem III, '*Kill with a borrowed knife*'), faking a non-existent danger.

But stratagems aren't confined to oriental culture. During WWII the British Army showed the world not only how many stratagems it was capable of using (Howard, 1995), but mostly the opportunity to use them at both the tactical and also the strategical level (Luttwak, 2001).

Time (and OODA loop)

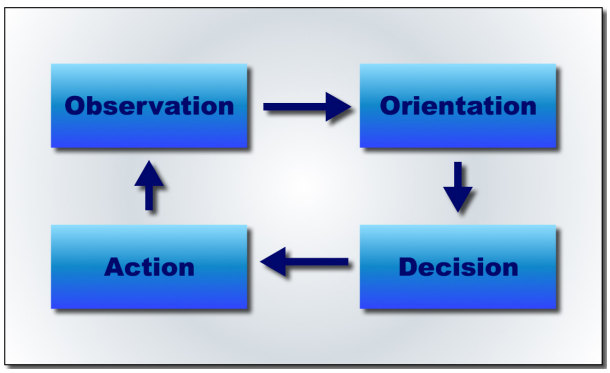
Everything about strategy deals constantly with time, although from different perspectives.

The first most obvious thing we have to consider is that time is irreversible, so whatever we do, we can't go backward. Furthermore, limited resources force us to choose priorities and we have thus to give up something to get something else; time lost in this way is irretrievable.

Speed is also very important in strategy, especially when being outnumbered, as it is the case of the Special Forces (McRaven, 1996). Also in investigations speed is crucial because the flow of time changes the state of crime scenes and erases the evidence. Furthermore, over time the power of criminals continues to grow, especially if it's fed by a constant flow of money. So it's often better to operate quickly, however speed must not be overstated, because it must be compensated with other important factors (first of all safety).

Rhythm and timing are also critical in clashes with the foe (Musashi, 1642): if we fail them, we risk losing in spite of our superiority.

Figure 11 — OODA loop.



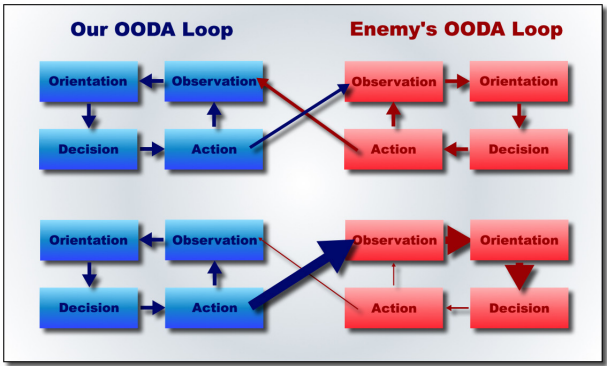
These concepts of time are wonderfully condensed in Boyd's theory (Boyd, 1987 — Osinga, 2007) of OODA loop ([15]). It starts with the observation of the environment, of the information and of the evolving circumstances. Orientation is based on analysis and synthesis, in which our experiences, our culture, our traditions and our being are also included. All this leads us to a take a decision which, once taken, becomes action. That is not the end, because action changes the environment and brings us back to a new observation, restarting the loop. Don't forget that our adversary treads an identical loop and the key for success is to operate inside the opponent's decision loop. Control of speed, rhythm and timing lets us tread the OODA loop faster than the adversary and this lowers the quality of our opponent's loop, overloading his system and disrupting his ability to react, and this takes us to victory. The strength of this simple idea is that it works at every level of strategy, from technical to tactical and up to grand strategy.

Also in investigations we can find the same complex dynamic of two loops that try to influence the opponent's decision loop. For example, at the beginning of the confrontation, the contrast between us and our opponent grows slowly, but when we are able to collect massive amounts of evidences and to cut the foe's attempts to operate, adversary's system collapses quickly against itself.

Irreversibility

The time dimension of strategic dynamics brings us to a natural but really important result: the irreversibility of investigative acts.

Figure 12 — AT TOP: two similar OODA loops. None of the opponent prevails over the other. AT BOTTOM: the blue loop is faster and more efficient than the red one. Its output is greater, so the blue is able to work within the antagonist's loop, degrades its effectiveness, reduces its quality.



([15]) It is interesting to note that Boyd's ideas were born as a result of his winning fighter pilot activities. In the same manner, Musashi came to the theorisation of strategy starting from his winning sword fights. This shows that strategy principles very often work also at lower levels then can be discovered at low levels and are later generalised to higher levels.

Inexperienced operators could think that searches, wiretapping, interviews and forensic sciences are like choices on a menu. During investigations we may choose one or the other, according to the situation and the 'taste'. This is not the true.

Every action we take have to be carefully thought through, because once done it's irretrievable and a lot of opportunities are burnt.

Also, our opponent feels directly the effects of some acts of investigations. For example, in a simple way, if we search a suspect's house, that may well change his way of acting, affecting the continuation of our inquiry that could be absolutely contaminated. This is the reason why every action must be carefully assessed and, with a broad view, this is one of the basic reasons why strategy counts during investigations.

Invisibility

Ancient theorists of war built strong strategy theories, but all of them failed in predicting the ability of the few to win over the many. After Napoleon and the Restoration, guerrillas warfare started to be used widely in the world. T. E. Lawrence 'of Arabia' was the first to systematise the principles of guerrilla warfare (Lawrence, 1921 and 1927). It was he who caught the essentials of the matter: absence of a front, technique of 'hit and run', stock up by the material subtracted from the adversary and so on. He also outlined the key strategies used by the men involved in this kind of warfare: mobility, flexibility, resistance, intelligence, cleverness, knowledge of territory, courage. It's amazing to find out that these are also the qualities of the modern ideal investigators.

Mao Zedong expanded Lawrence's principles of guerrilla warfare. Mao used to attack only when he had overwhelming numerical superiority, starting with small goals and then moving to more complex objectives, like in the game of Gô (Zedong, 1936). The success of his method created a school, so other principles were added to the original, especially initiatives and instant decisions in the face of new situations (Giap, 1961) and the preference for night attacks (Guevara, 1960).

All these kinds of moves are well suited for investigative activities. Also, the absence of a 'front' makes guerrilla warfare much more similar to an investigation, rather than to classic war. Invisibility is a fundamental characteristic of investigations, because any knowledge on the part of the antagonist of our moves lets him gain a strategic advantage. Invisibility and irreversibility are thus closely connected.

Invisibility is achieved also by security. All the decisions of the investigative team must remain confidential, because obviously the best way to know the adversary's intentions is to monitor them at their source. There are many ways in which information can leak out of a team: careless talking too much with friends, press or informer, losing papers, missing to

handle asymmetry during interviews, but unhappily also illegal access to databases and corruption.

Completeness

To conclude this discussion, we have to face an argument that apparently is against strategy, but is instead a necessary part of its application to criminal investigations. The 'principle of completeness' states that investigators have to search in all directions and to explore all possibilities, in order to obtain a complete view of the field investigated (Curreli and Minisci, 2011). The law, in Italy, doesn't expressly states this principle, which arises instead from the jurisprudential processing ([16]), while e.g. in the United Kingdom this principle is stated in the Criminal Procedure and Investigations Act 1996 ([17]).

If investigators restrict their perspective, they will find only what they are searching for, and maybe they will not see and not discover anything different from what they need to accuse the suspect. Completeness means to follow each lead, to expand in all directions, to take every chance.

It could seem 'anti-strategic' to follow all the possible lines of inquiry, instead of focusing efforts on the original track, considering that resources and time are limited, that we are looking for surprise and deception while chased by fog and friction. Simplicity would suggest us to cut useless branches and it's surely a good idea not to waste resources for useless activities.

But, a complete inquiry is much more genuine and solid and, even if it apparently goes against the economy of strategy, 'strategically' the efforts made during investigations will avoid a lot of effort during and after trials, caused by a miscarriages of justice.

Conclusions

Strategy is a wide system of ideas and insights that can help a fertile mind to face something that is unpredictable and chaotic, but full of relationships and connections. The ability to see the links can make the difference between victory and defeat.

During criminal investigations the 'fog' is thick as it is during a war, and the aim of this paper is to demonstrate that strategic principles can be useful for detectives in understanding how to conduct the inquiry.

([16]) This principle was settled by *Sentence number 88 of Italian Constitutional Court*, 28 January 1991, but could find its foundation in the articles number 326 and 358 of *Italian Code of Criminal Procedure* (D.P.R. number 447, 22 September 1988).

([17]) S.3.5.: *'When conducting an investigation, the investigator should pursue all reasonable lines of enquiry, whether these point towards or away from the suspect'.*

This is usually work that people learn by doing, while the theoretical studies are limited to law, psychology and criminology. Instead we think that the study of strategic principles can be very useful because it can change the minds of detectives, focus their brains, speed up results and can also avoid committing basic mistakes.

Strategic principles are not laws or rules, but are rather ideas that can help us to take the right decision at a critical moment. However before reaching their effectiveness, those principles have to be properly absorbed by the mind and thus a good training is absolutely necessary.

We have seen in this paper that:

— strategy deals with the contrast to an active and conscious opposition;

— typical characteristics of strategy are its paradoxical logic and the recursion between our plans and our adversary's plans;

— investigations can be opposed to a single criminal, a group of people or a criminal organisation;

— investigations can be oriented to the past, to the future or both. These options about people and time obviously changes our approach to investigations;

— the existence of an active and conscious opposition during investigations leads us to use strategical principles.

We have then seen that:

1) Everyday facts, chance, lack of information, exertion and fear can cause plans to fail: this results from *friction*. We always have to deal with friction and the only weapons we have are habit, experience, fortitude and training.

2) Also *limited resources* affect our work and make uncertainty grow, so we have to prioritise our tasks.

3) To reduce uncertainly we have to build an extensive *knowledge of the antagonist*, which lets us forecast our suspect's behaviour.

4) Also *surprise* and indirect approach lets us gain advantage over the antagonist, and this implies that we have to maintain our plans flexible. Surprise, which is a suspension of the strategic concept, has a cost that we have to evaluate.

5) *Deception* is a way to obtain surprise, by the use of misdirection, timing and scripting.

6) Also the use of *stratagems* can help us to obtain deception and surprise.

7) *Time* is an essential element of investigations and the right choice of speed, rhythm and timing is critical. The domination in the *OODA loop* can also give us supremacy over the antagonist.

8) Time also counts in investigations because of its *irreversibility*. In fact, an investigative action, once made, cannot be undone.

9) To avoid irreversibility, it is essential to maintain '*invisibility*' until you decide to uncover your presence.

10) Finally, *completeness* of investigations is not only a moral and ethical imperative, but also a strategic value.

Much more that this could and should be said on investigative strategy and more authors could be cited, but the teachings of the few men mentioned in this work, who lived in such different eras and cultures, have helped us during real criminal investigations and so we have selected them for gratitude before admiration.

We then close this work with an important and timeless consideration about limits of strategic thinking: the ultimate determinant is the man with the badge. This man is the final power. He has the control. He determines who wins ([18]).

([18]) Original quote is: '*the ultimate determinant […] is the man […] with the gun. This man is the final power […]. He's the control. He determines who wins*' (Wylie, 1989: 77). This refers to the fact that strategy and tactics can affect war but, at the end, is the simple soldier with his gun who makes the hard job, who does what the commander needs to gain victory. Equally, strategy in criminal investigation encounters a limit because is the man with the badge who works in the field, who is finally able to catch the criminal.

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Addressing emotions in Police selection and initial training: a European study

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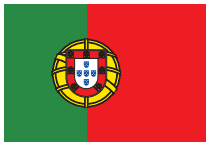


Abstract

Police officers have a strong need to control their personal emotions. Research that is focused on emotions is scarce but greatly needed regarding core institutional practices such as police selection and initial training. The purpose of this exploratory study is to uncover the extent to which police selection and training comprehends and addresses emotional issues across Europe. We examined European police forces via CEPOL, surveying the selection and initial training career police personnel. Data were collected at country level with cross validation to ensure institutional representativeness. Data analysis made use of the MCA technique complemented by hierarchical clustering to identify patterns and emerging typologies. Transcripts from open-response questions concerning future trends in police selection and training were analysed for content. Findings show differing axes for official and officer selection practices and initial training, as well as dissimilar training hours in psychological subjects. No discernible pattern emerged for either career regarding selection dimensions or psychology subjects in initial courses. These findings rule out a strategic alignment between selection and training and do not allow one to foresee a common policy across countries and careers. An organisational research framework must emerge in order to tackle these issues.

***Keywords*:**
Police; emotion; recruitment and selection; training.

Emotions in Police organiSations

Emotions in law enforcement is an under-researched subject despite the central role emotions play in the daily life of policemen (Daus and Brown, 2012). The nature of police work and constant exposure to risk may result in negative physical, psychological, and behavioural outputs (Slate, Johnson and Colbert, 2007), which often translate into burnout and use of violence (Kop and Euwema, 2001). Many other health problems and deviant behaviours such as abuse of alcohol or drugs, and suicidal tendencies have been reported in policemen (Adams and Buck 2010, Violanti et al. 2015). These problems are important not only for individuals, but also for society at large due to their potential for impairing police work by decreasing work quality and raising absenteeism and police violence, thereby compromising public safety (Basinska et al. 2014).

Policemen must guard their emotions during moments of tension, and may experience emotional dissonance and distress as a result (van Gelderen, Bakker, Konijn and Demerouti, 2011). This has been found to predict burnout, especially when related to depersonalisation (Schaible and Gecas, 2010)with police exhibiting significantly rates significantly higher than other occupations. This is not surprising considering the inherent dangers and challenges police face in the course of their duties. However, police are also subject to a host of institutional and cultural forces that are likely to contribute to burnout. This study examines the variety of ways self-processes, societal and institutional policing values, and demands for emotional presentation on police officers interact to produce burnout. Using data collected from a survey of police officers in the Pacific Northwest (N = 109. Although some authors treat dissonance as a predictor of burnout and psychological strain, more recently it was found to fully mediate between deliberative dissonance acts of policemen and experienced psychological strain (van Gelderen, Bakker, Konijn and Binnewies, 2014).

Police officers are routinely exposed to situations that trigger intense negative emotions. These situations are typically characterised by unpredictability, risk, stress, anger, and anxiety, and officers have a strong need for effective methods to control their emotions (Berking, Meier and Wupperman, 2010). However, the literature on models for managing emotions in organiational contexts is still at an early stage, proposing either typologies (Bolton and Boyd, 2003) or models that lack empirical support (Ashkanasy and Daus, 2002). Moreover, research is mostly focused on generic organisational contexts, especially of a business nature, overlooking the context of specific organisations such as police.

A noteworthy exception is Shipman et al. (2011), who produced a report for the US Army targeting a management model of emotions for leaders, which may be appropriate for police institutions due to the similarity of their underlying culture (Tuckey et al. 2012).

The state of the art made by both Gooty et al. (2009) and Ashkanasy and Humphrey (2011) indicates that despite the considerable collection of research there is still much to be done

to build cumulative knowledge and systematise sound and useful theoretically models. The problems identified (and challenges posed) by Gooty et al. (2009) were: 1) inconsistent definitions, 2) absence of affective dimensions (a result of the inability to aggregate discrete emotions), 3) absence of a longitudinal view of emotions, and 4) disregard for the context. Ashkanasy and Humphrey (2011) add to this list the focus on multilevel research. All in all, there seems to be a consensus that this is a field that deserves further attention.

At the HR practices level, emotions are especially addressed by focusing on recruitment and selection as well as initial training. However police selection research has received due attention only about two decades ago (Perez and Shtull, 2002) and Chenoweth's (1961) lamenting that police selection procedures replicated those in use in 1829 echoed still by the turn of the millennium (Decker and Huckabee, 1999). Literature on this topic is still very scarce (Landon and Arvey, 2007) and needed, especially in Europe (Beckman et al. 2003). Likewise, police initial training received criticism regarding the lack of attention to soft skills (e.g. Chappell, 2008) and especially those related with emotions, although they play a critical role in police daily life (Bar-On, Brown, Kirkcaldy and Thome, 2000). Because of this situation we opted to place a special focus on emotions regarding police HR practices driven by recruitment and selection practices and initial training. Both domains converge in increasing the chances of building a future police force suited for the institutional purpose. The remainder of the literature review will cover both domains, seeking to determine the state of the art, with the ultimate goal of analysing the centrality of emotions and psychological-related issues in this context.

Recruitment and selection in Police organisations

The police recruitment process has the long standing purpose of providing law enforcement agencies with the best practices to attract and select well-qualified applicants (TCOLE, 1977), especially considering their role in dealing with global security challenges (Kilcullen, 2005). The need for a high standard in selection (Hogarty and Bromley 1996) makes it a very costly and time-consuming process (Decker and Huckabee, 1999), which due to its complexity and lack of a clear job description has difficulties in attracting candidates (Orrik, 2008).

By the end of the 1980s police selection research was not a strong subject in Academia (Pynes and Bernardin, 1988) and has only been the subject of analysis and discussion in early 2000 (Perez and Shtull, 2002). Currently, it is a worldwide research subject (e.g. Chan 2006, Weitzer and Hasisi 2008) and a conflictual topic that is far from a consensual level of consistency, as noticeable by Detrick's (2012) and Dantzker's (2012) heated debate. On the basis of the theory-practice bridging process of scientific knowledge development (Van de Ven and Johnson, 2006) and within the realm of selection research, five issues should be covered (Salgado, Viswesvaran and Ones, 2001): prevalence of use, measurement and con-

struct validity, criterion-related validity, incremental validity issues, and group differences. The subsequent review addresses these issues.

A US survey on selection procedures showed a widely shared core of police selection tests and procedures such as cognitive screening or MMPI (Ash et al. 1990). The preceding four decades witnessed a sharp increase in the use of personality and psychiatric tests as well as situational and assessment centres (cf. Hogarty and Bromley 1996) with the corresponding decrease of cognitive, aptitude, and ability tests. Authors converge with Yuille's (1986) findings that the growing employment of psychologists and psychological techniques co-occurs with the degree of professionalisation of police selection.

Ho (1999) concluded that several police departments employed several psychometric and behavioral measures to select officers. The process was not unique, but generally includes some common techniques such as written test, psychological test, oral interview, agility test, medical examination, and background check. Psychological testing was considered a positive trend by Cochrane et al. (2003).

Regarding measurement and construct validity, Arvey et al. (1992) found physical ability test events were based on two latent variables, namely strength and endurance (taken as proxies of the job performance). This suggests an underlying construct in use to rate applicants. However, Lonsway (2003) found evidence that physical ability tests may have validity problems due to gender differences. The stigma about construct validation in personnel selection may explain the considerable scarcity of literature on this subject regarding police selection (Landon and Arvey, 2007).

Concerning criterion-related validity, Koper et al. (2001) report to the US National Institute of Justice suggests a proxy of police officer selection effectiveness judged by the rate of hired applicants who went through all the training until being ready for field work.

Weiss et al. (2000) approached the validity of several scales used in police selection, discussing their ability to predict the expected behaviour. Later, Weiss et al. (2003) detailed the MMPI-2 L scale as a tool in police selection.

Personality tests in police selection are addressed by Barrett et al. (2003), who point out that conscientiousness scales should not be considered as reliable evidence for police selection. Salgado et al. (2003) found that cognitive ability tests are more widely used in selection processes in Europe than in the United States.

Sellbom et al. (2007) examined the validity of scores on pre-hire administration of the MMPI2 RC and substance abuse scales in predicting behavioural misconduct in police officers. They conclude that MMPI-2 may validly predict behaviours and attitudes in police candidates being RC scale the best predictor of misconduct. However Caillouet et al. (2010)

found otherwise. They also found that PSY-5 does add value for predicting police officer performance. MMPI-2-Restructured Form (MMPI-2-RF) was found to be a defensible solution for police selection (Tarescavage et al., 2014) but may be plagued by positive response distortion (Detrick and Chibnall (2014) advising for additional investigation is needed about its validity).

Regarding incremental validity, following a controversy on the impact of intelligence tests on police candidates, personality tests were suggested by Bartol (1996) as a common alternative. NEO PI-R was found to explain police officer performance over and above MMPI-2 and IPI (Chibnall and Detrick, 2003). Likewise, Sellbom et al. (2007) found that the MMPI-2 and RC scale have incremental validity over and above clinical scales. Krause et al. (2006) also found that assessment centre ratings predicted training performance beyond cognitive ability tests. Lievens and Patterson (2011) sustain that high-fidelity simulations (assessment centres), low-fidelity simulations (situational judgement tests), and knowledge tests were all valid predictors of job performance. Incremental validity was higher for assessment centres, followed by situational judgement tests, and knowledge tests, in this order.

Finally, concerning group differences, TCOLE (1977) acknowledges the need to consider all the community groups in the selection process but fails to state how this translates as test norms. The minority group selection issue is ever since under scrutiny (Gray 2011). Perez and Shtull (2002) found negative issues linked with prejudice and bias in police selection procedures. Likewise Ben-Porat et al. (2012) concluded that to better deal with communities, police must improve its ability to hire with diversity and overcome preconceptions. Also, Waters et al. (2007) offer strategies to attract candidates from local ethnic minority communities: involving families and the minority applicants, plus their distinct levels of skill and human capital in the selection procedures. Cashmore (2002) found such diversity policies to be counterproductive but most authors assume the intrinsic added value of a diversity policy in action.

Diversity management in police institutions is an understudied subject (Ewijk, 2011) especially regarding the technical issues underlying police selection and minorities. To achieve a varied ethnic work environment it is important to use both cognitive and non-cognitive ability tests in the police selection process (Meijer et al., 2008). Police organisations use several recruitment and selection tools and processes to find the best candidate for the job. These methods are performed to reject applicants with 'psychopathology or problematic personality characteristics that could interfere with their performance as a law enforcement officer' (Weiss et al., 2013, p. 123).

Overall, despite the advancements, Beckman et al. (2003) concluded that more can be done in police recruitment, and that the selection research topic remains open, especially regarding European police forces.

Initial training in Police organisations

Behavioural outcomes that police training should attain today differs from those in which training was semi-military and strict-discipline based (Foley, 2014). Gravelle and Rogers (2011) emphasise the unarmed, courteous, patient, and restrained when confronted behavioural guidelines that policing by consent implied.

Providing an initial training course is the common solution among police organisations to provide technical and interpersonal skills from the basis of all police work (McDermott and Hulse, 2012).

According with Mather (2012) British efforts to standardise training faces issues because more so than cognitive development, attitudinal change consolidation is critical for police work. Additionally, informal police culture and field experience may prevail over formal training (Haarr, 2001).

Along with the development of policing ethos, training faces major challenges such as greater accountability and professionalism, adopting new technologies, and a relentless change in police culture (Foley, 2014).

