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Practical dimension of issues related to assessing the reliability of sources and the trustworthiness of data and information

Abstract

The phases of preparation, analysis, integration, initial interpretation of data and intelligence are relatively widely described in the literature. Only the field of assessing the certainty of sources and the reliability of data and intelligence has not kept pace with the development of other elements in the domain of information operations. In view of the increasing intensity of activities carried out by potential adversaries, the methods, techniques and tools currently in use should be critically evaluated and their limitations identified, and attempts should be made to develop and implement new processes and procedures. Above all, the capacity to prepare and communicate increasingly accurate assessments of the certainty of sources and the reliability of data and information must be enhanced. Therefore, it is necessary to: quantify the accuracy of the information, prepare new procedures and software, study the degree of information redundancy, its completeness and level of diagnosticity. Acquisition and analytical apparatus staff must be aware of existing limitations and search for ways to solve problems. Such a search should not focus on one-size-fits-all methods, but on a pragmatic approach to each element.

Keywords

intelligence, intelligence cycle, intelligence analysis, source reliability, information reliability.

Intelligence practice should be based on an effective system of gathering the necessary intelligence material, i.e. accessing reliable data and information from reliable sources. This is because decision-making processes at the operational, operational-strategic and strategic levels require a constant supply of reliable and best-prepared information products, provided by the analytical and information elements of reconnaissance structures and intelligence institutions. This should be the case mainly because these bodies have their own and largely effective ways of evaluating the reliability of data and information and the certainty of sources. However, one should not stop there and must strive to continuously improve the quality of data and information evaluation procedures.

The phases of preparation, analysis and integration, as well as the initial interpretation of data and intelligence, have been described relatively extensively in the literature. Appropriate and effective tools designed to support activities in all these dimensions also exist. Currently, only the field of assessing the certainty of sources and the reliability of data and intelligence remains a sphere that has not kept pace with the development of other elements in the domain of information operations.

In view of the increasing activities carried out by potential adversaries, the methods, techniques and tools currently in use should be critically evaluated and their limitations identified, and attempts should be made to develop and successively implement new processes and procedures. It is currently difficult to impose a rigid framework on this type of endeavour. In most cases, therefore, the aim is to provide greater flexibility in all areas of evaluation and to constantly expand the scope of cooperation between the acquisition and analytical apparatuses. This is because, most often, the analyst working in reconnaissance structures and intelligence institutions is one of the first people to whom the most important data and information resulting from the acquisition apparatus goes. This already happens at a stage in the development of events when data and evidence are still vague and ambiguous. Over time, the analyst is provided with further elements, allowing him or her to further build an argument, form opinions and prepare conclusions. They usually do not have direct access to the observed, studied object. Therefore, he or she collects the necessary elements in an indirect way. Since data and information are generally incomplete, careful assessments of data reliability and source certainty are necessary. The opinions and conclusions presented in the article are largely based on the experience of the author, a former practitioner of an intelligence institution, with knowledge of the directions of change of units of analysis, evaluations and preferences of information recipients. They have been contrasted with the available literature on the subject.

Review of the relevant literature

Intelligence studies in Poland is a relatively new area in terms of research and theory building. There are few studies, and the range of issues covered is limited to the basics, without attempting to build a theoretical foundation on its own.

At the beginning of the 21st century, official and unofficial (carried out in reconnaissance structures and intelligence institutions) translations of Michael Herman's books reached the Polish reader. Publication efforts at the time were made by Collegium Civitas in Warsaw and the University of Natural Sciences and Humanities in Siedlce. However, it is only since 2014, i.e. since the publication of Mirosław Minkina's work entitled *The Art of Intelligence in the Modern State*, that one can speak of Polish attempts at a holistic approach to intelligence studies[1].

With regard to intelligence analysis, the monograph *Teoria i praktyka działań analityczno-informacyjnych* (Eng. The Theory and Practice of Analytical and Information Operations), published in 2016, was of similar importance[2]. However, the number and quality of publications remain insufficient and therefore those interested in this topic continue to look to the work of Peter Gill[3], Stephen Marrin[4],

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[1]   M. Minkina, *Sztuka wywiadu w państwie współczesnym* (Eng. The art of intelligence in the modern state), Warszawa 2014.

[2]   J. Kozłowski, *Teoria i praktyka działań analityczno-informacyjnych* (Eng. Theory and practice of analytical and information activities), Warszawa 2016.

[3]   See: P. Gill, *Twenty years on: Intelligence and Security Committee and investigating torture in the 'war on terror'*; the same, *Explaining Intelligence Failure: Rethinking the Recent Terrorist Attacks in Europe*; also, *Theories of intelligence*; the same, *Intelligence, Threat, Risk and the Challenge of Oversight*; the same, *Policing in Ignorance?*; the same, *Thinking about Intelligence Within, Without, and Beyond the State*; the same, *Security Intelligence and Human Rights. Illuminating the 'Heart of Darkness'?*; the same, *Intelligence, Terrorism and the State*; *Intelligence Theory. Key Questions and Debates*, P. Gill, S. Marrin, M. Phythian (eds.). For a full bibliographical description, see the appendix bibliography - editor's note.

[4]   See: S. Marrin, *Analytic objectivity and science: evaluating the US Intelligence Community's approach to applied epistemology*; the same, *Evaluating intelligence theories: Current state of play*; the same, *Understanding and improving intelligence analysis by learning from other disciplines*; the same, *Why strategic intelligence analysis has limited influence on American foreign policy*; the same, *Improving Intelligence Studies as an Academic Discipline*; the same, *Evaluating CIA's Analytic Performance: Reflections of a Former Analyst*; the same, *Revisiting Intelligence and Policy: Problems with Politicization and Receptivity*; the same, *Rethinking Analytic Politicization*. For a full bibliographical description, see the appendix bibliography - editor's note.

Mark Phythian[5], James J. Wirtz[6] and Alan Breakspear[7]. This article presents a summary of the views of these researchers.

Professional journals such as "Intelligence and National Security", "International Journal of Intelligence and CounterIntelligence" and "Studies in Intelligence" are also sources of valuable studies on intelligence. They feature the views and opinions of Charles Cogan, Michael Warner, Donald Cameron Watt and others, including academic lecturers mainly from Germany and Spain. Their deductions, however, are insufficient for national intelligence studies. Hence, attempts to carry out additional analyses and develop a new approach to research in the field of intelligence activities are being made at Polish military schools, intelligence institutions and universities - at faculties related to the security field.

In recent decades, the literature on the subject, which, according to academia. edu, already numbers 228 items, has often held the view that intelligence activities should be organised and conducted primarily in response to information needs presented by users. This was the position taken by some politicians and commanders who tried to explain the courses of action adopted in this way.

Methodological dimension of intelligence studies

In this study, sources containing attempts to describe systems in reconnaissance and intelligence structures and related problems - at different levels, mainly organisational and functional - were analysed in detail. A descriptive and, at the same time, analytical approach to the sources, a functional and logical synthesis of the most important elements, the use of comparisons and analogies, as well as isolating and generalising abstractions - all these research activities allowed not only to identify the most important issues in the areas of assessing the certainty

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[5]   See: P. Gill, M. Phythian, *Intelligence in an insecure world*, Cambridge 2012.

