THE CHANGING ROLE OF THE LAW ENFORCEMENT ANALYST: CLARIFYING CORE COMPETENCIES FOR ANALYSTS AND SUPERVISORS THROUGH EMPIRICAL RESEARCH

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The changing role of the law enforcement analyst: Clarifying core competencies for analysts and supervisors through empirical research

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ABSTRACT:

Enhanced opportunities to use new techniques to derive insights from large volumes of data have potential to change the role of the law enforcement analyst. Alongside this growing potential is a push toward professionalization for crime and intelligence analysis as an occupation. In this paper, we explore the extent to which existing descriptions of core competencies reflect skills identified as important by analysts and their managers. We draw on interviews with sixty-one analysts and supervisors from law enforcement agencies in Canada, the United States, and Australia. We confirm that existing descriptions of core competencies align with those identified by analysts and managers. We identify three considerations for present-day police organizations: the importance of data literacy and technical skills, the importance of self-motivation as a trait for analysts, and the core competencies of analyst supervisors. We complicate discussions about the importance of technological comprehension in light of software that automates components of analysis, illustrating how limits in data literacy translate to challenges for making effective use of new technologies. Next, we demonstrate how an ability to navigate interpersonal dynamics in police organizations is *essential* for analysts and analytic managers to be effective in their roles. We illustrate a reliance on individual-level motivation for competency-building over organizationally-driven or standardized professionalization. Finally, we contribute to limited scholarship addressing competencies for analyst supervisors and managers, and discuss the implications of supervision for analyst skill development.

Key Words: Crime/intelligence analysis; data literacy; law enforcement analysts; intelligence-led policing

1. Introduction

As police services turn to data science techniques to measure, manage and control crime, we see the growth and development of the role of the crime intelligence analyst[1] (Belur and Johnson 2016; Manning 2008; Ratcliffe 2016). Data-driven practices, such as intelligence-led policing

[1] We use the term 'crime intelligence analyst' to refer to both crime analysts and intelligence analysts. Presently, there are no standards or agreed upon qualifications across police services in Canada, Australia, or the United States to differentiate between these roles, and the job designation (i.e., crime analysts, intelligence analyst, criminal intelligence analyst, strategic analyst and tactical analysts) are service-dependent.

(ILP), seek to transform policing away from traditionally reactive practices toward proactive and strategic approaches (Burcher and Whelan 2018). Central to this movement is the use of "crime intelligence" for guiding organizational decisions (Guidette and Martinelli 2009). As a result of the growing reliance on crime intelligence data, we have seen expanding employment and professionalization of criminal intelligence analysts (Cope 2004; Innes et al 2005; Sanders and Condon 2017; Taylor et al 2007).

Research on criminal intelligence analysts has grown significantly over recent years and covers a range of topics including: work practices (Chin et al. 2009; Joseph and Corkill 2011; Manning 2008; MacVean and Harfield 2008; Piza and Feng 2017; Ratcliffe 2002; Innes et al. 2005), important traits and skills (Calvert 2007; Evans and Kebbell 2012; Ratcliffe 2004), and fit within the broader police culture (Cope 2004; Fraser and Atkinson 2014; Sanders and Condon 2017). Much of this literature identifies an uneven professionalization process that impedes the integration and use of criminal intelligence analysis in policing (Schneider 1995; Sissens 2008; O'Shea and Nicholls 2003; Corkill, et al., 2015). While the International Association of Law Enforcement Intelligence Analysts (IALEIA) and the International Association of Crime Analysts (IACA) have created certification programs outlining essential skills and competencies (IALEIA 2012; IACA 2014), there are presently no agreed upon core competencies for analysts or analyst managers in Canada, Australia and the United States. In fact, empirical evaluations of analysts in practice suggest the role remains underdeveloped (Belur and Johnson 2016).

This paper identifies competencies that analysts and their managers working in law enforcement in Canada, Australia, and the United States of America (US) understand as essential for their roles. Our findings provide empirical support for existing competencies and qualifications identified by previous research and professional associations. In addition, our findings contribute to, and provide empirical insight into, discussions regarding the importance of: (1) data literacy and technical skills, (2) self-motivation as a trait, and, (3) core competencies of supervisors. The importance of technological comprehension and data literacy is interesting in light of suggestions that such skills are less crucial given the availability of software packages that automate components of analysis (O'Shea and Nicholls 2003; Evans and Kebbell 2012). However, technical skills alone are insufficient. An ability to navigate interpersonal dynamics in police organizations is essential for analysts and intelligence managers seeking to contribute to broader organizational objectives. This finding builds on existing literature around communication skills and organizational knowledge. Self-motivation is another crucial trait, particularly given existing limitations of organizationally-driven, standardized professionalization of intelligence work. In terms of organizational support for the intelligence function, understanding the core competencies of intelligence supervisors and their role in developing skills within their teams is crucial.

2. Literature Review

Researchers, experienced analysts, subject matter experts, and professional associations have identified and discussed important skills or competencies for police analysts (Schneider 1995; Sissens 2008; Boba 2005; Evans and Kebbell 2012; O'Shea and Nicholls 2003; Corkill et al. 2015; IALEA and GJSI 2012; IACA 2014). Certification programs developed by professional

associations such as IALEIA and IACA provide lists of essential skills and competencies for official certification (IALEA 2012; IACA 2014). Section 2.1 outlines key competencies identified by professional associations and existing academic literature. Section 2.2 describes known challenges and barriers to developing analyst skills and abilities. A small number of empirical studies set out in Section 2.3 outline the importance of analytic supervisors in supporting analyst skill development. Yet, further empirical exploration of this area is critical in order to understand the implications of supervision on the performance of police crime intelligence analysts.