Mather (2012) found that initial training syllabi were perceived as being overly focused on the criminal law with a lessened (but needed) attention to equipment, the role of police in society, and problem solving. The traditional focus on technical and task related training endures as the dominant subject areas overshadow soft skills, which are critical for community policing (Chappell, 2008). Additionally, the format of training delivery, mostly based on didactic/instruction methods, is doubtfully trainee-centered, and hinders a developmental approach (Foley, 2014).

Literature is rich in discussions on training evolution, methods, and implications for police practice. Notwithstanding, it falls short on issues concerning emotional training in a profession that has been labelled as the most suppressive of emotional display (Denkers, 1986). Policemen with greater emotional stability and positive affect experience fewer negative psychological outcomes (Bar-On et al., 2000) and law enforcement agencies seek to filter out applicants with emotional instability (Marzella, 2000). Emotions are even more central when the institutional culture sees emotional display as a weakness countering the police identity and valued behaviour (Tuckey et al., 2012).

Overall, the lack of research targeting emotion-related issues in police recruitment, selection, and training is surprising considering the inability of personality and other non-clinical psychological evaluation methods to determine a candidate's emotional stability (Oliver, 2014). The ultimate goal of this study is to help fill that gap.

Method

Sample and procedure

According to Bayley (1999), comparative international studies are essential to understand the characteristics of police forces, but still more than a decade has elapsed since that and the call for comparative studies, and it has yet to be answered (Ewijk, 2011). We opted to target European police forces via the European Union Agency for Law Enforcement Training — CEPOL, because the specificity of the subject required participants to be knowledgeable, and institutionally representative of their country (or police institution) in a transversal European entity. Besides, CEPOL is formally a European agency which supports research on policing and is intended to facilitate knowledge sharing. The study covered both official and officer careers. All national contact points were invited to answer an online survey or to readdress the invitation to the appropriate contact person.

The required institutional guarantees that all responses would be anonymous, and that no country or police force would be identified were given. A preview of the sections of the survey was also provided in order to allow the informed consent. A name, affiliation, and institutional email address were provided to assure the legitimacy of the inquiry.

From these invitations we received 15 answers of which 14 are partially usable (due to missing data) but only nine are fully usable for police official items and 10 for police officer items, thus corresponding to an initial response rate of 54 % that turned into 36 % to 32 % valid response rate range, which matches the usual figures (35.7%, sd = 18.8) seen in empirical studies targeting organisational representatives (Baruch and Holtom, 2008). This response rate fell short from expected possible due to the sensibility of the subject and the fact that recruitment and selection processes as well as syllabi training tend to be treated with discretion to prevent misuse.

Measures

The survey had four sections. The first covered characterisation variables of the police forces such as legal designation and nature, which are not a subject of further analysis due to the confidentiality commitment. These data were collected to check source legitimacy and prevent double entries. The second section included questions about recruitment and selection practices for both official and officer careers. The third had questions about the initial training course, also for both careers. The survey finished with two open-ended questions about selection practices and initial course syllabi trends in the police force. Emotion-related questions were scattered throughout the four sections.

Selection practices included techniques, dimensions, and instruments and were identified by crossing Cochrane et al.'s (2003) and Koper et al.'s (2001) lists of practices, adjusted for European terminology. The resulting list comprised the following nine selection techniques: written aptitude testing, personal interview, physical agility test, polygraph exam, voice

stress analyser, psychological evaluation, drug testing, medical exam, and background check. Respondents were requested to freely select which among these were in use in their respective police forces posteriorly coded as a 'yes' or 'no' variable.

To theoretically consolidate the selection dimensions we followed the competence architectural model (Bartram and Roe, 2005, 2008; Roe, 2002) comprising personality, intelligence, knowledge, skills, and attitudes to which we added motivation as used by Cochrane et al. (2003) as well as the instruments that measure these constructs. These instruments comprised commonly used tools such as MMPI-2, 16PF, Situational and Clinical interview scripts as well as Group dynamics scripts or Rorschach/Inkblot. Respondents were requested to freely select which among these were in use in their respective police forces posteriorly coded as a 'yes' or 'no' variable.

The third section of the questionnaire targeted the extension of emotion-related training provided to officers and officials. In order to avoid framing answers, instead of a direct question about training in emotions, we opted to ask for training in Psychology, which would unavoidably cover emotion-related topics. Beforehand, the respondents were requested to answer if there was any course or module in Psychology included in initial police training. Whenever positive, they were asked to indicate how many teaching hours and which syllabi contents were in use.

The last section comprised two open-ended questions covering future organisational trends in recruitment and selection processes and in initial police training.

Data analysis

The data analysis strategy was a twofold procedure that adhered to the exploratory nature of the study via a data mining approach (Hand, Manilla and Smith, 2001). We conducted a multiple correspondence analysis (MCA) in order to identify topographic spaces and characteristic associations between the variables, namely the selection practices (Greenacre and Blazius, 2006). To complement the MCA (Lebart, Morineau and Piron, 2006) we conducted a hierarchical cluster analysis to search for patterns, with the aim of identifying a possible typology of these selection practices. Due to the nature of data we opted to use Ward as a linkage method and Euclidean distances for binary variables (dummy coded for 1 = yes and 2 = no). Considering the explorative nature of the study as well as the small sample size we take 0.60 as a valid threshold for Cronbach's alpha (Hair et al. 1998, Robinson et al. 1991, Schmitt, 1996).

The same procedure was applied with specific psychology-related syllabi (in the cases where there is at least one module in Psychology taught) and finally, text transcripts from open answered questions concerning future trends in police selection and training in Europe were content analysed and resulting data treated with a final MCA.

Results

Findings are reported separately for officials and officers. Likewise, selection techniques are reported separately from initial training features with the exception of 'future trends', where they are treated jointly due to the organisational level of the focus.

Selection techniques

Having been requested to report the use of several techniques for descriptive purposes, respondents showed that for officials four techniques are always in use: personal interview, psychological evaluation, medical exam, and physical agility tests. Other techniques tend to be used by the majority (77.8 %) of selection services, namely written aptitude testing and background check. About one third of selection services test for drug use and all services reported *not* using polygraph and voice stress analyser. The MCA indicates a two-dimensional solution that explains only 27.6 % variance but incorporates two key theoretical dimensions in selection policies (Figure 1) and shows good average reliability (Cronbach $\alpha = 0.71$; competencies focused $\alpha = 0.77$, and clinical focused $\alpha = 0.61$).

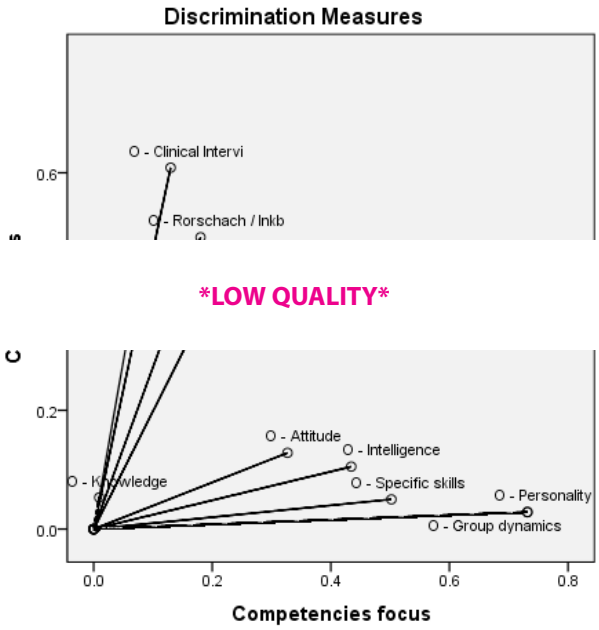
Joining the MCA results with the hierarchical cluster analysis we obtain the following mapping (object points labelled by number of identification, for anonymity sake, Figure 2):

Regarding officials (see Table 1), three European countries fall into the first cluster characterised by a focus on evaluating personality and motivation, using clinical instruments such as the clinical interview, the personal history questionnaire, or Rorschach. The second cluster, with two countries, shares the clinical focus but uses MMPI as the favoured instrument for clinical personality assessment, under a more comprehensive framework taking into consideration personality, intelligence, and motivation, as well as using a situational interview. The third cluster is a single country case showing a full KSA focus counting (also) on group dynamics and no clinical assessment. The fourth cluster is composed of three countries and expresses the most comprehensive competency-focused approach, covering both KSA and APOs.

Table 1
Official psychological instruments

	Clusters (Ward)				Total
	Cluster 1 APOs and clinical focus N = 3	Cluster 2 APOs N = 2	Cluster 3 Competencies focused N = 1	Cluster 4 Comprehensive evaluation N = 3	
Personality	100.0 %	100.0 %	0 %	100.0 %	88.9 %
Intelligence	66.7 %	100.0 %	0 %	100.0 %	77.8 %
Motivation	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %
Attitude	66.7 %	50.0 %	100.0 %	100.0 %	77.8 %
Specific skills	0 %	0 %	100.0 %	100.0 %	44.4 %
Knowledge	33.3 %	50.0%	0 %	66.7 %	44.4 %
MMPI-2	0 %	100.0 %	0 %	0 %	22.2 %
Personal History Quest.	66.7 %	0 %	0%	66.7 %	44.4 %
Clinical Interview	100.0 %	0 %	0 %	0 %	33.3 %
Rorschach/Inkblot	33.3 %	0 %	0 %	0 %	11.1 %
Group dynamics	0 %	0 %	100.0 %	0 %	11.1 %
Situational interview	0 %	50.0 %	0 %	0 %	11.1 %

Figure 1 — Dimensions



All instruments never reported omitted for simplicity sake. These were: 16 PF, California Psy. Inventory, Eysenck Pers. Questionnaire, Inwald Pers. Inventory, Hilson Safety/Security Risk Inventory, and Mental Status Exam.

As for officers, having been requested to report the use of several techniques for descriptive purposes, respondents showed that all selection services use personal interview. Most selection services test for physical agility (90 %), psychological evaluation (80 %), written aptitude (60 %), and medical exam (60 %). Half of the services conduct a background check of candidates and about 20 % test for drug use. All selection services reported not using polygraph or voice stress analyser.

The MCA indicated a two-dimensional solution that explains only 29.5 % but incorporates two theoretical dimensions (Figure 3) that have face validity and a good average reliability (Cronbach α = 0.76, competencies focused dimension α = 0.79, and cognitive focused dimension, α = 0.71).

Figure 2 — Cluster Mapping

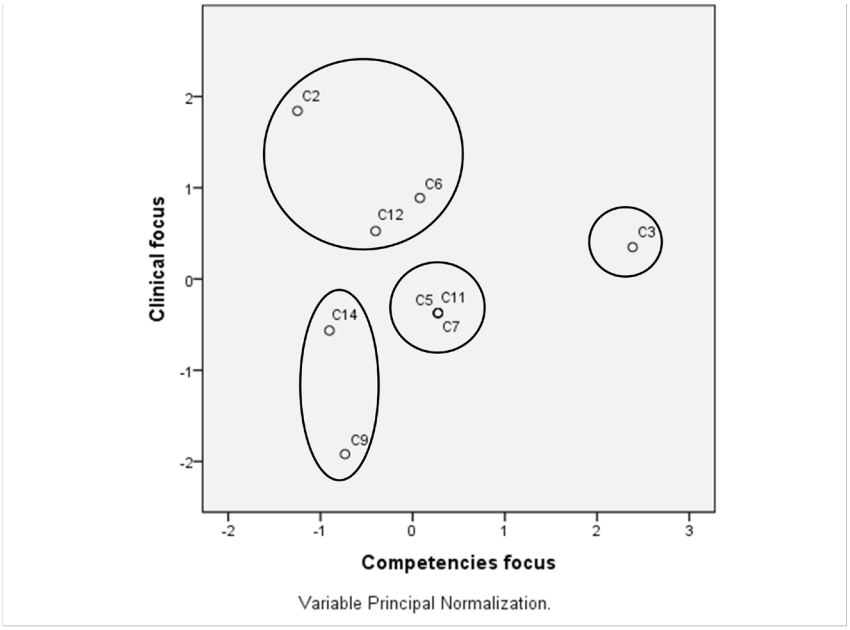


Figure 3 — Dimensions

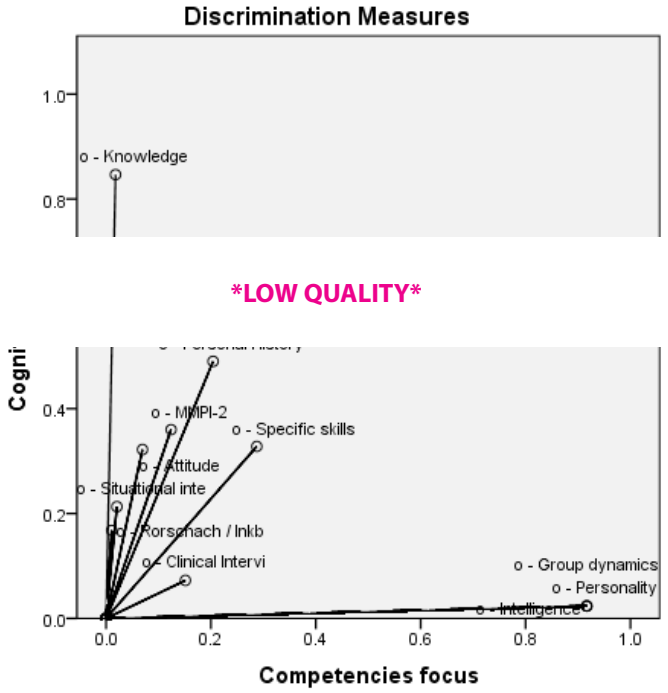
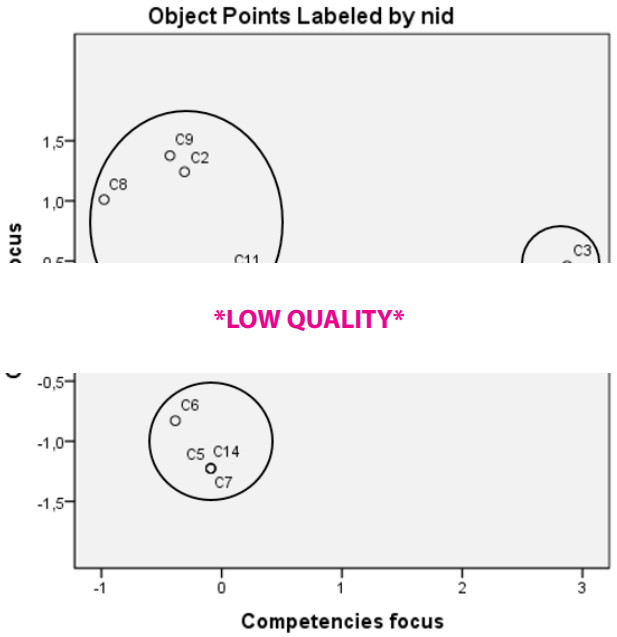


Figure 4 — Cluster Mapping



Variable Principal Normalization.

Figure 4 shows the cluster mapping. The first cluster is composed of four countries that have a more comprehensive coverage of KSAs and APOs. The second cluster is composed of five countries in which officer candidates are assessed with a focus on APOs and motivation without any focus on knowledge assessment, while a minority of the countries consider clinical issues. The third cluster is composed of a single country characterised by a focus on skills, attitudes, motivation, and using group dynamics (see Table 2).

Table 2
Officers' psychological instruments

	Clusters (Ward)			
	Cluster 1 Comprehensive evaluation N = 4	Cluster 2 APO N = 5	Cluster 3 Competencies focused N = 1	Total
Personality	100.0 %	100.0 %	0 %	90.0 %
Intelligence	100.0 %	100.0 %	0 %	90.0 %
Motivation	100.0 %	100.0 %	100.0 %	100.0 %
Attitude	100.0 %	40.0 %	100.0 %	70.0 %
Specific skills	75.0 %	20.0 %	100.0 %	50.0 %
Knowledge	100.0 %	0 %	0 %	40.0 %
MMPI-2	0 %	40.0 %	0 %	20.0 %
Personal history questionnaire	100.0 %	40.0 %	0 %	60.0 %
Clinical interview	0 %	40.0 %	0%	20.0 %
Rorschach/Inkblot	0 %	20.0 %	0 %	10.0 %
Group dynamics	0 %	0 %	100.0 %	10.0 %
Situational interview	0 %	20.0 %	0 %	10.0 %

Instruments never reported were omitted for simplicity sake and are precisely the same as found for officials.

Extent of Psychology training

Crossing officials' selection clusters with the extent of Psychology in initial courses (see Table 3) reveals no discernible pattern of association between clinical focus or competencies focus and exposure to psychology subject matter in initial training for officials.

Table 3
Extent of Psychology training in officials' initial course

Cluster 1 APOs and clinical focus N = 3		Clusters			
		Cluster 2 APOs N = 2	Cluster 3 Competencies focused N = 1	Cluster 4 Comprehensive evaluation N = 3	
Extent of Psychology training in officials' initial course	Yes, a course	66.7 %	100.0 %	100.0 %	33.3 %
	Yes, a module	33.3 %			33.3 %
	No, nothing				33.3 %

A required complementary analysis for a full comprehension of psychology training in use in European police concerns the number of hours in all cases in which at least one module in Psychology has been reported (Table 4). Cluster 3 is suppressed, as it is a single case.

Table 4
Number of hours of officials' psychology training

Officials' psychology training contact hours per cluster	Mean (h)	Std. Error
Cluster 1 — APOs and clinical focus	33.33	6.7
Cluster 2 — APOs	116.00	92.0
Cluster 4 — Comprehensive evaluation	94.50	85.5

Individual cases analysis (not shown due to anonymity restriction) indicates that contact hours with Psychology varies considerably, ranging from 9 to 208 hours, with clusters showing variable levels of heterogeneity (Cluster 1 = 33h/se = 6.7 while Cluster 4 = 94.5h/se = 85.5). This strengthens the belief that clusters are not sufficiently homogeneous to suggest any noticeable pattern.

Crossing officer selection clusters with the extent of Psychology in initial training (Table 5) shows no discernible pattern of association between cognitive focus or competencies focus and exposure to psychology subject matter in initial training for officers.

Table 5
Extent of Psychology training in officers' initial course

Cluster 1 Comprehensive evaluation N = 4		Clusters		
		Cluster 2 APO N = 5	Cluster 3 Competencies focused N = 1	
Extent of Psychology taught in officers' initial course	Yes, a course	75.0 %	80.0 %	
	Yes, a module		20.0 %	
	No, nothing	25.0 %		100.0 %

The complementary analysis applied earlier shows (Table 6) that for officers contact hours with Psychology varies considerably, ranging from 6 to 52 hours, with clusters showing variable levels of heterogeneity (Cluster 1 = 13h/se = 5.6 while Cluster 4 = 36.8h/se = 6.4). This again strengthens the belief that clusters are not sufficiently homogeneous to suggest any sort of pattern.

Table 6
Number of hours of officers' psychology training

Officers' psychology training contact hours per cluster	Mean (h)	Std. error
Cluster 1 — Comprehensive evaluation	13.00	5.6
Cluster 2 — APO	36.80	6.4

Future trends

Counting on respondents' expertise in recruitment and selection and on official and officer training, we asked about future trends and found the following (Tables 7 and 8):

Table 7
Selection trends

Category	Stated selection trends
Technical-scientific foundation	'We have started to create competency profiles for several positions'
Selection criteria	'Likely to be more emphasis on written communication skills such as statement writing'
	'Enhance performances and competencies to select better police officers'
	'A more targeted recruitment'
Regularity of use	'Selections procedures will be used for more cases'
	'More psychological testing for specific areas'
General policy	'Increase the number of women and focus on diversity'
	'The ambition is to attract more women and more people of immigrant background to apply for a police career'
Process modernisation	'e-recruitment'

Statement analysis indicates five categories that organise the vocabulary employed by respondents: technical-scientific foundation, selection criteria, regularity of use, general policy, and process modernisation. Statements suggest that competency profiling is seen to be at an early stage regarding technical-scientific foundation. Selection criteria and its regularity of use are seen as needed in order to raise the bar regarding both procedures and

skills. Likewise, an equal opportunity concern is addressed as a future issue. Lastly, efficiency concerns translate into process modernisation.

Table 8
Training trends

Category	Stated training trends
Training needs assessment	'Check if psychological contents meets daily police work'
Social focused subjects	'Social competence' 'Improvement of "human" formation' 'Human rights'
Technical subjects	'Technological skills'
Learning methods	'Less theory and more practice (pragmatic approach)' 'Case-based learning methods with progression as a function of time' 'More written work in the basic training' 'More integrated cross-subject teaching performed by teams of teachers with different professional backgrounds' ' "one shot" didactic modules focused on issues'
Evaluation methods	'A probationary initial training'

Five categories emerged: training needs assessment, social focused subjects, technical subjects, learning methods, and evaluation methods. Statements suggest that respondents acknowledge room for improvement due to a mismatch between needs and offer, a still suboptimal focus on social and technical issues, and especially, unsuitable learning and evaluation methods in use.

Overall, the trends (in selection and training) analysed with MCA, show a two-dimensional space in which selection trends prevail in discriminating between the axes (Figure 5). Both axes explain on average 27 % variance with acceptable Cronbach's alphas (Routine use $\alpha = .73$, Policy fulfilment $\alpha = .66$).

Business sector

Future trends fall upon these dimensions more than on content and criteria. Taking into consideration that the broad-range issues such as the routine use of procedures and the fulfilment of overall HR policy are the critical ones in estimated future trends (instead of selection criteria or training contents) we must conclude that the current situation is still one of endeavouring to set the fundamentals for critical HR areas in officials' and officers' careers.

Discussion and Conclusions

It is generally accepted that the requirements of police work imply certain personal features that translate into greater person-job fit. Desirable candidates for this profession are those who are assertive and decisive, yet compassionate and empathic (Roland, Greene, Hampton and Wihera, 2014), and represent the community they serve (Sanders, Hughes and Langworthy, 1995). Most of these features seem to be linked with emotions at work, which according to Thomas (2014) is one of the topics that should be addressed in research, adding to many topics traditionally studied such as policing strategies, organisation, and evidence-based policing.

Amongst the HRM practices, those that have received more attention from researchers focused on police matters are training and hiring (Mazeika et al., 2010). These are two of the HRM practices in which emotions play a central role, namely in selection process and specific psychological training. It is thus worthwhile to conduct research crossing emotions and these HRM practices within the context of police workforce.

Findings from this study should be interpreted while acknowledging its limitations. Although the geographical origins of respondents cover much of Europe, the small response rate prevents any generalisation to all of the European police forces. Likewise, a single organisational respondent poses a threat regarding biases, and requires further triangulation to check for representativeness. Notwithstanding, the subject under examination is not prone to social desirability responses and findings largely converge.