[6]   See: J.J. Wirtz, *The Tet Offensive: Intelligence Failure in War*; L.K. Johnson, J.J. Wirtz, *Intelligence: The Secret World of Spies: An Anthology*; L.K. Johnson, J.J. Wirtz, *Strategic Intelligence: Windows into a Secret World: An Anthology*; *Balance of Power. Theory and Practice in the 21st Century*, T.V. Paul, J.J. Wirtz, M. Fortman (eds.); *Planning the Unthinkable. How New Powers Will Use Nuclear, Biological, and Chemical Weapons*, P.R. Lavoy, S.D. Sagan, J.J. Wirtz (eds.); *Complex Deterrence: Strategy in the Global Age*, T.V. Paul, P.M. Morgan, J.J. Wirtz (eds.); *Strategic Denial and Deception: The Twenty-First Century Challenge*, R. Godson, J.J. Wirtz (eds.). For a full bibliographical description, see the appendix bibliography - editor's note.

[7]   See: A. Breakspear, *A New Definition of Intelligence*, "Intelligence and National Security" 2013, vol. 28, no. 5, pp. 678–693. https://doi.org/10.1080/02684527.2012.699285.

of sources and the reliability of data, necessary for the theoretical basis in the domain of intelligence activities, but also to propose possible solutions.

Without an intelligence theory and its individual functional areas, such as those being built in other countries for national political structures and intelligence institutions, it is difficult to plan undertakings at the strategic level in the medium to long term. Such an effort should therefore be made, even despite the resistance of a section of practitioners who do not approve of framing the problem in a conscious, structured and consistent way, and consider the creation and development of an intelligence theory a waste of time.

An assessment of the existing work in this area and a critical analysis of the sources and literature on the subject become necessary. Some of the work has already been done, many studies have been produced and accepted definitions have emerged. A widely recognised basis for this is the work of the intelligence classic Sherman Kent, e.g. *Strategic Intelligence for American World Policy* (Princeton 1949)[8]. A theory of intelligence operations should therefore be a holistic concept that includes a description and explanation of key phenomena and issues. A system of factual and logically structured laws, hypotheses and definitions should be developed. Furthermore, the theory of intelligence operations should constitute a self-contained unit of an academic discipline - in this case, security sciences. However, in order to build it, the principles that characterise the basic objects, events and the laws that govern them must be established. It is necessary to identify the relationships that link the main elements of the theory to empirical events[9]. With this approach, descriptive in its nature, it will be possible to explain facts already known - by selecting from theory the relevant laws and identifying theorems that describe events. Certain assertions can serve as methodological directives of inquiry and enable the correction of errors of observation of events or their explanation. The theory of intelligence operations is also intended to enable the standardisation of behaviour and actions taken to ensure that they are as effective as possible. It is also intended to make it possible to isolate the most important elements and to set standards of conduct. It should also address issues related to assessing the certainty of sources and the reliability of data and information.

Intelligence activities are an interesting but very complex object of study. It is difficult to capture all the issues related to them in a uniform way. It may be considered reasonable to study this problem from the point of view of both academics and practitioners - consultants, managers, operational officers, analysts and employees

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[8]   A.N. Shulsky, G.J. Schmitt, *Silent Warfare: Understanding the World of Intelligence*, Washington 2002, p. 169.

[9]   M. Warner, *Wanted: A definition of intelligence*, "Studies in Intelligence" 2002, vol. 46, no. 3, pp. 15–22.

of the security divisions of intelligence institutions and reconnaissance structures[10]. It is worthwhile, as in the case of this article, to also use the results of consultations and discussions in the expert community.

Is it possible to develop an intelligence-based "theory of everything"? Similar to the one that theoretical physicists are striving to create to describe all aspects of the universe. Many experts believe this will be difficult, but there are likely to be research schools and scholars who will attempt this. Others are likely to focus on the essential elements and practicalities of intelligence, including assessing the certainty of sources and the reliability of data and information[11]. Rapid results should not be expected, but the direction of development of this new scientific speciality must be considered promising, especially in countries such as Poland.

Assessing the reliability of sources and the credibility of data and intelligence

A number of data and material evaluation systems are used in intelligence operations. In the Anglo-American area and in international institutions, for example, the *Admiralty Grading Intelligence System* developed by the UK Naval Forces Command is used (Table 1). This method of assessing sources and intelligence data and information was implemented many years ago (in the 1940s) and is still the most widely used, including by analysts in the US intelligence community. It is also the primary tool, in its various variations, for conducting quality control of information activities in international intelligence structures. There is a wealth of source material available in the public domain on this system, as well as the *NATO - STANAG 2511 Intelligence Reports* standardisation agreement. Hence their use in this article.

The data and information in intelligence reports are subject to evaluation in terms of reliability of source and credibility of information. Such evaluations are prepared at both operational and analytical activity levels. These are governed by the NATO standardisation agreement STANAG 2511[12] and the provisions of the doctrinal document AJP-2.1[13] (Eng. *Allied Joint Doctrine for Intelligence*

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[10] K.J. Wheaton, M.T. Beerbower, *Towards a new definition of intelligence*, "Stanford Law and Policy Review" 2006, vol. 17, no. 2, pp. 319–330.

[11] P. Gill, M. Phythian, *Intelligence in an insecure world…*

[12] *NATO – STANAG 2511. Intelligence Reports*, https://standards.globalspec.com/std/720819/stanag-2511 [accessed: 17 III 2023].

[13] *NATO – AJP-2.1 Intelligence Procedures*, https://standards.globalspec.com/std/108985/ajp-2-1

Procedures; in the Polish Armed Forces - Doctrine document *DD–2.1 Reconnaissance procedures*). They propose a more elaborate version of the evaluation system (Tables 2 and 3).

Table 1. Data and intelligence assessment system.

Reliability of source		Credibility of information	
A	completely reliable	1	confirmed by other sources
B	usually reliable	2	probably true
C	fairly reliable	3	possibly true
D	not usually reliable	4	doubtful
E	unreliable	5	improbable
F	reliability cannot be judged	6	truth cannot be judged

Source: own elaboration based on: W. Reed, L. Collins, *Plunging Point: Intelligence Failures, Cover-ups and Consequences*, London 2005, p. 121.

Source certainty can be defined as the level at which the message conveyed by a source is accepted by the recipient as credible, competent and likely. The information content of the message, the opinion of the author of the information and the way the information is presented are considered to be the main elements in assessing source certainty. This makes it possible to distinguish three types of sources:
- trustworthy source,
- expert source,
- neutral source.

Source assessment can be carried out using the following approaches:
- firsthand knowledge – where the source of the information is known and directly accessible;
- second hand knowledge – when information reaches the recipient after it has already been assessed by someone else;
- credibility measure inferred from network – evaluation on the basis of the number and quality of the assessments made by the other components of the system;
- credibility of the organization;
- past ratings – statistical evaluation of previous results;

[accessed: 17 III 2023].

– assessment on the basis of the time factor, with the assumption that older evaluations are less reliable than those reaching the public at present[14].

Table 2. Scale of source reliability.

		Reliability of source
A	completely reliable	this level refers to a repeatedly tried and trusted source
B	usually reliable	this level refers to a source that has contributed to good results in information processes, but there are still elements that have caused, in some cases, some doubt
C	fairly reliable	this level relates to a source that has been used repeatedly in the past and for which a certain level of reliability has already been assigned
D	not usually reliable	this level refers to a source whose capabilities have been used in the past, but which has not proved to be trustworthy in most cases
E	unreliable	this level refers to a source whose capabilities have been exploited in the past, but which has not proved to be trustworthy
F	reliability cannot be judged	this level relates to a source whose capacity has not been used in the past

Source: own elaboration based on: *NATO – STANAG 2511*.

Table 3. Scale of reliability of data and intelligence.

		Credibility of information
1	confirmed by other sources	this level means that it can be stated with certainty that the information provided has also been passed on by another source or sources
2	probably true	this level means that, although the source cannot be guaranteed to be highly independent and reliable, on the basis of both the quantity and quality of the material it can be sufficiently estimated as reliable

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[14] M.A. Ekström, H.C. Björnsson, *A rating system for AEC e-bidding that accounts for rater credibility*, Digital Library, https://itc.scix.net/paper/ecce-2001-6 [accessed: 17 III 2023].