2.1 Core Competencies for Police Analysts

Empirical work in this area has involved surveying current analysts, interviewing analysts, managers, end-users of analytic products, and examining analyst job advertisements and job descriptions (O'Shea and Nicholls 2003; Corkill et al. 2015). Evans and Kebbell (2012) emphasize that the skills required to *create* an effective analytical product differ from those required to effectively *disseminate* products. This is an important distinction because these skill sets may vary significantly from one another and existing research suggests difficulty acquiring analysts who possess both skill sets (*ibid*).

In terms of background qualifications, tertiary education is generally required (Boba 2005; IALEIA and GJSI 2012; Corkill et al. 2015) and graduate degrees are often accepted in place of experience (Boba 2005). Formal training courses in tactical and strategic analysis are recommended, coupled with a minimum of 40 hours of direct training with an experienced police analyst (IALEIA and GJSI 2012). While Australia has recently implemented a certification programme at the federal level (Harrison et al. 2018), our findings suggest that standardizing skills of intelligence analysts remained a work in progress as of December 2016.

Commonly identified skills for *creating* analytic products include writing skills (Schneider 1995; IACA 2014; US Department of Justice 2007), research skills (e.g., methodological knowledge, statistics, and ability to assess competing hypotheses), knowledge of data collection processes (including developing data collection plans and identifying intelligence gaps) (Moore et al. 2005; IALEIA and GJSI 2012), ability to conduct threat assessments, create profiles, identify patterns, think critically, make inferences/derive meaning from information (IALEIA and GJSI 2012; Wastell 2010), and an ability to maintain objectivity and evaluate the integrity of information (Sissens 2008; IALEIA and GJSI 2012). Knowledge of criminal behaviour and crime indicators are cited (IALEIA and GJSI 2012), though it is unclear the extent to which this knowledge should be acquired through education versus experience (Evans and Kebbell 2012).

Ability to work with computational tools, particularly in regards to developing and managing databases, identifying and accessing available information sources, and effectively searching across multiple sources (IACA 2018). However, the importance of 'technical skills' has been called into question as technological innovation has meant wide availability of pre-packaged and automated software programs (O'Shea and Nicholls 2003; Evans and Kebbell 2012). It is suggested that as technology has become increasingly user-friendly and general technological literacy of police is increasing, law enforcement analysts no longer need to fulfil

the function of 'technical experts' (Evans and Kebbell 2012). Yet empirical work suggests that, very few analysts possess the technical abilities to use available technical tools to their full potential (Burcher and Whelan 2018). Moreover, the proliferation of black-boxed analytical software raises concerns about user understandings of the limitations of such tools (Bennett Moses and Chan 2018). orecasting crime is commonly identified as a necessary skill (Osbourne and Wernicke 2003), yet empirical work suggests that, in practice, forecasting remains quite limited (Selth and Wesley 2012).

Skills and traits identified as important for the *dissemination* of analysts' work include communication skills - particularly the ability to communicate information in an accessible way to a variety of end users (IACA 2018). Informal interpersonal social skills (such as a sense of humour) to effectively integrate organizationally are emphasized (Boba 2005). An understanding of "how intelligence fits into their organization, structurally and functionally" is essential for navigating the organizational environment and networking with community groups and stakeholders (Evans and Kebbell 2012, p. 213). Analysts also require an ability to teach sworn members and supervisors about analysis to facilitate evaluation and deployment of analytic products (IACA 2018). Internally and externally, it is increasingly important that analysts can describe how products were created, where and how data was accessed, and how they drew inferences from the data (IALEIA and GJSI 2012).

Law enforcement experience is referenced frequently, with potential to influence both creation and dissemination of intelligence products. Such experience may offer context for conducting analysis or enhance credibility with sworn members who often place greater trust in those who understand policing from their perspective (Boba, 2005; Evans and Kebbell 2012). Law enforcement experience can include administrative or dispatch experience, which facilitates use of the organization's records management system and databases.

This section has outlined a variety of competencies that have been identified in the literature as necessary for analysts to be 'effective'. However, answering this question requires an understanding, often elusive, as to what constitutes 'effective' crime or intelligence analysis.

2.2 Extrinsic and Intrinsic Challenges

Research on police analysts suggests the role remains underdeveloped and under-utilized in many organizations (Sanders, Weston and Schott 2015; Belur and Johnson 2016; Sanders and Condon 2017; Sissens 2008; Wastell 2010). Studies suggest analysts proficiency is often inhibited by structural and organizational factors, such as a lack of clear purpose or understanding of the role, lack of meaningful integration, un-established or ineffective relationships between analysts and end-users, limited or rudimentary training opportunities, and flat promotion structures leading to a lack of morale among analysts (O'Shea and Nicholls 2003; MacVean and Harfield 2008; Sissens 2008; Belur and Johnson 2016). In this section, we describe commonly identified extrinsic challenges, followed by an overview of concerns raised at the individual analyst level.

Highly skilled analysts are difficult to recruit and retain (Belur and Johnson 2016; Sissens 2008). Empirical work suggests recruitment practices can limit acquisition and retention of

competent analysts. For example, analysts are often not expected to possess skills required for strategic or problem analysis (O'Shea and Nicholls 2003). Job descriptions fail to exploit the value of past experience when they do not explicitly address such criteria. Corkill et al. (2015) found analyst job advertisements generally focus on generic public service attributes, contributing to perceptions that entry-level analyst roles are nothing more than administrative positions. There may also be additional constraints in the hiring process, where selection is constrained by collective agreements and mandatory hiring by seniority (O'Shea and Nicholls 2003). Regular training is often unavailable to analysts as a result of both limited budgets and poor training availability (MacVean and Harfield 2008; Belur and Johnson 2016). Training is often not updated in response to technological development (Walsh 2007), and high turnover reinforces organizational hesitancy to invest in training (Belur and Johnson 2016).