Overcoming these limitations is a challenge per se considering the institutional heterogeneity and policies. However, further research on emotions in police work is much needed and may bring novelty to research techniques and methods in the field. For example, Slaski (2002) defended the heuristic value of an organisational approach to understanding organisational dynamics and promoting opportunities for new techniques and research methods.

A first conclusion concerns the differing axes that structure the official and officer dimensions in selection. Although one can find similar cluster profiles from crossing these axes, it is important to keep in mind that the axes themselves are not coincident and that the clusters do not comprise the same countries. It is also worth stressing that no methods of selection are perfect (Decker and Huckabee, 1999), but one should recommend that the ideal instrument would be a test that is specifically built for police selection, rather than a test that has been adapted for use in the police environment (Lough and Von Treuer, 2013). It is also worth emphasising that a successful recruitment campaign must use a fine-tuned mixture of components to ensure strong informational output (Wilson, Wilson, Luthar and Bridges, 2013).

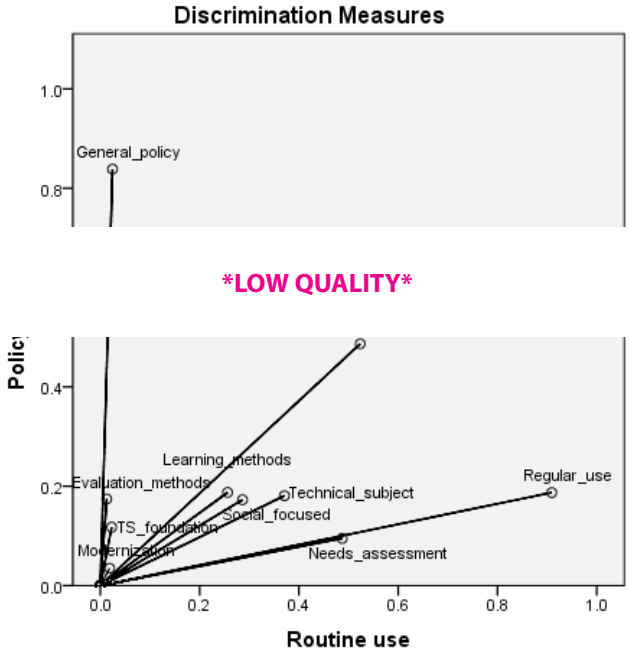
The varying number of training hours in psychology subjects (a 1:23 difference in officials' training and 1:9 in officers') is adding to the belief that practices taken together do not reveal a trend toward a common policy (Winterton, 2009).

All in all, a pattern between selection dimensions and psychology subjects in initial courses could indicate a strategic alignment between selection and training regarding psychological focus. No such pattern is discernible from findings in this study for either official or officer careers. We may therefore state that such a phenomenon might be an organisational-wide product and not simply a professional group feature. If this is true, the source of such invariance might reside in institutional culture assumptions or simply that there is not yet an explicit strategy to favour such alignment.

As for future trends in police selection and training in all categories found, there is a recurring tacit acknowledgement of a long way to go for improvement in the overall process. Also potential differences in Europe should be further understood and systematised.

Considering the literature and this study's findings, we cannot but repeat Daus and Brown's (2012) call for more research on emotion in police work. With this call it is worth remembering Denkers' (1986) caveat on the false belief that through selection and training one can guarantee higher police workforce quality. Structure, culture, policy, and leadership play

Figure 5 — Dimensions



the major roles in shaping police behaviour and therefore, an organisational embedded research framework must emerge in order to tackle these issues.

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Crowdsourcing and policing: Opportunities for research and practice

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Abstract
Crowdsourcing, i.e. digitally enabled processes to solicit contributions from large groups of external actors, is considered a promising approach to improve collaboration between citizens and organisations in both the private and public sector. In the present paper, we explain what crowdsourcing means and how it works. We then review the state of the art in this emerging field of research and examine the manifold opportunities, key challenges and main risks of its application in policing contexts.

***Keywords*:**
Crowdsourcing, social media, internet, collaboration, policing.

Introduction

Technological progress and accelerating changes in the population structure of modern societies present major security challenges for public authorities. These can only be mastered using complex security networks (Dupont, 2004). In such networks, security actors such as the police are closely connected and working with private security actors and citizens. This insight is well established in the literature and builds on, among other things, the pioneering work of Elinor Ostrom. More notably for the purposes of our paper, she investigated why the crime rate in a community actually increased, when the police came off the beat and into patrol cars (Ostrom and Baugh, 1973). She used the term 'co-production' as a way of explaining why the police needs the community as much as the community needs the police. In essence, public order and security crucially depend on participatory collaboration between state-sanctioned actors, such as the police, and actors of the wider public. Popular examples underlining the importance of collaboration in the field of security include the

concepts of '*community policing*', which integrates police and local communities, schools, clubs, immigration authorities, etc. to ensure public safety (Tilley, 2008), and '*police private partnerships*', in which the police join forces with private security actors to ensure the safety of neighbourhoods, factories, industrial areas, etc. (Youngs, 2004). In summary, public order and security are premised on the insight that close collaboration between different security actors is essential.

This puts the spotlight on innovative strategies, methods or technologies that enhance collaboration in the domain of policing. It is in this context that crowdsourcing, i.e. digital platforms and processes to solicit contributions from large groups of external actors, seems particularly promising as both an approach and a technology to significantly improve collaboration between public and private security actors, and to mobilise and re-engage the civil society in order to enhance public order and security. Crowdsourcing can leverage the potential of new forms of digitally enabled collaboration between police authorities and civil society. In what follows, we will briefly review the state of the art of crowdsourcing and pay particular attention to the opportunities and main challenges of its application in policing contexts.

Crowdsourcing Definition

Crowdsourcing is a multidimensional concept encompassing a wide range of empirical phenomena related to very different tasks and actors, and it has been subject to many misunderstandings (Hopkins, 2011). Hence, it cannot be satisfactorily defined in a few words. The following widely used definition of crowdsourcing was given by Estellés-Arolas and González-Ladrón-de-Guevara (2012: 197) in a paper, which explicitly aimed at defining crowdsourcing:

'Crowdsourcing is a type of participative online activity in which an individual, an institution, a non-profit organisation, or company proposes to a group of individuals of varying knowledge, heterogeneity, and number, via a flexible open call, the voluntary undertaking of a task. The undertaking of the task, of variable complexity and modularity, and in which the crowd should participate, bringing their work, money, knowledge and/or experience, always entails mutual benefit. The user will receive the satisfaction of a given type of need, be it economic, social recognition, self-esteem, or the development of individual skills, while the crowdsourcer will obtain and utilise to their advantage what the user has brought to the venture, whose form will depend on the type of activity undertaken.'

Crowdsourcing consists thus of a voluntary, collaborative relationship between a crowdsourcer — usually an organisation or an institution, e.g. the police — and a crowd — a large group of people that are considered together — using the internet to provide solutions to problems for the mutual benefit of the crowdsourcer and the crowd (Brabham, 2013). At

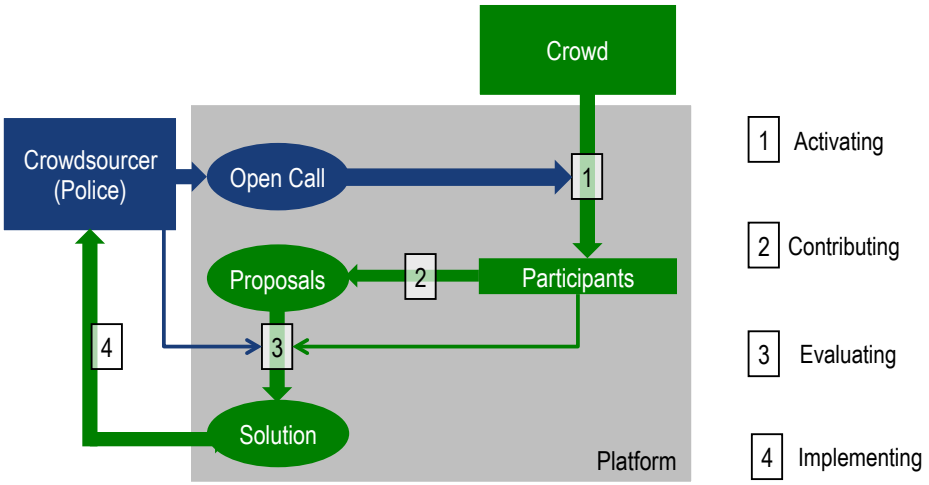
a basic level, community- and contest-based crowdsourcing can be distinguished. *Community-based crowdsourcing* is a continuous collaborative effort by a broad group of actors typically united by a common purpose and a shared identity. Prominent examples of this type of crowdsourcing include the online open-content collaborative encyclopedia Wikipedia and the open-source operating system Linux. In academic circles the distinction between community-based crowdsourcing and other, similar forms of online participatory work and user-generated content activities has been and still is the subject of much controversy (Hopkins, 2011). *Contest-based crowdsourcing*, in contrast, is competitive and less continuous in nature, as members of the crowd compete against each other in an attempt to win an often one-shot contest and capture the associated reward, which can be a monetary (e.g. prize money) or non-monetary (e.g. reputation). Market-leading intermediaries of such contest-based crowdsourcing comprise NineSigma and InnoCentive. In this paper, we focus primarily on contest-based crowdsourcing with many ideas being applicable to community-based crowdsourcing as well.

Crowdsourcing Process

Crowdsourcing usually unfolds in a sequential process (Wexler, 2011), which is illustrated in Figure 1. First, the crowdsourcer — in a policing context: the police — becomes aware that an internally unsolved often technical problem could potentially be solved by transferring it to a loosely defined crowd. Then the crowdsourcer broadcasts an 'open call' in the internet, often supported by a specialised intermediary, inviting the crowd to participate in solving the problem and providing a set rules or expectations for the participants. In order to motivate the crowd to participate, the crowdsourcer can offer monetary benefits such as a cash prize or career-enhancing attention. Such incentives might not be necessary when participants are expected to be motivated by altruism and their belief in the cause. Next, the crowdsourcer collects and evaluates the input received from the crowd. To identify the most valuable solution proposals, the crowdsourcer might again rely on the crowd by asking the crowd to assess the solutions submitted, thereby allowing them to learn from their peers. The most highly ranked solutions are usually turned over to internal experts and decision-makers who select the most valuable solution proposal and decide on whether to implement it. Finally, the crowdsourcer has to decide on whether to end or restart the crowdsourcing process, in an attempt to find a better solution for the problem or to solve another problem.

On the basis of this general process, many different applications of crowdsourcing are feasible. Crowdsourcing has already been successfully used by numerous companies to attract ideas and solutions to technical problems and gauge feedback from customers, ranging from new software (Boudreau and Jeppesen, 2015), IT-products (Bayus, 2013) or solutions to technical problems (Jeppesen and Lakhani, 2010; Lüttgens et al., 2014), to baby food (Poetz and Schreier, 2012) and designs for clothes and car parts (Langner and Seidel, 2015). We also

Figure 1 — Model of Contest-Based Crowdsourcing



know that crowdsourcing has been successfully used in the public sector to facilitate open governance and improve transparency, participation and collaboration of citizens in political processes (McDermott, 2010). For instance, movements such as 'Open Data' (e.g. data.gov) or 'Crowdscience' (e.g. Project Galaxy Zoo) attract large numbers of participants and result in unprecedented data inputs and project outcomes (Franzoni and Sauermann, 2014; Hilgers and Ihl, 2010).

Interestingly, the contemporary literature on crowdsourcing usually depicts the crowd as an inexpensive, original, effective and efficient problem solver, and hence crowdsourcing as generally beneficial, in particular for the crowdsourcer, but also for the crowd. This notion contrasts with the classical, but somewhat antiquated sociological conception of crowds as irrational and threatening phenomena, and therefore as a social problem (Wexler, 2011). In spite of the obvious and undeniable opportunities of crowd-based problem solving, we must, however, not ignore its disruptive power dynamics. Instead we should question the postulated win-win framing and account for 'those who are disintermediated or have their labor replaced by the crowd', that is, for 'those who bear the costs' (Wexler, 2011: 14) of crowdsourcing.

Crowdsourcing Applications

In an attempt to structure the multitude of existing crowdsourcing applications, Brabham (2013) developed a typology that distinguishes the following four problem-based crowdsourcing approaches covering the range of problem-solving activities suitable for crowdsourcing:

— *Knowledge discovery and management*: The crowdsourcer tasks the crowd with finding and collecting information into a common location and format, e.g. reporting conditions and use of public parks and hiking trails.

— *Distributed human intelligence tasking*: The crowdsourcer tasks the crowd with analysing large amounts of information, e.g. language translation for documents and websites or mapping of stars.

— *Broadcast search*: The crowdsourcer tasks the crowd with solving technical problems, e.g. finding better algorithms for timing traffic signals.

— *Peer-vetted creative production*: The crowdsourcer tasks the crowd with creating and selecting creative ideas, e.g. developing designs for public structures or art projects.

The four categories illustrate the different crowdsourcing mechanisms and goals, but are still quite abstract. A more pragmatic typology is presented by Hossain and Kauranen (2015). Based on an extensive literature review, they distinguish the following seven general crowdsourcing applications:

— *Idea generation*: Crowdsourcer calls crowd to submit new ideas, to generate ideas collectively, and to select the best ideas.

— *Public participation*: Political or public decision-makers use an online platform to engage a wide range of citizens in public planning projects, to harness their knowledge and to facilitate an open dialogue between citizens and policymakers.

— *Microtasking*: Crowdsourcer calls crowd to complete small, labour-intensive tasks for monetary or non-monetary rewards, e.g. Amazon's Mechanical Turk.

— *Open source software*: Crowd collectively develops computer software, e.g. Mozilla Firefox or OpenOffice the source code of which is public and that can be used free of cost.

— *Citizen science*: A form of collaborative research in which the participation of the crowd is used to solve real-world problems, e.g. by voluntarily collecting and processing data for scientific enquiry.

— *Citizen journalism*: Journalistic websites, such as e.g. Newsvine, calls crowd to submit, rate, recommend and comment on news stories and articles.

— *Wikies*: Websites, which allow anyone to contribute to their contents, thereby facilitating online work in collaborative environments, e.g. Wikipedia.

In practice, however, most crowdsourcing initiatives involve several of the abovementioned applications and cannot be assigned unambiguously to one area. In the following, we will examine which of these crowdsourcing applications could be useful in policing contexts.

Crowdsourcing in Policing Contexts

In the context of policing, crowdsourcing is still in its infancy. However, given the increased diffusion and interdependence of digital technologies like social media, internet, GPS, smart phones, cameras, and sensors, crowdsourcing offers completely new opportunities for security actors to cooperate with each other and with the wider public. Such new forms of collaboration between citizens, police, local authorities, and private security service providers hold considerable promise to improve public safety and order, in particular because it is a resource-efficient, bottom-up approach which builds on technical devices (e.g. smart phones) and corresponding behaviours (e.g. photography, social networking) that are widely used by citizens, regardless of their socioeconomic, cultural and ethnic background.

Based on Hossain and Kauranen's (2015) abovementioned typology, the most obvious applications of crowdsourcing in policing contexts correspond primarily to the areas 'public participation' and 'idea generation'. Accordingly, crowdsourcing technologies could be used, for example, in crime prevention programs, whose success critically depends on effective collaboration between the police, other public agencies and the broader civil society. Ideation contests, for instance, could be a promising avenue to generate and select new crime prevention strategies and tools, and to exploit the creativity and knowledge of key stakeholders from e.g. social services, schools, job creation, housing, law enforcement, and, of course, citizens. Other crowdsourcing applications combining 'public participation' with 'idea generation' could be aimed at engaging a wide range of citizens in security-related legislative processes such as, for example, the 'Policing Act Wiki' in New Zealand, which empowered citizens to engage in an open dialogue with the parliamentarians responsible for drafting a new police law by presenting the 'old' police law in wiki format (Hilgers and Ihl, 2010). This new format allowed the public to incorporate their demands and proposals by modifying, rewriting and complementing the 'old' police law, thereby helping lawmakers to improve the quality and efficiency of their regulatory practice. The wiki-version of the new police law was officially approved by the New Zealand parliament in 2008.

Further potential applications of crowdsourcing in a policing context are related to technical problem solving and security analytics. Problem solving contests could contribute to solve key internal technological challenges public authorities and police forces are faced with, for example, automated video tagging, face recognition or predictive policing algorithms (Greengard, 2012). Data mining, that is, the automated categorisation and grouping of data and identification of associations and remarkable patterns, could enable the collection, preparation, analysis and interpretation of large-scale security related datasets (e.g. photos, CCTV data, crime statistics, socioeconomic statistics, security barometers) in a manner that is conducive to the development of innovative analytical tools to support public authorities in ensuring public order and security.

The most promising applications of crowdsourcing in policing, however, include the ability to involve large numbers of citizens more directly in criminal investigations and other public order preserving activities, such as searches for missing persons or manhunts. Historical examples of such forms of crowdsourcing were, for instance, 'Wanted dead or alive' campaigns in the Wild West, or, more recently, reality crime TV shows like 'Crimewatch UK', 'America's Most Wanted', or Germany's 'Aktenzeichen XY … ungelöst'. The success of these paper- or TV-based crowdsourcing formats, despite their obvious limitations, provides further indication of the potential of crowdsourcing in the digital world of the 21st century, when online manhunts using police webpages and in particular social media sites, such as Facebook and Twitter, can reach hundreds of thousands or even millions of citizens in a few hours. Such interactions, however, do not fully exploit the strengths of crowdsourcing, as social media are merely used to supplement current channels of communication such as public service announcements, and serve mainly as a means of collecting and disseminating information rather than engaging in public discourse (Nhan et al., 2017).

Online collaboration between the police and citizens becomes particularly effective when public participation is combined with microtasking, that is, when police tasks are distributed over the internet to a large group of people, thereby enabling the police to collect large quantities of crime-relevant data and to use a large number of decentralised actors to help analyse these data without tying up police resources. Typical examples of this form of crowdsourcing is public monitoring of CCTV systems over the internet, which has significantly improved the surveillance capabilities in the United Kingdom (Schafer, 2013; Trottier 2014a, 2014b), and the posting of photos of persons alleged to have participated in the 2011 Stanley Cup riots in Vancouver by the police through a Facebook page, where visitors were invited to report anyone they recognised (Schneider and Trottier, 2011).

A case in point is the terror attack on the Boston Marathon in 2013 killing three people and injuring more than 170 (Rash, 2013). Here, in addition to the usual calls for information that might contribute to identifying possible suspects, the police asked citizens to submit photos and videos from the attack and the crime scene, which triggered large volumes of data streaming in that had to be analysed by police officers to find clues as to the identities of the attackers. However, these official police investigations were accompanied by parallel investigations conducted by online communities who pooled information and resources in order to assist the police in the analysis of the vast amount of data. At the same time, websites like Reddit ('the frontpage of the internet') also posted photos and video clips circulating through the news and social media and invited their members to analyse the visual data for clues, e.g. annotating persons with large backpacks who seemed suspicious. Finally, the official police investigations led first to the identification and location of two suspects, and 4 days later to one suspect killed and the other captured. In contrast, the unofficial investigations performed by the 'cyber-vigilantes' only resulted in false accusations, thereby illustrating the risks of crowdsourcing activities in the context of policing (Brabham, 2013; Nhan et al., 2017).

The limits and risks of crowdsourcing in policing contexts arise from the fact that the distributed actors in the crowd lack professional training, and that their efforts and activities are often redundant or subject to error. In spite of being well intentioned, crowdsourcing activities using internet technologies can give way to rampant speculation and further discriminatory practices. Innocent actions can be mislabelled as suspicious activities and, even more worrisome, innocent individuals can be misidentified as legitimate suspects. In combination with potentially dangerous forms of cyber-vigilantism such as doxing, which exploit the victims' privacy in an incontrollable manner with no chance for self-defence, crowdsourcing in the context of policing therefore can have potentially disastrous effects (Nhan et al., 2017; Schafer, 2013).

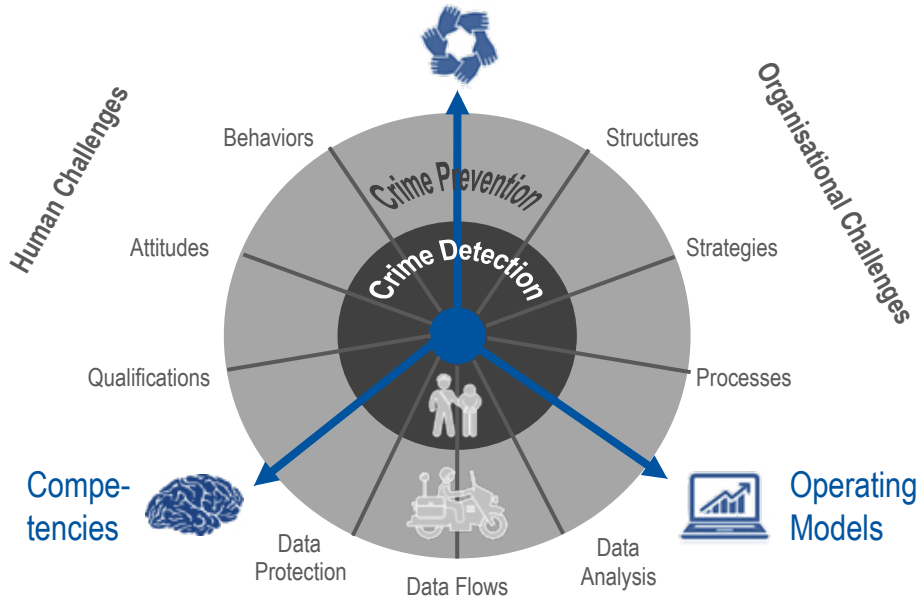
Nevertheless, the speed and scale of the unofficial investigations and the huge amount of relevant real-time information, photographs and videos collected in the aftermath of the Boston Marathon terrorist attack also demonstrated the opportunities of crowdsourcing for generating useful hints and involving communities in investigational and other law enforcement activities. Hence, bringing together the activities of the police and citizens in an official crowdsourcing platform, preferably owned by the police, which serves as a place for citizens to upload their photos and videos as well as to analyse them looking for useful clues, is paramount. Under such conditions, the police should be able to control or at least direct the data analysis activities by charging the participating public with appropriate duties (e.g. 'tag all male persons with blue backpacks'), eliminating bogus leads and misidentifications of individuals as suspects, dispelling rumors, etc. and allowing the law enforcement authorities to exploit the advantages of crowdsourcing while minimising its potential for harm.