3	possibly true	this level means that, despite insufficient possibilities to determine the level of reliability of the data and information, the new material does not contradict the conclusions and assessments already made
4	doubtful	this level means that new material may contradict previously acquired data and information and the conclusions and assessments developed
5	improbable	this level means that the new material contradicts previously acquired data and information as well as the conclusions and assessments developed
6	truth cannot be judged	this level means that there is no possibility to compare new elements, data and information with previously developed conclusions and assessments

Source: own elaboration based on: *NATO – STANAG 2511*.

Even a superficial analysis of the solutions presented indicates the existence of a number of constraints, which are present in three dimensions - communicative (the communication of data and information reliability and source assurance), criterial (the definition of indicators and their values) and structural (the place and role of data and information reliability and source assurance assessment procedures in intelligence activities).

Ways to report on the assessment of data and intelligence

The system of data and intelligence assessments outlined allows for a quantitative assessment of the certainty of sources and the reliability of data and information. It is structured in a way that is easy for users to understand, but allows for a large degree of subjectivity. For example, one analyst may rate a source at "A" (completely reliable) and another may rate the same item at "B" (usually reliable).

However, none of the variations of this rating system currently in use assign precise numerical values to the different levels. This can cause some problems in information work. For example, an analyst will assign a level "B" to a source for which a high degree of independence and certainty cannot be guaranteed, but on the basis of both the number and quality of the material can be sufficiently estimated as reliable. This may be the case when a source provides reliable data and information 70% of the time. However, another professional may interpret that it is 90%. Systemically, this will mean that the source will be rated better than it actually deserves. It is also possible to imagine a situation in which an analyst assigns a level

"B" to sources that provide reliable data and information only 50% of the time. Then there is a serious danger that data and information from this source will not be taken into account in the analyses and evaluations carried out[15].

In practice, we find that analysts assign values of 55-90% and 53-90% respectively for levels "B" (usually certain) and "2" (possibly true). For "C" (rather certain) and "3" (possibly true) levels, the values are between 40% and 80%[16]. This categorisation can lead analysts in very different directions. Some will accept the data and information provided to them, others will reject it. The problem is exacerbated when the materials, with the ratings assigned to them, are intended to be exchanged with foreign partners who may interpret the levels of source confidence and reliability of the data and information marked in the products differently[17]. Despite these difficulties, most reconnaissance structures and intelligence institutions use, usually with some modifications, the discussed method of evaluating sources and the material they provide.

Another problem is the tendency of analysts to use the extremes of both scales. At the time of the US Armed Forces Exercise Assessment in the 1970s, "A1" and "B2" scores together accounted for 80% of all scores, with 'B2' scores as high as 74%. This is a trend that is difficult to understand and dangerous. When recipients are presented with such highly rated material, they are unlikely to seek additional information and request data from other sources. Even more worrying is that, in practice, grades may be limited to two levels on ordinal scales, as has happened in US military structures[18].

A "B2" rating is a value for a source that is usually reliable and dependable and has historically contributed to good results in information processes. However, in this case, there may still be elements that have caused doubt. The data and information are likely to be true, although a high degree of independence and certainty of the source cannot be guaranteed. However, based on both the quantity and quality of the material, such a source can be sufficiently assessed as reliable. For the analyst, this is a relatively safe position, as he or she cannot be accused of placing undue trust in the source and its materials and of being uncritical of the data and

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[15] D. Irwin, D.R. Mandel, *Improving information evaluation for intelligence production*, "Intelligence and National Security" 2019, vol. 34, no. 4, pp. 503–525.

[16] Science and Technology Organization, *Assessment and Communication of Uncertainty in Intelligence to Sup-port Decision-Making*, STO-TR-SAS-114 (08.02.2019), p. 103.

[17] For example, the US Armed Forces use the term "information accuracy" (IAC) as a synonym for "reliability of data and information". See: *ATP 2-91.8 Techniques for Document and Media Exploitation* (document publica-tion date: 5 V 2015).

[18] M.G. Samet, *Subjective Interpretation of Reliability and Accuracy Scales for Evaluating Military Intelligence*, Arlington 1975, p. 12.

information presented. On the basis of interviews conducted in reconnaissance structures and intelligence institutions, the awarding of grades lower than "B2" in most cases raises many questions, while higher grades lead to accusations of overconfidence in the evaluation of the materials used and the assessments and forecasts developed on their basis. When the imposed rigour is not respected and the developed procedures are not followed, it may even result in the abandonment of this way of evaluating sources and materials or the adoption of other norms and standards.

Criteria for assessing data and intelligence – indicators and values

In addition to the problems of communication, of communicating assessment levels for particular areas, other problems can be highlighted - related to the failure to take into account contextual elements and the implicit treatment of the source confidence value as a constant for all thematic and geographical areas examined by the analyst.

Irrespective of the history of the source, the nature of the data and information it provides, the characteristics of that source and the circumstances surrounding the acquisition of the material are also taken into account. For example, a personal source may have provided reliable information on military operations in the past, but may lack knowledge and experience of political, social or economic issues. In addition, reconnaissance structures and intelligence institutions are often not passive recipients of information from a source, but actively shape the knowledge acquisition process in particular areas, directing their assets towards acquiring information in the areas in which sources specialise. In addition to this, it is important, especially with regard to a personal source, to examine the motivations (which are constantly and consistently pursued) that drive them to cooperate and their expectations of those who supervise and control activities, and to take into account the psychological construction of the source. In addition, attention should be paid to factors that directly influence the quality of the products delivered by the personal source, such as a rational approach to the task, competence and reliability. These elements are difficult to operationalise and quantify, so attempts to incorporate them into the source evaluation system may increase the subjectivity of evaluations. The situation becomes even more complicated when the information reaches the analyst with several intermediary elements. In such a case, it is necessary to examine the certainty of the original source, the certainty of the sources that intermediated the information, the certainty of the source that ultimately transmitted the material, and the quality of the communication channels. It should also be borne

in mind that the data and information are processed within the reconnaissance structures and intelligence institutions as part of the activities undertaken in terms of the intelligence cycle. As in the case of sources, the capabilities and skills of the staff of the organisational structures should be taken into account at all levels of this cycle, not only in terms of the transmission, processing and analysis of the data and information obtained, but also in terms of their evaluation. In addition, cognitive errors and biases are an issue, as well as motivation to act. In doing so, it should be borne in mind that managers of reconnaissance structures and intelligence institutions may add their comments and evaluations to the information products. It follows that there are a relatively large number of factors that can influence judgements about the certainty of sources and the reliability of data and information. That is why it is so important to provide adequate knowledge to all levels of the organisation carrying out analytical and information tasks and for the staff of reconnaissance structures and intelligence institutions to acquire adequate skills in evaluating data, information and materials.

Similar types of problems to those associated with the scale describing the certainty of sources apply to elements of assessing the reliability of data and information. Information is reliable first and foremost when it is corroborated by other sources. Such an assessment means that it can be stated with certainty that the information provided was also provided by another source or sources. However, there are no agreed and accepted indicators in Poland or in international institutions to assess how many other sources are needed to consider information reliable. One analyst may assume that two sources are sufficient, others that there should be three or more. The number of sources needed may also depend on the type and importance of the information. For example, an analyst may consider that more corroboration and more sources are needed in a particularly important case. This inconsistency may contribute to the misinterpretation by some staff of assessments of levels of reliability of information.