There have been some critiques of intelligence analysts' reasoning capabilities. Analysts often move from evidence to inference without testing propositions or addressing negative evidence (Wastell 2010). They often lack formal research methods or advanced statistical training (Boba 2005) and fail to understand the *context* that is crucial to making appropriate recommendations (Sissens 2008). There are calls to consider more closely how analysts make judgements or assessments, the importance of *how* analysts *think,* and a need to consider 'how analysts' minds should work' (Sissens 2008, p. 127). As Walsh (2007) describes,

> the impact of the products of intelligence analysis...has been compromised by poor tradecraft and training issues. Tradecraft...refers not only to the range of skills and experience in specific analytical techniques, but also to more generic advanced skills in critical thinking, research methodology and statistical modelling, amongst others (Walsh 2007: 70).

Tradecraft is consequential for an occupation still working to establish understanding and acceptance in police departments (Cope 2004; Fraser and Atkinson 2014; Sanders and Condon 2017).

The profession is also constrained by organizational understandings of the role. Many organizations lack a formal manual for their crime/intelligence analyst position(s) or formal definitions of the role (O'Shea and Nicholls 2003). In turn, police working with crime and intelligence analysts are not informed about the purpose of analysts or how analysts can support them (Belur and Johnson 2016; O'Shea and Nicholls 2003). As a result, analysts do not feel well integrated or utilized, creating challenges for morale and retention. Literature suggests enduring cultural challenges for civilian analysts to gain respect and develop credibility with sworn members (Cope 2004; Sanders and Chan forthcoming). Beyond sworn/civilian status and its consequences for credibility, Atkinson (2017) demonstrates how the patriarchal and gendered culture of policing shapes perceptions of analysts' relevance and perceived value in police departments. [2] Analysts, Atkinson argues, often accept passive, subordinate positions in order to integrate peacefully in the organization, which has detrimental consequences for the development of the profession and its meaningful integration into police intelligence work.

[2] Due to space constraints, a discussion of gender as it relates to analyst competencies and their 'fit' within the occupational culture of police intelligence work is beyond the scope and purpose of this paper, but is certainly worthy of future exploration.

Tensions remain as to whether making recommendations is an appropriate part of the analyst role. This tension creates challenges for both effectiveness and retention when analysts feel excluded from meaningful work (Sissens 2008). Evans and Kebbell (2012) are among the first to suggest that an analyst's attitude toward the role and position plays an important role in their effectiveness and integration within a service. This 'attitude' ideally involves high personal motivation, determination, and being self-driven (see also Schneider, 1995, Moore et al. 2005). They see 'self-starter' as an indication that the role has moved beyond that of a technician. However, other reasons *why* drive or motivation may be important remain unexplored.

2.3 Competencies for supervision of analysts

Little has been written about the competencies of those who supervise crime and intelligence analysts (exceptions including Walsh 2007; IALEIA and GJSI 2012; MacVean and Harfield 2008; Quarmby and Young, 2010). IALEIA (2012) outlines a target list of responsibilities for those managing analysts, including: ensuring analysts working under their purview possess appropriate competencies, evaluating products and performance, developing operational plans for structuring and governing intelligence in the organization, and creating a supportive environment for analysts. Ideal qualifications for analyst managers remain broad – generally a combination of a graduate degree in a social science or related field, and as little as two years experience working as an analyst (Boba 2005).

Quarmby and Young (2010) clarify specific considerations for intelligence managers, drawing on combined professional experience in national security, law enforcement and military contexts, and noting a "remarkable absence of formal training or clear guidance for intelligence managers" (p. 40). They emphasize that beyond knowledge of intelligence practices, managers must play a critical role in facilitating the integration of intelligence throughout the organization. They must act as a link between analysts and decision-makers, ensure analysts' work has influence in the organization, and support analysts through skill development opportunities and feedback.

The importance of the skills of those managing or supervising analysts in a police organization should not be underestimated (O'Shea and Nicholls 2003). Manager skill level plays a role in developing analyst competencies through training, oversight, and review of processes and products (Walsh 2007). Moreover, analyst managers theoretically oversee data collection, data quality, and evaluate whether methodologies and technology are sound. Ideally, analyst supervisors will advocate for resources and standardization of intelligence practices organization-wide (Walsh 2007; IALEIA and GJSI 2012). This requires an understanding of intelligence processes, needs and collection methods, and ability to be a "change agent" in the organization (Walsh 2007). Supervisor competence, therefore, affects quality and value of products, which in turn can impact whether products are used by decision-makers (Walsh 2007)

Analyst management acts as a means of risk management given the sensitivity of information involved in law enforcement analysis. For example, "when managers have substantive knowledge of the processes under their supervisions, they are even more effective

managers. Law enforcement intelligence is a politically and constitutionally sensitive area that requires the manager to understand the responsibilities, hazards, and challenges of the intelligence process" (US Department of Justice 2007: 7). Substantive processes carried out by those under their purview are more effective when the supervisor possesses an understanding of risks and 'hazards' of intelligence work (IALEIA and GJSI 2012).

