Intelligence for a complex environment: transforming traditional intelligence with insights from complexity science and field research on NATO

Spoor, B.E.P.

1. Introduction: Outlining the Research

The international security environment is increasingly complex. An increase in number and type of actors is empowered by fast developing technology and instant worldwide media reach. This is nothing really new. Regardless, intelligence is failing to keep up with these complex security challenges of the 21st century. This research searches a remedy by infusing intelligence with complexity science.

This introduction chapter explains the general outline of this research in four sections. The first section describes how intelligence relates to these security challenges. The second section presents the research aim and what knowledge gaps it addresses. The third section gives the problem statement and accompanying research questions. Lastly, the fourth section presents the research structure with a summary of the chapters and a research model.

1.1 The changing intelligence environment

The Russo-Ukrainian war gives prominent place to intelligence. The invasion of 2022 was preceded by the communication of American and British intelligence services predicting it. While intelligence is traditionally seen as secret, these services disclosed intelligence assessments at an unprecedented scale. In contrast, the German and French intelligence services were caught by surprise when the invasion took place, indicating the complexity of the intelligence task.[1] The war itself shows an unprecedented intensity in intelligence innovation. State intelligence services, private companies, individuals on social media, and think tanks provide daily, up-to-date assessments on territorial gains and losses, casualties and equipment losses, and tactics of the warring parties. Open source intelligence has become mainstream and democratised. The proliferation of drones improves reconnaissance and targeting to the lowest unit level and the Ukrainian government provides an app that its citizens can use to report on Russian military activities.

As such, the Russo-Ukrainian war fits the general realisation within intelligence that the international context and the military operational environment have changed

[1] Michelle Hogendoorn, Bram Spoor, and Sebastiaan Rietjens, "Caught by Surprise: Warning for Russia's Invasion of Ukraine," in *Reflections on the Russia-Ukraine War*, ed. Maarten Rothman, Lonneke Peperkamp, and Sebastiaan Rietjens (Leiden: Leiden University Press, 2024), 41-56.

significantly over the last decades.[2] The bipolar world of the Cold War became a multipolar world with a multitude of actors and alliances that are competing for political, military and economic gain. As a result the world became more interconnected. The acceleration of this process is globalisation: the increased exchange of people, goods, services and ideas across the world. This is intertwined with the Information Revolution, compromising technological developments like the internet, computers and mobile communication.[3]

The cumulative effect of all these drivers causes the decline of the Industrial Age. From a socio-economic system based on the mass production of goods the international order is adjusting to the Information Age; a global system based on the possession and exchange of information. Intelligence, with information traffic at its core, does not adjust well. This shows from the two most formative intelligence failures in the early 2000s; the 9/11 attacks and Iraq's missing weapons of mass destruction. Both failures led to the invasion of a country, Afghanistan and Iraq, that morphed into long and bloody counterinsurgency operations. The ensuing Global War on Terror (GWOT) makes that, despite a variety of drivers of change, intelligence literature identifies the single most important driver as the rise of non-state actors.[4] By definition a manifestation of globalisation, GWOT also meant intelligence became strongly concerned with cross-border insurgencies, international terrorists and organised crime. These non-state actors are often referred to as transnational threats in the literature. They are a very different problem from the relatively static nature of the traditional intelligence focus on states, and are often characterised with terms, or synonyms thereof, as 'adaptive', 'interconnected', 'diverse' and 'complex'.[5] However, the Russian war on Ukraine, and an increasingly assertive

---

[2] Minne Boelens, "The Revolution in Intelligence Affairs: Problem Solved?," in *Perspectives on Military Intelligence from the First World War to Mali: Between Learning and Law*, ed. Floribert Baudet, et al. (The Hague, The Netherlands: T.M.C. Asser Press, 2017), 120.

[3] e.g. Thomas L. Friedman, *The World Is Flat: The Globalized World in the Twenty-First Century* (New York, NY: Farrar, Straus and Giroux, 2005).