There are no specific guidelines in current data reliability assessment methods for evaluating alternative sources of data and information. This means that similar elements from different sources can be evaluated at both "1" and "5" levels. Without specific guidance, analysts may base their work only on elements related to the confirmation or non-confirmation of information by other sources. Some may pay more attention to instances where information cannot be verified or confirmed, while others will look for the golden mean to avoid falling into a rut. This will result in the appearance of different assessments despite the use of similar methods, such as the verification of data and information in primary sources. In doing so, it should be pointed out that confirmation by other sources does not always mean that the information is more reliable. Nor can the different

ways of confirming information be given the same weights. Information from social media should have a different weight, while police reports or reports sent by partner services should have a different weight. In this regard, some researchers suggest that when examining whether information is true or an attempt to mislead, the certainty of the source should also be taken into account. However, this contradicts the assumptions of documents such as *AJP-2.1*, which provide for independent indicators of source certainty and data and information reliability[19].

In addition, the completeness and level of diagnosticity of the information (the extent to which the information is coherent with the hypotheses developed by the analysts) should be checked. The following elements should be taken into account when assessing the accuracy of the materials used in information processes:

- Can the source of the data and information be assessed as having clear cognitive errors and biases?
- What was the source's motivation in providing the data and information?
- What was the source's actual task in obtaining the data and information?
- Does the source understand what is expected of it?
- What is the value of the material provided by the source?
- What is the source's assessment of confidence based on the materials provided?
- Did the source have direct access to the information and materials that were provided to the reconnaissance structures and intelligence institutions?
- What is the actual capability of the source to obtain data and information?
- Is there a real possibility to check the source's certainty and re-task it?
- What has been the source's performance to date?
- How accurate was the information provided by the source?
- Is the source susceptible to manipulation, disinformation and deception?
- Does the source report information and material to which it has direct access?
- Could the accuracy of the information provided by the source have been influenced by factors directly related to the source or by external elements?
- Could the accuracy of the information provided by the source have been influenced by factors related to the type of material provided?
- Is the information and material provided by the source internally consistent?
- How up-to-date is the information provided by the source?

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[19] P. Capet, R. d'Allones, *Information Evaluation in the Military Domain: Doctrines, Practices and Shortcomings*, in: *Information Evaluation*, P. Capet, T. Delavallade (eds.), New York 2014, pp. 103–125.

- Did the triangulation methods, techniques and tools used increase the completeness and relevance of the information?
- Do the methods, techniques and triangulation tools used identify contradictions and problems with the source's work and the materials it provides?
- Has the corroboration of the information provided by the source been carried out using national, allied or other source elements?
- Has the confirmation of information provided by the source been carried out using data and information provided by reconnaissance structures and intelligence institutions operating in other disciplines of intelligence operations?
- Has confirmation of the information provided by the source been accomplished using data and information provided by reconnaissance structures and intelligence institutions operating in the same intelligence discipline?
- What is the possibility of deception and disinformation?
- Has data, information, material been processed or altered in the course of post-acquisition and processing by reconnaissance structures and intelligence institutions?

Four elements should also be noted after assessing the accuracy of the information:

- Did the data, information and materials acquired provide a new or original perspective on the problem?
- Do the acquired data, information and materials support one or more hypotheses?
- Do the acquired data, information and materials offer the possibility of different interpretations?
- How complete are the acquired data, information and materials?

Current methods do not provide precise guidance on how to treat relationships and connections between sources. They do not indicate how to examine whether and how they are related to each other, whether they are independent of each other, or whether there is another type of relationship between them. For example, information on the situation in Iran provided by the United States will carry more weight than that provided by the Russian Federation, which cooperates closely and intensively with Tehran. In practice, sources considered to be allies or partners will receive much more attention and be trusted more than those from countries considered not quite friendly.

However, paying attention to the elements described above can contribute to cognitive errors and biases. Analysts have to deal with them all the time. Their

formal definition was presented in 1974 by Daniel Kahneman and Amos Tversky[20]. In relation to the process of cognition, they should be regarded as a kind of pattern of non-rational perception of reality. As elements of the cognition process, they influence human attitudes, emotions, reasoning and action.

In the case presented above, the problem mainly concerns **confirmation bias**, i.e. the tendency to prefer and use information that confirms expectations and hypotheses, regardless of whether that information is true. There can also be another bias, **the ambiguity effect**, which occurs when the decision-making process is affected by a lack of information. This results in the selection of an option for which the probability of selecting the more useful solution for the recipient is known, rather than one for which the probability of selecting the more useful solution for the recipient is unknown[21].

The anchoring effect, on the other hand, occurs when assessments and judgements are based on an element that has no information value in practice. The analyst may then base his or her work on the first received item to which he or she had access, and regardless of its value[22].

Attentional bias refers to a situation in which the analyst focuses on the first option considered and does not consider the alternatives[23]. The impact of this effect is exacerbated when the analyst bases his or her actions mainly on personal beliefs. This results in focusing on the data and information that supports them and ignoring those that contradict them.

Availability heuristics cause the analyst to assess the likelihood of an event occurring primarily on the basis of his or her own opinions or ability to refer to similar cases. He or she may also overestimate the importance of the information because it is available to them at the time.

Base rate neglect is a logical error. It consists of deciding to use data that are irrelevant and omitting the important ones. This occurs when the predictive value of the tests and methods used is not taken into account.

A best guess strategy is when the analyst does not have verified data and information and makes decisions using the most likely solutions.

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[20] A. Tversky, D. Kahneman, *Judgment under Uncertainty: Heuristics and Biases*, "Science. New Series" 1974, vol. 185, no. 4157, pp. 1124–1131. https://doi.org/10.1126/science.185.4157.1124.

[21] A taxonomy and description of these and more cognitive errors and biases can be found in: J. Kozłowski, *Teoria i praktyka działań analityczno-informacyjnych*…

[22] T.D. Wilson et al., *A New Look at Anchoring Effects: Basic Anchoring and its Antecedents*, "Journal of Experimental Psychology" 1996, vol. 125, no. 4, pp. 387–402.

[23] M. Hilbert, *Toward a Synthesis of Cognitive Biases: How Noisy Information Processing can Bias Human Deci-sion Making*, "Psychological Bulletin" 2012, vol. 138, no. 2, pp. 211–237.

Choice-supportive bias occurs when an analyst assesses his or her past choices and decisions as better than they actually were and uses such assessments in his or her current activities.

The clustering illusion is the tendency to see patterns or indicate correlations where their existence cannot be confirmed.

Confirmation bias is the tendency to prefer and use information that confirms expectations and hypotheses, regardless of whether this information is true or not.

Congruence bias, i.e. the suitability and appropriateness of the objects under consideration, occurs when the analyst prefers tests and questions that provide positive answers and situations where the preferred hypothesis can be positively verified.

The conjunction fallacy, also referred to as the conjunction illusion, is a cognitive as well as logical error that involves assigning a higher probability level to a conjunction of events than to individual events.

Conservatism bias refers to a situation or state of mind where elements with a high probability value are overestimated and those with a low probability value are underestimated.

Analysts too often rely on their knowledge relating to the issue under investigation. This is usually referred to as the curse of knowledge. It is then difficult for them to accept the views and opinions of others, especially those of colleagues who do not have the same experience and knowledge as they do. This also has a significant impact on the form and manner of communication with the audience, as they do not see the need to explain certain assessments and present supporting evidence and material. In addition, this leads to presenting issues from only one point of view and forgetting the broader perspective of the issue under investigation[24]. It also makes it difficult to understand the needs and requirements of the audience, which directly affects the content, form and even the way the product is disseminated.

The error of escalating committment (or irrational escalation) is justifying one's assessments and judgements on the basis of previous judgements and decisions - even when new evidence suggests otherwise. This mistake can occur when so much time, money and effort has been invested in a project that decisions are made to proceed despite the emergence of information indicating the unjustifiability of doing so.