Supervision limitations create barriers to developing analyst competencies, for example, evaluation of analysts' work is uncommon, and products (and the processes behind them) are often not reviewed (Belur and Johnson 2016). Particularly in the context of the changing role of analysts, supervisors need the capacity to strategically steer the work of analysts (Quarmby & Young, 2010; Walsh 2017). This requires more than two years experience and a passing familiarity with analytic outputs. As O'Shea and Nicholls (2003) identify, it is difficult to direct and evaluate the work of analysts when supervisors lack knowledge of what needs to be evaluated. The literature on analyst supervision thus explains the importance of this role and includes some descriptions of what the role does or should involve. However, little has been written about the core competencies of managers beyond the need for knowledge and experience of analysis itself.

3. The Present Study and Methodology

This paper results from data collected for an international partnership study exploring the work of crime intelligence analysts. In order to move beyond locally specific challenges in analyst teams, our research included participants from Canada, the United States, and Australia. These three countries were chosen because they are all members of the 'Five Eyes' intelligence community and collectively have a long and complex history of cooperation in the sharing of information for managing a perceived set of common adversaries. To date, there is significantly less research available on police intelligence in Canada and Australia as compared to the US. The study was designed to identify training, support and career opportunities provided to analysts and, by extension, to explore what is needed to help ensure analysts were able to gain useful insights from large data sets in line with new data science methods.

To study the work of crime intelligence analysts in Canada, the United States, and Australia, we conducted sixty-one semi-structured interviews with analysts, managers of analytical units, and field subject-matter experts. These included crime analysts and intelligence analysts working in tactical, strategic and business intelligence capacities, and analysts working in patrol districts and specialty units. Canadian interviews were conducted with 37 analysts from 7 police departments between June 2017 and May 2018. US interviews were conducted with 15 analysts from 15 police departments between May 2017 and July 2017. Australian interviews were conducted with 9 analysts from 8 police organizations between August 2016 and December 2016. We received university ethics board clearance prior to engaging in data collection. Participants were recruited through a number of methods, including: (i) police department participation wherein information about the study was sent to analytic teams for organizational approval to participate, (ii) personal contacts developed at crime and intelligence analysis training conference, and (iii) calls for participation sent through professional association (IACA) member distribution lists. All authors are academics without prior law enforcement experience

who have been conducting research in the field of policing and data science, and police technology more broadly, for several years. The sample of participants is too small to be representative of the relevant populations, but assists in identifying general themes.

We used in-depth interviewing to explore the background and qualifications of working analysts, organizationally required (or preferred) qualifications and skills, and perceptions about the ideal combination of skills and traits that a police analyst should possess. We inquired about common levels and types of training and perceptions of what training should ideally be available. We also explored supervision structures for police analysts and levels of knowledge or skill possessed by supervisors, and probe current competency evaluation practices, such as feedback and review processes for analysts' outputs, as this is an opportunity for review and improvement. Notions of competency are shaped by organizational expectations about the role and its intended function. Thus, we also explored how the role is understood and used within police organizations, finding that understanding about the purpose of the role vary greatly, complicating how to evaluate the role. From this, we opened discussions about developing analyst competencies and discuss ongoing challenges for acquiring and training skilled analysts in the profession. These insights are useful for informing hiring and training practices for crime and intelligence analysts and managers across Five Eyes countries that have deployed similar strategies and where analyst professionalization faces similar challenges.

Interviews were transcribed verbatim and coded using NVivo 11 qualitative data analysis software. Interviews were initially coded categorically - some categories followed specific areas of interest in the interview guide (such as training background/opportunities or formal reporting and supervision structures) and some emerged through participants' experiences (such as challenges related to morale or hierarchies of information sharing in their departments). Our analysis is informed by existing literature as our research questions and interview guide contents aimed to address gaps in existing work, yet our analysis was also flexible enough for new or unknown themes to emerge and challenge existing ideas (Braun and Clarke 2006). After data was coded into larger categories, we engaged in deeper analysis of particular codes related to analyst core competencies, approaching this closer analysis from a grounded and emergent perspective (Charmaz 2006). Within discussions about analyst core competencies, we saw salient themes emerge from participants' experiences in their field. For example, within the theme of 'technological challenges', we saw recurring discussions about interpersonal skills as adaptive for accessing information in light of technological limitations. We situate these new insights within existing knowledge and in the context of rapidly expanding technological innovation to contribute to ongoing conversations about what makes for 'effective' analysts.

4. Findings: Expanding the conversation about analyst competencies

Despite ongoing changes in the analyst role, our data supports existing lists of core competencies (Section 4.1). Our study focusses on three issues evident in the literature, addressing discussions about the ongoing relevance of technical skills, articulating a broader rationale for self-motivation as an essential trait, and explaining the importance and content of core competencies for supervisors. First, despite some suggestions in the literature that data literacy and technical skills may be of reduced importance, our findings suggest the ongoing importance of these skills, particularly as new challenges accompany growing technical complexity (Section 4.2). The

significance of interpersonal skills is often referenced in terms of disseminating products and effectively engaging end users. We build on this, demonstrating how interpersonal skills are also critical for acquiring information, in part as a response to technological limitations (Section 4.3). Finally, we explore the role and core competencies of supervisors, both in promoting analyst competence and in ensuring that analytic products are used to maximum effect within an organization (Section 4.4).

Identifying core competencies for crime intelligence analysts presents challenges due to organizational ambiguity and variability around the *intended* function of the role. Skills considered 'essential' vary depending on organizational expectations of the position. Without a clearly defined purpose and role, it is nearly impossible to both identify core competencies and gauge their effectiveness. It is the uncertainty in the role that requires not only technical skills (4.2) but also interpersonal skills and motivation (4.4). Articulating the role of analysts within a particular organization is an important component of the supervisory role.