[4] William J. Lahneman, *Keeping U.S. Intelligence Effective: The Need for a Revolution in Intelligence Affairs* (Lanham, Md.: Scarecrow Press, 2011), 113.

[5] e.g. Warren Fishbein and Gregory F. Treverton, "Making Sense of Transnational Threats," *Sherman Kent Center Occasional Papers* 3, no. 1 (2004); Roger Z. George, "Meeting 21st Century Transnational Challenges: Building a Global Intelligence Paradigm," *Studies in Intelligence* 51, no. 3 (2007); Kristian

China, show state actors still demand the attention of intelligence services. Modern threats come from state and non-state actors, even individuals, alike.[6]

Next to the physical world, these threats operate just as much in the cyber domain and the social world, or 'human environment' in military doctrinal terms. Modern threats use a hybrid strategy, combining military and non-military means. They operate in the grey zone between peace and war, and on a global scale. Information, identity and ideology are weaponised and combined with kinetic force. The highly interconnected world enables these actors, using actions and ideas, to exert much influence fast and on a worldwide scale. The world, driven by all these interconnected developments, is deeply complex and uncertain.[7] The war in Ukraine is but a recent example of this. Today's intelligence issues resemble wicked problems rather than the relatively simple puzzles of the Cold War. However, the organisation of intelligence is still very similar to its Cold War form.

Driven by more recent intelligence failures such as the fall of Kabul or the Hamas attack on Israel in October 2023, the need for intelligence to improve is obvious. How to accomplish this is a more difficult matter. If modern threats, and indeed the whole security environment, are complex, which theories, organisational forms, and processes of intelligence - that have remained largely unchanged since their inception in the former century - are still valid? How to regard intelligence in the twenty-first century? This study asserts that complexity science, the study of complex and adaptive systems, holds many promises for examining the threats in the operational environment as well as intelligence organisations themselves. While this may seem a logical deduction, the study of intelligence has yet to adopt the ideas and methods of complexity science (see Chapter 4). This is striking; There is general agreement on the increased complexity of threats and the security environment in

---

Gustafson, "Complex Threats," *The RUSI Journal* 155, no. 1 (2010); Patrick M. Hughes, "On Convergence, Emergence, and Complexity," *Military Review* 96, no. 2 (2016).

[6] David Omand, "The Future of Intelligence: What Are the Threats, the Challenges and the Opportunities?," in *The Future of Intelligence*, ed. Isabelle Duyvesteyn, Ben De Jong, and Joop Van Reijn (London: Routledge, 2014), 14.

[7] Robert Jervis, *System Effects: Complexity in Political and Social Life* (Princeton, NJ: Princeton University Press, 1997). Emilian Kavalski, ed. *World Politics at the Edge of Chaos: Reflections on Complexity and Global Life* (New York, NY: State University of New York Press, 2015).

general, however the issue is not addressed by taking a complexity turn and adapting intelligence to the changed circumstances. Therefore this study aims to seek insights from complexity science and to apply these to intelligence. The next section will further explain this.

1.2 Research aim & knowledge gaps

Complexity science *'asserts the ontological position that much of the world and most of the social world consists of complex systems'*.[8] Examples of these complex systems include the Internet, financial markets, ecosystems and the human brain.[9] These systems consist of agents that are diverse and connected and that interact and adapt to each other and to their environment.[10] The dynamics between these agents are non-linear. This means the output of these dynamics is disproportionate to the input, whereas in a linear system the output can be predicted or calculated from the input. In other words, the behaviour of a complex system cannot be predicted from studying its constituent agents. This behaviour is not steered by a central controller because the dynamics between the agents are self-organising. As a result complex systems produce completely novel phenomena at system level, referred to as emergence. Each complex system acquires information about its environment and its own interaction with it, identifies regularities in that information which are then recorded into a model, or schema. The system behaviour is based on these schemata and results of its behaviour upon the environment feed back into the models.[11]

The similarities with intelligence are obvious. Like a complex system, intelligence tries to understand the environment and reduce uncertainty in advising decision-making. Therefore a complexity approach to intelligence seems logical and

[8] David Byrne and Gillian Callaghan, *Complexity Theory and the Social Sciences: The State of the Art* (New York, NY: Routledge, 2014), 8.