It is therefore not surprising that many researchers point to the need to use currently available methods, tools and techniques in order to have at least a rudimentary ability to assess whether and to what extent particular sources corroborate certain information, and to avoid the phenomenon of amplification[25].

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[24] L. Virine, M. Turner, *Project Decisions: The Art and Science*, Vienna 2007, p. 285.

[25] P. Capet, R. d'Allones, *Information Evaluation in the Military Domain…*, p. 117.

This can also be dealt with by requesting further corroboration of specific information by the same source, seeking corroboration by other sources but of a similar type, and by exploring data and information provided by reconnaissance systems and structures carrying out tasks within other disciplines of intelligence activities.

The fact that there is now such a strong emphasis in intelligence structures and institutions on the need for information to be corroborated by other sources and the consistency and accuracy of the information provided may increase the possibility of **a primacy effect**. This occurs when the first piece of information provides a reference point for subsequent information reaching the recipient. This is a tendency to be more willing to use the information that arrived first, regardless of its value and relevance. The second information arriving in the system must agree with the first, the third with the first and the second. This causes the analyst to misjudge material provided to him or her that may in fact be true and important.

Added to this are other problems, such as the problem of justifiability, which is encountered when, after learning about arguments, a person continues to uphold decisions made on the basis of those arguments.

The effect of recentness (recency bias) means that information received last is traced as more important and useful. It is also a belief that observed patterns of behaviour will persist, and an underestimation of trends and patterns that analysts have dealt with before.

Representativeness bias arises when generalisations are made on the basis of a small number of facts and events, similar to typical cases or, in the analyst's view, representative.

Sampling fallacy (law of small numbers) manifests itself in the form of a tendency to view small samples as representative of the entire population.

The problem of **stereotyping** is the attribution of certain characteristics and behaviours to a certain person or situation, even when there is not enough data and information to confirm them.

The subadditivity effect is an error in probability estimation. It occurs when the probability of an overall number of events is assumed to be less than the probability of individual mutually exclusive elements of the overall situation occurring[26].

All the elements described above clearly indicate that one should not pay attention to the order in which the information appears, but for each individual detail one has to assess the reliability of the source and the credibility of the product provided. In order to minimise the analytical challenges associated with the possibility of a primacy effect and to increase the reliability and relevance of the results, for

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[26]   M. Hilbert, *Toward a Synthesis of Cognitive Biases…*, p. 214.

example, **a triangulation strategy** can be used. This is a methodological operation that provides an opportunity to make the data and information collected more reliable by including more than two sources. It involves incorporating different models and measurement tools to study the same phenomenon. Triangulation allows to increase the level of confidence in the results obtained, but also creates the possibility to gain a deeper understanding of the phenomenon studied and to generate new ways of explaining it.

Nowadays, triangulation is understood as a strategy to increase the completeness and relevance of research by taking into account different perspectives. However, it is not possible to pinpoint precisely and reliably the only and best way of obtaining data and information. Each process implemented captures a different, specific aspect of the phenomenon. Different approaches are therefore used in the form of:

– data triangulation (comparing studies conducted in different groups, over different time periods and in different locations),
– researcher triangulation (conducting research by multiple researchers),
– theory triangulation (using multiple theoretical concepts to explain the phenomenon under investigation),
– methodology triangulation (using research methods from different paradigms, for example quantitative and qualitative).

The essence of triangulation, then, is to exploit the principle of diversity of independent data sources, researchers, strategies, theories and even methodologies and thus to search for relevant explanations. Testing the same hypothesis using different methods contributes to minimising errors due to the limitations and drawbacks of the different techniques, and the level of similarity with regard to the results obtained usually allows the data and information obtained to be considered relevant. Triangulation is therefore a procedure to capture what is common in data from different sources and thus reduce or limit inference errors (Figure 1).
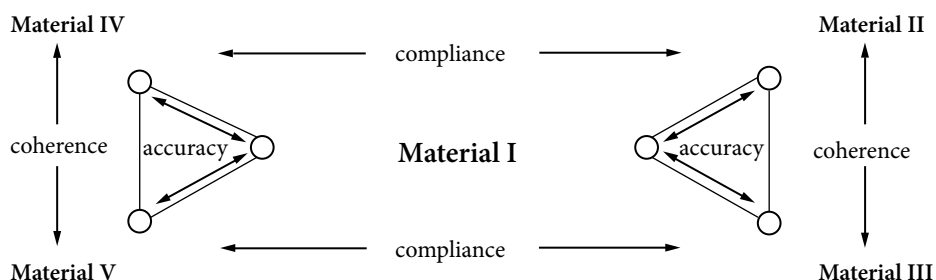
Figure 1. Use of triangulation for materials assessment (variant).

Source: own elaboration.

The use of triangulation requires a high degree of methodological rigour. Its absence leads to the generation of an excessive amount of data and the creation of further difficulties in their elaboration, to an increase in confirmation error and to conflict arising from the combination of different theoretical perspectives[27]. In reconnaissance structures and intelligence institutions, triangulation of data and triangulation of researchers has the greatest potential, in terms of practice. However, this requires proper instrumentation in the form of the creation of appropriate processes and procedures. These can be developed and implemented by researchers and experts in intelligence studies. For example, data and information acquired with a great deal of operational and financial effort are most often treated as reliable and the sources from which they were acquired as certain and useful. Analysts, on the other hand, tend to use data and information from sources they consider reliable and valuable. Such reductionism is understandable, but it causes them to ignore many other elements that may be equally, if not more, valuable.

Therefore, the most sensible approach for outreach activities is to aggregate data and information from many different sources. However, it should be borne in mind that data and information can be assessed inaccurately, especially when they come from multiple duplicate sources. They are then a repetition of those generated by the primary source. It is necessary to adequately investigate this problem and take the results into account, because once an assessment has been assigned, it is difficult to change it within the framework of existing and used procedures[28].

The lack of guidance on the number and quality of corroboration, especially when it affects the level of ratings, can lead to overconfidence in analysts' actions, especially when analysing a large number of materials. Information confirmed six times may be treated as more reliable than that confirmed three or four times. This ratio becomes a deceptive indicator of information quality.

In addition to examining the number and quality of corroboration, information reliability scales also examine the logic of the material provided to analysts. There may be **a deterministic hindsight bias**, which involves judging past events as more possible than they actually were. These are statements like: *I knew all along that this would happen*. This type of error causes the analyst to overestimate the accuracy and logic of his or her judgements and assessments.

When using scales related to the *Admiralty Grading Intelligence System*, many elements arising from the context in which the information emerged and the processes by which it was acquired (in practice, the disciplines of intelligence

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27 E. Hornowska et al., *Paradoksalny efekt triangulacji?* (Eng. The paradoxical effect of triangulation?), "Edukacja" 2012, no. 4, pp. 72–83.

28 J. Kozłowski, *Teoria i praktyka działań analityczno-informacyjnych…*, p. 219.

operations) are omitted. Such scales are most often used to assess sources and materials acquired by human intelligence (HUMINT). In most cases, it is advisable to develop separate evaluation systems designed for each discipline, with different levels of evaluation and indicators.