4.1 Support for core competencies identified in guidelines, policies and academic literature

Commonly identified 'ideal skills' in our data reflect those outlined in Section 2.1, with notable similarity across all three countries. This section outlines these confirmatory findings briefly before focusing on our specific contributions to the literature in Sections 4.2-4.4.

Many participants emphasize the importance of technological capabilities. These include the ability to find and access available information, effectively query multiple information sources, working with multiple data sources, and the ability to develop and manage databases. Computer programming and database skills allow analysts to automate some of their processes, increasing efficiency and allowing more of their time to be spent on complex tasks and advanced analysis. Although new software programs (such as Palantir[3] or PredPol[4]) may provide some automated data analysis, many participants say it remains important for analysts to possess technological capabilities in order to understand processes behind software interfaces, relational data, and algorithms (see section 4.2 for further discussion). Participants emphasize analysts should possess technical skills and knowledge of the Microsoft Office Suite as well as more advanced knowledge of mapping software such as ArcGIS. Organizational skills and project management abilities are frequently cited as important.

Important skills for dissemination of analysts' work include strong communication skills and the ability to communicate information in a way that is accessible for end-users. Oral communication skills are required for briefings and presentations. Informal interpersonal social skills are essential to fit into the police organization. Analysts require an ability to teach sworn members about analysis as much of supervisors' and sworn members' education falls informally on the analyst (explored in section 4.4 on Analyst Supervision). Analysts must understand relationships and networks of information sharing, engage in networking, and form partnerships.

[3] Palantir is an intelligence platform designed to facilitate searching across multiple databases and data sources, and containing built-in automated analytic functions.
[4] Pred Pol is a predictive policing software program that uses algorithmic analysis of departments' data to identify officer deployment zones.

4.2 Data Literacy and Technical Skills

A prominent discussion among participants was that data literacy and technical skills remain significant and important, largely *because of* - rather than in spite of – access to automated systems and programs. Crucial in understanding this debate are disagreements on the *intended role* of an analyst. Evans and Kebbell (2012) argue that, since technology has become more user-friendly, the technical specialist component is now a less important component of the police analyst role. Our data suggests otherwise. In particular, the importance of 'data literacy' arose frequently among participants. While software itself may have become more intuitive, the increasing complexity of data science methods associated with pattern-recognition and prediction, particularly in the context of large volumes of diverse, evolving data, requires a relatively high level of technical sophistication.

Nearly all participants discussed the importance of technical skills. While records management systems and databases (and interfaces) vary among services, analysts require the technical ability to navigate these systems. An analyst outlined ideal technical skills as follows:

> Very, very strong computer skills. And I'm going to say it… Excel, Access, PowerPoint. And when I'm talking about PowerPoint – I'm not just talking being able to get up and give a presentation – but being able to write those backside macros so you're not having to manually do those PowerPoints every time – it will draw from the ODBC connections [Open Database Connectivity, connecting Microsoft Access database to] … your records management systems (I09-US).

A former analyst with decades of experience in teaching and training describes the importance of *understanding* and working efficiently with data, which involves not only formal training but also 'pre-wired' brains:

> …The number one skillset would be – relational skills that revolve around data... So all the skills around how to put different datasets together, to query them, to aggregate them, to do quantitative analysis on those datasets... I don't say that because I think quantitative analysis is the most important type of analysis, but you're never going to get to the qualitative stuff unless you get skills at the quantitative level and learn how to do it efficiently and quickly and automate as much of the process as possible. Around the country I see analysts who just don't get that – meticulously hand entering reports into their own complicated spreadsheets and just wasting an enormous amount of time … So data, data querying, data management, data cleaning – all those related skills are the most important right now… Knowing how to build [your own database] so you don't replicate data entry that's already been done, but only supplement it with your own data entry for the things that you need to track … that's a skill that's really tough to teach (I03-US).

This description calls attention to a number of important skills for succeeding as an analyst in the current technological and organizational landscape. First, when it comes to technical skills, advanced computer skills such as the ability to build a customized database (other

participants mentioned programming, writing computer code) are important. These enable automation of processes that are otherwise time consuming yet not analytical, freeing up time for more advanced analysis. These technical skills are not alleviated by more intuitive software. Second, understanding data goes beyond technical abilities and requires an ability to understand how data fit together. Third, it suggests not only is data literacy a required competency, but one that cannot necessarily be taught (and therefore needs to be recruited for).

A lack of data literacy inhibits analysts from making use of some of the tools available to them. As a business strategist explains:

> Our initial thought of implementing the tool is that it would be self serve, a one stop shop, anybody working in this group could have the privileges to go in and build the reports – [but] what it has become, we have a group of about 8 people that we trust with data skills - who can build reports for the other 80 people to use - and the other 80 people can log into the tool and log into the report, and they can run it out to excel and PDF - that is their choice - but they can not build a report because if they build the report than the likelihood of them getting a wrong answer is high. So it's - for me [not letting the analysts build their own reports] it's risk management. … Understanding data models is not something that we put on the job posting - but if you give them a tool like [a database with built-in analytical component] or you give them a [business intelligence] tool, you want them to get into the pool and start to play and build for themselves they need to understand data models (I27-CAN).