Crowdsourcing Challenges

The previous chapter has not only illustrated the considerable potential of crowdsourcing in a policing context, but also its limited diffusion to date. It is against this backdrop that police practitioners and policing scholars alike might wish to dedicate greater attention and resources to the following three main crowdsourcing challenges, which can be broadly subsumed under the headings 'human behaviour', 'organisation', and 'technology' (see Figure 2).

— *Human behaviour*: Mainly due to psychological reasons, there can be substantial resistance to the introduction of crowdsourcing. Such behaviour is particularly prevalent if either individuals or organisations strongly resist change. This can be manifested in reactions like the Not-Invented-Here syndrome, which is the attitude-induced rejection of inputs from an external source (Antons and Piller, 2015). There is some evidence that such behavioural traits can be found in police organisations (Crank, 1997).

Figure 2 — Crowdsourcing Challenges



— *Organisation*: Crowdsourcing may require new intra- and inter-organisational strategies, structures and processes, which in turn may present barriers to the introduction of crowdsourcing in policing contexts. For example, crowdsourcing may necessitate new job responsibilities or workflows. We know from the organisational literature, however, that organisations often respond reluctantly to such changes (Hannan and Freeman, 1977). While organisational benefits from crowdsourcing may be tangible, crowdsourcing might require organisational upfront investment that can be difficult to attract.

— *Technology*: Crowdsourcing may present a variety of technological challenges. This includes unprecedented quantities of data, data flows, data analysis, data security and privacy concerns (Piezunka and Dahlander, 2015). On the one hand, social media like Twitter and Facebook offer notable opportunities for police and other security actors to, for example, identify suspects or receive crime warnings. On the other hand, crowdsourcing might result in information overflow and increased stress for police and other security staff.

In order to successfully meet these challenges, police organisations will have to develop new crowdsourcing competencies, create new crowdsourcing partnerships, and design new crowdsourcing platforms. Again, we will briefly review each in turn.

— *Crowdsourcing competencies*: Crowdsourcing requires new competencies from security actors to be effective. Of particular importance for crowdsourcing are competencies

related to the identification, integration and utilisation of new knowledge (West and Bogers, 2014). At the beginning of a crowdsourcing process, actors must be able to identify and frame a problem (Afuah and Tucci, 2012). They also have to specify the target audience for the selected crowdsourcing model (Lüttgens et al., 2014) and develop specific incentives for this target audience to encourage their participation (Frey et al., 2011). Once participants have submitted inputs, these inputs need to be analysed (Dahlander and Piezunka, 2014). Furthermore, inputs from social and other media require particular competencies from security actors and administrators of crowdsourcing communities. This may require new staff and further education.

— *Crowdsourcing partnerships*: Research on collaborative innovation clearly shows the advantages of a diverse partner network (Salge et al., 2013). For example, for the development of products and services, customers, suppliers, competitors, and universities play important roles. As mentioned above, collaboration and partnerships already play an important role for some police and security staff, but still remain to be fully leveraged. Collaboration with specific partners may be intensified based on the nature of the security problem at hand. Citizens may be able to support the police in the identification of suspects, while app-developers may support police work with specific algorithms. The challenge for any organisation using crowdsourcing remains to identify the appropriate mix of partners to increase security in its specific security context.

— *Crowdsourcing platforms*: Crowdsourcing platforms need to be designed such that partners have the appropriate incentives to contribute (Frey et al., 2011). This not only includes extrinsic incentives such as monetary incentives (e.g. prize money), but also intrinsic incentives such as recognition, reputation, fun, or intellectual challenges to solve problems (Füller, 2006). Research shows that contest-based crowdsourcing competitions are primarily fueled by monetary incentives, whereas community-based crowdsourcing tends to be more reliant on participants' intrinsic motivation (Afuah and Tucci, 2012). In the context of security, this underlines the importance of identifying and designing the right incentives for citizens and other security actors to participate in crowdsourcing activities.

The complexity of the abovementioned challenges and opportunities of crowdsourcing in the context of policing calls for rigorous academic research as well as practical experience. Indeed, the considerable challenges can only be overcome successfully, if police practitioners and policing scholars join forces. In doing so, they should not only seek to shed light on the upside potential of crowdsourcing technologies as a means to re-think police work in the digital age and re-engage civil society for increased public safety and order, but also seek to explore the associated organisational, human and technical challenges. We, however, are confident that crowdsourcing might contribute to a new and mutually beneficial mode of collaboration between citizens, the police, and other players in the field of security.

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Planning and policing of public demonstrations: A case study

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Abstract
One of the biggest political events that took place in Portugal since the Carnation Revolution in April 1974 occurred on 15 September 2012. It was a time when the consequences of the financial crisis hit the majority of the citizens, and the government announced a tax modification, along with several austerity measures. Accordingly, a group of citizens launched a national protest on the internet called 'To hell with the Troika! We want our lives!'. A few days later, around 23 000 people had said 'I'll go' on the Facebook page. Given these kinds of groups, the police had some difficulty to find credible representatives to speak with to adequately plan and execute the policing operation. This event, promoted by organisations outside the traditional political system, has constituted a challenge for the police regarding the constitutional rights of assembly, demonstration, and security and public peace maintenance. This demonstration constitutes the case study to be presented. The main goals are: to describe the police planning and implementation procedures; to analyse the dos and don'ts; and to get some lessons to be learned. Using a qualitative approach, police documents, and interviews with police officers and commanders involved in the policing operation were analysed through a content analysis procedure. Triangulation of data sources and timeline was made. Results are presented in a timeline, enabling the assessment of the whole operation, mainly the management of the information flows and the uncertainty of the goings-on on the field.

Keywords
Mass protest policing, decision-making, security, planning, training.

Introduction

In 2012, Portugal was under a deep economic and financial crisis, and as a result, an external financial intervention was given by the European Commission, the European Central Bank, and the International Monetary Fund (IMF), or the *Troika*, as the Portuguese people have named it. The demonstration on 15 September 2012 is a milestone in the recent history of Portuguese political protest. Considering the demonstrators' participation, it was the major political protest since the Carnation Revolution held in 1974. This protest occurred in the main Portuguese cities as a reaction to the announced reforms of the Single Social Tax.

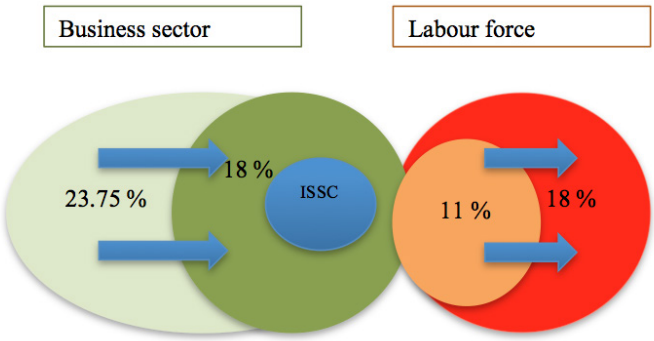
On 7 September 2012, the Prime Minister announced changes in the form of calculating the Single Social Tax, reducing the contribution of the business sector and as a compensatory measure increasing the contribution of the labour force (see figure 1). This generated a strong reaction in society and led to the rupture within the governmental coalition.

Labour force

The public perception of the contradiction between the government and the population, as well as the internal divergence within the governmental majority, was a key factor for the success of the mobilisation process.

The cultural frame made by the movement 'To hell with the Troika! We want our lives!' presented the Troika and the austerity policy as public enemies. The accomplishment of this mobilisation was essentially due to the social resonance of precariousness and austerity because many Portuguese families were clearly facing its effects. Social media gave a new empowerment to a novel generation of activists formed by unemployed and by precarious workers with higher education profile, which means they have the know-how to mobilise and organise a protest, replacing political parties or unions. This new kind of mobilisation

Figure 1 — Government proposal to change ISSC scheme in 2012



had obvious consequences for the policing operation planning, as there were no credible representatives to speak with.

In brief, this is what happens in Portuguese major events' security: As always, police focus the attention on the security of the events and the town. According to an interviewed police officer, it is important '… *to achieve the objectives of the organisers — the right to demonstrate — but at the same time to balance these objectives with other activities in the city, and citizens' rights'* (Interview 1).

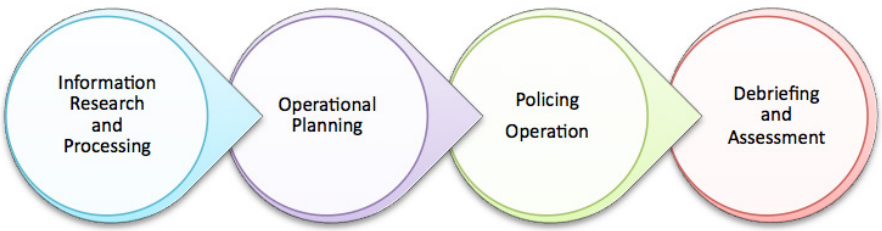
Police had to adapt to the challenges of a globalised world, where technology and new forms of protest have a strong impact in public order strategies and tactics. Police intervention, indeed, influence protesters' perceptions of the state reaction (della Porta and Reiter, 1995). Nowadays, protest policing appears to be a key issue for the professional self-definition of the police. Police planning has to be flexible and adaptable to unpredictable and uncertain events. One interviewed police officer mentioned that he '*…realized that for events of this nature, where human behaviour is determinant, unpredictability and uncertainty is huge. And so adaptability to circumstances is an added value' (*Interview 1*).*

The different phases of a security operation (see figure 2) within a large-scale demonstration are: information research and processing; planning; execution; and evaluation/debriefing.

The communication made by the organisers to the municipality is mandatory. Open sources are constantly analysed for gathering intelligence. The planning is based on meetings between the police and relevant partners. During these preparatory meetings, police support is requested by the organisers because of their lack of experience in organising demonstrations, which can also be considered as an indicator of trust and confidence in the police. To be successful, the exchange of information between the different police branches is crucial to establish the concept of operations and the different modalities of action.

Before the event, the police Commander delivers a briefing to all involved units.

Figure 2 — Phases of a security operation



During the event, information about public disorder is immediately transmitted to the commander to make decisions. But often, the 'less is more' rule applies, that is to say, that less information can lead to more effective decisions.

At the debriefing stage, a meeting is held with all police units and if needed with external entities for critical evaluation of the whole process, thus contributing to the adjustment of failures and/or systematisation of good practices.

To sum up, at first the police were supposed to deal with uncertainty. They could envisage the whole situation based on the Portuguese protest history, and respective policing operation, but they had no access to some information they usually have to prepare these kinds of events. The use of new models of mobilisation and advantage taking of perceived political opportunities by a new profile of demonstrators, gave a completely novel picture to the police, having increased uncertainty and transformed all operation. This leaderless protest implied the police had no trustful interlocutors to foresee the big picture. They had no view of what might happen during the event, and this is of great significance for those who have to design the security plan.

This was a peaceful demonstration, despite the enormous amount of participants, it seemed it would be the most suitable event to study the planning and policing procedures. In fact, evaluation was not at stake, thus eliminating a possible biased data collection and analysis. Also, because some time has passed — but not so much that the police interviewees could have forgotten their experience. Last but not least, because some reserved information became available to analysis.

This case study intends to describe the whole policing operation of one of the biggest Portuguese political events. The design, planning and implementation procedures will be addressed, as well as the information management and the decision making process.

Method

Participants

Six male police officers (three Commanders) involved in the police operation, in the areas of operations and intelligence.

Corpus

A set of police documents was gathered to be analysed:

1) Two Intelligence Reports;
2) A Traffic Control Operation Order;

3) An email sent to all the police force the day before the event;

4) A First Impression Report, made on the very day of the event; and

5) The final Police Report.

Also, data collected by interviewing the police officers, using a guide previously designed for the research purposes, was considered for analysis.

Instruments

Interviews and content analysis.

Procedure

A guide for the interview was designed taking into account the specific purposes of this study. It involves two parts: one regarding the policing of major political events in general; the other considering the event of 15 September 2012. The interviews were conducted in a semi-structured and semi-directive way. The police officers appointed to participate in the study were chosen because of their active role in the policing operation. After being invited, they have accepted to participate in the study and gave their written informed consent. The interviews were voice-recorded and then transcribed verbatim.

The police documents and the interviews were submitted to a thematic content analysis procedure (e.g. Ghiglione and Matalon, 2001). Data was analysed and codified in categories which were designed for the study, and derived from the collected data. The analytic procedure was open or exploratory. To warrant the analysis quality, triangulation of analysts was made, and other reliability and validity criteria were followed.

Also, a paper about the media perception concerning police activity during political protests in Portugal (Pais, Felgueiras, Rodrigues, Santos and Varela, 2015) was taken into consideration. It addresses the public opinion climate during 2012 by analysing the media coverage of major political events policing, namely, the news from the Portuguese News Agency, three major daily newspapers, and three major TV channels.

Results

The results are presented in a timeline, enabling the assessment of the whole policing operation, mainly the information management and the uncertainty of the developments that took place.

The demonstration: Social and political context

In 2011 the financial crisis was ruling the majority of the citizens' daily routines, and framing the actions of social and political actors. By then, a political protest named 'Geração à rascal' (precarious generation), motivated by a cultural frame of precariousness at many levels, set

up a new Portuguese protest dynamics (Felgueiras, 2016b). Lisbon became the epicentre of social discontent and political critique.

On 11 September 2012, at 11H00, there were 22 297 supporters on the Facebook page, which is an abnormal figure in the Portuguese major political events' history, suggesting the demonstration would have a massive participation. Several public figures stated their support to the initiative. Castells (2009) talk about the 'autonomy of the communicating subjects' and stress that 'the construction of communicative autonomy is directly related to the development of social and political autonomy, a key factor in fostering social change' (p. 414).

Media started an intensive coverage of the arrangements for this demonstration, closely following the mobilisation process, while the public's attention during 2012, especially considering the Portuguese TV channels with major audiences, was one of emphasising the police action during political demonstrations, mainly its results and consequences in terms of arrests and injured people, with the exhibition of images of violent demonstrators being dispersed by force, or detained (Pais et al., 2015). As Castells (2009: 302) put it, 'in the network society, the battle of images and frames, at the source of the battle for minds and souls, takes place in multimedia communication networks'.

All these factors combined with the viral effect of information disseminated through social networks led to a mobilisation that was estimated to be over 600 000 demonstrators, making this event the most attended in Portugal since 1 May 1974.

In fact, only 8 days after the Government's announcement, on 15 September, the demonstration took place in Lisbon. Some other protests occurred in 40 Portuguese cities and Berlin, Barcelona, Brussels, Paris, London, Madrid, and Fortaleza (Brazil). Even today some internet sites still give information about around a million people who have walked out into the streets. Furthermore, the event (in Lisbon) was supposed to end in a symbolic place — Praça de Espanha (Spain Square) — stressing the solidarity with the Spaniards and the political situation they were facing.

Planning and implementing the security operation: Before the event

The information research and processing began as soon as the news of the demonstration was out. An analysis of open sources regarding everything related to the events was carried out by the police, resulting in the Intelligence Reports to feed the police deployment with information ([19]).

Although several demonstrations were to happen in different Portuguese cities, it was known the demonstrators would come from various parts of Portugal in rented buses to

([19]) In 2012 Lisbon Police produced and disseminated a detailed Intelligence Report every 2 days and a half about public demonstrations and radical movements (*source:* Police of Lisbon).

the big demonstration in Lisbon. Information was available in diverse Facebook pages, managed by different promoters, with several messages regarding: the time of assembly; the promoters' intentions; the identification of hotspots; and the adherents' intentions regarding actions to be taken during the events. All this information allowed approaching the degree of acceptance of the cause of the demonstration. Also, the use of ironic or provocative language (sometimes subliminal) made the police be on the watch regarding any violent or disruptive action:

bring banners, snacks, torches (non-human yet), instruments (musical ones), cocktails (those to drink), cookies, (cinnamon) sticks, water (Portuguese Stone Water or others), and mainly dirty faces [in Portuguese, it is written as más caras, and these two words combined mean máscaras, or masks]. (Retrieved from the Intelligence Reports)

Such diverse information coming from so many groups and individuals should have implied a strong coordination between the police and the promoters. Holding meetings between the police and these organisations, intending to exchange useful information, is normal police procedure. However, information about the events was scarce and unreliable. All this had consequences for the police deployment. Also, it allowed for the identification of hotspots along the route.

The Intelligence Reports recommended to pay attention to: individuals and/or groups with a radical agenda; behaviours; mediatisation; direct action; cyber-attacks; actions against government members. Attention was also given to the news of demonstrations in Spain, regarding civil unrest and occupation of symbolic spaces. The majority of demonstrators were centre-left and moderate-right, but people from the most diverse ideologies came to demonstrate against the government-proposed measures. The police contained the extreme-right protesters and assured they also demonstrate.

As time was passing, there was an increasing feeling that the demonstration would be considerable.

> *The media, the day before the event, talked about 40 to 50 000 people, which has also fallen short of reality. (Interview 6)*

The Intelligence Report disseminated the day before the demonstration mentioned the number of participants was estimated to be above 30 000.

For the planning, it was important the cooperation with relevant external entities to solve specific problems (medical emergency, civil protection, urban cleaning, and public transportation). The exchange of information between different police branches was crucial to establish the concept of operations and the modalities of action.

The Police stated to the press that its resources 'would be used gradually and according to the degree of conflict and people's movements, always having in mind the threat levels and the permanent risk assessment' (retrieved from a note to the Portuguese News Agency by the Portuguese Police).

A briefing was carried out with all the police units involved in the operation. A dedicated communications channel was also set up to facilitate the operations. However, according to one of the interviewed police officers, '… *a control room would be of utmost importance, because even in terms of communications, (...) having a space where the information is received, where the decision-makers are, having the conditions to think and to be properly briefed, and to make decisions, (…) to think about what are the human resources and about other options to solve different public order incidents. What are the implications of adopting solution A, B or C, (...) I believe that this is what is missing' (*Interview 1*).*

Police strategy for the 15 September demonstrations was based on the premise 'high visibility and low-profile policing' (e.g. Adang and Cuvelier, 2001).

Planning and implementing the security operation: During the event

The demonstration under the motto 'To hell with the Troika! We want our lives!', starting at 15H00 and ending at 19H10, was a challenge for the police: there is always a sensitive balance between freedom and security.

Before the demonstration there was a feeling of ambiguity. On the day of the demonstration, it changed into a feeling of surprise, due to a large number of people present in the demonstration. TV was on live broadcast, and this may well have been a supplementary motivation for people to join the event, showing their solidarity with the cause. We live in 'a volatile and liquid society' (Bauman, 2007, p. 12) and protest is influenced by globalisation and social media.

When moving from planning to action, and considering the initial expectations, police commanders became stunned by the huge crowd, and this urged them to reconfigure the security problem. Accordingly, instead of worrying about critical points, violent situations, and incidents between groups, the police had to manage the simple allocation of people on the ground. Where do we put such a huge amount of people? How can we manage their rally in a safe and secure manner?

> *'When the head of the demonstration arrived at Praça Duque de Saldanha, the police officer ahead told me "it's impossible to gather them all in a traffic lane"". And it was. It seemed they were coming from a barrel and they arrived at the muzzle and occupied all the lanes. And we became dry. For a moment we had no capacity to move'* (Interview 6).

This demonstration was carried out without major incidents, with the greatest tension being felt in front of the IMF's office, with the bursting of firecrackers, tomatoes and glass bottles thrown at the police. Police had to segregate and control a group of extreme-right demonstrators to avoid confrontations with left-wing and anarchist groups.

At the end of the demonstration, about 3 000 people began a march towards the Parliament, remaining there until 2 a.m. Police means had to be deployed nearby. Some anarchists caused disorder in several commercial areas and stoned and launched pyrotechnics against the police, which led to some arrests. This was a ritualised and symbolic violence that should not be faced by a robust police reaction because these groups were amongst many other citizens who were peacefully demonstrating.

According to one of the interviewed police officers, '*… it came to a point that it already seemed a ritual, which both demonstrators and police officers knew very well. Because the protesters, the radical groups were the same: the slogans, the throwing of railing ... (…) Demonstrators expected the police to behave in a certain way and they themselves also played their role*' (Interview 1).

This day ended thus with an unauthorised demonstration in front of the Parliament, composed of several groups, associated with anarcho-libertarian movements and with several social movements, which previously integrated the demonstration. Despite the attempts of a minority of radicals, the low profile police strategy was widely praised by the media.

Planning and implementing the security operation: After the event

Usually, a debriefing occurs after a police operation like this. As an interviewed said: '*… it is important to make a debriefing, but one that in fact … which has actionable conclusions, that can be implemented*' (Interview 1).

Discussion

Planning and operational implementation have had to adjust to the increase of traditional protest but also of new forms of protest in recent years, many with tens of thousands of participants, often summoned through new technologies, supporting diverse causes and interests.

In this particular case, the huge amount of adherents to the demonstration turned out to be an element of surprise of utmost importance. Reality imposed itself and transformed the early sense of ambiguity and uncertainty that underlined the initial planning phase. Another security problem emerged due to the reconfiguration of the real scenario. The major issue was then the demonstrators' density, or the dangerous crowd density (Felgueiras, 2016a).

Police adopted flexible and adaptive responses according to the environment — 'chameleon' style and tone of policing — which is linked to the ecological rationality (Gigerenzer and Todd, 1999; Simon, 1956, 1990). For decisions to be flexible and adaptive — ecologically valid — the particular structure of information in the environment in which they are made must be considered. Thus, they are local and consider the change. They change whenever a new variable joins the set, whenever there is a change in the environment (Gigerenzer and Todd, 1999; Simon, 1956, 1990; Todd, 2001; Todd and Gigerenzer, 2000). So, in spite of the limitations of the human mind, people (decision-makers) develop an adaptive behaviour (being successful in their decisions) by exploring the information structure of natural decision environments (Gigerenzer and Selten, 2001). The interviews expressed this: '… *in planning, the decision is never final. (…) It is on the ground that decisions are made, depending on who is commanding, (…) and there are different decisions for similar situations'* (Interview 1).

On the existing protocols of action, one of the interviewed police officers mentioned that '… *perhaps at the level of decision-making and decision communication, methodology could be improved. But the principle that (...) there is certain openness and decisions are being made as things happen, (...) adapting to what is happening, I think that it happened, and it is a good protocol (…) I believe it is difficult to protocol scenarios, (…) in this type of political demonstrations. (…) if we did that, they would be protocols that would essentially push off individual accountability, because they would simply be actioned'* (Interview 1).