[9] Murray Gell-Mann, *The Quark and the Jaguar: Adventures in the Simple and the Complex* (New York, NY: Freeman and Company, 1994), 17; James Ladyman and Karoline Wiesner, *What Is a Complex System?* (New Haven, CT: Yale University Press, 2020), 19-63.

[10] Scott E. Page, *Diversity and Complexity* (Princeton, NJ: Princeton University Press, 2011), 25.

[11] Gell-Mann, *The Quark and the Jaguar: Adventures in the Simple and the Complex*, 17.

promising.[12] However, the attention for complexity in intelligence literature is marginal, as Beebe and Beebe state *'relatively little work has been done to date on the potential practical applications of complexity science to the field of intelligence analysis. Complexity rarely receives direct mention in the intelligence literature'*.[13] The volume of publications on the intelligence-complexity nexus is small, and many publications only treat complexity superficially (see section 4.1). Existing literature on the nexus mainly comes from scholars outside the intelligence and security field.[14] Intelligence, it can be stated, missed the complexity turn.[15]

Furthermore, complexity science offers much theory and methods that help to truly move beyond any traditional notions of intelligence. It offers a comprehensive and fundamental perspective where most intelligence studies on improvement have a narrow focus, e.g. technology, intelligence failure, bureaucratic reorganisation. Bay even states there is *'a lack of explicit meta-theoretical awareness'*.[16] De Werd observes: *'Most intelligence scholars refrain from explicitly articulating the theoretical roots of their revolutionary new thinking in philosophical terms'*.[17] This

[12] See also: Committee on a Decadal Survey of Social and Behavioral Sciences for Applications to National Security, "A Decadal Survey of the Social and Behavioral Sciences: A Research Agenda for Advancing Intelligence Analysis," (Washington, D.C.: National Academies of Sciences, Engineering, Medicine, 2019), 90-92, 117-22; Myriam Dunn Cavelty and Jennifer Giroux, "The Good, the Bad, and the Sometimes Ugly. Complexity as Both Threat and Oppertunity in National Security.," in *World Politics at the Edge of Chaos: Reflections on Complexity and Global Life*, ed. Emilian Kavalski (New York, NY: State University of New York Press, 2015).

[13] Sarah Miller Beebe and George S. Beebe, "Understanding the Non-Linear Event: A Framework for Complex Systems Analysis," *International Journal of Intelligence and Counterintelligence* 25, no. 3 (2012): 510.

[14] Thomas E. Copeland, "Intelligence Failure Theory," in *Oxford Research Encyclopedia of International Studies* (2010).

[15] Bram Spoor and Peter de Werd, "Complexity in Military Intelligence," *International Journal of Intelligence and CounterIntelligence* 36, no. 4 (2023): 1125.

[16] Sebastian Bay, "Intelligence Theories: A Literary Overview," *Lund, Sweden: Lund University* (2009). From; Stephen Marrin, "Evaluating Intelligence Theories: Current State of Play," *Intelligence and National Security* 33, no. 4 (2018): 480.