The quote above draws attention to potential risk created by low levels of data literacy. This business strategist describes how many analysts are not permitted to use technological systems to their fullest extent because they lack the knowledge to evaluate the accuracy of output. This is significant because it illustrates how investing in new technology is both ineffective - and potentially risky - if analysts do not possess understandings of what is occurring methodologically behind automated reports. In order to effectively use new technology and software, as well as critically evaluate intelligence products, analysts require advanced knowledge of data collection, management and analysis processes. Other analysts reiterated the importance of data literacy for making inferences and recommendations based on analytic products:

> We really want to emphasize … understanding of data structure, methodologies, statistics and making inferences… One of our biggest challenges is we tend to rely on descriptive information, saying something has gone up or down, we want people to start taking risks and making inferences from what they are seeing, putting forward recommendations, predictions, etc. and so in order to do that people need to know about confidence intervals (I10-CAN).

When asked, 'What skills do you believe are essential for someone to do your job effectively?' an analyst responded:

> Analysis skills. I mean anybody can research, if you can't put it together and make a

> key judgment then you can't do the job…I mean getting a premise out of those inferences. That's the main one, I've worked with people in the past that have awesome research skills but don't know what to do with that data (I10-AUS).

Similarly, another analyst stated:

> Critical thinking is a big one. It's a key skill for an intelligence analyst to be able to look at information and critically evaluate it, understand the flaws…and the limitations with the information that you're evaluating and to think about the sources that it's come from - bias behind where the information has come from, how it fits into the bigger picture (I06-AUS).

These quotes highlight the importance of data literacy for making effective use of analytic tools and methodologies and corroborate existing literature on the importance of understanding tools in order to ensure accountability in their use (e.g. Bennett Moses and Chan 2018). Data literacy among analysts can protect against uncritical adoption and deployment of black-boxed software, ensuring those using software are aware of its particular methodologies, affordances and limitations. Technical skills are a risk management issue, even when intuitive software is available.

Beyond understanding the technical side of complex databases, data literacy involves understanding which data are needed to answer a particular question. This requires an ability to interpret the goal of an analytic exercise, familiarity with available data sources, ability to acquire data from a variety of sources (automatically if possible), and ability to identify the *most appropriate* data sources to answer a question. A senior analyst emphasized the importance of

> Being aware of what kind of data you need to know, what you need to look at, that's huge… because the RMS will change, depending upon what agency you're at, but the data elements that you need to perform the analysis never really change. They'll grow, but you'll always have the basics (I11-US).

While user-friendly interfaces may make software systems easier to interact with, they do not themselves ensure that the analysis conducted will be well targeted at the question being tackled. An example of the failure to perform *appropriate* analysis was given by one analyst in a description of a peer's intelligence product responding to an inquiry into crimes along a parade route in a previous year. He explains,

> [The other analyst] had plotted all crime and occurrence types onto the map, including crimes that had nothing to do with the presence of the parade. The purpose of this product was to look at how many additional police resources were needed because the parade was taking place – how many incidents or how much crime does it generally create? Mapping all incidents made it look like the parade caused a significant amount of crime and that we would need lots of extra officers, yet the majority of those dots aren't related to the parade at all and shouldn't be included when considering additional resources (I38-CAN).

As described above, the importance of analysts possessing data literacy and methodological knowledge cannot be underestimated. The example above highlights practical risks if neither analysts nor sworn 'customers' are data-literate and evaluating the methodology behind products. Ultimately, however, the responsibility to ensure that the correct question is posed will fall on the analyst.

Our analysis thus qualifies the position taken in Evans and Kebbell (2012) concerning the reduced importance of technical skills. Despite improved interfaces and greater functionality, software has not reduced the need for analysts to possess solid understanding of relational data, automation techniques, and the affordances and limitations of different analytic tools. In addition, analysts need to be able to frame a specific problem in a way that guides how they tackle that problem in light of available data and tools.

4.3 Interpersonal Skills, Self-Motivation and Drive

A second issue on which our data sheds light is the importance of motivation and drive as essential traits, particularly given a lack of organizational support for training and the nascent and immensely autonomous nature of the role. Those who prioritize professional development (often on their own time and some at their own expense) learn skills that allow them to produce advanced analytic products. Motivation and self-drive is required to produce valuable or actionable products that 'give the role a good name' (I30-CAN). Another analyst explains,

> I'm not saying that you need to be completely proficient in everything – but the fact that you have the drive, or the determination, or the excitement to want to do it. Those kinds of things are important, because this field changes daily. You're never at a point where you feel like you've reached the plateau and you're just along for the ride. It's always how can I be better? What skills do I need to grow? What knowledge do I need to get? How do I need to grow myself, as a better analyst, to provide the best product that I can provide for my department (I11-US).

As this participant observed, training and professional development are often left up to analysts to pursue on their own accord. Rather than being prescribed a list of tasks or requirements, analysts are often largely autonomous. Thus, perceptions of their value rest on their ability to demonstrate utility and perform new techniques and methods that are useful for their department. In order to be proficient in present organizational climates, motivation and drive remain critical.

Like Evans and Kebbell (2012), our findings suggest a strong emphasis on the self-motivated, high initiative analyst. However, Evans and Kebbell (2012) infer that emphasis on *self-drive* reflects a change in the analyst role from technical specialist to adviser or associate for decision makers. The latter, they suggest, involves recommendations and a more esteemed position. However, our data challenges this on two levels. First, as we demonstrate, technical skills remain vital to analyst competencies, evolving as technology increases in complexity. Second, our data suggests analysts are rarely asked to make recommendations and doing so is met with resistance. Thus, while we align with the sentiment that these are important competencies, motivation or drive appears less indicative of the evolving role of the police

analyst as opposed to *necessary traits in response to enduring organizational barriers* to the profession.