According to our research, there is a mix of logic and intuition (feeling), there is a mix of information and experience: '… *there are no decisions either totally right or totally wrong (...). Sometimes the secret is more about knowing how to justify at the end why the decision was made, to have a good reason to have made the decision, even if the decision was not the best than to make a good decision that runs evil and then we cannot justify why we took it'* (Interview 1).

Prudent decision-making is a characteristic of adults, being the experience the key element to consider (Oliveira and Pais, 2010). Instead of resorting to slower and more costly analytical procedures, the experience of the learning process allows us to use simplified (often vague and imprecise) information representations that have been entered into a 'knowledge store' where there are positive or negative indicators (Rivers, Reyna and Mills, 2008) associated with mental images. It is, therefore, an affective repository of images (Slovic, Finucane, Peters and MacGregor, 2002, 2005) that is formed throughout our life through the experiences of individuals in certain situations or when they are confronted with certain stimuli (Oliveira and Pais, 2010). We have, then, 'a more "intuitive" processing, made of essential summary representations, and more fluid' (Oliveira and Pais, 2010, p. 454), based on experience, feelings and accumulated knowledge, that occasionally allows for more effective decisions, namely considering the level of expertise of the decision-maker. This allows us to respond quickly to situations where the decision-maker is immersed in a specific and complex environment, choosing the solution (or response) that seems satisfactory enough — satisficing

(Simon, 1990). The rationality of the decision is based on 'the adaptive functionality that the decision-maker rehearses in making the decision based on the best/possible representation that the cognitive/affective function offers him/her of the physical and psychosocial structure of his environment' (Oliveira and Pais, 2010, p. 423). Thus, we speak of an ecological rationality (Gigerenzer, 2001).

It seems this is precisely what happens on the field. If an adaptive behaviour and adaptive decision-making is to achieve, the commander's experience plays a significant role, and this knowledge is shared with the other police officers (new at that specific service, or novices) on the terrain. The knowledge '… *is inside the commander's head, or a person in charge, or a set of officers that were present in that operation... and the next time: "look, don't forget the other went wrong in this or that, don't forget to do this or that"* ' (Interview 1).

One may think this might be a good practice for the learning and training process of novice police officers, and it is. But it remains possible to do so because of the peaceful characteristic of the majority of the Portuguese political protest. Being the political demonstrations disruptive or violent, this strategy, though necessary, would not suffice to an adequate knowledge transfer. The interviewees also talked about this: '*It would be interesting (...) [to have] a platform that systematises some aspects of the operations (...) [because] one thing is looking at an archive like this and see thousands of paper sheets of previous Operation Reports, another thing is that information to be already analysed. (…) it would have to be something organised by topics, not a mere repository of reports, of scanned reports*' (Interview 1).

Meanwhile, sometimes there is too much information circulating during the security operation, and if the information is not properly addressed, the inputs are above all misinformation and noise to the police commander. On the other hand, the management of emotions is, sometimes, difficult in these kinds of situations. As mentioned by a police officer, it would be positive '… *to have a place where people could stay, sometimes even a little bit away from all that emotion, where they could receive information, discuss it and make decisions*' (Interview 1).

The study of decision-making in a world of uncertainty shows that 'often, under some circumstances, a single good argument performs better, not only because it is simpler and faster, but because it is more precise and predictive than a multiplicity of mathematical equations' (Ratinho, 2015, p. 15). The use of cognitive shortcuts allows this. Sometimes the decision-maker ignores much of the available information to focus on a single good reason to make the decision — one-reason decision-making (Gigerenzer and Todd, 1999) — which allows him to avoid the lengthy process of analysing various clues of information, being able to be highly effective in its decision. According to our research one of the police officers stressed that '… *normally under these circumstances the Police Commander who is responsible for the whole operation would go to the field with his staff, (...) the commander listened to several people and discussed, he was a person already with a lot of experience at that time in these matters, but he still listened to many people and then made decisions*' (Interview 1).

Conclusions

Police are the cornerstone of public order and security/safety of demonstrations and meetings. Police are crucial to protect fundamental rights and freedoms of citizens during manifestations and public gatherings.

Having the event a fragmented organisation there was no formal representative to deal with to make the usual planning meetings. The information was being delivered through diverse sources, different organisers, thus posing a problem to the police. The collected information was fuzzy, giving no warranty of reliability and accuracy. This is becoming an increasing problem the police have to cope with. Nevertheless, the increasing autonomy citizens have in searching, analysing, and producing information, using new technological devices and channels pose a new problem to the police. Of course 'technology per se does not produce cultural and political change, although it does always have powerful effects of an indeterminate kind. Yet, the possibilities created by the new multimodal, interactive communication system extraordinarily reinforce the chances for new messages and new messengers to populate the communication networks of society at large' (Castells, 2009: 414).

On the other hand, in these situations, there is no leadership, and this may turn into a difficulty for the organisers themselves to act together with the demonstrators they don't know, to organise them or to contain some disruptive or violent behaviours. Considering this particular kind of citizenship, self-mobilisation for civic participation, and genuine interest in building up a fair society, one may say this event was the Portuguese democracy pinnacle.

Nevertheless, Portuguese police need to improve its protocols according to the different scenarios. Also, police need to improve command and control during these events. Training in mediation and negotiation to all police organisation should be extended as well as training in analytic research in social networks. Furthermore, both media monitoring and media training have to be considered of crucial importance for the police, as 'different forms of control and manipulation of messages and communication in the public space are at the heart of power-making' (Castells, 2009: 302).

Lessons learned and recommendations:

Mediation, negotiation, and dialogue, intelligence, public order, coordination, cooperation are fundamental

- to understand social networks and protest repertoire;
- to identify threats, vulnerabilities and risks;
- to improve public communication strategy;

- to monitor social media permanently;
- to improve police training and education;
- to make research during real time events.

A permanent work of adaptation — chameleon style of policing — to the new social environment is part of the police strategy. Ensuring the balance between freedom and security in the complex world we live in is even more difficult, given the multidimensional nature of socio-political phenomena and the permanent scrutiny of public authorities.

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Between the Military and the Police: Public Security Police and National Republican Guard Officer's attitudes to Public Administration Policies

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Abstract

The main goal of this paper ([20]) is to assess the Public Security Police (PSP) and the National Republican Guard (NRG) officer's attitudes in the context of the recent changes of policies in the Portuguese public administration occurring in these two institutions. This moment assumes significant interest due to the fact that Portugal is redefining security and national defence strategies. From the theoretical point of view, this paper emphasises the importance of knowing a settled opinion of the police officers, as well as their attitudes/behaviours, in the institutional context, especially when exogenous factors cause organisational shifts. On the other hand, considering the complexity of socioeconomic reality, we tried to identify, understand and highlight how the police forces have distinct ways of looking and dealing with these changes of policy. On an empirical level, this paper contributes to an enrichment of literature review, emphasising the moderator role that officer's perceptions play for the policy restructure of public administration, in the relation between the predicted variables analysed and their attitudes to their institutional changes. In the police policy level, suggestions and recommendations useful for adopting future strategies were also included for policymakers to consider.

Keywords

Public administration policies, public policy, police, attitudes, citizenship.

([20]) This article is based on my PhD thesis in Sociology, defended in 2013 at ISCTE — University Institute of Lisbon.

Introduction

As usual in a classical path of scientific research, we formulate a key issue to guide our investigation: *What are the attitudes of GNR and PSP officers ([21]) towards changes brought about by the reform and restructuring process that these institutions underwent within the framework of ongoing reforms in Public Administration?*

The 'justifications' and 'motivations' that led us to carry out the research were the following:

(i) Lack of studies on police reforms;

(ii) No studies on the attitudes of Security Forces personnel;

(iii) Increase knowledge about Security Forces;

(iv) New reform of the Security Forces is scheduled.

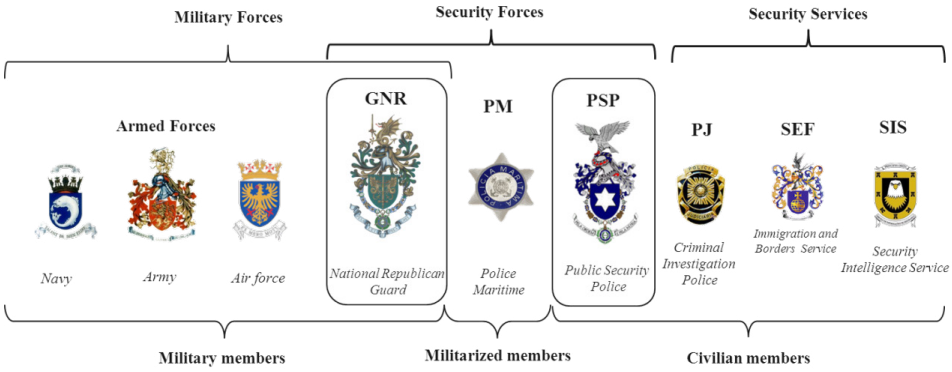
As it is difficult to present the theoretical framework of our investigation here, it should be noted that in Portugal the public administration (PA) reform trend was at its peak in 2005 with the approval of the Restructuring Programme for the State's Central Administration (PRACE), which had consequences on the entire PA, including the GNR and PSP (Silva, 2015).

In the case of the two security forces, internal changes with structural and functional impact were only visible after their Organic Laws were issued in 2007. However the creation, extinction, modification or transfer of PSP and GNR units, services and bodies only took place in 2008 and 2009.

Within this context, we should highlight that 'while in some countries police organisational structures have been subject to frequent reform, in Portugal the police model has remained all but unaltered since the end of the 19th century' (Durão, 2011, p. 396). This model has a dualist organisational structure in relation to the larger police bodies, a police force with military status (GNR) and another police force with civilian status (PSP) ([22]). The GNR and PSP are the only security police forces focused on complying fully with the basic duties of the Portuguese Internal Security System ([23]) (see Figure 1).

([21]) When I use the term 'officer' in this article, I am referring only to higher ranks (see Table 1.).
([22]) This is the case across the states of southern Europe, e.g. Spain, France and Italy (Monjardet, 1996).
([23]) Criminal Prevention; Public Order, Criminal Investigation and Intelligence.

Figure 1 — Portuguese Military Forces, Security Forces, Security Services (24)



Thus, given the scope of the object of study and interdisciplinary nature of this research, with a highly exploratory character, the following objectives were defined for our investigation:

(i) Explore and discover an organisational area which is understudied in Portugal;

(ii) Analyse the attitudes of GNR and PSP officers towards the changes brought about by the reform and restructuring process;

(iii) Increase and update knowledge about Portuguese police forces.

Research Methodology

In this investigation we have adopted a quantitative research strategy. As for the techniques of collection and analysis of empirical information to be used, we relied on documentary analysis, 12 semi-directive exploratory interviews (7 GNR + 5 PSP) and 507 questionnaire surveys (250 GNR + 257 PSP) ([25]).

For a representative sample of the population (712 GNR + 778 PSP = 1 490 officers) we used the 'hierarchical rank' stratification variable, which allowed us to create a proportionate stratified sample (Table 1) consisting of 507 police officers from both security forces (250 GNR + 257 PSP).

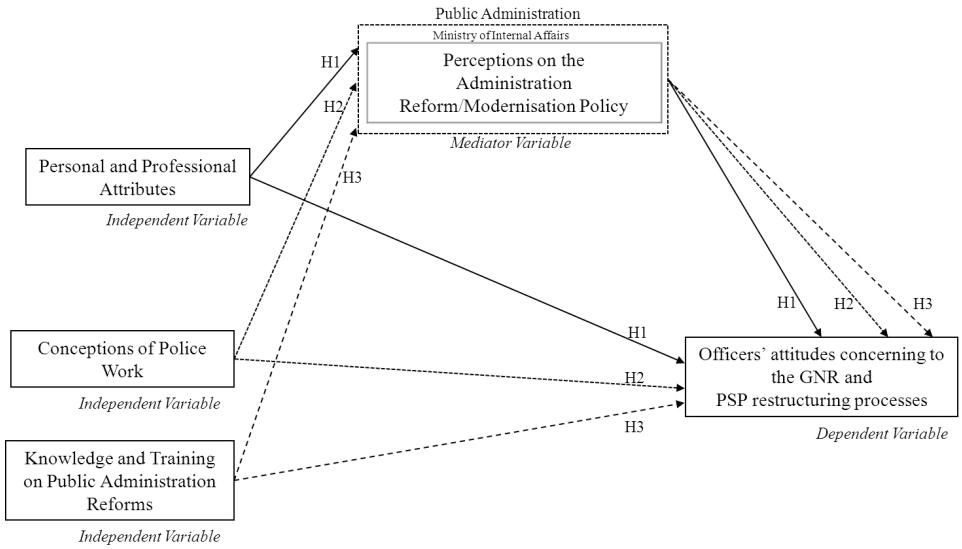
([24]) See page: http://www.gnr.pt/missao.aspx
([25]) Field work: 2010/2011.

Table 1 — Proportionate Stratified Sample

Police Forces			Police Officers Population 2010		Stratum Weight		Sample Size	
	GNR (Military Status)	PSP (Civilian Force)	GNR	PSP	GNR	PSP	GNR	PSP
Higher ranks/Categories	Colonel (OF-05)	Superintendent	58	31	0.08	0.04	20	10
	Lieutenant Colonel (OF-04)	Intendant	165	34	0.23	0.04	58	11
	Major (OF-03)	Sub-intendent	95	112	0.13	0.14	33	37
	Captain (OF-02)	Commissioner	258	157	0.36	0.20	91	52
	Lieutenant (OF-01)	Sub-commissioner	99	444	0.14	0.57	35	147
	Second Lieutenant (OF-01)	---	37	-	0.05	-	13	-
Total			**712**	**778**	**1.00**	**1.00**	**250**	**257**

Later in light of the theoretical issue, whose main scenario was public administration reforms, we defined three hypotheses that enable providing a causal explanation between independent and dependent variables identified in the following analysis model (see Figure 2).

Figure 2 — Initial conceptual model



Hypothesis 1: The GNR and PSP officers' perception on the administration reform/modernisation policy plays a mediating role for the relation between the personal and professional attributes of the officers and their attitudes concerning the GNR and PSP restructuring processes.

Hypothesis 2: The GNR and PSP officers' perception on the administration reform/modernisation policy plays a mediating role for the relation between knowledge and training on public administration reforms and the officers' attitudes concerning the GNR and PSP restructuring processes.

Hypothesis 3: The GNR and PSP officers' perception on the administration reform/modernisation policy plays a mediating role for the relation between conceptions of police work and the officers' attitudes concerning the GNR and PSP restructuring processes.

Results and Discussion

On a global analysis, with regard to the socio-demographic and professional insertion characterisation, the striking feature is that more than half of the officers surveyed are 40 years of age or older.

With respect to the marital status of the officers surveyed, most of them are married, whereby the figures are very similar in both Security Forces. Regarding the academic qualifications, there are officers within the GNR and PSP, but more substantially within the GNR, who although performing the same functions, pursued completely different educational and professional trajectories. This situation tends to fade completely over the next 10 years, given that the course to gain admission to the GNR and PSP confers a master's degree on the new officers.

In terms of the professional attributes of officers, Sub-commissioners, Captains and Lieutenant Colonels predominate. As for the duties performed by these officers, within the GNR and PSP, most carry out command functions, as expected, yet the percentage is slightly higher within the PSP. As for inspection and enforcement duties, as well as instruction/ training/ teaching functions, as might be expected, they present relatively low figures. Lastly, it was furthermore apparent in this research that most GNR and PSP officers have between 10 to 50 people working under their supervision.

In relation to the conceptions of the police work of GNR and PSP officers and, in particular, with regard to the 'work environment and relations', approximately half of the officers surveyed stated that, if they could choose, they would opt for working longer hours and earning more money; this percentage is slightly higher within the PSP. Half of the officers surveyed consider that their jobs are steady, interesting and, above all, that is useful

to society. In reference to remuneration and promotion opportunities, opinions are more diverse, although the majority disagrees partially with such assertions. Lastly, with regard to relations with co-workers, immediate superiors and subordinates, such are considered to be 'not good', 'good' and 'very good', respectively, whether on the whole or specifically within the GNR and PSP.

In general, the professional career of the GNR and PSP officers is assessed as 'falling short of their expectations' by more than half of the officers of both forces. Only a small percentage of the officers considered that 'it exceeded expectations'. A significant percentage of the officers within the GNR considered 'future career opportunities to be reasonable'; whilst within the PSP 'future career opportunities are considered to be poor'.

When analysing the results obtained, regarding the conceptions of the GNR and PSP officers' profession, it was clear that the statements which, on average, attained more agreement were: 'I'm proud to work for my institution'; 'the social prestige of the security forces is directly related to measures which confirm the public recognition of the value of the service rendered' and 'my performance should be directed to the goals set out by the organisation'. On the other hand, on the opposite side, the statements that, on average, the GNR and PSP officers disagreed most upon were: 'I would trade my institution for a job I like'; 'my interests should be defended by socio-professional associations' and 'the officer's performance assessment should be aimed at merely evaluating one's professional competence and not one's personal skills'.

As regards knowledge and training on public administration reforms, GNR and PSP officers believe that the activity carried out by the public administration is on average effective. Besides, it should be noted that slightly more than half of the officers surveyed never participated in simplification activities implemented by Ministry of Internal Affairs; and those who did attend merely attended one activity. As it is impossible to highlight the major differences, with regard to the number of activities wherein the officers of the two security forces participated, what should be noted is that over such an extended period of time the number of activities is very low.

Regarding the participation of GNR and PSP officers in training activities, on the whole, more than half of the sample did not attend any training activities. This percentage gains even more importance within the GNR, when compared with the number of PSP officers. When this issue is combined with the time variable, it appears that more than half of the officers surveyed did not participate in conferences on public administration reform over the last 3 years; and those who did attend merely attended one conference. Most GNR and PSP officers considered it necessary to undergo further complementary vocational training to allow for improving the performance of their current duties, namely within Police Management/Operational Activity, Public Administration and Auditing, and Human Resources Management.

Yet, when the officers were asked if they attended vocational training activities pertaining to the public administration reform, even if at their own expense, on the whole, only a very small percentage stated that they were involved in vocational training activities in this field. The utility of training and the degree of information on the most important issues related to their service within the GNR and PSP are considered high among the officers of both security forces. GNR and PSP officers generally favour the idea of their staff undergoing training and a very high ratio of GNR and PSP officers superiorly propose that their employees attend vocational training activities.

Internally, the GNR and PSP Social Portals, combined with the 'restructuring of the official websites of both Institutions on the Internet', were considered to be simplification and debureaucratisation measures with very positive effects on the functioning of the cited two institutions, conveying an image of innovation and greater transparency of the services rendered to the citizens as well as rapid access to information.

Externally, the GNR and PSP have achieved very positive results in terms of simplification and democratisation of citizens' access to the security forces, which allows for implementing new policing programmes that encourage interaction with the public via internet.

However it should also be noted that, regardless of the effects produced, above all in terms of simplification of internal and external processes, with measurable results in the quality of the service provided to citizens, the reform fell 'far short' of the intended major reforms of the internal security system and internal organisation of the security forces.

From the analysis to GNR and PSP organisational structure and contexts, the following was found: similarities in the variables — integration/specialisation/standardisation/formalisation/ centralisation and configuration; low activity structure/high authority concentration; more mechanistic type structural configurations; in general, more similarities than differences in the organisational design.

Furthermore, that same will of some convergence in the organisational design, by Ministry of Internal Affairs, also became evident in the latest restructuring of the security forces, where, despite the various working groups and studies carried out, the forces did not have a decisive participation in the main strategic orientations that were shaped in the respective organic laws, staff and remuneration regulations and in the actual health systems where 'an approximation in wording was clear'. In the GNR, for example, as a result of the restructuring process and upon proposal of an auditing firm, the Brigade command echelon which was typically characteristic of the military institution was suppressed, and the Traffic and Fiscal Brigades were extinct, among many other changes.

As for officers 'perceptions on the "effects of public administration modernisation measures pertaining to the functioning of public services" ', the issues that gave rise to a greater num-

ber of positive assessments by officers were, on average, the computerisation of services; the simplification of procedures and communications; the enhancement of coordination/communication among public administration bodies. On the other hand, no issues were identified as having negative effects. However, there were issues that, according to the officers, had no effect whatsoever, mainly the following: reduction of the number of civil servants; replacement of the traditional remuneration system by performance-based salary; employee performance assessment by external public entities. GNR and PSP officers furthermore consider themselves averagely aware of the simplification and debureaucratisation measures implemented by the Ministry of Internal Affairs in recent years. Moreover, the average was found to be slightly higher among GNR officers than PSP officers.

The 'GNR and PSP Social Portals' and the 'electronic management system of documents seized from drivers' were the simplification and debureaucratisation measures implemented in the Ministry of Internal Affairs with effects on the functioning of the GNR and PSP that, on average, were regarded as the most positive by the GNR and PSP officers. It was furthermore verified that slightly more than half of the GNR and PSP officers surveyed stated that they had never participated in administrative modernisation activities promoted by GNR or PSP.

With regard to likely public administration modernisation obstacles, officers of both security forces tend, on average, to identify the 'lack of political will to carry out reforms' and the 'financial costs of reforms' as the most relevant.

The measures implemented and that most benefited the officers surveyed concern aspects related to 'occupational independence' and 'occupational safety/stability'. The benefit related to 'occupational independence' is also higher whether in GNR or PSP.

The 'creation of shared services common to the two forces' and the 'proper articulation of areas of responsibility between the GNR and PSP' were the two measures common to GNR and PSP that officers considered to have more positive effects on the functioning of both institutions. On the other hand, the measures that officers considered to have more negative effects were the 'GNR and PSP retirement regime reform'.

As we had the opportunity to clarify previously, our analysis model as well as the hypothetical cases that we set for this research assume that the GNR and PSP officers' perception on the administration reform/modernisation policy plays a mediating role on the relation between 'officers' personal and professional attributes', the 'conceptions of police work' and the 'knowledge and training on public administration reforms' and 'their attitudes pertaining to the GNR and PSP restructuring processes'.

We thus operationalised three mediation models that show the three hypotheses that guided this investigation (see Figures 3, 4 and 5). The strategy developed by Baron and Kenny's (1986) was used to test these mediation models.