[17] Peter de Werd, "Critical Intelligence: Analysis by Contrasting Narratives: Identifying and Analyzing the Most Relevant Truths" (PhD, Utrecht University, 2018), 18.

lack of theorising makes that new methods, technological or organisational, are not grounded in broad, underlying highly conceptual frameworks. This can have severe consequences; Liaropoulos warns against relying on organisational and technological reform alone, stating *'Any effort to reform intelligence must adopt a holistic approach'*.[18] Meanwhile, with the development of new methods *'less fully considered are the appropriateness and validity of these methods as well as the underlying assumptions they enshrine'*, according to Moore.[19] With its complexity approach, this research addresses the call for a more multi- and interdisciplinary approach in intelligence studies.[20]

A more comprehensive and theorising perspective would allow for a better understanding of what drives intelligence to change and how this change can look like. Comprehensive and theorising however, does not mean 'unifying'. The goal is not to look for a single theory to explain all of intelligence (theories). The search for a fundamental, metatheoretical framework is about adopting a philosophical stance. The advantage of such a stance is that it can reflect on the structure and workings of the current fragmented theories and methods and balance against it. It can function as a background or foundation in which to see new developments or even generate new thinking. It could form a method to make some sense of the kaleidoscope of developments in intelligence. This would help to improve intelligence in many ways. *'Theorizing about the larger issues and patterns of intelligence can help to inform decisions on future intelligence systems, structures, or functions'*, according to Barger.[21]

---

[18] Andrew Liaropoulos, "A (R)Evolution in Intelligence Affairs? In Search of a New Paradigm," (Athens: Research Institute for European and American Studies, 2006), 17.

[19] David T. Moore, *Sensemaking: A Structure for an Intelligence Revolution* (Washington, DC: National Defense Intelligence College Press, 2011), 4.

[20] Stephen Coulthart, Michael Landon-Murray, and Damien Van Puyvelde, eds., *Researching National Security Intelligence: Multidisciplinary Approaches* (Georgetown University Press, 2019); Stephen Coulthart and Abebe Rorissa, "Growth, Diversification, and Disconnection: An Analysis of 70 Years of Intelligence Scholarship (1950-2020)," *Intelligence and National Security* (2023).

[21] Deborah G. Barger, "Toward a Revolution in Intelligence Affairs," (Santa Monica, CA: RAND Corporation, 2005), 107.

In its aim to improve intelligence with insights from complexity science this research contributes to addressing two more knowledge gaps. Intelligence studies is mainly concerned with intelligence on the level of the state and national intelligence services, often referred to as strategic intelligence or national security intelligence.[22] Intelligence at the level of military operations is researched far less.[23] Military intelligence is not a clearly defined intelligence off-shoot. Contrary, the term is rather ambiguous and often replaced by defence intelligence, combat intelligence or tactical intelligence. This research sees military intelligence as services and units who engage in intelligence as a 'warfighting function' – as termed in doctrine.

This military focus on intelligence is most apparent in the case study of this research. The object of analysis here is the intelligence organisation of NATO's Multinational Corps Northeast (MNC NE). The corps is the NATO tactical command for Poland, Estonia, Latvia, and Lithuania with the mission to *'train for defensive operations, in order to effectively deter any attack and if need be to defend the Alliance's northeastern territory against any aggressor'*.[24]

The data collection at MNC NE took place by means of interviews with 56 (mainly) intelligence officers from nine different corps units and commands, on how they make sense of their operational environment. In addition, numerous informal talks, participant observations, insight in documents, and desk review contributed to this collection effort. As such, next to contributing to knowledge on military intelligence, this case study also contributes to the small volume of contemporary empirically-based research within intelligence studies. And on the corps specifically, only two

[22] Robert Dover, Huw Dylan, and Michael S Goodman, "Introduction to a Research Agenda for Intelligence Studies and Government," *A Research Agenda for Intelligence Studies and Government* (2022): 5.

[23] Loch K. Johnson, "The Development of Intelligence Studies," in *Routledge Companion to Intelligence Studies* (Routledge, 2013), 13. S. Rietjens, "Intelligence in Defence Organizations: A Tour De Force," *Intelligence and National Security* 35, no. 5 (2020): 717; Sebastiaan Rietjens and Peter De Werd, "Intelligence and the Military: Introduction," (Taylor & Francis, 2023); Alessandro Scheffler and Jan-Hendrik Dietrich, "Military Intelligence: Ill-Defined and Understudied," *International Journal of Intelligence and CounterIntelligence* (2023).