A number of participants emphasized the importance of interpersonal skills. As one analyst explains, analysts with strong interpersonal skills are more effective, but it is not a trait that is necessarily expected of or hired for among analysts:

> What makes a good analyst, I think that we do ourselves a huge disadvantage - to some degree in - and some people we have hired over the years are less able and willing to put themselves out there … analysts should be willing to get up at parades and talk about their work and showcase what they have done - and some of them are like that but the vast majority are not - and we have never put that expectation on them (I22-CAN).

Another analyst shares the sentiment that the interpersonal element is often under-considered when selecting and hiring new analysts,

> There's also an interpersonal aspect to it that I think a lot of analysts don't give a lot of credit to. …But it's hugely important to get out there and go on ride-alongs with officers, talk with them at their roll calls, and build that interpersonal rapport. If I deliver 4 or 5 slides of a presentation about a pattern orally, at the beginning of a patrol shift, I can convey a lot more quickly than I can with a written product… You leave fewer questions open if you present in an interpersonal environment than you do if your entire output is written (I02-US).

These examples highlight an often-overlooked competency, which existing research suggests is a difficult skill to teach (Evans and Kebell 2012). Informal interpersonal elements often cited involve having a sense of humour or being able to 'take a joke'. As a senior analyst responsible for hiring explains:

> The other one is communication. You have to be able to, have a great personality, you can't be easily offended. So when my interns come on board, I'm like – listen, being in law enforcement is different and you have to have thick skin. You're going to deal with individuals who like to joke around, then you have some that everything is very, very serious. You can't take anything personally, but you have to be very respectful at the same time. So your personality is a big, big skill as well. You have to be able to adapt because there's different units. … you have to be able to adjust to different types of units and personalities (I12-US).

Interpersonal social skills and the ability to operate within police culture are essential because important information is often communicated informally. These interpersonal elements are essential to being heard, respected, and utilized in a meaningful way. An analyst explains that inability to build these interpersonal relationships is related to doing less valuable work:

> If you're not personable and professional, you can quickly be cut out of those things and then you are sort of floating out there in space and doing menial crime analysis -

> So I think it is really about combining a skill set with a friendly and professional demeanour (I14-CAN).

When analysts are reliant just on technology to access information, the limitations of technology present challenges for information sharing. As this example highlights, social exclusion translates to being excluded from more meaningful cases and advanced products, translating to a dependence on database reporting that this analyst perceives as less valuable ('menial'). Interpersonal skills remain particularly essential for analysts to access information that is not contained in digital form.

Many of our participants cited motivation and drive as essential for the necessary initiative and creativity in performing their role. These qualities are identified as important for professional development and for viability of the profession itself. When discussing necessary skills and traits for analysts, two participants explain:

> First of all, motivation. You've got to be motivated to do the job, some days are not pretty. But also, having creativity as well… there are some people in this profession who shouldn't be crime analysts because they just show up, they believe they have job security, and they just collect the paycheque. They're not motivated. … So having motivation is definitely a huge component of that… it's on me to be able to get different programs up and running and that chimes into the whole motivation thing. You've got to be motivated to come up with new ideas. Be driven to read up on current literature. Otherwise, the profession is just going to flatline (I02-US).

A particular element of self motivation or 'drive' is understood as essential for maintaining growth in the profession, important for promoting creativity, and self-initiative to keep up with knowledge in the field. Creativity is linked to developing new products that keep police decision-makers interested in what can be provided by the analyst. Analysts who stand out embrace new skills, develop original products, and remain aware of new tools that they can use to demonstrate value to police leaders. Motivation is also described as essential because of the autonomous nature of the role and lack of clear outcome goal. Another analyst identifies the importance of,

> …Being self-motivated and self-directed really, because with a lot of this stuff you can't be minutely tasked and managed… So, you have to be a naturally motivated person to know what your end goal is and try and get to that end goal without having to be directed per se on, well, now you should collect this, and now you should collect this (I11-AUS).

Our data suggests that the independent and often autonomous nature of the role requires analysts who are able to self-direct and seek out new tools, practices, and products without being shown. The ever-evolving nature of the field – with new types of data and new techniques constantly becoming available – is best suited to analysts who will take the initiative to learn and adapt rather than engaging in monotonous routine or waiting for instructions. The role remains largely autonomous and dependent on self-driven professional development, in part, because of present analyst supervision practices, as we demonstrate in Section 4.4.

4.4 Analytic Supervision

To date, less attention has been paid in the literature to the role of analyst supervisors and the core competencies to which they ought to be held. There are a range of supervision structures in place across organizations, often shaped by size and level of resource investment in analytical programs and personnel. In some organizations, analysts are supervised solely by a sworn member with minimal knowledge of the role of the analyst. The lack of organizational clarity around an analyst's role and responsibility (section 4.2) combined with the lack of analytic supervision creates challenges for recruiting and retaining analysts. When discussing important skills for analysts, many participants suggested that there are areas where organizational recruitment processes fail to pursue particular skills or abilities, including those identified above as important. A number of participants described challenges with a lack of targeted recruitment for some essential skills, or inaccuracies of role descriptions or job ads. In particular, and in light of the discussion in Section 4.2, there is a perception that recruitment does not sufficiently target the necessary technical skills and data literacy:

> I don't think we do a very good job at advertising the skillsets. We've got core competencies that come with any job posting, and a lot of those core competencies are things like communication, relationship building, those are 100% key, and that's stuff that we can't necessarily teach an applicant. Efficiency and thoroughness, analytical thinking obviously, and I'm sort of giving you all the ones that are posted, these are the catchy terms. But when you get right down to it, those technical skills are something that we don't probe for, I don't think enough (I13-CAN).