Figure 3 — Mediation model 1

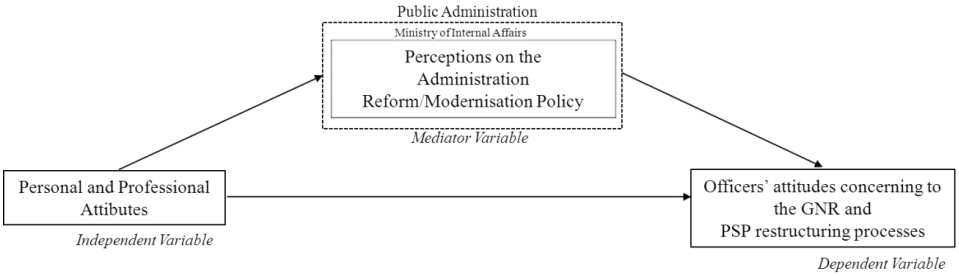


Figure 4 — Mediation model 2

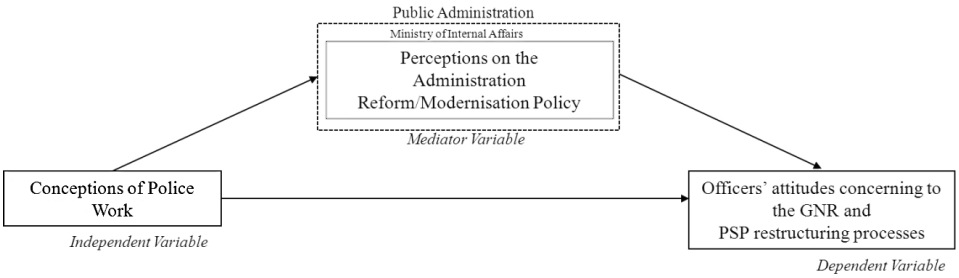
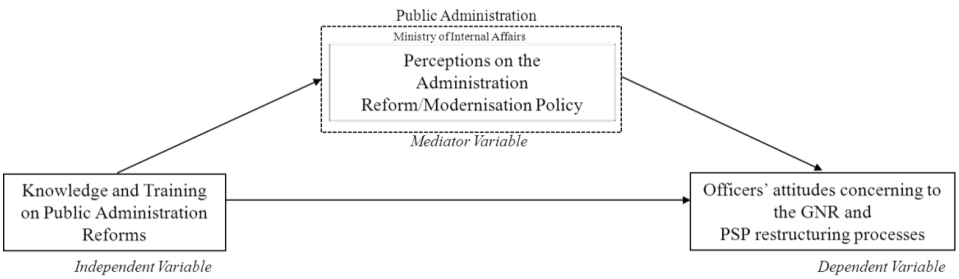
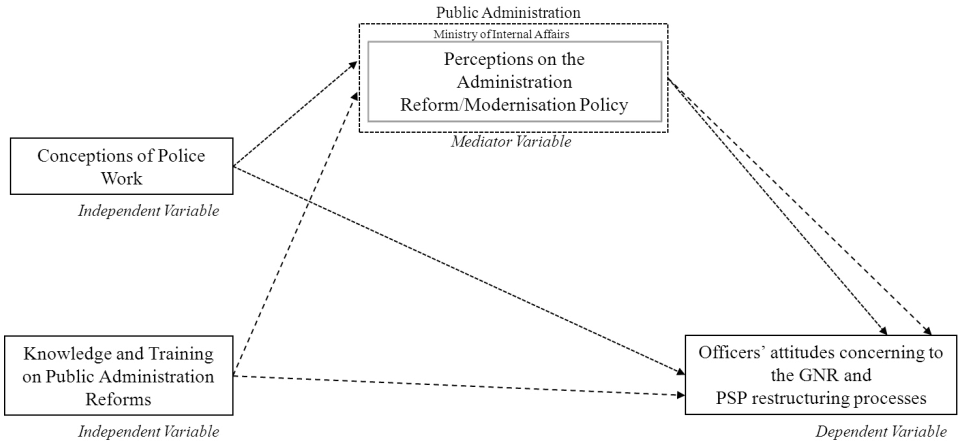


Figure 5 — Mediation model 3



After analysing the results attained through linear regression, it was possible to conclude that the variables relating to the 'personal and professional attributes' did not reveal a statistically significant effect on officers' attitudes pertaining to the GNR and PSP restructuring processes. Thus, contrary to the initial analysis model, the results showed that the perceptions that officers have on the administration reform/modernisation policy simply mediate the 'conceptions of police work' and the 'knowledge and training that officers have on public administration reforms', which means that the model was only partially supported. In view of these results, the final analysis model shall be replaced by the following (see Figure 6).

Figure 6 — Final conceptual model



The results obtained indicate that the model explains 7.7 % of the total variation of the officers' attitudes towards the restructuring processes, being significant ($F(1, 476) = 15{,}800$, $p < 0.001$) (see Table 2.)

This means that the work environment and the modernisation measures contribute to explain the attitudes of officers. However we have a full mediation since the effect of the work environment on officers' attitudes ceased to be significant in the presence of modernisation measures, being the indirect effect significant (Sobel $Z = 3.277$, $p < 0.001$).

The results therefore show that the perceptions on the administration reform/modernisation policy have a positive effect on officers' attitudes pertaining to the GNR and PSP restructuring processes (see Figure 7).

Figure 7 — Mediator role of the perceptions on the effects of the public administration modernisation measures on the conceptions of police work (work environment) and the officer's attitudes concerning to the GNR and PSP restructuring processes

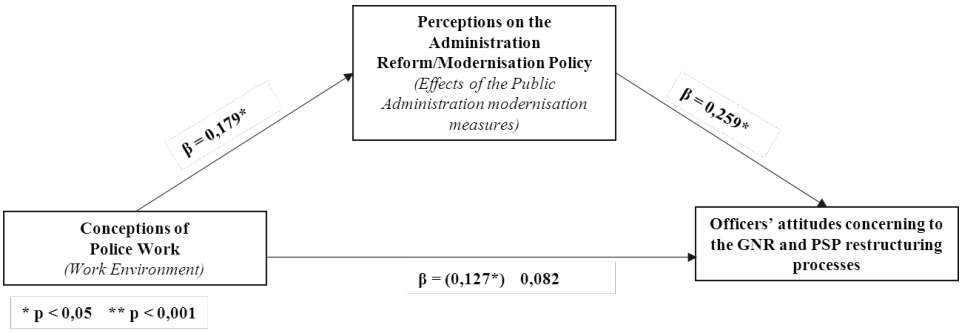


Table 2
Regression analysis of the Officer's Attitudes on 'conceptions of police work' (work environment) and 'public administration measures'

Independent variables	1	2	3
	Officer's Attitudes	Public Administration modernisation measures	Officer's Attitudes
	β	β	β
Work environment	0.127	0.179	0.082
Public Administration modernisation measures			0.259**
Adjusted R2	0.014	0.030	0.077
	F (1, 466) =7,603	F (1, 476) =15,800	F (2, 465) =20,485

** p < 0.05 ** p < 0.001*

Next, we will determine the mediator role of the perceptions on the effects of the simplification and debureaucratisation measures implemented by Ministry of Internal Affairs (mediator) in the relation between the conceptions of police work (vocation) (independent variable) and the attitudes of the officers towards the GNR and PSP restructuring processes (dependent variable).

In this case the model explains 4.2 % of the total variation of officers' attitudes towards the restructuring processes, being significant [F (1.444) = 10.893, p < 0.001] (see Table 3). This means that the vocation and the simplification measures implemented by Ministry of Internal Affairs contribute to explain the attitudes of officers.

Yet we have a full mediation given that the effect of vocation on officers' attitudes ceased to be significant in the presence of the simplification measures implemented by Ministry of Internal Affairs, being the indirect effect significant (Sobel Z = 2.571, p = 0.010).

The results therefore show that the perceptions on the administration reform/modernisation policy, namely the effects of the simplification and debureaucratisation measures implemented by Ministry of Internal Affairs, have a positive effect on officers' attitudes pertaining to the GNR and PSP restructuring processes (see Figure 8).

Figure 8 — Mediator role of the perceptions of the simplification and reducing bureaucracy measures implemented by Ministry of Internal Affairs on conceptions of police work (vocation) and the officer's attitudes concerning to the GNR and PSP restructuring processes

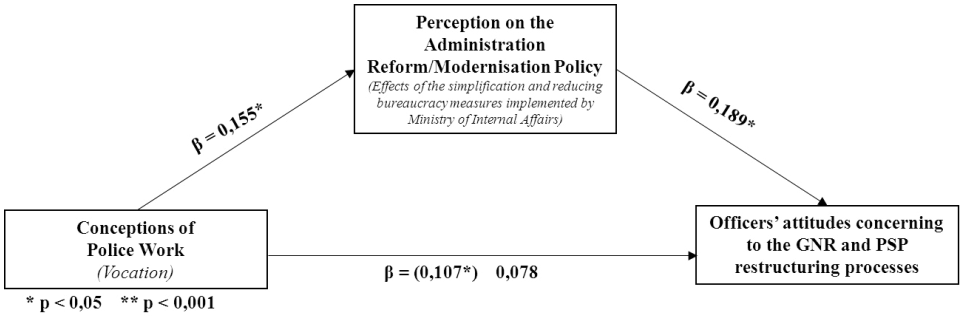


Table 3

Regression analysis of the Officer's Attitudes on 'conceptions of police work (vocation)' and 'perceptions on the effects of the simplification and reducing bureaucracy measures implemented by Ministry of Internal Affairs'.

Independent variables	1	2	3
	Officer's Attitudes	Simplification measures implemented by Ministry of Internal Affairs	Officer's Attitudes
	β	β	β
Vocation	0.107*	0.155**	0.078
Simplification measures implemented by Ministry of Internal Affairs			0.189**
Adjusted R2	0.009*	0.022 **	0.042**
	F (1, 436) =5,028	F (1, 444) =10,893	F (2, 435) = 10,605

** p < 0.05 ** p < 0.001*

In another effort, we also tried to determine the mediator role of the perceptions on the effects of the public administration modernisation measures in the relation between knowledge and training on public administration reforms (training utility) and the attitudes of the officers towards the GNR and PSP restructuring processes.

In this case, the model explains 6.9 % of the total variation of officers' attitudes relating to the restructuring processes, being significant [F (1, 387) = 11.660, p < 0.001] (See Table 4). This means that the training utility and the public administration modernisation measures contribute to explain the attitudes of the officers.

However we have a partial mediation since the effect of the training utility on officers' attitudes ceased to be significant in the presence of the public administration modernisation measures, being the indirect effect significant (Sobel Z = 2.774, p = 0.005).

The results therefore show that the perceptions on the administration reform/modernisation policy, namely the effects of the public administration modernisation measures, have a positive effect on officers' attitudes towards the GNR and PSP restructuring processes (see Figure 9).

Figure 9 — Mediator role of the perceptions on effects of the public administration modernisation measures on the knowledge and training on public administration reforms (training utility) and the officer's attitudes concerning to the GNR and PSP restructuring processes

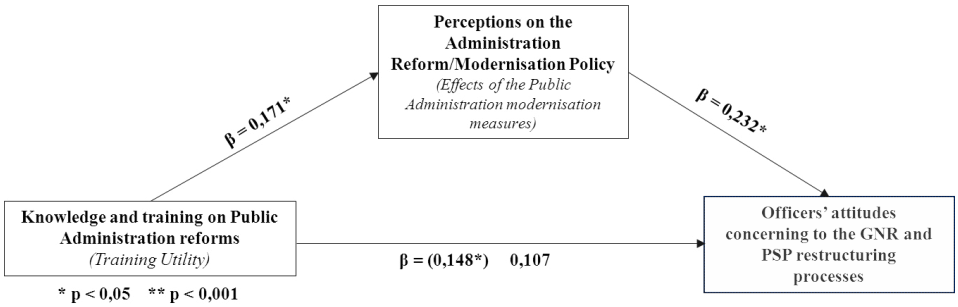


Table 4
Regression analysis of the Officer's Attitudes on 'Knowledge and training on public administration reforms (training utility)' and 'public administration measures'

Independent variables	1 Officer's Attitudes	2 Public administration modernisation measures	3 Officer's Attitudes
	β	β	β
Training utility	0.148*	0.171**	0.107*
Public administration modernisation measures			0.232**
Adjusted R2	0.019*	0.27**	0.069**
	F (1, 382) =8,504	F (1, 387) =11,660	F (2, 381) =15,221

** p < 0.05 ** p < 0.001*

Finally, an attempt was further made to determine the mediator role of the perceptions on the effects of the simplification and debureaucratisation measures implemented by the Ministry of Internal Affairs in the relation between knowledge and training on public administration reforms (training utility) and the attitudes of the officers towards the GNR and PSP restructuring processes, as graphically represented in Figure 10 and summarised in Table 5.

Figure 10 — Mediator role of the perceptions on effects of the simplification and reducing bureaucracy measures implemented by Ministry of Internal Affairs and knowledge and training on public administration reforms (training utility) and the officer's attitudes concerning the GNR and PSP restructuring processes

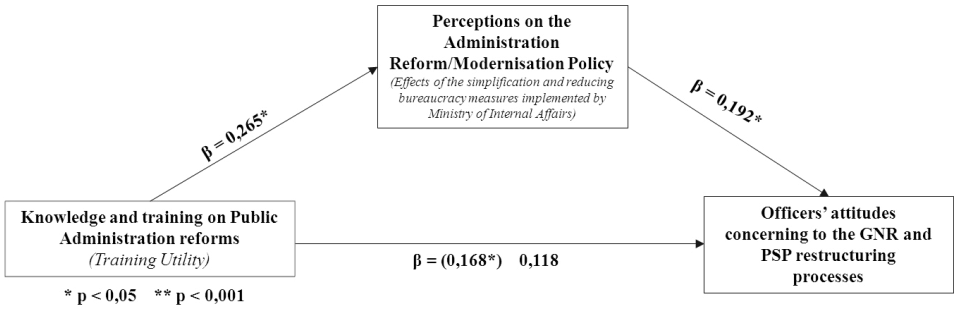


Table 5 — Regression analysis of the Officer's Attitudes on 'Knowledge and training on public administration reforms (training utility)' and 'simplification and reducing bureaucracy measures implemented by Ministry of Internal Affairs'

Independent variables	1	2	3
	Officer's Attitudes	Simplification measures implemented by Ministry of Internal Affairs	Officer's Attitudes
	β	β	β
Training utility	0.168**	0.265**	0.118*
Simplification measures implemented by Ministry of Internal Affairs			0.192**
Adjusted R^2	0.026**	0.068**	0.058**
	F (1, 372) =10,823	F (1, 377) =28,567	F (2,371) =12,397

** p < 0.05 ** p < 0.001*

The model explains 5.8 % of the total variation of officers' attitudes pertaining to the restructuring processes, being significant [F (1, 377) = 28.567, p < 0.001] (See Table 5). This means that the training utility and the simplification measures implemented by Ministry of Internal Affairs contribute to explain the attitudes of officers.

Yet we have a partial mediation given that the effect of the training utility on officers' attitudes ceased to be significant with the presence of the simplification and debureaucratisation measures implemented by Ministry of Internal Affairs, being the indirect effect significant (Sobel Z = 3.060, p = 0.002).

The results therefore show that the perceptions on the administration reform/modernisation policy, namely the effects of the simplification and debureaucratisation measures implemented by Ministry of Internal Affairs, have a positive effect on officers' attitudes towards the GNR and PSP restructuring processes (See Figure 10).

In short, from the three hypotheses in this research, where we assumed that the GNR and PSP officers' perception on the administration reform/modernisation policy plays a mediating role on the relation between 'officers' personal and professional attributes' (Hypothesis 1), the 'conceptions of police work' (Hypothesis 2) and the 'knowledge and training on public administration reforms' (Hypothesis 3) and their attitudes pertaining to the GNR and PSP restructuring processes, only hypotheses 2 and 3 were validated, as it was not possible to corroborate hypothesis 1.

As explained throughout this investigation, the initial analysis model as well as the hypotheses established assumed that the perception that the GNR and PSP officers' perception on the administration reform/modernisation policy played a mediating role on the relation be-

tween 'officers' personal and professional attributes', the 'conceptions of police work' and the 'knowledge and training on public administration reforms' and their attitudes towards the GNR and PSP restructuring processes.

Conclusions

At a time when the redefining of national security and defence strategy issues assumes growing importance and undeniable weight in the context of public security policies in Portugal, the completion of this research of a highly exploratory character mainly aimed to analyse the impact that the last reform had on the only two police forces (GNR and PSP) that are directed towards the full compliance of the basic duties of the Internal Security System — criminal prevention; public order; criminal investigation and intelligence.

Nevertheless, we also sought to highlight the essential dualism that exists in Portugal regarding the military nature of the National Republican Guard and the civilian nature of the Public Security Police, which has survived all the reformist winds, although sometimes obscured in the superficiality of several works, even academic, or in the immediacy of several reflections with some lack of analytical distancing.

Although some changes have been verified regarding to the work procedures and organisational structure of the security forces in Portugal, on a global analysis the final status desired by Ministry of Internal Affairs was not attained, that is, the GNR and PSP continue to be based essentially on rigid and bureaucratic systems, not giving way to the emergence of more flexible structures that are capable of adapting to the new challenges of contemporary societies.

On the other hand, there are still ambiguities and overlaps in the definition of responsibilities of the security forces and the desired streamlining of structures and management of means needed for the performance of duties was only partially achieved.

However, in the case of this investigation, it is fair to say that there was no organisational change prompted by the security forces themselves with the aim of changing their organisational systems; instead there was an organisational change that resulted from external factors to the GNR and PSP that changed their functioning, causing an entire organisational transformation, giving rise to adaptive responses by both organisations, which was more evident within the GNR.

Although some changes have been verified regarding to the work procedures and organisational structure of the security forces in Portugal, based essentially on a logic of cost reduction and without considering the distinct organisational cultures (military versus civilian), as were the cases of greater complexification and standardisation of the staff and

remuneration regulations and the severe loss of social supports at the health insurance system level, on a global analysis we can conclude the final status desired by Ministry of Internal Affairs was not attained.

The expectation that the reform of the security forces would lead to a significant release of staff to perform the operational activity, as well as internally providing jobs for civilians, and the closure of unnecessary posts and police stations did not prove true; putting thus into question one of the main objectives of the reform that consisted in the standardisation of structures and effectiveness of security forces, 'preventing the apparatus from performing more effective policing'.

There was insufficient interpretation of the proposals submitted, in legislative measures, set out in the Internal Security Law and also in the new PSP and GNR Organic Laws and Statutes.

On the other hand, the actual resistance to reform based on changes imposed by law allows us to currently conclude, by way of assessment, that the effective reform of the Ministry of Internal Affairs, once again, fell far short of what appeared to be the original intention of policy decision-makers.

In short, despite the efforts of the last reform in 2007, the GNR and PSP continue to be based essentially on strict and bureaucratic systems, not giving way to the emergence of more flexible structures that are capable of adapting to the new challenges of contemporary societies. Predictably causing a negative impact on the structure and effectiveness of the forces, but also some discontent and resistance of its personnel, broadcast in the media by the associations and the top leaders themselves, without forgetting the undeniable discrediting of policymakers in the eyes of the public.

Finally, it should further be pointed out that very few studies have been carried out in Portugal that analyse the security forces and, in particular, the attitude and perception issue of their staff, as is the case of the officers. Moreover, there is no known study in Portugal to try to identify predictors of attitudes of a professional universe with peculiar characteristics, such as the police; which is why this study assumes an essentially exploratory character and does not resort to the already consolidated scientific research on this subject. It should furthermore be noted that this research aims to become the starting point for other studies in this area.

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Abstract

An important aspect in the analysis of written documents is the type of materials used in questionable documents. The present study aims to characterise and create a database of the absorption spectra in the visible region, obtained by microspectrophotometry (in reflectance mode), of inks from blue and black writing instruments, such as ballpoint pens and liquid ink pens (rollerball pens, gel pens, felt-tip pens and fountain pens). The study was performed with 167 ink samples of 36 different brands commonly used in national and international markets. To validate the possible use of the database a preliminary blind test with 22 samples yielding a consistent and accurate match of 13 samples revealed that this technique has a good potential to obtain a list of inks with the same spectral characteristics. To evaluate the differentiation level of this method the samples were grouped based on the overlap of the 1st derivative spectra. As this grouping systematisation was found to present some limitations when we have a large number of samples, a multivariate analysis of the data was made. For this, a hierarchical cluster analysis (HCA) was performed. The discrimination power was calculated and compared with another works.

Keywords

Document examination, ink analysis, blue and black writing instruments, microspectrophotometry, hierarchical cluster analysis (HCA).

Introduction

The technological development of the past 30 years has put us in a digital era, in which we increasingly resort to electronic means for identification and commercialisation purposes. However, documents continue to play a key role in different segments. They are used in the establishment of various relationships, whether personal, financial, commercial or institutional. In order to serve the most varied interests and conveniences, documents are in constant threat of being susceptible to imitations or changes. The forgery and counterfeiting of documents is associated with different types of crimes, particularly trafficking of drugs, weapons, vehicles and people, money laundering, organised illegal immigration, homicides, kidnapping, paedophilia, international terrorism, corruption, theft, swindling, economic and financial crimes (Hammond, 2013).

Scientific analysis of documents, as part of forensic science, aims to clarify the nature of a document for legal purposes (Ellen, 1997). In the Portuguese Scientific Police Laboratory different types of analysis to all kinds of questionable documents using appropriate methodologies and instrumentation are performed. One of the aspects of the document analysis is to detect evidence of tampering. This kind of alterations, where a different ink of a manual writing instrument, although of the same colour, has been used, is very common and involves overlap and adds features, obliteration and insertion of new entries and signatures for various types of documents such as bank checks, invoices and contracts.

Nowadays one can find more easily manual writing instruments since they are often used in the production/filling of a certain document or used to sign it. Writing instruments are divided into two major (and broad) categories: (1) ballpoint pens and (2) liquid ink pens. In the first category are the inks of the ballpoint pens which are unique in that their inks are viscous — oils or glycols are used as solvents and colourants, which are mostly dyes. In the second category the inks of the rollerball and gel pens, felt pens and fountain pens are included. In this category, inks are liquid or gel using solvents and aqueous solutions in their constitution, and whose colourants may be dyes, pigments or both. The colourants (dyes or pigments) are one of the main components used in the writing ink composition and are responsible for the colour of the writing instruments (Ezcurra et al. 2010; Brunelle et al., 2003; Andrasko, 2002).

Microspectrophotometry in the analysis of questionable documents

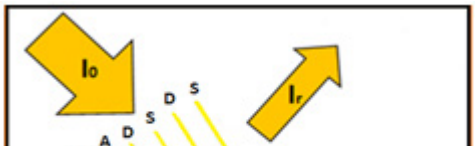
Colour is a feature with an important role in forensic comparative studies. A visual description of colour, particularly a comparison between two objects is difficult because the human eye sees only within a narrow range of the electromagnetic radiation (the visible region), and even in this range it is not uniformly sensitive to all wavelengths. Moreover, the lighting and observation conditions can compromise the visual result of the comparison made by the observer (Zięba-Palus, 2006; Martyna et al. 2013).