Evaluation of structural intelligence

To complete the overview of the issues related to communication problems and the criteria used in intelligence activities, it is worth adding that the role and place of procedures for assessing the certainty of sources and the reliability of information may be different in different institutions and countries. In NATO structures, these procedures have been placed in the intelligence cycle at the processing stage (Figure 2). This clearly indicates the very important role of the analyst in determining these types of data and information characteristics.
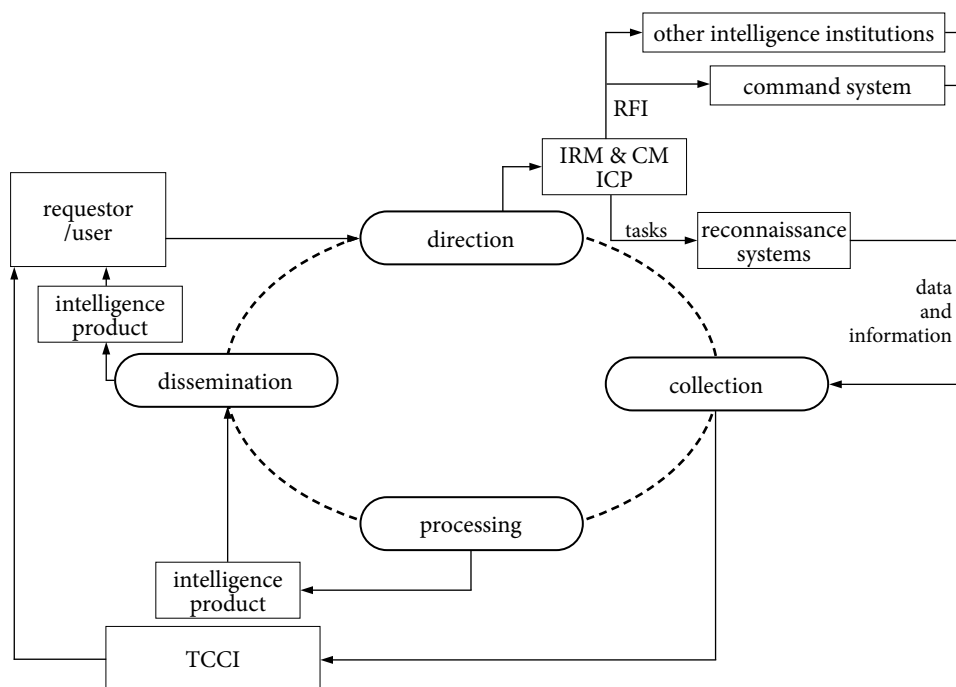
ICP (*intelligence collection plan*) – a procedure for gathering information from all available sources to meet intelligence and reconnaissance needs and converting it into directive documents, orders and information requests to the appropriate structures;
IRM & CM (*intelligence requirements management and collection management*) – a management system for the collection and distribution of reconnaissance (intelligence) data and information;
RFI (*request for information*) – data and intelligence needs;

TCCI (*time critical components of information*) – data (information) requiring transmission to recipients within a strict time frame.

Figure 2. Intelligence cycle (NATO).

Source: own elaboration based on European Defence Agency material.

In contrast, the British doctrine describing intelligence issues - *Joint Doctrine Publication 2-00 (JDP 2-00). Understanding and Intelligence Support to Joint Operations (Fourth Edition)* - emphasises the interaction of acquisition and analytical staff in this regard[29]. The acquisition apparatus is responsible for the preparation of preliminary assessments, and the analysts make the final evaluation of the source and the data and information.

Regardless of the adoption of appropriate processes and procedures, each modality significantly affects the operation of reconnaissance structures and intelligence institutions. An additional criterion is usually introduced at this stage - suitability. It is a question of whether data and information from a particular source have been used to prepare information material. Then, however, a factor that is strongly subjective in its nature begins to play a large role - it is the analyst who decides what to use, how and when.

The described state of affairs indicates that there is a clear shortage of mechanisms when new sources, data and information emerge. The problem is compounded when there are multiple interrelated elements in the system. Hence the urgent need for iterative evaluation mechanisms in the intelligence cycle. These can be useful both for individual material and information elements, for inference processes, and for the preparation of assessments and analyses.

Before attempting to look for alternative solutions, it is worth making a preliminary but critical analysis in the broadest possible area of information operations. First of all, it should be mentioned that many of the problems in the information domain are the result of the general situation in reconnaissance structures and intelligence institutions, especially the methods and ways of securing and supporting the activities carried out by analysts.

Also inherent in the activities of reconnaissance structures and intelligence institutions - due to the organisational structure, security considerations and the processes and procedures implemented - is a kind of analytical subjectivity and problems with the reliability of data and information and with the certainty

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[29] *Joint Doctrine Publication 2-00. Understanding and Intelligence Support to Joint Operations (4th Edition)*, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1178940/JDP_2_00_Ed_4_web.pdf, pp. 3–20 [accessed: 30 VIII 2023].

of sources. This applies especially to the preparation and distribution phase of information products.

Therefore, doctrinal, supporting and technical documents, as well as regulations and handbooks, have been drafted to limit the impact of the above-mentioned factors as much as possible. This, however, has not been entirely successful. The very objective of reducing subjective factors as much as possible in intelligence analysis is currently unrealistic. The main reason for this is that so many elements in the information processes of reconnaissance structures and intelligence institutions now depend on the expertise of individual analysts and on the activities they carry out using various methods, techniques and analytical tools. It is difficult for analysts to rely, due to the importance of the material they develop and present to decision-makers, only on statistical assessments and various types of programmes. The analyst must create for himself a model of the phenomenon he is investigating, decide on the use of particular data and information, and analyse and evaluate it himself. All elements in intelligence analysis are subjective by their nature. It is therefore not easy to draw a direct conclusion as to the real possibility of limiting the influence of personality factors on information processes.

Attempt at a diagnosis

What can be done is to subject internal processes and procedures in reconnaissance structures and intelligence institutions to real scientific analysis and evaluation, research and testing, a kind of audit of intelligence activities. This can be done by experts and researchers in the field of intelligence studies in close cooperation with service personnel. This is because it is not only a matter of improving the current state of affairs, but also of looking for factors that will actually make it possible to continuously improve the level of quality, timeliness and reliability of information products.

Mention must be made here of the still insufficient use of the achievements of the social sciences, humanities and basic sciences, as well as the capabilities of specialised software to support analytical processes and statistical calculations at both strategic-operational and tactical levels. This also applies to elements such as the use of structured analytical techniques, the training and preparation processes of analysts, modern methods for the numerical description of probabilities in relation to individual events, and even to the concept of the intelligence cycle itself.

At this stage, scientific developments should be used as widely as possible and guidelines for information processes should be developed as a matter of urgency and implemented in order to better structure them and rapidly increase their efficiency.

The search for alternative solutions

Reconnaissance structures and intelligence institutions have tried to develop objective methods, techniques and tools to assess the reliability of data and information. However, without actual research, any efforts made to identify the most important determinants that could prove useful in the day-to-day work of such organisational structures may result in the introduction of additional elements of a still subjective nature into the processes. This will certainly not increase the quality level of the evaluation of the certainty of sources and the reliability of data and information.

In this type of endeavour, it is necessary to adopt a certain hierarchy of factors present in the processes under study, to assess the relations and relationships between them and the impact of both classes on the possibility of satisfying the information requirements of the recipient. For example, it is possible, and sometimes even appropriate, to give less weight to the pursuit of information confirmation and more weight to the study of temporal relationships, especially when activities aimed at confirming certainty and reliability may introduce delays into the system that are unacceptable from the point of view of decision-making processes.

Some factors (beliefs, motivations) may be completely irrelevant, while others - for example, the technical capabilities of reconnaissance systems - may be crucial to the quality of intelligence operations.

In doing so, it is important to bear in mind that there are huge differences between the various reconnaissance systems. What works in imagery intelligence (IMINT) recognition is not useful in assessing personal sources.