[24] Website MNC NE, 'Mission', accessed 10-2-2022. https://mncne.nato.int/about-us/mission

scientific publications exist (see section 5.2.2). The military focus is also applied by using not only academic literature on intelligence but also some military doctrine and publications by military professionals.

Lastly, the case study reveals that the idea of hybrid warfare is especially problematic in making sense of the environment. This is no surprise but rather points to the external validity of the case study as it fits into a larger trend of hybridity in conflicts.

1.3 Problem statement & research questions

This research aims for a theoretical (complexity science) and an empirical (case study research) contribution to the study of intelligence, while highlighting military intelligence. From this, the following problem statement is formulated:

- ***How can complexity science advance intelligence transformation?***

The aim to improve intelligence is phrased here as intelligence transformation. To explain this it is important to distinguish it from the other terms prevalent in the debate that describe the changes (needed) in intelligence: 'reform/reorganisation' and 'revolution'. The first category, reforms/reorganisations, is a common occurrence within intelligence. The US is especially known for this, often done based on investigations into its intelligence community after failures.[25] If this results in actual improved performance is questionable. Hammond states that *'while many prescriptions for Intelligence Community ''reform'' have proved difficult to implement, IC structure seems to have been subjected to reforms and reorganizations somewhat more often, perhaps because structural problems are seen, correctly or not, as more easily solved'*.[26] Reforms and reorganisations are often just about a bureaucratic re-ordering of existing entities and structures. Agrell adds: '*Major reorganizations are in many cases cosmetic, as the staff remain intact or simply get*

[25] Mark M. Lowenthal, *Intelligence: From Secrets to Policy*, 5 ed. (Washington, DC: CQ Press, 2012), 383-86; Amy B. Zegart, *Spying Blind: The CIA, the FBI, and the Origins of 9/11* (Princeton, N.J.: Princeton University Press, 2007), 27-34.

[26] Thomas H. Hammond, "Intelligence Organizations and the Organization of Intelligence," *The International Journal of Intelligence and Counter Intelligence* 23, no. 4 (2010): 682-83.

recycled in a new organizational chart'.[27] Pillar goes so far as to say that the calls to adjust the US Intelligence Community to the post-Cold War era have become a meaningless cliché: *'the urge to reorganize is largely background noise rather than an effective adaptation to changed circumstances'*.[28]

Reform and reorganisation, with their bureaucratic conditions, are obvious evolutions. Contrary, the second category of approaches to improve intelligence advocates not a gradual but a swift and total overhaul of the system.[29] In the literature authors that advocate a revolutionary approach are a minority.[30] However, their voices are apparently loud enough to have given birth to the term Revolution in Intelligence Affairs (RIA) to distinguish them from the larger volume of works on reform and reorganisation. Overall, the re-examination of intelligence is very fragmented. As Lahneman concludes: *'Studies varied widely in terms of focus and methodology. Since the intelligence enterprise is a very complex undertaking, most of the studies focused on only a portion of it, examining, for example, functional areas, such as […] organization, the analytic process, the policy maker-analyst relationship, open source intelligence (OSINT), covert operations, or the role of information technologies.'*[31]

Intelligence transformation in this study differs from these characterisations. It is not evolutionary reform or reorganisation because it concerns itself with more than slowly re-ordering existing entities and structures. A transformation, according to the online Cambridge Dictionary, is *'a complete change in the appearance or character of something or someone, especially so that that thing or person is improved'*.[32] A transformation is about a fundamental new approach to intelligence,

---

[27] Wilhelm Agrell, "The Next 100 Years?: Reflections on the Future of Intelligence," in *The Future of Intelligence*, ed. Isabelle Duyvesteyn, Ben De Jong, and Joop Van Reijn (London: Routledge, 2014), 139.