Microspectrophotometry is a technique that allows the comparisons of colour between small samples from different materials, such as fibres, fabrics, paints or plastics (Zięba-Palus, 2006; Pfefferli, 1983).

The microspectrophotometer consists of an optical microscope coupled to a spectrophotometer connected to a computer via an analogue-digital converter (Zięba-Palus, 2006; Martin, 2014). It can be used for analysis in the visible and ultraviolet regions, and spectra in transmittance or reflectance mode can also be obtained (Martin, 2014).

When light interacts with the sample, several (physical) phenomena can occur and be observed. These are absorption, transmission and reflection (Figure 1.1) in addition to scattering and (fluorescence or phosphorescence) emission (not shown in Figure 1.1). In the analysis of the writing instrument inks, the diffuse reflection phenomenon is dominant relative to specular reflection; this happens because the ink is a non-homogeneous sample. Therefore, the reflected light is measured with respect to the diffuse reflectance (Seipp, 1997).

Figure 1.1 — The path of light involved in the interaction process with a sample. The phenomena that are presented are: absorption (A), transmission (T) (which only occurs when working in transmittance mode) and reflection. The reflection may be diffuse (D) or specular (S). I0 is the intensity of incident light, It the intensity of light leaving the substance and Ir intensity of light reflected into a specified direction. (Adapted from Seipp, 1997)



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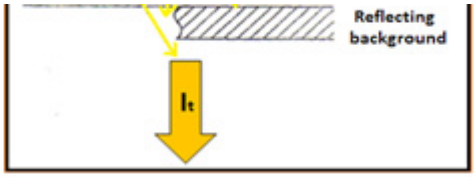


A study carried out at the Home Office Forensic Science Laboratory of UK in 1985 showed that the microspectrophotometry technique in the transmission mode was less discriminatory than the high performance thin layer chromathography (HPTLC) for the porous tip and roller ball pen (Totty, R. et al., 1985). More recently, inks have been studied by HPTLC to complete the International Ink Library chromatogram library, maintained by the United States Secret Service (Neumann C., 2011).

Microspectrophotometry does not reveal the identity of the individual components of an ink and many authors have shown in their investigations that this methodology alone may be inconclusive. The use of this technique is comprehensive in terms of its purpose, and has been used not only to respond to ink differentiation, but has also been used as a tool for classification and dating (Zięba-Palus J. et al., 2012). In 2013, the colour of 40 blue pen inks (36 ballpont and 4 gel) was studied in the three colour systems defined by the International Commission on Illumination (CIE) through the spectra in the visible region obtained by microspectrophotometry (Martyna, A. et al., 2013). More recently, this technique was also used in the study of the sequence of intersecting lines (Biao Li, 2016), showing positive results.

Reflectance microspectrophotometry showed less discriminatory power when compared to Thin Layer Chromatography (TLC) and filtered light examination (visible luminescence, infrared luminescence and infrared reflectance) (Roux, C. et al., 1999). UV-VIS spectrophotometry was also compared with TLC and Fourier Transform Infrared Spectrometry in the analysis of 21 black and 12 blue ballpoint inks, being verified the complementarity of the FTIR by detecting resins and solvents in addition to the colouring agents (Causin, V. et al.). In most of the studies performed with this technique no chemometric methods were used for sample differentiation.

Aim of the study

This study aims to characterise and to analyse writing instrument inks in order to create a database of the absorption spectra in the visible region with a non-destructive reflectance mode microspectrophotometry technique. In the present work, the objects of study are the inks from blue and black writing instruments, such as ballpoint pens and liquid ink pens (rollerball pens, gel pens, felt-tip pens and fountain pens). To facilitate these comparisons and evaluate the discrimination level of the technique, the data obtained from the writing instrument inks will be grouped according to the first derivative of the observed peaks in the visible region and with a hierarchical cluster analysis method (HCA).

Materials and Instrumentation

Sample characterisation and the ink database

80 blue inks [56 ballpoint pens (BBn), 17 rollerball and gel pens (LBn), 5 felt pens (FBn) and 2 fountain pens (FOBn)] and 87 black inks [55 ballpoint pens (BKn), 17 rollerball and gel pens (LKn), 5 felt-tip pens (FKn) and 10 fountain pens (FOKn)] were analysed. They came either from national (Portuguese) or international markets from 36 different brands (and some models) such as BIC, Pentel, Uni Mitsubishi Pencil, Paper Mate, Corvina, Reynolds, Molin, ACVILA, Lecce Pen, RTC, Office Cover, Pelikan, LINC, STABILO, A.G. SPALDING BROS, WATERMAN, mab, PLUS B-2, Unix, Epene, Fegol, Q-CONNECT, PARKER, MONTE LEMA, AURORA, Rotring, Fisher Space Pen, PILOT, STAEDTLER ZEBRA, Ergo marker, HERO, LAMY, CROSS, MONT BLANC and 'white label' — see tables 2.1, 2.2, 2.3 and 2.4.

Table 2.1
Samples of blue (BB) and black (BK) ballpoint pen ink

Code	Brand	Model/name
BB1	BIC	E-O-30
BB2	BIC	U-E-08
BB3	BIC	P-F-26
BB4	BIC	N-H-9
BB5	BIC	T-G-4
BB6	BIC	T-G-10
BB7	BIC	A-H-10
BB8	BIC	Cristal GRIP (Q-H-19)
BB9	BIC	ATLANTIS
BB21	Pentel	SUPERB (BK77)
BB22	Pentel	STAR V (BK66)
BB31	White label	Estetica Dental Lopez (Espanha)
BB32	White label	i RISO
BB33	White label	www.FCT.unl.pt
BB34	White label	Caixa Geral de Depósitos
BB35	White label	Caixa Geral de Depósitos-Banco da EXPO 98 Lisboa
BB36	White label	Caixa Geral de Depósitos-Banco da EXPO 98 Lisboa
BB37	White label	Caixa Geral de Depósitos-Banco da EXPO 98 Lisboa
BB38	White label	Caixa Geral de Depósitos-Banco da EXPO 98 Lisboa
BB39	White label	Caixa Geral de Depósitos-Banco da EXPO 98 Lisboa
BB40	White label	Grupo Banco Espirito Santo (BES)
BB41	White label	Note it
BB42	White label	Note it
BB43	White label	Note it
BB44	White label	Sagres-Companhia de Seguros. s.a.
BB45	White label	Estúdio Fotográfico, Lda
BB46	White label	STAPLES (traço de 0.7 mm)
BB47	White label	Note it
BB48	White label	USO
BB49	White label	IBEROSTAR,Hotels e Resorts (Tunisia)
BB50	White label	C A1
BB51	White label	STAPLES — REVU
BB52	White label	Santander Totta
BB53	White label	STAPLES-COMFORT STIC. 1.0
BB54	White label	KEESING Technologies

Code	Brand	Model/name
BB55	White label	LaborSpirit,Lda
BB56	White label	TECHNO SPEC
BB57	White label	Não tem
BB81	Uni Mitsubishi Pencil	Lakubo (uni SG-100 (07) blue)
BB91	Paper Mate	Ink Joy 100 1.0M (Ponta:1.0 mm)
BB101	Corvina	WH-T (Ponta:1.0 mm)
BB102	Corvina	51 (Ponta:1.0 mm)
BB106	Reynolds	Medium 048
BB116	molin	twisty
BB121	ACVILA	FINE 309
BB126	Lecce Pen	Não tem
BB127	Lecce Pen	Não tem
BB128	Lecce Pen	Não tem
BB131	RTC	Não tem
BB132	RTC	Não tem
BB136	Office Cover	ASTRO (Ponta: 1.0 mm)
BB141	Pelikan	Não tem
BB151	LINC	Glycer fine
BB156	STABILO	galaxy 818 M
BB161	A.G. SPALDING BROS.	Não tem
BB166	WATERMAN	STANDARD MAX. (MOYENNE/MEDIUM)
BK1	BIC	Z-E-17
BK2	BIC	E-O-32
BK3	BIC	H-E-5
BK4	BIC	I-H-30
BK5	BIC	I-H-6
BK6	BIC	SOFT Feel Med. USA
BK7	BIC	Cristal GRIP (Q-H-11)
BK8	BIC	ATLANTIS 1.2
BK9	BIC	Cristal STYLUS (T-L-03 Tunisia)
BK21	Pentel	SUPERB (BK77)
BK22	Pentel	STAR V
BK23	Pentel	SUPERB (BK77)
BK31	White label	STAPLES (Traço de 0.7 mm)
BK32	White label	Note it
BK33	White label	Note it
BK34	White label	USO
BK35	White label	Grupo Banco Espirito Santo (BES)

Code	Brand	Model/name
BK36	White label	IP ST-Instituto Português do Sangue e da Transplantação,IP
BK37	White label	não se sabe/não tem
BK38	White label	não se sabe/não tem
BK39	White label	CS — www.cs-hoteis.com
BK40	White label	Sapo.pt
BK41	White label	Note it (esferográfica cristal preta)
BK42	White label	CA Crédito Agrícola
BK43	White label	Novo Banco (Antigo Banco Espirito Santo — BES)
BK44	White label	BPI (Banco Português de Investimento)
BK45	White label	STAPLES — COMFORT STIC. 1.0
BK46	White label	STAPLES — COMFORT STIC. 1.0
BK47	White label	Nao tem
BK71	Pelikan	STICK
BK72	Pelikan	Não tem
BK73	Pelikan	STICK
BK81	Paper Mate	Comfort Mate MED.
BK82	Paper Mate	Ink Joy 100 1.0M (Ponta: 1,0mm)
BK83	Paper Mate	Replay U.S.A
BK91	mab	não se sabe/não tem
BK92	mab	não se sabe/não tem
BK101	PLUS B-2	traço 0.7 mm
BK106	Office Cover	ASTRO (Ponta: 1.0 mm)
BK111	RTC	não se sabe/não tem
BK112	RTC	não se sabe/não tem
BK116	Unix	Unix 2001-TC POINT 0.7 — Italy
BK121	Epene	ball point pen EP01-0108
BK122	Epene	ball point pen EP01-0108
BK126	Fegol	Cristal Line 1
BK131	Q-CONNECT	Ponta 0.7 mm
BK136	Uni Mitsubishi Pencil	Lakubo (uni SG-100(07) black)
BK137	Uni Mitsubishi Pencil	Lakubo fine (uni Mitsubishi SA-G JAPAN 45)
BK146	PARKER	Ball Pen Refill (Fine)
BK151	WATERMAN	STANDARD MAX. (MOYENNE/MEDIUM)
BK156	A.G. SPALDING BROS.	Não tem
BK161	MONTE LEMA	Ink Dokumental
BK166	AURORA	tungsten long-life refill
BK171	Rotring	Não tem
BK176	Fisher Space Pen	Black Med. Refill Send

Table 2.2
Samples of blue (LB) and black (LK) rollerball and gel ink

Code	Brand	Model	Code	Brand	Model
LB1	BIC	Cristal Gel + Medium	**LK1**	BIC	Cristal Gel + Medium
LB11	Pentel	K108 Hybrid roller (K108-MC)	**LK11**	Pentel	K106 Hybrid roller
LB21	Linha Branca	Note it 0.7 (esferográfica gel)	**LK21**	Linha Branca	Note it 0.7 (esferográfica gel)
LB22	Linha Branca	Note it (esferográfica tinta gel)	**LK22**	Linha Branca	Note it (esferográfica tinta gel)
LB23	Linha Branca	30457	**LK23**	Linha Branca	30457
LB24	Linha Branca	30457	**LK24**	Linha Branca	30457
LB25	Linha Branca	30457	**LK25**	Linha Branca	UNITED OFFICE Roller-ball 0.7
LB26	Linha Branca	30457	**LK41**	STAEDTLER	Gel Roller 465 Fine Point 0.25
LB27	Linha Branca	UNITED OFFICE Rollerball 0.7	**LK51**	ZEBRA	J-ROLLER MEDIUM 0.7 (JAPAN E222)
LB41	Paper Mate	Gel — Roller XF (0.5mm) D8	**LK61**	PILOT	PILOT V BALL 05
LB51	PILOT	PILOT V BALL 05	**LK71**	Uni Mitsubishi Pencil	uni-ball fine DELUXE (UB-177)
LB61	Uni Mitsubishi Pencil	uni-ball fine DELUXE (UB-177)	**LK72**	Uni Mitsubishi Pencil	uni-ball Signo (UM-100 JAPAN 89)
LB62	Uni Mitsubishi Pencil	uni-ball Signo (UM-100 JAPAN 136 (UM-100.64))	**LK73**	Uni Mitsubishi Pencil	uni-ball eYe fine (UB-157 BLACK)
LB63	Uni Mitsubishi Pencil	uni-ball Signo (UMN-207F BLUE)	**LK74**	Uni Mitsubishi Pencil	uni-ball Signo (UMN-207F BLACK)
LB64	Uni Mitsubishi Pencil	uni-ball eYe micro (UB-150 BLUE)	**LK75**	Uni Mitsubishi Pencil	uni-ball eYe micro (UB-150 BLACK)
LB65	Uni Mitsubishi Pencil	uni-ball Signo (UM-120 (0.5) BLUE JAPAN G29)	**LK76**	Uni Mitsubishi Pencil	uni-ball Signo (UM-120 (0.5) BLACK JAPAN G32)
LB71	PARKER	Roller ball Refill 0.8 mm Blue Medium	**LK81**	PARKER	Roller ball Refill 0.8 mm Black Medium

Table 2.3
Samples of blue (FB) and black (FK) felt pen ink

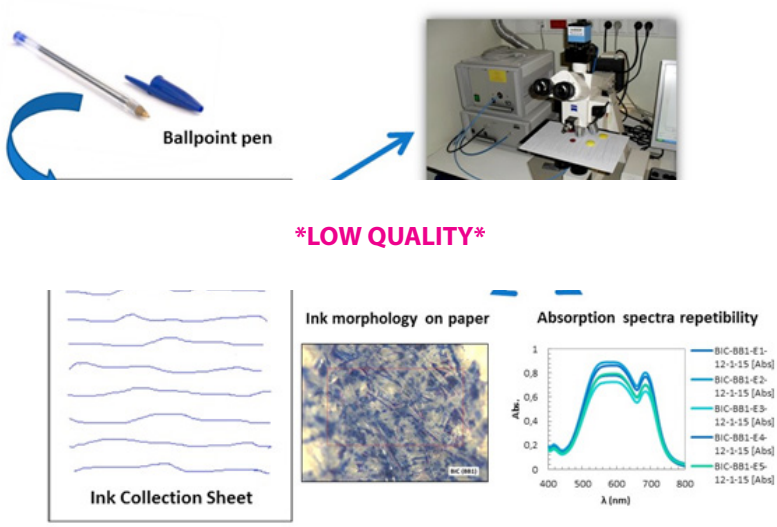
Code	Brand	Model	Code	Brand	Model
FB1	Bic	metal point	**FK1**	Paper Mate	Flair Original M
FB6	Paper Mate	2000 ROLLER	**FK6**	White label	Grupo Banco Espirito Santo (BES)
FB7	Paper Mate	Flair Original M	**FK7**	White label	note it (marcadores escrita nylon)
FB11	ergo marker	CD/DVD FINE LINER 4001 0.7 mm	**FK8**	White label	fibra liner-ponta de fibra de 1 mm (LUS I HF — LINE)
FB16	White label	Note it (marcadores escrita nylon)	**FK11**	Rotring	Tikky Graphic 0.5 (pigmented ink)

Table 2.4
Samples of blue (FOB) and black (FOK) fountain pen ink

Code	Brand	Model	Code	Brand	Model
FOB1	HERO	202 (60 mL)	**FOK1**	HERO	Black ink 204 (Glass Bottle 60 mL)
FOB5	Pelikan	LEVEL (tinta:329441)	**FOK5**	LAMY	Tinta preta (50 mL)
FOK6	LAMY	Caneta de Tinta Permanente, marca Rotring e modelo Levenger			
FOK9	PARKER	Quink (SOLV-X)			
FOK13	WATER-MAN	Tinta preta (50 mL)			
FOK17	CROSS	Tinta preta (62.5 mL)			
FOK21	AURORA	Aurora 88			
FOK25	MONT BLANC	Tinta com super-cleaner SC21			
FOK29	Pelikan	LEVEL (tinta:329524)			
FOK30	Pelikan	negro brilhante permanente (4001)			

The experimental procedure consisted in drawing lines on a white printing paper (80 g/m^2, A4, Inacopia office®), which was then fixed to a microscope base slide, and placed on the stage of the microscope with the microspectrophotometer instrument (Figure 2.1). For acquisition of the absorption spectra a TIDAS MSP-800 microspectrophotometer, consisting of a microscope (Zeiss®, Axiotech 100) coupled to a spectrophotometer (J&M Tidas®), was used.

Figure 2.1 — Scheme for the study of ink characteristics: physical (ink morphology) and spectral (spectra obtained in five analysis in different areas).



The blue and black inks were analysed in the visible region between 400 and 800 nm in the reflectance mode. In this work, the spectra were obtained in the reflectance mode. This mode of obtaining the spectra, besides being non-destructive, allows to have a sample with no previous treatment for analysis (in contrast for example with the spectra in transmittance mode) (Zięba-Palus, 2006; Martyna et al., 2013; Pfefferli, 1983). For each ink, five measurements were obtained in five different lines and areas of the collected traces of ink, using a diaphragm to select each area, under the following conditions: for the microscope [Diaphragm dimensions (220.0 × 127.0 µm), image resolution (640 × 80), objective with 20× magnification and light intensity of the microscope 10 (maximum)] and for the spectrophotometer [Interpolation (YES), Step (1 nm), Representation (Absorbance AU), Scan type (Single Scan), Accumulations (3), Bunching (1 Pixel)]. As reference, a white area (i.e. with no ink) of the same sheet, where the ink was collected, was used.

Formation of groups for hierarchical cluster analysis (HCA)

The hierarchical cluster analysis interconnects objects by their associations, giving rise to a dendrogram (bidimensional representation) wherein like objects, according to the chosen variables, are grouped together. The smaller the distance between objects, the greater the similarity between them. (Kaufman et al., 1990; Wu et al., 2007; Mendlein et al., 2013). To group the analysed samples the Euclidean distance (to calculate the distance between each pair of objects), and the Ward method (of connection as binding criteria for the formation of groups) were used. A program written in R (version 3.0.1) was used to make the clustering of the samples, and consequently produce the dendrogram.

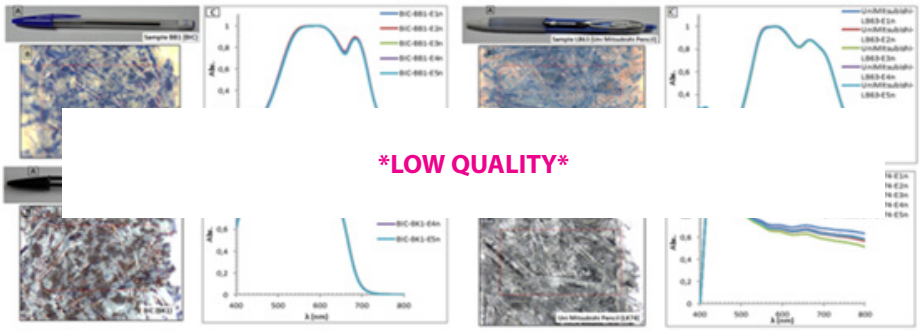
The HCA analysis which was based on the five parameters [(i) number of visible bands and (ii) associated wavelength, (iii) absorption value at the wavelengths in (ii) and (iv) the values of the 1st derivative for the wavelength maxima and (v) the presence/absence of fluorescence in the investigated samples] lead to the association in 3-5 different groups (subdivided in other subcategories). With regard to the fluorescence (an additional parameter for the construction of dendrograms), the samples were excited in the visible region between 485 and 610 nm and the presence or absence of luminescence was observed with the naked eye through a spectral video comparator (foster + freeman®, VSC5000).

Results and discussion

Characterisation of the writing ink instruments

All inks in study were collected on paper and attached to a characterisation sheet containing: (i) a photograph of the manual writing instrument (pen) from which the ink was taken; (ii) an image of the morphology of the deposited ink on the paper sheet corresponding to one of the areas selected for analysis, magnified 200×; and (iii) the absorption spectra consisting of five measurements performed for each sample, was obtained. To illustrate this, an example for ballpoint pens and liquid ink pens (rollerball and gel pens) is given in Figure 3.1.

Figure 3.1 — Physical (ink morphology) and spectral characteristics of the BB1 (upper, left), BK1 (bottom, left), LB63 (upper, right) and LK74 (bottom, right) samples in which A corresponds to writing instruments, B corresponds to the image of the morphology of the paint, and C corresponds to the absorption spectra of the five measures conducted for the BB1, BK1, LB63 and LK74 samples, respectively.



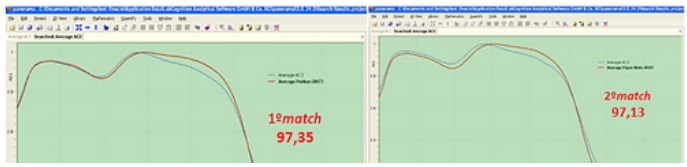
Database

The collection of the 167 inks led to the creation of an absorption spectra database. The different types of collected ink allowed the construction of libraries according to the physical (ink morphology) and spectral characteristics of each ink. The average spectrum, obtained from five spectra for each of those inks, was added to the appropriate library. This procedure leads to the creation of eight libraries, including: *Ballpoint pen blue ink* — code BBn, *Ballpoint pen black ink* — code BKn, *Liquid (rollerball/*gel) *pen blue ink* — code LBn, *Liquid (rollerball/*gel) pen black *ink* — code LKn, *Felt-tipped pen blue ink* — code FBn, *Felt-tipped pen black ink* — code FKn, *Fountain pen blue ink* — code FOBn and F*ountain pen black ink* — code FOKn.

To further validate the generated database libraries, i.e. if they are functional, a preliminary test with 22 blind samples (knowing that 14 were already entered in the database and the remaining eight were not) taken on white printing paper (80 g/m^2, A4, Inacopia office®) was made. This set of samples is composed of writing instruments inks of blue (9) and black (13) colour. In order to have the preliminary test as close as possible to a practical case, it was initially assumed that all samples were unknown (considered blind samples). With the aid of optical microscopy (e.g. magnifying lens), a pre-selection of the type of ink present on each sample was made, thus facilitating the choice of the most appropriate library. Out of the 22 samples, 13 have been correctly identified. The remaining nine were totally unknown and have been added to the generated libraries after analyses. Table 3.1 summarises the results for the 22 blind samples.