It is also clear from the research and analysis of the literature that intelligence processes are significantly different from other activities undertaken in the information dimension. In addition, the possibility of error is much greater in this case because:
- the analyst moves into areas which few researchers are interested in or which, due to their complexity, have not yet been properly explored;
- the analyst considers mainly what might happen, rather than what is already known and studied;
- the analyst cannot abandon a task just because there is not enough data;

- the analyst must constantly take into account the possibility of disinformation;
- the impact of analysis on state action can be direct, so a poorly prepared assessment or analysis can have far-reaching consequences[30].

For the reasons outlined above, it will be difficult to introduce any common system of assessing the certainty of sources and the reliability of data and information into everyday practice. Each employee of reconnaissance structures and intelligence institutions will try to build and test their own solutions. Therefore, instead of aiming to create systems to cover all areas of operation, it is better to strive for everyone to use a similar methodology to assess the materials acquired, as well as to apply similar norms and standards in information products.

The *Admiralty Grading Intelligence System* is based on the assumption that an independent assessment of factors such as source certainty and the reliability of data and information is necessary. This position can be argued, or even challenged, as the levels defined in this system are assumed to be only a rough approximation. At the same time, due to significant deficiencies in the elements directly related to the evaluation of data and information reliability, the employees of reconnaissance structures and intelligence institutions largely, also according to the research and opinions of the author of this article, take shortcuts and base their decisions only on the evaluation of source certainty, as they believe that certain sources usually provide reliable data and information[31].

Each user would prefer to deal with only one indicator instead of two, in order to be able to decide unequivocally whether or not to take the acquired data and information into account in the subsequent stages of information processing and analysis and preparation of the information product. Research in this area was undertaken as early as 1975. The results indicated then that the accuracy of evaluations and analyses prepared by analysts based on separate indicators for source reliability and data and information reliability was lower than when such material was based on a single indicator[32].

This turning point was and still is the beginning of research and the search for new solutions. Since the 1980s, the information revolution has been underway, forcing the emergence of new methods, techniques and analytical tools. Any new

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[30] J. Kozłowski, *Teoria i praktyka działań analityczno-informacyjnych…*, p. 299.

[31] R.S. Nickerson, C.E. Feehrer, *Decision Making and Training: A Review of Theoretical and Empirical Studies of Decision Making and Their Implications for the Training of Decision Makers*, Cambridge 1975, p. 49.

[32] M.G. Samet, *Quantitative Interpretation of Two Qualitative Scales Used to Rate Military Intelligence*, "Human Factors" 1975, vol. 17, no. 2, pp. 192–202.

effort in this area, however, also creates new problems. There is a lack of mechanisms to compare multiple elements of varying quality, a situation that analysts encounter relatively often.

Various solutions can be considered. For example, adopt a two-element scale for the reliability of information - information is either confirmed or considered incorrect, wrong. For source reliability, from a low level (the source provides little or no reliable data or information) to a high level (the source always provides verified and reliable information). But even after this simplification, it is necessary to develop a way of preparing an indicator or indicators that would unambiguously describe the quality and accuracy of information, mainly so that it can be used effectively in ICT systems supporting analytical activities.

For the reasons mentioned above, one of the possible solutions to be implemented, according to the conclusions drawn from the expert interviews conducted by the author of this article[33] nd his professional experience, could be the introduction - instead of the current two-component evaluation method - of a single indicator to describe the accuracy of the information (Table 4).

Table 4. Sherman Kent terms for use in intelligence analysis (probability of occurrence).

Probability (100%)		
93%	± 6%	event almost certain
75%	± 12%	probable event
50%	± 10%	equal chance of an event occurring
30%	± 10%	event is unlikely to occur
7%	± 5%	event almost certainly will not occur
0% probability		

Source: R.F. Kesselman, *Verbal Probability Expressions in National Intelligence Estimates: A Comprehensive Analysis of Trends from the Fifties through Post 9/11*, Erie 2008, p. 22.

At present, experts and staff of reconnaissance structures and intelligence institutions indicate that recipients prefer assessments in numerical form. This creates an impression of precision and unambiguity that can sometimes be deceptive, and this was not the intention of the analysts and their superiors. Besides, the human mind is not used to thinking in strictly numerical terms, especially when it comes to probabilities. Such unintentional precision can even defy sound intuition

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[33] Expert interviews conducted using the Delphi method in 2016 and from July to December 2022 with a selected focus group (non-standardised interview). Unpublished research, additional information is available from the author of the article.

and even acquired experience and accumulated knowledge. Hence, there have been attempts to create a uniform nomenclature for use in analytical activities[34].

The research conducted by the author of this article shows that analysts can nevertheless use numerical assessments successfully in many cases. Some audiences support this position[35]. In their view, the lack of precision inherent in the system currently in use is an excessive and unnecessary concession by analysts to existing norms and standards. Some researchers believe that it is worthwhile to further develop and implement procedures for creating numerical evaluation figures in everyday practice. It is also possible to systematically train analysts in new ways of providing elements related to the certainty of sources, the reliability of data and information or the accuracy of information.

The use of numerical values in information products will also increase the quality of information activities carried out in environments - bilateral, coalition, allied by eliminating the language barrier and semantic problems. Another gain from the implementation of such a way of operation of intelligence institutions and reconnaissance structures will be that the use of such an indicator as information accuracy can be an objective indicator of the quality of analysts' work. It is possible, for example, to compare the assessments developed with the actual situation. This will not work on a micro scale, but with a sufficiently large sample, the quality of the assessments will be much higher.

This will require the creation of an element to evaluate the work of the analytical units responsible for processes, procedures and the indication of baseline values of individual factors. Quantifying the accuracy of the information will also allow the extensive use of Bayesian networks to explore the relationships between individual meaning elements.

Multidimensional probability distributions are effectively represented by Bayesian networks. A Bayesian network is an acyclic directed graph - the nodes of the graph represent random variables, the arcs represent relationships, the nodes have associated conditional probability arrays, and the variables represented by the nodes take discrete values - directed edges describe the information relationships between the variables. As new elements appear, the Bayes network is updated in a consistent and precise manner. This approach can reduce systematic errors in information structures. It is mainly concerned with those components of error that, for multiple measurements of the same value of a certain quantity taken under practically invariant conditions, remain constant, both in absolute value and sign, or change according to a specific law as the reference conditions

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[34]   J. Kozłowski, *Teoria i praktyka działań analityczno-informacyjnych…*, p. 215.

[35]   Expert interviews conducted by the author of this article from July to December 2022.

change[36]. While Bayesian networks can help analysts explore new areas and reduce error rates and the impact of cognitive biases, the constant and mechanistic use of such methods can cause problems in analytical work, due to the nature of such networks or the difficulty in establishing input parameters for the processes and procedures being prepared. Therefore, a high level of a priori knowledge is needed.

There may be a fair number of antagonists who will insist that an overemphasis on analytical rigour could lead to an over-reliance by audiences on information products. In such a situation, there may be a tendency to take sometimes unnecessary risks. Research casts doubt on such claims[37]. They even indicate that audiences approach assessments expressed in quantitative form very cautiously and even demand additional data and information. Quantifying the probability of accuracy of information will further limit the possibilities for utilitarian use of sometimes vague or ambiguous claims by analysts.

Problems related to allegations about the precision of analytical judgements can be minimised by proper audience training and a sound system of analyst education. In doing so, both sides of the information processes must realise that the probability values given always refer to beliefs and opinions. They are in no way indicative of the methodological elements of information processes.

Therefore, materials sent to recipients should always be accompanied by appropriate explanations, for example in the form of probability ranges. It is possible to inform recipients that the accuracy of a communication is, for example, 70% with a 95% probability that the accuracy level is between 55-85%. This should then be interpreted to mean that the analyst is 95% certain that the accuracy can take values within the stated range, and that his or her assessment, based on experience and knowledge, is 70%. Such a way of informing the audience can help to counter accusations of overconfidence in numbers, processes and procedures. Providing such a range is also additional information for the recipient, and at a meta level.