[28] Paul R. Pillar, "Adapting Intelligence to Changing Issues," *Handbook of intelligence studies* (2007): 157.

[29] Lahneman, *Keeping U.S. Intelligence Effective: The Need for a Revolution in Intelligence Affairs*, 71-72; Lowenthal, *Intelligence: From Secrets to Policy*, 327, 29, 43.

[30] Lahneman, *Keeping U.S. Intelligence Effective: The Need for a Revolution in Intelligence Affairs*, 71.

[31] Ibid., 14.

[32] Cambridge English Dictionary online, 'transformation', accessed 22-10-2019.

like a revolution, only it is sceptic to the violent and sudden change connotating such revolution. Unlike with revolution, time – or pace – is not inherently part of the meaning of transformation. Furthermore, this research views intelligence not as moving evenly fast in its entirety. Some aspects, like technological adaptation, develop faster than other aspects such as political oversight. Chapter 3 examines these different aspects of intelligence and their development.

While firmly embracing the novelty of transformation and revolution, this research also acknowledges that understanding of new approaches begins by explaining them with familiar language and concepts. Rejecting the reform/reorganisation approach as inadequate this research focuses on the commonality between revolution and transformation of being about complete systemic change.

Additionally, four research questions are formulated to help guide the research:

1. *What is the status of intelligence transformation?*
2. *How did intelligence evolve?*
3. *How does complexity science relate to intelligence?*
4. *How do military intelligence organisations deal with their complex operational environment?*

The next section further explains the research questions and how they relate to each other.

1.4 Research structure

To answer the central question a research structure is developed, consisting of a summary of the chapters and a research model. The structure is set up according to a cascading model. In this model the chapters build on one another: the conclusions in one chapter are pursued to the next in an incremental manner. This research builds a framework through the accumulation of the theoretical chapters, which is then used for a case study research, and is followed by concluding chapters.

After this introductory first chapter, Chapter 2 explains *What is the status of intelligence transformation?* The intelligence cycle, intelligence theory and intelligence paradigm are presented as the focal points of intelligence transformation. The third chapter will focus on the second research question *How*

did the intelligence habitus evolve? This chapter examines if the transformation issues also exist outside theoretical academic intelligence studies. This broader perspective is explained as the intelligence habitus, borrowing from French philosopher Pierre Bourdieu. To this aim a literature study is done of academic, professional and doctrinal publications to examine how intelligence developed. Hereby a comprehensive approach is needed to avoid the prevalent fragmentation and narrow scope of the transformation debate. To accomplish this, the framework of the five driving forces from *The Evolution of International Security Studies* (2009) by Barry Buzan and Lene Hansen is used; *Great Power Politics, Technology, Events, Academic Debate* and *Institutionalisation.* The framework, and what is understood by 'intelligence habitus' is explained in detail in Chapter 3. This provides a thorough overview of the evolution of the intelligence habitus.

To answer the third question *How does complexity science relate to intelligence?* Chapter 4 starts with a literature study of existing notions of complexity within intelligence literature and then connects these to complexity science. As a parallel, publications on warfare and complexity and organisational complexity theory are surveyed to help connecting complexity to intelligence. The specific research approach for the case study is discussed in Chapter 5. Chapters 6, 7 and 8 form the empirical part of the research. The corresponding research question is *How do military intelligence organisations deal with their complex operational environment?* The case study research is based on interviews with personnel from MNC NE, as well as informal talks, participant observations, insight in documents, and desk review. The last chapter answers the problem statement *How can complexity theory advance intelligence transformation?* By formulating recommendations to improve intelligence performance in complex environments. Finally, Chapter 9 reflects upon this research and recommendations for further research are formulated.

Figure 1 depicts the research model for this study. The white boxes represent the sources the research is based on, blue boxes represent chapters and are followed by the corresponding research questions.