The quote above demonstrates how a lack of understanding about the importance of data literacy skills among those who are responsible for hiring analysts can result in recruitment efforts that overlook these essential skills. As Corkill et al. (2015) explain, improving specificity of required skills may assist organizations to overcome challenges such as mandatory selection of candidates based on seniority, made possible when job descriptions are non-specific.

In addition to organizational recruitment practices that may neglect core competencies, an absence of organizational standardization for training creates problems for consistency among analysts. While self-drive can motivate individuals to pursue training, greater clarity about requirements is important. Several organizations in all three countries had implemented civilian supervision structures for analysts. Our research is among the first empirical explorations of how this change may impact analyst competencies. We find introducing civilian management has helped standardize training among analysts within organizations. One analyst opines that a major benefit of civilian supervision has been "delivering standard training like the excel training or mapping training" (I14-CAN). This organizational shift will ideally help address lack of standardization in training. Civilian managers familiar with the policing environment can also assist inexperienced analysts in navigating cultural barriers. One analyst who was currently acting as a temporary supervising analyst explains,

> The [supervising analyst] I had was a very experienced analyst, so she came with a whole bunch of relationships on the sworn side at a higher level. So she was very good with our superintendent, our inspector, and she knew - much better than I do - the business of policing. So that I think was key… And I think [understanding the political landscape is] probably more critical than actually knowing how to do a map and being able to help your analysts you know figure out software stuff. Because you can always figure out another analyst that you could pair them up to, but once you get to that management level I think both sworn and civilian, you really need to be able to understand the business of policing, which is completely different than just being an analyst (I13-CAN).

This analyst identifies an important part of the civilian supervisor role is facilitating resources for training, and that this is more effective when the supervisor is well integrated into the organizational culture and has existing positive relationships with sworn members. This puts great emphasis on the importance of interpersonal skills for both effective analysts and effective analyst managers, but also how organizationally civilian management with these skills may help support new analysts.

Also important to consider when it comes to analyst supervision is the ability of the supervisor to review and provide feedback on analytic products. Analysts in our study emphasize that supervisors without analytic experience are often unable to review products for methodological soundness or provide feedback on analytical processes. Professional accreditation associations emphasize "products should be reviewed and evaluated by other intelligence professionals, who may arrive at different conclusions based on the same facts" (IALEIA and GJSI 2012). For analysts operating solely under sworn supervisors without analytic experience, this presents a challenge for analyst support, oversight, and evaluation.

> We found analysts often saying that they feel it's [their products] gone into a vacuum, that it's been sent off to the decision maker and they don't get any feedback. So there isn't that closing of the loop, and when they specifically ask for feedback they just go, yeah, it was great or it was useful. So it's not really helpful to get them to improve (I04-AUS).

In order for supervisors to provide meaningful feedback, they must possess knowledge to evaluate data and methodological decisions related to analytical processes and products. As the quote above highlights, without this oversight, products are often only reviewed by end-users who lack understanding about how analytic products are constructed, and as police professionals, often lack methodological training that would allow for this assessment. Departments need to and in some cases are, in the words of one analyst, "looking a little bit more closely at roles and responsibilities for intelligence management" (I25-CAN).

Managers not only require skills to create analytic products, but also the skills to effectively oversee personnel and navigate the policing environment. Alongside improving specificity of analyst job descriptions and postings, it is important for organizations to be deliberate and specific in terms of the skills required for effective supervision of analysts. Among such competencies is the need for supervisors to understand the role analysts play in a

particular organization. In defining and justifying the role of analysts within organizations, supervisors can help ensure the effective production and use of analytic products.

5. Discussion and Conclusion:

Our empirical research provides support for many of the core competencies identified by organizations such as IALEIA and IACA as well as in academic literature. However, there are three refinements that we would suggest. First, our research suggests the continuing importance of technical skills, despite and often *because of* improvements in software. Second, our research suggests that interpersonal skills are required for a broader range of reasons than that previously identified in the literature, including the ability to manage one's own continuing professional development in line with the needs of one's particular role. Finally, we think it imperative to have clear competency frameworks for analyst supervision, highlighting in particular skills relating to navigating the organizational landscape, understanding and providing feedback on analytic products, and understanding the role played by analysts. Our work here is hopefully the beginning of an important discussion about specific competencies for intelligence managers. These findings are not necessarily generalizable outside of the jurisdictions studied, however they would be worth exploring elsewhere.

Clarifying the *intended role* of the analyst is particularly relevant when discussing core competencies for both analysts and supervisors. Skills considered essential vary depending on organizational expectations of the position. An undefined role also makes it challenging to gauge effectiveness without clearly defined purpose – and in turn, what constitutes competency. It is the uncertainty in the role that requires not only technical skills (4.2) but also interpersonal skills and motivation (4.3). The discussion of what is ideally involved in the role of police analysts is significant when discussing core competencies because when their role excludes making recommendations but simply producing reports, fewer higher-level analytical and communication skills are required. Even if analysts are trained on such skills, unused skills may be lost over time. From the perspective of supervisors, understanding the role of analysts and the function of analytic products within an organization provides not only an appropriate framework for recruitment, training, and feedback, but also facilitates the measurement of performance and impact. It is supervisors who can negotiate the intersection of intelligence products and organizational needs, driving the cultural and organizational change required for intelligence-led policing. From an organizational perspective, this is a crucial component in ensuring that the analytic function enhances overall performance.

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