For the matching process the following parameters were used: Minimum Quality (80); Comparing Algorithm (Squared Difference) and Normalise Each Search Range. Below are two examples to demonstrate the results obtained for the blind samples using the matching process of the *paronama 3* software program.

Figure 3.2 — Results for correspondence of BS2 sample with the data entered in the library.



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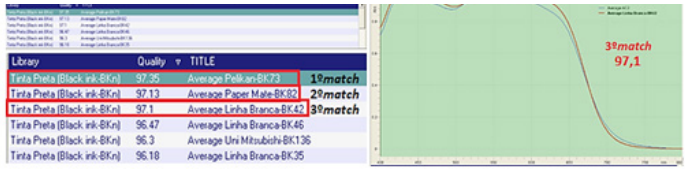


Table 3.1
Obtained result for the match of 22 blind samples (marked with blue and grey colours are blind samples of blue and black colours, respectively)

Blind Sample	1st match		Writing instrument used as Blind Sample	Blind sample identification
BS1	94,54	Paper Mate (FB7)	Paper mate Ink Joy 100 (BBn)	✗
BS2	97,35	Pelikan (BK73)	Pelikan (BKn)	✓
BS3	99,44	Pentel (BB21)	Pentel (BB21)	✓
BS4	98,73	LINC (BB151)	LINC GLYCER (BB151)	✓
BS5	98,29	Uni Mitsubishi (BB81)	Uni Lakubo-Mitsubishi (BB81)	✓
BS6	98,25	mab (BK92)	mab (BK92)	✓
BS7	99,01	BIC (BK5)	BIC (BK1)	✗
BS8	99,09	Pentel (BK22)	Pentel (BK22)	✓
BS9	98,08	"White label" (BK39)	"White label" (BKn)	✓
BS10	99,16	Office Cover (BB136)	Office Cover-Astro (BB136)	✓
BS11	98,44	Paper Mate (FB7)	Paper mate flair M (FB7)	✓
BS12				
BS13		*LOW QUALITY*		
BS14				
BS15	97,95	"White label" (LK21)	Uni Mitsubishi (LK73)	✗
BS16	92,3	"White label" (LB25)	"White label" (LB25)	✓
BS17	97,8	Uni Mitsubishi (LB61)	Uni Mitsubishi (LB61)	✓
BS18	82,81	PARKER (LK91)	Refill Aurora (BKn)	✗
BS19	84,94	PARKER (BK146)	Paper Mate Replay USA (BKn)	✗
BS20	95,01	PARKER (LK81)	Permanent ink LAMY(FOKn)	✗
BS21	95,16	Paper Mate (FK1)	Rotring (BKn)	✗
BS22	91,77	"White label" (BK41)	Fisher Space Pen (BKn)	✗

For instance, Blind Sample 2 (BS2) shows a 1st match value of 97.35 (out in 100) with the black ballpoint pen brand Pelikan (BK73). This ink was correctly identified. The 2nd and 3rd match have little spectra differences and shows a good match result, close to the first match (Figure 3.2). Noteworthy is the fact that 1st, 2nd and 3rd matches show little spectral differences between them. The spectrum in red represents the data that is entered in the library while the blue spectrum is the sample under analysis.

Figure 3.3 — Results for the correspondence of BS3 sample with the data added into the library

With the results of Blind Sample 3 (BS3) we observe that the value of the 1st match was 99.44 for a blue ballpoint pen Pentel brand (BB21). This sample was correctly identified too but in this case, the second and third match spectra exhibit accentuated differences which resulted in values of match significantly lower than the first one (Figure 3.3). Noteworthy is the fact that 1st, 2nd and 3rd matches show significant spectral differences between them. The spectrum in red represents the data that is entered in the library while the blue spectrum is the sample under analysis.

Blind Sample 7 (BS7) was correctly identified only on the 3rd match (BIC-BK1). This result can be explained by the high similarities in the formulation of constituent inks of samples BK151 (Waterman brand) and BK5 (BIC brand).

With the 22 blind samples, it was possible to obtain a correct functional match for 13 of the samples: 8 blue and 5 black.

Due to the large number of samples analysed and knowing that some of these exhibit similar spectral characteristics from each other, there was a need for clustering, to ease its characterisation and consequently its identification. In order to achieve this, two types of procedures were considered. One procedure can be considered more indicative (with a high degree of subjectivity) and the other more analytic (which can be considered more objective).

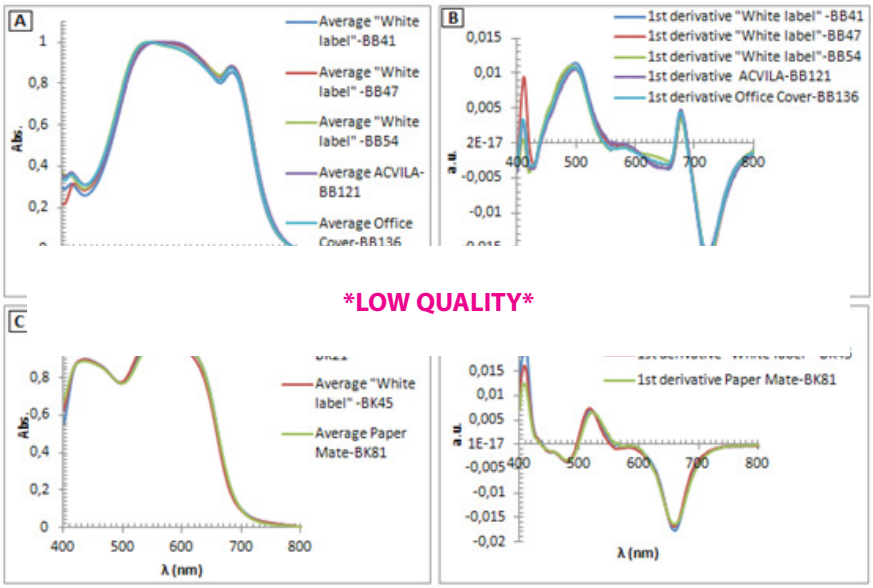
The first was based on the observation of the spectra comparison and is based upon the 1st derivative, i.e. these values are used to group samples. The 1st derivative allows us to observe the maximum and the minimum of the spectra and thus to facilitate the grouping.

This process is considered to have a high dose of subjectivity because it strongly depends on the observer and its degree of subjectivity. The second process should be considered more objective because it uses a multivariate analysis: hierarchical cluster analysis (HCA). This method allows testing how a set of elements relates to each other, and how they are similar according to the variables used.

Data clustering using 1st derivative

To group the samples analysed, the 1st derivative was calculated from the plots resulting from the average five measurements made for each sample. Comparisons between graphics overlays and the 1st derivative were obtained in order to form groups of the samples analysed. In Figure 3.4 an example of two groups is given: a blue (BBn) and black (BKn) ballpoint pens.

Figure 3.4 — *From left to right*. Absorption spectra corresponding to the average of five measurements performed with each of the samples BB41, BB47, BB54, BB121 and BB136 (A) and respective graphics of the 1st derivative (B). Absorption spectra corresponding to the average of five measures performed to samples BB41, BB47, BB54, BB121 and BB136 (C) and respective graphics of the 1st derivative (D).



In general, certain groups could be created using the graphic overlay of the 1st derivative of the samples. In Table 3.2 the number of generated groups and respective number of samples per group is summarised.

The association into these types of groups (solely based on the overlapping of the graphs of the 1st derivative) reveals that microspectrophotometry may be considered an excellent non-destructive technique for ink differentiation. The problem is that when there are a large number of samples to analyse, this grouping becomes insufficient, making this type of analysis impractical, since this is done manually. Therefore, it is necessary to use another type of analysis in order to be able to associate all the samples analysed in groups. To do this, we have used the hierarchical cluster analysis (HCA).

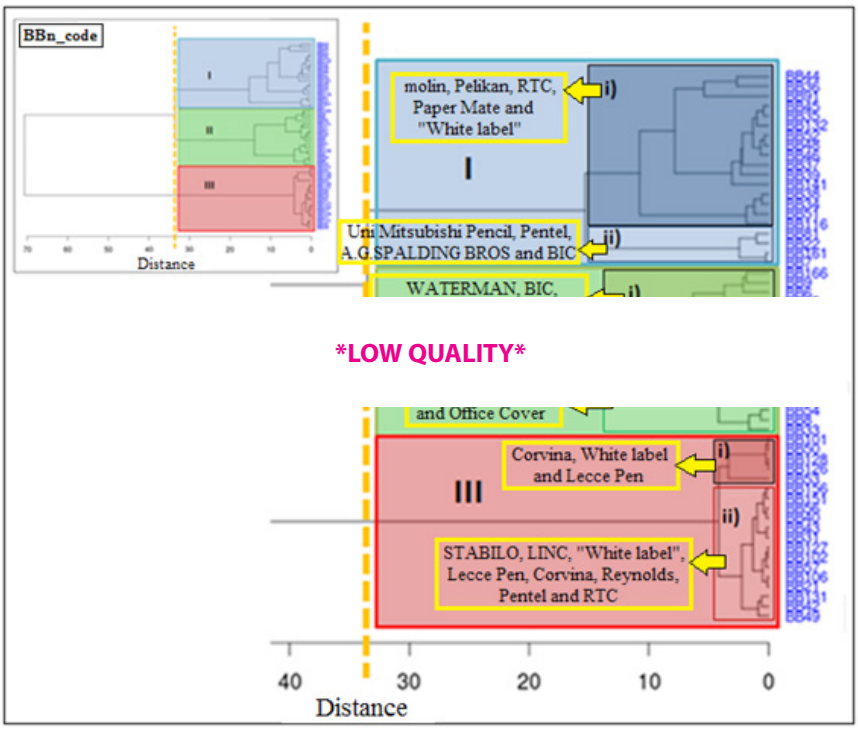
Table 3.2
Number of groups formed using the superposition of the graphics 1st derivative, taking into account the number of available samples for each type of ink

Writing instruments		Groups	Samples	Number of samples per group (G1 to G26)
Ballpoint pens	Blue ink	26	56	2, 3, 1, 3, 1, 3, 1, 3, 2, 2, 4, 2, 5, 2, 2, 1, 1, 3, 2, 5, 2, 1, 2, 1, 1,1
	Black ink	26	55	13, 2, 2, 3, 3, 1, 3, 3, 2, 2, 2, 1, 2, 1, 1, 1, 1, 2, 1, 2, 2, 1, 1, 1, 1,1
Liquid ink pens	Rollerball and gel blue ink	12	17	5, 1, 1, 1, 2, 1, 1, 1, 1, 1, 1, 1
	Rollerball and gel black ink	5	17	13, 1, 1, 1, 1
	Felt blue ink	5	5	1, 1, 1, 1, 1
	Felt black ink	4	5	1, 2, 1, 1
	Fountain blue ink	2	2	1, 1
	Fountain black ink	7	10	2, 3, 1, 1, 1, 1,1

Data clustering using hierarchical cluster analysis (HCA)

The formation of groups using hierarchical cluster analysis (HCA) was already explained in 2.1.1. For each set of data (BBn, BKn, LBn, LKn, FBn, FKn, FOKn) there is a dendrogram in which each object is represented by the sample code. As an example, for the blue ballpoint pens, the following brands were grouped in the following three groups (Figure 3.5).

Figure 3.5 — Dendrogram constructed by hierarchical clustering (Ward binding method) on the data set of 56 samples ballpoint pen ink of blue colour (BBn) (26). Different colours are used to represent the groups formed according to their similarities. Each formed group is represented by two sub-groups (i) and (ii).



According to the dendrogram shown in Figure 3.5, for the ballpoint pens of blue (BBn) there are three major groups: Group I (blue): Molin, Pelikan, RTC, Paper Mate, 'White label', Uni Mitsubishi Pencil, Pentel, A.G.SPALDING BROS and BIC. Group II (green): WATERMAN, BIC, 'White label', ACVILA; BIC and Office Cover. Group III (red): Corvina, 'White label', Lecce Pen, STABILO, LINC, Reynolds, Pentel and RTC.

For black ballpoint pens there are also three major groups: Group I (PARKER, RTC, BROS AG-SPALDING, Pentel, Mitsubishi Pencil Uni, Paper Mate, 'White label' BIC Epene, and Pelikan); Group II (Fisher Space Pen, PLUS B-2, Pelikan, BIC, Epene, Paper Mate, 'White label' Rotring, Office Cover, WATERMAN, Pentel, Fegol); Group III (MONTE LEMA, Pelikan, AURORA, Unix, mab, 'White label' Uni Mitsubishi Pencil, BIC, Q-CONNECT).

(26) There are cases in which the same brand appears in different groups (examples: RTC, Pentel, Bic, 'White label'); this is because the analyses were made with different models for each brand.

Blue rollerball and gel pens have five major groups: Group I ('White label', BIC, Paper Mate and Uni Mitsubishi Pencil); Group II ('White label'); Group III (PARKER, PILOT and 'White label'); Group IV ('White label'); Group V (Pentel). For black rollerball and gel pens have four major groups: Group I (PARKER); Group II (Uni Mitsubishi Pencil); Group III ('White label', BIC, Uni Mitsubishi Pencil, Pentel); Group IV ('White label', Uni Mitsubishi Pencil, PILOT, ZEBRA, STAEDTLER).

Blue felt-tip pens have two major groups: Group I ('White label', ergo marker, Paper Mate); Group II (Paper Mate, BIC). For black felt-tip pens exists two major groups: Group I ('White label', Rotring); Group II ('White label', Paper Mate).

Black colours fountain pens have four major groups: Group I (Pelikan, LAMY, MONT BLANC); Group II (HERO); Group III (AURORA, CROSS, WATERMAN, PARKER); Group IV (Pelikan). The two blue Fountain pen (Hero and Pelikan brand) were not submitted to HCA analysis.

In Table 3.3 the number of generated groups/subgroups, and respective number of samples per group/subgroup is summarised.

Table 3.3
Number of groups formed using hierarchical cluster analysis (HCA), taking into account the number of available samples for each type of ink

Writing instruments		Groups	Samples	Number of samples per subgroup (Sb)
Ballpoint pens	Blue ink	3	56	G1:SbI:16 + SbII:4 G2:SbI:7 + SbII:10 G3:SbI:5 + SbII:14
	Black ink	3	55	G1:SbI:7 + SbII:13 G2:SbI:7 + SbII:17 G3:SbI:4 + SbII:7
Liquid ink pens	Rollerball and gel blue ink	5	17	G1:SbI:3 + SbII:6 G2:SbI:2 G3:SbI:2 + SbII:1 G4:SbI:2 G5:SbI:1
	Rollerball and gel black ink	4	17	G1:SbI:1 G2:SbI:1 G3:SbI:4 + SbII:5 G4:SbI:5 + SbII:1
	Felt blue ink	2	5	G1:SbI:2 + SbII:1 G2:SbI:2
	Felt black ink	2	5	G1:SbI:2 G2:SbI:2 + SbII:1
	Fountain black ink	4	10	G1:SbI:3 + SbII:1 G2:SbI:1 G3:SbI:4 G4:SbI:1

The HCA data analysis suggests that for the blue ballpoint pens, black rollerball and gel pens, black and blue felt tip pens and fountain pens, there is no brand with more than one model found in the same group. In the black ballpoint pens, the mab brand appears in the same group and sub-group, and the same happens with the blue rollerball and gel pens from the Uni Mitsubishi Pencil brand.

Discriminating power

The analysed ink samples were grouped in two different ways by visual comparison through the superimposition of the absorption spectra and their respective first derivatives and by the application of a hierarchical cluster analysis (HCA) statistical method. In order to evaluate the discriminating power of microspectrophotometry, several authors used discriminating power (DP) according to the work developed by Smalldon and Moffat (Smalldon et al., 1973).

The discriminating power (DP) is defined as the 'probability that two distinct samples selected at random from the parent population would be discriminated in at least one attribute if the series of attributes were determined' and is calculated using the formula DP = 1 – [(Number of discriminated pairs)/(Number of possible sample pairs)] (Smalldon et al., 1973). The number of possible pairs is calculated using the formula [n (n-1)]/2, where n is the total number of samples. For example, in the qualitative analysis of blue ballpoint inks we have [56 (56-1)]/2 = 1 540 possible pairs of compared samples. For this class of inks the qualitative analysis of the results obtained with this technique has a power of discrimination of 72 %. Table 3.4 shows the DP values obtained for the classes of inks studied.

Table 3.4
Discriminating powers (DP) of qualitative analysis

Writing instruments		DP (qualitative analysis)
Ballpoint pens	Blue ink	0.72
	Black ink	0.73
Liquid ink pens	Rollerball and gel blue ink	0.93
	Rollerball and gel black ink	0.51
	Felt blue ink	1
	Felt black ink	1
	Fountain blue ink	1
	Fountain black ink	0.93

Considering the high number of inks under study, the values obtained for DP are high and demonstrate once again the good differentiation ability of microspectrophotometry in reflectance mode, thus allowing a non-destructive analysis of the documents being studied.

Totty et al., 1985, obtained a DP of 0.86 for black inks and 0.84 for a total of 16 blue inks. These inks were taken from porous tip pens and spectras were obtained in transmission mode in the visible region. Roux, et al., 1999, obtained DP of 0.83 to both 49 blue and 42 black ballpoint pen inks with the Olympus microspectrophotometer in reflection mode. More recently, Causin, V. et al., 2008, obtained a DP value of 0.96 for the 21 black ballpoint pen inks and 0.79 for the 12 blue ones. In this study, the spectra were obtained in the transmission mode in the UV-VIS region. The microspectrophotometry system used in our study and the differentiation of spectra in a visual form allows the obtaining of a good DP, however the different modes of acquisition and different types of pens used in the previous studies do not allow a linear comparison for all class of inks. The final result of the differentiation using this statistical method should always be obtained based on the last subgroups (and not the first ones); however this result should always be validated by the forensic expert.

Conclusions

The identification and dating of writing inks remain a major challenge in the forensic examination of questionable documents. Given the need to increasingly provide relevant information to our justice system, we explore and develop techniques and methodologies to generate forensic intelligence. Microspectrophotometry is undoubtedly a very effective technique to differentiate inks. This study demonstrated a wide applicability in terms of ink writing instruments and its high discrimination power for the different type of inks in analysis.

The 167 analysed ink samples were grouped into 87 distinct groups by overlapping the spectra of the 1st derivative and 37 groups using a hierarchical clustering analysis (HCA). Despite the HCA analysis showing a smaller number of groups, this type of chemometric method provides us with a sophisticated and efficient approach to differentiate ink samples essential when we have a large number of samples to compare.

The creation of the database constitutes a way to provide a list of inks with the same spectral characteristics as the analysed sample, however these groups show that different ink brands have similar spectral characteristics. This is an ongoing work, whose subsequent steps will (i) increase the number of samples analysed, (ii) analyse through HPLC and HPTLC all the inks to establish a more powerful database, (iii) add other variables to HCA method, (iv) another chemometric algorithms.

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Announcement

CEPOL 2017 Research and Science Conference

INNOVATIONS IN LAW ENFORCEMENT — Implications for practice, education and civil society

Date: 28-30 November 2017

Venue: National University of Public Service**, Budapest, Hungary**

CALL FOR PRESENTATIONS

The guiding theme for the **14th edition** of the CEPOL Research and Science Conference in 2017 is **'Innovation'**.

If the term 'innovation' basically implies that something is changed, done in a new way, a new idea, method or piece of equipment being applied, then modern life is for sure a testimony for a constant and self-accelerating stream of transformations of how things are done. Inventions and innovations are the main drivers of the process of modernisation, which barely a society or an individual on the globe can manage to escape from.

However, it is far from being good news only — **crime is innovative** as well: Fresh ideas, methods or devices are used for breaking formal as well as informal rules, regulations and laws and can cause harm to others. In turn, police forces and other law enforcement agencies are under unremitting pressure to innovate, in order not to just keep up with innovative criminal activities, but also to improve the organisational efficiency as well as meeting both political and public expectations.

In a similar fashion as major technological inventions and innovations have shaped the way we live, work, move or communicate in general (cars, computers, satellites, the internet, mobile and smart phones — to name a few), they have moulded or even transformed the practices, patterns and capabilities of police and other law enforcement bodies (inter-

national exchange of data, DNA-analysis, international video-surveillance as high impact examples). However, inventions and innovations are not just a matter of developing technology — new ways in organising, training, education and research are equally as relevant.

As before, the CEPOL 2017 Research and Science Conference will convene practitioners in policing and other areas of law enforcement, trainers, educators and scientific scholars from Europe and the international sphere.

The topical focus of this year's event is on innovations in law enforcement, examined through the lens of scientific research and academic study and looking at the implications from three different angles:

- from the point of view of the police or law enforcement officers;
- from the point of view of the teachers, trainers, educators in the law enforcement education systems;
- from the point of the citizens, who will be subject to and beneficiaries of innovative law enforcement practices.

The conference organisers invite presentations, preferably based on recent **empirical research** or **academic study**, addressing the following areas and lead questions:

1. Which are the emerging innovations in society that are prompting a response from the law enforcement community, both in terms of adapting strategies and tactics, as well as the law enforcement educational requirements?

2. What are the expectable implications, benefits, risks or potential ramifications of introducing certain new technologies (gadgets or systems), organisational or operational concepts for doing law enforcement work in a new, innovative manner? Is it different for innovations that are driven or imposed by the outside environment as opposed to those that are emerging from 'inside'? Where and when have law enforcement innovations failed and what lessons have been learned so far?

3. Which educational innovations will have significant impact on the training and education of law enforcement officials on the various levels of the organisations — and why?

4. Some innovations in law enforcement are received with great sympathy and endorsement, some with lesser enthusiasm by members of the civil society. What has to be taken into account in the management of the innovation process so a particular innovation is not perceived as ineffective, undue, unfair or even illegal? Are there innovative ways to manage a confrontation between the innovators and the preservers?

The two and a half day conference that will take place in **Budapest** will build on its proven format focusing on professional information exchange and facilitation of networking. Keynote, plenary, parallel and open paper sessions will provide ample opportunities to discuss the role of innovation in law enforcement practice, training and education and its likely impact on security and the feeling of security within the European societies.

Presentations are invited for the main and open paper track of the programme and full papers are planned to be published in a Special Conference Edition of the European Police Science and Research Bulletin afterwards.

Proposals for presentation are to be submitted online via the conference webpage at where you will find information about participation and logistics in due time.

Deadline for paper submissions: 31 August 2017

Submitted papers will be evaluated by the organisational committee and information about acceptance will be issued by 15 September at the latest. For presenters of accepted papers conference fee (including buffet lunch and coffee breaks) will be waived.

Any general inquiry about the conference shall be sent only to this address:

Conference2017@cepol.europa.eu

We are looking forward to welcome you at the 2017 CEPOL Conference in Budapest!

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