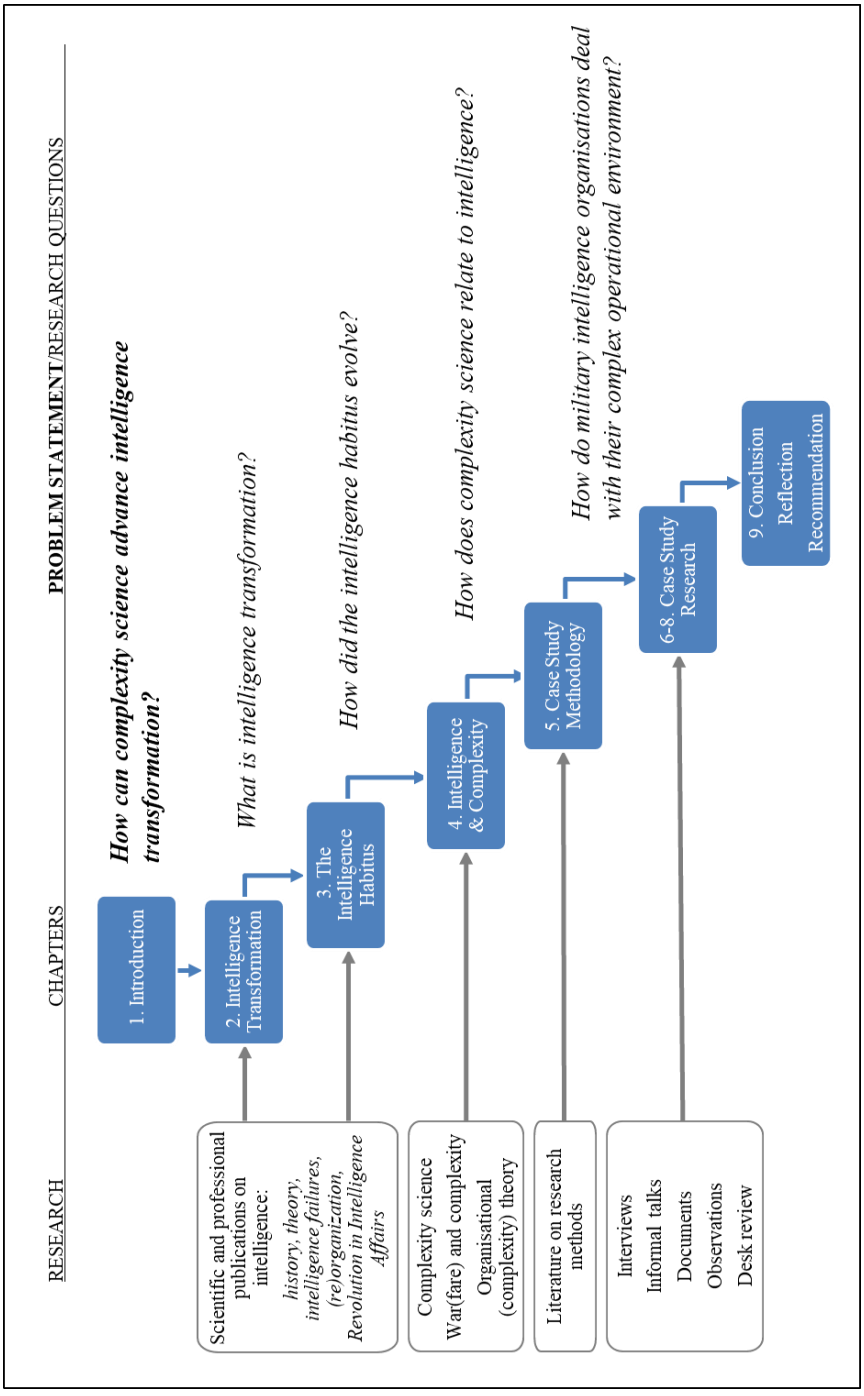

Figure 1: Research model