The presented probabilistic way of evaluating data and information, the relevant processes and procedures should be developed in parallel with changes in the system of training of analysts and education of recipients of information products. Such measures are also necessary because many people do not follow the logic of the system and firmly hold on to previously acquired beliefs.

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[36] A. Król, *Sieci bayesowskie jako narzędzie wspomagające proces podejmowania decyzji* (Eng. Bayesian networks as a tool to support decision-making), "Zeszyty Naukowe Politechniki Śląskiej" 2014, no. 71, pp. 209–219.

[37] J.A. Friedman, J.S. Lerner, R. Zeckhauser, *Behavioral Consequences of Probabilistic Precision: Experimental Evidence from National Security Professionals*, "International Organization" 2017, vol. 71, no. 4, p. 807.

As previously attempted to demonstrate, the place and role of procedures for assessing the certainty of sources and the reliability of data and information varies according to the processes implemented in the organisation. This has obvious and direct implications for both the level of assessments prepared and the final shape of information products. Some processes and methods promote far-reaching cooperation in this regard between representatives of the acquisition apparatus and analysts (see the case of document *JDP 2–00*).

It is not possible to find in the public domain guidelines and instructions relating to how to calculate the final values of assessments of the certainty of sources and the reliability of data and information made by individual organisational units of reconnaissance structures and intelligence institutions. This problem deserves systematic research work to be undertaken by academic centres in cooperation with reconnaissance structures and intelligence institutions. This may prove very useful, as it will familiarise current and future audiences with the ways in which assessments are made. This, in turn, may lead to situations in which they are willing to use analytical and information products and engage more directly with intelligence structures. In addition, the results of such work could be used not only in the area of national security, but also in the financial and insurance sectors.

One solution that can be implemented is to collect all the assessments on the accuracy of data and information, from each of the business units, at each stage of the intelligence cycle - and then aggregate them. In this way, a member of the acquisition apparatus carries out an initial assessment and provides a probability level. To this, he or she should include a brief description of the reasons and motives that guided him or her in generating such an assessment. The same steps should be carried out by the analyst.

Only then can an average be calculated in the mode and format adopted by the organisation. This way of proceeding can help to reduce inconsistencies and uncertainties arising from different ways of working and to identify the most important values at each stage of the intelligence cycle. It also allows assessments to be continually updated as new data and information becomes available. This works especially well during the development of prognoses. In particular, the preparation of the justifications given by the participants in the process proves useful. Their written form encourages, if not forces, the employees of reconnaissance structures and intelligence institutions to thoroughly examine individual materials.

This trend is now being reinforced by the suggestion, repeatedly expressed by recipients of information products, to prepare and present such justifications in as many cases as possible. At the same time, when an assessment is or may turn out to be incorrect, it is always possible to reconstruct the sequence and content of the activities carried out within the dimension of the intelligence cycle and

to check where mistakes in reasoning and inference were made by the individual participants in the information processes. Due to the relatively high complexity of the procedures, such a course of action should be reserved for elements on which it is difficult for the participants in the information activities to agree on the values of the assessments, or those that are used in particularly important analytical projects critical to state security.

Formalising such ways of working together to develop assessments of the certainty of sources and the reliability of data and information can help to guide the ways in which individual modes of inference are carried out and make wider use of the knowledge available within the organisation. It should also improve communication between the acquisition apparatus and the analytical division.

Such a model, hybrid in its nature, of conducting assessments of the certainty of sources and the reliability of data and information individualises the procedural and substantive responsibilities of individual employees of reconnaissance structures and intelligence institutions. In addition, it structures the analytical processes. The described modus operandi can be accused of seeking to shift responsibility for documents to as many employees as possible and of diluting it. Therefore, it will be necessary to develop a broad consensus within the organisation on the mode and conduct of evaluation processes and procedures.

New directions for research and implementation activities

In the methodologies currently being developed for assessing the certainty of sources and the reliability of data and information, indicators relating to the validation of the information are a central element of the methodology. Triangulation, for example, can be used for such purposes. It can be used primarily to determine how unique and useful the acquired data and information is. In order to assess whether it causes the analyst to have to look at a problem from a new perspective, additional analytical activities are needed - not only determining the certainty and reliability of individual elements. Continuous attention must therefore be paid to issues of information accuracy, and at every stage of the intelligence cycle.

Analysing the current state of affairs in the field of source certainty and data and information reliability assessments, one can identify many limitations that affect the quality of intelligence assessments and analyses. Moreover, given the multiplicity of intelligence directions and the complex interactions between the determinants of information elements, it is difficult to develop, let alone implement, a general method for assessing source certainty and data and information reliability. However, attempts can be made to transfer experience from the field of insurance and actuarial

theory and practice to the practice of intelligence activities. At the very least, it is worth exploring, per analogiam, such possibilities - for example, the usefulness of the theory and mathematical apparatus of credibility theory and source credibility theory. Indeed, confidence theory is one of the important concepts used in insurance. Its theoretical foundations were laid in the 1960s with the emergence of many modern statistical theories. It now underpins the efficient and economically sound practice of insurance companies, as well as the development of actuarial science. It is also worthwhile to elaborate on the limited fluctuaction credibility theory or the greatest accuracy credibility theory[38]. Initial proposals were made by the article's author in a 2016 monograph[39]. However, it must be remembered that the scope of practical application of limited fluctuation theory, which is based on the central limit theorems of the probability calculus, is limited.

In contrast, the second approach is widely used. It is based on Bayesian statistical analysis with a quadratic loss function with a priori distributions and conditional distributions of random variables. Families of a priori distributions coupled with an exponential family of conditional distributions and modern Bayesian statistics are also used. The practical Bühlmann model, now developed into the Bühlmann-Straub model, also with a Hachemeister extension, and the hierarchical Jewell model present great potential[40].

In order to enhance the ability to already develop and report increasingly accurate assessments of the certainty of sources and the reliability of data and information, a number of measures can, and indeed should, be taken in this regard. First, one must strive to systematically communicate to colleagues and audiences the value of an indicator such as information accuracy. This can be done by presenting subjective assessments of probability in quantitative form, supplemented by an indication of probability ranges. This is the form of assessment preferred by the audience. Secondly, cooperation procedures should be formalised and the necessary software developed in this regard for those in the acquisition and analytical apparatuses. Thirdly, examination and evaluation of the degree of information redundancy, its completeness and level of diagnosticity should also become part of the analytical activities. Finally, the staff of the acquisition and analysis apparatus should be made reasonably fully aware of the existing limitations

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[38] H. Jasiulewicz, *Teoria zaufania. Modele aktuarialne* (Eng. Confidence theory. Actuarial models), Wrocław 2005; H. Bühlmann, *Mathematical Methods in Risk Theory*, New York 1970; W.S. Jewell, *Credible Means are Exact Bayesian for Simple Exponential Families*, "ASTIN Bulletin. The Journal of the International Actuarial Association" 1974, pp. 336–341.

[39] J. Kozłowski, *Teoria i praktyka działań analityczno-informacyjnych…*, pp. 119–128.

[40] Ibid, pp. 137–149.

in terms of assessments of the certainty of sources and the reliability of data and information, and jointly seek ways to solve the problems that arise. This search should not focus on one-size-fits-all methods, but on a pragmatic approach to deal with each element insofar as the meaningful element or information is potentially important. The most relevant ones will require additional effort, including team effort, to indicate the level of probability and the ranges of probability and to prepare a written justification of the position taken.

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